Barracuda JAMES TAYLOR

Barracuda Brick Slip Support System – Embodied Carbon Overview
Stainless Steel v's Aluminium

The embodied carbon attributable to a product or material type is the sum (total) of the greenhouse gas emissions released during the following life-cycle phases.

Product Phase
Raw material extraction/supply and transport
Semi-finished product manufacturing and transport
Finished product manufacturing and transport

Construction Phase
Transport to site and installation

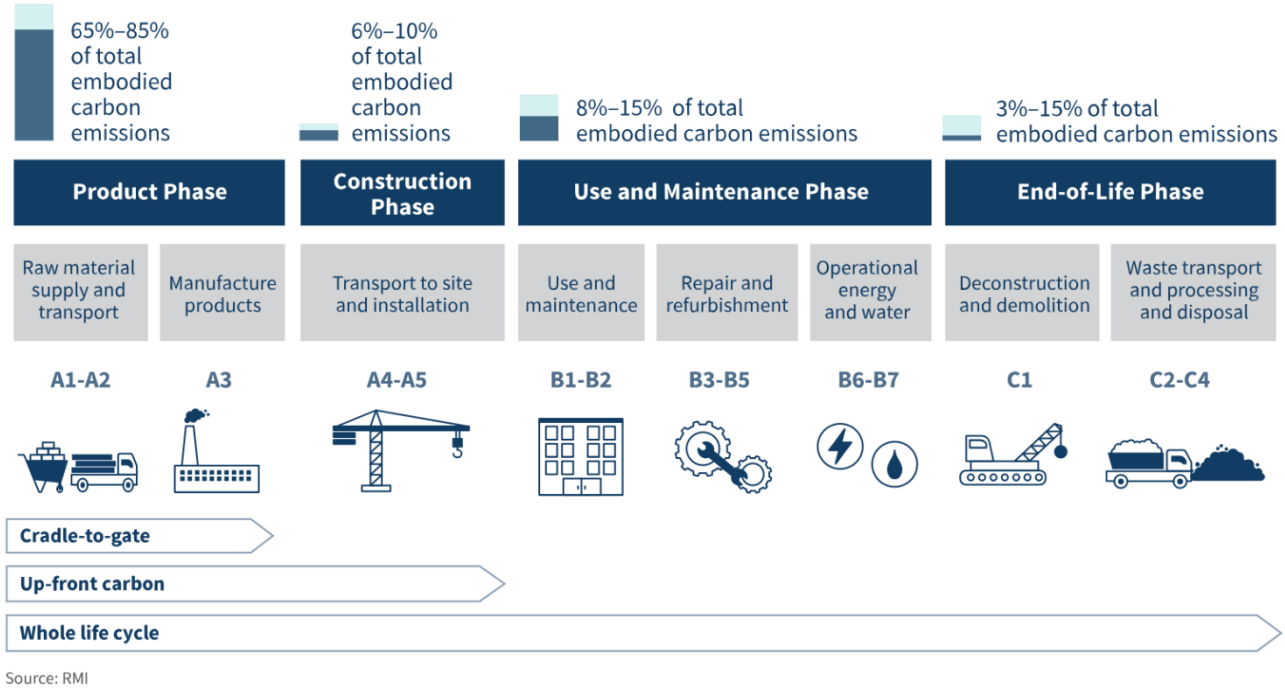
Use and Maintenance Phase
Use, maintenance, repair and refurbishment

End of Life Phase
Deconstruction/demolition
Waste transport, processing and disposal

Related to embodied carbon, but not the same, is, embodied energy. Embodied energy accounts for the energy used during all of the above life-cycle phases regardless of the energy source.

If the energy used is from a renewable source, the amount of embodied carbon will be reduced.

The life cycle phases are typically illustrated as shown below.



Source: RMI

The above illustration shows the life cycle categories (A1-A2, A3 etc. etc.) that most of us are now familiar with seeing in BS EN 15804 conforming Environmental Product Declarations (EPD's).

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Because this overview compares two material types rather than drawing a direct comparison between two specific products manufactured from those two material types, we can only talk in general terms about the typical embodied energy usually associated with the material type.

Product Phase
This, singularly, is the most significant phase, because it typically accounts for up to 85% of the total embodied carbon attributable to a material type or product.

The production of aluminium is hugely energy intensive. Aluminium electrolysis, the process of extracting aluminium from its ore (Bauxite) requires approximately 8 times as much energy as the equivalent initial stages of steel production.

Construction Phase
With regard to embodied carbon (and embodied energy) the construction phase is broadly similar for both aluminium and stainless steel. Small advantages can be gained from clever system design that speeds construction.

Use and Maintenance Phase
If we are trying to draw comparisons between material types, then it's also important to think about a material's functional attributes. Stainless steel is stronger than aluminium therefore less of it will be required to perform a comparable 'structural' function.

It's also important to consider comparative durability. Stainless steel is ultimately more durable than aluminium, significantly so in the context of a brick slip support system which will always have mortar in direct contact with the primary system rails. Aluminium is particularly susceptible to corrosion when in contact with mortar and will require additional surface protection such as powder coating or an anodised finish. The environmental impact associated with the provision and application of this additional surface protection coating should be taken into account.

End of Life Phase
With regard to embodied carbon (and embodied energy) the end of life phase is broadly similar for both aluminium and stainless steel, however, because of the greater likelihood that aluminium construction products will have some sort of additional protective surface coating, not all aluminium components can be readily recycled or represent a cost effective recycling proposition.

Recycling
The potential for a particular material type to be recycled, can reduce both the embodied carbon (and embodied energy) associated with the raw material extraction and production phase. Both stainless steel and aluminium have good recycling potential. Both are infinitely recyclable however stainless steel has a higher recycling 'rate' due largely to the likelihood that aluminium construction products may have an additional protective surface coating. Typically, recycling stainless steel saves approximately 70% of the energy required for primary production. Recycling aluminium saves approximately 90% of the energy required for primary production.