**expoSE**

**Exponential Solar Energy**

Our society has been based on fossil fuel, but it is being disrupted by the exponential growth of renewable energy production. This is the catalyst for change in the way we manage, power and move economic and social life. The architectural form of the exponential curve expresses the concept of extreme tension and verticality. It’s a translation of the leap towards change. In the post carbon future, solar energy is a step towards freedom, setting the foundations for a better society. And our power station is not only a way of making energy but a simple way of making places to attract people.

***Renewables are disrupting the landscape of the energy industry by decentralizing the source. As such solar energy is changing our economic and social life. In its form, expoSE celebrates technological progress and its exponential growth.***

Celebrating the progress is key, especially as society is challenged by the environmental realities of our changing planet. In this regard e*xpoSE* is an attempt to show that we must take action now. And while this solar power station creates 92.200.000 kWh/Year of energy from the sun and is not accessible to public during the day, a large sheltered public space is created at its back, to provide for a various range of collective activities and events for the community to best use in the day.

At night a system of LEDs shines across the public space created for a celebration of energy. A sky reaching event shines on Masdar’s horizon celebrating the exponential change of renewable energy into a spectacle of light.

***In a world where society is stationary, progress is in constant movement, just as nomad tribes in the past were on a constant move looking at the future for a better opportunity.***

*ExpoSE* shows that the simplicity of renewable energy and local traditions can merge and converge to have positive impacts and create special places.

**Environmental Impact Statement**

A fundamental aim of the project is to create a beautiful, challenging and stimulating landmark that functions as a solar power station, while attempting to use site soil space as efficiently as possible restricting to minimal disruption of the site conditions, the existing topography and its surroundings, already in the progress of urbanization.

The project covers an area of the site of 13500m2, a 270m length and 50m width, and consists of two solar energy technology types: the first is made of photovoltaic modules with planar optical micro-tracking technology that uses an optical layer to funnel concentrated sunlight to high efficiency cells (typically used in space industry applications). The structure additionally provides a micro-tracking tilting system and rotational pivoting to track the sun’s position during the day. This technology, currently at a startup stage that has been tested and applied at a small scale, has a 372.827 kWpeak and can produce an estimate of 867.000.000kWh/year.

The second technology used is the CIGS (copper indium gallium selenide) solar panels which has a high absorption coefficient that makes it a thin structure. The CIGS layers are so thin that become flexible allowing the power station to take its intended exponential form. Its 13.920 kWpeak allows for an annual production of 25.200.000 kWh/year.

Both solar systems will have incorporated automated robotic cleaning systems that will remove the collected sand over the protective glass layer, maintaining always high performance of energy production, ensuring a total annual energy production of 892.200.000 kWh/Year.

A modular structure system supports the photovoltaic modules above ground and mostly consists of a lightweight and recycled stainless steel. The main structural pole also made of stainless steel with high reflective properties, supports the flexible CIGS solar panels with additional tensile cables, while a set of semi-structural smaller cables form the holding system to which a layer of hemp tent-like fabric is fixed. The hemp fabric has a particular low natural impact, avoiding use of other natural fibers as cotton or synthetics deriving from oil.

Spanning up to 40m high the structural pole requires an underground foundation on one end to ensure structural stability and strength, while a battery storage system is installed under the first layer of photovoltaics.

The project in its entirety aims at providing multiple functions. Firstly, as a solar power station with restricted access during the day to provide maximum energy production. The exponential curved form allows for a large place to be created. Almost 2500m2 of a shaded public space under the curve becomes a collective area for a broad range of events that enhance social and economic impacts to Masdar’s community and the surrounding areas. This multifunctional use day/night avoids the utilization of other surfaces for the same purpose, leaving other spaces as natural as possible.

The facility is designed to be simple and with less consumption of material. The lightweight structures in metals and the glass will be sourced from recyclable materials. And the Adoption of concrete will be minimized. When necessary an ecological concrete will be used, produced with desert sand currently under development by startups.

At night ***expoSE*** lights up its LEDs installed on the photovoltaic systems and another large space is created turning a solar panel technology into a spectacle of light, a celebration of energy with beam light on the pole pinnacle reaching to the skies.

**Conceptual Cost Estimate**

21.000.000$ Planar optical micro-tracking solar panels:

Estimate includes the price of the photovoltaics, the protective walkable glass layer, structure foundations.

3.500.000$ CIGS solar panels:

Includes CIGS solar panels, protective and walkable PVC polyester layer, structure foundations.

1.700.000$ other materials:

Estimate includes steel work of pole, pinnacle design and foundations, structural and semi-structural tensile metal cables, reinforced 230gr fabric hemp with supporting metal mesh, and lighting.

**References**

Planar optical micro-tracking solar panels <https://insolight.ch/>

Desert sand concrete <http://www.materialfinite.com/>