



Arconic Basis of Reporting Greenhouse Gas Emissions and Energy Inventory **July 2022**

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Table of Contents

1	INTRODUCTION.....	3
1.1	COMPANY INFORMATION	3
1.2	PURPOSE & OBJECTIVE	4
1.3	DEFINITIONS	4
2	REPORTING OF ANNUAL ENERGY CONSUMPTION & GHG EMISSIONS	6
2.1	CORPORATE GHG AND ENERGY REPORTING.....	6
2.2	PARTICIPATION IN MANDATORY AND VOLUNTARY GHG REPORTING PROGRAMS.....	6
3	GHG EMISSIONS QUANTIFICATION (SCOPES 1 & 2).....	6
3.1	APPROACH FOR GHG EMISSIONS QUANTIFICATION.....	6
3.2	EMISSIONS FACTORS	7
3.3	TYPES OF GREENHOUSE GAS EMISSIONS REPORTED	8
3.4	GLOBAL WARMING POTENTIALS.....	8
3.5	GHG EMISSIONS CALCULATION METHODOLOGY (SCOPES 1 AND 2).....	8
4	OPERATIONAL BOUNDARIES (SCOPES 1 & 2).....	8
4.1	ORGANIZATIONAL BOUNDARIES	9
4.2	OPERATIONAL BOUNDARIES.....	9
4.2.1	Types of GHG Emissions Reported	9
4.2.2	Indirect (Scope 2) Emissions	9
5	GHG EMISSIONS QUANTIFICATION (SCOPE 3).....	10
6	BASE YEAR SELECTION & RE-CALCULATION CRITERIA	10
6.1	BASE YEAR SELECTION	10
6.2	RE-CALCULATING BASE YEAR EMISSIONS.....	11
6.2.1	Changes in Organizational Structure	11
6.2.2	Changes in Calculation Methodology.....	12
6.2.3	Discovery of Errors	12
6.3	RE-CALCULATION OF BASE YEAR EMISSIONS.....	12
6.4	RE-CALCULATION OF NON-BASE YEAR EMISSIONS	12

1 INTRODUCTION

1.1 Company Information

Arconic is a leading provider of aluminum sheet, plate, and extrusions, as well as innovative architectural products, that advance the ground transportation, aerospace, building and construction, industrial and packaging end markets. Arconic is organized into three (3) business segments:

- **Rolled Products (“RP”)** produces a range of aluminum sheet and plate products for the ground transportation, aerospace, industrial, building and construction and packaging markets.
- **Building and Construction Systems (“BCS”)** manufactures differentiated products and building envelope solutions, including entrances, curtain walls, windows, composite panel, and coil coated sheet.
- **Extrusions (“AEX”)** produces a range of extruded products, including automotive shapes, aerospace profiles and high strength rod and bar for the ground transportation, aerospace, and industrial markets.

Arconic enables smart buildings, high performance defense vehicles, oil and gas drilling and more efficient power generation. Our approximately 10,500 people and twenty-one (21) major manufacturing locations deliver value-added products.

Based upon the country where the point of sale occurred, the United States and Europe generated a majority of Arconic sales. In addition, Arconic has manufacturing locations in Canada and China. A more comprehensive description and introduction to Arconic is available [here](#).

Arconic is a member of the Aluminium Stewardship Initiative (“ASI”). ASI is a global non-profit standards-setting and certification organization. It brings together producers, users, and stakeholders in the aluminum value chain with a commitment to maximize the contribution of aluminum to a sustainable society. A more comprehensive description and introduction to ASI is available [here](#). Arconic’s ASI related sustainability disclosures can be found [here](#).

1.2 Purpose & Objective

Arconic operating locations emit both direct and indirect greenhouse gas ("GHG") emissions almost exclusively from the consumption of energy (natural gas, other fossil fuels, and purchased electricity) in conjunction with the manufacturing of our products as well as the heating and cooling of our facilities.

This document describes our data collection and validation approach, organizational boundary, methodologies, and assumptions used in preparing Arconic's annual inventory of Scope 1, 2, and 3 GHG emissions.

