In 2017, Manulife became the 1st global life insurer to issue a green bond. This regular debt instrument with proceeds allocated to the emission-efficient assets aligns our investment and financing activities. Manulife’s Green Bond Framework (the “Framework”) is governed by Manulife’s Green Bond Council, and is consistent with the global best practice - Capital Markets Associates’ Green Bond Principles, as confirmed by a 2nd party opinion. Together with our second issuance in 2018, the two outstanding green bonds is over C$1 billion with the estimated annual environmental benefit of 240,555 tons of avoided carbon dioxide emissions.

### About sustainable finance at Manulife

Manulife is a long-term investor committed to steering its investments towards net zero emissions. As of 2021, C$42 billion or 9.8% of the C$427 billion general account assets backing in-force liabilities was invested in long-duration, carbon emission-efficient assets. These green investments are a good economic fit to the Manulife’s business model. They form part of an asset mix that optimizes risk-adjusted returns and matches the characteristics of the long-dated insurance liabilities, some of which continue for over 20 years.

<table>
<thead>
<tr>
<th>Manulife Green Investments</th>
<th>Holdings at 31/12/2021 [Canadian dollar billion]</th>
<th>Holdings at 31/12/2020 [Canadian dollar billion]</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green Buildings</td>
<td>$18.9</td>
<td>$16.9</td>
<td>Direct equity investments and commercial mortgages backed by green building certifications Leadership in Energy and Environmental Design (LEED), Buildings Owners and Managers Association (BOMA Best), and Energy Star</td>
</tr>
<tr>
<td>Renewable Energy</td>
<td>$9.5</td>
<td>$9.8</td>
<td>Private debt and equity financing of solar/wind/geothermal/waste biomass/hydro energy</td>
</tr>
<tr>
<td>Sustainably-managed Timberland</td>
<td>$4.3</td>
<td>$4.0</td>
<td>Assets operated by Manulife subsidiary MIM Timberland and Agriculture and private placements certified to Forest Stewardship Council (FSC) and Programme for the Endorsement of Forest Certification (PEFC) standards</td>
</tr>
<tr>
<td>Energy Efficiency</td>
<td>$3.4</td>
<td>$3.9</td>
<td>Private debt financing of energy efficiency upgrades at US government sites</td>
</tr>
<tr>
<td>Clean Transportation</td>
<td>$3.0</td>
<td>$2.7</td>
<td>Private debt financing of electrified transport and mass public transit</td>
</tr>
<tr>
<td>Sustainably-managed Agriculture</td>
<td>$1.6</td>
<td>$1.3</td>
<td>Investments operated by Manulife subsidiary MIM Timberland and Agriculture and certified to the Leading Harvest Standard</td>
</tr>
<tr>
<td>Sustainable Management of Water Resources</td>
<td>$0.7</td>
<td>$0.6</td>
<td>Private debt financing of water recycling and purification businesses</td>
</tr>
<tr>
<td>Green Bond Investments</td>
<td>$0.6</td>
<td>$0.7</td>
<td>Mainly private green bond placements in renewable energy, energy efficiency, clean transport, and sustainably-managed forests</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$42.0</strong></td>
<td><strong>$39.8</strong></td>
<td>General Account investments only, no third-party funds, Private debt and equity investments, no public securities, except for several green bond investments</td>
</tr>
</tbody>
</table>
| **Percent of Total General Account** | **9.8%**                                     | **9.7%**                                     | Total General Account assets: Y2021: $42.7 billion; Y2020: $41.1 billion.

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1. Manulife’s green bond is a fixed income instrument with an amount equal to the net proceeds allocated to new and/or existing Eligible Assets defined in the Manulife’s Green Bond Framework, for example - renewable energy, energy efficiency, sustainably managed forests and other investments that advance ecosystem improvements.


3. The Second-Party Opinion on the Framework, and the Annual Review of this Green Bond report (the limited assurance procedure) are available on the Manulife Investor Relations webpage under Results and Report [https://www.manulife.com/content/dam/corporate/global/en/documents/pas/MFC_GB_SP0_2017_EN.pdf](https://www.manulife.com/content/dam/corporate/global/en/documents/pas/MFC_GB_SP0_2017_EN.pdf) 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.

