ERM SUSTAINABILITY REPORT 2023

# Approach to decarbonization

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# Decarbonizing our operations

ERM is committed to playing our part in the global imperative of addressing climate change. For over 15 years, we have actively monitored and sought to incrementally decarbonize our operations, in line with our belief that as the world's largest pure play sustainability consultancy, we have a responsibility to demonstrate strong climate leadership.

We recognize the critical role of collaboration in providing leadership and our senior management and subject matter experts are active contributors to the evolving technical, corporate and societal response to climate change. We are engaged with the world's leading organizations and initiatives on climate, including the World Business Council for Sustainable Development (WBCSD) Climate and Energy Programs, the Natural Climate Solutions Alliance, Race to Zero, The Climate Pledge, Pledge to Zero, and the UN Global Compact UK Climate Working Group, among others. More details can be found in the collaboration section of the **Sustainability Report**.

## Key milestones in the decarbonization of our operations

**2007** ERM began collecting GHG data and implemented emissions reductions measures that continue to this day.

**2012** After embedding these measures across the organisation, we first publicly reported this data and our emissions targets in 2012 as part of our Sustainability Report, reflecting the importance of decarbonization to our corporate strategy.

**2018** ERM became one of the first professional services firms to commit to the Science Based Target initiative (SBTi), with our targets formally approved in 2019.

**2021** We announced our own net-zero commitment with emissions reductions aligned to an updated 1.5 degrees Celsius SBTi target, to be delivered across our operations by 2025.
Since 2021, ERM has used 100% renewable electricity in our offices.
We published our first Task Force on Climate-related Financial Disclosures (TCFD) report.

**2022** We submitted our Scopes 1, 2 and 3 greenhouse gas (GHG) emissions data for third-party assurance.

**2023** We conducted a Scope 3 review and rebaselined our Scopes 1, 2 and 3 targets. We remain on track to meet our 2025 emissions reductions targets and have voluntarily commenced compensating our Scopes 1, 2 and a portion of our Scope 3 emissions, as part of our decarbonization strategy.

**Next steps** In line with our climate leadership position and reflecting evolving scientific and technical guidance, ERM has committed to the SBTi's Corporate Net-Zero Standard and submitted updated emissions reductions targets for approval by SBTi.

# Our FY23 performance

### Our existing decarbonization targets

We set science-based targets in 2021 for Scopes 1 and 2 emissions and Scope 3 emissions from business travel and employee commuting. ERM is on track to meet our science-based targets through sustained emissions reductions across our operations.

### Scopes 1 & 2 emissions

We remain focused on reducing our own emissions, and in FY23 continued to work with our office optimization team to embed sustainability criteria into our planning and decision-making for new offices or those being reviewed at the expiry of a current lease. We have maintained 100% renewable electricity within our changing portfolio of offices by negotiating renewable energy contracts and purchasing renewable energy credits in locations where direct purchase is not yet feasible.

Building on a companywide vehicle fleet review, we continue to make progress in retiring company cars, and we are transitioning to low-emission or electrical vehicles.


**Our current SBTi targets:**

- **Reduce absolute Scopes 1 and 2 GHG emissions 80% by 2025 from a 2014 base year.**
- **Reduce absolute Scope 3 GHG emissions from business travel and employee commuting by 30% by 2025 from a 2018 base year.**

## Scope 3 emissions

As a professional services firm, Scope 3 emission reductions remain our most significant challenge. During FY23, we conducted a full Scope 3 review working with internal teams and our experts to consider what the future of work will be like in various locations around the world and how this may impact our emissions profile. This exercise enabled us to identify those Scope 3 categories that are relevant to ERM, including both material categories and those identified as immaterial to our operations. Material categories include purchased goods and services, capital goods, business travel and employee commuting. Immaterial categories include fuel and energy related activities and waste generated.

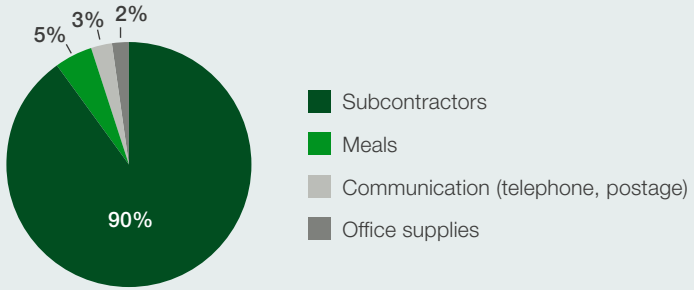
The category of purchased goods and services represents one of the most substantive sources of ERM's Scope 3 emissions and its' inclusion has significantly altered our Scope 3 profile. Our current Scope 3 emissions are set out below, noting that the absolute emissions have increased significantly from our FY22 profile, due to the inclusion of additional Scope 3 categories, principally that of purchased goods and services.

