# Shaping Energy in Urban Space - WIND-COLUMN

One approach to share the way we experience the world is through the creation of an abstract expression of ‘Art’. The term ‘Energy’ is merely a rationale definition of the matter in physics, we create that to power the way we live our modern life. After receiving the brief, the reoccurring question we keep asking ourselves was ‘how can we merge the two into one’?

The creation that we want to achieve must be more than a power generating sculpture. To marry the two ideas into one, a medium is needed in incorporating equal amounts of both worlds. We believe ‘Space’ is the answer – a three-dimensional expanse which is free, available and unoccupied, allowing art to dance with energy in the intermedium of space.

We approached the St Kilda Triangle from the three perspectives identified above: art, energy and space. The issues and opportunities were investigated for the design to truly activate the underutilised area and benefit the surrounding community. The master-plan is redesigned to suit our ideologies while maintaining its original intention, functions and areas.

We define ‘Art’ as a form of flowing energy which powers the urban spaces. This is reflected by our vision of a site-specific design that represents the notion of the ‘regeneration of art’, which is the source of urban energy. The design is a cluster of upright structures of energy formations, allowing artists to freely install artworks onto them, thus activating the triangle as a gathering space for local and international artists. In time, these designed structures become part of the site. These upright structures were redesigned from the form of turbine-less wind generators. By introducing fluidity and monumentality to the generator, it offers diversity to the form and establishes its identity on the site.

The generators are placed on two areas on our new master plan, one interacting with the water creating ripples from its subtle vibrations, and one interacting with the new green spaces allowing artists to establish new connections.

The design incorporates two prototypes from the Vortex Bladeless, Spain. Prototype one is 7.5 meters in height and capable of generating 1.5 kWh. The design housed 72 of those generators. The estimated energy generation is 946,080 kWh per annual. The second prototype is 13 meters in height with 4 kWh compacity. The design housed 35 of those generators. The estimated energy generation is 1,226,400 kWh per annual. Both combine offers the performance of 2,172,480 kWh per annual. The annual electricity generation income is $434,496.00 based on 20 cents/KWh electricity price. The products also have multiple benefits such as low maintenance cost and simple construction and transportation. Based on detail calculation, 70 % of total electricity generated on site can fully power all programs included in the existing program with Liquid Metal Batteries battery system. The batteries are store in the basement, keep it out the sight of the public with integrated electricity system.

The remaining 35% can be sold back to the grid to generate profit for the developments. The estimated remaining profit is $152,073.60 after the operation and maintenance cost. The total cost of the development of the generator and associated system is estimated to be $2,300,000.00 The cost breaks down into 45% of manufacture and installation, 20% of infrastructures, 15% of the associated preliminary cost and 10 precents of contingency in the developments. The estimated investment time return is around 15 years.

By having traditionally dangerous and giant wind turbines located close and interacting with the local community, the purpose of educating the public on environmental awareness can be achieved. It is also an innovative step, demonstrating globally on the possibilities of new technologies. Using the generators as devices of art, the purpose goes beyond its traditional functions. The design places the generators to create gathering space on the site while achieving optimized wind exposure.

To the public entering the space created, the cluster of column-like generators creates a perception of psychological barriers. The positions and heights of the generators create diversity in the space and thus introduce different qualities. When artworks are later installed to these structures, the design shifts into an open outdoor exhibition space for the community. By linking the energy generator, art and space, the design is no longer a singular object but one that is interconnected with future opportunities.

To support the idea of these three linking qualities, the team investigates the St Kilda Triangle and its master plan in detail in attempt to ensure the design adds value to the community and original masterplan. St Kilda Triangle is located across the road from one of the most famous beaches in Melbourne – St Kilda Beach. It is also next to a heritage listed theater and theme park, which tracks back to over a hundred years old. It was once the most popular recreational centre in the 1960s and 70s, housing musicals, operas, ballets and annual events like the Melbourne Film Festival. This was however dispersed by new theater and stages, as artists shifted to contemporary places with their audiences. The heritage theater stayed unchanged along with its slow-moving surroundings.

The site lies within a great location and transport system, which brings good development prospects. Well-developed roads and public transportation connects St Kilda with Melbourne CBD by both cars and trams. St Kilda Triangle is currently underutilized as a car park, with minimum economic benefits and no attraction to the public.

Previous development schemes were put aside, causing millions of dollars spent with no positive outcome. The first factor was the economy – the global financial crisis in 2008. The second factor was its conflict with local culture, as local residents did not want physical structures blocking the seascape but instead a large open space for local events such as St Kilda Festival, Esplanade Markets etc. The public wanted to maintain traditional sentiments of the suburb, and did not want their children to grow up in an over-commercialised society.

Functionalities from the previous masterplan were merged into this project and presented in a different way. With the St Kilda context in mind, the current master plan is modified to suit the new design, extending the ideologies to introducing more green space with an amphitheatre at the centre of the outdoor plaza. The amphitheatre aims to restore the traditional use of the site as a performance place. Alongside the Palais Theatre, the community now has the chance to host outdoor events in the amphitheatre with the aesthetic energy generators as its background. The green hills will grow along the edges of the Esplanade and will smoothly merge into existing pedestrian paths to ensure the seascapes are maintained for the surrounding buildings. The design introduces three openings to the culture facilities with energy generators growing out of it. The openings are surrounded by waters which forms a playground for the visitors and introduces additional nature light into the culture facility underneath. A directed circulation is presented to link the plaza and culture facilities. All functions from the original masterplan are retained and extended, including the outdoor view terraces and car parks.

**Environmental Impact Statement**

Traditional wind power generators with blades produce up to 60 decides on average which must to be kept away from residential area to avoid it being a nuisance. Vortex Bladeless oscillates at a low frequency with 20 Hz non-audible noise. It could be installed with in public area close to residents, brings an opportunity to conduct wind energy generation at inner city. Another issue with wind turbines was bird causalities. Although it is not a high-risk problem, to approach net positive on natural environment, wildlife friendly must been taken into account. The stick-like bladeless device only brings minimum movement during power generation, would bring substantial decline in rate of bird collision.

When wind flows through the rotation area, blade wind power generator transfer kinetic energy from wind into movement of turbines, which means the device decelerate air low and decrease natural ventilation in the surrounding area. Vortex Bladeless would not be a bulk blockage, has a small cross-sectional area. Its impact on natural ventilation is neglectable. In the meantime, the small size appliance does not shadow its neighbouring structure. The two Vortex Bladeless prototype in different sizes fit in various sites for both practical and aesthetic aspect. The unique shape maximised people’s visual when looking though a cluster of appliances.