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Annual Green Bond Report – Use of Proceeds, May 2019

The MFC 3.317% CAD 600 million subordinated debt due 9 May 2028

Manulife issued its second green bond[1], 3.317% CAD 600 million subordinated debt (the 'Second Green Bond') on May 9, 2018. In the Manulife Green Bond Framework[2] (the 'Framework'), we committed to publishing annual use of proceeds reports. This report follows on our first disclosure[3] in November 2018 associated with our inaugural green bond issue. Our second disclosure presents the allocation of the debt proceeds of our Second Green Bond, environmental performance indicators, and examples of renewable energy, energy efficiency and forestry projects. Sustainalytics, a provider of environmental, social, and governance research to institutional investors issued the second-party opinion on the Framework and the annual review for this report[4].

Use of Proceeds and Environmental Performance

The proceeds of the Second Green Bond were fully allocated at issuance to renewable energy, energy efficiency, and sustainably-managed forestry projects in Canada, US and Uruguay. Thus, there is a zero balance of unallocated proceeds.

The annual environmental benefit of the Second Green Bond is estimated at 258,400 tons of avoided carbon dioxide emissions, or 430 CO_2 tons annually per CAD 1 million invested [see Table 1 on page 2 for summary of allocated amounts by the Framework's Eligibility Criteria on an aggregate portfolio basis].

Examples of Projects

Wind Energy: In August 2017, Manulife participated in a USD 136.8 million, 19.5 years amortizing B-bond offering to finance the operation of the 70 MW Wind farm located in Campo Palomas, Department of Salto, in the northwest of Uruguay. The wind farm generates approximately 200,000 MWh of renewable energy annually, enough to power 13,573 households.

Solar Energy: In December 2017, Manulife provided debt financing to support Axium Infinity Solar's CAD 540 million acquisition of a portfolio of eight solar facilities totaling 76 MW capacity located across the Province of Ontario, Canada (Brockville, Ottawa, Temiskaming Shores, Pakenham and Ingleside).

Energy Efficiency: Manulife's financing of Hannon Armstrong in 2016 funded energy conservation at the Smithsonian Institution's National Zoological Park and the Smithsonian Conservation Biology Institute outside Front Royal, Virginia, United States. The investment supports installation of high-efficiency air-cooled chillers, solar shades on skylights, 625 kW solar plant, and LED lighting upgrades in 1,088,000 square feet of buildings of the US Federal Government. The Park consists of 163 acres amid Rock Creek Park in Washington, DC, and houses approximately 2,000 animals. The project annually saves 5,852 megawatt hours of electricity and avoids 4,340 tons of carbon dioxide emissions.

Sustainably-Managed Forestry: Vinegar Bend is an 18,940-acre timberland property acquired by Manulife/Hancock Natural Resource Group in 2017 located in three counties in Alabama and three counties in Mississippi, United States. 14,140 acres are managed for pine plantation, 4,161 acres are managed as bottomland hardwood, and 640 acres are non-forested land. The pine plantations are managed on 27-30-year rotation age, while the hardwood is typically age 50+. Merchantable timber totals approximately 690,000 tons of which 70% is pine. The net greenhouse gas emission profile of the property is 136,272 tons of avoided emissions per year.

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[1] Manulife's green bonds are fixed income instruments with an amount equal to the net proceeds intended to be used to finance or re-finance new and/or existing Eligible Assets consistent with Manulife's Green Bond Framework

[2] Manulife Green Bond Framework is aligned with the International Capital Market Association's Green Bond Principles 2017, and directs the use of proceeds towards renewable energy, green buildings, sustainably-managed forests, energy efficiency, clean transport, sustainable water management and/or pollution prevention and control: http://www.manulife.com/servlet/servlet.FileDownload?file=00P5000000u15GVEAY

[3] Annual Green Bond Report, November 2018 for the MFC 3.0% SGD 500 million subordinated debt issue due 21 November 2029 http://manulife.force.com/servlet/servlet.FileDownload?file=00Pf2000014yDxNEAU

[4] The *Second-Party Opinion* on the Framework, the *Annual Review* of this Second Green Bond report (the limited assurance procedure) are available on the Manulife Investor Relations webpage http://manulife.force.com/investor-relations. It confirms a) the assets meet the Use of Proceeds the Eligibility Criteria outlined in the Framework, and b) Manulife reported on at least one Key Performance Indicator for each Use of Proceeds criteria in the Framework.