Our Scope 3 screening and inventory development is now aligned with the SBTi Corporate Net-Zero Standard and the results of this review have been incorporated into our updated implementation plan to meet our net-zero and science-based targets.

### Climate impacts of purchased goods and services

Purchased goods and services account for 67% of our Scope 3 emissions and 90% of emissions within this category derive from our subcontractors. Addressing the supply chain is, therefore, a priority action for our decarbonization strategy.

**Purchased Goods & Services: Breakdown of Emission Sources**




In the coming year, we will engage with our supply chain with the aim to set targets for purchased goods and services that aligns with our net-zero strategy.

Our initial focus will be on top-tier suppliers where engagement can generate the most impact in terms of emissions reductions. We will support capacity building in our top-tier and business-critical suppliers to improve their own decarbonization efforts.

As we work to achieve our long-term targets to reduce emissions across Scope 3 emissions, we plan to monitor performance among our suppliers, intervene in the event suppliers are failing to align with our net-zero strategy and strengthen low-carbon supplier choices.

## Scope 3 emissions, by category FY20 - FY23 (tCO2e)[1]

GRI 305-3

| | Base year | | | Most recent year |
|---|---|---|---|---|
| **Category** | **FY20** | **FY21** | **FY22** | **FY23** |
| Purchased goods & services | 26,634 | - | - | 25,485 |
| Capital goods | 1,879 | - | - | 1,599 |
| Business travel | 15,412 | 2,454 | 4,411 | 8,475 |
| Employee commuting | 7,646 | 530 | 515 | 2,554 |
| **Total** | **51,571** | **2,984** | **4,926** | **38,113** |

[1] Our Scope 3 inventory includes categories 1, 2, 6 and 7. A screening was conducted for our nonmaterial categories, such as categories 3 and 5 of Scope 3, which are not reported as these are de minimus.

Business travel and employee commuting are covered by our ongoing corporate commitment to our SBTi target to reduce Scope 3 emissions. Our travel policy and reduced travel budgets remain in place to address emissions as pandemic travel increases and restrictions have lifted.

For the third year, we have calculated the associated energy use and GHG emissions from home-based working given that many of our employees work a portion of their time at home. Further details on this our Scope 3 data and review, can be found in the 'Data and disclosure' section of this document.

Decarbonization data can be found in the **2023 Sustainability Report**.

## Residual carbon emissions

Residual emissions are those carbon emissions that remain while we implement measures to achieve our net-zero commitment. ERM will continue to prioritize emissions reductions but we believe it is our responsibility to also manage residual emissions when these arise.

Drawing on our pool of subject matter experts as well as emerging best practice, we have developed a phased approach to compensate residual emissions focusing on the purchase of high-quality carbon credits for all of our Scopes 1 & 2 emissions and Scope 3 emissions from internal travel.

In FY23, we purchased carbon credits from two sources: half of our credits derive from nature-based solutions certified by the Gold Standard Foundation, and half of our credits have been purchased directly from the project developer. This strategic approach to credit purchasing allows for diversified geographical coverage and a balance between nature and technology-based solutions, that we believe optimizes the value which can be generated through credit purchasing. Our Gold Standard credits include **The Nicaforest high impact Reforestation Program** and our direct project developer credits include **Improved Cooking Stoves Programme in Burundi**.

Recently, there has been focused attention on the carbon credit markets, particularly the voluntary carbon markets (VCM). ERM is increasing our role in the carbon markets with a public role advocating on the VCM via our engagement with the Natural Climate Solutions Alliance (NCSA) hosted by WBCSD. We are a member of the NCSA Accelerator which sets out best practice and advice on procurement practices.

### Our procurement criteria for the purchasing of carbon credits encompasses the following:

- ERM's carbon credits have been selected in line with the highest environmental and social integrity standards, which include: the avoidance of broader social or environmental harm, are compatible with the protection of human rights, promote equity, apply social safeguards, and demonstrate positive socio-economic impact.
- ERM sources its credits from respected carbon registries such as the Gold Standard Project Marketplace and project developers whose projects have been registered in international carbon registries such as VERRA.
- To ensure the highest environmental quality, ERM uses the international neutrality standard PAS2060. This demonstrates that the emissions reductions are additional, permanent, provide robust mitigation against leakage and double counting, and are restricted to early vintage years.
- All credits from the registries are transparent, verified by third parties and follow a robust emission reduction accounting methodology to assure the volume of emissions are reduced through the offset project.
- From FY24, we intend to purchase credits via a long-term credit purchase portfolio and signed emission reduction purchase agreements. This provides surety to the project developers to sustain projects and builds the demand side of the wider market.
- ERM's longer-term FY26 goal is for 100% of ERM's carbon credit projects to have demonstrated livelihoods benefits.

# Next steps for FY24 and beyond

ERM has committed to the SBTi Net-Zero Standard and submitted updated emissions reductions targets for approval by SBTi. Aligning to SBTi's Net-Zero Standard creates room for longer-term target setting and the engagement of our supply chain, which is a primary source of our Scope 3 emissions. Whilst we await validation, we will begin implementing the updated targets as part of the next phase in our decarbonization strategy.

