

Embodied carbon assessment of multi-modal transport corridors: project scoping

A DecarboN8 & TfN Collaboration

Context

In order to stay within 1.5-2 deg of global warming there is an urgent need to reduce global greenhouse gas emissions. Not exceeding this level of warming effectively gives a global 'carbon budget' from 2020 to 2100 and indeed beyond. This carbon budget can be ratioed to a UK budget, a city budget¹, or indeed to the transport sector. The recent Decarbonising Transport: setting the challenge paper from the Department of Transport focused only on operational emissions, and whilst it acknowledges embodied emissions in infrastructure and the transport fleet exist, it does not propose to deal with them. This is ignoring a critical part of the decarbonising transport challenge, and has a real risk of delivering decarbonisation solutions for 'tail-pipe emissions' that merely shift the carbon burden to another part of the system. To truly decarbonise transport we must both decarbonise both the operational and embodied emissions. This requires understanding and assessment of embodied carbon as part of strategic decision making for infrastructure investment, as well as systematic quantification and reduction at a scheme level.

This project proposes estimating the embodied carbon impact of one of TfN's multimodal sub-corridors in order to provide the evidence base to conduct a strategic level embodied carbon assessment, and thus enable the results to be factored into decision making.

Project Scope

- Embodied carbon assessment of the infrastructure of a TfN sub-corridor: Tyne and Wear – South Northumberland
- Sub-corridor is in TfN's 2027-2033 phasing.
- If the different components of the scheme will deliver operational decarbonisation, e.g. shorter journey times, if provided with the operational benefit of the scheme, we could explore the timeframes that embodied carbon would be paid back in operational savings.

Life Cycle Stages included in study:

- As a minimum we will include cradle to gate emissions, which estimates the impact of the initial materials used to build the infrastructure for the sub-corridor.
- Ideally, transport of materials, construction (both machinery required on-site and modal disruption implications) and maintenance impacts for the sub-corridor will be included, however this is partially dependent on data availability.
 - Discussion of the different datasets, and scenario models to cover these life cycle stages will make up part of the embodied emissions workshop on 27th July, and will help to determine the life cycle stages that we can cover.

Key Project Steps:

1. TfN to identify sub-corridor options and discuss with Strategic Oversight Group

¹ E.g. <http://www.manchesterclimate.com/sites/default/files/Manchester%20Carbon%20Budget.pdf>

2. Confirm sub-corridor for DecarboN8 assessment
3. DecarboN8/TfN embodied emissions workshop with delivery partners & academics
 - a. Scope datasets & models available to estimate the embodied carbon of different models across all stages of the lifecycle.
4. DecarboN8 to confirm life cycle stages to be assessed based on data availability
5. DecarboN8 team to conduct embodied carbon assessment of sub-corridor
6. Sub-corridor Results workshop with TfN & delivery partners

Expected Outputs

- DecarboN8 Webpage providing an overview (and links where possible) of all the datasets that are available to assess the embodied carbon of infrastructure
- Embodied carbon assessment of sub-corridor options, highlighting any hot spots that could be targeted for reduction.

Longer Term Plan:

- DecarboN8 will run a workshop with TfN, delivery partners & academics to brainstorm options to reduce the embodied carbon of the sub-corridor route.

Data Request for analysis:

To conduct the analysis, we will ideally need information on the below

To define the study boundary conditions:

- Mapped-out spatial boundary of the sub-corridor (and different contributing elements) to show the scale of the construction and maintenance;
- Intended design life: i.e. the timescale over which the construction, operation and maintenance impacts are expected to be accounted for, ideally will a break down for the estimated time of construction and frequency of maintenance once operational. -
 - This would likely need to be for the different sub-components, or could be by modal type, e.g. road, rail & tram.

To estimate the embodied carbon of the sub-corridor:

- As much scheme design information as is available for all elements of the project;
- Typical component build ups, material specifications and maintenance procedures;
- Typical geographical sources of these materials (these would usually be covered by manufacturers if they are a part of the National Sustainable Public Procurement practitioners)
- Operational impact of the alterations i.e. are their predicted emissions savings?

Data that could assist in filling information gaps:

- If available, cost/carbon relationships/comparison from previous projects;
- Any initial cost analysis of the schemes;
- Access to similar data on previous projects for comparison or benchmarking of environmental performance.