

BLOWING HORN ZLGUEYWA

Near the shores of the great Belt, which is one of the straits that connect the Cattegat with the Baltic, stands an old mansion with thick red walls. I know every stone of it, says the Wind. (The story of the wind by Hans Christian Andersen)

Blowing Horn is an artistic vision with sustainable design and engineering proposal in Refshaleøen near Copenhagen City.

In design process of this Land Art the following items are considered as the main design criteria.

- 1- Considering Denmark's rules and agreements to select the most efficient type of the energy consumption.
- 2- Understanding the history, geography, details of the design site, and the broader contexts of Refshaleøen, Copenhagen, and also Denmark in general.
- 3- Using proper technology to generate green electricity.

The Danish Government has the target that Denmark should use 100% renewable energy in the energy and transport sectors by 2050. In March 2012 a new political agreement on energy was reached in Denmark. The Agreement will give the following main results:

- More than 35% renewable energy in final energy consumption
- Approximately 50% of electricity consumption to be supplied by wind power
- 7.6% reduction in gross energy consumption in relation to 2010
- 34% reduction in greenhouse gas emissions

Considered this agreement "Wind Energy" is selected type of energy consumption in this generator.

Refshaleøen is a former industrial site in the harbor of Copenhagen, for more than a hundred years it was home to the shipyard which closed in 1996.

Based on this history and also importance of the "Blowing Horns" in Danish culture and myths, this monument is a golden horn which is located on a ship form berth next to the site.

In this Land Art, in order to generate electricity from the wind power, we used three different techniques and methods;

A- Windbelt: This type of wind generator uses a belt secured between two fixed points set within a rectangular housing. The belt oscillates rapidly creating a rocking motion at the two ends. This motion is harnessed by small kinetic energy generation devices employing magnets at the ends of the belt witch move rapidly back and forth between metal coils.

B- Compact wind acceleration turbine: This type of horizontal axis wind turbine uses a cone or series of cones to concentrate the wind, increase the velocity of the wind as it passes through the rotor's swept area, and thus increase the efficiency of overall system. They are also referred to as ducted turbine.

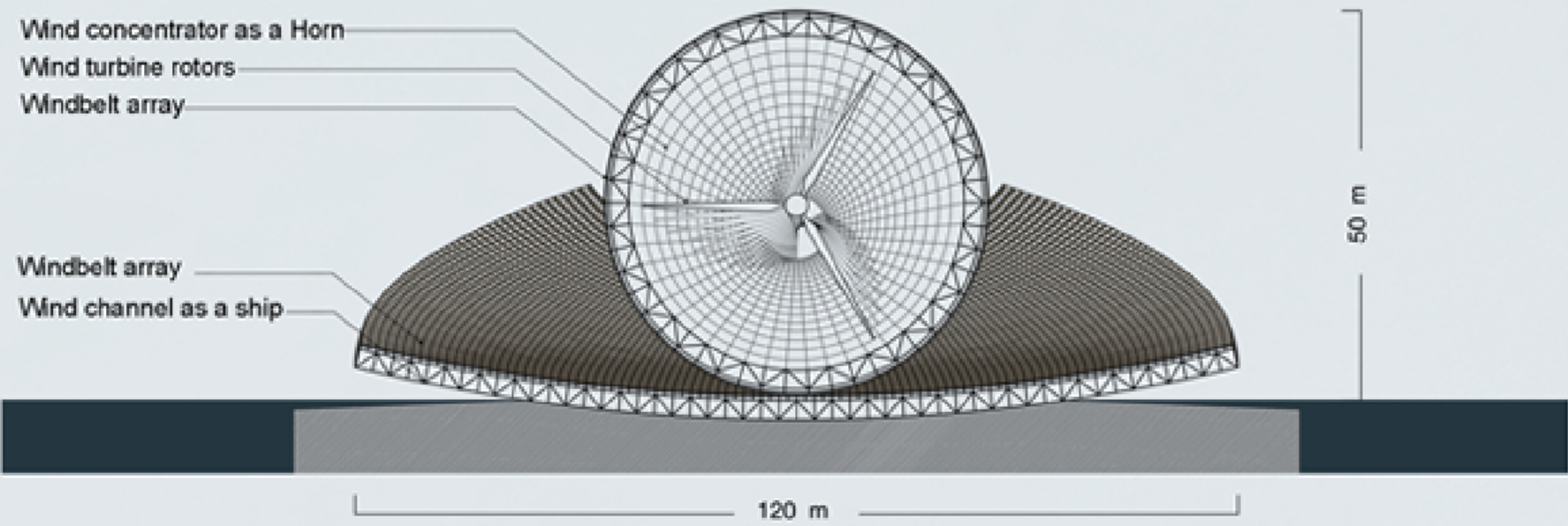
C- Selsam multirotor wind turbine: This invention uses multiple rotors on a single drive shaft.