Photo credit: Alicia Arcidiacono, United Statesa

With respect to Scopes 1 and 2 emissions, our emphasis is on optimization of existing measures and building upon the momentum already achieved through our current program. We will also seek to capitalize upon opportunities to accelerate deployment of measures such as the transition of our car fleet to electric vehicles (EV) or hybrid models.

The most significant development in our FY24 decarbonization program will be the inclusion of Scope 3 emissions arising from our capital goods and purchased goods and services. Consistent with our commitment to align with the SBTi Net-Zero Standard and to provide greater visibility of the nature and source of our Scope 3 emissions, we are launching a supply chain engagement strategy. This strategy will enable us to identify carbon management programs currently in place within our supply chain and how we can work collaboratively to reduce emissions arising from our contracted activities in line with our Scope 3 emissions reduction targets.

This next phase in our decarbonization strategy will be accompanied by the launch of ERM's Transition Plan, later in FY24, which will set out our vision and proposed approach to delivery of net-zero across our value chain.

# Data and disclosure – further details

### FY23: Reviewing our approach

The introduction of the SBTI Net-Zero Standard provided new guidelines for the analysis and reporting of GHG inventories and the target setting scope and timeframes that follow from this. During FY23, we undertook a series of measures to support our preparation for alignment with the Net-Zero Standard, which are summarised below.

### Rebaselining

In FY23 we rebaselined our data to align with the GHG Protocol and latest SBTi requirements. We have changed our base year to FY20 for our Scopes 1, 2 and 3 emissions. Our previous base years were FY14 (for Scopes 1 and 2) and FY18 (for Scope 3). The new base year data is retroactively recalculated to reflect ERM's structural changes such as acquisitions growth and the new Scope 3 categories of capital goods and purchased goods and services. The methodologies used for recalculation of our base year and new Scope 3 categories are in line with guidance from the GHG Protocol.

### Employee commuting and homeworking emissions

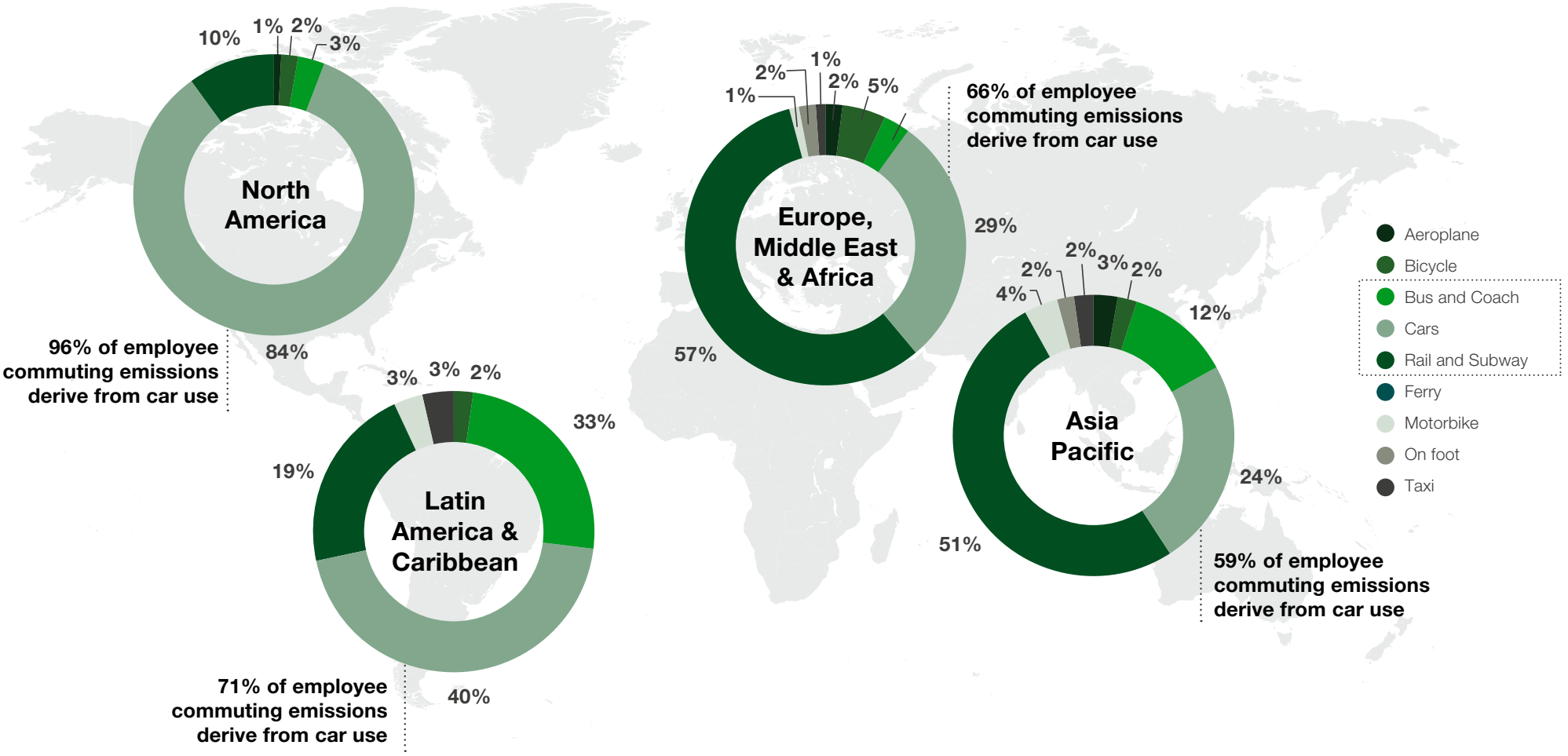
Capturing the additional energy use and associated carbon emissions from employees who work from home, in addition to commuting to and working in an ERM office, gives us a more complete understanding of our Scope 3 emissions.

