

## Alternative Energies

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Solar panels - Current application of solar panels aside from those in the solar farms is based on their installation on individual structures. The quantity of panel placement is dictated by the available surface area which, in most cases, is not sufficient for optimum result. TSL provides framework for installation of solar panels on each tier along its clear bay length of 104' and height of 9.5' (114');. One side of a tier holds 130 - 21'x48' panels having a total area of 131,040 sq.in. A data from "A Discovery Company" website indicates 1 square inch of solar panel obtains 70 milliwatts-hour. 1 watt requires 14.286 square inches. The panels produce 9,172watts-hr. With TSL axis running north-south, the rotating solar panels capture, on average, 6 hours of sunshine on each side, in other words, bay captures 12 hours of sunlight. Based on the website of "American Wind Energy Association", average house consumes 10,000kw-hr a year. On a 5 tiered TSL, there are 16 residential lots comparable to 5'x130'; current lots or 16 residences. If everyday were sunny throughout the year, solar panels on 5 tiers will produce 200,750 kw, enough energy for 20 residences. However, 365 days are not always sunny, so other methods are needed to acquire energy. Furthermore, TSL is not just for residences, it is for a city. All facilities in TSL need energy. One of other source of alternative energy is the wind.

Wind turbines - The rotor diameters of utility-scale wind turbine for land-based wind farms vary from 50 meters (164 feet) to 90 meters (295 feet). With the support, the height is 75 meters (246 feet) to 135 meters (442 feet). The effective wind speed needed for these turbines is a minimum of 12 miles per hour. Most turbines for residential use have rotor diameter of 8 meters (26 feet) needing 10mph wind and are mounted on towers of 40 meters (131 feet). The above information was obtained from "Wind Energy Association" website. From the above data, effective wind turbines are placed high above ground and need a minimum of 8mph or 12 mph wind to produce substantial energy. Support for a turbine is a significant portion of the total cost. Current concerns of the wind turbine are (1) needing location with strong enough wind, (2) requirement for vast amount of land, (3) cost for turbine support, (4) connection to the existing grid, (5) question on esthetic, (6) too tall, (7) impact on the environment and others. Spaceframe platform of TSL is the support for the wind turbine. 6 feet height spaceframe allows 5 feet diameter turbine within the center of each pyramid shaped module. There are 13 - 8' based pyramid in a bay of TSL. In each tiered platform, at least 39 turbines are placed. For 165 feet (50.23 meters) tall, 5 tiered TSL, a bay has a minimum of 390 turbines. The lowest height where 78 turbines (1/5 of the total) are placed is 30 feet (9.1 meters) above ground. Every 30 feet, additional 78 turbines are located. Since the TSL is an open framed structure, there are more spaces for turbine placements. Turbines on TSL (1) operate under gentle wind, (2) are integral part of the space frame, (3) are not readily visible, (4) have very limited, if any, impact on the environment and (5) are independent of the existing grid. The current energy is used as supplement. In the bay footprint (120' x 394' or 36.5m. x 120m.) of 5 tiered TSL, two 90m or six 50m utility scale turbines or about 44 turbines for residential use can be placed. 5 tiered TSL has a minimum 390 - 5' (1.3 meters) diameter turbines. The concept is to use many small turbines instead of few large ones. Small turbines are integral part of the structure and do not occupy additional land for their placements as do the large ones. TSL functions as land providing volume and more surface area above set area of land to support most all things that are constructed on land. The items are attached to the platforms eliminating the need for additional land and independent supports as do the solar panels and wind turbines at energy farms. The spaceframe incorporates panels, turbines, drainage and utility and other infrastructure systems within its height besides supporting items on and/or below it. By Koichi Paul Nii