WIND LEADS: Interacting with change

The coastal processes of wind, waves and currents influence the distribution of sediments. Wind, as the primary source, generates waves and allows for the erosion or build-up of dunes and beaches. These natural processes and unique factors of place influence the shape of the St Kilda coastline. Wind Leads compares these natural processes against human movement, tracking current human engagement with current natural process.

Infrastructure and the inevitable growth of a city have made the St Kilda triangle a functioning but static form. Like wind forming ripples in sand and sea, Wind Leads is the representation of natural processes that continue but no longer influence physical change onto the landscape. Masts of a boat or obstructions in sand, the poles connect to large fabric sails. The sails act as physical representations of these processes, leading or trapping those who choose to look up or travel through them. Each pole varies in height, ranging from 5- 12m high and 20cm wide. This echoes the shapes of dunes and shifting sand, allowing for variety and undulation from both the movement of the sailcloth and resulting contour views from afar. Considering views, areas of height occur in areas that do not obstruct views. Loose ends guide the viewer through space, moving in waves across the area, linking and overlapping to allow for a free flow of movement underneath them. Crossing the boulevard, the sails encourages a movement from beachfront to the St Kilda Triangle and beyond. The yellow sails act as visual queues that encourage movement. The undulation of these sails is met with human movement. Juxtaposing the sails, tiles line the floor, illuminating and tracking the movement of its users.

Wind leads is created as a permanent installation that considers the relationship between present circumstance, as a popular crossing and destination for its locals, and as reminder of natural processes that are always present. Most importantly, it encourages interaction and contemplation of place. A self-generating installation, Wind Leads considers the variety of people crossing the area, lighting their footsteps like shadows, acknowledging multiple histories and placing them within a present context. The sails, with reference to the ocean, connects land, sea and people into one space, each moving individually yet simultaneously. Wind Leads is a conceptual statement of place, a reminder of time and the inevitability of its passing. Sands shifting in wind, Wind Leads adheres to the processes of time, of people crossing and natural processes in a state continual change.

TECHNOLOGY

Piezoelectric technology is the main generator used with Wind Leads. It is used in two ways, both versions relying on the forces of natural processes. Piezoelectric technology is used to for power conversion and storage of electricity to create smarter and sustainable built environments that encourage people to directly engage with clean energy. Energy is produced from the sail ‘mast’ rods that are forced to sway from the sails picking up wind pressure. Working similarly to a boat sail the wind moves the mast to drive the boat. Movement in Wind Leads is made from the tension of sails on either side forcing the mast to move in multiple directions . Each 20mm wide hollow rod is stacked with a series of elastomeric piezoelectric toroids and rigid backup plates with electrodes running in-between. A cable connects the even electrodes with another cable that connects the odd ones. This further generates a current through the electrodes to generate electricity. Generated electricity is fed back up the rod to give energy to small LED light at the top of each rod. When the pole generates too much energy needed for the light, electricity is sent back into the main grid. The light, depending on the amount of electricity generated, glows accordingly. This is used to mirror the energy produced from the illuminating tiles on the ground that light up from human footsteps or motion.

As people step on the tiles, the weight of their footsteps causes electromagnetic induction generators to displace vertically. Each tile contains 4 generators, one at each corner of the tile. This results in a rotary motion that generates off grid electricity. Energy is converted and stored in a battery that is used to power LED strip lights that follow the user as they move across the space. Each tile eventually fades as energy is lost, similarly to the sail masts. This offers users an interactive platform that not only engages the user with the space but tracks their own impacts within the environment. This is measured against the energy harvested from the natural environment (Sails), creating an interactive platform between man-made and nature.

INVIRONMENTAL IMPACT

Wind Leads is self reliant, gaining its appeal through how it interacts with the environmental processes of wind and the people who cross it regularly. It imparts a clean green ideology that looks to the future, a statement of progress that generates engagement. Wind Leads is not just an energy generator but a way of thinking and acting. The installation looks to understand how we engage with the environment around us, bringing a consciousness of place and how we impact on it. A continuous signifier of processes, Wind Leads reflects our own interactions, allowing them to exist independently of the surrounding city. Functioning ‘off-grid’, the installation generates itself, both physically and conceptually, creating a self-reflective environment between the places and ourselves we inhabit.

GENERATED ENERGY

Each tile can produce around 5-7kw of energy per step. There are approximately 48707 tiles, if half were stepped on they would produce around around 170474kw. Each sail mast has the possibility to produce the same amount of energy as a small wind turbine as it uses the same Piezoelectric within a different form. This would be around half a megawatt per year.

Combined Total energy: Approximately 62100 megawatts per year

DIMENSIONS & MATERIALS

216 mast poles, between 5m to 12m high and 20mm in diameter. Each with 5mm carbon fibre reinforced silicone exterior, fitted with ‘mast slots’ and reinforced with steel ties to hold sails. Flexible aluminium central shaft is connected to ties and surrounded by piezoelectric technology (elastomeric piezoelectric toroids and rigid backup plates)

Golden yellow sails: Approximately 4800m of lightweight synthetic sailcloth

Tiles: 300mm(l) x 300mm(w) x 12mm(h) polycarbonate surface, rough surfaced with slip proof coating. Each tiles sits on 4 generators that are shared with the corners of neighbouring tiles. Area covered: 14125sqm