

2023 Sun Life Financial GHG Reporting Methodology

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1.0 Background

The purpose of this document is to report on and provide transparency into Sun Life Financial's (Sun Life's) greenhouse gas (GHG) emissions calculation methodology for Scope 1, 2 and select Scope 3 categories (listed in [Section 4.0 Scope 3 Emissions](#)) for the 2023 reporting year (January 1, 2023 – December 31, 2023), some of which are subject to a limited assurance third party review. This reporting methodology builds on the 2022 reporting [methodology](#) developed collaboratively by Sun Life and its third-party consultant Brightly, with notable modifications outlined in Section 7.0. Sun Life has engaged KPMG LLP (KPMG) to provide limited assurance on select GHG metrics for the 2023 reporting year and the 2019 base year for Sun Life's operational emissions target (see KPMG's [GHG Emissions Assurance Statement](#)).

In accordance with the Greenhouse Gas Protocol (GHG Protocol),¹ Sun Life discloses emissions across Scope 1, 2 and select Scope 3 categories as described in [Section 4.0 Scope 3 Emissions](#). This enables Sun Life and its stakeholders to understand the GHG emissions trends of its global portfolio and track progress towards its sustainability goals. In 2023, Sun Life adopted Green Project Technologies' carbon accounting platform to track utility consumption and GHG emissions for Sun Life's global activities, further supporting its carbon accounting processes, as described below.

This document details the methodology used to measure the GHG inventory for the 2023 reporting year and contains information on boundaries, assumptions, calculation methodologies, and emissions factors used to develop Sun Life's GHG footprint.

2.0 Reporting Boundaries

Sun Life determines which business enterprises and activities are in-scope for the annual GHG inventory using both organizational and operational boundaries, in line with the GHG Protocol:

Organizational boundaries identify which areas of the organization are to be included in the reporting company's GHG inventory and define the approach used to determine ownership or control over the energy and emissions reported for the portfolio.

Operational boundaries dictate how emissions from business operations are accounted for across scopes 1, 2, and 3, i.e., which specific categories of emissions are allocated for carbon accounting and reporting.

¹ Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (2004)

2.1 Application of Boundaries to the Real Estate Portfolio

Sun Life calculates emissions associated with its real estate portfolio, which includes real estate investment (REI) properties and corporate real estate (CRE) leased offices, using the financial control approach.² Sun Life’s financial control is determined individually at the real estate asset level.

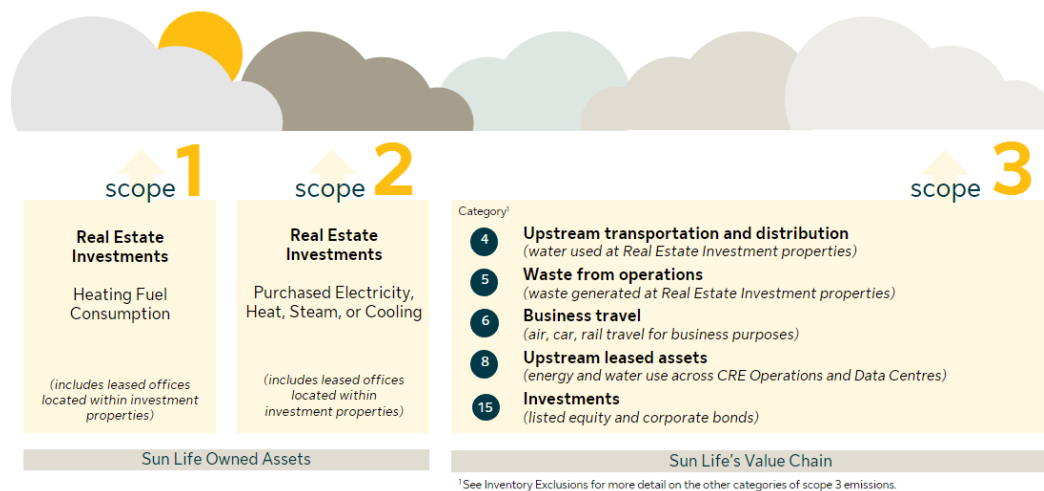
Sun Life has financial control over all REI properties but does not have financial control over leased CRE offices, except for where CRE offices are located within REI properties. If the lessor (Sun Life) has ownership and financial control over the asset, emissions from fuel and energy consumption fall under Scope 1 and Scope 2 respectively, and the emissions from water use and waste fall into the Scope 3 category 4 and 5 respectively.

When Sun Life is a lessee of a leased space and does not have financial control, all emissions from fuel, energy and water consumption are reported as Scope 3 Category 8: Upstream Leased Assets.

In cases where energy usage is associated with both REI and CRE spaces, emissions are always allocated to the lowest relevant Scope, i.e. Scope 1&2. Scope 1 & 2 emissions from REI properties are thus subtracted out of Scope 3, Category 8 emissions from CRE spaces, when applicable. This avoids double counting across scopes, in alignment with the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard, “a company’s Scope 3 inventory does not include any emissions already accounted for as Scope 1 or Scope 2 by the same company.”

2.2 Sun Life’s Reported Emissions

The graphic below shows a visual representation of Sun Life’s reported GHG emissions across the scopes as per the determined operational boundaries.



² The GHG Protocol defines financial control as having the ability to direct the financial and operating policies of the operation, with a view to gaining economic benefits from its activities.

