

Echo of Wind

Visualizing the beauty of wind patterns

Few things are more present in Denmark than wind. It is not only the driving force behind the country's many windmills but also a force which has shaped its landscape. Wind is by itself invisible but through interaction with its surroundings its patterns and behavior can be captured – and its natural force harvested for electrical gain. The movement of leaves, branches, waves and textile are all heavenly affected by and visualizing wind. One of the most practical visualizations of wind movement is in sails – and it has helped shaping Denmark as a great sea-nation throughout the course of history. The location at Refshaleøen, next to the old shipbuilding docks, and with windmills in the background is as such a perfect location to create awareness but also to implement an installation that celebrates the beauty of wind. It is not only a very important location in the context of Copenhagen, but also as the water gateway into Denmark.

Textile has an ability to capture and visualize movement. It has a memory in its behavior, that both reflects its surroundings but also the constraints by which it is composed. This duality in the behavior of fabric has been an aesthetic fascination for artists and architects throughout centuries. An architectural proposal based on this aesthetics has a supple sensibility and therefore a possibility to integrate and capture literal and phenomenal motion in relation to its surroundings, its program and visitors. Creating an installation that embodies the transition from static to dynamic – an installation that visualizes the forces within and around us – and utilizes its energy.

Project breakdown

The project consists of a variety of static and dynamic springs distributed over the entire site. Whereas the static springs can host various forms of platforms viewing spaces, the dynamic springs are being moved by the wind. The bending of the lightweight carbon fiber springs, transforms the mechanical forces of bending and motion into electrical current through piezoelectric. Pieces of textile are connecting the dynamic springs, helping to both catch and bend the springs, but also create an echo of the wind pattern. In this dance between wind, textile and electricity the visitors are invited to take part through exploring the different areas within.

The project is highly scalable and flexible, and can be adapted to various sizes and formats. The project is laid out in a grid, but it is within the grid possible to rearrange – attach and detach springs – exchange static and dynamic springs, to accommodate events, different seasons or programmatic ideas.

This flexibility is achieved through a shared plateau in concrete, which shelters the electrical and mechanical devices. With the right tools it is possible to rearrange the different components so the installation can be optimized for any given scenario or activity. And thereby becoming more than a purely energy producing intervention, but also a public space that enables a dialog between wind and visitors - nature and humans.

Technical details

Piezoelectric materials are excellent power generation devices because of their ability to combine mechanical and electrical properties. When a piezoceramic transducer is stressed mechanically by a force, its electrodes receive a charge that tends to counteract the imposed strain. This charge may be collected, stored and delivered to power electrical devices. The technology is still in its early stages in terms of big scale usage, but it has a lot of potential of converting both wave and wind force into clean energy in the future. Therefore the installation can be seen as a test facility for piezoelectric energy, with the potential for collaboration with Universities and private investors to discover and explore the potential - and maybe start a new green wind adventure in Denmark.

The installation consists of an 80 cm podium of concrete in which the piezoelectric generators are embedded. The dynamic springs are made of lightweight carbon fiber, whereas the static ones are made in metal. The fabric is attached to the springs in the top and the bottom and can be vary in type and transparency to create the desired atmosphere.

It is not possible for the visitors to interact with any of the electrical or mechanical systems, therefore making it safe for the public to use and explore the installation and enjoy its many functions.

Environmental Impact Assessment

The impact of the installation on the environment and the natural ecosystem is very small. One of the most controversial moves is the 80 cm high concrete podium, which is built on top of the current site. But since the site already has major foundations from old buildings underneath, the loss of nature is minimal. The installation is not polluting its surroundings.