According to local windrose diagram, the orientation of this monument is in the most powerful winds direction.

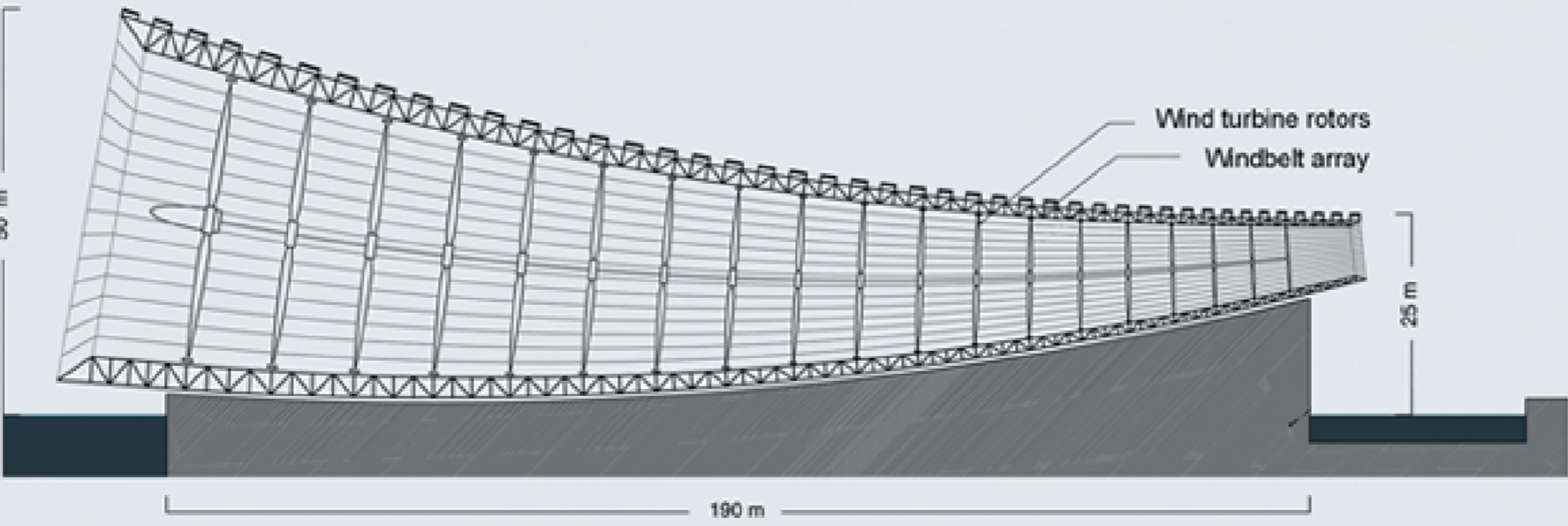
Inside of the Blowing Horn which concentrates the wind, there are series of wind rotors with a single drive shaft. By reducing the cone diameter, the power of wind increases at the end of Blowing Horn which causes the maximum efficiency of the generator.

On the other hand, ship form of the base of monument is designed to act as a channel which leads wind through the windbelt array on the deck and outer shell of the Blowing Horn.

Based on average of local wind's speed, The annual production of this generator will about 500 MWH.



Cross sections



Longitudinal sections & elevation