3.0 Scope 1 and 2 Emissions

Sun Life reports on Scope 1 and Scope 2 emissions as defined by the GHG Protocol for Scope 1 and Scope 2. Scope 1 emissions are direct emissions from on-site combustion of fuels, including from natural gas, propane, diesel, fuel oils, and all other hydrocarbon-based fuel sources (note that Sun Life does not calculate emissions associated with refrigerants leakages, or diesel back-up generators, for more details see [Section 3.2 Inventory Exclusions \(Scope 1 and 2\)](#)). Scope 2 emissions are indirect emissions from purchased energy (electricity, steam, chilled water), that are consumed at properties but generated elsewhere.

As per the GHG Protocol's Scope 2 Guidance³, Sun Life follows a dual reporting approach and reports on both location-based and market-based emissions:

- The location-based approach reflects the average emissions intensity of grids on which energy consumption occurs. For Scope 2 location-based, Sun Life reports all emissions associated with purchased energy (electricity, steam, chilled water).
- The market-based approach reflects the emissions from electricity that Sun Life has chosen to purchase via contractual instruments. Sun Life's market-based emissions calculations account for Renewable Energy Credits (RECs), green power purchase agreements (GPPAs), and any other applicable market-based instruments. RECs represent the rights to the environmental benefits from generating electricity from renewable sources. RECs are purchased for some REI and CRE properties and are reported using the market-based approach, as described below.

3.1 Market Based Emissions Factors

As per the GHG Protocol, residual mix emissions factors (representing grid emissions after the removal of voluntary green energy purchases) are used to calculate market-based emissions for the relevant locations within the US and Europe. If publicly available residual mix emissions factors are not available, location-based emissions factors are used. Note that residual emissions factors are only used to calculate emissions associated with the portion of energy use not covered by Renewable Energy Credits (RECs), as discussed further in [Section 5.0 Market Based Instruments](#). Please see [Appendix A](#) for further details on the applicability of emissions factors.

3.2 Inventory Exclusions (Scope 1 and Scope 2)

The following activities are excluded from Sun Life's Scope 1 and 2 inventory:

- Fugitive emissions from refrigerants: Sun Life uses refrigerants for two purposes, air conditioning, and running kitchen appliances at a few office locations. Data regarding fugitive emissions from refrigerants is not available, and thus is not included in the 2023 inventory's boundaries.

³ GHG Protocol Scope 2 Guidance – An amendment to the GHG Protocol Corporate Standard (World Resources Institute, 2015)

- Diesel fuel for back-up generation: Data regarding the amount of diesel used for back-up power generation is not currently available, and thus is not included in the boundaries of the current inventory.
- Emissions are excluded for REI properties where all utilities are tenant-paid, and data isn't available. Sun Life will consider expanding data coverage to capture tenant utilities.

4.0 Scope 3 Emissions

Scope 3 emissions are the result of business activities not owned or controlled by the reporting organization, but that the organization indirectly affects through its value chain. As per the GHG Protocol's Scope 3 Guidance Sun Life currently reports on select Scope 3 emissions categories as listed below. For unreported categories, please refer to [Section 4.6 Inventory Exclusions \(Scope 3\)](#) for further details.

4.1 Category 4, Upstream Transportation and Distribution

Sun Life reports emissions associated with water transmission, distribution, and treatment at REI properties. This includes emissions associated with the energy needed to pump, process, and deliver clean water to Sun Life's REI properties, as well as to treat and dispose of the water after its use. Also included in this category are water-associated emissions at CRE offices within REI properties. Emissions are calculated using primary data on the volume of water consumption where data is available.

4.2 Category 5, Waste Generated in Operations

Sun Life reports emissions associated with waste by disposal type (landfill, recycling, compost etc.) for REI properties, where data is available. Emissions are calculated using various data sources including primary data and diversion reports provided by waste haulers and waste management invoices that include weight or volume of waste disposed.

4.3 Category 6, Business Travel

Sun Life reports emissions associated with global business travel across three modes of transport using both the distance-based and spend-based methods. The three modes are: air, rail, road (including personal vehicles, car-rentals, bus, rideshares, and taxis).

Sun Life uses the distance-based method whereby the distance traveled via each mode is multiplied by the appropriate emission factor for that mode of transportation to calculate emissions. Distances traveled are collected for each business unit globally based on data provided by expense management systems or by a third-party travel management company. Where business travel expenses are available without associated travel distances, the spend-based method is used, such that travel expenses are multiplied by an appropriate emission factor expressed in terms of GHG emissions per unit of currency.

4.4 Category 8, Upstream Leased Assets

Sun Life does not have ownership or financial control over its CRE leased offices (unless they are located within REI properties), thus, emissions from CRE properties, including on-site data centres are allocated to Scope 3 Category 8, Upstream Leased Assets.

This category includes the following emissions sources from CRE spaces: on-site combustion of fuels (e.g., natural gas for heating), purchased energy (electricity, steam, chilled water), water consumption (including supply and treatment). Primary data such as utility bills, invoices, and meter-readings are used when available; where Sun Life specific utility data is not available (through sub-metering etc.), whole-building utility data is pro-rated based on Sun Life's share of the building's total gross leasable area. Reasonable estimations are used to fill in data gaps, as described in [Section 6.3 Estimation Approaches](#).

4.5 Category 15, Investments

Sun Life has commenced work to determine its Scope 3 Category 15 GHG emissions, beginning with the financed emissions associated with the company's asset management activities. Financed emissions are the GHG emissions related to the investment and lending activities of financial institutions, such as Sun Life. Assessing and reporting financed emissions is an emerging and evolving process across the financial sector, and the inclusion of financed emissions in the 2023 GHG inventory represents Sun Life's progress towards measuring, monitoring, and disclosing emissions financed through Sun Life's investment capital. However, it is important to recognize the evolving nature of the financed emissions accounting landscape and the inherent limitations faced in this process. This includes challenges with data accuracy and availability, variability in emissions disclosures, the time lag between financial and GHG data, and the availability of appropriate methodologies. Sun Life plans to refine its methodology and approach to financed emissions analysis as data, industry guidance and market practices evolve.

