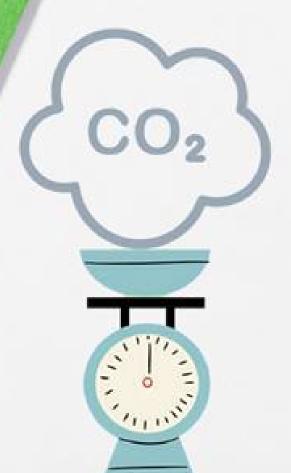# GHG Quantification Methodology 2024

SCOPE 1 - QUANTIFICATION METHODOLOGY

For calculating scope 1 emissions, we have included data pertaining to three categories:

Fugitive emissions from refrigerants
A 'purchase-based approach' has been used to arrive at the activity data for the consumption of refrigerants. To calculate fugitive GHG emissions, the Intergovernmental Panel on Climate Change (IPCC) and DEFRA emission factors have been referenced.

Stationary combustion
The key fuel sources considered for arriving at the activity data are furnace oil, coal, HSD, Natural gas, gasoline. To quantify emissions, the relevant guidelines from IPCC and Department for Environment, Food and Rural Affairs (DEFRA) have been referenced for emission factors.

Wastewater
Most of our Manufacring units sending the Wastewater to Third party CETPs (common effluent treatment plants for treatment) for treatment and Disposal. Hence Emissions from Transportation and Treatment of Effluent is captured at Relevant category of SCOPE-3 i.e Category 5:Waste Generated in Operations

SCOPE 2 - QUANTIFICATION METHODOLOGY

Scope 2 emissions data encompasses activity data from grid electricity consumption. We have adopted a location-based approach for selecting the emission factors, due to unavailability of source-specific emission factors. For the Estimation of Scope-2 Emissions, we have adopted emission factors published by Central Electricity Authority of India.

SCOPE 3 QUANTIFICATION METHODOLOGY

We have aligned our methodology to GHG accounting standard & ISO 14064 (Guidance on quantification and reporting of greenhouse gas emissions) . Due to variation in data availability & nature of category, we have used different methodologies for different categories.

Scope 3 Category No	Scope 3 Category Description	Methodology
1	Purchased Goods and Services	Supplier-specific method Hybrid method
2	Capital Goods	Hybrid method Average-product method
3	Fuel- and Energy-Related Activities	Average-data method
4	Upstream Transportation and Distribution	Distance-based method
5	Waste Generated in Operations	Waste-type-specific method
6	Business Travel	Distance-based method
7	Employee Commuting	Fuel-based method
8	Upstream Leased Assets	Lessor-specific method
9	Downstream Transportation and Distribution	Distance-based method
10	Processing of Sold Products	Average-data method
11	Use of Sold Products	Not Applicable, as this category is not relevant
12	End-of-Life Treatment of Sold Products	Average-data method
13	Downstream Leased Assets	Not Applicable, as this category is not relevant
14	Franchises	Not Applicable, as this category is not relevant
15	Investments	Not Applicable, as this category is not relevant

Category 1 -Purchased Goods and Services

At Granules, the majority of our purchased goods and services emissions originate from Active Pharmaceutical Ingredients (APIs) , Key Startup Materials (KSMs) .Solvents and Packaging materials .Key raw materials include PAP, Acetic Anhydride, DCDA, Ibuprofen and Metformin HCL Etc..

Methodology Used: Supplier-specific method & Hybrid method using the Primary and Secondary data.

Category 2 - Capital Goods

At Granules, the majority of our capital goods emissions originate from purchase of pharma manufacturing equipment's . Granules procures many capital goods that aid its operations of producing API, PFI and finished dosages. Key capital goods include compression machines, tablet printing machines, coating granulators, air receiver tanks etc.,

Methodology Used: Hybrid method &Average-product method using the Primary and Secondary data.

Category 3 - Fuel- and Energy-Related Activities

At Granules, we consume the electricity and fuels like Coal, HSD, Furnace oil etc in the manufacturing operations of pharmaceutical products. Hence the majority of our Fuel and Energy related activities emissions originate from generation and transmission of electricity from grid and extraction, exploration, production and transportation of the fuels like Coal, Diesel, Furnace oil.

