Planning, Policy & Programming

Life Cycle Assessment for Complete Streets: Framework and Pilot Studies

Developing a framework for LCA of complete streets projects, and then test it using several case studies. This is the first step towards standardized guidelines to conduct social and environmental LCAs for complete streets.

MAY 2019

Project Title:
Life Cycle Assessment for Complete Streets: Framework and Pilot Studies

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WHAT IS THE NEED?

Current LCA impact indicators focus only on the environment and human health impacts, the exclusion of socio-economic indicators is considered to be a gap. The need for social LCA (SLCA) has been identified world-wide and is on the frontier of LCA research (United Nations Environment Programme 2009).

As funding for complete streets projects is becoming much more widely available, the development of project evaluation metrics that consider quantitative socio-economic impacts when assessing, prioritizing and improving projects has increasing importance. Performance metrics are also needed for evaluation of social equity of project selection, which is a critical issue for complete streets as evidenced by concerns being voiced across California and in intense discussion at the 2015 Smart Growth America conference in Baltimore (SGA 2015). For these reasons, the development of social impact indicators for LCA is of great importance.

WHAT WAS OUR GOAL?

To create consequential LCA frameworks for complete streets, consequential LCA case studies that consider socio-economic, as well as, environmental indicators. Creating the LCA frameworks are the first step towards the development of standardized guidelines for the conduct of social and environmental LCAs for complete streets to be used with life cycle cost analysis to produce a complete, transparent and quantitative picture of a complete street project, including interdependencies between impacts. The conceptual frameworks can serve as a check for the Complete Streets.

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WHAT DID WE DO?

The purpose of this project was to develop a framework for LCA of complete streets projects, including the development of draft socio-economic impact indicators, and then test them using several case studies.

Task 1: Project Management
In consultation with the co-PI, post-doctoral associate, Ali Butt, will undertake project management activities, ensuring that deliverables and milestones are met, and convening meetings among project participants, researchers and stakeholders.

Task 2: Literature Review
Evaluate previous complete streets research addressing:
• Policy
• Previous modeling and analysis of complete streets that have informed policy decisions (i.e., mode choice modeling, and project-level LCA)
• Determining the scope of previous analyses, including economic assessment, public health and safety assessments, and evaluations of social benefits and economic equity.
   • Conduct informal interviews through connections with the LCA community
   • Complete a gap analysis

Task 3: Creating typologies for complete street conversions

The team will create typologies for complete street conversions by
• Defining what you are starting with and what you are changing; and
• Evaluating how the conversion changes the network that supports mobility.

Task 4: Consequential LCA Framework development
Develop the LCA framework, and addressing the following:

• Define the objectives of complete streets in terms of impacts
• Define appropriate system boundaries that capture important interactions. In other words, how broad does the analysis need to be captured?
• Define the complete street functional unit. Key questions to be addressed include:
   • What are the services/functions provided by a complete street?
   • Can the service or function be defined at a street/project level, or do they require a larger scope?
• Begin to define performance metrics in terms of socio-economic and environmental impacts that are more or less important.
   • Define different types of mobility (i.e., access to what? e.g., recreation or tourism, versus access to school, work, and healthcare).
• Understand mode choice.
   • What are future projections of travel behavior/mode choice in the absence of complete streets?
   • What are the expected effects of implementing complete street designs? This is going to be particularly important for examining mode choice, and requires network level assessment.

Task 5: Test the framework with quantitative analysis on several case studies.

Develop recommendations for the data collection, modeling tools, and interpretation required to complete quantitative analyses of complete street projects and programs. Identify and evaluate the case studies.

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Task 6: Reporting

Final deliverables for this project will include a summary report of all task technical memos, a policy report, and a policy brief. The results of the consequential LCA framework and case study analysis will also be prepared and submitted for publication in a scholarly journal.

WHAT WAS THE OUTCOME?

Project outcomes include the first frameworks for complete street typologies and consequential LCA for complete streets, consequential LCA case studies that consider socio-economic, as well as, environmental indicators. These outcomes are communicated to key stakeholders to inform complete street policy and prioritization, and to provide analytical consistency that can help communication or dialogue across stakeholder groups, including local and state agencies, community groups and NGOS.

WHAT IS THE BENEFIT?

Implementation Action Plan that will allow decision-makers to address, or at minimum consider, all aspects of complete streets, and also identify unintended consequences. The system boundaries are expected to consider impacts of changes beyond just the street itself, but also to its role and effects on the entire neighborhood and the project within the road network.