Sun Life reports financed emissions associated with listed equities and corporate bonds for its General Account (GA) in alignment with The Partnership for Carbon Accounting Financials (PCAF) Standard Part A: Financed Emissions.⁴ These assets represent approximately 21.4% of General Account assets under management (AUM) and includes the Scope 1 and 2 emissions of all investees as well as the Scope 3 emissions of investees in sectors the PCAF Standard has phased in for reports published in 2023 and onwards.⁵

Emissions are calculated using holdings data as of December 31, 2023 (see [Data Sources section](#) for additional information). Where verified or unverified emissions are available

⁴ PCAF (2022). The Global GHG Accounting and Reporting Standard Part A: Financed Emissions. Second Edition.

⁵ For reports published in 2023 and onward PCAF has phased in the following sectors (by NACE Level 2 classification): Energy (oil and gas), mining, transportation, construction, buildings, materials, and industrial activities.

from the investee company directly (e.g., a company sustainability report) or indirectly via verified third-party data providers (e.g., CDP), the attribution factor of each asset is calculated by dividing the outstanding dollar value of the issuer by the Enterprise Value Including Cash (EVIC) (in the case of listed companies) or total equity + debt (for bonds and private companies). That percentage is then multiplied by the corresponding company's Scope 1, 2, and 3 emissions where available. This results in a financed Scope 1, 2, and 3 emissions data point for each asset in accordance with PCAF.

Emissions are calculated at the parent level except for publicly traded subsidiary investees and non-corporate-owned investees where they are calculated at the investee level. Reasonable estimations are made when data is not available (see [Estimates section](#) below).

The following assets are excluded from the scope of reporting:

PCAF Asset Class	% Excluded	Reason for Exclusion
Listed Equity and Corporate Bonds	5.5%	Actual data unavailable and/or insufficient data for estimation.
Business Loans and Unlisted Equity	100%	Assessing data availability and quality to determine GHG emissions
Project Finance	100%	
Commercial Real Estate	100%	
Mortgages	100%	

Insurance-associated emissions, which are also included in Category 15, are excluded from the inventory due to a lack of dedicated methodology for life and health lines of insurance as of the publication date of this document.

4.6 Inventory Exclusions (Scope 3)

The following Scope 3 categories are not included in Sun Life's 2023 inventory. Some of these categories are not material to Sun Life's business, while others are expected to be material but currently lack available or reliable data. Sun Life continues to assess and pursue opportunities to improve data availability and methodology advancement to improve coverage and granularity of GHG reporting over time. See below for detail regarding these exclusions:

Scope 3 Category	Reason for Exclusion
1. Purchased Goods & Services	Expected to be relevant and/or material to Sun Life's operations; assessing data availability and quality to determine GHG emissions
2. Capital Goods	
3. Fuel and Other Energy Related Activities	
7. Employee Commuting	

Scope 3 Category	Reason for Exclusion
9. Downstream Transportation and Distribution	Not currently applicable to Sun Life's operations
10. Processing of Sold Products	
11. Use of Sold Products	
12. End of Life Treatment of Sold Products	
13. Downstream Leased Assets	
14. Franchises	

5.0 Market Based Instruments

5.1 Renewable Energy Credits (RECs)

RECs are market-based instruments that represent the rights to the environmental benefits from generating electricity from renewable sources. RECs have a unique trackable ID that ensures the energy purchased can be verified as renewable. RECs are purchased for some REI and CRE properties and are reported using the market-based approach. In cases where RECs are purchased, residual emissions factors are used to calculate market-based emissions associated with the portion of energy use not covered by the REC, and a zero-value emissions factor is used to calculate emissions for the portion of the energy covered by the REC.

5.2 Carbon Offsets

Carbon offsets, also known as carbon credits, are market instruments used to finance activities that avoid the release of or capture GHG emissions. Carbon offset standards issue offsets to projects which are purchased and used by companies as a supplement to other carbon mitigation strategies. Each credit that Sun Life uses is equal to one tonne of carbon dioxide equivalent (tCO_{2e}) of real, additional, verifiable, and permanent emission reductions as supported by the respective offset standard. As part of CarbonNeutral® company certification⁶ Sun Life supports projects that generate emission reductions through reforestation, improved forest management, and rural clean cooking with biogas in countries of operations such as Canada, United States, and India. However, carbon offsets are not included in market-based emissions totals.

5.2.1 Carbon Neutral Operations

Sun Life has maintained a CarbonNeutral® company certification since 2021 which includes the purchase of carbon offsets for operational emissions associated with global offices, data centres and business travel. CarbonNeutral® is a registered trademark of Climate Impact Partners and is achieved in accordance with [The CarbonNeutral® Protocol](#),

⁶ Sun Life purchases carbon offsets and reports emissions in accordance with the requirements Climate Impact Partners' CarbonNeutral Protocol.

the leading global framework for carbon neutrality. To meet 2023 carbon neutrality goal, Sun Life offsets remaining operational emissions by financing emissions reduction projects, supporting the transition to a low-carbon global economy. All the projects are independently verified to ensure emissions reductions occur.

6.0 Data Sources and Quality

Sun Life uses primary source data where possible for emissions calculations. However, when primary data is not accessible, an appropriate estimation approach is used based on available data, as discussed below.