4. All amounts in Canadian dollars, unless otherwise stated, and for the year ending 31 December 2021.
About Manulife’s climate commitments and governance

Manulife is committed to steering our investment portfolio to be net zero by 2050. To ensure best practice in emission reduction target setting, measurement, and progress reporting, Manulife is committed to the Science Based Targets initiative. The net zero transition is managed by the general account’s Climate Change Working Group chaired by the Head of Environmental, Social and Governance Integration and consisting of senior investment officers and members of the credit and portfolio management teams.

Manulife’s Climate Action Plan is driven by the Executive Sustainability Council - the Chief Sustainability Officer and nine members of the Executive Leadership Team, including the Chief Executive Officer, and is overseen by the Board's Corporate Governance and Nominating Committee.

Manulife is also a member of global collaborations that advance integration of sustainability into financial decision-making:

- **Accounting for Sustainability** is a network of financial leaders that inspire action to shift towards resilient business models and a sustainable economy. In 2017, our Chief Financial Officer became the founding Chair of the A4S's Canadian Chapter
- **United Nations Environmental Programme – Finance Initiative** is a partnership between United Nations Environment and the global financial sector that promotes sustainable finance. Manulife has been a signatory since 2005
- **Equator Principles** are a set of voluntary guidelines that help financial institutions identify and manage environmental and social risks in project finance. Manulife committed to the principles in 2005.

For more information on Manulife’s sustainability performance, please see our [Annual Sustainability Report](#).

About this report

Consistent with our Green Bond Framework, we committed to publishing an annual use of proceeds report. This report follows on our five historical reports published in November 2018, November 2019, May 2019, May 2020 and May 2021 which are available on the Manulife’s [Investors Relations](#) webpage. This report combines the two annual use of proceeds reports into one, and shows relevant metrics by issuance, including allocation of proceeds, environmental performance indicators, and project examples. Sustainalytics - a provider of environmental, social, governance research to institutional investors - who issued the 2nd party opinion on the Framework, has reviewed this report and confirmed its alignment with the Framework.

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GREEN BOND 1: 3.0% S$ 500 MILLION SUBORDINATED DEBT DUE 21 NOVEMBER 2029

Key elements
- Use of Proceeds: Renewable energy (wind and solar)
- Geography: Canada and United States
- Management of Proceeds: All proceeds allocated at issuance; no change in allocations since issuance
- Estimated Environmental Benefit: 55,063 tons of avoided carbon dioxide emissions or 111 tons CO₂ per S$ 1 million

Use of proceeds by category on portfolio basis and environmental performance

<table>
<thead>
<tr>
<th>Project</th>
<th>Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renewable Energy: Wind</td>
<td>Province of Quebec, Canada</td>
<td>• total installed capacity: 350 Megawatt</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• estimated to power 59,500 homes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 20-year agreement with Hydro Quebec since construction 2014</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• largest wind energy facility in Canada under single PPA</td>
</tr>
<tr>
<td>Renewable Energy: Solar</td>
<td>Haldimand County, Province of Ontario, Canada</td>
<td>• total installed capacity: 100 Megawatt</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 800-acre farm with 450,000 solar panels, powering 17,000 homes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 20-year feed-in-tariff contract with HydroOne since 2015</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• one of the largest solar farms in Canada</td>
</tr>
</tbody>
</table>
GREEN BOND 2: 3.317% C$ 600 MILLION SUBORDINATED DEBT DUE 9 MAY 2028

Key elements
- Use of Proceeds: Renewable energy (wind & solar), energy efficiency of public buildings, sustainably managed forestry
- Geography: Canada, US, Uruguay, Peru
- Management of Proceeds: All proceeds allocated at issuance and an additional asset was added in 2021 due to underlying loan amortization
- Estimated Environmental Benefit: 185,492 tons of avoided carbon dioxide emissions, or 310 tons CO₂ per C$1 million

