

Slashing the Burden: Inductive ethnographic observation followed by deductive surveys, towards an initial proposal for a Stadium focused carbon reduction and circularity design toolkit

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ABSTRACT

The construction industry contributes over 39% of carbon emissions, almost 50% of raw materials and 62% of waste worldwide, making it a key contributor to the climate crisis. Existing stadium benchmark data indicates the stadium building as the most carbon-intensive typology, estimating construction stage embodied carbon ranging 3000-5000 kgCO₂-eq/m², primarily due to its semi-external nature, increasingly extreme climatic conditions related to user comfort, low usage and enormous spectator draw. With over 30 stadia under construction in the Middle East alone, the circularity and materials carbon intensity of this building typology is critical to address.

Without a bespoke stadium carbon reduction or circularity design tool in existence, this paper draws upon general building classifications to reveal current UK industry sustainability, decarbonisation and circularity design guides, assessments and toolkits, to inform a proposed design approach for the stadium building.

The research method comprises a three-phase approach. Phase 1 begins with qualitative inductive ethnographic observation to facilitate immersion within building design professional practice, industry or government think tanks and principal construction industry sustainability exhibitions within the UK. This aimed at deciphering the key building design sustainability, decarbonisation and circularity guides used in industry whilst identifying their limitations as viewed in industry. Following, phase 2 proceeds to conduct a quantitative and qualitative deductive study using structured cross-sectional surveys targeted at elite sustainability and stadium-focused design professionals to assess the relevance, efficacy and constraints of the observed sustainability toolkits. Advancing, to use statistical and thematic analysis to corroborate the phase 1 theory and reveal stadium professional opinion related to industry toolkits applied to the stadium-specific use category. Phase 3 conducts a desktop study to map the findings from the previous phases into 4 classification sets: the RIBA Plan of Work application framework; tool typologies; decarbonisation or circularity building design aspects; and navigation interface methods. This stage uses thematic analysis to interpret data results attributed to efficacy and limitations pertaining to stadium buildings, to inform a proposed preliminary bespoke stadium decarbonisation and circularity design toolkit.

This investigation provides new knowledge towards facilitating carbon reduction and circularity of stadia buildings by industry designers, through the compilation and development of a proposed bespoke baseline toolkit. The following outputs are developed: 1) a categorisation of the design support tools used for design sustainability, decarbonisation and circularity of the stadium per design phase and per design aspect, and 2) a mapping of design tools organised in families according to tool purpose. Recommendations are included for the expansion of RIBA in-use stage 7 to correspond with the new Net Zero Building Standard to facilitate more regular assessments during the stadium operational stage which require

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