



## Analysing Embodied Carbon for Rural Trail Bridges in East Africa

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### Abstract

Bridges to Prosperity (B2P) spent the last two decades designing and building trail bridges to better lives in rural communities and fight poverty caused by rural isolation, with a current focus in East Africa. Accurate carbon factors are crucial for understanding the carbon impact of a structure and influencing the supply chain to reduce emissions. This paper outlines the methodology used to calculate carbon factors tailored to B2P's supply chain. Analysis of B2P A1-5 embodied carbon data, calculated using these factors, is presented to show the relationship between trail bridge span and embodied carbon. The paper also discusses how B2P can use this data to make informed decisions to reduce their bridge's carbon impact. This research contributes to the organization's goal of promoting sustainable and environmentally conscious infrastructure development in East Africa.

**Keywords:** trail bridges; rural infrastructure; carbon factors; embodied carbon; carbon assessment

### 1 Introduction

When rivers swell in rural communities, walks to school, the doctor, work, or the market become life-threatening without safe and reliable transportation infrastructure. Bridges to Prosperity (B2P) envisions a world where poverty caused by rural isolation no longer exists. B2P works closely with governments and communities to build trail bridges in isolated communities globally, constructing or supporting over 480 trail bridges, serving >1.7 million people, in 21 countries.

Utilising refined standardised bridge designs and a construction process optimised for remote environments with manual processes has facilitated cost reductions. The cost of a B2P-designed trail bridge is lower than other traditional infrastructure. B2P aims to source materials locally, and those that aren't locally available they then look to repurpose material where possible, including steel pipe and cable from large

construction sites and ports. This contributes to a lower embodied carbon. When combined with a cost-share approach, it is feasible for budget-constrained governments to invest in their own rural infrastructure programs. Several studies have shown trail bridges have a high ROI, returning at least 6x the cost in increased economic activity [1]. Additionally, communities with new trail bridges saw a 75% increase in farm profits, a 60% increase in women entering the workforce, a 36% increase in employment income, and a 30% increase in overall household income.

Carbon assessments had not previously been conducted for B2P bridges. This year B2P have collaborated with Arup to upskill B2P staff on embodied carbon calculations and increase understanding of embodied carbon. This article presents the initial outcomes of the work and discusses how B2P can use this data to drive further improvement.