Arconic utilizes the World Resources Institute's *The Greenhouse Gas Protocol - A Corporate Accounting and Reporting Standard (Revised Edition)* (called the "GHG Protocol") to account for its annual greenhouse gas ("GHG") emissions. The standard is available [here](#). Also, as part of our approach, we reviewed guidance from other standards such as International Standard ISO 14064-1.

In addition to our operating locations, our direct suppliers and customers emit GHG emissions associated with our raw material supplies and our final shipped products. This document also describes the approach, organizational boundary, methodologies, and assumptions used in preparing estimates of these Scope 3 value chain emissions. Our approach in general follows the criteria for GHG reporting as described in [*The Greenhouse Gas Protocol - Corporate Value Chain \(Scope 3\) Accounting and Reporting Standard*](#).

The purpose of this document is to ensure that our approach and calculations for our annual GHG emissions are done in a transparent and accurate manner consistent with WRI's *GHG Protocol* Principles.

1.3 Definitions

To help delineate direct and indirect emission sources, improve transparency, and provide utility for different types of organizations and different types of climate policies and business goals, the *GHG Protocol* and Arconic utilize three (3) definitions of "Scope" (Scope 1, Scope 2, and Scope 3). A summary of these definitions is provided below from page 27 of the *GHG Protocol*.

Scope 1: Direct GHG Emissions

Scope 1 emissions occur from sources that are owned or controlled by the company (e.g., emissions from combustion in owned or controlled boilers, furnaces, vehicles).

Scope 2: Indirect GHG Emissions

Scope 2 accounts for GHG emissions from the generation of purchased electricity

consumed by the company. Purchased electricity is defined as electricity that is purchased or otherwise brought into the organizational boundary of the company. Scope 2 emissions physically occur at the facility where electricity is generated. Please note, the term “electricity” is used in this chapter as shorthand for electricity, steam, and heating/cooling.

Scope 3: Other Indirect GHG Emissions

Scope 3 is an optional reporting category that allows for the treatment of all other indirect emissions. Scope 3 emissions are a consequence of the activities of the company but occur from sources not owned or controlled by the company. Some examples of Scope 3 activities are extraction and production of purchased materials, extraction & transportation of purchased fuels, and the use of sold products and services.

Greenhouse Gas Emissions

Greenhouse gases are those gaseous constituents of the *atmosphere*, both natural and *anthropogenic*, that absorb and emit radiation at specific wavelengths within the spectrum of terrestrial radiation emitted by the Earth’s surface, the atmosphere itself and by clouds. This property causes the greenhouse effect. Water vapor (H₂O), *carbon dioxide* (CO₂), *nitrous oxide* (N₂O), *methane* (CH₄) and *ozone* (O₃) are the primary GHGs in the Earth’s atmosphere. [Source](#)

Material Discrepancy

An error (for example from an oversight, omission, or miscalculation) that results in the reported quantity being significantly different to the true value to an extent that will influence performance or decisions. Also known as material misstatement.

With regards to accuracy, the *GHG Protocol* notes that, “a material discrepancy is an error that results in a reported quantity being significantly different to the true value.” As a rule of thumb, an error is considered to be materially misleading if its value exceeds 5% of the total inventory.” For instance, 5% of Arconic’s annual Scope 1 & 2 emissions inventory would be about 80,000 metric tons of CO₂e and collective inaccuracies of this magnitude would constitute a material discrepancy. Arconic’s corporate objective for asserting its annual GHG emissions is to report all significant emissions sources accurately and well within the 5% materiality threshold.

Inventory Boundary Significance Threshold

A quantitative and/or qualitative criterion used to establish and define any significant change to the inventory boundary. In this case, Arconic’s inventory boundary significance threshold is defined as 1% of the relevant factor. Arconic ESG staff reserves the right to exclude categories in the inventory boundary that are less than or equal to the established threshold.

