

## C0. Introduction

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### C0.1

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

Manulife Financial Corporation is a leading international financial services group that helps people make their decisions easier and lives better. We operate primarily as John Hancock in the United States and Manulife elsewhere. We provide financial advice, insurance, as well as wealth and asset management solutions for individuals, groups and institutions. At the end of 2018, we had more than 34,000 employees, over 82,000 agents, and thousands of distribution partners, serving almost 28 million customers. As of December 31, 2018, we had over C\$1.1 trillion in assets under management and administration, and in the previous 12 months we made C\$29.0 billion in payments to our customers. Our principal operations in Asia, Canada and the United States are where we have served customers for more than 100 years. With our global headquarters in Toronto, Canada, we trade as 'MFC' on the Toronto, New York, and the Philippine stock exchanges and under '945' in Hong Kong.

Effective January 1, 2018, the Company introduced Global Wealth and Asset Management as a primary reporting segment. This change reflected organizational changes made to drive better alignment with our strategic priorities as well as to increase focus and leverage scale in our global wealth and asset management businesses. Our reporting segments are:

Asia – providing insurance products and insurance-based wealth accumulation products in Asia.

Canada – providing insurance products, insurance-based wealth accumulation products, and banking services in Canada.

U.S. – providing life insurance products, insurance-based wealth accumulation products, digital advice solutions, and administering in-force long-term care insurance and our annuity businesses in the U.S.

Global Wealth and Asset Management (“Global WAM”) – providing fee-based wealth solutions to our retail, retirement and institutional customers around the world.

Global WAM also includes:

- Hancock Natural Resource Group (HNRG): HNRG specializes in global farmland and timberland portfolio development and management. Assets are managed on behalf of our clients through the Hancock Agricultural Investment Group (HAIG) and the
- Hancock Timber Resource Group (HTRG). HNRG's investments are integrated with comprehensive property management operations. HNRG manages over USD 13.7 billion (CAD\$18.6B) (December 31, 2018) of assets under management.
- Manulife Real Estate manages a portfolio of properties across North America and Asia with more than 61.9 million sq/ft of floor space. Manulife Real Estate has fully integrated in-house capabilities and 80 years of experience as an active investor, owner, developer and asset manager of commercial real estate. Diversified by both geography and asset type, our assets include office, industrial, residential and select retail properties. The portfolio breakdown by square feet is 49% U.S., 40% Canada, and 11% Asia (December 31, 2018).

NAL: Based in Calgary, Alberta, NAL Resources Management Ltd. (NAL) is a fully integrated oil and gas manager, with a team of fulltime corporate staff focused on direct property ownership and operating control of oil and gas producing assets in Western Canada. NAL currently operates approximately 40,000 barrels of oil equivalent per day of production.

As part of our well-diversified investment program, we are a market leader in financing renewable energy and energy efficiency projects. Our Infrastructure investment teams include renewable energy financing specialists that invest Manulife's on-balance-sheet assets into wind, solar, hydroelectric, geothermal, and waste-to-energy projects, as well as in energy efficiency installations that allow our borrowers to reduce their energy use. Since 2002, Manulife has invested CAD \$13.6 billion in renewable energy and energy efficiency projects.

Corporate and Other: comprised of investment performance on assets backing capital, net of amounts allocated to operating segments; financial costs; costs incurred by the corporate office related to shareholder activities (not allocated to operating segments); our Property and Casualty (P&C) Reinsurance business; and run-off reinsurance business lines.

All data provided is for 2018 and in Canadian dollars, unless otherwise stated.

## C0.2

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

	Start date	End date	Indicate if you are providing emissions data for past reporting years	Select the number of past reporting years you will be providing emissions data for
Row 1	January 1 2018	December 31 2018	No	<Not Applicable>

## C0.3

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

Bermuda  
Cambodia  
Canada  
China  
Indonesia  
Japan  
Malaysia  
Philippines  
Singapore  
Taiwan, Greater China  
Thailand  
United Kingdom of Great Britain and Northern Ireland  
United States of America  
Viet Nam

## C0.4

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

CAD

## C0.5

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

Operational control

## C1. Governance

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### C1.1

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

Yes

#### C1.1a

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

Position of individual(s)	Please explain
Board-level committee	In 2019, oversight of our environmental, social and governance framework was added to the charter of the Corporate Governance and Nominating Committee of the Board of Directors. The committee reviews Manulife's sustainability strategy progression and stays informed of Environmental, Social, and Governance (ESG) trends, risks and opportunities through management reporting. Members of the Corporate Governance and Nominating Committee includes the Board Chair and 5 independent Board members.

#### C1.1b

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

Frequency with which climate-related issues are a scheduled agenda item	Governance mechanisms into which climate-related issues are integrated	Please explain
Scheduled – some meetings	<ul style="list-style-type: none"> <li>Reviewing and guiding strategy</li> <li>Reviewing and guiding major plans of action</li> <li>Reviewing and guiding risk management policies</li> <li>Monitoring implementation and performance of objectives</li> </ul>	Our newly adopted sustainability governance framework, introduced in 2018, sets out a structured approach to pursuing and managing sustainability activities across the enterprise, within the context of Manulife's business model and our short-term and long-term strategic business objectives. In 2019, oversight of our environmental, social and governance framework was added to the charter of the Corporate Governance and Nominating Committee of the Board of Directors. The committee reviews Manulife's sustainability strategy progression and stays informed of Environmental, Social, and Governance (ESG) trends, risks and opportunities through management reporting. Members of the Corporate Governance and Nominating Committee include the Board Chair and 5 independent Board members.

## C1.2

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**(C1.2) Provide the highest management-level position(s) or committee(s) with responsibility for climate-related issues.**

Name of the position(s) and/or committee(s)	Responsibility	Frequency of reporting to the board on climate-related issues
Chief Financial Officer (CFO)	Both assessing and managing climate-related risks and opportunities	Quarterly
Chief Risks Officer (CRO)	Both assessing and managing climate-related risks and opportunities	Quarterly
Other, please specify (Executive Sustainability Council (ESC): Members are: CFO, CRO, CIO, General Counsel, Chief Analytics Officer, President and CEO of Global Wealth and Asset Management.)	Other, please specify (Both assessing and managing climate-related risks and opportunities. • Sets Manulife's sustainability ambition and strategy •Acts as recommendation body on strategy and significant issues to Executive Leadership Team , including the CEO )	As important matters arise

## C1.2a

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**(C1.2a) Describe where in the organizational structure this/these position(s) and/or committees lie, what their associated responsibilities are, and how climate-related issues are monitored (do not include the names of individuals).**

Corporate:

In 2018 Manulife introduced a new governance framework for sustainability within its Corporate segment and set the responsibility for execution of the Sustainability strategy with the Executive Sustainability Council (ESC). In 2019 ESG oversight was added to the charter of the Board's Corporate Governance and Nominating Committee .).

In addition to the highest-level management structure, we have an implementation structure and operating subsidiary-specific committees that execute asset class-specific sustainability objectives.

To operationalize the new governance model for sustainability, in 2018, Manulife introduced the Sustainability Centre of Expertise (CoE) - made up of business team leads across the company tasked with integrating sustainability into our business. Representation includes Head Office Leads, Business Unit Sustainability Leads and other key internal stakeholders. Climate change is a key component of the work of the Sustainability CoE. This group meets once a month and responsibilities include:

- Leading development and implementation of sustainability strategy
- Ensuring integration of sustainability into business unit strategies/policies/procedures
- Advising on sustainability matters and provides support and capacity building to business units/markets
- Producing sustainability reporting and oversees communications
- Managing external relationships

Climate change is a key component of the work of the Sustainability CoE, and work related, including the setting of targets and KPIs is led by the Climate Change Working group, introduced in 2019 and which is sponsored by the CRO.

Because of the varied nature of our operating subsidiaries, climate-related issues related to our real assets are managed at the Business Unit level through Business Unit Sustainability leads as they are specialists within their sectors. Through the Manulife Sustainability CoE and the Climate Change Working Group (launched in 2019), Environmental risks, including those related to climate, are elevated, when appropriate, to the ESC, which includes the CRO. The corporate Sustainability team also performs quarterly check-ins with Business Unit leads to allow for issue-specific reporting. We also use our annual CDP reporting process to capture more in-depth information related to climate change. In addition to issue-specific reporting, the management of climate change is captured in ERM's Evolving Risk Inventory, which is reported to the Board's Risk Committee at least twice a year.

Real Estate: Sustainability, including issues related to climate, are overseen by the Executive Sustainability Steering Committee, which is chaired by Manulife Real Estate's Global Head of Real Estate Asset Management and consists of senior real estate executives from key departments and regions. The committee includes the most senior managers from Property and Asset Management (Canada and the US), Engineering and Technical Services, Investments, Corporate Real Estate, Leasing, Marketing and Communication, Human Resources and Sustainability. The Director of Sustainability - Real Estate, came on board in 2018 to help the management drive the sustainability work within Real Estate. The Committee oversees progress toward achieving our sustainability vision and ensures we meet our commitments and adhere to corporate policies and practices. The Executive Sustainability Steering Committee meets quarterly to discuss sustainability strategy, sustainability program advancement and portfolio performance. During committee meetings, strategy and performance progress are presented and decisions regarding strategy direction and initiatives are made. Strategy and performance relating to climate change risks and opportunities are addressed through analysis of greenhouse gas emissions, greenhouse gas reduction targets, renewable energy strategy and performance and performance in industry ESG benchmarking initiatives including the Global Real Estate Sustainability Benchmark (GRESB).

HNRG: HNRG's CFO and COO are executive level positions that both report to HNRG's CEO. Both positions have responsibilities for climate-related issues across both farmland and forestry operations. HNRG's CSO helps the management execute on the sustainability objectives.

NAL: NAL has initiated several core business strategies including a Carbon Footprint Reduction strategy with associated targets and goals. This strategy is sponsored by our VP, Financial and Information Services. The primary group taking action are the Health, Safety and Environment and Operations groups which consists of managers, engineers and consultants that collaborate with a multitude of industry associations and other external groups searching for technologies and solutions to proactively reduce NAL's carbon footprint. Key committees that monitor climate-related issues include NAL Executive, NAL's Board of Directors and Health, Safety, and Environment Committee.

## C1.3

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

Yes

### C1.3a

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**(C1.3a) Provide further details on the incentives provided for the management of climate-related issues (do not include the names of individuals).**

**Who is entitled to benefit from these incentives?**

Facilities manager

**Types of incentives**

Monetary reward

**Activity incentivized**

Energy reduction target

**Comment**

One aspect of determining bonuses for property management is based on if they meet the energy and water reduction targets.

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## C2. Risks and opportunities

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### C2.1

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

	From (years)	To (years)	Comment
Short-term	0	3	
Medium-term	3	15	
Long-term	15	40	

### C2.2

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

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

### C2.2a

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

	Frequency of monitoring	How far into the future are risks considered?	Comment
Row 1	Six-monthly or more frequently	>6 years	As sustainability is integrated into our business operations, Manulife introduced in 2018 the Sustainability Centre of Expertise - made up of Head Office Leads, Business Unit Sustainability Leads and other key internal stakeholders. This group meets once a month and responsibilities include the Identification of risks and opportunities related to sustainability and climate change. When a risk is identified, and is material, it is escalated to the Executive Sustainability Council.

**C2.2b**

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

Corporate: Manulife considers a climate-related risk and opportunities to be financially substantive if it has a negative impact on our financial position or our ability to operate. These impacts may be direct or indirect and may include business losses or disruption resulting from extreme weather conditions; the impact of changes in legal or regulatory framework made to address climate change; or increased mortality or morbidity resulting from environmental damage or climate change.

Management of material climate-related issues for our real assets is carried out at the Business Unit (BU) level. Systems for risk identification, assessment and management are built into existing policies and procedures and are specific to the asset (e.g. oil and gas, real estate, forestry, agriculture etc.). BU Sustainability leads report on environmental issues, including issues related to climate change. The Climate Change Working group launched in 2019 as a sub-team of the Sustainability Centre of Expertise and sponsored by the CRO, is responsible for working with BU Sustainability leads to set, measure and report on Manulife's environmental KPIs and indicators. The working group performs an assessment and reports to the Executive Sustainability Council (ESC), which includes the CRO, any material environmental issues, which would be reported to the Board's Risk Committee and/or Corporate Governance & Nominating Committee through consolidated reporting. The management of climate change is captured in ERM's Evolving Risk Inventory and reported to the Board's Risk Committee at least twice a year. ERM scans for trends/insights via industry publications and other channels and disseminates any relevant information to BUs and other internal stakeholder as required. The Corporate Sustainability team does the same and acts as a resource to BU Sustainability leads in their development of processes related to climate management.

Real Estate: Real Estate considers climate and natural hazard risks during its acquisition due diligence process. 3rd party consultants perform building assessments and rely on local studies and guidelines where available. Environmental assessments, building status reports and insurance renewals are conducted periodically depending on the risk profile of a property. The Engineering and Technical Services team assesses portfolio-level CC risks and opportunities and tracks and benchmarks energy and GHG emissions. As building owners and managers, we minimize our environmental footprint by systematically investing in resource efficiency and embedding conservation practices throughout our operations. In our investment practices, we list sustainability issues and risks that must be considered in due diligence checklists. A "Sustainability in Investment and Due Diligence Summary Form" is completed for all investments, is signed off on by the investment manager and is provided as part of the investment package. This form specifically asks if there are any climate related risks identified during the due diligence process. We have set five-year targets for energy, water and waste and a long-term greenhouse gas emissions target for 2040 that aligns with national and international greenhouse gas emission reduction commitments. We report our progress to investors and other stakeholders through our Real Estate Sustainability Report, the annual GRESB for each fund and the PRI Direct Property Investing module.

