



# Embodied Carbon Action Plan

## SE 2050 Net Zero Commitment

July 30, 2021

**Revision Control**

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## 1 Introduction

This document outlines NORR's Embodied Carbon Action Plan (ECAP) created in response to the Structural Engineers 2050 (SE 2050) Net Zero Commitment. This commitment will contribute towards achieving carbon neutral structural engineering practices by 2050 in effort to combat climate change. This initiative focuses primarily on the climatic impact associated with structural design and seeks to disseminate the tools, methodologies, and data provided by participating organizations to reduce or offset the embodied carbon (EC) inherent to the built environment. While recognizing the impact of the construction industry on greenhouse gas emissions worldwide, NORR is committed to reducing EC in its practices and emerging as an industry leader in sustainable structural design.

This action plan will provide an overview of the SE 2050 Program then establish NORR's goals for achieving a reduction in embodied carbon. Ultimately, this document will outline the actionable steps NORR will take to develop, implement, and execute embodied carbon reduction strategies in its procedures. With this action plan, NORR hopes to engage its employees even further beyond the scope of the SE 2050 commitment and to help develop sustainable engineering practices as well as a better tomorrow.

## 2 SE 2050 Program Overview

The Structural Engineers 2050 Commitment (SE 2050) Net Zero Commitment was created by the Carbon Leadership Forum (CLF) and is hosted by the Sustainability Committee of the Structural Engineering Institute (SEI) of the American Society of Civil Engineers (ASCE). The main challenge to be addressed by this effort is, as stated by the CLF, that "All structural engineers shall understand, reduce, and ultimately eliminated embodied carbon in their projects by 2050." Below are the four areas of focus of SE 2050.

### 2.1 Education

Objective: educating employees and enhancing professional development on topics related to reducing embodied carbon in design.

### 2.2 Reporting

Objective: measurement, tracking, and reporting embodied carbon data and comparing determined EC values to any predefined targets.

### 2.3 Embodied Carbon Reduction Strategies

Objective: reduce embodied carbon, document lessons learned in pursuing reduced-carbon designs, and set embodied carbon goals for projects.

### 2.4 Advocacy

Objective: share the goals of the SE 2050 commitment and enhance outreach on the important topic of embodied carbon.

### 3 NORR Embodied Carbon Action Plan

NORR's internal outcomes to be met by this. Embodied Carbon Action Plan (ECAP) are presented in four categories and are ultimately achieved through the actionable steps presented herein. These outcomes form the base doctrine of NORR's environmental commitment and serve to direct this action plan.

#### 3.1 Vision and Mission

The overarching vision for NORR's commitment is stated as follows:

"To establish NORR as an industry leader in embodied carbon best practices in structural engineering and ultimately assist in achieving industry carbon-neutrality"

Through this vision and the implementation of the ECAP, NORR will affirm itself as a frontrunner in sustainable structural design. Within this vision, four primary missions will be accomplished through the ECAP.

First, the SE 2050 Net Zero Commitment requirements will be met and exceeded through unique solutions that develop NORR's expertise in the field. While the SE 2050 guidelines provide a minimum standard to be met, in order to develop excellence in sustainable design and play a significant role in the health of the environment, this standard must be exceeded.

Second, new structural design strategies will be implemented to enable better assessment and reduction of embodied carbon. As the consideration of embodied carbon is an emerging and growing field, new tools and methodologies must be adopted to effectively achieve the overall vision.

Third, property owners' own carbon reduction goals will be facilitated through NORR's proficiency. To elicit the greatest consideration of embodied carbon, the carbon goals of property owners must be achievable to encourage further carbon reduction and to promote industry-wide change.

Finally, technical staff will be inspired and educated towards carbon reduction strategies as those are developed internally. Some of NORR's strongest elements are its multi-disciplinary, in-house, design teams which exist beyond the sphere structural engineering. Those disciplines will be engaged through company-wide knowledge dissemination.

Together, these four missions will establish the groundwork for the goals and strategies listed below which will ultimately uphold NORR's vision and establish it as a hub for embodied carbon research, education, dissemination, and execution.

#### 3.2 Goals

The following list of goals quantifies the critical topics of education, reporting, embodied carbon reduction, and advocacy that are essential to an effective carbon reduction strategy.

1. Identify and refine structural design processes within the scope of NORR's current procedures that can yield improvements to embodied carbon totals over the first year of commitment and beyond.

2. Establish embodied carbon as an additional criterion to monitor, on all major structural design projects within six months of commitment
3. Work with clients to set embodied carbon reduction targets for significant projects.
4. Influence other disciplines' consideration of embodied carbon through advocacy and resource sharing.
5. Advocate multi-disciplinary sustainability studies of embodied and operational carbon to arrive at the most environmentally conscious solutions.
6. Ensure NORR applies state-of-the-art tools and methods to achieve a reduction in embodied carbon annually.
7. Improve upon available embodied carbon reduction tools for structural designs and identify knowledge gaps following their adoption.
8. Engage NORR's multidisciplinary technical staff to encourage feedback and facilitate discussion towards embodied carbon goals on a semi-annual basis.

### 3.3 Strategies

The following strategies outline the means through which the above goals will be achieved and inform the actionable tasks presented subsequently.

