**Eclipse over the Blue (Solar) Hill:**

Major forms or renewable energy exist with us night and day and derive from ultimate source the sun. Perhaps the only visible form of renewable solar energy, comfortable to eye, manifests itself in the form of reflection from the moon.

Like renewable energy that is natural, sustainable, the design takes natural forms and becomes part of the landscape. As we move around the Masdar city during the evening hours, we can experience the eclipsed, crescent of moon, changing shape, above the blue (solar) hill.

**Simplicity over Complex Design:**

Rather than complex forms which seldom are achievable the Eclipse is a simple manifestation of natural technological forms that have been transformed into landmarks. Solar PV within the limitation of the site can be productive with east, west, and southern alignment. The system has to be raised to allow shadowing from adjacent buildings. The three faces of the maximum radiation receiving pyramid have been elongated into the blue (Solar) Hill. An addition of a wind turbine has been done to increase the production capacity. Lighting added to the periphery enhances - changes the viewer experience.

During the day it appears as a blue (solar) mountain with a wind turbine installed at top. During evening-night hours we can experience an eclipsed moon over the hill. LED lights installed over the external edge of the wind lens of the turbine and the solar system do the miracle .The eclipse changes shape as we move around the city and appears as a focal point towards Masdar city from surrounding cities such as Abu Dhabi and Khalifa. Air approach for Abu Dhabi now has another landmark landscape towards Masdar City – A new moon.

**Viewer Experience:**

The eclipse can be viewed from distance. With nightlife dominating the Gulf region, it can be viewed from adjoining cities of Abu-Dhabi, Khalifa City. Moving around the periphery of the city, different phases of the eclipses can be seen. Finally approaching the Eclipse a viewing deck above the Hill allows the viewer a closer look and gives them a breathtaking view from above the city.

**Technology and Production Capacity**

There are two technologies used in the design – Solar- PV and Wind Energy.

An ideal orientation of solar energy system would be south facing. With limiting conditions of the site, 3.5mw of the panels face south west and remaining 2.5 mw face east. Under the conditions, south-west facing panels are assumed to have a capacity factor of 0.15 and east facing panels a capacity factor of 0.075, giving overall annual production capacity of 6.2 million KWH

Wind Turbine with a 90-100 m diameter has an installed capacity of 2 MW. Annual Production capacity of the wind turbine at 30% capacity factor is 5.2 million KWH.

Energy used by installation per annum (12 hours per day) is 1.5 million kwh. Net energy produced is approximately 9.9 million KWH

**Cost Approximation**

The installation is going to be supported on RCC Columns of 2 m dia., with supporting truss system projecting from columns for panel installation. Evacuation and solar power conversion units are going to be housed at the bottom. Lifts will carry visitors to the viewing deck. Cost of full installation is approximated as below.

|  |  |  |  |
| --- | --- | --- | --- |
| **Material** | **Amount** | **Rate (USD)** | **Cost** |
| Solar PV Panels | 6000 kw | 1000 | 6000000 |
| Solar Power Conversion Units and Wiring |  |  | 8000000 |
| Wind Turbine | 2 mw | 3000000 | 3000000 |
| Structural Steel (In Truss System) | 150 ton | 2000 | 300000 |
| RCC (Columns and Foundation) | 20000 m3 | 110 | 2200000 |
| Reinforcement  | 6000 ton | 1000 | 6000000 |
| 35% for Labor Component of Construction |  |  | 3000000 |
| Miscellaneous Costs (15%)– Cleaning systems, Lifts etc |  |  | 3000000 |
| Lighting Installation |  |  | 2000000 |
| Miscellaneous Costs for Evacuation System |  |  | 5000000 |
| Total Cost | 38500000 |
| Approximate Cost per Watt | 5 USD /watt |

**Environmental Impact Statement**

Normal electricity produced through fossil fuels is being replaced with solar PV and Wind Power. In a desert area with scarcity of soft water, the impact of use of renewable electricity is assessed at two levels – conservation of water, conservation of fossil fuels (prevention of greenhouse gas emissions)

1. At approximate 150 liters of water consumed per kwh of electricity, annually one billion liters of water can be conserved. Over the lifetime (25 years) 25 billion liters of water will be conserved. Energy required to convert hard water to soft water comes as an additional benefit.
2. The installation is capable of producing 9.9 million kwh of electricity per annum. With 0.94 kg of CO2e of Greenhouse gases produced per kwh of energy from fossil fuels, the system is able to reduce 9.3 million tons of Green House Gases annually. With assumed life expectancy of the installed machinery and system of 25 years, installation is going to prevent 186 million tones of green house gas emissions at a reduced average efficiency of 80%, over its lifetime.