Last year, we engaged an external assurance provider to review our homeworker methodology. Based on the assurer's recommendations, ERM launched the Global Commuter and Homeworker survey in FY23 to capture accurate commuter and homeworker data from our employees. We also collected data around renewable energy use while working from home incorporated this in our calculation of homeworker GHG emissions. The survey achieved a response rate of 67% globally, which is higher than industry standards.

We uploaded survey data to our carbon data management platform, Ecometrica, which calculates the commuter emissions for various types of travel (e.g., car, public transport, etc.) and the additional energy demand associated with home working, applying residential heating and cooling data based on country-specific emission factors. For renewable energy homeworker data, heating is applied but electricity is applied as zero coefficient to increase accuracy of data.

In FY23, we calculated 2,554 tCO2e emissions from employee commuting and 3,344 tCO2e associated with the additional energy demand from our employees working from home, for a total of 5,898 tCO2e. For comparison, our FY23 emissions are approximately 11% less than our employee commuting emissions of 6,636 tCO2e in FY20, which included less than 3 months of COVID travel restrictions and fewer employees than during FY23.

# 2022 Employee Commuter Survey: % travel by mode per region[1,2]




[1] Global business and Group are included in regional totals
[2] Total emissions from FY23 (reporting period from April to March)

We do not include the estimated energy demand associated with working from home in our total GHG footprint, as it is voluntary reporting under the GHG Protocol and lacks final standards and guidance. In previous years during the pandemic, we did calculate working from home emissions as we had mechanisms in place to support data calculations. With our employees now undertaking a hybrid of remote locations (home and client sites) and ERM office locations, we do not have the mechanisms or methodologies that can support robust calculations. We will continue to track the development of standards and guidance with respect to homeworker data reporting.

### Renewable energy and market instruments

We have significantly reduced our Scope 2 emissions by switching to green energy contracts, purchasing renewable energy and implementing other energy efficiency measures. Since FY21, ERM has sourced 100% renewable electricity across the global portfolio of our offices.

ERM has market instruments in place for 100% of our global energy portfolio. The renewable energy is sourced 8% by direct supplier contracts and 92% by purchased renewable energy certificates (RECs), International RECs (I-RECs) or Guarantees of Origins (GOs).

In FY23, we used alternative options where in-country Energy Attribute Certificates (EACs) were not available, including:

- **South Korea**. There are no in-market unbundled EAC products currently available. The Korea Electric Power Corporation currently has a green pricing program that provides EACs bundled with electricity purchases to program consumers, and the government is in the process of developing an unbundled EAC system.
- **Guyana**. There are no in-market unbundled EACs available. Although geographically close to Brazil, which has EACs available, there is no interconnection between the two countries' electricity grids.
- **Romania**. While Romania has legislation in place for electricity disclosure and has introduced a national GO system to comply with EU law, no GOs have been issued in the country to date.
- **Taiwan**. Due to the recent introduction of a new national Renewable Portfolio Standard in Taiwan, the available supply of unbundled EACs for voluntary purchasers like ERM is limited by government-backed restrictions of generation technology, high demand, and significantly high pricing.

We evaluated our FY23 EAC procurement based on global standards for attribute tracking systems, technical criteria and market boundary criteria of our renewable energy claims. As a result, we chose to procure RECs from wind and solar technology that bears the EKOEnergy label. EKOEnergy verifies to ensure renewable energy projects do not have a negative ecological impact on the local environment and dedicates a portion of funds to the development of new renewable energy projects in developing countries. In North America, we procured RECs from the same e-Grid sources. Sourcing from the same grid is considered to be a best practice.

Continuously reviewing the best standards in each market enables ERM to purchase EACs with the highest level of integrity and environmental quality.