HNRG: Climate risk is assessed as part of the due diligence process for new acquisitions, where future water availability, fire and pest risk (among other issues) and carbon market opportunities are identified. One identified physical risk is chronic risks associated with changes in precipitation patterns and extreme variability in weather patterns. Our investment goal is to build diversified investment portfolios that are likely to reduce risks over the life of the asset. An investment is either not made if climate change risk is too high or risks are mitigated by portfolio diversification. Prioritization of opportunities is based on return expectations. Process-wise, HNRG's CFO uses quarterly risk registry updates to assess climate-related risks and opportunities; whereas the HNRG COO uses those registries to manage related risks.

NAL: Using the AS.NZ4360:2004 framework, we identify, analyze, mitigate and monitor risks across risk categories. The categories include financial, operational, legal/regulatory, human resources and reputational risks. Risks are evaluated on the consequence and likelihood of the risk occurring, within a 1 yr. and 5 yr. time frame, and then are prioritized utilizing a risk assessment matrix. Identified risks are monitored and reported on a quarterly basis. Additionally, NAL's participation in the committees organized and managed by the Canadian Association of Petroleum Producers (CAPP) assist in the identification of climate-related risks.

## C2.2c

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

	Relevance & inclusion	Please explain
Current regulation	Relevant, always included	Corporate level: The Manulife Sustainability Centre of Expertise works in tandem with Regulatory and Public Affairs group to monitor emerging regulations and cascades through the organization as appropriate. Manulife's Legal and Compliance function is responsible for monitoring compliance with current regulations. BU level: Business unit Sustainability leads are responsible for monitoring regulatory changes in their sectors.
Emerging regulation	Relevant, always included	Corporate level: The Centre of Expertise works in tandem with Regulatory and Public Affairs group to monitor emerging regulations and cascades through the organization as appropriate. BU level: Business unit Sustainability leads are responsible for monitoring regulatory changes in their sectors.
Technology	Relevant, always included	Example 1, our utilities investment team considers disruptive technologies that may impact energy delivery, e.g. advances in the electric vehicle infrastructure, etc. Example 2, NAL assess technological solutions for lowering emissions and the costs associated with implementing these technologies as compliance costs rise.
Legal	Relevant, always included	Possibility of legal actions or shareholder proposals/resolutions regarding our management of climate change risks.
Market	Relevant, sometimes included	Real Estate: Increasing demand for sustainable and energy efficient properties, particularly in the commercial office portfolio may lead to risk of properties underperforming or not meeting tenants' sustainability demands. Additionally, from a Real Estate perspective, tenants and investors place greater expectations on companies to manage and disclose their sustainability performance.
Reputation	Relevant, always included	Financial institutions such as Manulife, are expected by the public to show their contribution to the transition to a low-carbon economy. Hence, if there was a lack of investments in renewable energy it could pose a reputational risk. The Manulife Sustainability Centre of Expertise works in tandem with Investor Relations, Brand Marketing, Regulatory and Public Affairs groups to monitor emerging reputational risks associated with such sustainability factors.
Acute physical	Relevant, always included	Corporate level: An acute physical risk for Manulife is business disruption due to severe weather events that may translate into the mortality risk, operational disruption, or devaluation of impacted invested assets, for example coastal real estate. Manulife has business continuity policies, plans and procedures in place that take into account the risk of business disruption due to severe weather events.
Chronic physical	Relevant, always included	HNRG: As part of HNRG's risk assessments, the impact and management of chronic physical conditions such as drought and water scarcity are built into investment due diligence and operational procedures.
Upstream	Relevant, always included	Corporate: Our vendor code of conduct states vendors should proactively minimize or mitigate the environmental impacts associated with their business activities through documented policies and procedures. Vendors who provide Manulife with services and/or products are expected to adhere to the requirements of Manulife's Vendor Code of Conduct.
Downstream	Relevant, always included	As under reputation risk, there is an expectation that Financial Institutions, through their products and services as well as risk management processes, offer low carbon products and responsible investment options that can contribute in the transition to a low-carbon economy.

**C2.2d**

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

Governance of climate change risk management is provided by our Executive Sustainability Council.

Company level: Business Unit Sustainability leads report environmental issues, including specific issues as a result of, or related to, climate change, through Manulife's Sustainability Centre of Expertise (CoE) on a monthly basis. The CoE and Climate Change Working group (launched in 2019) – sponsored by the Chief Risk Officer, performs an assessment and reports to the Executive Sustainability Council (ESC), which includes the Chief Risk Officer, any material environmental issues, which would be reported to the Board's Risk Committee through consolidated reporting.

In addition, failure to adequately prepare for the potential impacts of climate change may have a negative impact on our financial position or our ability to operate. Potential impacts may be direct or indirect and may include business losses or disruption resulting from extreme weather conditions; the impact of changes in legal or regulatory framework made to address climate change; or increased mortality or morbidity resulting from environmental damage or climate change.

Real Estate: Real Estate considers climate and natural hazard risks during its acquisition due diligence process. 3rd party consultants perform building assessments and rely on local studies and guidelines where available. Environmental assessments, building status reports and insurance renewals are conducted periodically depending on the risk profile of a property. The Engineering and Technical Services team assesses portfolio-level CC risks and opportunities and tracks and benchmarks energy and GHG emissions. Each of our properties are committed to following our Sustainable Building Standards, which encourage best practices in 13 sustainability aspects ranging from energy management and alternate transportation. The standards allow benchmarking of our performance and understanding of business outcomes. Further, we have set five-year targets for energy, water and waste and a long-term GHG emissions target to 2040 that aligns with national and international GHG emission reduction commitments. In 2017, our Renewable Energy Working group examined opportunities to increase renewable energy procurement and generation.

HNRG: Climate risk is assessed as part of the due diligence process for new acquisitions, where future water availability, fire and pest risk (among other issues) and carbon market opportunities are identified. Our investment goal is to build diversified investment portfolios that are likely to reduce risks over the life of the asset. An investment is either not made if climate change risk is too high or risks are mitigated by portfolio diversification. Prioritization of opportunities is based on return expectations. Once assets are acquired, management of climate-related risks becomes a matter of routine business. We are generally not insured for these types of risks but seek to mitigate their impact through portfolio diversification and prudent operating practices. For example, forestry assets are managed to reduce the risk of wildfire which may be exacerbated by a change in climate. Similarly, water management for agricultural properties is a daily responsibility for farm managers and therefore routine even with increased warming and potentially restricted water flows in some environments. HNRG's CFO uses quarterly risk registry updates to assess climate-related risks and opportunities; whereas the HNRG COO uses those registries to manage related risks.

Our timberland and farmland holdings are exposed to natural risks, such as prolonged drought, wildfires, insects, windstorms, flooding, and climate change. We are generally not insured for these types of risks but seek to mitigate their impact through portfolio diversification and prudent operating practices.

NAL: As mentioned in the risk identification C.2.2.b. section above, we use the AS.NZ4360:2004 framework, we identify, analyze, mitigate and monitor risks across risk categories. Our internal process includes the quantification of climate risks using internal emission manager software, including carbon pricing sensitivities when evaluating investment decisions, and actively seeking, testing and implementing carbon reduction technologies.

## **C2.3**

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

Yes

## C2.3a

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

**Identifier**

Risk 1

**Where in the value chain does the risk driver occur?**

Direct operations

**Risk type**

Transition risk

**Primary climate-related risk driver**

Policy and legal: Mandates on and regulation of existing products and services

**Type of financial impact**

<Not Applicable>

**Company- specific description**

The Montreal Protocol is leading to the phase-out of HCFC-22 gases in air conditioning equipment. A significant portion of the air conditioning units in Real Estate's portfolio uses HCFC refrigerants (primarily R-22), which is a potent GHG. Due to phase-out regulations in Canada and the U.S., HCFC-22 refrigerants are being eliminated from the supply chain and no HCFC-22 (R-22) equipment will be manufactured in or imported into Canada. These policies could increase service and maintenance requirements as HCFC equipment may need to be retired before its typical replacement period.

**Time horizon**

Short-term

**Likelihood**

Virtually certain

**Magnitude of impact**

Medium-low

**Are you able to provide a potential financial impact figure?**

Yes, a single figure estimate

**Potential financial impact figure (currency)**

5000000

**Potential financial impact figure – minimum (currency)**

<Not Applicable>

**Potential financial impact figure – maximum (currency)**

<Not Applicable>

**Explanation of financial impact figure**

Assuming 25%-50% of properties in Real Estate offices portfolio will require a chiller retrofit, capital costs could be in the range of \$5 million per year. In 2017, chiller replacements in Chicago received almost \$600,000 in government rebates to reduce this cost.

**Management method**

HCFC chillers, we try where possible to use low-GHG alternative gases. We are currently assessing the scale of this risk for operations and plan to compile a consolidated inventory of chiller equipment across the portfolio to design a strategy to comply with phase-out regulations. There is no additional cost for managing this risk. It is part of Manulife Real Estate's Operations and Engineering and Technical Services group mandate.

**Cost of management**

0

**Comment**

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**Identifier**

Risk 2

**Where in the value chain does the risk driver occur?**

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Direct operations

**Risk type**

Transition risk

**Primary climate-related risk driver**

Policy and legal: Increased pricing of GHG emissions

**Type of financial impact**

<Not Applicable>

**Company- specific description**

Carbon taxes and cap and trade programs came into effect in Alberta and Ontario in 2017, two provinces where Real Estate has operations, as well as in the state of California. A national price for carbon emissions will be rolled out where Real Estate operates. Carbon pricing schemes increase operating costs and disproportionately impacts costs for less efficient properties.

**Time horizon**

Short-term

**Likelihood**

Virtually certain

**Magnitude of impact**

Medium-low

**Are you able to provide a potential financial impact figure?**

Yes, a single figure estimate

**Potential financial impact figure (currency)**

4800000

**Potential financial impact figure – minimum (currency)**

<Not Applicable>

**Potential financial impact figure – maximum (currency)**

<Not Applicable>

**Explanation of financial impact figure**

The Canadian Tax Journal estimates that a \$50 per tonne Carbon tax would mean a 30% price increase in natural gas and a 13% price increase in electricity. This would translate to additional costs of \$4.8 million for all Canadian operations by 2022. Other regions, such as California, would also see proportionally similar costs.

**Management method**

Estimated budget increases from carbon pricing is included in property budgets, which rolls up to business planning. For example, in 2016, Real Estate's utility management consultants Solution 105 provided estimated cost increases to properties in Alberta for their 2017 budgeting process. There is no additional cost for managing this risk. It is part of Manulife Real Estate's Operations and Engineering and Technical Services group mandate.

**Cost of management**

0

**Comment**

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**Identifier**

Risk 3

**Where in the value chain does the risk driver occur?**

Customer

**Risk type**

Transition risk

**Primary climate-related risk driver**

Market: Changing customer behavior

**Type of financial impact**

<Not Applicable>

**Company- specific description**

Increasing demand for sustainable and energy-efficient properties, particularly in the commercial office portfolio may lead to risk of

properties underperforming or not meeting tenants' sustainability demands. Additionally, tenants and investors place greater expectations on companies to manage and disclose their sustainability performance.

**Time horizon**

Short-term

**Likelihood**

Very likely

**Magnitude of impact**

Medium-low

**Are you able to provide a potential financial impact figure?**

Yes, a single figure estimate

**Potential financial impact figure (currency)**

1682000

**Potential financial impact figure – minimum (currency)**

<Not Applicable>

**Potential financial impact figure – maximum (currency)**

<Not Applicable>

**Explanation of financial impact figure**

Over the past 5 years, Manulife certified an average of 7 properties per year to LEED and 94 properties to Energy Star and BOMA BEST certification. Assuming an average additional cost for LEED certification of \$200,000 and \$3,000 for BOMA BEST and Energy Star, this results in an annual cost of almost \$1.5 million.

**Management method**

Given the rising demand among commercial tenants, Manulife continues to invest in sustainability to attract and retain tenants and sustain occupancy. As of end of 2017, Manulife had 41.2 million square feet certified to LEED, BOMA BEST or Energy Star. An increase of 12.5M square feet in 2017. There is no additional cost for managing this risk. It is part of Manulife Real Estate's Operations and Engineering Technical Services group mandate. In addition to certification costs, capital expenses for energy efficiency-related refurbishments, and operational expenses for increased asset management efforts are estimated to represent up to 5% of total annual costs in the real estate portfolio.

**Cost of management**

0

**Comment**

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**Identifier**

Risk 4

**Where in the value chain does the risk driver occur?**

Direct operations

**Risk type**

Transition risk

**Primary climate-related risk driver**

Policy and legal: Enhanced emissions-reporting obligations

**Type of financial impact**

<Not Applicable>

**Company- specific description**

Mandatory building disclosure for energy and water performance is in place in many US cities where Real Estate operates and was launched in the Province of Ontario in 2018. Other cities and regions will likely follow. These regulations add transparency may reduce demand for properties that are below average efficiency. These regulations may require capital to improve efficiency to make properties marketable.

**Time horizon**

Current

**Likelihood**

About as likely as not

**Magnitude of impact**

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Low

**Are you able to provide a potential financial impact figure?**

No, we do not have this figure

**Potential financial impact figure (currency)**

<Not Applicable>

**Potential financial impact figure – minimum (currency)**

<Not Applicable>

**Potential financial impact figure – maximum (currency)**

<Not Applicable>

**Explanation of financial impact figure**

Estimated financial impacts are difficult to assess as costs for any property will depend on local market performance relative to similar properties. Property costs may include lower vacancy rates in poorly performing properties or capital costs to improve efficiency. There are also small costs to comply with disclosure requirements.

**Management method**

Properties are required to disclose performance in Chicago, New York and Boston, due to municipal programs. Many properties utilize third-party consultants to comply with regulations and verify data. In 2017, Real Estate began updating its utility management system as part of a larger IT system update. The updated system is expected to facilitate compliance with future reporting requirements. There is no additional cost for managing this risk. It is part of Manulife Real Estate's Operations and Engineering and Technical Services group mandate.