6.1 Data Sources

6.1.1 Real Estate Assets

Sun Life reports REI emissions associated with all investment properties and CRE emissions associated with Sun Life's global offices and all business groups. Business groups include Canada, U.S., Asia (Hong Kong, Indonesia, Philippines, Vietnam, and International), SLC Management and its affiliates (BGO, Crescent Capital Group, InfraRed Capital Partners, Asset Management and Advisors Asset Management, Inc. (AAM)), and MFS.

Utility data for REI and CRE properties is obtained directly from monthly utility bills and/or meter specific readings where available. For certain properties, data is received directly from the property manager with supporting documentation. Brightly Software Canada (Brightly) tracks utility consumption for Sun Life's REI portfolio on its Eco Tracker Platform and provides the activity data for GHG inventory calculations. In cases where incomplete data is provided, data is estimated based on the data available. For CRE sites, where no data is available, usage is estimated. Estimation methodologies utilized in Sun Life's GHG footprint are explained in further detail in [Section 6.3 Estimation Approaches](#).

6.1.2 Business Travel

Sun Life reports travel emissions for Sun Life Financial and all business groups. This includes Sun Life US, Sun Life Canada, Sun Life Asia and International, SLC Management and its affiliates (BGO, Crescent Capital Group, InfraRed Capital Partners, Asset Management and Advisors Asset Management, Inc. (AAM)), and MFS.

Data for business travel is obtained at the business unit level for each applicable mode of transportation, in units of total distance traveled by each travel method (i.e., air, rail, road). In some instances, only reimbursed travel costs are available without associated travel distances. In this case, emissions are calculated using country-specific spend-based emissions factors, rather than distance. Where travel data is not available, emissions are estimated. Please see [Section 6.3 Estimation Approaches](#) below for more details on business travel estimations.

6.1.3 Investments

Data for financed emissions is obtained both internally from investment managers (portfolio holdings and weights) and externally (investee EVIC, equity, debt and absolute emissions). For data obtained externally, Sun Life uses MSCI and S&P Trucost for all directly reported emissions (e.g., company sustainability reports) and S&P Trucost for all indirectly reported emissions (e.g. estimated based on verified third party data providers like CDP). Please see [Section 6.3 Estimation Approaches](#) below for more details on financed emissions estimations.

6.2 Data Quality Assessment and Validation

Sun Life's team performs a multi-level data quality check of the datasets across all categories. These data quality checks fall into three categories: preliminary checks, resource level checks, and historical checks. See below for additional details on each category of data quality checks.

- Preliminary data checks involve activity data completeness and accuracy checks. For the REI datasets prepared by Brightly, three layers of checks are conducted before data is provided to Sun Life. These include automated flags at the invoice entry stage, ongoing cost, and consumption validation against models, and year-over-year variance analysis.
- Resource level data checks ensure that activity totals and emissions totals are within an expected range based on historically reported values. For real estate assets, average Energy-Use-Intensities for each utility resource are used to ensure that total reported building energy usage falls within an expected range for a specific building classification and/or geography (such as the Commercial Buildings Energy Consumption Survey (CBECS)⁷ and Energy Star⁸).
- Historical data checks ensure that aggregated emissions totals for all scopes are within expected values based on historical data disclosures. For example, total emissions intensities are calculated using diverse metrics such as square footage, employee count, etc. for the current and historic year for comparison purposes.

6.2.1 Financed Emissions Data Quality

Sun Life recognizes the key role that data quality plays in ensuring the accuracy and reliability of GA financed emissions calculations. Data quality scores provide transparency into the accuracy of the data used and provide a quantitative base year upon which Sun Life can improve.

⁷ "U.S. Energy Information Administration - EIA - Independent Statistics and Analysis." *Energy Information Administration (EIA)- Commercial Buildings Energy Consumption Survey (CBECS)*, www.eia.gov/consumption/commercial/. Accessed 7 Jan. 2024.

⁸ "US Energy Use Intensity by Property Type." *Energy Star*, portfoliomanager.energystar.gov/pdf/reference/US%20National%20Median%20Table.pdf. Accessed 7 Jan. 2024.

Sun Life follows PCAF's data quality hierarchy assigned for each asset class. As outlined in The Standard, data quality scores are assigned based on the application of three calculation options: reported emissions, physical activity-based emissions, and economic activity-based emissions.

Table 1 below is the matrix of data quality scores for listed equity and corporate bonds.

Table 1: Data Quality Hierarchy for Listed Equity and Corporate Bonds (adapted from PCAF Standard A Table 5-3)

Data Quality Score	PCAF Options for Calculation		Data used for calculation
1	Option 1: Reported emissions	1a	Verified emissions of investee company
2		1b	Unverified emissions of investee company
	Option 2: Physical activity-based emissions	2a	Unknown emissions – calculated using physical activity data (specifically energy consumption)
3		2b	Unknown emissions – calculated using physical activity data (specifically production data)
4	Option 3: Economic activity-based emissions	3a	Company revenue
5		3b	Outstanding amount of assets
		3c	Asset turnover ratio

Sun Life assessed data quality on two levels – asset class and overall portfolio. At the asset class level, a data quality score is assigned for each data point. Using the outstanding amounts for each borrower or investee under the asset class, a weighted average data quality score was determined in line with PCAF.

Table 2 below shows the data quality scores categorized by emission scope and asset class.