Use of proceeds by category on portfolio basis and environmental performance

<table>
<thead>
<tr>
<th>Category per Green Bond Principles</th>
<th>Eligibility Criteria in the Manulife Green Bond Framework</th>
<th>Location</th>
<th>Green Bond Original Allocations (C$ million)</th>
<th>% Original Allocation</th>
<th>Manulife’s share of annual energy production, energy savings, and certified acreage, allocated to Green Bond¹</th>
<th>Manulife’s share of estimated annual avoided carbon dioxide emissions, allocated to Green Bond ²,³,⁴,⁵</th>
<th>Data Quality Score ⁶</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renewable Energy: Wind</td>
<td>Development, construction, operation, maintenance and upgrades of wind energy facilities and equipment</td>
<td>Uruguay</td>
<td>19.8</td>
<td>3%</td>
<td>31,503 [energy generated in MegaWatt hour]</td>
<td>315</td>
<td>2b</td>
</tr>
<tr>
<td>Renewable Energy: Solar</td>
<td>Development, construction, operation, maintenance and upgrades of solar energy facilities and equipment</td>
<td>Canada, US and Peru</td>
<td>333.9</td>
<td>56%</td>
<td>83,593 [energy generated in MegaWatt hour]</td>
<td>17,656</td>
<td>2b</td>
</tr>
<tr>
<td>Energy Efficiency</td>
<td>Development, construction, acquisition, installation, operation, upgrades to reduce energy consumption/improve resource efficiency</td>
<td>US</td>
<td>171.6</td>
<td>29%</td>
<td>41,589 [energy savings in MegaWatt hour] 15% average efficiency vs. baseline</td>
<td>56,754</td>
<td>1b</td>
</tr>
<tr>
<td>Sustainably-Managed Forestry</td>
<td>Purchase and operation of forest holdings certified by credible third-parties such as FSC and PEFC</td>
<td>US</td>
<td>72.6</td>
<td>12%</td>
<td>36,243 [acres 100% certified to the PEFC standard]²</td>
<td>110,767</td>
<td>1a</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>310 CO₂ tons/C$ 1 MM allocated</td>
<td>597.9⁷</td>
<td>185,492</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
- a. Estimated avoided carbon dioxide emissions are based on Manulife’s share of annual energy generation, energy savings, and forest acreage, whereby our share is the outstanding debt and equity investments in the projects as a proportion of the projects’ total enterprise value as of December 31, 2021. The reported figures were scaled to the C$ 597.9 million allocation of the net proceeds from the green bond issuance.
- b. Avoided carbon dioxide emissions were estimated based on the life-cycle emission avoidance factors for wind and solar technologies, as published by the International Renewable Energy Agency. Emission avoidance is a function of displacing emissions from the fossil fuels in the countries energy mix (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). The net greenhouse gas emission profile can fluctuate largely as a result of ongoing forest management activities, such as fertilization, herbaceous weed control, and harvesting schedules. The year-on-year change in the profile may be positive or negative.
- e. The environmental benefit estimated by Manulife in the form of avoided carbon dioxide emissions does not constitute a transfer of right to any person of the tradable carbon credit or other offset that may be associated with all or part of the environmental benefit.
- f. PEFC: the Programme for the Endorsement of Forest Certification, an international non-profit, non-governmental alliance of national forest certification systems dedicated to promoting sustainable forest management through independent third-party certification.
- g. C$ 597.9 million is net proceeds from the green bond issuance, namely C$ 600 million gross issuance amount net of C$ 2.1 million transaction costs.
- e. Data quality score per methodology by Partnership for Carbon Accounting Financials - The Global GHG Accounting and Reporting Standard for the Financial Industry, 2020, First edition, page 54. Score 1a means verified emissions from the developer; 1b - unverified emissions from the developer; 2b - emissions estimated based on the project’s energy production. The overall scale is: high quality = 1; low quality = 5.
Examples of projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Location</th>
<th>Description</th>
</tr>
</thead>
</table>
| Campo Palomas                    | Department of Salto, Uruguay | • installed capacity: 70 Megawatt  
• estimated to power 13,573 households  
• annual power generation: 200,000 MegawattHour  
• in August 2017, Manulife participated in the USD 136.8 million financing |
| Axium Infinity Solar             | Province of Ontario, Canada | • installed capacity: 76 Megawatt  
• portfolio of eight solar facilities across the province  
• in December 2017, Manulife provided debt financing for C$540 million portfolio acquisition |
| Smithsonian Institution's       | Washington D.C., United States | • energy efficiency upgrades to the park hosting pandas Tian Tian, Mei Xiang, and her new cub Xiao Qi Ji: high-efficiency air-cooled chillers, solar shades on skylights, 625kiloWatt solar plant, LED lighting  
• US Government building of 1,088,000 square feet and 163 acres of parkland  
• annual energy savings 5,852 MegaWh; carbon dioxide emissions avoidance 4,340 tons |
| Vinegar Bend                     | Alabama and Mississippi, United States | • 18,940-acre timberland property of pine and bottomland hardwood plantations  
• 100% of property certified to PEFC (Programme for the Endorsement of Forest Certification)  
• pine plantation is managed on a 27-30 year rotation age, and hardwood is typically age 50 years+  
• merchantable timber totals approximately 690,000 tons of which 70% is pine |
Methodology