**Cost of management**

0

**Comment**

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**Identifier**

Risk 5

**Where in the value chain does the risk driver occur?**

Direct operations

**Risk type**

Physical risk

**Primary climate-related risk driver**

Chronic: Changes in precipitation patterns and extreme variability in weather patterns

**Type of financial impact**

Reduced revenue and higher costs from negative impacts on workforce (e.g., health, safety, absenteeism)

**Company- specific description**

Extreme high temperatures or increased presence of storms increase the risk of disrupted electricity supply resulting in the need to operationalize business continuity plans and ensure back-up fuel sources (i.e. generators).

**Time horizon**

Short-term

**Likelihood**

Very likely

**Magnitude of impact**

Medium-low

**Are you able to provide a potential financial impact figure?**

No, we do not have this figure

**Potential financial impact figure (currency)**

<Not Applicable>

**Potential financial impact figure – minimum (currency)**

<Not Applicable>

**Potential financial impact figure – maximum (currency)**

<Not Applicable>

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### Explanation of financial impact figure

Real Estate has not assessed the scale of this risk in financial terms, but we expect disruptions caused by extreme temperatures to have minimal impact on financial returns given the distributed nature of Real Estate's operations and the business continuity plans already in place for such events. Real Estate has already equipped properties with generation capacity to provide electricity during black-outs. Both at the time of the acquisition, and on a rolling review basis, we identify flood risk, and prepare flood plans. These are conducted both by our Technical Services team, and our insurance provider.

### Management method

Most properties have a business continuity plan to respond to supply disruptions. We also view improved energy efficiency as a method to manage the risk of extraordinary energy costs during periods of high electricity demand. Energy is tracked at all properties that pay for utilities. Annual performance at all properties is examined and reported internally by our energy management provider, Solution105. The cost to develop and implement business continuity plans and flood plans is low, and mainly relates to internal employee training costs. With respect to energy costs, the extraordinary costs related to extreme weather in the real estate portfolio are estimated at \$5 million per year.

### Cost of management

5000000

### Comment

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### Identifier

Risk 6

### Where in the value chain does the risk driver occur?

Direct operations

### Risk type

Transition risk

### Primary climate-related risk driver

Policy and legal: Enhanced emissions-reporting obligations

### Type of financial impact

<Not Applicable>

### Company- specific description

There could be an increased operational cost for oil & gas producers associated with the introduction of a carbon tax and its implementation and integration with federal regulations.

### Time horizon

Long-term

### Likelihood

Very unlikely

### Magnitude of impact

High

### Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

### Potential financial impact figure (currency)

40000000

### Potential financial impact figure – minimum (currency)

<Not Applicable>

### Potential financial impact figure – maximum (currency)

<Not Applicable>

### Explanation of financial impact figure

Federal Carbon tax rising to \$50/tonne by 2023. Unmitigated cost annually of ~\$40MM by 2023.

### Management method

Commenced implementation of an internal carbon price. Evaluating carbon reduction investment opportunities on a case-by-case basis. Capital costs on a per case basis. G&A costs of ~\$250k/year

### Cost of management

250000

## Comment

---

### Identifier

Risk 7

### Where in the value chain does the risk driver occur?

Direct operations

### Risk type

Transition risk

### Primary climate-related risk driver

Technology: Costs to transition to lower emissions technology

### Type of financial impact

<Not Applicable>

### Company- specific description

Cost of compliance with new pieces of legislation implemented or pending is increasing and likely continue to rise. The federal government is contemplating dropping the reporting threshold to 10,000 tonnes CO2e/year, which will capture more NAL facilities. We are engaged with industry associations and our peers to better understand the risks and opportunities, and how the legislation will be implemented.

### Time horizon

Long-term

### Likelihood

Virtually certain

### Magnitude of impact

Medium-low

### Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

### Potential financial impact figure (currency)

500000

### Potential financial impact figure – minimum (currency)

<Not Applicable>

### Potential financial impact figure – maximum (currency)

<Not Applicable>

### Explanation of financial impact figure

Draft regulatory framework recommending measuring and reporting high emission intensity sites three times (3x) per year.

### Management method

We are currently evaluating how this will be managed. Cost to manage will increase as site visit required 3x year for high emission intensity sites.

### Cost of management

200000

## Comment

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## C2.4

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

Yes

## C2.4a

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

**Identifier**

Opp1

**Where in the value chain does the opportunity occur?**

Customer

**Opportunity type**

Products and services

**Primary climate-related opportunity driver**

Development and/or expansion of low emission goods and services

**Type of financial impact**

Increased revenue through demand for lower emissions products and services

**Company-specific description**

Commercial office tenants are increasingly looking to occupy properties that have superior environmental performance and support tenants' corporate sustainability objectives. Real Estate believes that its reputation as a leading owner and manager of green commercial real estate in North America has a positive impact on Manulife Real Estate's ability to attract and retain high-quality tenants and positively influence own Real Estate employees who work in those properties.

**Time horizon**

Current

**Likelihood**

Likely

**Magnitude of impact**

Medium-low

**Are you able to provide a potential financial impact figure?**

No, we do not have this figure

**Potential financial impact figure (currency)**

<Not Applicable>

**Potential financial impact figure – minimum (currency)**

<Not Applicable>

**Potential financial impact figure – maximum (currency)**

<Not Applicable>

**Explanation of financial impact figure**

Research published in the Journal of Portfolio Management (Sep. 2015) shows that properties with sustainability ratings or certifications (e.g. Energy Star, LEED, BOMA BEST) command rental rates that are roughly 3.7 percent higher per square foot than otherwise identical properties. The same study demonstrates numerous other benefits, including lower rent concessions, higher occupancy and lower operating costs. From this study, it can be extrapolated that a LEED certification, for example, can add 10% on the market value of a property.

**Strategy to realize opportunity**

Energy efficiency investment and green building certification is managed at the asset-level with sign-off at the corporate-level. Manulife Real Estate encourages property managers to take advantage of local/regional energy efficiency incentives and green building schemes, such as LEED and BOMA Best (Canada). As of the end of the year 2017, Manulife had 41.2 million square feet certified to LEED, BOMA BEST or Energy Star. Real Estate integrates best sustainability practices in developments as well. In 2017, Manulife rolled out its Sustainable Building Standards at all properties. In 2017, 707 Fifth St, Calgary was awarded LEED CS Gold for its strong sustainability design and features. Costs associated with building certifications are incorporated into a building's operating budget; or incorporated into the development proforma and new development budget. The cost of LEED certification varies depending on the type of certification being pursued. For new construction, LEED Gold certification can add up to 4 percent to the cost of construction and more than \$100,000 in additional design/consulting fees. The cost of LEED certification for existing buildings varies depending on performance, and ranges from \$100,000 to \$500,000 depending on required building upgrades and external consulting fees.

**Cost to realize opportunity**

0

**Comment**

**Identifier**

Opp2

**Where in the value chain does the opportunity occur?**

Customer

**Opportunity type**

Products and services

**Primary climate-related opportunity driver**

Development and/or expansion of low emission goods and services

**Type of financial impact**

Increased revenue through demand for lower emissions products and services

**Company-specific description**

As tenant organizations place greater emphasis on their corporate sustainability goals, there is an opportunity to provide them with additional services related to climate change. One example would be providing tenants with renewable energy to power their operations. This can be achieved both from on-site renewable energy generation and by off-site renewable procurement.

**Time horizon**

Short-term

**Likelihood**

Likely

**Magnitude of impact**

Medium-low

**Are you able to provide a potential financial impact figure?**

Yes, a single figure estimate

**Potential financial impact figure (currency)**

700000

**Potential financial impact figure – minimum (currency)**

<Not Applicable>

**Potential financial impact figure – maximum (currency)**

<Not Applicable>

**Explanation of financial impact figure**

The primary benefits of a renewable energy strategy and tenant offering would be differentiation and to be good corporate citizen. If, Real Estate were able to procure or generate renewable electricity and sell to 20% of tenants to cover their electricity demand, at an average rate of \$5 per MWh, this could generate an additional \$700,000 annually.

**Strategy to realize opportunity**

In 2016 and 2017, Real Estate developed a strategy for renewable energy, which included large scale procurement and tenant offerings. In 2018, Real Estate looked to validate its tenant offering strategy and secure commitment to increase renewable energy procurement in the portfolio. Management costs include the time required to develop renewable energy. This cost is still being assessed as part of our strategy.

**Cost to realize opportunity**

0

**Comment****Identifier**

Opp3

**Where in the value chain does the opportunity occur?**

Direct operations

**Opportunity type**

Energy source

**Primary climate-related opportunity driver**

Use of lower-emission sources of energy

**Type of financial impact**

Returns on investment in low-emission technology

**Company-specific description**

Decreasing costs to produce renewable energy compared to rising overall costs for energy production create an opportunity to invest in renewable energy. Entering into long-term power purchase agreements (PPAs) provide an opportunity to support emissions reductions at properties and generate returns.

**Time horizon**

Short-term

**Likelihood**

Likely

**Magnitude of impact**

Medium-low

**Are you able to provide a potential financial impact figure?**

No, we do not have this figure

**Potential financial impact figure (currency)**

<Not Applicable>

**Potential financial impact figure – minimum (currency)**

<Not Applicable>

**Potential financial impact figure – maximum (currency)**

<Not Applicable>

**Explanation of financial impact figure**

Impacts of the opportunity depend on many factors, including deal size and structure and future energy prices. It is therefore difficult to estimate. One PPA examined in Boston in 2016 had an estimated net present value savings ranging from \$500,000 - \$22 million.

**Strategy to realize opportunity**

In 2016, Real Estate participated in a consortium looking to procure renewable energy through a PPA although decided not to pursue the project. Real Estate also engaged Manulife investment teams to identify potential for sourcing renewable energy deals internally. The cost of management was predominantly time required by real estate employees to participate in the consortium. An energy consultant was utilized to assess the deal and help develop an overall strategy. This cost is still being assessed as part of our strategy.

**Cost to realize opportunity**

0

**Comment**

---

**Identifier**

Opp4

**Where in the value chain does the opportunity occur?**

Direct operations

**Opportunity type**

Resource efficiency

**Primary climate-related opportunity driver**

Other

**Type of financial impact**

Other, please specify (Resource effic., increased assets value)

**Company-specific description**

Manulife owns a significant portfolio of timber and agricultural land. With rising average temperatures induced by a changing climate, it is likely that we will experience a longer growing season in many regions which could increase productivity and thus the overall value of our land assets.

**Time horizon**

Long-term

**Likelihood**

Likely

**Magnitude of impact**

Medium

**Are you able to provide a potential financial impact figure?**

No, we do not have this figure

**Potential financial impact figure (currency)**

<Not Applicable>

**Potential financial impact figure – minimum (currency)**

<Not Applicable>

**Potential financial impact figure – maximum (currency)**

<Not Applicable>

**Explanation of financial impact figure**

A significant portion of our agricultural land is in North America. The IPCC reports that over the first few decades of this century, moderate climate change would increase aggregate yields of rain-fed agriculture by 5–20%, but with important variability among regions. While it is difficult to predict what impact changing temperatures will have on the value of our agricultural assets over the next several decades, it could be in the range of +10-20%.

**Strategy to realize opportunity**

1. Identify those crops that farmers can produce competitively in a global market. Competitively produced crops include such staples as corn, soybeans, almonds, and walnuts. We eliminate crops that do not pass this screen. 2. Identify the low-cost production regions for those crop types that were identified in step (1). For example, although corn and soybeans can be grown in almost every state, we purchase land that produces these crops almost exclusively in the Midwest and the Mississippi Delta, avoiding higher-cost production areas. 3. Identify those properties in the low-cost production regions that have the highest expected risk-adjusted returns. Climate change-related risks figure into this analysis. This is the "bottom-up" part of the strategy, where our acquisition team and our property management partners focus their efforts. Potential acquisitions are screened to make sure properties meet client objectives and have attractive risk/return characteristics. The cost of managing the opportunity will likely not be materially different than managing assets today; rather management options will change. As such, cost of risk management in previous column is 0.

**Cost to realize opportunity**

0

**Comment**

---

**Identifier**

Opp5

**Where in the value chain does the opportunity occur?**

Supply Chain

**Opportunity type**

Products and services

**Primary climate-related opportunity driver**

Development of new products or services through R&D and innovation

**Type of financial impact**

Other, please specify (Reduced exposure to GHGs/ carbon pricing)

**Company-specific description**

NAL has partnered with a company to replace and install low bleed controllers to reduce venting.

**Time horizon**

Current

**Likelihood**

Virtually certain

**Magnitude of impact**

Medium

**Are you able to provide a potential financial impact figure?**

Yes, a single figure estimate

**Potential financial impact figure (currency)**

2300000

**Potential financial impact figure – minimum (currency)**

<Not Applicable>

**Potential financial impact figure – maximum (currency)**

<Not Applicable>

**Explanation of financial impact figure**

Estimated reduction of emissions is 45,000 tonnes per year. Using the Federal government backstop of \$50/tonne equates to a reduction of carbon tax paid of ~\$2.3MM.

**Strategy to realize opportunity**

Utilizing 3rd party company to assist management of the initiative. The company we have partnered with installed the equipment at their cost in exchange for sharing the carbon credits which they would in turn market and sell to pay for the equipment. Once the capital expenditure has been covered, the 3rd party is sharing in net carbon tax benefits.

**Cost to realize opportunity**

0

**Comment**

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**Identifier**

Opp6

**Where in the value chain does the opportunity occur?**

Supply Chain

**Opportunity type**

Products and services

**Primary climate-related opportunity driver**

Development of new products or services through R&D and innovation

**Type of financial impact**

Other, please specify (Reduced exposure to GHGs/ carbon pricing)

**Company-specific description**

NAL is exploring additional technology to capture venting from production tanks.

**Time horizon**

Current

**Likelihood**

Very likely

**Magnitude of impact**

Medium-high

**Are you able to provide a potential financial impact figure?**

Yes, a single figure estimate

**Potential financial impact figure (currency)**

1100000

**Potential financial impact figure – minimum (currency)**

<Not Applicable>

**Potential financial impact figure – maximum (currency)**

<Not Applicable>

**Explanation of financial impact figure**

Estimated reduction of 21,000 tonnes of emission. Using the federal backstop of \$50/tonne equates to a reduction of carbon tax paid of \$1.1MM.

