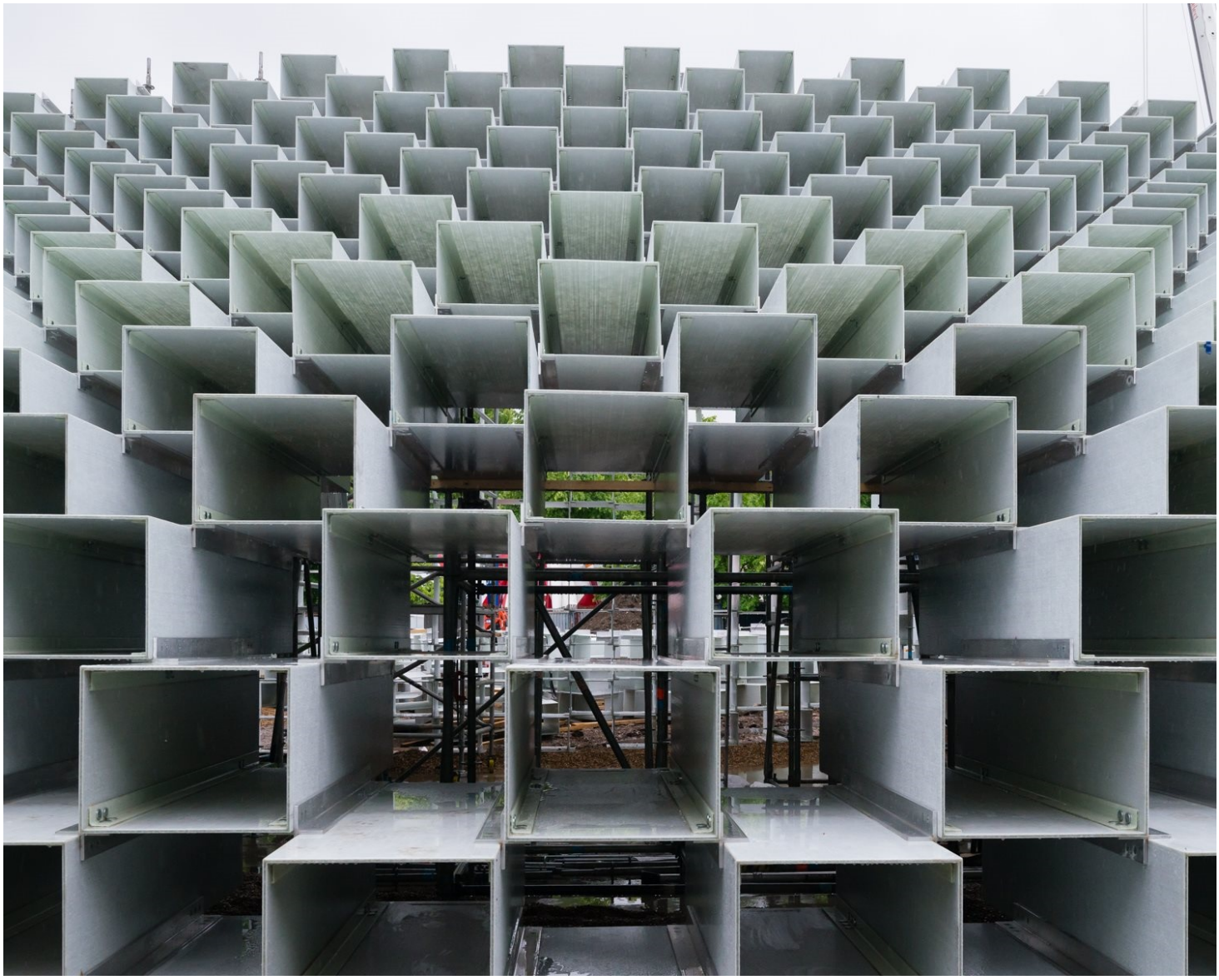
AJ THE ARCHITECTS' JOURNAL

BIG's Serpentine Pavilion: Organic in form, but not in construction

20 June, 2016 By Simon Sturgis



Bjarke Ingels has missed a trick by not making his Serpentine Pavilion as sustainable as it could be, writes *Simon Sturgis*