Significance Threshold

A qualitative or quantitative criteria used to define a significant structural change, calculation methodology change, or improvements in data accuracy that would trigger base year emissions recalculation. In this case, Arconic's significance threshold is defined as 10% of the base year GHG emissions.

2 REPORTING OF ANNUAL ENERGY CONSUMPTION & GHG EMISSIONS

2.1 Corporate GHG and Energy Reporting

Arconic reports its global Corporate GHG emissions and energy consumption annually based on a calendar year period (i.e., January 1st to December 31st). The Corporate GHG emissions and energy consumption are typically prepared in the first calendar quarter following the end of the reporting year. Annual GHG emissions and energy consumption are then published in the annual Sustainability Report.

Arconic publishes total annual values of its Scopes 1, 2 and 3 emissions in its Sustainability Report. In addition, Arconic publishes a breakdown by region and business unit of its annual Scope 1 and 2 GHG emissions in its Sustainability Report. Arconic also publishes estimates, methodologies, and explanations for all 15 Scope 3 categories in Section 6.5 of its annual CDP Report.

2.2 Participation in Mandatory and Voluntary GHG Reporting Programs

Individual Arconic locations are expected to comply with any mandatory GHG emissions reporting program to which they may be subject, as required by law or regulation. Each Business Unit is responsible for ensuring that their affected locations understand and comply with the requirements of such mandatory programs, including the identification and implementation of any needed processes, equipment, or documentation.

Locations may participate in voluntary GHG reporting programs that support business objectives. Both Corporate and Business Unit sustainability staff should be made aware of participation in advance to ensure consistency in the approach, calculations, and disclosures with the Corporate GHG reporting.

3 GHG EMISSIONS QUANTIFICATION (Scopes 1 & 2)

3.1 Approach for GHG Emissions Quantification

Arconic Corporate sustainability staff summarizes the energy data and calculates GHG

emissions in a MS Excel Energy and GHG Emissions file on an annual, calendar year basis. The energy data is converted to GHG emissions using reputable and current emission factors. That is,

$$\text{GHG Emissions} = \text{Energy} \times \text{Emission Factors}$$

The emissions are typically quantified in the first calendar quarter of the following year when a summary of all the energy data has been compiled and forwarded from Strata per Section 3.

The corporate sustainability staff is responsible for completing the calculations, documenting the energy data, emission factors and any supporting information used in calculating the GHG emissions, and placing records of completed inventories in a central secure environment.

3.2 Emission Factors

Arconic converts annual purchased energy values into emissions of the applicable GHGs utilizing emission factor values from various non-governmental organizations ("NGOs"), government agencies, and utilities.

3.2.1 Scope 1 Emission Factors

For fossil fuels such as natural gas, diesel, gasoline, and propane, Arconic utilizes emission factors from the most relevant national or international body:

- USA: US Environmental Protection Agency (EPA) GHG hub
- UK: UK Department for Environment, Food, & Rural Affairs (DEFRA)
- Other Countries: Intergovernmental Panel on Climate Change (IPCC)

3.2.2 Scope 2 Emission Factors

From 2025 onwards, Arconic will report both market-based and location-based Scope 2 emissions. Location-based emission factors are the average grid emission factor of the region the site is located in. Market-based emission factors are based on the most detailed information available, including utility providers and purchased renewable energy, but will utilize location-based sources in the absence of more specific information.

The Market-Based Scope 2 emissions will be considered definitive for the purposes of tracking Arconic's progress against its 2030 GHG intensity reduction goals.

Location	Market-Based EF Source	Location-Based EF Source
Rolled Products ("RP")		
Alcoa	TVA (Utility)	US EPA eGrid