**Strategy to realize opportunity**

NAL uses an emission software to track and report on emission from equipment Cost to realize opportunity: 50,000 Exploring options to capture and use vented gas from production tanks would be a capital cost to NAL, which is unknown at this time. We are continuing to explore options.

**Cost to realize opportunity**

50000

**Comment**

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**Identifier**

Opp7

**Where in the value chain does the opportunity occur?**

Supply Chain

**Opportunity type**

Products and services

**Primary climate-related opportunity driver**

Development of new products or services through R&D and innovation

**Type of financial impact**

Other, please specify (Reduced exposure to GHGs/ carbon pricing)

**Company-specific description**

NAL is assessing 12 additional technologies aimed at GHG reduction.

**Time horizon**

Current

**Likelihood**

Unknown

**Magnitude of impact**

Unknown

**Are you able to provide a potential financial impact figure?**

No, we do not have this figure

**Potential financial impact figure (currency)**

<Not Applicable>

**Potential financial impact figure – minimum (currency)**

<Not Applicable>

**Potential financial impact figure – maximum (currency)**

<Not Applicable>

**Explanation of financial impact figure**

Unknown

**Strategy to realize opportunity**

Unknown NAL is assessing 12 technologies aimed at GHG reduction.

**Cost to realize opportunity**

0

**Comment**

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**Identifier**

Opp8

**Where in the value chain does the opportunity occur?**

Direct operations

**Opportunity type**

Energy source

**Primary climate-related opportunity driver**

Shift toward decentralized energy generation

**Type of financial impact**

Reputational benefits resulting in increased demand for goods/services

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**Company-specific description**

A continued decline in solar panel prices will see more commercial properties adding solar panels to their roofs. We have already financed a small number of portfolios and anticipate more will come. These do need some support from local government and this has generally been halted in Ontario but we do believe over time these types of assets will come back and be financeable.

**Time horizon**

Medium-term

**Likelihood**

Likely

**Magnitude of impact**

Medium

**Are you able to provide a potential financial impact figure?**

Yes, a single figure estimate

**Potential financial impact figure (currency)**

100000000

**Potential financial impact figure – minimum (currency)**

<Not Applicable>

**Potential financial impact figure – maximum (currency)**

<Not Applicable>

**Explanation of financial impact figure**

We see the potential from these types of portfolio financings in the range of \$100 million of EVA (Economic Value Add). This would be the profitability over comparable public transactions or opportunity cost investments.

**Strategy to realize opportunity**

Managed by current portfolio team. Managed by current portfolio team. No additional cost to realize the opportunity.

**Cost to realize opportunity**

0

**Comment**

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**Identifier**

Opp9

**Where in the value chain does the opportunity occur?**

Direct operations

**Opportunity type**

Markets

**Primary climate-related opportunity driver**

Other

**Type of financial impact**

Other, please specify (Increased revenue, greater demand )

**Company-specific description**

As with the above, our portfolio is dependent to some degree on the policy of the government and the utilities providing Power Purchase Agreements to the market. We are at a low point in the cycle right now as BC, Ontario and Quebec are absorbing the costs from the previous cycle but anticipate within the next 5 years this part of the market will come back as these provinces enter new rounds of renewable energy growth.

**Time horizon**

Medium-term

**Likelihood**

Likely

**Magnitude of impact**

Medium

**Are you able to provide a potential financial impact figure?**

Yes, a single figure estimate

**Potential financial impact figure (currency)**

250000000

**Potential financial impact figure – minimum (currency)**

<Not Applicable>

**Potential financial impact figure – maximum (currency)**

<Not Applicable>

**Explanation of financial impact figure**

As above, this number is an incremental value add number. We would typically participate in a large percentage of the new transactions in the Canadian market if and when they come to fruition. The amount would be earned over a 3 or 4-year period.

**Strategy to realize opportunity**

Managed by current portfolio team. Managed by current portfolio team. No additional cost to realize the opportunity.

**Cost to realize opportunity**

0

**Comment**

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**Identifier**

Opp10

**Where in the value chain does the opportunity occur?**

Investment chain

**Opportunity type**

Products and services

**Primary climate-related opportunity driver**

Development and/or expansion of low emission goods and services

**Type of financial impact**

Other, please specify (Reputational benefits resulting from increased demand for goods/services)

**Company-specific description**

In November 2017, Manulife issued its inaugural Singapore dollar 500 million green bond, whereby proceeds were allocated to the wind and solar energy projects in North America. In May 2018, Manulife followed up with the second CAN\$ 600 million green bond issue with proceeds allocated to renewable energy, buildings energy efficiency and sustainably managed forestry.

**Time horizon**

Current

**Likelihood**

Likely

**Magnitude of impact**

Medium-low

**Are you able to provide a potential financial impact figure?**

No, we do not have this figure

**Potential financial impact figure (currency)**

<Not Applicable>

**Potential financial impact figure – minimum (currency)**

<Not Applicable>

**Potential financial impact figure – maximum (currency)**

<Not Applicable>

**Explanation of financial impact figure**

Unknown

**Strategy to realize opportunity**

Continue investing in a sustainable economy. Managed by current portfolio team. No additional cost to realise opportunity.

**Cost to realize opportunity**

0

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**Comment**

**C2.5**

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

	<b>Impact</b>	<b>Description</b>
Products and services	Impacted for some suppliers, facilities, or product lines	Real Estate: established the Renewable Energy Working Group to develop a business plan to provide a clean energy offering to its tenants. This is a multi-stakeholder group that includes members from Manulife's specialized renewable energy project finance team to determine if there is an opportunity to leverage internal capabilities. Manulife Real Estate has also developed and implemented a real estate sustainability strategy to increase the environmental performance of its portfolio to make it more appealing to Fortune 500 and other top tier tenants with sustainability objectives.
Supply chain and/or value chain	Impacted for some suppliers, facilities, or product lines	Corporate: Manulife has in place a vendor code of conduct that includes adherence to environmental standards to ensure vendors perform to a minimum standard, helping reduce reputational and operational risk to Manulife. Vendors who provide Manulife with services and/or products are expected to adhere to the requirements of Manulife's Vendor Code of Conduct.
Adaptation and mitigation activities	Impacted for some suppliers, facilities, or product lines	Real Estate: investment and operational due diligence now includes assessments related to mitigation (e.g. energy efficiency opportunities) and adaptation (e.g. understanding impacts of severe weather events on critical equipment).
Investment in R&D	Impacted for some suppliers, facilities, or product lines	NAL: encouraged partnerships with companies and other external organizations to develop creative ways to source new technologies/innovations in processes to lower GHG emissions from operations.
Operations	Impacted for some suppliers, facilities, or product lines	Real Estate: In 2017, Manulife Real Estate rolled out its Sustainable Building Standards program. This program applies to all properties, including those managed by third parties. The program seeks to manage risks from increasing energy costs, carbon pricing and regional disclosure initiatives by driving best practices in energy management at all properties. The standards also seek to capture opportunities from building certifications and tenant engagement on sustainability issues. The program impacts include additional costs and time to develop resources and implement programs at the property level. Costs are expected to be offset by increased returns from efficiency or otherwise justified to manage downside risk. NAL: impacted by cost incurred for changing out equipment. Carbon pricing model integrating into capital projects impacts return on investment. Impacts associated with acquisition economics.
Other, please specify	Impacted	Governance: Understanding the risks that climate change can pose on the insurance industry and working through the Sustainability Center of Expertise and Executive Sustainability Council, a need was identified to create a Climate Change working group. Established in 2019, and overseen by our Chief Risk Officer, the Climate Change working group works to more fully understand the risks posed by climate change to our business. Having this Climate Change working group allows for us to look at our risks at an enterprise-wide level and to have input from various business units as to how to mitigate potential risks. This also allows for closer engagement with senior leaders in the organization around climate related issues. Through this Climate Change working group our objective is to set long-term enterprise-wide targets and KPIs related to Climate Change.

**C2.6**

**(C2.6) Describe where and how the identified risks and opportunities have been factored into your financial planning process.**

	Relevance	Description
Revenues	Not yet impacted	Real Estate: developing a renewable energy offering for tenants.
Operating costs	Impacted for some suppliers, facilities, or product lines	Real Estate: integrates climate related items into budgets to address risks and opportunities including energy audits and building certifications. These items may increase operating costs, however any increases are typically offset by savings from annual energy reductions.
Capital expenditures / capital allocation	Impacted for some suppliers, facilities, or product lines	Real Estate: At select properties, capital projects, such as installation of battery storage and electric vehicle charging stations increase capital expenditures. Ideally, these items are either offset by savings from energy efficiency or help to increase tenant satisfaction and decrease vacancy.
Acquisitions and divestments	Not yet impacted	Real Estate: Climate impacts are specifically examined during investments and are included in Manulife Real Estate's "Sustainability in Investment and Due Diligence Summary Form". No acquisitions have been abandoned or altered yet due specifically to climate change. It is expected that this may change as climate risks in different real estate markets become more transparent and are either priced into acquisitions or properties are not selected for investment.
Access to capital	Impacted	Corporate: We raise capital on an ongoing basis and in 2017 and again in 2018, saw market opportunities to issue green bonds. We are the 1st global life insurer to issue green bonds.
Assets	Not evaluated	
Liabilities	Not evaluated	
Other	Please select	

**C3. Business Strategy**

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**C3.1**

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

Yes

**C3.1a**

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

Yes, qualitative and quantitative

**C3.1c**

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

Governance of climate change is provided by our Executive Sustainability Council.

Understanding the risks that Climate Change can pose on the Insurance industry and working through the Sustainability Center of Expertise and Executive Sustainability Council, a need was identified to create a Climate Change working group. Established in 2019 and overseen by our Chief Risk Officer, the Climate Change working group works to more fully understand the risks posed by Climate Change to our business. Having this Climate Change working group allows for us to look at our risks at an enterprise-wide level and to have input from various business units as to how to mitigate potential risks. This also allows for closer engagement with senior leaders in the organization around climate related issues. Through this Climate Change working group our objective is to set long-term enterprise-wide targets and KPIs related to Climate Change, including clear emissions reduction targets. Our goal is to align our targets to the Paris Agreement.

A company-specific explanation of how business objectives and strategy have been influenced by climate-related issues can be seen in our Real Estate division where setting long-term GHG emission targets has been influenced by the increased importance of making the portfolio more sustainable. Each year, the Real Estate Executive Sustainability Steering Committee sets sustainability objectives. In 2017, these objectives included achieving a reduction of two per cent in energy consumption at properties where Manulife manages the utilities, and setting performance targets for water usage, waste management, greenhouse gas emissions. Select sustainability objectives were integrated into personal objectives for 2018. Annual objectives for the Executive Sustainability Steering Committee are integrated into strategy and operations by Committee members.

Manulife Real Estates business strategy is linked to a newly set long-term GHG emission target (2040) and energy target of a 10% energy reduction by 2022. This energy target is intensity based with a 2017 baseline. These targets will inform capital investments, operational procedures and portfolio mix.

In 2017, we developed GHG accounting procedure to standardize methodologies and processes across our multiple business units and to expand on our reporting coverage and increase the quality of our reporting. We developed this tool to stay ahead of evolving international climate related regulatory requirements as well as responding to stakeholder expectations regarding corporate disclosure practices. We will be updating our GHG Accounting Policy in 2019.

Other aspects of climate change that have influenced the strategy include:

- HNRG: Regulatory changes (e.g., California Sustainable Groundwater Management Act) and opportunities to develop climate beneficial projects that are adaptive to a changing climate have influenced business strategy. We continue to enhance our agricultural due diligence requirements on water availability to ensure that new acquisitions have a secure and stable water supply under regulatory structures such as the California Sustainable Groundwater Management Act. Specific business decisions include engagement in the development of Groundwater Sustainability Plans in California and water markets in Australia. Adaptation strategies are informed by HNRG's participation in the Climate Smart Land Network and MIT's Joint Program on the Science and Policy of Global Change.
- NAL: We've incorporated carbon pricing into our economic models at NAL Resources. This is influencing our capital investment decisions and promoting the use of lower emission designs and technologies. We have set a 2022 target to reduce operational emission intensity on a per barrel basis by 50%. At the end of 2018, the company has been successful in achieving half of this target.
- Infrastructure Investment Teams: Another area of our business strategy where Climate Change is incorporated is our Infrastructure investment teams, which includes renewable energy financing specialists that invest Manulife's on-balance-sheet assets into wind, solar, hydroelectric, geothermal, and waste-to-energy projects, as well as in energy efficiency installations that allow our borrowers to reduce their energy use. Since 2002, Manulife has invested CAD \$13.6 billion in renewable energy and energy efficiency projects. For example, we utilized our Asian balance sheet to invest in two renewable energy projects in 2018 - one is portfolio of contracted utility-scale solar projects in the US and the other is an offshore wind project in UK. In Peru we are involved in the financing of 213,441 small-scale solar system units that will supply electricity to off-grid rural areas in Peru.

