

# Wind pavilion

Masdar city as a leader of renewable or sustainable energy producing city in the world has a great impact in using clean energy and integrate the energy producing with urban planning and urban design. This city urban plan has an integrated land use design that mixed of urban spaces like residential area, park, plaza and shopping center with sustainable energy harvesting lands. Thus this urban design approach bring this technology in the heart of the city and it makes this city a place that people can touch or feel the impact of these clean technologies in their life.

This integration create an opportunity for designers and architects to display these facilities with an artistic language that make people to enjoy and rest in this place by bringing people activities in the site making a plaza with different use like playing sport activity or temporary market or exhibitions . considering an open amphitheater , a gallery a tea house and pavilion across the site can bring lots of activities to the site.

Sitting on the coastal region in the Middle east, Masdar city has some climatic opportunities. Lots of sunny days and a constant flow of wind cross this city, high water tube and humid weather are four major opportunities to producing energy and fresh water for this city.

## Concept

Wind pavilion idea comes from traditional wind tower (wind trap shaft) that is a typical sustainable structure around these region to ventilate hot air in the house and bring cooler air to the room. in this project this flow of wind converts to electricity with catching the wind and concentrate it on a spherical wind turbine. The form of this wind tower is two rectangular shape that connected with

together with a funnel tensile structure. In this pavilion people can touch the wind and see the sustainable energy producing system and its impact on their life.

## **Climate and technology**

In coastal regions because of presence of the sea wind can constantly flow across the land. In days wind flow toward the land because of absorbing the heat by water and in land higher temperature lift up and pull the cooler air from the sea side. In night because of absence of sun it reverse and wind flow toward the sea. Wind towers can catch these wind in both side and after concentrate it on a spherical wind turbine it can produce electricity.

Masdar city placed in a sunny part of the region in middle east so here is a great opportunity to produce energy from sun light. So using white and transparent solar panel to producing in this project is an important clean energy producing systems.

Humid air and high water tube is two other opportunity for producing fresh water. With using a cloud fisher net in upper part of the wind tower, and help of the wind humid air flow through this net and the fresh water will be caught in the net and produce fresh water.

The other system is dig enough into ground to reach fresh water.

Other sustainable climatic tips for the activity places in the site are high rise hollow ceiling to ventilate the hot air in the place, using low mass material that not absorb and store the heat in itself and using shadow and bright or white color material .

## **Environmental impact**

Cloud fisher net can produce 4 up to 40 liter of atmospheric water a day per 1 square meter that can produce at least 1,152,000 up to 11,520,000 liters of water for 800 square meter in 360 days. It can reduce the energy that is needed for producing fresh water in this drought climate.

1 square meter of white solar panel can produce namely 1000 watt per hour and there are 2100 vertical square meter of this white solar panel that stand toward east and west for morning and sunset sun shine that generate  $2100 \times 200 \text{ watt efficiency} \times 5 \text{ hours a day} \times 360 \text{ day} = 760 \text{ mwh}$  in one year.

As well 8000 square meter transparent solar panel can produce  $8000 \times 200 \text{ watt efficiency} \times 5 \text{ hours} \times 360 = 2880 \text{ mwh}$  in one year. So in the whole it produce 3640mwh electricity in one year with solar panel.

For wind tower and its turbine basically there is no other simple so we consider its energy generating output as the conventional wind mill at 2.3 to 3 mw per day. So the calculation would be  $2 \text{ spherical wind turbine} \times 3 \text{ mwh} \times 360 \text{ day} = 2160 \text{ mwh}$  per year. so in the whole this project can produce 5800 mwh in one year it is enough energy to supply 1500 household with electricity. So this project can help by decrease the use of fossil fuel for producing electricity and global temperature as well air and water pollution in a local scale to have a better and more sustainable city and environment.

## **Primary material used in the project consist of:**

Concrete for foundations, walls and floor pavement.

Stainless steel cable for holding the tensile structure .

Stainless steel for bridge and wind tower structure.

Cloud fisher net for atmospheric water.

Wooden shader for holding the transparent solar panel.