**Following Eye**

**Concept:** Masdar City has plenty of solar energy throughout the year and a uniform distribution every month, making it the most worthwhile as renewable energy. The concept "Following Eye" is inspired by the eyes that represent the light reference to the sun. The device shows the tremendous technological advances that have taken place in Masdar City, witnessing the daily life of the local citizens. The eyes follow the sun during the day to absorb solar energy to produce electricity, and follow the citizens at night to provide them with bright lights.

**General Site Plan Design:** The site plan is designed based on the sun direction and the ball spacing calculation generated by the triangle grid, spreading in the whole site. The triangle grid is the benchmark of the general layout. According to the entrance, the device, circular road, and circle plaza are well planned based on the grid. And through the combination of the device and appropriate height form a decorative node, where there are less devices to ensure people be able to better view the node.

**Main part:** The diameter of the main part is 2m, including three sub-parts: (1)convex lens (The center cross-sectional area is circle with a radius of 0.55 m. The left ball crown curvature radius is 1.8 m and the right ball crown curvature radius is 9 m. The convex lens weighs about 87 kg); (2) multi-junction photovoltaic cell (11 cm diameter); (3) supporting rods.

**Technology:** The device is mainly composed of rod part, convex lens, solar panel, mechanic and electronic control systems. Following Eye is designed to use convex lens to gather solar energy into PTV solar panels. Compared to conventional solar panels, the Eye's solar panel size is traditionally 1% when it produces the same electrical energy due to the concentration of solar radiation. In addition, according to the photoelectric effect, the device can theoretically absorb sunlight and moonlight. Planetary gears and turntables are used in the heart connection, allowing the convex lens and PTV plates to rotate simultaneously on two planes, so that the sun can be tracked daily for maximum light energy. For the control system, photosensitive bridge is set on the convex lens. When the light is not directly to the convex lens and the bridge is not balanced, at this time the system will feed back to the background timely for adjustment of the angle of the convex lens, until the acceptance of direct light. Shadow simulation analysis of the device shows that when the distance between each Eye' solar is 2.5 m, there is occlusion during the two periods (8:00-9:00 and 16:00-17:00) in the winter solstice. Therefore, the layout should be able to avoid the occurrence of this situation. According to the calculation results, when the Eye's solar is arranged into equilateral triangle, the adjacent two devices are spaced at 2 m, and the height of the adjacent device rod is 3.5 m and 6 m respectively, the shadow occlusion problem can be avoided. So the Eye's solar can absorb solar energy as much as possible.

**Material:** The sphere itself uses PC, which has lightweight, transparent, high strong, anti-fatigue and good plastic properties. The PC material is wrapped a forming sphere, making the device more complete. The solar absorption use multi-junction photovoltaic panels, absorbing most of the sunlight frequency in order to generate more energy, and the conversion efficiency of photoelectric can increase up to 40%.

**The cost and power generation analysis:** The cost of a single device includes rod, convex lens, multi-junction photovoltaic cells, PC materials, control systems and mechanical components, taxes and others, a total of 3330$. A total of 500 devices will be arranged on the site, so the total price is about 2331000$. The annual generator capacity of all devices is: π ×0.552 × 2035 kWh/㎡ × 40% × 500 = 0.39 MkWh. 500 devices have a power of 115 kW. The design has a total price-to-performance ratio of about 14.5$/W to qualify the competition requirements no more than 20$/W.

**Final intention:** When completed, following eye will become an iconic device for Masdar City's western portal. Motorists and members of the public can overlook the spectacular views of 500 spherical installations with the difference high elevation in the park. During the day, the convex lens of the Eye's solar device will slowly rotate and changes the direction according to the sun's angle, which looks like 500 of eyes gazing to the sun. The transparent sphere is light and neat,symbolizing a balloon festival representing the pageant as from a view human point. The Eye's solar follows the sun during the day and absorbs solar energy efficiently, and when sunset until thorough the night, the convex lens of the Eye will stop following the sun. At this time, the LED light mounted on the convex lens will emit a soft glow. The LED light of the joints and around the park are connected into an arc and form a unique night landscape. At the same time, the Eye's solar will project light to follow the action course of users and create an interesting interactive experience for the people as an attractive public space.

**Environmental impact statement:** The project consist on the installation of 500 solar spherical devices trough out two parcels in the city of Masdar, this parcels are currently contemplated as green space in the city current master plan and we intend to keep the public space vocation of the site, furthermore the installation seeks to be energy auto sufficient by providing artificial light whose energy has been gathered by the device itself. To minor the impact of the construction of the public space the sun spheres device where designed to be prefabricated while construction in situ only requires land conditioning and installation jobs.

The sphere will be industrially fabricated and many of its components are pieces that are currently available in the market such as PTV solar panels, photovoltaic cells, LED lamps among other mechanical and electrical components, the heavy part of production is consider to be the fabrication of the designed orb which will utilize around 87 kg of PC plastic for each piece, making the final sum around 43,000 kg of plastic, the steel utilized for each device is calculated to weight 28,000 kg for each orb, making the total of 1,400,000 kg of steel in a rough calculation, which is not many if we compare it to traditional scale steel structure buildings built in the United emirates. The totality of the heavy production of the orb can be taken by enterprises based on the city of Abu Dhabi which is no more than 10 kilometers away from the proposed site of the intervention.

For the sake of the ambient the project pretends to arrange the following eyes according to a landscape design plan and fill the surrounding area with grass and vegetation to give the city green areas which will minor the impact of the construction on the long term.