### Acquisitions

ERM has undergone a period of sustained growth. Data for new offices or offices added through ERM acquisitions during FY23 have been included where available. We calculated Scopes 1 and 2 GHG data for the offices of the following ERM acquisitions: Arcus, RCG, OPEX, Point Advisory, MarineSpace, Shelton Group and Libryo. Scope 3 data will be included from FY24, when these acquisitions will be integrated fully into our systems. Coho and NINT are new acquisitions, which are not yet part of our data collection cycle.

## Assurance of our data and disclosure

We recognize the importance of accuracy in the data we are disclosing and transparency in our reporting processes. For the second year, we have undertaken external assurance of our GHG emissions data, as part of our approach to continuous improvement and in preparation for enhanced financial disclosure requirements in the United Kingdom, European Union and other key jurisdictions within which we operate. We will continue to undertake assurance of our reporting consistent with stakeholder expectations and evolving best practice.

Our FY23 GHG emissions inventory (GHG Assertion) data for 1 April 2022 to March 31 2023, was subject to a limited level of assurance and materiality in line with the GHG Protocol (revised edition, Jan 2015) and ISO 14064 - Part 3 for GHG emissions. The verification procedure is based on current best practice and is in accordance with ISAE 3000 and ISAE 3410. **Click here** to read the third-party data verification statement.

## TCFD disclosure

Using the TCFD framework, we have reviewed our physical and transition risks in relation to our future business strategy. Learn more about ERM's climate-related governance, strategy, risk management and quantification, and targets and metrics in our **TCFD disclosure**.

## Data calculation and collation

All emissions data presented in our Sustainability Report 2023 is expressed as carbon dioxide equivalent ($CO_2e$) and includes all Kyoto gases and refrigerants. ERM uses the Fifth Assessment Report as a source of global warming potential (GWP) without climate feedback. All data has been calculated using a market-based approach, unless otherwise stated. For further information on market-based methods, please refer to **www.ghgprotocol.org**

ERM uses Ecometrica as our sustainability management system to collect and manage our greenhouse gas data. Ecometrica uses emission factors from DEFRA, EEIO, EPA, IEA, IPCC, European Residual Mix factors and custom factors (derived for multiple sources). Ecometrica hosts these emission factors and regularly updates them when the latest factors are released, and data calculation is conducted within this platform. For calculation of new Scope 3 categories, including Category 1 & Category 2, ERM has used EEIO emission factors, in line with guidance from the GHG Protocol, to provide an indicative estimate of emissions for FY23.

We report environmental data for offices that fall within ERM's material threshold (as defined in our Sustainability Reporting Protocol) per fiscal year (FY), which runs 1 April to 31 March. ERM's Sustainability Reporting Protocol provides guidance for the development and maintenance of robust data collection systems that will measure sustainability performance across all key performance areas in a consistent, accurate and auditable manner.

We work with property owners to improve our access to actual energy consumption data for leased offices. Where data is unavailable, we use the average data method as per the GHG protocol and estimate the energy data using office floor size. Sources excluded are reviewed annually to determine if emissions are considered de minimis. For FY23, offices that encompassing fewer than 50 square meters, excluding dedicated server-hosting spaces, were considered de minimis and excluded from energy data collection and reporting process. In FY23, several ERM offices moved to virtual and shared spaces with low occupancy, and these offices qualify as de minimis.

Regardless of whether an office meets the de minimis exemption or not, we collect data to calculate business travel emissions for all ERM employees. In FY23, we introduced use of Rydoo, a centralized expense claim system, which helps improve data completeness.

# Climate data reference list

ERM uses the Fifth Assessment Report as a source of global warming potential (GWP) without climate feedback, as shown in the following reference table.

| Gases | Activity | Geography | Reference |
|---|---|---|---|
| **CO2, CH4, N2O** | Homeworker | All countries (except US, Canada) | Ecometrica homeworker model (2022) |
| **CO2, CH4, N2O** | Auto rickshaw (petrol) | Asia | India GHG Program, India Specific Road Transport Emission Factors (2015). |
| **CO2, CH4, N2O** | AVE train | Spain | Renfe (2022). Informe De Responsabilidad Social Y Gobierno Corporativo 2021, available online at: **https://www.renfe.com/es/en/renfe-group/renfe-group/responsible-company** |
| **CO2, CH4, N2O** | Average battery electric vehicle (combined emissions) | United Kingdom | Department for Business, Energy and Industrial Strategy (2022). 2022 Government GHG Conversion Factors for Company Reporting. |
| **CO2e** | Average German bus | Germany | Deutsche Bahn (2022). 2021 Integrated Report. |
| **CO2, CH4, N2O** | Average passenger car | United States, Earth, North America | EPA (2022). GHG Emission Factors Hub. Center for Corporate Climate Leadership. April 2022. **https://www.epa.gov/climateleadership/ghg-emission-factors-hub**. Accessed May 2022. |
| **CO2, CH4, N2O** | BC Motorcycle, gasoline | British Columbia (Canada) | BCME (2021). 2020 B.C. Best Practices Methodology for Quantifying Greenhouse Gas Emissions For Public Sector Organizations, Local Governments And Community Emissions. April 2021. British Columbia Ministry of Environment and Climate Change Strategy. Accessed June 2021. |