## C3.1d

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

Climate-related scenarios	Details
IEA Sustainable development scenario IEA NPS IEA CPS Nationally determined contributions (NDCs)	<p>Within our general account investments, climate scenario analysis, as recommended by the TCFD, is being contemplated and implementation over a multi-year period is being planned. Manulife Asset Management has participated in the Pilot Project on Implementing the TCFD Recommendations for Investors - UNEP FI, together with twenty of the world's leading investors, has worked over the past year to develop scenarios, models, and metrics to enable scenario-based, forward-looking assessment and disclosure of climate-related risks and opportunities. The work contributed to the industry's advancement of the recommendations of the Financial Stability Board's (FSB) Task Force on Climate-Related Financial Disclosures (TCFD). Investors, together with a specialized consulting firm (Carbon Delta), support from UNEP FI and expertise from the field have trialed their portfolios against a range of climate scenarios and co-developing a metric for determining the value at risk for equity, bond, and real estate portfolios. The outputs and conclusions of this group are intended to stimulate and ease TCFD adoption by the wider industry, including the 1900 investor members of the Principles for Responsible Investment. Manulife Asset Management has extensive experience with investing in public markets asset classes globally. Based on this experience, we conducted a comparison of geographically distinct equity portfolios to help evaluate the potential difference in impact of climate risk on different regions, with implications for asset allocation. Accordingly, we analyzed the impact of climate risk on companies in two existing investment portfolios from different geographic regions. We looked at three climate scenarios. The analysis also identified the physical hazards of climate change that carry the highest potential negative impact at the portfolio level and the industries in each portfolio that are potentially most exposed to these risks. The climate risk tool used in our scenario analysis uses a 15-year timeframe to assess the risks and opportunities associated with climate change. The output allowed for an analysis at the company level, to help determine those companies may have greater exposures to climate risk. This analytical work exemplifies how Manulife Asset Management currently seeks to integrate the evaluation of climate risk in its investment processes. We believe that the scenario analysis will continue to improve over time and become more meaningful in terms of the output provided. Our current analysis is limited to Scope 1 carbon emissions of the underlying companies, which measures direct carbon emissions from operations. Scope 2, which includes indirect emissions from the consumption of energy-e.g., electricity-is not included in the analysis. Future analyses may be developed to incorporate Scope 2 and Scope 3 carbon emissions. According to the scenario analysis methodology used by our service provider, climate transition risk-or the general cost associated with moving from a current business-as-usual scenario in the direction of a more carbon-neutral future-represents the greatest portfolio risk. This is followed in magnitude by physical hazard risk-or the cost impact associated with extreme weather events, which we identify in our initial analysis as extreme heat, coastal flooding, and tropical cyclones. Both climate transition and physical hazard risks may be partially offset by low-carbon technology innovation such as carbon extraction or sequestration-particularly for those companies that have invested in research and development geared toward objectives of sustainability.</p>

## C4. Targets and performance

### C4.1

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

Intensity target

### C4.1b

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

**Target reference number**

Int 1

**Scope**

Scope 1+2 (location-based)

**% emissions in Scope**

27

**Targeted % reduction from base year**

10

**Metric**

Metric tons CO2e per square foot\*

**Base year**

2017

**Start year**

2017

**Normalized base year emissions covered by target (metric tons CO2e)**

0.0058

**Target year**

2022

**Is this a science-based target?**

No, but we anticipate setting one in the next 2 years

**% of target achieved**

0

**Target status**

Underway

**Please explain**

We are targeting a 10% energy consumption reduction between 2017 to 2022 associated with carbon emission per square foot in our real estate Portfolio. Total energy consumption increased between 2017 and 2018 because of increased reporting and changes in weather. When these factors are controlled or 'normalized' our 'like-for-like' consumption was consistent.

**% change anticipated in absolute Scope 1+2 emissions**

-3

**% change anticipated in absolute Scope 3 emissions**

0

**Target reference number**

Int 2

**Scope**

Scope 1

**% emissions in Scope**

56

**Targeted % reduction from base year**

50

**Metric**

Metric tons CO2e per barrel of oil equivalent (BOE)

**Base year**

2017

**Start year**

2017

**Normalized base year emissions covered by target (metric tons CO2e)**

0.027

**Target year**

2022

**Is this a science-based target?**

No, and we do not anticipate setting one in the next 2 years

**% of target achieved**

0

**Target status**

Underway

**Please explain**

We are targeting a 50% reduction in greenhouse gas emission intensity over five years in our oil and gas subsidiary, NAL Resources.

**% change anticipated in absolute Scope 1+2 emissions**

-46

**% change anticipated in absolute Scope 3 emissions**

0

---

## C4.2

---

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

**Target**

Energy usage

**KPI – Metric numerator**

Energy usage Energy use (ekWh)

**KPI – Metric denominator (intensity targets only)**

Per square foot

**Base year**

2017

**Start year**

2017

**Target year**

2022

**KPI in baseline year**

19.2

**KPI in target year**

17.3

**% achieved in reporting year**

0

**Target Status**

Underway

**Please explain**

We are targeting a 10% energy reduction between 2017 to 2022 associated with equivalent kWh (ekWh) per square foot in our real estate portfolio.

**Part of emissions target**

INT 2

**Is this target part of an overarching initiative?**

No, it's not part of an overarching initiative

---

**Target**

Waste

**KPI – Metric numerator**

Waste diversion rate (%)

**KPI – Metric denominator (intensity targets only)**

Diversion rate (%)

**Base year**

2017

**Start year**

2017

**Target year**

---

2022

**KPI in baseline year**

52

**KPI in target year**

62

**% achieved in reporting year**

0

**Target Status**

Underway

**Please explain**

We are targeting a 65% waste diversion rate by 2022 associated in our real estate portfolio.

**Part of emissions target**

**Is this target part of an overarching initiative?**

No, it's not part of an overarching initiative

---

**Target**

Other, please specify (Water)

**KPI – Metric numerator**

Water use (L)

**KPI – Metric denominator (intensity targets only)**

Per square foot

**Base year**

2017

**Start year**

2017

**Target year**

2022

**KPI in baseline year**

61

**KPI in target year**

60.5

**% achieved in reporting year**

0

**Target Status**

Underway

**Please explain**

We are targeting a 7.5% water reduction between 2017 to 2022 associated with litres per square foot in our real estate portfolio.

**Part of emissions target**

**Is this target part of an overarching initiative?**

No, it's not part of an overarching initiative

---

## C4.3

---

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

Yes

C4.3a

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

	Number of initiatives	Total estimated annual CO2e savings in metric tonnes CO2e (only for rows marked *)
Under investigation	5	122800
To be implemented*	3	33400
Implementation commenced*	3	4100
Implemented*	53	59352
Not to be implemented	2	15700

C4.3b

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

**Initiative type**

Low-carbon energy purchase

**Description of initiative**

Other, please specify (Renewable energy purchases )

**Estimated annual CO2e savings (metric tonnes CO2e)**

14257

**Scope**

Scope 2 (market-based)

**Voluntary/Mandatory**

Voluntary

**Annual monetary savings (unit currency – as specified in C0.4)**

0

**Investment required (unit currency – as specified in C0.4)**

66780

**Payback period**

>25 years

**Estimated lifetime of the initiative**

<1 year

**Comment**

Manulife Investment Management - 29 buildings purchased renewable energy in 2018. A total of 51,403.5 MWh of renewable energy was purchased.

**Initiative type**

Energy efficiency: Building fabric

**Description of initiative**

Other, please specify (Renewable energy purchases )

**Estimated annual CO2e savings (metric tonnes CO2e)**

1.41

**Scope**

Scope 2 (location-based)

**Voluntary/Mandatory**

Voluntary

**Annual monetary savings (unit currency – as specified in C0.4)**



79804

**Investment required (unit currency – as specified in C0.4)**

367991

**Payback period**

4 - 10 years

**Estimated lifetime of the initiative**

6-10 years

**Comment**

---

**Initiative type**

Energy efficiency: Building services

**Description of initiative**

Other, please specify (Renewable energy purchases )

**Estimated annual CO2e savings (metric tonnes CO2e)**

1461.18

**Scope**

Scope 2 (location-based)

**Voluntary/Mandatory**

Voluntary

**Annual monetary savings (unit currency – as specified in C0.4)**

513092

**Investment required (unit currency – as specified in C0.4)**

5863608

**Payback period**

11-15 years

**Estimated lifetime of the initiative**

16-20 years

**Comment**

---

**Initiative type**

Other, please specify (Renewable energy purchases )

**Description of initiative**

<Not Applicable>

**Estimated annual CO2e savings (metric tonnes CO2e)**

119.61

**Scope**

Scope 2 (location-based)

**Voluntary/Mandatory**

Voluntary

**Annual monetary savings (unit currency – as specified in C0.4)**

808000

**Investment required (unit currency – as specified in C0.4)**

1643705

**Payback period**

1-3 years

**Estimated lifetime of the initiative**

16-20 years

**Comment**

---

**Initiative type**

Energy efficiency: Building fabric

**Description of initiative**

Other, please specify (Renewable energy purchases )

**Estimated annual CO2e savings (metric tonnes CO2e)**

0.3

**Scope**

Scope 1

**Voluntary/Mandatory**

Voluntary

**Annual monetary savings (unit currency – as specified in C0.4)**

5910

**Investment required (unit currency – as specified in C0.4)**

66564

**Payback period**

11-15 years

**Estimated lifetime of the initiative**

21-30 years

**Comment**

---

**Initiative type**

Process emissions reductions

**Description of initiative**

New equipment

**Estimated annual CO2e savings (metric tonnes CO2e)**

32575

**Scope**

Scope 1

**Voluntary/Mandatory**

Voluntary

**Annual monetary savings (unit currency – as specified in C0.4)**

15000

**Investment required (unit currency – as specified in C0.4)**

0

**Payback period**

No payback

**Estimated lifetime of the initiative**

6-10 years

**Comment**

---

**Initiative type**

Process emissions reductions

**Description of initiative**

New equipment

**Estimated annual CO2e savings (metric tonnes CO2e)**

10938

**Scope**

Scope 1

---

**Voluntary/Mandatory**

Voluntary

**Annual monetary savings (unit currency – as specified in C0.4)**

10000

**Investment required (unit currency – as specified in C0.4)**

0

**Payback period**

No payback

**Estimated lifetime of the initiative**

6-10 years

**Comment**

---

**C4.3c**

---

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

Method	Comment
Financial optimization calculations	Investments in emissions reduction are primarily driven by a strong business case for energy efficiency. Retrofits, building upgrades, retro-commissioning and other efficiency projects are implemented across the portfolio on an ongoing basis. Government incentives further contribute to the business case, increasing rate of return on efficiency projects.
Dedicated budget for other emissions reduction activities	Select properties and regions have a dedicated budget for purchasing renewable energy credits.
Employee engagement	Real Estate provides tools and training to investment, property management and operations staff regarding integrating sustainability, including energy efficiency and related carbon reductions into investment and asset management processes.
Compliance with regulatory requirements/standards	Real Estate complies with and exceeds all regulatory and code requirements for energy efficiency.
Internal incentives/recognition programs	Real Estate rolled out its Sustainable Building Standards program in 2017. This program rewards properties for implementing strong sustainability practices in 13 sustainability focus areas, of which 4 can be directly linked to mitigating climate impacts.

**C4.5**

---

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

Yes

**C4.5a**

---

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

**Level of aggregation**

Group of products

**Description of product/Group of products**

Manulife Asset Management has developed and implemented low carbon/fossil fuel free investment strategies for institutional clients.

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

Low-carbon product

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

Other, please specify (Low carbon investment strategies)

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

0.1

**Comment**

Revenue is not a good denominator for the value of services for lifecos because it includes investment gains and losses.

---

**Level of aggregation**

Group of products

**Description of product/Group of products**

John Hancock Investments launched four new environmental, social and governance (ESG) funds.

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

Low-carbon product

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

Other, please specify (Low carbon investment funds)

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

0.1

**Comment**

Revenue is not a good denominator for the value of services for lifecos because it includes investment gains and losses.

---

## C5. Emissions methodology

---

### C5.1

---

**(C5.1) Provide your base year and base year emissions (Scopes 1 and 2).**

**Scope 1**

**Base year start**

January 1 2016

**Base year end**

December 31 2016

**Base year emissions (metric tons CO2e)**

383761

**Comment**

**Scope 2 (location-based)**

**Base year start**

January 1 2016

**Base year end**

December 31 2016

**Base year emissions (metric tons CO2e)**

299072

**Comment**

**Scope 2 (market-based)**

**Base year start**

January 1 2016

**Base year end**

December 31 2016

**Base year emissions (metric tons CO2e)**

291488

**Comment**

**C5.2**

---

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

ISO 14064-1

The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)

**C6. Emissions data**

---

**C6.1**

---

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

**Reporting year**

**Gross global Scope 1 emissions (metric tons CO2e)**

668040

**Start date**

January 1 2018

**End date**

December 31 2018

**Comment**

C6.2

---

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

**Row 1**

**Scope 2, location-based**

We are reporting a Scope 2, location-based figure

**Scope 2, market-based**

We are reporting a Scope 2, market-based figure

**Comment**

C6.3

---

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

**Reporting year**

**Scope 2, location-based**

321806

**Scope 2, market-based (if applicable)**

307656

**Start date**

January 1 2018

**End date**

December 31 2018

**Comment**

C6.4

---

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

Yes

C6.4a

---

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

**Source**

---

Mobile Sources - owned and leased

**Relevance of Scope 1 emissions from this source**

Emissions are not relevant

**Relevance of location-based Scope 2 emissions from this source**

No emissions excluded

**Relevance of market-based Scope 2 emissions from this source (if applicable)**

No emissions excluded

**Explain why this source is excluded**

Manulife's owned and leased vehicles are considered to be a small source of GHG emissions relative to our owned and leased real estate portfolio. Efforts continue to focus on improving GHG emission reporting from our owned and leased real estate portfolio at this time.

---

**Source**

Refrigerants - real estate portfolio

**Relevance of Scope 1 emissions from this source**

Emissions are not relevant

**Relevance of location-based Scope 2 emissions from this source**

No emissions excluded

**Relevance of market-based Scope 2 emissions from this source (if applicable)**

No emissions excluded

**Explain why this source is excluded**

Our real estate property managers are not currently required to report refrigerant top-ups or other proxy data that would allow for calculating these GHG emissions. We estimate that refrigerants represent less than 1% of our emissions.

---

**Source**

Back-up fuel consumption - real estate portfolio

**Relevance of Scope 1 emissions from this source**

Emissions are not relevant

**Relevance of location-based Scope 2 emissions from this source**

No emissions excluded

**Relevance of market-based Scope 2 emissions from this source (if applicable)**

No emissions excluded

**Explain why this source is excluded**

We currently do not track diesel use for back-up power in our real estate portfolio. Based on individual building-level inventories, we estimate these emissions represent less than 1% of our total real estate emissions.