Bohai	Purchased Renewable Energy Certificates	Ministry of Ecology and Environment of the PRC
Davenport	US EPA eGrid	US EPA eGrid
Danville	US EPA eGrid	US EPA eGrid
Hutchinson	US EPA eGrid	US EPA eGrid
Kitts Green	Smartest Energy (Utility)	UK DEFRA
Kofem	Our World in Data	Our World in Data
Kunshan	Ministry of Ecology and Environment of the PRC	Ministry of Ecology and Environment of the PRC
Lancaster	US EPA eGrid	US EPA eGrid
San Antonio	US EPA eGrid	US EPA eGrid
Technology Center ("ATC")	US EPA eGrid	US EPA eGrid
Extrusions ("AEX")		
Chandler	US EPA eGrid	US EPA eGrid
Hannover	Purchased Renewable Energy Certificates	
Lafayette	US EPA eGrid	US EPA eGrid
Massena	New York Power Authority	US EPA eGrid
Building & Construction Systems ("BCS")		
Bloomsburg	US EPA eGrid	US EPA eGrid
Cranberry Township	US EPA eGrid	US EPA eGrid
Eastman	US EPA eGrid	US EPA eGrid
Guérande	Our World in Data	Our World in Data
Lethbridge	Our World in Data	Our World in Data
Merxheim	Our World in Data	Our World in Data
Runcorn	UK DEFRA	UK DEFRA
Springdale	US EPA eGrid	US EPA eGrid
Vendargues	Our World in Data	Our World in Data
Visalia	US EPA eGrid	US EPA eGrid

The GHG emission factors and their references are reviewed each year prior to preparing the annual emission inventory. Updates are made as needed and associated documentation is kept on file as either a standalone emission factor template or as worksheets in a master MS Excel file for each reporting year.

3.3 Types of Greenhouse Gas Emissions Reported

Per the *GHG Protocol*, Arconic strives to report on the six greenhouse gases covered by the Kyoto Protocol: carbon dioxide ("CO₂"), methane ("CH₄"), nitrous oxide ("N₂O"),

hydrofluorocarbons (“HFCs”), perfluorocarbons (“PFCs”), and sulfur hexafluoride (“SF₆”). Arconic does not emit PFCs or SF₆ emissions. HFC emissions are not measured but are believed to be far less than 1% of its total emissions.

3.4 Global Warming Potentials

Arconic normalizes GHG emissions into metric tons of “carbon dioxide equivalents” utilizing the values published by the International Panel on Climate Change (“IPCC”) in the [Fifth Assessment Report](#). Arconic utilizes this assessment version to be consistent with the reporting of national GHG emissions inventories by the United States and other countries for their annual national inventories. See [Understanding Global Warming Potentials | US EPA](#).

3.5 GHG Emissions Calculation Methodology (Scopes 1 and 2)

- a. The approved annual energy data from Strata and EPM is converted into GHG emissions (CO₂, CH₄, N₂O and CO₂e) in the MS Excel file by the corporate sustainability staff using updated emissions factors for each location. Emission factors utilized are documented and referenced in MS Excel master file tabs.
- b. GHG emissions are calculated for each location by scope. Scope 1 - direct emissions at each location and Scope 2 - indirect emissions associated with purchased electricity and steam.
- c. Location emissions are then compiled by GHG type, Business Unit, and operating region for CDP and other reports.
- d. Pivot tables are used to further analyze the results to check for changes from prior years to support internal and external reporting of GHG emission results.
- e. The annual energy and GHG emissions are reviewed and approved by the Vice President of Government Affairs and Sustainability prior to inclusion in the annual Sustainability report.

As stated earlier, Arconic reports its global corporate GHG emissions and energy use annually based on the previous calendar year. The corporate GHG emissions and energy consumption are typically prepared in the first calendar quarter following the end of the reporting year. Annual GHG emissions and energy consumption are then published in the annual ESG Report in the second quarter and submitted in the annual CDP Report by the end of July. Arconic publishes a breakdown by type, by region, and Business Unit of its annual Scopes 1 and 2 GHG emissions.

4 OPERATIONAL BOUNDARIES (Scopes 1 & 2)

4.1 Organizational Boundaries

Arconic accounts for and reports its GHG emissions and underlying energy data per Chapter 3 of the Greenhouse Gas Protocol on an “Operational Control Approach.” That is, where they have full authority to introduce and implement its operating policies at the operation.

