



Assessing the carbon footprint of bridges and a strategy to deliver carbon reductions

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Abstract

As actions to tackle the impacts of the climate emergency start to gain traction across the industry and beyond, reduction of carbon in bridges should be front of mind for bridge engineers. Understanding the impacts of our design and construction work is essential to make meaningful reductions to the carbon footprint of our structures. The whole life carbon of a bridge is known to significantly differ from that of a building structure. A gap in this knowledge was identified across the industry throughout the design, construction and operation life cycle stages. This paper reports on the journey that was undertaken by Mott MacDonald and how this, along with the learning from other consultants helped shape industry-wide guidance via the Net Zero Bridges Group. This work enables whole-life carbon reductions in bridges to be integral to all our projects throughout all lifecycle stages.

Keywords: Bridges; carbon footprint; carbon assessment; decarbonisation; sustainability; net zero

1 Introduction

The need to decarbonise our infrastructure is well understood by this point. This compels the bridge engineer to reduce the overall carbon footprint of the structure, even if each bridge may only be a small percentage of a country's total infrastructure carbon emissions.

Often engineers are reluctant to admit that they can significantly influence the carbon footprint of what they design or build. The argument typically includes a narrow scope constrained by limited funding and the fact that engineers will consider their designs to be already structurally efficient. This latter aspect is partly driven by reducing costs and construction time, but also from an engineer's pride for their work.

There are many things we as bridge and structural engineers can do to influence the carbon footprint and other sustainability aspects of the assets we design. The key is to engage with the topic, undertake your own carbon assessments to

understand the process and its limitations, identify carbon hotspots and think how you can reduce these throughout your design whilst still fulfilling the client's requirements. In fact, it is often prudent to challenge the brief if a clear easy win from a carbon reduction or sustainability perspective can be gained.

2 Carbon Assessments

2.1 What is a Carbon Assessment and Why Are They Important?

A whole-life carbon assessment (WLCA) is a method of estimating the total amount of carbon emissions that are produced by a built asset throughout its entire lifecycle. [1]

Forecasting and tracking carbon throughout a design is important to inform design decisions. The choices that can impact carbon emissions most are made at the start of a project. At the concept stage, changing the bridge location, bridge form, materials, span arrangement or construction