---

**Source**

Hancock National Resource Group (HNRG)

**Relevance of Scope 1 emissions from this source**

Emissions are relevant and calculated, but not disclosed

**Relevance of location-based Scope 2 emissions from this source**

Emissions are relevant and calculated, but not disclosed

**Relevance of market-based Scope 2 emissions from this source (if applicable)**

No emissions excluded

**Explain why this source is excluded**

The portion of HNRG's assets owned by Manulife make up less than 1% of Manulife's General Account assets. 2018 was the first time HNRG calculated their emissions but were not ready to publicly disclose. It is estimated they make up approximated 50% of total GHG Inventory.

---

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**(C6.5) Account for your organization's Scope 3 emissions, disclosing and explaining any exclusions.****Purchased goods and services****Evaluation status**

Relevant, calculated

**Metric tonnes CO2e**

13463

**Emissions calculation methodology**

We calculated the GHG emissions associated with our transactional and office paper. We apply a conversion factor of 2.541 mtCO2e/tonne of paper purchased. This emission factor is taken from the Environmental Paper Network 2015, Paper Calculator. We used the emission factor for uncoated freesheet, 0% recycled to be conservative in our calculation.

**Percentage of emissions calculated using data obtained from suppliers or value chain partners**

100

**Explanation****Capital goods****Evaluation status**

Relevant, not yet calculated

**Metric tonnes CO2e**

&lt;Not Applicable&gt;

**Emissions calculation methodology**

&lt;Not Applicable&gt;

**Percentage of emissions calculated using data obtained from suppliers or value chain partners**

&lt;Not Applicable&gt;

**Explanation****Fuel-and-energy-related activities (not included in Scope 1 or 2)****Evaluation status**

Relevant, not yet calculated

**Metric tonnes CO2e**

&lt;Not Applicable&gt;

**Emissions calculation methodology**

&lt;Not Applicable&gt;

**Percentage of emissions calculated using data obtained from suppliers or value chain partners**

&lt;Not Applicable&gt;

**Explanation**



## Upstream transportation and distribution

### Evaluation status

Not relevant, explanation provided

### Metric tonnes CO2e

<Not Applicable>

### Emissions calculation methodology

<Not Applicable>

### Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

### Explanation

As a financial institution, emissions associated with upstream transportation and distribution are not considered material in the context of our Scope 3 value chain emission inventory.

## Waste generated in operations

### Evaluation status

Relevant, calculated

### Metric tonnes CO2e

2479

### Emissions calculation methodology

We measure the amount of waste to landfill in our real estate portfolio and apply a mixed municipal solid waste emission factor of 0.39 mtCO2e/tonne for waste. The emission factor comes from the EPA Waste Reduction Model (WARM), version 14, March 2016.

### Percentage of emissions calculated using data obtained from suppliers or value chain partners

### Explanation

## Business travel

### Evaluation status

Relevant, calculated

### Metric tonnes CO2e

27396

### Emissions calculation methodology

Employee business travel by air and by passenger car mileage is tracked centrally by our procurement team who works with our travel partners in Canada and the U.S. Emission factors for air travel are provided by the 2018 Guidelines to UK Defra GHG Conversion Factors for Company Reporting. Three different emission factors were used 0.16 kg CO2e/km for a short-haul (<483 km), 0.09 kg CO2e/km for medium-haul (>+483km, <3700 km) and 0.11 kg CO2e/km for long haul (>+ 3700km). For personal car mileage the emission factor is from the EPA Emission Factor for Greenhouse Gas Inventories, March 2018.

### Percentage of emissions calculated using data obtained from suppliers or value chain partners

### Explanation

## Employee commuting

### Evaluation status

Relevant, not yet calculated

### Metric tonnes CO2e

<Not Applicable>

### Emissions calculation methodology

<Not Applicable>

### Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

### Explanation

## Upstream leased assets

### Evaluation status

Relevant, not yet calculated

### Metric tonnes CO2e

<Not Applicable>

### Emissions calculation methodology

<Not Applicable>

### Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

### Explanation

## Downstream transportation and distribution

### Evaluation status

Not relevant, explanation provided

### Metric tonnes CO2e

<Not Applicable>

### Emissions calculation methodology

<Not Applicable>

### Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

### Explanation

As a financial institution, emissions associated with downstream transportation and distribution are not considered material in the context of our scope 3 value chain emission inventory.

## Processing of sold products

### Evaluation status

Not relevant, explanation provided

### Metric tonnes CO2e

<Not Applicable>

### Emissions calculation methodology

<Not Applicable>

### Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

### Explanation

As a financial institution, emissions associated with the processing of sold products are not considered material in the context of our scope 3 value chain emission inventory.

## Use of sold products

### Evaluation status

Not relevant, explanation provided

### Metric tonnes CO2e

<Not Applicable>

### Emissions calculation methodology

<Not Applicable>

### Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

### Explanation

As a financial institution, emissions associated with the use of sold products are not considered material in the context of our scope 3 value chain emission inventory.

## End of life treatment of sold products

### Evaluation status

Not relevant, explanation provided

### Metric tonnes CO2e

<Not Applicable>

### Emissions calculation methodology

<Not Applicable>

### Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

### Explanation

As a financial institution, emissions associated with the end of life treatment of sold products are not considered material in the context of our scope 3 value chain emission inventory.

## Downstream leased assets

### Evaluation status

Relevant, not yet calculated

### Metric tonnes CO2e

<Not Applicable>

### Emissions calculation methodology

<Not Applicable>

### Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

### Explanation

## Franchises

### Evaluation status

Not relevant, explanation provided

### Metric tonnes CO2e

<Not Applicable>

### Emissions calculation methodology

<Not Applicable>

### Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

### Explanation

Manulife does not operate under a franchise business model.

## Investments

### Evaluation status

Relevant, not yet calculated

### Metric tonnes CO2e

<Not Applicable>

### Emissions calculation methodology

<Not Applicable>

### Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

### Explanation

**Other (upstream)**

**Evaluation status**

**Metric tonnes CO2e**

<Not Applicable>

**Emissions calculation methodology**

<Not Applicable>

**Percentage of emissions calculated using data obtained from suppliers or value chain partners**

<Not Applicable>

**Explanation**

**Other (downstream)**

**Evaluation status**

**Metric tonnes CO2e**

<Not Applicable>

**Emissions calculation methodology**

<Not Applicable>

**Percentage of emissions calculated using data obtained from suppliers or value chain partners**

<Not Applicable>

**Explanation**

C6.7

---

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

No

C6.10

---

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

**Intensity figure**

0.0000253989

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

989846

**Metric denominator**

unit total revenue

**Metric denominator: Unit total**

38972000000

**Scope 2 figure used**

Location-based

**% change from previous year**

107

**Direction of change**

Increased

**Reason for change**

For 2018, revenue before realized and unrealized investment gains and losses was \$48.0 billion compared with \$52.6 billion in 2017. The decrease was due to the net impact on ceded premiums of reinsuring a block of our legacy U.S. individual pay-out annuity business in 2018 and a change to a reinsurance agreement in Canada Group Benefits, partially offset by business growth in Asia. In 2018, the net realized and unrealized investment losses on assets supporting insurance and investment contract liabilities and on the macro hedging program were \$9.0 billion compared with a gain of \$5.7 billion for full year 2017. The full year 2018 loss largely resulted from interest rate increases in both North America and Asia. Additional losses were driven by declining equity markets as all major indices were down during the year. In 2017, the net realized and unrealized investment gains on assets supporting insurance and investment contract liabilities and on the macro hedging program were \$5.7 billion, primarily driven by the decline in Canadian, U.S. and Hong Kong interest rates.

---

**Intensity figure**

26.6

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

989846

**Metric denominator**

full time equivalent (FTE) employee

**Metric denominator: Unit total**

37263

**Scope 2 figure used**

Location-based

**% change from previous year**

31

**Direction of change**

Increased

**Reason for change**

Total FTE increased from 35,153 in 2017 to 37,263 in 2018. The increase is due to including emissions from acquisitions made by NAL Resources in Q4 of 2017 which resulted in a doubling of production. We are working on revising our baseline to include the acquisition.

---

**C7. Emissions breakdowns**

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## C7.1

---

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

Yes

### C7.1a

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

Greenhouse gas	Scope 1 emissions (metric tons of CO <sub>2</sub> e)	GWP Reference
CO <sub>2</sub>	386683	IPCC Fourth Assessment Report (AR4 - 100 year)
CH <sub>4</sub>	279880	IPCC Fourth Assessment Report (AR4 - 100 year)
N <sub>2</sub> O	1477	IPCC Fourth Assessment Report (AR4 - 100 year)

## C7.2

---

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

Country/Region	Scope 1 emissions (metric tons CO <sub>2</sub> e)
Canada	664373
United States of America	3597
Other, please specify (Rest Of World (ROW))	70

## C7.3

---

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

By business division

### C7.3a

---

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

Business division	Scope 1 emissions (metric ton CO <sub>2</sub> e)
Corporate	3772
Real Estate	25299
NAL Resources	638970

## C7.5

---

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

Country/Region	Scope 2, location-based (metric tons CO2e)	Scope 2, market-based (metric tons CO2e)	Purchased and consumed electricity, heat, steam or cooling (MWh)	Purchased and consumed low-carbon electricity, heat, steam or cooling accounted in market-based approach (MWh)
Canada	175292	172513	481527	12038
United States of America	88522	77151	223641	39366
Other, please specify (Rest of World (ROW))	57992	57992	97831	0

**C7.6**

---

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

By business division

**C7.6a**

---

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

Business division	Scope 2, location-based emissions (metric tons CO2e)	Scope 2, market-based emissions (metric tons CO2e)
Corporate	51814	44936
Real Estate	134582	127310
NAL Resources	135410	135410

**C7.9**

---

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

Increased

**C7.9a**

---

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

	Change in emissions (metric tons CO2e)	Direction of change	Emissions value (percentage)	Please explain calculation
Change in renewable energy consumption	0	No change	0	
Other emissions reduction activities	0	No change	0	
Divestment		<Not Applicable>		N/A
Acquisitions	237701	Increased	33	The increase is due to including emissions from acquisitions made by NAL Resources in Q4 of 2017 which resulted in a doubling of production. The associated emissions increase was 237,701 tCO2e, and our total Scope 1 and Scope 2 emissions reported in the previous year was 715,078 tCO2e, therefore we arrived at 33% through $(237701/715,078) * 100 = 33\%$ . We are working on revising our baseline to include the acquisition.
Mergers		<Not Applicable>		N/A
Change in output		<Not Applicable>		N/A
Change in methodology		<Not Applicable>		N/A
Change in boundary		<Not Applicable>		N/A
Change in physical operating conditions		<Not Applicable>		N/A
Unidentified	37068	Increased	5	This increase is due to unidentified reasons. The associated emission increase was 37,068 tCO2e, and our total Scope 1 and Scope 2 emissions reported in the previous year was 715,078 tCO2e, therefore we arrived at 5% through $(37068/715078)*100 = 5\%$
Other		<Not Applicable>		N/A

## C7.9b

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

Location-based

## C8. Energy

### C8.1

**(C8.1) What percentage of your total operational spend in the reporting year was on energy?**

More than 0% but less than or equal to 5%

### C8.2



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

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

**C8.2a**

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

	Heating value	MWh from renewable sources	MWh from non-renewable sources	Total MWh
Consumption of fuel (excluding feedstock)	HHV (higher heating value)	0	1757580	1757580
Consumption of purchased or acquired electricity	<Not Applicable>	51404	731506	782910
Consumption of purchased or acquired heat	<Not Applicable>	<Not Applicable>	<Not Applicable>	<Not Applicable>
Consumption of purchased or acquired steam	<Not Applicable>	0	20053	20053
Consumption of purchased or acquired cooling	<Not Applicable>	0	36	36
Consumption of self-generated non-fuel renewable energy	<Not Applicable>	<Not Applicable>	<Not Applicable>	<Not Applicable>
Total energy consumption	<Not Applicable>	51404	2509175	2560579

**C8.2b**

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

	Indicate whether your organization undertakes this fuel application
Consumption of fuel for the generation of electricity	No
Consumption of fuel for the generation of heat	Yes
Consumption of fuel for the generation of steam	No
Consumption of fuel for the generation of cooling	No
Consumption of fuel for co-generation or tri-generation	No

**C8.2c**

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

**Fuels (excluding feedstocks)**

Natural Gas

**Heating value**

HHV (higher heating value)

**Total fuel MWh consumed by the organization**

1748526

**MWh fuel consumed for self-generation of electricity**

<Not Applicable>

**MWh fuel consumed for self-generation of heat**

<Not Applicable>

**MWh fuel consumed for self-generation of steam**

<Not Applicable>

**MWh fuel consumed for self-generation of cooling**

<Not Applicable>

**MWh fuel consumed for self-cogeneration or self-trigeneration**

<Not Applicable>

**Comment**

---

**Fuels (excluding feedstocks)**

Motor Gasoline

**Heating value**

HHV (higher heating value)

**Total fuel MWh consumed by the organization**

9053

**MWh fuel consumed for self-generation of electricity**

<Not Applicable>

**MWh fuel consumed for self-generation of heat**

<Not Applicable>

**MWh fuel consumed for self-generation of steam**

<Not Applicable>

**MWh fuel consumed for self-generation of cooling**

<Not Applicable>

**MWh fuel consumed for self-cogeneration or self-trigeneration**

<Not Applicable>

**Comment**

---

**C8.2d**

---

**(C8.2d) List the average emission factors of the fuels reported in C8.2c.**

**Motor Gasoline**

**Emission factor**

2.453

**Unit**

kg CO2e per liter

**Emission factor source**

Environment Canada National Inventory Report 1990-2016, Part 2, Annex 6, Table A6-12, written 2018

**Comment**

**Natural Gas**

**Emission factor**

1.945

**Unit**

kg CO2e per m3

**Emission factor source**

US EPA's Emission Factors Hub, March 2018 (<http://www.epa.gov/climateleaders/guidance/ghg-emissions.html>). Conversion factor for Btu to m3 taken from Portfolio Manager Technical Reference: Thermal Conversion Factors Environment Canada National Inventory Report 1990-2016, Part 2, Annex 6 Table A6-1 and A6-2, written in 2018

**Comment**

**C8.2f**

---

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

**Basis for applying a low-carbon emission factor**

Energy attribute certificates, Renewable Energy Certificates (RECs)

**Low-carbon technology type**

Other low-carbon technology, please specify (Unknown )

**Region of consumption of low-carbon electricity, heat, steam or cooling**

North America

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

51404

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

0

**Comment**

Our operations in the US and Canada have purchased REC's to cover part of their GHG emissions during the reporting year.

