

Romell R-Tech - Executive Summary

1. Project Overview

The Carbon Footprint Analysis (CFP) was conducted for the existing **Romell R-Tech Commercial Development** located at Village Pahadi, Goregaon (East), Mumbai, with a site area of **17,326 m²** and a total built-up area of **51,379.41 m²**. The assessment represented a Whole Building Life Cycle Assessment (WBLCA) that quantified greenhouse gas (GHG) emissions associated with both embodied carbon (construction stage) and operational carbon (use stage) over the projected 45-year life cycle of the asset. This assessment also evaluated the effectiveness of carbon reduction measures and renewable energy interventions incorporated into the project design.

2. Methodology

The assessment follows the principles of Whole Building Life Cycle Assessment (WBLCA) in accordance with EN 15978, ISO 14044, ISO 14064 and aligned with GHG Protocol. Life-cycle emissions were modelled using the ecoinvent v3.11 database through SimaPro software. The assessment boundary included:

Product Stage (A1-A3): Raw material extraction, processing and manufacturing of construction materials (Embodied Carbon).

Construction Stage (A4-A5): Material transportation, workforce transportation, construction energy use and waste management.

Use Stage (B1-B7): Building operation including electricity consumption, transportation, wastewater treatment, organic waste management and refrigerants (Operational Carbon).

Carbon Reduction Measures: Landscape sequestration and energy efficiency initiatives.

3. Construction Phase Carbon Footprint

The total embodied carbon associated with the construction phase was estimated at **18,517 tCO₂e**, corresponding to an Upfront Carbon Intensity of **0.36 tCO₂e/m²** of built-up area. Building materials contributed **17,255.49 tCO₂e** and represented the dominant source of construction-related emissions. Material transportation, construction energy consumption, workforce transportation and construction waste management accounted for the remaining emissions. Adoption of AAC blocks, fly ash-based concrete, recycled steel content and local material sourcing resulted in a **19% savings** in embodied carbon compared to the baseline scenario.

4. Operational Phase Carbon Footprint

The operational phase carbon footprint is estimated to be **2,793.03 tCO₂e/year**, corresponding to a per-capita operational emission intensity of **1.15 tCO₂e/person/year**. Purchased electricity consumption is expected to contribute **2,645.39 tCO₂e/year**, thereby making operational energy use the dominant contributor to the project's annual carbon footprint. Additional emissions will arise from site transportation, wastewater treatment, organic waste management, and refrigerant usage.

5. Mitigation Measures

The project incorporates carbon reduction measures, including an on-site wastewater recycling, organic waste treatment and landscape-based carbon sequestration. Terrestrial sequestration through landscape development provides annual carbon savings of approximately **3.57 tCO₂e/year**. These measures collectively contribute to an estimated **05% savings** in operational carbon emissions compared to the baseline scenario.

6. Life Cycle Carbon Footprint

Over the assumed 45-year service life, the project is expected to generate a total life-cycle carbon footprint of **1,44,203.35 tCO₂e/yr**, comprising:

Upfront Emissions (Construction Phase - A1–A5): **18,517 tCO₂e**

In-Use Emissions (Operational Phase - 45 Years): **2,793.03 tCO₂e**

The project demonstrates approximately **05% savings** in life-cycle emissions compared to the baseline scenario through sustainable material selection, renewable energy deployment, energy-efficient systems, on-site waste treatment and landscape carbon sequestration.

7. Key Indicators

Construction Duration: 3 Years

Construction Stage Emissions: 18,517 tCO₂e

Annual Operational Emissions: 2,793.03 tCO₂e/year

Building Service Life Considered: 45 Years

Total Life Cycle Carbon Footprint: 1,44,203.35 tCO₂e

Construction Carbon Intensity: 0.36 tCO₂e/sq.m²

Per Capita Operational Emissions: 1.15 tCO₂e/person/year

Annual Carbon Savings from terrestrial Sequestration: 3.57 tCO₂e/year

Overall Carbon Reduction Achieved: 05% compared to the Baseline Scenario
