

Structural Engineers 2050 Commitment Initiative

The proposal for a SE 2050 Commitment Initiative was drafted by a committee of the Carbon Leadership Forum including: Amy Hattan, Thornton Tomasetti; Catherine De Wolf, MIT; Duncan Cox, Thornton Tomasetti; Frances Yang, Arup; and Kate Simonen, UW.

The Paris Climate Agreementⁱ set a new target: to keep global temperatures from rising above 2°C and avoid catastrophic, irreversible climate change. To meet this goal, the building sector must be carbon free by 2050ⁱⁱ. Structural engineers have an important role to play in reducing greenhouse gas (GHG) emissions from the building sector, yet sustainable design has traditionally been the realm of the architect. However, structural materials contribute to at least 40% of the carbon embodied in a buildingⁱⁱⁱ, and the new call to move towards a zero carbon built environment includes embodied carbon as a significant contributor to the building sector's impact on global climate change.

The goal of the *Structural Engineers 2050 (SE 2050) Commitment Initiative* is to inspire structural engineers to contribute towards the global vision of Zero Carbon buildings by 2050, and to provide measurement of progress towards that vision. Much like the AIA 2030 Commitment does for operational energy in buildings, this SE 2050 initiative will challenge structural engineers to meet embodied carbon benchmarks and increasingly higher reduction targets in a "race towards the most efficient building" as we approach the year 2050.

Towards this goal, the initiative aims to enlarge the collection of structural material quantities on buildings projects to enable the determination of an embodied carbon baseline. Therefore, the initiators will develop a process that enables simple and straightforward, yet robust, collection of structural material quantity data. Contributing data will be rewarding for structural engineers, as it provides information on material efficiency.

The SE 2050 Commitment asks that structural engineers commit to providing structural material quantities and key project information to a database such as the *MIT database of embodied Quantity outputs (deQo)*. The intention is that firms who commit to the initiative will contribute a minimum of 20 or 20% of their projects in the first year with an increasing percentage of their projects contributed each year to eventually include all projects in design or completed each year. The database is a centralized repository that will anonymize and aggregate the information, managed by a third party. The project information will be kept confidential unless the provider of the project data wishes to make it public.

In early 2018, MIT and the *Carbon Leadership Forum (CLF)* will collaborate to assess the data collected to refine embodied carbon benchmarks for building structures. As Architecture 2030 used operational energy benchmarks to set the 2030 Challenge, these structural materials based benchmarks will be used to set parallel challenges and targets for embodied carbon improvement in building structures.

CARBON LEADERSHIP FORUM

Four stages of this project are anticipated: Pilot, Data Collection, Baselines and Targets described below. We are currently in the first stages of the Pilot.

Stage 1. Pilot: In this stage, two structural engineering firms (Arup and Thornton Tomasetti) and two University research groups (CLF/UW & Building Technology/MIT) are collaborating to identify shared goals and propose a data collection methodology. The two SE firms have already contributed and will continue to contribute structural material quantity data to the MIT database.

The key stages of the pilot include:

- a. Aligning/defining the initiative goal and scope (presented here).
- b. Testing implementation. Address items such as:
 - a. What meta data is reported on each project
 - b. What material data is collected (balancing precision vs. effort)
 - c. How to collect the data (deQo, or equivalent alternatives)
- c. Building connections with organizations that have aligned interests.
 - a. Start initial contacts (some already made)
 - b. Develop strategy for sharing information/moving to next stages
- d. Proposing a SE 2050 Commitment structure and identify partners to implement
 - a. Kate Simonen shares draft with CLF board in August 2016
 - b. Kate Simonen presents to CLF in September 2016 for discussion
 - c. Amy Hattan mentions the SE 2050 Initiative in Greenbuild 2016 presentation on the How and Why of Climate Action in October
 - d. Group seeks ASCE/AIA/USGBC funding/support after Greenbuild 2016

Stage 2. SE 2050 Commitment Part A: Data Collection: Firms who commit to the SE 2050 Commitment pledge to collecting and reporting structural material quantities. Options for the commitment include:

- a. Track and report ‘all’ projects.
- b. Track a minimum of 20 or 20% of their projects in the first year. Report all tracked data.
- c. Commit to track as many as practical for firm, report # tracked / total # projects.

Stage 3. Establishing Baselines: Analyze collected data and develop methodology to establish current performance baselines for material and carbon efficiency. This will require understanding of how representative the collective data is and may require some effort to weight submissions to accurately represent the distribution of current building stock.

Stage 4. SE 2050 Commitment Part B: Targeting Improvement: Establish performance reduction targets similar to those developed for operational energy in the Architecture 2030 Challenge.

ⁱ “Adoption of the Paris agreement—Proposal by the President—Draft decision -/CP.21”, UNFCCC. 2015-12-12. Retrieved from <http://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf>, 2016 07 27.

ⁱⁱ IPCC. 2014. Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Synthesis Report, Geneva, Switzerland: IPCC.

ⁱⁱⁱ Kaethner, S. and Burridge, J. (2012) “Embodied CO₂ of structural frames.” *The Structural Engineer*, May, pp. 33-40.