WiSE LANTERN

*“When you can’t change the direction of the wind power –adjust the your sails”*

-H. Jackson Brown Jr.

*“I have no doubt that we will be successful in harnessing the sun energy… if sunbeams were weapons of war, we would have had solar energy centuries ago”*

 -Sir George Porter

The Green Energy produced from the Solar and Wind resources, has the potential to provide substantial amount of power to the grid with apparently zero environmental hazards. Like fossil fuels, these resources will not give out and can produce span less amount of energy. The WiSE (**Wi**nd **S**olar **E**nergy) Lantern structures, the hybrid clean energy generating units, are the combination of both solar and wind energy, which form small microgrid. These structures can supply abundant renewable energy to the locality. The main advantage of having hybrid energy generators is, during night the in the absence of solar energy the wind power. People visiting the theatre hall and park will attracted to the fascinated design of WiSE Lantern. .This structure will also be decorated with combination of different dazzling LED lights during night with water gushing from upside underneath the transparent solar glasses. Certainly this structure will be a glorifying landmark and a popular tourist place with high technical and aesthetic value.

**Motivation & Objectives**

The main theme of the proposed design of the WiSE Lanterns, is focused on fulfilling these three main objectives, which as well act as the key motivations.

* **Environmentally Sustainable Green Energy**

As the site is very nearer to sea shore the wind profile is very much promising to harness the clean energy. At the same time the daily average sunshine hours for the proposed site are quite sound to extract a good amount of green solar power. These factors function as one of the key motivation to develop the structure which generate complete green power. The power obtained from WiSE Lanterns add zero emission to the environment, which can reduce a considerable amount of CO2 and other greenhouses gases in the air w.r.t the energy obtained from fossil fuel burning.

* **Lost Energy Recovery**

The designed structure is large in height and naturally the amount of wind gust is very high at this level. For conventional horizontal wind turbine, a considerable amount of wind energy is lost due to the vibration of the structure. In this proposed design the energy lost from the structure vibration is captured and used to generate electricity by implementing piezoelectric materials embedded inside the structure; so the designed WiSE Lantern structures are quite a good efficient clean energy generator.

* **Power Up the Local Residential Areas**

The main objective of the WiSE Lanterns is to supply a cheap, reliable, hazard free and non-polluted energy to the local houses throughout the entire 24 hours. This grid connected hybrid green energy generators reduce the amount of energy imported from the utility grid for residential areas.

 **Specifications and Materials used in WiSE Lanterns**

In this proposed structure, vertical wind turbine model is used. The main disadvantage of vertical wind turbine is the initial starting torque, which has been overcome by using fluid coupling, aided by the pumping water at a height of 20 meter above the ground level. Three pumps of 1.5 hp capacity aids the aforementioned process. The water gushing in and out are visible from outside and illuminated by the LED lights (beneath transparent solar cells). The detailed specification and the materials used are given in the table as below

|  |  |  |
| --- | --- | --- |
| Components | Dimensions | Material used |
| Large Wind Turbine | Swept area =1424 m2Height = 72 mNo. of blades = 3 | Blade material is woven fiberglass, shaft is made up of recycled aluminum and connecting members are made up of fiberglass |
| Medium wind Turbine | Swept area = 38.4 m2Height = 16 mNo. of blades = 3 | Blade material is woven fiberglass, shaft is made up of recycled aluminum and connecting members are made up of fiberglass |
| Supporting structure for large and medium turbine | 20 x 20 x 100 m2 | Reused steel, aluminum and Reinforced cement concrete. |
| Small Wind turbine | Swept area = 31.54 m2Height = 16 mNo. of blades = 3 | Blade material is woven fiberglass, shaft is made up of recycled aluminum and connecting members are made up of fiberglass |
| Supporting structure for small turbine | 3 x 7 x 20 m2 | Reused steel, aluminum and Reinforced cement concrete. |
| Solar Panels | 1650 × 992 × 40mm | Polycrystalline and amorphous Si thin film solar cells  |

**Average Clean Energy Produced by WiSE Lantern**

|  |  |  |  |
| --- | --- | --- | --- |
| Green Generators | Numbers | Total Power Capacity (kW) | Daily energy produced (kWh) |
| Energy from wind turbines including vibrational energy | 1 Lagre+1 Medium+4 Small turbines | 3290 | 46060 |
| Opaque + Transparent solar panels  | 550 opaque+ 170 transparent | 148.3 | 495 |
| Total  | 3438.3 | 46555 |

The annual energy that can be harnessed from the proposed WiSE Lantern structures is 16293970 kWh. By considering average 40 kWh of daily energy requirement for a single house, the no of houses the hybrid green energy generator can supply are approximately 1160.

**Environment Impact Statement**

1. The WiSE Lantern power generators has large impact on the air quality. As the structure generates clean energy from the environment, so it do not release harmful greenhouse gases like CO2 which are main responsible for the global warming.
2. Due to the tremendous vibration of the wind turbines the natural habitat (flora and fauna) may be disturbed which is reduced by coupling elements in the structure.
3. Normally with wind turbines the public health and community can be hampered due to the sound and the vibration issue. As this proposed structure is made up with light materials, the issue related to the sound can be solved whereas due to the use of coupling elements and the RCC structure the vibration issue also can be solved.
4. No surface and ground water will be used other than the construction phase.