Methodology Used: Average-data method using the Primary data.

Calculation formula Upstream CO2e emissions of purchased fuels (extraction, production, and transportation of fuels : Σ (fuel consumed (e.g., kWh) × upstream fuel emission factor (kg CO2e)/kWh))

Source of Emission Factors Used: India Specific Road Transport Emission Factors, India GHG Program, 2015 & EcoInvent

Category 4 - Upstream Transportation and Distribution

At Granules, the majority of our upstream transportation and distribution emissions generated during the transportation of all materials like APIs ,RM ,KSMs ,Packaging materials etc used in your pharmaceutical product manufacturing. Majority of the suppliers of raw materials, packing materials and MRO (Maintenance, Repair & Operations) items used in the manufacturing of our products are situated in India and China. RM and PM are usually transported from the suppliers / traders' site by sea and road with air shipments constituting a small share of the inbound shipments.

Methodology Used: Distance-based method using the Primary data.

Calculation formula   Distance-based method (transportation):

sum across transport modes and/or vehicle types:
= Σ (mass of goods purchased (tonnes or volume) × distance travelled in transport leg (km) × emission factor of transport mode or vehicle type (kg CO2e/tonne or volume/km))

Source of Emission Factors Used: India Specific Transport Emission Factors, India GHG Program, 2015 & DEFRA

Category 5 - Waste Generated in Operations:

At Granules, the majority of our "Waste generated in operations" emissions generated during the transportation, treatment , disposal of Waste and Wastewater generated in the pharmaceutical manufacturing process.

As a company that produces pharmaceutical APIs, PFIs and finished dosages, we generate and dispose waste under two categories namely liquid waste (effluent) and solid waste. Solid waste is further divided into sub-categories basis the chosen disposal methods.

Effluent waste undergoes primary treatment within Granules' premises and is then disposed to Central Effluent Treatment Plants (CETPs). The methods of treatment of various solid wastes are described below.

All the figures for absolute emissions include both emissions due to transportation of the waste to respective 3rd party treatment facilities and emissions due to treatment of the waste in such facilities

Methodology Used: Waste-type-specific method using the Primary Data

Calculation formula Waste-type-specific method:

Σ (waste produced (tonnes or m3) × waste type and waste treatment specific emission factor (kg CO2e/tonne or m3))

Source of Emission Factors Used: EcoInvent, USEPA and other Emission factors from Secondary Research Reports

Category 6 - Business Travel

At Granules, the majority of our "business travel "emissions generated during the travelling (by road ,by train ,by air , including local travel by bus ,car ,auto etc) and staying during the business visits like meetings, conferences, site visits, and training sessions.

Primary modes of transportation used by employees during business travel are flights and cars for which company authorized travel service partners are available. Employees also use trains, buses and hotels during business travel for which they are reimbursed at actuals basis rules outlined in the company travel policy guidelines

Methodology Used: Distance-based method using the Primary data

Calculation formula Distance-based method:

Σ (distance travelled by vehicle type (vehicle-km or passenger-km)
× vehicle specific emission factor (kg CO2e/vehicle-km or kg CO2e/passenger-km))

Source of Emission Factors Used: India Specific Transport Emission Factors, India GHG Program, 2015 & DEFRA

Category 7 - **Employee Commuting**

At Granules ,the majority of our "employee commuting " emissions generated through employees travel between home and workplaces by various modes of transportation used by employees such as company provided bus ,employee-owned vehicles like two-wheeler ,car and public transport like bus ,Metro train ,Auto etc.

***Methodology Used*:** Fuel-based method & Distance-based method using the Primary data

Calculation formula Distance-based method:

total distance travelled by vehicle type (vehicle-km or passenger-km)
= Σ (daily one-way distance between home and work (km) × 2 × number of commuting days per year)

Source of Emission Factors Used: India Specific Transport Emission Factors, India GHG Program, 2015 & DEFRA

Category 8 - Upstream Leased Assets:

At Granules, the majority of our "upstream leased assets "emissions generated from Leased Warehouses , Guest house/Hostels ,Laptops etc .Granules has taken warehouses, hostels and IT assets on lease basis. The emissions from the utilisation of these assets for operations of Granules been estimated in this category.