Table 2 – Weighted Average Data Quality Scoring by Scope & Asset Class in Sun Life's GA Portfolio

Asset Class	Data Quality Score		
	Scope 1	Scope 2	Scope 3
Listed Equity & Corporate Bonds	2.11	2.15	2.54

6.3 Estimation Approaches

Sun Life's annual data collection process occurs between January and early December. Where primary data is not yet available at the time of the data collection, data is estimated as needed to ensure a comprehensive twelve-month emissions inventory. To ensure a comprehensive twelve-month emissions inventory, Sun Life utilizes reasonable estimations to annualize primary data. Despite diligent efforts during the data collection process, certain facilities may provide limited or no data. In such cases, Sun Life employs estimation methods

to determine annual consumption. Detailed descriptions of the estimation approaches for each respective emissions category are provided below.

Real Estate Assets

For REI and CRE properties, best efforts are made to capture actual, validated source data across all resources (energy, water, and waste) for all emission calculations. When verifiable utility data is not available, utility data is estimated based on a linear regression of historical consumption compared to weather data which accounts for seasonal temperature variations (heating and cooling days) or by using the portfolio average consumption intensity. In the case of non-weather dependent utility accounts, historical consumption is assumed to be equal to recent year consumption. For properties where no data exists for the current year, but historical data no older than two years does exist, remaining utility data is estimated using the available historical data as a proxy. For the waste streams, when regular waste streams were missing entries for some months, the missing data was estimated based on recent historical average waste generation.

Business Travel

For global business travel, best efforts are made to collect primary distance traveled data at the business unit level. In some cases where distance data is not available, spend data is used instead. For unavailable business travel data, emissions are estimated at a monthly level by taking the monthly average emissions of either historical years of the same month, or months within the same year, depending on the best available data. Where 2023 travel data is not available, emissions are estimated using the most recent available year's data. If 2020 is the most recent data year available, then 2019 (or earlier years) is used instead to account for atypical travel practices during the peak of the COVID-19 pandemic. For instance, where data was unavailable for November and December, it is estimated using the 10-month average of data available (January through October).

Investments

For financed emissions, best efforts are made to collect primary, reported GHG data from issuer company sustainability reports. Where verified or unverified emissions are not available from the investee company directly (e.g., a company sustainability report) or indirectly via verified third-party data providers (e.g., CDP), an estimation is made using PCAF Option 2: physical activity-based emissions or PCAF Option 3: economic activity-based emissions. When data for estimation is not available, the asset is excluded from measurement and explained in [Section 4.5 Category 15, Investments](#).

7.0 Notable Changes to Reporting

As Sun Life continues to report its annual GHG footprint, continuous improvements are made where possible to improve the efficiency of the data collection and reporting process along with accuracy of the calculations. The section below details the methodological changes implemented for the 2023 GHG inventory along with the updates to Sun Life's base year recalculation policy.

7.1 Methodology Changes

Sun Life instituted the following methodological changes from 2022 for the 2023 reporting year:

1. **Exclusion of Offsets in “Net Market Based” Emissions Totals:** In 2022, carbon offsets were included in the reported “net market-based emissions.” However, as these offsets are not directly related to electricity purchased or consumed at a specific property, as per the GHG Protocol these offsets should not be factored into reported market-based emissions totals and are excluded.
2. **Emission Factors:** In 2022, residual emissions factors were used for market-based emissions calculations for the US only. In 2023, residual emissions factors are used for Scope 2 market-based emissions calculations for both the US and European countries (as opposed to using supply-based emissions factors only). Sun Life has updated and consolidated emissions factor sources to perform emissions calculations as per the latest sources. In 2022 for Scope 3, Category 5, Waste, emissions were calculated using internally derived emissions factors based on the landfilled waste methane emissions quantification guidelines in the IPCC 2006 guidelines for national GHG inventories,⁹ with calculation inputs from the National Inventory Reports from Canada and the United States. In 2023, US EPA emissions factors for waste are used as they are deemed more suitable. For a complete list of emissions factors used for the 2023 inventory, including those which have changed since 2022, please refer [Appendix A](#).
3. **Emissions Calculations:** In 2022 reporting for Scope 3, Category 5, Waste emissions, only emissions resulting from waste sent to landfill were reported. In 2023, waste calculations were performed using disposal specific methods (i.e., landfill, recycling, compost, etc.), and all waste sent to waste-to-energy facilities were assumed to be combusted.

7.2 Base Year Recalculation Policy

Emissions are recalculated for the base year and each historical year being reported, in alignment with the GHG Protocol, to account for the following factors:

1. Assets/Portfolio acquisitions and divestments
2. Addition of net new data sources
3. Material changes to the Reporting Methodology

Sun Life uses a 5% materiality threshold for base year emissions recalculation for Scope 1 and 2, and Scope 3 (excluding Category 15) at the aggregate level. If the cumulative impact of the factors listed above results in a change of 5% or more in any direction, the base year emissions will be re-calculated. Any exceptions to this approach shall be publicly disclosed. In accordance with this policy, Sun Life’s 2019 base year has been recalculated and disclosed in the [2023 Sustainability Report](#).

⁹ 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 5, Waste (IPCC, 2006).

A base year recalculation policy specific to financed emissions is under development and will be included in Sun Life's future methodology documentation.

8.0 Sun Life Operations Performance vs. Target

In 2021, Sun Life committed to renewing GHG targets in line with best practices for net-zero target setting to reduce emissions in line with internal and global sustainability goals.

These targets include a 50% reduction of absolute GHG emissions in its operations by 2030 relative to 2019 in addition to committing to reaching net zero by 2050 for its operations and investments. The operational emissions reductions target scope includes emissions resulting from global corporate offices and data centres as well as from business travel, inclusive of majority-owned Sun Life affiliate companies. For further details on Sun Life's progress against target, refer to the [2023 Sustainability Report](#).

