CATALINA COSTAL CATCHER

We should not want to protect the environment; we should want to create a world where the environment does not need protecting. The world is beginning to realize the dire circumstances where our resources are running out and damaging our environment. Renewable clean energy sources are becoming keystones to cities but efficiency and aesthetic often don’t achieve symbiosis in the resulting product. More over the final product doesn’t represent its location or character of the area making installations of renewable energy ‘one purpose wonders.’

The concept behind the Catalina Costal Catcher is to memorialize its unique location, culture, and history. The figures beyond the pier are designed to remind visitors of the unique history of the Santa Monica Pier and specifically the time of the La Monica ballroom that was lost to a storm. The shape of each pillar takes the form of a dancer with skirts that catch sunrays creating a ghost like dancing mirage of the past. The resulting twelve dancers symbolize the twelve peaks the ballroom originally had to its structure.

The platform on which the dancers sit has a crested form designed specifically to represent the weather pattern that the installation harnesses for drinking water. The Catalina Eddy weather phenomenon pushes towards land with the same crested shape native to Southern California. This renewable resource art piece embeds into the Santa Monica environment and represents the region’s unique weather.

This all weather, all environment design focuses on utilizing the specific weather partial to Santa Monica during any condition throughout the year. Culturally Santa Monica citizens are known for being less fond of the June Gloom and Grey May aspects to the weather through its late spring, summer, and early fall months. This weather due to the marine layer that rises off the coast from Catalina Eddy causes low hanging clouds and fog/mist to roll towards the land and into the city. It can dissipate as the day goes on but clearly has been nicknamed for its disturbance in the beach area. Using technology that can harness this ‘less favorable’ time of year that benefits the city can help balance out the gloomy connotation and represent a valuable condition that Santa Monica can use to provide clean drinking water.

Technology

Each dancing figure is composed of a low cost polyethylene or polypropylene mesh. The mesh material collects water droplets from the marine layer and low forming stratus clouds and carries them down to the base of the system which contains a reverse osmosis system built into the platform that can transfer out clean drinking water. The mesh has a coating that helps the water quickly travel down the system to the base before heavy winds can push the droplets out of the mesh.

Specially designed printed photovoltaic cell arrays will be placed around the concaving midsections of the figures to signify to onlookers the dancers skirt and flare of the dance movements of an age past but not forgotten. The PV cells have been spaced out between the mesh segments to receive max sunlight and take advantage of the 300 days of sunshine that Santa Monica receives annually.

The platform is a wave energy extractor made up of oscillating water columns (OWC) allowing the entire structure to float on top of the water. The columns alternate rising and falling with the waves and create fluid pressure that can be pushed to a generator and a turbine to create energy.

The marine layer harvesting dancers can collect between 12,000 – 62,000 gallons of water a day during the Catalina Eddy season if the fog persists all day. The mesh sections come in three different “kit of part” sizes with the smallest diameter at 39 feet, the medium diameter of 51 feet, and the large diameter of 70 feet. The tallest dancer pillar is 260 feet tall just under the 80-meter allowance and shrinks to roughly 33.5 meters at the shortest dancer at 110 feet. This leads to roughly a 1.4 - 7.4 million gallons of water collection annually. Realistically this number would most likely be halved due to the potential quick dissipation of the marine layer depending on temperature ranges of the area.

The energy collection from the photovoltaic panels can produce as much as 30-150 watts per foot a day and with three panels in sizes of 80 feet by 80 feet, 60 feet by 60 feet, and 50 feet by 50 feet. In standard weather conditions the panels would collect 1100 Megawatts annually.

The platform that is weighed down with 3,253,800 pounds of sand that the oscillating wave columns hold along the water surface uses fluid pressure to generate energy through a turbine. Several studies in wave technology done by the Bureau of Ocean Energy Management show that southern California can achieve up to 250 terawatts in recoverable wave energy insuring there is enormous potential for the platform to benefit Santa Monica. With recent studies and averages in potential energy gain the area of this platform is likely to produce 5,200 Megawatts give or take 500 kilowatts depending on storm seasons.

Environmental Impact Statement

This installation is designed to accommodate both energy and water collection for the Santa Monica area. The installation’s home out beyond the breakwater will be tethered to the ocean floor and float on top of the waters surface so that it doesn’t disrupt the natural motion of the waves into the beach area. The structure is meant to be all weather and can hold in any condition while still harvesting water and or energy.

Total energy collection of the project is 6,300 Megawatts annually. With research in 2014 stating an average United States utility customer consumes 10,900 kilowatts per year,­­ the installation can provide power to 576 homes. This project is also constructed based off need and cost. The kit of parts construction concept allows for whatever height and variance of figure sections and photovoltaic skirt array cells necessary to achieve the desired water and energy collection, which allows for flexibility based on budget. The goal is to achieve a design that encompasses the character of Santa Monica and is flexible based off the needs of the city.

This design will not negatively impact the environment whatsoever. All materials that may be corrosive such as the steel pistons for the tidal energy platform don’t touch the water and are protected from the weather by the platform surface. There are no harming elements to this installation that could damage any ecosystems or the beach, which was the overall intention of the project.

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