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**C9. Additional metrics**

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**C9.1**

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**(C9.1) Provide any additional climate-related metrics relevant to your business.**

## C10. Verification

---

### C10.1

---

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

	Verification/assurance status
Scope 1	Third-party verification or assurance process in place
Scope 2 (location-based or market-based)	Third-party verification or assurance process in place
Scope 3	Third-party verification or assurance process in place

### C10.1a

---

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

**Scope**

Scope 1

**Verification or assurance cycle in place**

Annual process

**Status in the current reporting year**

Complete

**Type of verification or assurance**

Limited assurance

**Attach the statement**

Manulife CY2018 LR Assurance Statement.pdf

**Page/ section reference**

1-3

**Relevant standard**

ISO14064-3

**Proportion of reported emissions verified (%)**

100

---

**Scope**

Scope 2 location-based

**Verification or assurance cycle in place**

Annual process

**Status in the current reporting year**

Complete

**Type of verification or assurance**

Limited assurance

**Attach the statement**

Manulife CY2018 LR Assurance Statement.pdf

**Page/ section reference**

1-3

**Relevant standard**

ISO14064-3

---

**Proportion of reported emissions verified (%)**

100

---

**Scope**

Scope 2 market-based

**Verification or assurance cycle in place**

Annual process

**Status in the current reporting year**

Complete

**Type of verification or assurance**

Limited assurance

**Attach the statement**

Manulife CY2018 LR Assurance Statement.pdf

**Page/ section reference**

1-3

**Relevant standard**

ISO14064-3

**Proportion of reported emissions verified (%)**

100

---

## C10.1b

---

**(C10.1b) Provide further details of the verification/assurance undertaken for your Scope 3 emissions and attach the relevant statements.**

**Scope**

Scope 3- at least one applicable category

**Verification or assurance cycle in place**

Annual process

**Status in the current reporting year**

Complete

**Attach the statement**

Manulife CY2018 LR Assurance Statement.pdf

**Page/section reference**

1-3

**Relevant standard**

ISO14064-3

---

## C10.2

---

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

No, but we are actively considering verifying within the next two years

## C11. Carbon pricing

---

## C11.1

---

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

Yes

## C11.1a

---

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

Alberta carbon tax

Alberta SGER

Other carbon tax, please specify (Canadian Federal Carbon Tax)

## C11.1b

---

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

### Alberta SGER

**% of Scope 1 emissions covered by the ETS**

17

**Period start date**

January 1 2018

**Period end date**

December 31 2018

**Allowances allocated**

0

**Allowances purchased**

0

**Verified emissions in metric tons CO<sub>2</sub>e**

0

**Details of ownership**

Other, please specify (Unknown at this time )

**Comment**

Alberta Environment has not completed the rollout of the implications related to gas plants that report under CCIR. Expect Q3 2018.

## C11.1c

---

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

**Alberta carbon tax**

**Period start date**

January 1 2018

**Period end date**

December 31 2018

**% of emissions covered by tax**

100

**Total cost of tax paid**

**Comment**

This coverage is 100% of NAL's Alberta emissions.

**Other carbon tax, please specify**

**Period start date**

July 1 2023

**Period end date**

December 31 2023

**% of emissions covered by tax**

100

**Total cost of tax paid**

40000000

**Comment**

Unmitigated estimate of \$40MM.

**C11.1d**

---

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

NAL: our strategy to comply with the systems in which we participate is to use internal emission manager software to continually monitor GHG emissions and prepare and send annual reports to requested government authorities. We use the information collected here to determine ways to reduce our direct GHG emissions. An example of how we have applied our strategy is the setting of a GHG target in 2017. The target is for a 50% reduction in GHG emission intensity (metric tonnes of CO<sub>2</sub>e per BOE) over five years (2017 to 2022).

**C11.2**

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

No

**C11.3**

---

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

Yes

**C11.3a**

---

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

**Objective for implementing an internal carbon price**

Change internal behavior

**GHG Scope**

Scope 1

Scope 2

**Application**

Carbon Tax is applied to all areas of the business including corporate building, field operations, transportation.

**Actual price(s) used (Currency /metric ton)**

30

**Variance of price(s) used**

In 2018 AB \$30/tonne increasing to \$50/tonne in 2023. There is currently no carbon tax in Saskatchewan.

**Type of internal carbon price**

Shadow price

Implicit price

**Impact & implication**

---

**C12. Engagement**

---

**C12.1**

---

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

Yes, our customers

Yes, other partners in the value chain

**C12.1b**

---



**(C12.1b) Give details of your climate-related engagement strategy with your customers.**

**Type of engagement**

Education/information sharing

**Details of engagement**

Run an engagement campaign to educate customers about the climate change impacts of (using) your products, goods, and/or services

**% of customers by number**

100

**% Scope 3 emissions as reported in C6.5**

0

**Please explain the rationale for selecting this group of customers and scope of engagement**

Tenants' behaviour has major impacts on a building's energy usage and waste production as well as the use of alternate transportation and other factors that can mitigate climate impacts. By engaging tenants, Real Estate can have a much greater impact. All Real Estate properties are encouraged to participate in some form of tenant engagement. 100% - Our Sustainable Building Standards are applicable to all properties and include tenant engagement strategies and tenant campaign materials for all properties.

**Impact of engagement, including measures of success**

Manulife's Real Estate division engages with tenants (i.e. customers) to foster a commitment to energy conservation, waste and carbon emission reductions. E-mail communications, tenant sustainability handbooks, newsletters, building campaign posters, LCD displays in elevators and building websites are all utilized to promote and provide updates on Manulife's initiatives and to offer ongoing reinforcement and continual education. Success is measured by improvements to footprint year over year. Real Estate has a comprehensive Sustainable Building Standards program which promotes energy and water reduction, and tenant engagement and provide properties with resources to support their sustainability activities.

**Type of engagement**

Education/information sharing

**Details of engagement**

Share information about your products and relevant certification schemes (i.e. Energy STAR)

**% of customers by number**

100

**% Scope 3 emissions as reported in C6.5**

0

**Please explain the rationale for selecting this group of customers and scope of engagement**

Real Estate fund investors increasingly care about climate risks and opportunities and want to see that they are being managed. Real Estate, therefore, wants to demonstrate to investors that climate change and sustainability are important and are managed in their portfolios. All investors are engaged through GRESB and sustainability reporting initiatives. 100% of our properties are included in our GRESB response. This information is available to investors. Further, we list the percentage of our portfolio with building certifications (LEED, Energy Star) in our Sustainability Report, which is publicly available.

**Impact of engagement, including measures of success**

Manulife Real Estate participates in the Global Real Estate Sustainability Benchmark (GRESB) each year for all funds. GRESB is an investor led initiative to benchmark real estate funds on sustainability performance, including aspects of climate risk and opportunity. In addition, Real Estate produces an annual sustainability report each year for all stakeholders including investors. The sustainability report includes a section on supporting the transition to a clean economy that details how Real Estate is addressing risks and opportunities related to climate change.

**C12.1c**

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

Manulife considers other partners in the value chain to be employees, regulators, civil society and industry peers. The purpose of our climate-related engagement activities is to build our own capacity/knowledge on climate issues, help capacity build in our sector, and ensure our value chain is aligned on the management of climate-related issues.

In 2018, Manulife collaborated on the following climate-related engagement strategies:

- Manulife's Chief Financial Officer signed the Accounting for Sustainability (A4S) letter supporting the recommendations of the Financial Stability Board's Task Force on Climate-related Financial Disclosures.
- Manulife Asset Management (MAM), Manulife's global third-party asset management arm, was one of the founding members of the Climate Action 100+, a five-year collaborative engagement initiative involving more than 200 institutional investors. Through this initiative, MAM will engage with investee companies to better understand their climate risk plans and disclosures, and advocate for better practices where necessary.
- Manulife Asset Management participated in the UNEP FI investor pilot of the TCFD recommendations.
- Hancock Natural Resources Group (HNRG) sponsored the Massachusetts Institute of Technology's Joint Program on the Science and Policy of Global Change, providing HNRG with cutting-edge, authoritative, peer-reviewed science related to climate change, drawing upon a range of academic disciplines from oceanography to economics.
- Manulife partnered with the Intact Centre for Climate Adaptation at the University of Waterloo to launch a foundational study of the impact of climate change on health.
- Manulife Real Estate trained more than 200 of its employees on applying sustainability fundamentals in their roles.
- Manulife Real Estate established a cross-company renewable energy working group to explore future low-carbon and carbon-free investment opportunities.
- Manulife Real Estate developed a network of more than 125 green champions, each of whom acts as the sustainability point person and role model at their respective properties.
- Manulife Real Estate is a member of the BOMA Resilience Committee to draft flood resilient guidelines for commercial properties
- Manulife Real Estate participated in consultations for the Federal Advisory Council on Climate Action and the Expert Panel on Sustainable Finance
- Manulife Corporate Sustainability team is working with Intact Centre on Climate Adaptation at the University of Waterloo to follow up on our 2018 report "After the Flood: The Impact of Climate Change on Mental Health and Lost Time From Work". Our hope is to use quantitative data to gain more insight about the impacts of flooding and other natural disasters on mental health. We are currently in a preliminary phase and will continue advancing the project throughout 2019.

## **C12.3**

---

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

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

## **C12.3a**

---

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

Focus of legislation	Corporate position	Details of engagement	Proposed legislative solution
Cap and trade	Support	The Oregon State Legislature is advancing Cap and Trade legislation (HB2020). A coalition of forest owners and managers, of which HHNRG is one, has promoted the appropriate treatment of forests, specifically carbon offset provisions for forestry. Engagement has been by direct lobbying, drafting of legislative concepts, and reviewing legislative language.	Support HB2020, specifically the forestry provisions.
Other, please specify (U.S. Climate Policy )	Neutral	National Alliance of Forest Owners (NAFO) and by extension HNRG is attempting to clarify the treatment of carbon emissions from forest biomass as carbon beneficial.	Amendment to the Clean Air Act

**C12.3b**

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

Yes

**C12.3c**

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

**Trade association**

Canadian Association of Petroleum Producers

**Is your position on climate change consistent with theirs?**

Consistent

**Please explain the trade association's position**

CAPP's position on climate change policy is that it should deliver economic growth, environmental protection and secure and reliable energy supply. It should be designed to be efficient, predictable and stable, and promote investment in technology that allows the Canadian industry to maintain competitive with other foreign jurisdictions.

**How have you influenced, or are you attempting to influence their position?**

NAL is actively engaged with the CAPP Board of Governors as well as in several CAPP committees and executive policy groups. Through NAL's participation in CAPP governance, the company is in a position to influence policy positions related to climate change.

**Trade association**

National Alliance of Forest Owners (NAFO)

**Is your position on climate change consistent with theirs?**

Consistent

**Please explain the trade association's position**

This industry group is actively engaged in US policy discussions surrounding EPA GHG reporting for biomass combustion for energy generation.

**How have you influenced, or are you attempting to influence their position?**

Member of National Alliance of Forest Owners.

**Trade association**

Australian Forest Products Association (AFPA)

**Is your position on climate change consistent with theirs?**

Consistent

**Please explain the trade association's position**

AFPA is lobbying the Australian government to influence climate policy development. The AFPA is supportive of a carbon price,

and forest carbon offsets, as long as these policies/programs don't impact the competitiveness of Australia's forest products industry.

**How have you influenced, or are you attempting to influence their position?**

Member of Australian Forest Products Association.

---

**Trade association**

U.S. Industrial Pellet Association (USIPA)

**Is your position on climate change consistent with theirs?**

Consistent

**Please explain the trade association's position**

USIPA is actively engaged in US and European policy discussions related to renewable energy directives and sustainability of biomass supply criteria.

**How have you influenced, or are you attempting to influence their position?**

Member of U.S. Industrial Pellet Association.

---

**Trade association**

Geneva Association

**Is your position on climate change consistent with theirs?**

Consistent

**Please explain the trade association's position**

The Geneva Association put out a Climate Risk Statement in support of adaptation measures and other policy changes: <https://www.genevaassociation.org/research-topics/extreme-events-and-climate-risk/climate-risk-statement-geneva-association>.

**How have you influenced, or are you attempting to influence their position?**

Manulife is a member.

---

**Trade association**

REALpac

**Is your position on climate change consistent with theirs?**

Consistent

**Please explain the trade association's position**

From the REALpac website "REALpac recognizes the significant environmental, social, and economic impact of Canada's the commercial real property sector, the need for an industrial driven approach toward supporting national and provincial strategies on greenhouse gas reduction, the importance of reasoned discourse with political and policy officials and the value of persuasive arguments for sustainable economic growth. The Association also recognizes the need for industry-wide "green" benchmarking data and shared best practices, and is working with its constituents and its national and international counterparts to help to responsibly ensure the sector is well-positioned for a sustainable future".

**How have you influenced, or are you attempting to influence their position?**

A Manulife employee sits on the REALpac ESG committee and provides contributions for Ontario's future building energy benchmarking and mandatory reporting requirements.