The following table summarizes Sun Life's Operational Emissions target scope and reporting.

Target Type	Absolute Reduction, 50% reduction
Target Boundary	Operations Includes: Corporate offices Data centres Business travel Activities Included: Energy Water Travel modes
Target Base Year	Fixed base year: 2019
Target Achievement Year	Long term: 2030
Offsets and Credits	No use of RECs (i.e. location-based approach), no use of Carbon Offsets as it is an absolute reduction target
Double Counting Policy	Leased corporate offices in properties owned by Sun Life as real estate investments are not double counted in Sun Life Global Reporting as per Section 2.1
Reporting	Annual operational emissions and progress against base year is reported in the 2023 Sustainability Report

9.0 Glossary of Terms

Base Year	The earliest year selected for inclusion in reporting for comparative purposes, as per section 5.
REC	Renewable Energy Credit(s)
WTE	Waste-to-energy
kWh	kilowatt-hours of electricity
ekWh	Equivalent kilowatt-hours (all energy types)
ekWh/ft ²	Equivalent kilowatt-hours per square foot of Effective GLA
GHG	Greenhouse gases, for the purposes of this report: CO ₂ , CH ₄ , N ₂ O
CO ₂ e	Carbon dioxide equivalent
gCO ₂ e	Grams of carbon dioxide equivalent
gCO ₂ e/L	Grams of carbon dioxide equivalent per litre
gCO ₂ e/m ³	Grams of carbon dioxide equivalent per cubic metre
gCO ₂ e/lb	Grams of carbon dioxide equivalent per pound
gCO ₂ e/kg	Grams of carbon dioxide equivalent per kilogram
gCO ₂ e/ekWh	Grams of carbon dioxide equivalent per equivalent kilowatt-hour
gCO ₂ e/ton-h	Grams of carbon dioxide equivalent per ton-hour
gCO ₂ e/kWh thm	Grams of carbon dioxide equivalent per thermal energy
tCO ₂ e	Metric tons of carbon dioxide equivalent
tCO ₂ e /1,000ft ²	Metric tons of carbon dioxide equivalent per 1,000 square feet of Effective GLA
pkm	Passenger-kilometre

Appendix A – Emissions Factors 2023

Emissions were calculated using emission factors from publicly available sources wherever possible. The following sections detail the emission factors used for reporting along with the source for each factor.

A.1 United States

A.1.1 – Grid Electricity, Location Based

Geography	Emissions Factor	Unit	Source
AZNM (WECC Southwest)	0.3734	kgCO _{2e} /kWh	2023 GHG Emission Factors Hub US EPA
CAMX (WECC California)	0.2421		
ERCT (ERCOT All)	0.3707		
FRCC (FRCC All)	0.3793		
MROW (MRO West)	0.4549		
NEWE (NPCC New England)	0.2467		
NWPP (WECC Northwest)	0.2896		
NYCW (NPCC NYC/Westchester)	0.371		
NYLI (NPCC Long Island)	0.5529		
RFCE (RFC East)	0.3067		
RFCW (RFC West)	0.4775		
RMPA (WECC Rockies)	0.5291		
SPNO (SPP North)	0.4532		
SRSO (SERC South)	0.4067		
SRTV (SERC Tennessee Valley)	0.4253		
SRVC (SERC Virginia/Carolina)	0.2917		

A.1.2 – Grid Electricity, Market Based

Geography	Emissions Factor	Unit	Source
AZNM (WECC Southwest)	0.3737	kgCO _{2e} /kWh	2023 Green-e Residual Mix Emission Rates
CAMX (WECC California)	0.2449		
ERCT (ERCOT All)	0.414		
FRCC (FRCC All)	0.3837		
MROW (MRO West)	0.479		
NEWE (NPCC New England)	0.2467		
NWPP (WECC Northwest)	0.2984		
NYCW (NPCC NYC/Westchester)	0.371		
NYLI (NPCC Long Island)	0.5529		
RFCE (RFC East)	0.3067		
RFCW (RFC West)	0.4783		

Geography	Emissions Factor	Unit	Source
RMPA (WECC Rockies)	0.541	kgCO _{2e} /kWh	2023 Green-e Residual Mix Emission Rates
SPNO (SPP North)	0.5275		
SRSO (SERC South)	0.4104		
SRTV (SERC Tennessee Valley)	0.4254		
SRVC (SERC Virginia/Carolina)	0.2941		

A.1.3 – Natural Gas & Fuel Oils

Item	Geography	Emissions Factor	Unit	Source
Natural Gas	USA	0.0545	kgCO _{2e} /SCF	2023 GHG Emission Factors Hub US
Fuel Oil No. 2		10.2441	kgCO _{2e} /Gal	2023 GHG Emission Factors Hub US EPA
Propane (LPG)		5.7416	kgCO _{2e} /Gal	

A.1.4 – Steam

Geography	Emissions Factor	Unit	Source
USA - NYC	53.6000	kgCO _{2e} /Lb.	New York City Local Law 97
USA - non-NYC	79.2790	kgCO _{2e} /Lb.	2023 GHG Emission Factors Hub US EPA