| Gases | Activity | Geography | Reference |
|---|---|---|---|
| **CO2, CH4, N2O** | Bus, average | United States, Earth, North America, Europe, Turkey, United Kingdom | EPA (2022). GHG Emission Factors Hub. Center for Corporate Climate Leadership. April 2022. **https://www.epa.gov/climateleadership/ghg-emission-factors-hub**. Accessed May 2022. |
| **CO2e** | Bus, average, unknown fuel | Netherlands | CO2 emissiefactoren (2021), **http://co2emissiefactoren.nl/lijst-emissiefactoren**. Accessed March 2021 |
| **CO2, CH4, N2O** | Canada homeworker | Canada | Natural Resources Canada (2020). Residential End-Use Model, Ottawa, 2020. **https://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/data_e/sources.cfm** (2012). Energy efficiency in buildings. Guide F. The Chartered Institution of Building Services Engineers. #Statistics Canada (2022). Report on Energy Supply and Demand in Canada (57-003-x2022001). 2019 Revised. Online: **https://www150.statcan.gc.ca/n1/en/catalogue/57-003-X**. Released May 2, 2022. #EC (2022). National Inventory Report. Greenhouse Gas Sources and Sinks in Canada: 1990 – 2020. Environment Canada. Online: **https://unfccc.int/documents/271493** |
| **CO2, CH4, N2O** | Car, diesel, average | United States, Earth, North America | EPA (2022). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2020. United States Environmental Protection Agency. Online: **https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2020** |
| **CO2, CH4, N2O** | Car, gasoline, average | Canada | EC (2022). National Inventory Report. Greenhouse Gas Sources and Sinks in Canada: 1990 – 2020. Environment Canada. Online: **https://unfccc.int/documents/461919** |
| **CO2, CH4, N2O** | Car, medium | Europe, Turkey, United Kingdom | Department for Business, Energy and Industrial Strategy (2022). 2022 Government GHG Conversion Factors for Company Reporting. |

| Gases | Activity | Geography | Reference |
|---|---|---|---|
| **CO2, CH4, N2O** | Diesel Vehicles (post 2004) | Australia | Commonwealth of Australia 2021 (Department of the Environment and Energy). National Greenhouse Account Factors (NGA) – Australian National Greenhouse Accounts. November 2021. Online: **https://www.dcceew.gov.au/sites/default/files/documents/national-greenhouse-accounts-factors-2021.pdf** |
| **CO2, CH4, N2O** | Diesel, 100% mineral | Europe, Turkey, Brazil | Department for Business, Energy and Industrial Strategy (2022). 2022 Government GHG Conversion Factors for Company Reporting. |
| **CO2, CH4, N2O** | Diesel, mobile combustion | United States, Earth, North America | EPA (2022). GHG Emission Factors Hub. Center for Corporate Climate Leadership. April 2022. **https://www.epa.gov/climateleadership/ghg-emission-factors-hub**. Accessed May 2022. |
| **CO2, CH4, N2O** | Diesel, retail station biofuel blend | United Kingdom, Finland, Ireland | Department for Business, Energy and Industrial Strategy (2022). 2022 Government GHG Conversion Factors for Company Reporting. |
| **CO2, CH4, N2O** | District Heating (country default) | Germany | Umwelt Bundesamt (2022). CO2-Emissionsfaktoren für fossile Brennstoffe, **https://www.umweltbundesamt.de/sites/default/files/medien/479/publikationen/cc_29-2022_emission-factors-fossil-fuels.pdf** |
| **CO2, CH4, N2O** | Electricity grid | All countries | United Nations (2023). UN Statistics Division – 2020 Energy Balance Visualizations. **https://unstats.un.org/unsd/energystats/dataPortal/#IPCC** (2006). Revised IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual. Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge. |
| **CO2e** | Electricity grid, aggregated, national | Australia | Commonwealth of Australia 2021 (Department of the Environment and Energy). National Greenhouse Account Factors (NGA) – Australian National Greenhouse Accounts. November 2021. Online: **https://www.dcceew.gov.au/sites/default/files/documents/national-greenhouse-accounts-factors-2021.pdf** |

