**Glass Boulders**

*Glass Boulders* embodies the future of sustainable energy. Producing over 690 MWh per year at a fraction of the surface area comparative to traditional solar technology, it defies common perception of what green energy infrastructure looks like in the public domain. Standing first and foremost as an artwork, *Glass Boulders*offers people a variety of experiences, that fundamentally alter their understanding of St. Kilda, as a dynamic space in constant transition.

Directly referencing the coastal terrain of the region, *Glass Boulders* captures the natural processes of the site, forming a clean energy landscape unlike any other, where layers of sedimentation are built up of recycled glass coated with transparent solar panels (TSP). An elegant design, playing to the strengths of the technology, embedding itself into its surroundings and adapting its aesthetic to the climate, as it manipulates the physical characteristics of the area it inhabits.

All boulders being constructed from standard issue recycled glass, coated in TSP[[1]](#footnote-1), infrared wavelengths are captured allowing all other visible light to pass through. On sunny days, this light is bent as it passes through the boulders, fragmenting into various colors, as light does moving through a prism. Additionally, by preventing infrared wavelengths from passing through the structure, it also opposes the presumed ‘greenhouse’ warming effect of being inside an ordinary glass structure, by actually cooling the interior of the structures, providing people with a relaxing space on warm summer days.

Under the presence of rainfall, water dances across the transparent surfaces of the boulders, offering an extraordinary calming experience when taking shelter within the structures themselves. Water which is then collected by ducts placed along and around the base of the structures to be used for both irrigation of the St. Kilda triangle, as well as the various water features included in the Master Design for the space.

At night the work transforms once again, into a luminous dreamscape. Utilising only a small portion of the energy generated to make the glass structures radiate with light, the site is made accessible and welcoming at all times of day. Naturally the lights, which are a series of small LEDs embedded within the boulders, will be kept at a level as not to disturb residents nearby, whilst still captivating people visiting the space.

Strategically arranged to map the path of the sun as it travels across the sky, the layout is optimised both in relation to energy production as well as functionality. DDA compliant in its placement, as to ensure the work is accessible to all; it also offers a variety of spaces within the context of the larger site for social use, becoming a part of the natural rhythm of St. Kilda.

The proposed layout consists of 27 variously sized glass boulders. A modular design; the work can adapt over time as needed. With rising sea levels being a growing concern for this coastal site, the boulders placed along the beach can be relocated inland with relative ease. Likewise, additional boulders can always be added to the system should the demand for an increase in energy production arise.

A boulder roughly 12m3 in size, which requires an initial investment of 9 MWh to produce will generate 4 MWh of energy per year paying itself off after a couple years. Likewise, a pavilion sized boulder, roughly 560m3 in size, requiring an initial investment of 137 MWh to generate 61 MWh per year, with the added benefit of saving the embodied cost of producing the pavilions already outlined in the Master Plan. All accomplished whilst occupying a minimal amount of ground surface area, in proportion to traditional solar panel technology, allowing us to elegantly overlay this structure into the urban tissue of the city.

*Glass Boulders*can withstand the test of time, as it’s robust form will continue to provide clean energy for generations to come. It stands as an inspiration to how sustainable practices can seamlessly be implemented into public life, stimulating people’s senses, enriching their experiences of space and challenging their understanding of place.

In all regards, *Glass Boulders*truly is a powerful work of art.

**Annual Capacity**

690 MWh

640,000 Litres of Water

**Embodies Energy Input:**

2,420 MWh

417,000 kg CO2

**Primary Materials and Technology**

Recycled Glass

Transparent Solar Panel (TSP) Coating[[2]](#footnote-2)

**Dimensions**

Total ground surface area: 986m2

27 Glass Boulder

* 15 x (1.1m x 1.6m x 18.m)
* 5 x (1.9m x 2.7m x 2.2m)
* 3 x (4.5m x 6.4m x 3.8m)
* 3 x (7.9m x 11.2m x 6.4m)
* 1 x (20.2m x 28.9m x 12m)

**Environmental Impact**

Throughout the design process of this project, due consideration has been given to factors such as the design's carbon footprint, it’s potential impact on the overall ecosystem and the City of Port Phillip’s Toward Zero strategies to meet its sustainability challenges.

Due to the nature of the technology, the panels can be sourced locally from recycled glass. As opposed to conventional solar panels, the application of the technology through coating is significantly less energy intensive, producing an estimated carbon footprint of 417,000 kg CO2 for the construction of 27 glass boulders. Based on this figure, within a short span of 3.5 years, *Glass Boulders* will start contributing positively via zero emission clean energy; something which is further reduced when taking into consideration the embodied energy that is saved by the boulders that absorb the functionality of proposed pavilions. Additionally, as each solar layer is encapsulated, due to the method of application, they are protected from deterioration due to weather elements; thus, *Glass Boulders* is prone to a longer lasting durability as opposed to conventional solar panels that have an average lifetime expectancy of 25 years.

In relation to its surroundings, *Glass Boulders* provides an additional 640,000 litres of fresh rainwater per year, which is fed directly back into the space in the forms of irrigation for the site and integration into the various water features outlined in the Master Plan. On top of this, all the light required for the photosynthesis processes is passed through the robust structures, hence all plant life located within and around the structure will remain unaffected by the work.

With a low carbon footprint, longer lifespan than traditional solar panels, and minimal interference to local plant life, *Glass Boulders* ensures St. Kilda’s natural habitats and regional biodiversity continue to thrive well into the future.

1. Emergence of highly transparent photovoltaics for distributed applications, C. J Traverse et al., 2017 [↑](#footnote-ref-1)
2. Emergence of highly transparent photovoltaics for distributed applications, C. J Traverse et al., 2017 [↑](#footnote-ref-2)