**REFLECTION**

**PRELUDE**

St Kilda is known for being a center for culture and home to art, music and entertainment.

The objective of the project is to add the site to the list of attractions such as Luna Park, Acland and Fitzroy Street.

The site provides a unique location imbedded in a rich urban surrounding with a heavy connection to the foreshore.

Nature is the source of energy and has always been the subject of beauty and excitement, a master of creating intriguing spaces.

Within this context the concept was to develop an artistic approach to the expressions of nature, creating a language between energy, St Kilda and nature.

The structure volumes were subjected to natural weathering agents such as wind, erosion, rain and heat.

Fast forwarding millions of years, creating art as if it was carved by of nature, a chaotic spatial volume inside man made boundaries.

**DESIGN**

Several key points were taken into count for the design.

1. Maintaining view from the esplanade to the foreshore.

2. Ease of access through the site and over Jacka Boulevard.

3. Generating clean energy.

4. Respecting the surrounding urban context.

5. Creating a unique destination and providing an exciting experience during the day and night.

First a parking space for 230 cars was placed below grade accessible from the lower esplanade next to an energy storage building separated by a public crossing.

 The esplanade balcony was expanded and terraced creating a sloped platform giving an open view to the foreshore.

Two access points to the foreshore were created;

One directly from the esplanade through a crossing bridge,

And the second from a pedestrian crossing on Jacka Boulevard.

The solar energy systems are lifted 15m above ground and the base dimensions are minimized to clear as much view as possible

The structure consists of four steel columns around the corners and a triangular steel grid which holds plexi glass panels.

This is placed on top of an RC base that runs through the parking level.

Four modules are placed near the edges of the site, leaving a clear view range from the esplanade.

Wind systems are scattered across the edges of the site and the secondary boundaries acting as a visual reference that provides direction and links the project to the urban context.

The base structure of the solar modules provides a platform for holograms and light shows, creating a unique experience during the night and transforming the site to an entertainment destination.

**List of Primary materials**:

1-steel

2-carbon fiber

3-fiber glass

4-concrete

5-plexi glass

6-glass

**TECHNOLOGY**

The site utilizes two types of technology for solar and wind:

1. **CPV technology**

A curved grid is calculated for maximum annual average radiation, a concentrator photovoltaic system is then placed on the grid, with one directional axis rotation tracker.

The grids are lifted 15m above ground level on a steel structure system.

Panels are also placed on a rotating louver system covering the crossing bridge.

Each array has 4x4 panels and dimensions of 1.2x1.2 m.

Each panel consists of a large mirror that is used to collect direct sunlight and then focus the reflected light onto a smaller secondary mirror. The secondary mirror then redirects the reflected light into a glass prism, channeling the sunlight onto a triple multi-junction photovoltaic chip.

System output = 1000 W/m2

Total CPV panels area =3563 m2

Average daylight hours= 12-(43% loss for cloudy conditions) = 6.84 hours

Panels efficiency = 43%

Estimated energy from solar technology:

3563x6.84x0.43x1000x0.9 = **9.43 MW or 3442 annually**

1. **Vortex technology**

An array of 520 vortex systems spread across the edges of the primary and the secondary boundaries of the project.

This system is cost effective and environmental friendly.

Each vortex consists of 4 main parts:

1. MAST

Circular structure made of fiber glass and carbon fiber that generates

Oscillatory movement from wind.

1. ROD

A carbon fiber rod that provides flexibility and strength to the movement.

1. Generator

A built-in linear alternator that converts kinetic energy into electricity.

1. TUNING SYSTEM

Magnetic coupling system that provides movement stability.

Each vortex goes up to 13 meters high with a capacity to produce

4kw of energy, making the entire system capacity around **2MW.**

Estimated energy from wind: 520 x 4 = **2 MW or 730 MW annually**

The project’s estimated energy production = **11.43 MW X 365 = 4172 MW annually**

**ENVIRONMENTAL IMPACT**

Melbourne is a place of diverse natural environments and great variety in natural resources. It provides habitats for a wide range of plant and animal life.

Targeting a sustainably future environment, the project uses the site resources without any emissions and most of the materials used are recyclable.

Wind systems are environmental friendly and require little to no maintenance.

The inclination of the solar systems are used to collect rain and storm water, the water then goes through pipes into water tanks located below for filtering and storage.

A **15MWh** storage that runs on lithium-ion batteries is installed below grade under the crossing bridge.

It serves to store energy and then feed it back into the grid at peak load hours.

The project is expected to contribute in Victoria’s plans by 12% in energy capacity and 37% in storage.