| Gases | Activity | Geography | Reference |
|---|---|---|---|
| **CO2, CH4, N2O** | Electricity grid, eGrid subregion | United States | EPA (2022). eGrid2020. Release : 1/27/2022. Online: **https://www.epa.gov/egrid/download-data**. Accessed February 9, 2022. |
| **CO2, CH4, N2O** | Electricity grid | Brazil | Governo do Brasil (2022). MCTIC. Arquivos dos fatores médios de emissão de CO2 grid mês/ano. Ministério da Ciência, Tecnologia, Inovações e Comunicações. Online: **https://www.gov.br/mcti/pt-br/acompanhe-o-mcti/sirene/dados-e-ferramentas/fatores-de-emissao**. Accessed March 2023 |
| **CO2, CH4, N2O** | Electricity grid, national average | United States | EPA (2023). eGrid2021. Release : 1/30/2023. Online: **https://www.epa.gov/egrid/download-data**. Accessed February 9, 2023. |
| **CO2, CH4, N2O** | Electricity grid, national average (Scope 3) | United States | EPA (2022). eGrid2020. Release : 1/27/2022. Online: **https://www.epa.gov/egrid/download-data**. Accessed February 9, 2022. |
| **CO2, CH4, N2O** | Light rail | Earth, Europe, Turkey, United Kingdom | Department for Business, Energy and Industrial Strategy (2022). 2022 Government GHG Conversion Factors for Company Reporting. |
| **CO2, CH4, N2O** | Motorcycle, petrol, small | Japan, Earth, Europe, Turkey, United Kingdom | Department for Business, Energy and Industrial Strategy (2022). 2022 Government GHG Conversion Factors for Company Reporting. |
| **CO2, CH4, N2O** | US homeworker | United States | CIBSE (2012). Energy efficiency in buildings, CIBSE Guide F. The Chartered Institution of Building Services Engineers. #EIA (2018). 2015 Residential Energy Consumption Survey. **http://www.eia.gov/consumption/residential/data/2015/index.cfm?view=consumption#end-use-by-fuel**. #EPA (2020). eGrid2018v2. Release : 3/9/2020. Online: **https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid** Accessed March 11, 2020. #EPA (2020). GHG Emission Factors Hub. Center for Corporate Climate Leadership. March 2020. **https://www.epa.gov/climateleadership/ghg-emission-factors-hub**. Accessed September 2020 |

| Gases | Activity | Geography | Reference |
|---|---|---|---|
| **CO2, CH4, N2O** | Ferry, average (all passengers) | Earth, Europe, United Kingdom | Department for Business, Energy and Industrial Strategy (2022). 2022 Government GHG Conversion Factors for Company Reporting. |
| **CO2, CH4, N2O** | Flights | Earth, Europe, United Kingdom | Department for Business, Energy and Industrial Strategy (2022). 2022 Government GHG Conversion Factors for Company Reporting. |
| **CO2, CH4, N2O** | Gasoline | United States, Earth, North America | EPA (2022). GHG Emission Factors Hub. Center for Corporate Climate Leadership. April 2022. **https://www.epa.gov/climateleadership/ghg-emission-factors-hub**. Accessed May 2022. |
| **CO2, CH4, N2O** | Gasoline passenger cars | United States, Earth, North America | EPA (2022). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2020. United States Environmental Protection Agency. Online: **https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2020** |
| **CO2, CH4, N2O** | Gasoline passenger vehicle | Japan | GIO, CGER, NIES (2022), National Greenhouse Gas Inventory of Japan. Greenhouse Gas Inventory Office of Japan (GIO), Center for Global Environmental Research (CGER), National Institute for Environmental Studies (NIES). |
| **CO2, CH4, N2O** | Gasoline Vehicles (post 2004) | Australia | Commonwealth of Australia 2021 (Department of the Environment and Energy). National Greenhouse Account Factors (NGA) – Australian National Greenhouse Accounts. November 2021. Online: **https://www.dcceew.gov.au/sites/default/files/documents/national-greenhouse-accounts-factors-2021.pdf** |
| **CO2, CH4, N2O** | Heat/steam, good quality CHP: UK average | Earth | Department for Business, Energy and Industrial Strategy (2022). 2022 Government GHG Conversion Factors for Company Reporting. |

| Gases | Activity | Geography | Reference |
|---|---|---|---|
| **CO2, CH4, N2O** | Intercity rail | United States, Earth, North America | EPA (2022). GHG Emission Factors Hub. Center for Corporate Climate Leadership. April 2022. **https://www.epa.gov/climateleadership/ghg-emission-factors-hub**. Accessed May 2022. |
| **CO2, CH4, N2O** | Italian high speed train | Italy | Italo (2021). 2020 Sustainabiliy Report. |
| **CO2, CH4, N2O** | Battery electric, hybrid vehicle | Earth | Department for Business, Energy and Industrial Strategy (2022). 2022 Government GHG Conversion Factors for Company Reporting. |
| **CO2e** | Metro, electric | Netherlands | CO2 emissiefactoren (2021), **http://co2emissiefactoren.nl/lijst-emissiefactoren/**. Accessed March 2021 |
| **CO2, CH4, N2O** | Motorcycle, average | United States, Earth, North America | EPA (2022). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2020. United States Environmental Protection Agency. Online: **https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2020** |
| **CO2, CH4, N2O** | Natural gas | Canada | EC (2022). National Inventory Report. Greenhouse Gas Sources and Sinks in Canada: 1990 – 2020. Environment Canada. Online: **https://unfccc.int/documents/461919** |
| **CO2, CH4, N2O** | Natural gas (100% mineral) | Europe, Turkey, United Kingdom | Department for Business, Energy and Industrial Strategy (2022). 2022 Government GHG Conversion Factors for Company Reporting. |
| **CO2, CH4, N2O** | Natural gas, national average, stationary combustion | United States, North America | EPA (2022). GHG Emission Factors Hub. Center for Corporate Climate Leadership. April 2022. **https://www.epa.gov/climateleadership/ghg-emission-factors-hub**. Accessed May 2022. |

