**The Story**

Dunescape is a vibrant landscape presenting the geological evolution of the St Kilda Triangle and its greater surrounds through history. Mountainous dunes harvest clean energy from the sun. Three kinds of wind trees harvest wind energy, provide lighting at night, and create an ephemeral soundscape. Kinetic energy paving takes advantage of movement across the site, and invites interaction through the use of lights that respond to energy generation.

People come to Dunescape from Acland St, Fitzroy St, the Palais Theatre and Luna Park to meet, relax, reflect and interact. Dunescape is a place for engaging with the iconic beach suburb that is St Kilda, and realising the potential for both beautiful and functional clean energy landscapes in the built environment.

Dunescape will completely transform the site without interrupting view lines or changing the inherent character of St Kilda; attracting people and encouraging pause, to stop and contemplate, rather than mindlessly traverse it.

**Description**

The intervention maximises clean energy harvesting, simultaneously creating an enjoyable space. Solar panels are fixed to the northern side of the dunes, making the most of the sun. Due to the higher air velocity on site, wind and kinetic energy are also utilised. These three different modes of energy generation in a comfortable space allow people to extend their understanding of the benefits and potential of new energy technologies.

Based on the history of geological processes of the original landscape and surrounds, the dune form references the waves of erosion of the Port Phillip Bay coastline over many years. Once mountains, the landscape was slowly eroded through natural processes of wind and water. The top layer of the dunes represents these mountains. After erosion, through years of wind and water, this place became shrub land and sand dunes. More recently, colonisation and development has resulted in an awkward space exposed to the elements and used only as car park.

Indigenous histories and ongoing connections are strong in St Kilda and the greater bay area, specifically the Yaluk-ut Weelam clan of the Boonwurrung. Euro Yuroke is its traditional name, which means “place of the grinding stones”. The story of Bunjil shows a deep respect for the land since time immemorial. We honour this deep respect and spiritual connection to the land through our reference to geological time and the creation of a space that invites contemplation on the long term history of the site and surrounds.

Native coastal vegetation has inspired the wind trees. They range in size from nine to seven and five metres in height.One is developed from leaves of coastal tea trees and banksia. Their form imitates the arrangement of leaves from the stern in the middle. The other is like the leaves of palm trees and Australian pine trees. The smaller wind tree of five metres is developed from ground level coastal vegetation. People can push and interact with them. The blades are covered in photovoltaic thin film. All the wind trees have LED lights, which provide lighting at night. As the wind moves across the site, the wind-belt will have sounds which reveals to visitors through their senses, that the wind has generated energy. The wind trees also have an educational value, as symbols of ecological significance and clean energy possibilities.

The kinetic plaza element improves interactive and educational value, transforming people’s footsteps to electricity. At night, when people walk on it, lights in middle will light up for 30 seconds, inviting people to interact with clean energy. During the daytime, the tiles will store the energy and transfer energy to electricity grid.

The height of dunes represents the geological change. Based on site topography now, the triangle will be high to low just like mountain to swampy-land and to the nowadays Jacka Boulevard. One side of dunes solar panel with high strength glass will be used to avoid fracture. On other side different rocks will represent the different times. These solar dunes have educational values in geology and clean energy.

Visitors can interact with low wind trees and kinetic pavers. At night, the wind trees will become lights and kinetic paver will be lighted for 30 seconds when people walk on paver. There is no doubt that this is a good idea for recycling and transferring different kinds of energy.

People will be attracted to use this space. With a height of four and three meters, the dunes can provide sufficient shading area for people sitting. The dunes can provide shading and seating areas to shelter visitors keeping them cool on sunny days.

Different material is used to divide function areas. They also establish a feeling of comfort. The first terrace connects with the Esplanade, Luna Park and the Palais Theatre, allowing sufficient space for 3000 people to come in and out during events held there. The second terrace can be connected with the slope by lawn and lead people go to the triangle. The third terrace is a plaza for cultural events. The fourth terrace is like a timber footpath, the material choice of timber has high heat capacity, which will be good for the urban heat island. The fifth terrace uses turf to connect with foreshore.

The views are not only protected but subtly enhanced; people can still see from the Esplanade and the dunes widen view. The topography has also been elevated and the majority of dunes face the foreshore.

**Technology**

Pavegen tiles allow the paving to compress an indiscernible 5 mm per footstep and produce up to 8 Watts of energy. Hence, if in 10 hours 300,000 steps per hour can have 24 MWh.

The microWindbelt (12 cm version) generator can produce up to 3 to 10 watts of power. And that is the micro-sized generator. 10w\*(245/12+273/12+247/12)\*12\*4\*24=7.1424MWh

The vertical axis wind turbine runs for one year. Half the time the wind is 10 m/s. half the time there is no wind at all. Therefore the average wind speed is 5m/s power generated is 1752 kWh

1752 kWh\*16=28.032MWh

The performance and potential of thin-film materials are high, reaching cell efficiencies of 12–20%; prototype module efficiencies of 7–13%; and production modules in the range of 9%.[31] The thin film cell prototype with the best efficiency yields 20.4%.Per square meter produce around 150-200W in good sunlight.

1010 square meter solar cells will be installed

200w\*1010\*10+2=22.2 MWh. Hence, the overall energy output is estimated to be 24MWh+7.1424MWh+ 28.032MWh+20.2 MWh=81.3744MWh

**Environmental impact**

Renewable energy is clean, producing zero carbon pollution. The use of renewable energy protects land resources, ecologies and environment. It is also a good way to improve the quality of life in an age of rapid development, economic and technological. We can use electricity from new sources of energy to supply lighting in this area at night. Dunescape will have no operational pollution to air, soil and water, because there are two parts existing in operation; transferring and recycling.

To both visually and experientially connect and extend Dunescape to the close surrounds of the St Kilda Triangle site, we have selected similar materials from its context, such as timber from the foreshore development, blue stone paver from front of theatre, grass from the slope and foreshore. Additional materials have been selected based on their heat capacity, to reduce the urban heat island effect in this area, such as paving and timber.