

EXECUTIVE SUMMARY

NRMCA Industry Wide Life Cycle Assessment Project Report Version 4

Purpose and context. The National Ready Mixed Concrete Association Industry Wide Life Cycle Assessment Project Report Version 4 updates and supersedes Version 3.2 issued in December 2021. It provides the technical basis for NRMCA's industry average environmental product declaration and updated national and regional benchmarks. The study reflects new governing requirements, a larger and more current primary dataset, an expanded product schedule, and more detailed geographic and statistical reporting.

Navigating this report. In a PDF reader, open the Bookmarks panel to move among the main sections. Expand Appendix D to find the national, regional, state, and metro benchmark groups. The table of contents and results maps also provide clickable links. To return after following a link, use the reader's Back command, or select another destination from the bookmarks or table of contents.

Major Changes Since Version 3.2

- **Updated governing requirements.** Version 4 is structured to conform to ISO 14025:2026, ISO 14040, ISO 14044, ISO 21930:2017, and NSF 1112-26 Concrete Product Category Rule Version 3. The prior study used ISO 14025:2006 and Concrete PCR Version 2.1. PCR Version 3 clarifies product and EPD classifications, covers permanent and mobile batching operations including volumetric mixing, strengthens documentation, and updates rules for electricity, transportation, material loss, and optional Module A4 reporting.
- **Broader product representation.** The modeled schedule increases from 72 to 120 industry average mix designs. It includes air entrained and non air entrained normal weight concrete from 2,500 to 5,000 psi, high strength concrete through 12,000 psi, and lightweight concrete at 3,000, 4,000, and 5,000 psi. Eight cementitious material configurations are represented at each applicable strength level.
- **Larger and more current primary dataset.** The analytical population expands from 489 facilities in Version 3.2 to 1,264 facilities in Version 4. Primary foreground data cover 12 month reporting periods during 2023 and 2024 and include production, plant technology, energy, water, ancillary materials, wastes, emissions, and inbound material transportation. Facility level information remains confidential.
- **Expanded geographic detail.** Version 4 reports national results and benchmarks for 18 geographic study groups: the eight original NRMCA regions, California, Florida, Ohio, Texas, Illinois, DC Metro, and the Greater Los Angeles, Bay Area, and San Diego subregions. Regional calculations apply location relevant material shares, inbound transportation, manufacturing inventories, and electricity profiles within a consistent framework.
- **More transparent modeling and uncertainty information.** The study updates upstream datasets and applies the PCR Version 3 transportation methodology, including imported material and ocean shipping data. It uses surveyed manufacturing loss and regionalizes U.S. electricity at the balancing authority level. No environmental attribute certificates or renewable electricity instruments are applied.
- **Expanded statistical analysis.** Version 4 introduces product level statistical analysis for key LCIA indicators, including measures of variability, precision, and confidence intervals. This added analysis improves transparency regarding the range and uncertainty underlying the reported industry average results and helps users interpret how individual product results relate to the reported averages.

Scope and Appropriate Use

The assessment remains cradle to gate and reports Modules A1 through A3 for one cubic meter of fresh concrete, with results convertible to one U.S. cubic yard using the PCR factor. Module A4, the use stage, and end of life are not included in the baseline model. Results support industry average reporting and region and strength specific benchmarking, but do not represent a specific plant or product, full life cycle performance, or environmental superiority. Comparisons require equivalent functions, declared units, system boundaries, data sources, and PCR based methods.

Overall significance. Version 4 provides a more current, comprehensive, and transparent picture of U.S. ready mixed concrete production. Expanded facility coverage, product representation, geographic resolution, updated background data, and explicit treatment of variability give users a stronger technical foundation for interpreting industry averages and applying regional benchmarks.