We have aligned our reporting with the International Capital Markets Association’s Green Bond Principles 2021. The selection of the environmental impact metrics was informed by the Harmonized Framework for Impact Reporting 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, industry practice, including the Climate Bond Initiative’s criteria for forestry, we also elected to report percentage acreage under the forest certification system and carbon removals for our timberland projects.

**Renewable Energy:** Avoided emissions are emissions from fossil-fuel-powered electricity generation that are displaced by renewable energy production. As a rule, we use the project developers’ reported carbon dioxide emission avoidance figures, where available. Where not available, we estimate by multiplying our share of the renewable energy project’s production by the carbon dioxide emission avoidance factors.

In 2021, we implemented the methodological change to the calculation of our share in the projects, consistent with the carbon accounting standard Partnership for Carbon Accounting Financials. Namely, our share of production is a function of our year-end outstanding debt and equity investment in the project over the project’s enterprise value. Historically, in the previous reports, we calculated our share of production as percentage of our deployed capital to the project’s enterprise value at the time of origination.

We use emission avoidance factors published by the International Renewable Energy Agency that are specific to renewable energy technologies, such as wind and solar, and to countries, such as Canada, US, Uruguay and Peru. They are based on lifecycle assessments by the Intergovernmental Panel on Climate Change - the Special Report on Renewable Energy Sources and Climate Change Mitigation. Namely, avoided emissions are net of renewable energy project’s own emissions. We made adjustments for the country-specific fossil-fuel power generation mix: for Canada, as published by the Natural Resources Canada - the agency of the Government of Canada; and for the US, as per the U.S. Energy Information Administration.

We note our estimation provides a general indication of avoided emissions, and we continue to evolve our methods over time, as better information on countries’ electricity use and technology displacement options becomes available.

**Energy Efficiency:** Environmental metrics for energy efficiency projects were available directly from the project originator Hannon Armstrong.

**Sustainably Managed Forestry:** Carbon removals from timberland were estimated by our 100%-operating subsidiary Hancock Natural Resource Group. Annual changes in the greenhouse gas 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. In essence, the net greenhouse gas profile = change in carbon stock within standing forest inventory (biogenic growth) + carbon stored in harvested wood products – nonbiological emissions.

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, light Detection and Ranging [LiDAR]) 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, nitrous oxide from fertilizer application, and methane and nitrous oxide from biomass combustion during prescribed burns. 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. Emissions from prescribed burns are calculated using biomass consumption values provided by the IPCC for temperate forests, which describes all of HTRG-managed forests.

We expect the net greenhouse gas profile to fluctuate largely because of ongoing forest management activities, such as fertilization, herbaceous weed control, and harvesting schedules. The year-on-year change in the profile may be positive or negative.

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6 International Capital Markets Association, Green Bond Principles, June 2021  

https://www.ifc.org/wps/wcm/connect/35c1cd76-b751-474c-85a-0f8b7654a272/Updated+logo+FIP+PROPOSAL+HELP+CLEAN.pdf?


9 International Renewable Energy Agency, Avoided Emissions Calculator, 2018  
http://www.irena.org/Climatechange/Avoided-Emissions-Calculator

10 Natural Resources Canada, Government of Canada, assessed 20 April 2022. Latest available data is for 2014  
https://www.nrcan.gc.ca/energy/electricity-infrastructure/about-electricity/7359#generation

11 US Energy Information Administration, 2021  
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