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Table 1: Use of Proceeds by Category on Portfolio Basis and Annual Environmental Performance of the Second Green Bond, the MFC 3.317% CAD 600 Million Subordinated Debt due 9 May 2028

Category per Green Bond Principles	Eligibility Criteria in the Manulife Green Bond Framework	Location	Green Bond Allocations (CAD million)	Manulife's share of annual energy production,energy savings, and certified acreage, allocated to Green Bond	Manulife's share of estimated annual avoided carbon dioxide emissions, allocated to Green Bond
				Energy generation (MegaWatt hour) [a]	**Avoided carbon dioxide emissions (tons) [a,b]**
Renewable Energy: Wind	Development, construction, operation, maintenance and upgrades of wind energy facilities and equipment	Uruguay	19.8	24,173	725
Renewable Energy: Solar	Development, construction, operation, maintenance and upgrades of solar energy facilities and equipment	Canada and US	333.9	77,343	19,760
				Energy savings (MegaWatt hour) [a]	**Avoided carbon dioxide emissions (tons) [a,c]**
Energy Efficiency	Development, construction, acquisition, installation, operation, upgrades to reduce energy consumption/improve resource efficiency	US	171.6	32,635	44,535
				Property 100% certified to the PEFC[e] standard (acres) [a]	**Avoided carbon dioxide emissions (tons) [a,d]**
Sustainably-Managed Forestry	Purchase and operation of forest holdings certified by credible third-parties such as FSC and PEFC	US	72.6	28,440	193,380
Total	**430 CO^2 tons/CAD 1 MM invested**		**597.9[f]**		**258,400**

Notes:

a. Manulife's share of forecast and actual energy generation, energy savings, sustainably-managed forest acreage, and estimated avoided carbon dioxide emissions are based on our debt and equity investments in the projects as a proportion of the projects' total enterprise value at the time of our capital deployment. The reported figures were scaled to the CAD 597.9 million allocation of the net proceeds from the green bond issuance.

b. We estimated avoided carbon dioxide emissions for renewable energy projects based on the energy mix in local country grids and the life-cycle emission factors for wind and solar technologies [see Methodology].

c. Avoided carbon emissions from our energy efficiency projects were estimated by the project originator Hannon Armstrong. Their CarbonCount® methodology used the estimated kilowatt hours ("kWh"), gallons of fuel oil, million British thermal units ("MMBtus") of natural gas and gallons of water saved as appropriate, for each project. The energy savings were converted into an estimate of metric tons of CO2 equivalent emissions based upon the project's location and the corresponding emissions factor data from the U.S. Government and International Energy Agency.

d. Avoided carbon emissions from our forestry projects were estimated using carbon accounting protocol by our 100%-owned timber subsidiary Hancock Natural Resource Group [see Methodology].

e. PEFC: the Programme for the Endorsement of Forest Certification, an international non-profit, non-governmnetal alliance of national forest certification systems dedicated to promoting sustainable forest management through independent third-party certification.

f. CAD 597.9 million is net proceeds from the green bond issuance, namely CAD 600 million gross issuance amount net of CAD 2.1 million transaction costs.