A.1.5 – Water Delivery and Treatment

Geography	Emissions Factor	Unit	Source
United States, AZNM (2023)	0.35779	kgCO _{2e} /m ³	2023 GHG Emission Factors Hub US EPA Water delivery and treatment Intensities Extracted from Wakeel et al. (2016)
United States, CAMX (2023)	1.268029		
United States, ERCT (2023)	0.323956		
United States, FRCC (2023)	0.362458		
United States, MROW (2023)	0.412752		
United States, NEWE (2023)	0.236706		
United States, NWPP (2023)	0.270744		
United States, NYCW (2023)	0.356064		
United States, NYLI (2023)	0.53074		
United States, RFCE (2023)	0.294405		
United States, RFCW (2023)	0.457637		
United States, RMPA (2023)	0.501566		
United States, SPNO (2023)	0.395213		
United States, SRSO (2023)	0.387909		
United States, SRTV (2023)	0.40811		
United States, SRVC (2023)	0.278232		

A.1.6 – Waste

Item	Geography	Emissions Factor	Unit	Source
Concrete - Recycled	USA	0.011023	kgCO ₂ e/kg	2023 GHG Emission Factors Hub US EPA
Corrugated Containers - Recycled		0.121254		
Dimensional Lumber - Recycled		0.099208		
Food Waste - Composted		0.165347		
Glass - Recycled		0.055116		
Mixed Metals - Recycled		0.253532		
Mixed MSW - Combusted		0.473994		
Mixed MSW - Landfilled		0.573202		
Mixed Organics - Composted		0.187393		
Mixed Paper (primarily from offices) - Recycled		0.033069		
Mixed Plastics - Recycled		0.242508		
Mixed Recyclables - Recycled		0.099208		

A.2 Canada

A.2.1 – Grid Electricity, Location & Market Based

Geography	Emissions Factor	Unit	Source
AB - (Generation)	0.5100	kgCO ₂ e/kWh	Canada NIR Part 3 , Published 2023 (1990-2021 Data) - Part 3 Annex 13
BC - (Generation)	0.0140		
ON - (Generation)	0.0280		
QC - (Generation)	0.0013		
MB - (Generation)	0.0019		
NB - (Generation)	0.2900		
PE - (Generation)	0.3000		
NL - (Generation)	0.0160		
SK - (Generation)	0.6700		
NS - (Generation)	0.6600		

A.2.2 – Natural Gas and Fuel Oils

Item	Geography	Emissions Factor	Unit	Source
Natural Gas	AB	1.9734	kgCO ₂ e/m ³	Canada NIR 2023, Part 2 , Published 2023 (1990-2021 Data) - Part 2 Annex 6
	BC	1.9774		
	ON	1.9324		
	QC	1.9374		
	MB	1.9264		
	NB	1.9304		
	PE	1.9304		

Item	Geography	Emissions Factor	Unit	Source
	NL	1.9304	kgCO _{2e} /m ³	Canada NIR 2023, Part 2 , Published 2023 (1990-2021 Data) - Part 2 Annex 6
	SK	1.9314		
	NS	1.9304		
Light Fuel Oil	-	2.7619	kgCO _{2e} /L	Canada NIR 2023, Part 2

A.2.3 – Steam

Geography	Emissions Factor	Unit	Source
Ontario	0.0764	kgCO _{2e} /Lb.	Enwave Brightly Report 2023
Canada - non-Ontario	0.1057	kgCO _{2e} /Lb.	Energy Star 2023

A.2.4 – Deep Water Lake Cooling

Geography	Emissions Factor	Unit	Source
Ontario	0.0066	kgCO _{2e} /kWh (ekWh)	Brightly EPL Report 2023

A.2.5 – Water Delivery and Treatment

Geography	Emissions Factor	Unit	Source
AB	0.6528	kgCO _{2e} /m ³	Canada NIR Part 3 , 2023, as well as water delivery and treatment intensities from Maas et al. (2009).
BC	0.01792		
ON	0.03584		
QC	0.001664		
MB	0.002432		
NB	0.3712		
PE	0.384		
NL	0.02048		
SK	0.8576		
NS	0.8448		

A.2.6 – Waste

Sun Life uses the same emissions factors for waste for Canada as for the USA, please [see Section A.1.6](#) for a full list of waste emissions factors included in Sun Life's 2023 GHG footprint.

A.3 International

A.3.1 – Grid Electricity, Location and Market Based

*Note that Sun Life used the same emissions factors for international locations for both location and market based, unless noted in [Section A.3.2](#) below (European countries only).

China:

Item	Geography	Emissions Factor	Unit	Source
Grid Electricity - China (Location and Market Based)	South China	0.8367	kgCO ₂ e/kWh	NDRC 2021
	Northwest China	0.9155		
	North China	0.9680		
	Northeast China	1.1082		
	Central China	0.9014		
	East China	0.8046		

Europe:

Item	Geography	Emissions Factor	Unit	Source
Grid Electricity - (Location Based Only)	Ireland	0.3320	kgCO ₂ e/kWh	SEAI Report 2023
	United Kingdom	0.2071	kgCO ₂ e/kWh	DEFRA 2023

All Other Countries:

Item	Geography	Emissions Factor	Unit	Source
Grid Electricity - (Location and Market Based)	Bermuda	0.7530	kgCO ₂ /kWh	IFI V3.2 2022
	Hong Kong - HKEC	0.6800	kgCO ₂ e/kWh	HKEC Report 2022
	Hong Kong - CLPG	0.3900	kgCO ₂ e/kWh	CLPG Report 2022
	India	0.7760	kgCO ₂ /kWh	IRENA 2023 Report
	Indonesia	0.6870	kgCO ₂ /kWh	IRENA 2023 Report
	Malaysia	0.5500	kgCO ₂ /kWh	TNB 2022 Report
	Philippines	0.7000	kgCO ₂ /kWh	Key Energy Statistics Report 2021
	Singapore	0.4168	kgCO ₂ /kWh	EMA 2022
	Vietnam	0.6280	kgCO ₂ /kWh	IRENA 2023 Report

