St. Kilda Lanterns

The Lanterns represents the revival of St. Kilda's historical, environmental and urban cultural realities. The project has envisioned contextual appropriation and citizen participation; within the perspectives of leisure, performance and creativity. The proposal for the abstracted lantern canopies challenge the duality of public spaces through the logic of innovation and autonomy.

As visitors wander alongside the Jacka Boulevard and its permanent coastal and carnival atmosphere they encounter the robust timber silhouettes of the lanterns that unfold among the pavilion. The scene is somehow familiar with parabolic forms reminiscent of St. Kilda's historical boats and their moorings. However, the lanterns are like nothing they've seen before. They long to get near the lights.

A swift breeze picks up and the vertical turbines spin faster as the weather changes. The gradient of different coloured hues flutter among the boulevard. Their crossover amplifying a visual stimulus in a form of abstraction depending on the orientation of visitors. The impending darkness approaches, and the gradient of the lanterns become even more prominent. The cables that interconnect the grand lantern and smaller pavilions illuminate the night, bringing people closer to the cultural centre.

The impressiveness of the twelve-point reflected grand lantern allows for eloquence, acting as metaphor for a sun clock. It's not measuring time, but instead producing energy by reflecting solar heat and the dominant wind currents near the foreshore. The installation reminds us that energy is just as precious and momentary as time. It aims to send a positive awareness to locals and visitors, suggesting that there is still time to correct prevailing environmental damage and advocate hope for future generations. It represents a rigorous phase in the quest for sustainable measures, and how to continually implement them in infrastructural technologies to create a more liveable city.

Legibility & Accessibility

St. Kilda Lanterns inventively draws from historical context of the site to form a legible public space. The permeable ground plane currently allows for markets and nightlife events to become a counterpoint as part of vital local catchment.

The assembly of lanterns implicitly acknowledge the integration of cognitive experience by challenging traditional environmental infrastructures. St. Kilda Lanterns transforms the typology of the site and enhances the frontage of the iconic foreshore; inviting visitors to wander in and out of the marketplace pavilions. The lanterns connect the existing Esplanade markets through the site.

The installations have been fragmented into specific unit programs which work autonomously, but converse with one another via the interconnecting ramp on The Esplanade. The notion behind the disability ramp provides a seamless transition of the pedestrian network from The Esplanade to Jacka Boulevard and St Kilda foreshore.

Viewing Experience

The grand lantern flourishes with the ambition to create a cultural promenade that complements the Palais Theatre and Luna Park. They key ideas being pursued are the vision for a viewing platform and the revitalization of the public realm as part of the program. It invites users to engage in a series of activities. As visitors look down, buskers are taking part in improvised spectacles, tourists are photographing the structure and families are gathering by the steps that lead down to the cultural centre.

To define the rationality of its abstract form, volumetric composition takes ownership of the space and guides artistic expression. The reflected morphology of the twelve-pointed lantern form takes advantage of careful symmetries which enables spatial organization. The openness from the roof bounded by the spiral stairwell amplifies the interior and creates a point of reference. The interplay of natural light is prevalent; the kaleidoscope of colours refracted through OPV panels celebrate the pavilion's expressivity and theatrical qualities to a visually prominent degree.

Environmental Impact Statement

The proposal is characterized as a hybrid clean power generator, manifesting St. Kilda's prevailing winds, solar intensity and urban environment. The realization of the vertical-axis wind turbines, OPV and monocrystalline solar panels challenge traditional sustainable infrastructures. They represent individualization and emergence of a new environmental discourse.

The pavilions synthesize a holistic approach through the eleven abstracted lanterns of varying widths. The structure is built using a cross-laminated timber frame with steel plate connections, ensuring a stable performance over long periods of time. This system provides quick assembly disassembly of parts allowing either permanent or transient use. The grand pavilion is 40m in height with a diameter of 40m. The medium and smaller pavilions assimilate a diameter of 23m and 10.5m, with heights ranging between 4.5m to 18m.

The vertical-axis wind turbines improve the features of the St. Kilda Lanterns due to their light structure, efficiency and ethereal materiality. The translucent roof softens the boundaries of the structure and addresses suitable environmental practices. The OPV and Monocrystalline solar panels are fixed within the timber infrastructure which respond to the intensity of the sun, with highest efficiency panels receiving higher exposure. This arrangement encourages a gradient perception of the exterior. The concentration of solar rays and wind currents allows the generators to store heat energy, thus permitting the installation to function after the sun is gone. In total, the amount of energy generated by the eleven pavilions is 32,7346 Kwh annually, representing the amount of 60 households. In contrast, the average Victorian household consumes 15kwh per day, adding to 5,475 kWh per year.

Solar Power Generation 1	E=efficiency*area						
		Efficiency of Solar Panels	10%	15%	17%	19%	21%
Roof Area- sqm	Number of Roof	Amount of Roof Area- sqm					
1014	1	1014					
328	2	656					
67	5	335					
	Days	365					
	Solar Efficiency- kWh/sqm/day)	4.12					
		Amount of Power Generation- kWh	120605	180907	205028	229149	253270
	Electricity Price- dollar/kWh	0.3					
		Value- dollar	36181	54272	61508	68745	75981

Solar Power Generation 2	E=efficiency*area						
		Efficiency of Solar Panels	10%	15%	17%	19%	21%
Roof Area- sqm	Number of Roof	Amount of Roof Area- sqm					
1014	1	1014					
328	2	656					
67	10	670					
	Days	365					
	Solar Efficiency- kWh/sqm/day)	4.12					
		Amount of Power Generation- kWh	140756	211134	239285	267436	295587
	Electricity Price- dollar/kWh	0.3					
		Value- dollar	42227	63340	71785	80231	88676

Wind Power Generation	E=0.5*coefficiency*air density*sweep area*wind speed^3					
		Coefficiency	0.31	0.37	0.41	0.47
Sweep Area- sqm	Number of Wind Turbines	Total Sweep Area- sqm				
18.5	1	18.5				
6	2	12				
1.4	5	7				
	Wind Speed- m/s	6.62				
	Days	365				
	Air Density- kg/cbm	1.195				
		Amount of Power Generation- kWh	17653	21069	23347	26764
	Electricity Price- dollar/kWh	0.3				
		Value- dollar	5296	6321	7004	8029

Wind Power Generation	E=0.5*coefficiency*air density*sweep area*wind speed^3					
		Coefficiency	0.31	0.37	0.41	0.47
Sweep Area- sqm	Number of Wind Turbines	Total Sweep Area- sqm				
18.5	1	18.5				
6	2	12				
1.4	10	14				
Additional Small Wind Turbines	100	140				
	Wind Speed- m/s	6.62				
	Days	365				
	Air Density- kg/cbm	1.195				
		Amount of Power Generation- kWh	20948	25002	27705	31760
	Electricity Price- dollar/kWh	0.3	80261	95795	106151	121685
		Value- dollar	6284	7501	8312	9528

Annual Electricity Cost- dollar		1671.32	
Amount of Electricity		5571.066667	
option 1- 5 small pavilions-lowest efficiency	Units to supply		Annual Electricity Generation- kWh
		25	138257
option 2- 5 small pavilions-highest efficiency	Units to supply		Annual Electricity Generation- kWh
		50	280034
option 3- 10 small pavilions- lowest efficiency	Units to supply		Annual Electricity Generation- kWh
		29	161703
option 4- 11 small pavilions- highest efficiency	Units to supply		Annual Electricity Generation- kWh
		59	327346
Additional Power Generators		67	374955
		75	417272