1. Scope 3 Category of Importance & Focus

As per the 2024 Material Emissions Report generated by Roadstone this value chain analysis focuses on Concrete as a Product. Concrete accounts for Roadstones highest total emissions by product group and also encompasses a significant portion of Roadstones cement usage which is a Scope 3 Category 1 material for Roadstone. Category 1 accounts for the highest Scope 3 emissions in Roadstone and Cement is the highest-ranking category 1 emitting material.

- Category 1: Purchased Goods and Services
- Focus: Cement procurement and concrete production

2. Value Chain Description

This analysis covers the full value chain of concrete, from raw material extraction, including cement (), aggregates and fillers (Roadstone and Non-Roadstone Sources) and additives/admixtures and other materials, transport to the Roadstone plant, manufacturing, transport to site, construction and end of life treatment. Roadstone have not considered the impact of the In-Use (B-Module) of the life cycle analysis and it must be noted in most instances the In-Use module gives a benefit due to the recarbonation of concrete.

The chain analyses as per life cycle modules are outlined below:

- A1 – Raw Material Extraction
- A2 – Transport to Roadstone concrete plant
- A3 – Manufacturing
- A4 – Transport to Site
- A5 – Construction
- C1 – De-construction
- C2 – Transport to Recycling Facility
- C3 – Recycling Process (Prepare the recycled aggregates for inclusion in a new product.

3. Scope 3 Categories Involved

- Category 1: Purchased Materials (Cements, Supplementary Cementitious Materials, Aggregates & fillers, Admixtures & Additives)
- Category 3: Energy-related emissions (concrete & aggregate production)
- Category 4: Upstream transport
- Category 9: Downstream transport
- Category 12: End-of-life treatment

4. Quantification of Emissions

As per the Material Emissions Report 2024 Concrete Emissions in the cradle to gate modules for Roadstone account for XXXXX tCO_2e and Cement as a Scope 3 Category 1 material accounts for XXXXX tCO_2e emissions with XXXXX % of total cement usage occurring within ready-mix concrete and therefore cement accounts for XXXXX % of the total cradle to gate concrete embodied CO2 emissions. The use of GGBS as a supplementary cementitious material (SCM) accounts for XXXXX tCO2e of Roadstones total emissions with XXXXX % of GGBS being used in concrete. Therefore GGBS accounts for XXXXX % of cradle to gate embodied CO2 emissions. Scope 1 & 2 directly used in concrete production accounts for XXXXX % of the total cradle to gate.

Using internal LCA models the emission intensity of concrete in the cradle to gate life cycle stages for 2024 is XXXXX kg.CO2e/m3 with the following approximate breakdown across all mixtures and production locations.

- Cement as a Scope 3 Category 1 material – XXXXX %
- Upstream Transport as Scope 3 Category 4 – XXXXX %
- Scope 1 & 2 directly in concrete production and Roadstone aggregate production – XXXXX %
- GGBS as a Scope 3 Category 1 material – XXXXX %
- Admixtures & Additives as a Scope 3 Category 1 material – XXXXX %
- Aggregates as a Scope 3 Category 1 material – XXXXX %
- Energy as Scope 3 Category 3 – XXXXX %
- Explosives in Roadstone Aggregate Production as a Scope 3 Category 1 material – XXXXX %

In 2025 the Irish Concrete Federation (ICF) published six industry average ready-mix concrete EPDs on the EPD Ireland platform. These EPDs covered three different strength grades and two binder types, a 100% CEM II/A-L and a 70% CEM II/A-L, 30% GGBS blend. Roadstone supplied mix design information to ICF as part of this process. The following values were determined as suitable for use within the downstream modules for a concrete value chain analysis in Ireland.

