**Meeniyan Djeembana**

*gathering place of the moon*

**STORY + CONCEPT**

There isn’t just one Aboriginal culture in Australia- there are approximately 400 different cultures, each with its own language and laws. In the local area of our site, are the Boonwurrung of the Kulin nation. The project intends to celebrate the aboriginal heritage of Narrm, or the Melbourne area, as a distinctive destination and inclusive loci for cultural events among locals and visitors alike.

Djeembana, in BoonWurrung, means 'gathering place'- a place for many special occasions for communities to get together, barter, dance, pass on knowledge, to catch up with extended families, and for new additions to the family to be introduced. Meeniyan means 'moon,' a tribute to the nearby Luna Park which is listed by the Victorian Heritage Register as a historical site. As a cultural beacon, Meeniyan Djeembana will be an emblem that pays homage to local heritage/history while also serving as a buoy for the city’s future environmental goals.

Meeniyan Djeembana is a modular energy production strategy that creates a canopy using graphene nets suspended with helium balloons. The canopy cover of Meeniyan Djeembana will be knit, using traditional craft of net-making. Graphene threads will be woven together and held up by weather balloons and anchored at strategic points on the site. In making a light structure, the project will deploy less intrusive construction, settling gently on the soil for protection of future tree planting sites and retention strategies or rapid removal.

**FUNCTION**

In Melbourne and many regional areas, summer temperatures can easily reach 40°C. Only months ago in January 2018, spikes in air-conditioning use caused power outages from blown fuses and transformers on the distribution network, but not because of a lack of energy supply.[[1]](#footnote-1) As a result, almost 50,000 homes across the state lost power.

While the project intends to produce power, it also aims to increase canopy cover, in accordance with Melbourne City Council's aim to mitigate Urban Heat Island Effects. The city’s goal is to increase canopy cover from 22% to 40% which can drop a neighborhood's temperature 2-3 degrees by simply having large canopies that create shade.[[2]](#footnote-2) This will inevitably reduce the risk of heat-related illnesses and average energy expenditure. It is estimated that “increasing tree cover by 10 per cent – or planting about three trees per building lot – can save annual heating and cooling costs by an estimated $50 to $90 per dwelling unit because of increased shade.”

**ENERGY CREATION + CALCULATION**

**Meeniyan Djeembana** uses **ion harvesting technology** that generates clean renewable electricity from atmospheric ions. Pioneered by Ion Power Group, ion harvesting utilizes patented conductive material to collect electrically charged ions from the atmosphere.[[3]](#footnote-3) The electrical charge is then stored in a capacitor bank to be used for various uses. Ion harvesting does not need any fossil fuels and is truly renewable as the neutralized ions can be charged again once it is released back into the atmosphere.

Graphene is used in Ion Power Groups’ prototype of the ion collector for its superior conductivity. As atmospheric conductivity increases with height, it is more effective to position the graphene collector at a higher altitude.

For our calculations of the annual kilowatt per hour energy generation, the unit power was derived from 30W of usable electricity produced from 400 graphene material at 9.69cm2 from Ion Power Group’s report.[[4]](#footnote-4)

**Unit Power Calculation**

30W/(9.69cm2\*400)/10000\*1000 = 0.077kW/m2

**Annual Kilowatt per Hour Energy Generation**

0.077kW/m2 (power per surface area of graphene net) X 14,796m2 (Total Surface Area of Net) X 24hrs X 365 Days = 9,980,200 kWh

**DIMENSIONS AND MATERIAL**

Meeniyan Djeembana is constructed in modules for maximum flexibility and scalability. Each module consists of a graphene net anchored by four concrete piles on a 20m by a 20m grid and a weather balloon.

**Graphene net**

The graphene material is woven together using a method inspired by traditional weaving techniques to create a net that holds the balloon. Each graphene strip is connected to an insulated wire that travels down to the ground and to a storage unit via the cavities of the anchor points. Graphene was chosen as the main collection material for its superior conductivity and its light weight, imbuing the net structure an ephemeral quality while suspended in air.

**Weather balloon**

Recycled weather balloons of two different diameters are used to hold up the graphene nets in place. As the main support structure, the balloon holds up the nets in a playful way and allows the membrane to react to its environment in a dynamic way. The balloons also become a participatory aspect of the work as visitors can set their own helium balloons in addition to the main balloon to set the module to reach higher heights, making it more effective in harvesting ions.

**ENVIRONMENTAL IMPACT ASSESSMENT**

In making a light, floating structure, the project will deploy less intrusive construction, settling gently on the soil for protection of future tree planting sites and retention strategies or even rapid removal.

The high structure will cast significant shade for beachgoers and local public destinations alike. Life-Saving Victoria, a mission to prevent aquatic related death and injury in all Victorian communities, has reported that there have been increased visitors to various beaches suffering heat-related accidents during the summer. Simple shading not only reduces such accidents but can also mitigate urban heat island effects within the city.

The Melbourne City Council reports that only 3 species of trees make up the canopy in metropolitan Melbourne- Elms, Planes, and River Red Gums. As such, they are highly vulnerable to diseases and extreme heat. In conjunction with the city's initiative to increase biodiversity, the shade created by Meeniyan Djeembana will also provide shelter on site for any planted tree or vegetation from dehydration. Its porosity will not affect surface water runoff and allow rain to trickle down into the soil.

There are no large rotating rotors or propellers, as the project does not require movement from wind or waves. Consequently, impact on avian wildlife will be mitigated and noise pollution will be minimal.

Because it utilizes ion harvesting technology, it can continue to generate electricity through the night and in harsh weather conditions as well. In fact, storms and changes in the atmosphere can generate more ions in the air and produce additional amounts of energy.

The project will continue to recognise the area for its iconic Luna Park and beloved Palais Theatre, live entertainment, great food, film and music festivals, and its vibrant community of local artists and musicians.

Sources

http://lsv.com.au/blog/

<http://www.boonwurrung.org/>

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1. “Victoria May Force Power Companies to Compensate for Outages.” *ABC News*, Australian Broadcasting Corporation, 29 Jan. 2018, www.abc.net.au/news/2018-01-29/melbourne-heat-brings-hottest-night-of-summer-blackouts/9369228. [↑](#footnote-ref-1)
2. Melbourne City Council [↑](#footnote-ref-2)
3. “How Ion Harvesting Works On Earth.” *Ion Power Group*, ionpowergroup.com/how-it-works-on-earth/. [↑](#footnote-ref-3)
4. Ibid. [↑](#footnote-ref-4)