

**Independent Opinion
on the Statements of
Manulife Investment Management
Relative to Its
Annual estimates of GHG emissions and
carbon storage at timberland investments**

Opinion Date: 2023-06-12

To the Management of:

MANULIFE INVESTMENT MANAGEMENT, TIMBERLAND AND AGRICULTURE
197 Clarendon St., Boston, MA 02116 USA

Independent Verification Opinion of:

Futurepast, Inc.
2111 Wilson Boulevard, Suite 700
Arlington, Virginia 22201 USA

Subject Matter:

Annual emissions of GHG emissions and carbon storage

For the Period:

1 January 2022 to 31 December 2022

Details Pertaining to the Statements

Responsible Party, if Different from Addressee

N/A

Statement of Responsibility:

It was the responsibility of MANULIFE INVESTMENT MANAGEMENT TIMBER AND AGRICULTURE (Manulife) to prepare its ANNUAL GHG EMISSIONS AND CARBON STORAGE statements in accordance with the World Resources Institute/ World Business Council for Sustainable Development's "*The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard – Revised Edition*" (March 2004) as amended in 2013 and 2015 (GHG Protocol). This responsibility includes designing, implementing, and maintaining a data management system relevant to the preparation and fair presentation of the statements. Manulife is responsible for the fair presentation of its data and information and ensuring that these are free from material misstatements.

Intended User and Limitation of Liability

Intended User:

This report has been prepared for the management of Manulife for both internal use and for public disclosure.

Limitation of Liability:

Manulife is solely responsible for the preparation and presentation of the information it has submitted to Futurepast for verification. Our role is limited to expressing a conclusion as to whether the greenhouse gas emissions and carbon storage as stated by Manulife are presented fairly in accordance with the GHG Protocol. In doing so, we do not assume any duty, liability, or

responsibility of Manulife or of any third party. Our duties in relation to the opinions expressed are owed solely to Manulife. As such, we do not accept any responsibility for any loss allegedly occasioned by any third party acting or refraining from action because of our expressed opinions.

Details Pertaining to the Validation/Verification Body

Futurepast's Role: Futurepast is an impartial third-party validation/verification body.

Declaration of Impartiality

Evaluation of Actual or Potential Conflicts-of-Interest Futurepast, and the verification team members and independent reviewer, have evaluated their potential for compromised impartiality and found no actual or potential threats to impartiality with respect to the performance of this engagement.

Details Pertaining to the Verification Team and Independent Reviewer

Verification Team Leader: This verification was led by Kim Mattson.

Verification Team Members: Bruce Carroll assisted the team leader in the execution of this verification as a technical expert.

Independent Reviewer: This verification was independently reviewed by John Shideler.

Details Pertaining to the Verification

Type(s) of Engagement: Verification

Objectives of the Verification: To verify the 2022 GHG inventory of Manulife's timberland business and to confirm that emissions and reported removals are free of material misstatements within the agreed level of assurance and that the inventory conformed to the requirements of the criteria.

Scope of the Verification: Manulife directly operates forest lands in six countries: Australia, Canada, Chile, New Zealand, Brazil, and the United States.

Level of Assurance:	Limited
Threshold of Materiality:	10 %
Verification Criteria:	Futurepast performed this verification in accordance with the requirements of ISO 14064-3:2019.

Description of Work Performed

Description of the Basis for Our Conclusions and Opinion

Manulife provided a methods document describing how they followed the GHG Protocol for reporting emissions and a set of spreadsheets showing their calculations derived from timber volumes, timber harvests, land area, land exchanges, volume estimate changes, and Scope 1 and Scope 3 emissions reporting. Futurepast reviewed these documents using a risk-based approach where we focused on those data that posed the greatest risks to misstatement in their annual GHG report.

Futurepast verified the consolidated total carbon stocks and emissions found in the tab "Dashboard Total" of the Manulife Calculator Dashboard 2022 v. 3 and many of the associated linked tabs. We reviewed the average stem volume per acre values for selected property in the "Carbon Summary by Property2022" tab in the Dashboard workbook as a check to ensure that the values were within expected ranges and generalized assumptions on the forest types and management regimes. We reviewed the other pools (standing dead, understory, debris) for reasonableness. We checked the actual calculations used and the emission factors to convert to CO2 equivalent. We checked the sources for these equations and emission factors. We reviewed emissions from fuel use, fertilizer use, and burning and how they were derived.

