**Velella**

*Vēlum:* sail, *-ella:* bacteria

Discover Santa Monica's Peculiar Sea Raft

Fantastic sights and sounds of the Pleasure Pier entertain people for hours. But, the most intriguing sight is undoubtedly the view to the south of the Pier from the Ferris Wheel. Your regular beachgoer would mistaken it for the rare sight of the alien-looking *Velella velella* washing up to the shore if not for the magnificent difference in scale. A colony of tiny free-floating "sailors" seem to meld together to form a dazzling and humongous jellyfish-likestructure*.* At night, the view turns ethereal with blinking LED lights that float on a vast area and adorn the breakwater, almost like an expensive necklace.

While not visible from the pier, the structure contains powerful sources of inspiration and innovative solutions available to the people of Santa Monica. The fun structure aims to advocate strategies that involve the general public in decision-making for affordable and clean energy. The Santa Monica Pier is an excellent site for public engagement, especially in the state of California, where climate change is a buzzword that drives more and more people to choose cleaner resources.

Getting to *Velella* from the Pier by itself is a renewable experience as people will be encouraged to use boats powered by clean energy generated at the facility. Frequent routes would make the structure accessible, but people would be able to experience the land art from the Pier as well. This dual experience would be achieved using visual aids of lighting and signage, along with the experience of tasting purified water from the facility at custom drinking fountains located at the Pier.

*Velella velella,* also known as "by-the-wind-sailors" have a recent history of washing ashore in California in response to El Nino events in the past few years. The hydrozoan consists of a float for the base with a clear sail to the top that enables these organisms to move with winds and currents. Their popularity with the Pier Aquarium and their amazing ability to function as a system in colonies serve as the basis for this concept.

The design is comprised of two major components- The desalinization demonstration facility and the floating façade. Each of these components contribute to the two-fold system of renewable energy technologies, namely, photosynthetic solar panel and saline water electrolysis. The demonstration facility would ideally be powered entirely by the clean energy provided by the solar panels, making this design a truly self-sustaining system.

Ebb and flow of low tide and high tide influence the movement of the floating façade of *Velella,* much like its hydrozoan counterpart. However, the structure takes biomimicry a step further by applying an ingenious technique to the recycled can and aluminum façade. On a closer look, one would be able to see the green powdery texture of the solar harvesting technique developed by MIT Researcher, Andreas Mershin. The technique involves mixing of ready to use "stabilizing powder" with agricultural waste such as grass clippings to create a green goo that performs photosynthesis even after the plant's death. Tapping into Photosystem-I Chlorophyll molecules from plants to the floating façade makes this technology highly malleable and inexpensive. While this technology is not as efficient as the regular photo voltaic cells (0.1% efficiency as compared to 15-18%), it is non-toxic, affordable and easy to install. The rough surface of the floating façade is connected through a web of zinc nanowires that run through the recycled cans and interconnected LED lights that activate in the absence of daylight.

The interior of the structure houses a transparent pyramid showcasing the energy accumulator and desalinization demonstration facility. Here, people can view the network of energy accumulation in action between the solar collectors and desalinization facility. One could get a taste of the desalinated and purified water at one of the custom drinking fountains connected to the facility's output. The bizarre experience of walking on a partially transparent surface over seawater to drink the seawater after purification makes the core facility a very interesting place.

The organic form of the façade is a strong juxtaposition to the pyramid core structure, as a symbol of natural and man-made forces working together for a better tomorrow.  *Velella* proposes a variable and flexible source of renewable energy that integrates with an internal system while interacting with its context. In the near future, *velella* is envisioned to be a source of inspiration and education for the hybridized use of bio renewable energy and biomimicry in design solutions.

**Estimations:**

Solar Energy (Photosynthetic Solar Panel, 0.1% efficiency):

Approximate surface area of Floating Façade: 2000 sq. M

Annual Capacity: 365 MW h

Potential to power 480 houses every year

Desalinization Facility:

Annual energy consumption: 120 MW h

Desalinated water output: 35 tons every year

In 30 years, the facility would be able to-

Manage energy consumption to 3600 MW h

Output 1028 ton of desalinated sea water

Reduce Carbon Dioxide emissions by 3665.8 tons

Reduce Sulphur Dioxide emissions by 10.54 tons

Reduce Nitrogen Oxide emissions by 10.24 tons

Reduce miscellaneous wastes by 265 tons