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Methodology

We have aligned our reporting with the International Capital Markets Association's Green Bond Principles 2018[5]. The selection of the environmental impact metrics was informed by the Harmonized Framework for Impact Reporting[6] published by a consortium of the global development banks. This framework sets out market practices for green bond reporting, including such metrics as annual energy generation, annual energy savings and reduced/avoided carbon dioxide emissions for renewable energy and energy efficiency projects. Additionally, based on our literature review and industry practice, including the emergence of the Climate Bonds' criteria for forestry, we also elected to report metrics for sustainably-managed timber projects such as percentage acreage under the forest certification system and avoided carbon dioxide emissions.

As a rule, we use project developers' avoided carbon dioxide emission estimates, where available. Where not available, we estimate, using the methodology described below. In this reporting instance, environmental metrics for energy efficiency projects were available from the project originator Hannon Armstrong. The forest-related avoided emissions were estimated by our 100%-operating subsidiary Hancock Natural Resource Group.

Renewable Energy: Avoided emissions are estimated by multiplying annual renewable energy production (in megawatt-hours) by the carbon dioxide emissions factors (tons per one megawatt-hour). Emission factors reflect emissions from fossil-fuel-powered electricity generation that are displaced by wind or solar technologies in the local country energy mix. We used emission factors for Canada and the U.S. from the tool developed by the International Renewable Energy Agency [IRENA][7]. We relied on Natural Resources Canada[8], the agency of the Government of Canada for the Canadian energy mix, and the U.S. Energy Information Administration[9] for the U.S. energy mix. IRENA's dataset is based on the lifecycle assessments by the Intergovernmental Panel on Climate Change, documented in the Special Report on Renewable Energy Sources and Climate Change Mitigation.

Our avoided emissions estimation provides a general indication of avoided emissions. We expect the estimation to evolve over time, as better information on countries' electricity use and technology displacement options becomes available.

Sustainably-Managed Forestry: Annual changes in the Hancock Timber Resource Group (HTRG) greenhouse gas (GHG) inventory are estimated using a standardized methodology developed by forest carbon accounting experts and tailored for location-specific circumstances. Final results reflect the change in carbon stored in the forest carbon 'pools' over the year as well as GHG emissions associated with certain timber operations.

Change in carbon stored is calculated as the difference in carbon stored in the forest at the beginning and end of each year. Standard industry timber inventory and appraisal approaches (e.g., timber cruising) are used to estimate 'opening' and 'closing' growing stock volumes, and these volumes are then converted into amounts of carbon stored. The equations and factors used draw from relevant reference sources (Unites States Forest Service, peer-reviewed scientific papers, among others) and are selected based on the locations and types of species in question. In addition to live tree carbon, carbon stored in standing deadwood, understory, debris, and/or harvested wood products is also considered, depending on the geographic location.

Emissions quantified from timber operations include carbon dioxide from fuel combustion in vehicles and equipment and nitrous oxide from fertilizer application. Fuel combustion emissions are estimated using assumed amounts of fuel use per acre based on past sampling of HTRG operations and standard emission factors. Fertilizer nitrous oxide emissions are estimated using typical HTRG fertilizer application rates per acre, or measured quantities where available, and emission factors published by the Intergovernmental Panel on Climate Change (IPCC) and others.

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[5] Green Bond Principles, June 2018
https://www.icmagroup.org/green-social-and-sustainability-bonds/green-bond-principles-gbp/

[6] The World Bank, *Harmonized Framework for Impact Reporting,* 2015
https://www.ifc.org/wps/wcm/connect/f932dc004ad996538a1fea4fb4720a61/Updated+logo+FINALPROPOSALIRH+CLEAN.pdf?MOD=AJPERES

[7] International Renewable Energy Agency, Avoided Emissions Calculator, 2014
http://www.irena.org/climatechange/Avoided-Emissions-Calculator

[8] Natural Resources Canada, 2016
https://www.nrcan.gc.ca/energy/electricity-infrastructure/about-electricity/7359#generation

[9] US Energy Information Administration, 2017
https://www.eia.gov/tools/faqs/faq.php?id=427&t=3