The current listing of auditable locations is reconciled on a periodic basis with the location’s energy invoices for natural gas and electricity consumption, that are captured in Strata. By comparing the listing of locations subject to internal auditing against the listing of locations for which utility invoices are available in Strata, the completeness of the GHG inventory can be assessed.

It is noted that this listing does not include locations that are sales and administrative offices, service centers, or warehouses that have been determined not to be “material” to the approach described above. Arconic excludes reporting emissions from its service centers and office buildings that have been estimated to be well less than 1% of its total Scopes 1, 2, and 3 emissions.

4.2 Operational Boundaries

The following GHG emissions have been determined to be “material” to Arconic’s businesses and are accounted for in its GHG reporting.

4.2.1 Direct (Scope 1) Emissions

Direct emissions, also referred to as Scope 1 emissions, can include emissions from stationary combustion sources, emissions from company-owned or leased mobile equipment, and process units.

4.2.2 Indirect (Scope 2) Emissions

Arconic accounts for and reports GHG emissions associated with the generation of purchased electricity and steam, also known as indirect or Scope 2 emissions. Scope 2 emissions occur at the facility where the electricity or steam is generated. Contractual information meeting Scope 2 quality criteria were not available when the 2021 base year was established. As such, location-based results were used as a proxy since a market-based result could not be calculated.

From 2025 onwards, Arconic will report both Market- and Location-based Scope 2 emissions.

5 GHG EMISSIONS QUANTIFICATION (Scope 3)

In addition to direct and indirect emissions, Arconic estimates and reports on indirect GHG emissions that would result because of its value chain activities. These emissions are also referred to as Scope 3 emissions. Arconic has evaluated the 15 Scope 3 emission categories and currently considers the following categories as applicable to its business:

- Category 1 - Purchased goods and services
 - Only procured metals are included in scope, emissions based on metal weight
 - Aluminum smelter emission factors sourced from CRU
 - Secondary Aluminum considered to have zero emissions
- Category 2 - Capital goods
 - Emissions based on capital spend on Machinery & Industrial Equipment and Manufacturing Buildings. Other categories such as IT excluded.
 - Emission Factors from IAEG GHG Reporting Guidance 2023
- Category 3 - Fuel and energy related activities
 - Includes emissions from extraction, production, and transportation of fuels and energy purchased or acquired, upstream emissions of purchased electricity, and transmission and distribution (T&D) losses from the generation of the electricity purchased.
 - Emissions based on energy used
 - Emission Factors from IAI and US EPA eGrid.
- Category 4 - Upstream transportation and distribution
 - Upstream transportation of prime aluminum, alloyed slab, and alloying elements. Scrap is excluded.
 - Emissions based on weights of metal transported
 - Emission Factor from EAA Profile Report 2025
- Category 9 - Downstream transportation and distribution
 - Transportation from Arconic locations to customers
 - Emissions based on outbound shipping data
 - Transportation emission factors taken from US EPA GHG EF Hub and BSR Clean Cargo
- Category 12 - End-of-life treatment of sold products
 - Based on total product sold minus direct buy-backs from customers, emissions based on weight of product disposed.
 - Emission factors from World Aluminum 2013

Arconic estimates the relevance and materiality of such Scope 3 emissions for each of the 15 categories contained in WRI's *The Greenhouse Gas Protocol - Corporate Value Chain (Scope 3) Accounting and Reporting Standard*. Estimates of Scope 3 emissions from categories are quantified at the corporate level rather than at a location level. Detailed calculation methodologies for Scope 3 categories disclosed are available internally.

Arconic publishes total annual values of its Scope 3 emissions in both its Sustainability Report and CDP public reports. Arconic also publishes estimates, methodologies, and explanations for all 15 Scope 3 categories in Section 6.5 of its annual CDP report.

6 BASE YEAR SELECTION & RE-CALCULATION CRITERIA

6.1 Base Year Selection

Arconic has selected 2021 as the base year for the purpose of its global GHG emissions and energy consumption inventory. Section 5 of The *GHG Protocol* states, "Companies shall choose and report a base year for which verifiable emissions data are available and specify their reasons for choosing that particular year."

