DESERT TRINITY

Renewable Oasis

The wind element of the structure holds 53 small Helical Wind Turbines (HWT) within it, which has a paraboloidal configuration, rotating on the vertical axis. The blades of the HWT are attached to multiple central vertical ribs which run parallel, supported by a steel frame. The blades of the HWT can utilize wind from any direction. The system of HWT has a rotor diameter of 2m and a blade length of 5.6m. Carbon fibre reinforced polymer is used for the wind blades to ensure that the structure is lightweight and strong which allows the blades to spin faster and capture winds at a low velocity.

The solar elements are relatively low maintenance because it uses simpler light weight technology and is a passive system that has no moving parts. The primary materials used are ETFE, mirror film, steel, PET base film, local sand and concrete. The total cost of the two concentrated solar paraboloids is \$2.7 million approximately. The cost of constructing the wind paraboloid is approximately \$24,000. The total cost/Watt of the entire installation is \$4.94/ Watt. Balancing solar with wind power eliminates the intermittency issues and combining the two technologies reduces overall delivered power cost.

Total Energy Generation

ients Energy Generation

Wind Element Energy Generation

Homes Powered







З



Pay Back Period

An approximate estimate of 2 the solar and wind elements. T

388 MWh/year electricity is generated through e bridge is covered with piezoelectric tiles, which also generates energy in addition to the energy generated by the paraboloids. The nameplate capacity of a concentrated paraboloid is 267kWp. Considering a capacity factor of 50%, energy generated through the solar paraboloids is 2343 MWh/year. The nameplate capacity of an individual HWT is 0.3kWp. 53 HWTs are held within the wind paraboloid generating 45 MWh/year, with a capacity factor of 32%. The amount of electricity consumed by a typical house in Masdar



ROCK CLIMBING

UV LED LIGHT

Ultraviolet light emitting diodes are fitted on the wind paraboloid which acts as a deterrent system to prevent birds from collidi

OUTER RING

_____ A concrete structural outer ring that supports the paraboloid and transfers the load to the ground through concrete pier blocks.

CARBON FIBRE REINFORCED PLASTIC BLADES

CFRP is a robust and lightweight material, which allows the blades to spin faster to capture low velocity winds.

STEEL STRUCTURE

A steel frame acts as the support system for the VAWTs. The central vertical shafts have connection flanges on the top and bottom which nks it to the steel frame



PIEZDELECTRIC TILE



SKATING

is 10 MWh/year. Hence, the net energy produced annually can supply peak load demand to more than 238 homes in the UAE.. Desert Trinity is envisioned as the energy park of the future in a public realm that spreads awareness of the need for sustained reduction in energy utilization. As a step further, the pedestrian bridge that unifies the Trinity (three elements) is composed of low carbon concrete with piezoelectric tiles, enabling visitors to contribute towards the generation of energy during their visit to the power plant of the future.