| Gases | Activity | Geography | Reference |
|---|---|---|---|
| **CO2, CH4, N2O** | Natural gas, stationary, commercial | United States, North America | EPA (2022). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2020. United States Environmental Protection Agency. Online: **https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2020** |
| **Biogenic CO2** | Passenger vehicle, ethanol | Brazil | GHG Protocol Brasil (2022). Ferramenta GHG Protocol 2022. Version 2022.0.1. Programa Brasileiro GHG Protocol. Available online: **https://eaesp.fgv.br/centros/centro-estudos-sustentabilidade/projetos/programa-brasileiro-ghg-protocol**. |
| **CO2, CH4, N2O** | Petrol, 100% mineral | Europe, Turkey | Department for Business, Energy and Industrial Strategy (2022). 2022 Government GHG Conversion Factors for Company Reporting. |
| **CO2, CH4, N2O** | Purchased Steam/Hot Water | United States, North America | EPA (2022). GHG Emission Factors Hub. Center for Corporate Climate Leadership. April 2022. **https://www.epa.gov/climateleadership/ghg-emission-factors-hub**. Accessed May 2022. |
| **R22** | R22 | Earth | IPCC (2007). IPCC Fourth Assessment Report: Climate Change 2007. Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge. |
| **HFC** | Refrigerant gas HFC-134a | Earth | IPCC (2007). IPCC Fourth Assessment Report: Climate Change 2007. Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge. |
| **CFC** | Refrigerant gas R11, R12 | Earth | IPCC (2013). IPCC Fifth Assessment Report: Climate Change 2013. Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge. |
| **R401a** | Refrigerant gas R401a | Earth | IPCC (2013). IPCC Fifth Assessment Report: Climate Change 2013. Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge. |

| Gases | Activity | Geography | Reference |
|---|---|---|---|
| **HFC-407a** | Refrigerant gas R407c | Earth | IPCC (2007). IPCC Fourth Assessment Report: Climate Change 2007. Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge. |
| **HFC-410a** | Refrigerant gas R410a | Earth | IPCC (2007). IPCC Fourth Assessment Report: Climate Change 2007. Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge. |
| **CO2, CH4, N2O** | Small battery electric vehicle (combined emissions) | United Kingdom | Department for Business, Energy and Industrial Strategy (2022). 2022 Government GHG Conversion Factors for Company Reporting. |
| **CO2, CH4, N2O** | Taxi, regular | Japan, Europe, Turkey, United Kingdom | Department for Business, Energy and Industrial Strategy (2022). 2022 Government GHG Conversion Factors for Company Reporting. |
| **CO2e** | TGV train | Europe | SNCF (2021). Information Sur La Quantite De Gaz A Effet De Serre Emise A L'occasion D'une Prestation De Transport |
| **CO2e** | Thalys train | Europe | SNCF (2021). Information Sur La Quantite De Gaz A Effet De Serre Emise A L'occasion D'une Prestation De Transport |
| **CO2, CH4, N2O** | Train, Eurostar | Europe, Turkey, United Kingdom | Department for Business, Energy and Industrial Strategy (2022). 2022 Government GHG Conversion Factors for Company Reporting. |
| **CO2e** | Train, international | Netherlands | CO2 emissiefactoren (2021), **http://co2emissiefactoren.nl/lijst-emissiefactoren/**. Accessed March 2021 |

| Gases | Activity | Geography | Reference |
|---|---|---|---|
| **CO2, CH4, N2O** | Train, national | Japan, Europe, Turkey, United Kingdom | Department for Business, Energy and Industrial Strategy (2022). 2022 Government GHG Conversion Factors for Company Reporting. |
| **CO2, CH4, N2O** | Transit rail | United States, North America | EPA (2022). GHG Emission Factors Hub. Center for Corporate Climate Leadership. April 2022. **https://www.epa.gov/climateleadership/ghg-emission-factors-hub**. Accessed May 2022. |
| **CO2, CH4, N2O** | Truck, light-duty, diesel, gasoline average | United States, Earth, North America | EPA (2022). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2020. United States Environmental Protection Agency. Online: **https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2020** |
| **CO2, CH4, N2O** | Underground train | Earth, Europe, United Kingdom | Department for Business, Energy and Industrial Strategy (2022). 2022 Government GHG Conversion Factors for Company Reporting. |

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# Approach to decarbonization

SUPPLEMENT

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