- A4 Transport to Site – 4.1kg.CO2e/m3
- A5 Construction – 6.3kg.CO2e/m3
- C1 Deconstruction – 1.3kg.CO2e/m3
- C2 Transport to Recycling Facility – 2.3kg.CO2e/m3
- C3 Recycling – 6.8kg.CO2e/m3

By using both analysis given above it is determined that for a value chain analysis on concrete in Roadstone the following are the breakdown of Scope 3 emissions across the full value chain.

- Cement as a Scope 3 Category 1 material – XXXXX %
- GGBS as a Scope 3 Category 1 material – XXXXX %
- Upstream Transport as Scope 3 Category 4 – XXXXX %
- Downstream Transport as Scope 3 Category 9 – XXXXX %
- End of Life Treatment as Scope 3 Category 12 – XXXXX %
- Additives & Admixtures as Scope 3 Category 1 material – XXXXX %
- Energy as Scope 3 Category 3 – XXXXX %
- Aggregates as Scope 3 Category 1 material – XXXXX %
- Explosives used in Roadstone Aggregate production – XXXXX %.

The analysis above illustrates that Scope 3 Category 1 accounts for 87% of the total Scope 3 emissions across the full value chain with cement alone accounting for XXXXX % of the total. This Scope 3 analysis has not included the emissions due to construction/installation, by supplying special mixtures such as self-compacting concrete or highly pumpable/flowable concretes Roadstone can also aid to reduce construction emissions although the extent of which has not yet been investigated.

This analysis demonstrates the importance of Roadstone investigating emission reduction opportunities in concrete as it has the most emissions of any Roadstone product and in particular cement as the highest Scope 3 emitting material both within concrete and Roadstone overall.

5. Value Chain Partners

- Suppliers: XXXXX
- Transporters: Roadstone fleet and third-party logistics
- Production Sites: Roadstones Ready-Mix Concrete Production Facilities
- Customers: Developers, contractors, infrastructure clients

6. Data Sources

- ICF Verified EPDs (36 documents), available to view and download on the EPD Ireland platform.
- Supplier-specific emission factors
- Internal LCA database and external LCA software models
- Procurement and production records

7. Endorsement

The full value chain analysis presented within this report has not been directly endorsed. However, Roadstone have supplied information for the publication of industry average EPDs for ready-mix concrete in Ireland through ICF and published on the EPD Ireland platform. Roadstone also utilises LCA software and in-house LCA tools to give clients project specific carbon footprint reports for its concrete mixes.

8. Reduction Opportunities

Roadstone have two overarching absolute emissions reduction targets to 2030 from a 2021 baseline year.

- Reduce absolute gross Scope 1 and Scope 2 (Market-Based) emissions by 42%.
- Reduce absolute Scope 1, 2 (Market-Based) & 3 GHG emissions across the business by 30%.

In order to achieve both overarching targets the individual absolute gross Scope 1, Scope 2 (Market-Based) & Scope 3 reduction targets are 26%, 100% & 27.5%, respectively.

Roadstone have developed and are implementing a number of decarbonisation measures and associated action plan to achieve these targets with a number of the measures being directly related to concrete and cement due to the ranking of these elements within Roadstone's overall material and product emissions tables. These measures include:

- Transition to lower-carbon cements including the use of SCMs such as GGBS where technically feasible and actively engage with the supply chain to aid the development of such binders.
- Reduce Scope 3 emissions by prioritising the procurement of construction materials that are transparently documented through EPDs or equivalent emissions-specific data.
- Reduce emissions across the full value chain by actively engaging customers and clients to raise awareness of the carbon footprint of construction materials and promote the adoption of lower-carbon alternatives such as CEVO concrete.
- Reduce Scope 3 emissions by optimising mix designs using advanced admixtures, performance-enhancing additives, and ongoing R&D, without compromising performance and durability.
- Improve energy efficiency in aggregate and concrete production through the use of 50,001 site energy efficiency plans and energy benchmarking, staff training & engagement, use of hybrid equipment and batching control optimisation to reduce primarily Scope 1 and also Scope 2 emissions.

William Wilson, Sustainability Manager, Roadstone Ltd