A.3.2 – Grid Electricity, Market Based**Europe:**

Item	Geography	Emissions Factor	Unit	Source
Grid Electricity - (Market Based Only)	Ireland	0.4748	kgCO ₂ /kWh	AIB 2023 (2022 Data)
	United Kingdom	0.3652		

A.3.3 – Natural Gas

Geography	Emissions Factor	Unit	Source
Ireland	2.1556	kgCO ₂ e/m ³	Ireland NIR 2023
United Kingdom	2.0384		UK DEFRA 2023

A.3.4 – Water Delivery and Treatment

Geography	Emissions Factor	Unit	Source
China - North China	1.2390	kgCO ₂ e/m ³	Derived using location-based grid intensities as listed above, and values for water intensities from Wakeel et al. (2016)
Bermuda	0.9609		
Hong Kong - HKEC	0.6078		
Hong Kong - CLPG	0.6346		
India	0.9901		
Indonesia	0.8766		
Malaysia	0.7018		
Philippines	0.8932		
Singapore	0.5319		
Vietnam	0.8014		
Ireland	0.4236		
United Kingdom	0.2642		

A.3.5 – Chilled Water

Geography	Emissions Factor	Unit	Source
Indonesia	1.0442	kgCO ₂ e/ton-h	2023 Location-based grid intensities as listed above, and 1.52ekWh/ton-h for the intensity of water chilling (via Brightly 2022).
Malaysia	0.8360		
India	1.1795		
Hong Kong (CLPG Grid)	0.5982		
Singapore	0.6335		

A.3.6 – Hot Water

Geography	Emissions Factor	Unit	Source
United Kingdom	0.1797	kgCO ₂ e/kWh	UK DEFRA 2023

A.3.7 – Steam

Geography	Emissions Factor	Unit	Source
United Kingdom	0.0528	kgCO ₂ e/Lb.	UK DEFRA 2023

A.4 Business Travel

A.4.1 – Car Travel, Non-EV

Geography	Emissions Factor	Unit	Source
USA and Canada	0.3341	kgCO ₂ e/passenger.mile	US EPA EF Hub 2023 - Table 10, and AR-5 for GWP
All Other Locations	0.1666	kgCO ₂ e/passenger.km	UK DEFRA 2023

A.4.2 – Car Travel, EV

Geography	Emissions Factor	Unit	Source
United Kingdom Only	0.0935	KgCO ₂ e/passenger.km	UK DEFRA 2023

A.4.3 – Rail Travel

Geography	Emissions Factor	Unit	Source
All Locations	0.0355	kgCO ₂ e/passenger.km	UK DEFRA 2023

A.4.4 – Air Travel

DEFRA Category	Passenger Class	Distance Range	Emissions Factor	Unit	Source
Short Haul to/from UK	Average Passenger	<=785km	0.10974	kgCO ₂ e/passenger.km	UK DEFRA 2023
Short Haul to/from UK	Business Class	<=785km	0.16191		
Short Haul to/from UK	Economy Class	<=785km	0.10794		
Medium Haul to/from UK	Average Passenger	>785k<=3,700km	0.15423		
Medium Haul to/from UK	Business Class	>785km<=3,700km	0.34253		
Medium Haul to/from UK	Economy Class	>785km<=3,700km	0.11812		
Medium Haul to/from UK	First Class	>785km<=3,700km	0.47246		
Medium Haul to/from UK	Premium Economy Class	>785km<=3,700km	0.18898		
Long Haul, to/from non-UK	Average Passenger	>=3,700km	0.10377		
Long Haul, to/from non-UK	Business Class	>=3,700km	0.23047		
Long Haul, to/from non-UK	Economy Class	>=3,700km	0.07947		
Long Haul, to/from non-UK	First Class	>=3,700km	0.31789		
Long Haul, to/from non-UK	Premium Economy Class	>=3,700km	0.12716		

A.4.5 – Spend-Based Travel Emissions Factors

Item	Emissions Factor	Unit	Source
ExioBase Ignite V3 - Rest of World Europe - Air transport services	1.0915	kg CO ₂ e/CAD	ExioBase Ignite V3.2, 2022 (Derived Further Internally)
ExioBase Ignite V3 - Rest of World Asia and Pacific - Other land transportation services	0.000023	kg CO ₂ e/IDR	
ExioBase Ignite V3 - United States - Other land transportation services	0.0998	kg CO ₂ e/USD	

Item	Emissions Factor	Unit	Source
ExioBase Ignite V3 - USA - Air transport services	0.8040	kg CO ₂ e/USD	ExioBase Ignite V3.2, 2022 (Derived Further Internally)
ExioBase Ignite V3 - Canada - Other land transportation services	0.2900	kg CO ₂ e/CAD	
ExioBase Ignite V3 - Rest of World Asia and Pacific - Air transport services	1.0915	kg CO ₂ e/CAD	
ExioBase Ignite V3 - Rest of World Asia and Pacific - Other land transportation services	0.000023	kg CO ₂ e/IDR	
ExioBase Ignite V3 - Rest of World Asia and Pacific - Air transport services	1.0915	kg CO ₂ /CAD	
ExioBase Ignite V3 - United States - Other land transportation services	0.0998	kg CO ₂ e/USD	
ExioBase Ignite V3 - Rest of World Europe - Other land transportation services	0.2632	kg CO ₂ e/CAD	
ExioBase Ignite V3 - Canada - Air transport services	0.9339	kg CO ₂ e/CAD	
ExioBase Ignite V3 - Rest of World Europe - Air transport services	1.0915	kg CO ₂ e/CAD	