Environmental stewardship and sustainability in its broadest sense are ever-increasing drivers in building design, never more so than in Copenhagen, the home of BIG, designer of the 2016 pavilion. This is particularly critical in a temporary structure such as the Serpentine Pavilion because it represents a carbon investment in a building that is only required for four months.

So what are the lifetime carbon costs of BIG's Serpentine Pavilion? What it is made of, what are its construction emissions, and what will happen to it once it leaves Kensington Gardens?

> Our estimate is that the total carbon cost of the installation is about 180 tCO2e

To set the context, consider the following: Which is ‘greener’, a timber fence or a brick wall? Part of the answer depends on how long you want the wall or fence. If it is 100 years, choose brick, but if it is five years, choose timber. The rest of the answer depends on where the materials have come from and what will happen to them once they are no longer required. It’s all about choosing the appropriate materials and processes for your requirement, and thinking about its likely future life cycle. This may seem complex, but the principles are easily unpicked, and the pavilion’s lifetime carbon footprint is measurable.

The architecture of BIG’s pavilion may itself provide the clue to its future life. The building is an almost organic assembly of repetitive components which have come together in this place, in this particular form. If this building is considered as an organism rather than a static object, then its time as a pavilion may only be a short part of a much longer, varied and maybe even dispersed life. The architecture lies in the component rather than the whole assembly. The nature of the architecture therefore allows it to morph into many different things, but it is the components that provide the answers. What are they, and did BIG plan for this morphing from the outset?

The pavilion is made from glass fibre reinforced plastic (GRP) units. This is a lightweight, oil-derived material. The 500mm x 500mm units are 10mm thick and of varying lengths. They are bolted together using L-shaped GRP sections. These particular units were made in Denmark. Denmark has a very sustainable electricity grid (less than 50 per cent the carbon density of the UK) which means that the embodied carbon of the manufacturing process is very low.

> The choice of oil-based products is a clear negative

Our estimate is that the total carbon cost of the installation is about 180 tCO2e: 130 tonnes from manufacturing and 50 tonnes from transporting the units to the UK from Denmark by sea/road. This equates to the carbon locked within some 1,400 mature trees, or 620 return flights London to Copenhagen. If this carbon cost were to be spread over the pavilion’s four-month life and then incinerated on demolition, this would be a very poor carbon return on investment.

SerpProgress 13

However after completing its term at the Serpentine, the pavilion is to be reinstalled across Asia and North America, thus extending its useful life to some degree. Because of its prefabricated modular nature, it can be disassembled and reassembled with minimal effort and with infinite variation. Transport will be the principal carbon cost.

End-of-life disposal is a concern with GRP. It can be used as a fuel source, or alternatively as a form of recycled aggregate. Materials such as recycled plastics from a range of waste sources have a lower inherent carbon cost and less damaging disposal costs and could have been used in place of GRP. This would have reinforced the idea of the pavilion as both organic in nature as well as in its construction.

In sum, the strength of BIG's pavilion, in addition to its soaring lightness of form, is its ease of disassembly and its potential for creative reuse. Its initial carbon cost is mitigated by the efficiency of Denmark's power grid. Nonetheless, the choice of oil-based products is a clear negative.

I would challenge next year's Serpentine Pavilion architect to design with full resource efficiency so as to make the minimum carbon impact and be 100 per cent recyclable. It should a truly zero carbon building, an exemplar of the circular economy and of visionary architecture as well. We need more outstanding sustainable architecture and the Serpentine Pavilion should point the way.

Simon Sturgis is managing director of Sturgis Carbon Profiling