***Methodology Used*:** Lessor-specific method using the Primary data

Calculation formula Lessor-specific method:

Σ (scope 1 and scope 2 emissions of lessor (kg CO2e) area, volume, quantity, etc., of the leased asset/ total area, volume, quantity, etc., of lessor assets

Source of Emission Factors Used: India Specific Transport Emission Factors, India GHG Program, 2015, DEFRA & EcoInvent

Category 9 - Downstream Transportation and Distribution

At Granules, The majority of our downstream transportation and distribution emissions generated during the transportation of Finished dosage formulations , Pharmaceutical formulation Ingredients (PFIs) and Active Pharmaceutical Ingredients (APIs).Majority of the customers of Granules India Limited are concentrated in Europe, Americas and Australia. Typical products include API (Active Pharmaceutical Ingredient), PFI (Pharmaceutical Formulation Intermediate) and Finished Dosage (FD) that are primarily shipped to customers via sea and air. For domestic customers, sales

Methodology Used: Distance-based method using the Primary data.

Calculation formula   Distance-based method (transportation):

sum across transport modes and/or vehicle types:
= Σ (mass of goods purchased (tonnes or volume) × distance travelled in transport leg (km)
× emission factor of transport mode or vehicle type (kg CO2e/tonne or volume/km))

Source of Emission Factors Used: India Specific Transport Emission Factors, India GHG
Program, 2015 & DEFRA

Category 10 - Processing of Sold Products:

Granules India Limited Manufactures Active Pharmaceutical Ingredients (API) and Pharmaceutical
Formulation Intermediates (PFIs) which are sold to other pharma. companies that transform them
further into Finished Dosage (FD) for use by end consumers.

Methodology Used: Average-data method using the Secondary data.

Calculation formula Average-data method:

Σ (mass of sold intermediate product (kg) × emission factor of processing of sold products (kg
CO2e/kg of final product))

Category 12 - End-of-Life Treatment of Sold Products

Granules India Limited sells a mix of Active Pharmaceutical Ingredients (API), Pharmaceutical
Formulation Intermediates (PFI) and Finished Dosages (FD) to its customers. We have accounted
for treatment of waste from processing of sold APIs / PFIs to FD by our customers. We have further
accounted for the packaging waste disposed once finished dosages, produced by Granules India
Ltd., are consumed by our customers

Methodology Used: Average-data method using the Secondary data.

Source of Emission Factors Used: US EPA Emissions factors hub, 2023,

Exclusions:

Category 12 - Use of Sold Products: This category is not relevant to Granules operations, all the final products are consumed by the end users

Category 13 - Downstream Leased Assets: This category is not relevant to Granules as there are no downstream leased assets.

Category 14 - Franchises: This category is not relevant to Granules as there are no Franchises.

Category 14 – Investments: This category is not relevant to Granules as there are no Investments

UNCERTAINTY:

The GHG emissions reported for Scope 1, Scope 2, and Scope 3 include inherent uncertainties due to estimation methodologies and data limitations. For Scope 1 and Scope 2 emissions, which cover direct and energy-related emissions under our operational control, uncertainties are minimized through direct measurement and utility data; however, minor variability may occur due to the accuracy of fuel and electricity data collection methods

Scope 3 emissions reporting for Granules involves inherent uncertainties due to the complexity and variability of the data sources across the value chain. Since these emissions largely depend on activities outside Granules' direct control—such as supplier operations, product transport, and end-of-life treatment—estimating them accurately presents significant challenges. Data reliability issues, varying supplier reporting practices, limited primary data availability, and the use of industry averages or estimation models contribute to this uncertainty.

Granules recognizes these limitations and is committed to continuously refining its data collection and estimation processes. Through engagement with suppliers, adoption of advanced calculation methodologies, and leveraging of more accurate data sources, Granules aims to improve the accuracy of its Scope 3 inventory over time, thereby enhancing its alignment with the GHG Protocol requirements and supporting its broader sustainability goals.