Art and technology don’t always go hand-in-hand. Historically this has not been an important issue, however, in our modern age the intersection between these two fields has become a necessity for both the environment and to maintain the aesthetic of our living space. It is the desire of this project to fulfil not only the above but also a commitment to the Boonwurrung people by protecting the land through lowering emissions and appreciating their culture by utilising traditional art.

Issue

The LAGI 2018 competition has invited participants to design a clean energy landscape for a post-carbon world—a public artwork that will help to power the city and inspire the future. Victoria is setting an example for the world with a goal of zero carbon emissions by 2050. Melbourne, already one of the most sustainable cities in the world, is targeting net-zero by 2020. The city of Port Phillip has provided St Kilda Triangle as a canvas for the LAGI 2018 competition. How then, can typically unaesthetic sources of renewable energy be utilised to create a sustainable urban design with visually pleasing infrastructure?

Design

St Kilda triangle aims to be a centre of cultural innovation, to pushed social boundaries, and is a key part of the city’s cultural footprint. Today St Kilda is a thriving public transit suburb of Melbourne with a heart of creativity, environmentalism, and social inclusiveness.

First and foremost the site must have a special layout to engage the public providing a transition between the city and beach while also being a place to hangout in its own right. To achieve this the main walkway extends from the northwest corner of the site and winds through the main axis of the site with offshoots to different attractions which are scattered freely. At the opposite end of the main axis sits the open exhibition space behind the Palais theatre which also has a viewing platform to provide exquisite views of the beach. The north and south sides of the site separated by the main road are join by oblique paths running from the bus stops and existing pedestrian entrances. A large area on the north side of the site is reserved for an open-air event centre, while a slope of natural height difference on the north side of the site is amenable to seating to view the event centre performances. Scattered throughout the site are various shelters and sunshades of different sizes to fit a multitude of purposes from community activities to every day leisure. The free-form arrangement of the site bodies creates a vibrant and exciting public place to explore.

Light Terrarium will boost tourism and generate a new wave of economic and social benefits for the state and the community, while creating a great place to hang out. At its heart is a cultural facility, with an integrated landscape that creates areas for recreation, socialising and events, while enhancing views of the bay and improving connections to the foreshore.

The design of light terrarium is primarily based on using large numbers of beta rays in a matrix to build sunshades, shelters and street art. The matrix of beta rays will cover the sun facing surface of circular and spherical structures from which emerges a pattern of dots. Inevitably the spheres cannot fully cover the surface and so any light which slips between the globes will fall onto coloured glass which sits behind each sphere. On a sunny day the stained glass will project a dot painting on the ground in the traditional style of the Boonwurrung people. The coloured pattern will be brought to life at night with small lights that will allow the site to stay lively throughout the night, making the park accesable and fun 24 hours a day.

The energy source

The fundamental building block of light terrarium (and the source of the site name) is the beta ray which is a relatively new advancement in photovoltaics. The beta ray is a transparent spherical solar energy collector with an inbuilt tracking system that can harvest both solar energy and thermal power simultaneously, generating output regardless of the weather. This new variation of the solar panel boasts numerous advantages over its predecessor in both efficiency and cost. Through concentrating the light to a smaller area the beta ray is able to promis as much as 95% more energy conversion, with a low carbon footprint while producing energy independent of weather conditions. The beta ray achieves this by harvesting thermal power, which makes it independent of cloud cover.

Environmental impact

In total the area that will be covered by the beta rays is 19,000.00 m2 and each beta ray takes up 0.0324m2 and so in total there will be 58640 beta rays. Each beta ray is 10cm by 10cm and produces about 110 watts per day which in total will be approximately 2680 Kwh for all beta rays and overall will produce 23470 Mwh per year. This is approximately enough energy to power up to 3000 houses with average yearly consumption. In addition to carbon neutral energy produced by the beta ray it also requires significantly less resources to produce and maintain the device. The Light Terrarium concept utilizes a new technology to produce a clean energy producing vibrant public space and it has the potential to pave the way for future urban developments.

Reference: https://newatlas.com/rawlemon-spherical-solar-energy-generators/30453/