



**Temporary Works
forum**

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Blog: Temporary Works Forum (TWf)

Are designers doing enough to lower embodied carbon in Temporary Works?

It's well established that the key first step to reducing CO₂e emissions is to measure them. Whilst this seems more commonplace with permanent works designs, the practice appears less prevalent in 'temporary works'. An initial review suggests that this might be because existing tools and standards are produced with an emphasis on the permanent works (and are prepared by those involved in permanent works), with temporary works not receiving due consideration.

The balance of CO₂e emissions may be quite different when considering temporary works as opposed to permanent works. For example, whilst the bulk of emissions for permanent works derive from the production of material, many emissions for temporary works may be in the transport of material (such as when proprietary equipment is used repeatedly at different sites across the country).

As with many issues relating to temporary works, early contractor involvement^[1] by the permanent works designer - and better consideration of constructability^[2] - would save time, cost and carbon during the construction phase. It allows more educated decisions. For example:

- Can a 2% (say) increase in rebar cost save 60 tonnes in high-risk propping?
- Can driven piles allow for lower extraction forces and thinner virgin stone mats?
- Can large plan shallow storm storage be used as opposed to a single deep storage chamber (requiring months of intensive dewatering due to poor ground)?
- Can slabs be designed to run MEWPs on to allow quicker fit-out and thus less preliminaries?

¹ TWf Information Sheet No. 14, Considering temporary works early in a project: Reducing cost, improving buildability and reducing risk (TWf), <https://www.twforum.org.uk/viewdocument/twf-information-sheet-no-14-cons?LibraryFolderKey=e542e005-0045-4c2f-9143-a2fb03176bac&DefaultView=folder>

² Constructability: A guide to reducing temporary works (TWf), <https://www.twforum.org.uk/viewdocument/constructability-a-guide-to-reduci?LibraryFolderKey=543e8f37-c7a2-46c2-9d49-4c764afaa815&DefaultView=folder>

Permanent works designers need to be able to ascertain the carbon more accurately during construction rather than using a simple percentage rule-of-thumb that may be inaccurate at best and a misleading.

A design that *increases* the material content of the permanent works - thereby reducing the need for temporary works - may indeed be safer, less disruptive, more cost-effective and, crucially, more carbon-efficient.

It is important that a *whole-life approach* be adopted by the project team - often not the case - and where a slightly more substantial permanent works solution reduces the temporary works required this should be given due consideration.

Challenges with temporary works

The scope for reduction in CO₂e emissions in temporary works is significant.

The Institution of Structural Engineers' *How to calculate embodied carbon*^[3] highlights that Engineers have the potential to dramatically reduce carbon emissions associated with their work, where even small gains have a huge impact (see **Figure 1**).

Figure 0.1: Contextualising potential impact of structural engineers[†]



Figure 1: Potential for Engineers to reduce carbon emissions

Source: IStructE

With temporary works, there's often more potential for conservatism in design. Every effort is made to ensure design efficiency, but short deadlines and a lack of data frequently mean that conservative solutions are required to find a safe design. Inefficient design invariably leads to greater embodied carbon as a result, so a focus on *design efficiency* is an important step in reducing CO₂e emissions; again whilst considering the works in the wider context of the project.

The cheapest or easiest option is not always the least carbon intensive, so *measurement* is the key to including emissions in any discussion when appraising solutions. To have a fighting chance of adopting carbon calculation into the

³ How to calculate embodied carbon, IStructE (2020), <https://www.istructe.org/IStructE/media/Public/Resources/istructe-how-to-calculate-embodied-carbon.pdf>



temporary works design process any tools used must be robust, but also simple and quick to use.

As well as challenges, temporary works also offers some opportunities for carbon reduction that are not possible with permanent works. For example, where new materials and/or technologies exist - that do not meet a specification that is dated and does not reflect current technology - it may be possible to use these in temporary works, as often these specifications do not apply. These new technologies can be deployed where, traditionally, more carbon-intensive solutions would have been used by default. Earth Friendly Concrete (EFC) has recently been used in place of Portland cement-based concrete to produce all manner of temporary works including vault infills, thrust blocks, wind post foundation bases, etc.

Action

Significant carbon is there to be saved in temporary works and action must be taken now by permanent works designers to cut embodied carbon from designs but, by taking a *holistic or whole-life approach*, still giving contractors the best chance of limiting embodied carbon during the construction phase.

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on half of Temporary Works Forum (TWf) Working Group 32, Low carbon temporary works

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