1. Examine in-house tools for potential add-ins to facilitate embodied carbon consideration over the first year of commitment
2. Develop procedures for optimizing embodied carbon reduction over the course of a project
3. Conduct estimates of embodied carbon in on-going projects using life-cycle analyses (LCAs) of building materials following a year of commitment
4. Engage clients and architects to optimize the use of structural materials and suggest lower-carbon alternatives when available
5. Host discussions with other disciplinary teams to increase engagement and assist in determining areas of potential embodied carbon reduction
6. Identify and acquire necessary software for monitoring embodied carbon throughout a project
7. Review available embodied carbon data analysis tools and develop a standardized method of reporting project data within a year of commitment
8. Schedule semi-annual meetings to update the firm on the EC reduction implementation progress and ongoing tasks
9. Engage firm marketing and HR to help establish the SE 2050 campaign and make the initiative more well-known

### 3.4 Actions

This section presents the list of actionable steps to be taken to ultimately meet NORR's carbon reduction vision and goals. The tasks are divided into the four critical components identified by the SE 2050 guidance: education, reporting, EC reduction, and advocacy and include the responsible NORR team member.

**Table 1. Embodied Carbon Education Actions**

Action	Owner	KPI
Distribute firm-wide announcement of firm's commitment to SE 2050; annually share prev. ECAP after 1 <sup>st</sup> year	HS	Announcement is made and previous reports are distributed annually
Provide a narrative describing how NORR is promoting firm-wide education for EC & the SE 2050 commitment	HS	Firm-wide education plan is developed and announced within a year
Nominate an EC Reduction Champion. Include a brief profile in the ECAP	BN	EC champion is selected and is coordinating EC reduction efforts
Select date to present an EC 101 Webinar to firm. Can use own or existing	HS	EC 101 is presented to firm
Have representative attend quarterly external education programs via SE 2050	BN	Firm representative attends SE 2050 external education programs
Share the SE 2050 resources library with staff	HS	SE 2050 resources shared and emphasized to staff
Share EC reduction strategies document with staff	HS	Document shared with staff
Provide outlining plans for a min. of one firm-wide presentation per year on EC	BN	Create EC presentation outline plans for an annual presentation
Present "How to calculate embodied carbon" to all technical staff	AH	Document is presented to technical staff within one year of commitment
Attend a presentation of an LCA tool for calculating EC	AH	Technical staff attends LCA presentation

Table 2. EC Reporting Actions

Action	Owner	KPI
Provide a narrative describing plans to measure, track, report EC	BN	Outlining plans are made for EC calculations, EPD access, Life Cycle Analysis (LCA) methodologies, material data extraction
Describe the internal training procedure for EC you will or have provided	HS	Internal training procedure for EC is presented
Submit two or more projects annually to the SE 2050 database	AH	Greater than three EC projects are submitted following the first year of commitment
Discuss sustainability goals with owner and architect for projects to be submitted	HS	EC kickoff meetings held throughout project duration and notes are reported
Meet your target EC reduction from the previous year	HS	Set and meet EC reduction goals for projects following the first year of commitment



Table 3. Actions for EC Reduction

Action	Owner	KPI
Set EC educational goals for first year	HS	Educational goals are identified, and curriculum is outlined
Provide lessons learned and feedback to the program for second year and beyond	BN	Record and report successes and failures in program implementation following first year of commitment
Provide a lessons learned case study in the ECAP	BN	Develop and submit an EC lessons learned case study following the first year of commitment
Create a project-specific EC reduction plan	AH	Project-specific EC reduction plan is developed and submitted applicable
Complete an EC comparison project in project conception phase	AH	EC comparison is completed and submitted to client/architect when applicable

Table 4 Advocacy Actions

Action	Owner	KPI
Provide a narrative about knowledge/data sharing plans	BN	Develop and report data sharing plans within a year of commitment and as needed
Describe the value of SE 2050 to clients (could include marketing materials)	HS	Informational materials are developed and presented to clients to discuss EC goals
Declare SE 2050 membership on boilerplate proposal language	HS	SE 2050 membership included on NORR proposals and other boilerplate material within one year of commitment
Share SE 2050 details on the company website	HS	SE 2050 commitment shared on website
Share education opportunities with clients	HS	EC education opportunities are forwarded externally to clients

## 4 Concluding Remarks

This document represents NORR's first annual Embodied Carbon Action Plan as inspired by the SE 2050 commitment as well as NORR's dedication to environmental stewardship. The framework presented herein outlines the company's vision, goals, strategies, and immediate tasks to implement the means to create a reduction in embodied carbon through structural design. Action items are divided into educational, EC reduction, reporting, and advocacy subtasks which will form the structure for NORR's embodied carbon response for the next 30 years and beyond. In general, this action plan will enable NORR to emerge as a frontrunner in sustainable structural engineering practice through internal embodied carbon education, advanced carbon-conscious design procedures, superior sustainability coordination with clients, and a uniquely inspired employee environment. Together, these components will develop continuously in the mid-term future and ultimately contribute to achieving net-zero structural engineering practices by 2050. NORR is committed to reducing embodied carbon in its projects and incorporating this important metric across all of its actions.

## 5 Appendix A: Embodied Carbon Champion Profile

**Embodied Carbon Champion:** Benjamin Nicoletta, E.I.T., M.A.Sc.

**Role:** Structural Designer (Engineering in Training), NORR Ottawa

**Bio:** An aspiring structural engineer and current EIT, Benjamin (Ben) Nicoletta is an early-2021 addition to NORR's Structural Engineering team in Ottawa. Ben is an October 2020 graduate from a Master of Applied Science at York University where he studied and conducted research in structural-fire safety engineering, specifically in topics like the performance of engineered timber in fire, the response of bridge structures in fire, and the resilience of critical infrastructure against fire events. He also graduated from Carleton University's Bachelor of Civil Engineering in 2018. Ben is a passionate advocate for climate change issues and his research experience and motivation make him a strong candidate to guide NORR's commitment to the SE 2050 program.