The basis for 2021 as the base year is that it is the first year following the most significant impacts from the COVID-19 pandemic, for which a complete set of GHG emissions and energy consumption inventory data for what are now Arconic-owned or operated locations can be compiled to allow a meaningful and consistent comparison of GHG emissions over time. This follows the November 2016 separation of Alcoa Inc. into Arconic Inc. and Alcoa Corporation and the April 2020 separation of Arconic Inc. into Howmet Aerospace Inc. and Arconic. Also, 2021 is more representative of the company's portfolio and product mix, especially related to the ramp-up of its packaging business. At this time, the 2021 base year is deemed to be the most representative and closest to the company's planned GHG target setting activities.

6.2 Re-Calculating Base Year Emissions

To enable a meaningful and consistent comparison of later years' GHG emissions against those of the base year, Arconic requires that the base year GHG emissions be recalculated in later years, as needed, when there is a significant change, defined as an increase or decrease equal to or greater than 10% of the base year GHG emissions. Examples may include any of the following:

- (1) Cumulative structural changes to the organization, including mergers, acquisitions, and divestitures, and outsourcing and insourcing of GHG-emitting activities,
- (2) Cumulative changes in GHG emissions calculation methodology; and
- (3) Discovery of an error, or several cumulative errors, impacting the calculated base year emissions.

Locations that are subject to a mandatory GHG regulatory reporting program shall follow the requirements for base year recalculation, if any, as defined by their program.

It is expected that with a rapidly and continuously changing ESG space that the base year will and should be recalculated and is a sign of continuous improvement and refinement.

6.2.1 Changes in Organizational Structure

Arconic requires that its base year GHG emissions inventory be recalculated in subsequent years to account for a change(s) in the organizational structure (e.g., acquisition of a new business, or divestiture of a location) which triggers a significant change (greater than +/- 10%) in the base year GHG emissions. The basis for this is that GHG emissions performance relative to the base year can only be accurately determined if the base year GHG inventory covers the same set of assets as the most current year.

In the case of an acquisition, the base year adjustments can be based on actual reported GHG emissions, calculated emissions like Arconic's calculation methodology, or estimated calculations depending on data availability and quality. Base year emissions are not adjusted for an acquisition that did not exist in the base year, consistent with the *GHG Protocol*.

6.2.2 Changes in Calculation Methodology

When a change in calculation methodology is implemented in a reporting year (or multiple changes over multiple years) and is determined to result in a significant change (greater than +/- 10%) of the base year GHG emissions inventory, Arconic requires recalculation of the base year emissions. If the data required to make the more accurate emissions calculations is not available, then Arconic may try to "back cast" the improved emissions estimate or may acknowledge the change in methodology without recalculation.

For changes in emissions factors that reflect real changes in emissions (e.g., due to fuel changes, grid composition, or changes in technology), the base year GHG inventory is not recalculated.

6.2.3 Discovery of Errors

Arconic requires that the base year GHG emissions inventory be recalculated in the case of the discovery of an error, or several cumulative errors, in the current year (for an emissions source(s) that also existed in the base year) that would result in a material discrepancy (greater than 5%) of the base year GHG inventory.

6.3 Re-Calculation of Base Year Emissions

Arconic corporate sustainability staff has accountability for determining if recalculating

the base year emissions because of the above criteria has been triggered. This is done as part of the annual GHG emissions inventory preparation. A re-calculation of the base year emissions requires approval from the Vice President of Government Affairs and Sustainability. When recalculating the base year emissions, the corporate sustainability staff will be required to document the reason(s) for making the change to base year inventory as well as the data sources used for making the change.

6.4 Re-Calculation of Non-Base Year Emissions

For purposes of retaining an accurate representation of the company's historical GHG emissions, Arconic may revise its historical, non-base year enterprise wide GHG emissions inventories as needed, to account for: (1) changes in GHG emissions calculation methodology that would result in a significant change (greater than +/-10%) in historically reported GHG emissions; and (2) discovery of an error, or several cumulative errors.