---

**Trade association**

The Canadian Green Building Council (CaGBC)

**Is your position on climate change consistent with theirs?**

Consistent

**Please explain the trade association's position**

The CaGBC provided recommendations on how to help meet Canada's GHG reduction goals in a 2016 report. The report outlines four key recommendations aimed at meeting Canada's climate change targets while fueling the growth of Canada's sustainable building industry. The four recommendations include new data proving the effectiveness of these measures, if taken immediately: 1. Meet Canada's climate change targets by investing in and providing incentives for energy efficiency improvements (such as recommissioning, deep retrofits, solar and renewable onsite energy systems, and switching of fuel systems) in existing buildings commercial, institutional and high-rise residential buildings over 25,000 sq.ft., to reach high-performance energy efficiency. 2. Strengthen building performance by advancing building energy benchmarking, reporting and disclosure initiatives 3. Invest in net-zero buildings 4. Reduce the Government's GHG Emissions.

---

**How have you influenced, or are you attempting to influence their position?**

A Manulife Real Estate employee sits on the Board of the CaGBC and is chair of the Board. The Board member will provide his experience in property and asset management and contribute to the overall governance of the organization.

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**Trade association**

A Better City

**Is your position on climate change consistent with theirs?**

Consistent

**Please explain the trade association's position**

A Better City is a diverse group of business leaders united around a common goal — to enhance Boston and the region's economic health, competitiveness, vibrancy, sustainability and quality of life. A Better City develops solutions and influences policy in three critical areas central to the Boston region's economic competitiveness and growth — transportation and infrastructure, land use and development, and environment and energy. Under environment and energy, A Better City has three focus areas, including reducing carbon emissions and building climate resiliency. A better City has developed several resources and undertaken multiple initiatives to advance these areas.

**How have you influenced, or are you attempting to influence their position?**

Member

---

**Trade association**

Clean Energy BC

**Is your position on climate change consistent with theirs?**

Consistent

**Please explain the trade association's position**

From the Clean Energy BC website, "Clean Energy BC has been the voice of British Columbia's Clean Energy industry for the past 25 years. The purpose of the association is to: - Promote BC's clean energy industry - Assist the growth of manufacturing supply, and service industry in BC serving clean energy production in BC and around the world. - Build relationships with all levels of government, BC Hydro, First Nations, environmental organizations and the public to improve the sector's social licence. – Ensure the business and regulatory climate is reasonable and efficient for operating assets. - Improve the regulatory and economic environments for clean energy production in BC - Work with environmental organizations to develop science-based clean energy development models.

**How have you influenced, or are you attempting to influence their position?**

An employee is a founding member of Clean Energy BC. We have participated directly with this association to lobby for new generation programs and have assisted in drafting or commenting on new procurement initiatives.

---

**Trade association**

Ontario Waterpower Association (OWA)

**Is your position on climate change consistent with theirs?**

Consistent

**Please explain the trade association's position**

From the OWA website, "OWA is a not-for-profit, member-based organization promoting the sustainable development of waterpower resources in Ontario." OWA is a strong advocate of climate change initiatives.

**How have you influenced, or are you attempting to influence their position?**

An employee is a founding member of OWA. We have participated directly with this association to lobby for new generation programs and have assisted in drafting or commenting on new procurement initiatives.

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**C12.3d**

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

No

**C12.3e**

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**(C12.3e) Provide details of the other engagement activities that you undertake.**

HNRG is a member of the Climate Smart Land Network (CSLN). CSLN is an alliance of forest landowners and land managers that are working together to respond to the challenges posed by climate change. The program is structured to assist Network members in identifying and implementing pragmatic on-the-ground solutions that both meet their management goals and increase natural system resiliency to climate change.

HNRG sponsors the Joint Program on the Science and Policy of Global Change at the Massachusetts Institute of Technology (MIT). The Joint Program provides sponsors access to historical information, analysis, projections and modeling capabilities focused on climate change and its impacts using state-of-the-art economic and earth system models.

The Global Real Estate Sustainability Benchmark (GRESB) – Manulife Real Estate employees participated in GRESB industry events in Canada, including a panel on transitioning to a low carbon in real estate.

Real Estate is a member of the BOMA Resilience Committee to draft flood resilient guidelines for commercial properties. Real Estate participated in consultations for the Federal Advisory Council on Climate Action and the Expert Panel on Sustainable Finance.

NAL has recently engaged Saskatchewan Research Council (SRC). This organization has developed a technical handbook identifying climate issues with potential technologies, equipment, process and solutions to implement to effectively reduce, capture and re-use emissions.

NAL is actively engaged on several committees with the Petroleum Technology Alliance of Canada (PTAC). This funding organization is in a position to test new technologies providing feedback to regulatory bodies and industry on solutions to address the climate change landscape.

Manulife Asset Management became a signatory to the CDP in January 2018.

Manulife Corporate Sustainability team is working with Intact Centre on Climate Adaptation at the University of Waterloo to follow up on our 2018 report “After the Flood: The Impact of Climate Change on Mental Health and Lost Time From Work”. Our hope is to use quantitative data to gain more insight about the impacts of flooding and other natural disasters on mental health. We are currently in a preliminary phase and will continue advancing the project throughout 2019.

**C12.3f**

---

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

In 2018 Manulife introduced the Sustainability Center of Expertise, made up of sustainability leads across the Business that meet formally on a monthly basis. This group also engages with Regulatory and Public Affairs group to ensure the sharing of information and alignment.

**C12.4**

---

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

**Publication**

In mainstream reports

**Status**

Complete

**Attach the document**

Annual Report 2018.pdf

**Page/Section reference**

Risk Management p. 36 Risk factors p. 70 Governance, Strategy and emission figures p.40

**Content elements**

Governance  
Strategy  
Risks & opportunities  
Emissions figures

**Comment**

---

**Publication**

In voluntary sustainability report

**Status**

Complete

**Attach the document**

2018 Sustainability Report and Public Accountability Statement.pdf

**Page/Section reference**

1-74

**Content elements**

Governance  
Strategy  
Risks & opportunities  
Emissions figures  
Other metrics

**Comment**

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## C14. Signoff

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### C-FI

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**(C-FI) Use this field to provide any additional information or context that you feel is relevant to your organization's response. Please note that this field is optional and is not scored.**

### C14.1

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

	Job title	Corresponding job category
Row 1	CFO, Manulife	Chief Financial Officer (CFO)

## SC. Supply chain module

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### SC0.0

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(SC0.0) If you would like to do so, please provide a separate introduction to this module.

### SC0.1

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(SC0.1) What is your company's annual revenue for the stated reporting period?

	Annual Revenue
Row 1	38972000000

### SC0.2

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(SC0.2) Do you have an ISIN for your company that you would be willing to share with CDP?

Yes

### SC0.2a

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(SC0.2a) Please use the table below to share your ISIN.

	ISIN country code (2 letters)	ISIN numeric identifier and single check digit (10 numbers overall)
Row 1	CA	56501R1064

### SC1.1

---

(SC1.1) Allocate your emissions to your customers listed below according to the goods or services you have sold them in this reporting period.

**Requesting member**

Accenture

**Scope of emissions**

Scope 1

**Allocation level**

Company wide

**Allocation level detail**

<Not Applicable>

**Emissions in metric tonnes of CO<sub>2</sub>e**

56

**Uncertainty (±%)**

20

**Major sources of emissions**



Stationary combustion

**Verified**

No

**Allocation method**

Allocation based on the market value of products purchased

**Please explain how you have identified the GHG source, including major limitations to this process and assumptions made**

Corporate level GHG emissions data was used to produce this allocation estimate. The market value of services purchased by Accenture was divided by the total market value of services delivered by Manulife in 2018. We used this proportion to allocate Manulife's corporate-level Scope 1 emissions data to Accenture. There are significant limitations to this process, namely that the delivery of insurance services is not directly linked to the GHG emitting activities of the firm which are located within Manulife's investment management division.

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**Requesting member**

Accenture

**Scope of emissions**

Scope 2

**Allocation level**

Company wide

**Allocation level detail**

<Not Applicable>

**Emissions in metric tonnes of CO2e**

27

**Uncertainty (±%)**

20

**Major sources of emissions**

Purchased electricity, district heating and cooling

**Verified**

No

**Allocation method**

Allocation based on the market value of products purchased

**Please explain how you have identified the GHG source, including major limitations to this process and assumptions made**

Corporate level GHG emissions data was used to produce this allocation estimate. The market value of services purchased by Accenture was divided by the total market value of services delivered by Manulife in 2018. We used this proportion to allocate Manulife's corporate-level scope 2 GHG emissions data to Accenture. There are significant limitations to this process, namely that the delivery of insurance services is not directly linked to the GHG emitting activities of the firm which are located within Manulife's investment management division.

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**Requesting member**

TD Bank Group

**Scope of emissions**

Scope 1

**Allocation level**

Company wide

**Allocation level detail**

<Not Applicable>

**Emissions in metric tonnes of CO2e**

4314

**Uncertainty (±%)**

20

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**Major sources of emissions**

Stationary combustion

**Verified**

No

**Allocation method**

Allocation based on the market value of products purchased

**Please explain how you have identified the GHG source, including major limitations to this process and assumptions made**

Corporate level GHG emissions data was used to produce this allocation estimate. The market value of services purchased by TD Bank Group was divided by the total market value of services delivered by Manulife in 2018. We used this proportion to allocate Manulife's corporate-level Scope 1 emissions data to TD Bank Group. There are significant limitations to this process, namely that the delivery of insurance services is not directly linked to the GHG emitting activities of the firm which are located within Manulife's asset management division.

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**Requesting member**

TD Bank Group

**Scope of emissions**

Scope 2

**Allocation level**

Company wide

**Allocation level detail**

<Not Applicable>

**Emissions in metric tonnes of CO<sub>2</sub>e**

2078

**Uncertainty (±%)**

20

**Major sources of emissions**

Purchased electricity, district heating and cooling

**Verified**

No

**Allocation method**

Allocation based on the market value of products purchased

**Please explain how you have identified the GHG source, including major limitations to this process and assumptions made**

Corporate level GHG emissions data was used to produce this allocation estimate. The market value of services purchased by TD Bank Group was divided by the total market value of services delivered by Manulife in 2018. We used this proportion to allocate Manulife's corporate-level scope 2 GHG emissions data to TD Bank Group. There are significant limitations to this process, namely that the delivery of insurance services is not directly linked to the GHG emitting activities of the firm which are located within Manulife's asset management division.

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**Requesting member**

Royal Bank of Canada

**Scope of emissions**

Scope 1

**Allocation level**

Company wide

**Allocation level detail**

<Not Applicable>

**Emissions in metric tonnes of CO<sub>2</sub>e**

2228

**Uncertainty (±%)**

20

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### Major sources of emissions

Stationary combustion

### Verified

No

### Allocation method

Allocation based on the market value of products purchased

### Please explain how you have identified the GHG source, including major limitations to this process and assumptions made

Corporate level GHG emissions data was used to produce this allocation estimate. The market value of services purchased by Royal Bank of Canada was divided by the total market value of services delivered by Manulife in 2018. We used this proportion to allocate Manulife's corporate-level Scope 1 emissions data to Royal Bank of Canada. There are significant limitations to this process, namely that the delivery of insurance services is not directly linked to the GHG emitting activities of the firm which are located within Manulife's asset management division.

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### Requesting member

Royal Bank of Canada

### Scope of emissions

Scope 2

### Allocation level

Company wide

### Allocation level detail

<Not Applicable>

### Emissions in metric tonnes of CO<sub>2</sub>e

1073

### Uncertainty (±%)

20

### Major sources of emissions

Purchased electricity, district heating and cooling

### Verified

No

### Allocation method

Allocation based on the market value of products purchased

### Please explain how you have identified the GHG source, including major limitations to this process and assumptions made

Corporate level GHG emissions data was used to produce this allocation estimate. The market value of services purchased by Royal Bank of Canada was divided by the total market value of services delivered by Manulife in 2018. We used this proportion to allocate Manulife's corporate-level scope 2 GHG emissions data to Royal Bank of Canada. There are significant limitations to this process, namely that the delivery of insurance services is not directly linked to the GHG emitting activities of the firm which are located within Manulife's asset management division.

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## SC1.2

### (SC1.2) Where published information has been used in completing SC1.1, please provide a reference(s).

We do not use published information to allocate emissions in SM1.1. We use primary data based on our calculated GHG Inventory and our revenue. Since we are a financial services firm, we use the economic allocation approach. This is consistent with the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard. We have allocated scope 1 and 2 emissions based on each customer's contribution to our annual revenue for the 2018 reporting year.

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## SC1.3

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**(SC1.3) What are the challenges in allocating emissions to different customers, and what would help you to overcome these challenges?**

Allocation challenges	Please explain what would help you overcome these challenges
Customer base is too large and diverse to accurately track emissions to the customer level	The following would help overcome these challenges: more demand from customers to provide these emissions allocations; a methodology to provide greater certainty that the allocation of emissions is consistent by all respondents.

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**SC1.4**

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**(SC1.4) Do you plan to develop your capabilities to allocate emissions to your customers in the future?**

No

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**SC1.4b**

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**(SC1.4b) Explain why you do not plan to develop capabilities to allocate emissions to your customers.**

The current 'allocation based on the market value of products purchased' is the most appropriate method to allocate emissions to our customers.

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**SC2.1**

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**(SC2.1) Please propose any mutually beneficial climate-related projects you could collaborate on with specific CDP Supply Chain members.**

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**SC2.2**

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**(SC2.2) Have requests or initiatives by CDP Supply Chain members prompted your organization to take organizational-level emissions reduction initiatives?**

No

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**SC3.1**

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**(SC3.1) Do you want to enroll in the 2019-2020 CDP Action Exchange initiative?**

No

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**SC3.2**

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**(SC3.2) Is your company a participating supplier in CDP's 2018-2019 Action Exchange initiative?**

No

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**SC4.1**

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**(SC4.1) Are you providing product level data for your organization's goods or services?**

No, I am not providing data

**Submit your response**

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**In which language are you submitting your response?**

English

**Please confirm how your response should be handled by CDP**

	Public or Non-Public Submission	I am submitting to	Are you ready to submit the additional Supply Chain Questions?
I am submitting my response	Public	Investors Customers	Yes, submit Supply Chain Questions now

**Please confirm below**

I have read and accept the applicable Terms