Issues we encountered were assembled into a list of findings and were presented to the client for resolution. Manulife made corrections and the corrections were accepted.

The data examined were historical in nature.

Summary of the Responsible Party's Statements

	2021	2022
(a) Emissions - Fuel Combustion from MIM TA Owned Vehicles / Equipment (MtCO ₂ e)*	2,879	3,102
* metric tons of CO ₂ equivalent		
(b) Emissions - Fuel Combustion from Contractor Owned Vehicles / Equipment (MtCO ₂ e)	195,330	482,445
(c) Total Direct and Indirect N ₂ O Emissions (MtCO ₂ e)	21,199	8,642
(d) CH ₄ and N ₂ O Emission from Managed Fire (MtCO ₂ e)	52,318	37,489
Total Scope 1 (MtCO ₂ e, (a+c+d))	76,396	49,050
Total Scope 3 (MtCO ₂ e, (b))	195,330	482,445
Total Non Biological Emissions (MtCO ₂ e)	271,726	531,496 (1)
Removals (Net Biological Change MtCO ₂ e)	3,179,520	-1,339,974 (2)
Storage (Carbon stocks MtCO ₂ e)		
Forests	615,204,003	638,506,302
Resource Change		-24,642,273
Wood products	2,943,228	2,557,633 (3)
Total Net GHG Profile* (2+3-1)		686,164

Source: Manulife Calculator Dashboard 2022 version 3 May 5, 2023/Dashboard Total

* Adjustments (Resource Change) are made to adjust 2022 values to be comparable to 2021. These include property exchanges, and changes to inventory methods.

As shown in the table above, forest carbon stores increased by approximately 23.3 million MtCO₂e from the previous year. This was offset by a negative 24.6 million MtCO₂e Resource Change adjustments for property exchanges and changes in inventory methods (so as to compare like with like). This resulted in a net negative 1.34 million (i.e., decrease) in forest carbon stores. Carbon stored in wood products was calculated to be 2.56 million MtCO₂e. The wood products storage (2.56), net biological decrease (-1.34) in the forest carbon, and the non-biological emissions (-0.53) summed to a net greenhouse gas profile of 0.69 million MtCO₂e of removals for 2022.

Limitations, If Any

Manulife's largest stores of carbon are in the forest stands. Carbon estimates are based on volume estimates. Futurepast accepted the volume data "as is."

Scope 2 electricity emissions were not reported as no offices or infrastructure is located at the remote forest sites and electricity emissions were considered *de minimus*.

Modifications, If Any

Manulife's GHG inventory did not fulfil the requirement for public disclosure listed in the GHG Protocol, Chapter 9, "Reporting GHG Emissions" that emissions data for all seven GHGs (CO₂, CH₄, N₂O, HFCs, PFCs, SF₆, NF₃) be separately reported in metric tonnes and in tonnes of CO₂ equivalent.

Manulife's inventory base year (2020) was not recalculated as required by chapter 5 of the GHG Protocol.

Conclusions (Verification)

Except for the limitations and modifications described above, and based on our evaluation of the evidence, nothing comes to our attention which causes us to believe:

- That Manulife Investment Management's inventory report for its timberland business for the period from 1 January 2022 to 31 December 2022 is not materially correct and is not a fair representation of its GHG data and information, and
- That Manulife Investment Management's inventory report for its timberland business for the period from 1 January 2022 to 31 December 2022 has not been prepared in accordance with the World Resources Institute/World Business Council for Sustainable Development's "The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard – Revised Edition" (March 2004) as amended in 2013 and 2015.

Approvals

Kim Mattson

Verification Team Leader:



Date: 2023-05-10



John C. Shideler

Independent Reviewer:

A handwritten signature in black ink that reads "John C. Shideler".

Date: 2023-05-21

Signature

Verification/Validation Body: Futurepast: Inc., Arlington, Virginia USA

Opinion Issued:

2023-06-12

