Motion Actuation: A New Cultural Meme

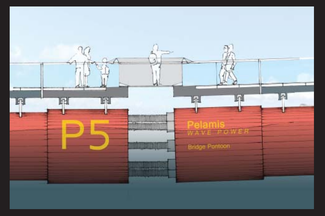
As you descend, you bypass a throng of tourists and enter the tower's lower outer spiral for vertical bike parking. Its diagonal steel structure is wrapped in a translucent weave of flexible thin film organic photovoltaic cell fabric that emits a vibrant glow of light and performs well even on cloudy days. You gaze down to the inner tower and catch a glimpse of the Little Mermaid seated below the tower's oculus. She reminds you of her story's theme of transformation from water to land to sky and how she now sits at the intersection of these energy generating elements. While walking, you are thrilled to discover that your footsteps on the Pavegen surface activate a series of scrimmed projections on the outer circle around the Little Mermaid. They are in reference to Refshaleoen's shipbuilding history and the optical tower. Translucent images of proportion templates and the B & W shipyard intermingle with the composition of light and color to create a stimulating artistic and educational atmosphere.

On your way to the cafe, you show a visitor how she can learn about the park's installation, technology and ecology through the downloadable Refshaleoen MotionActuation app. In real-time she can read about the energy amounts produced by each technology as well as track her level of power generation. The app delivers feedback about how the energy produced on site is used throughout Copenhagen and provides tools to make informed decisions to change behaviors, or memes, to become more energy productive and efficient. The MotionActuation app can be synchronized with the Copenhagen Wheel app, on-site urban bike-sharing, for everyday bicycle commutes, as well as related educational apps.

As you drink your coffee with friends, you imagine what the world would be like had we designed our cities around the dimension of the bicycle and clean renewable energy. You realize that you want Copenhagen and all cities to work like a fine-tuned instrument that produces more energy from renewable sources than it consumes and returns to a system of perpetuity with positive waste. Refshaleoen's Motion Actuation park and installation are designed as a place to enhance peoples' daily well-being by bringing the beauty of renewable energy into everyday lives and harvesting energy from motion and movements of the natural elements and visiting humans in pursuit of carbon neutrality. It is the embodiment of a new global and cultural meme.

FROM ATOP REFSHALEOEN'S
NEW MOTION ACTUATION TOWER
THE ACTIVITY OF PEOPLE, THE ELEMENTS
AND THE CITY ARE SPREAD OUT BEFORE YOU

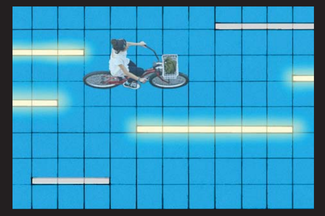
Water - Wave



The western portion of the Refshaleoen Motion Actuation Park is a floating board walk with a sea water pool, a cafe | bath house and an event space. This board walk and the proposed bridge connection to Langelinie will be largely supported on pontoons utilizing a next generation of Pelamis' Wave Energy generator. These generators are downsized their larger open-ocean cousins and are specially tuned to the gentler waters of bays and estuaries. They are specifically designed for lightweight floating structures and minimize impacts to sensitive transitional waters. The board walk will be supported on 25 of these Wave Energy generators, each 20 meters in length. The electricity they generate will support pool, bath house and cafe functions.

Est. Annual Output: **137,000 kWh** +

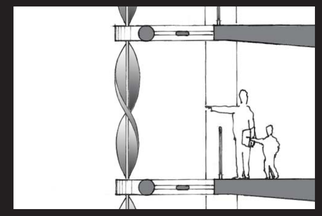
Land - Kinetic



The Refshaleoen Motion Actuation Park proposes a new artistic and energy generating model for Copenhagen's Green Cycle Routes. As a prototype, 6,500 square-meters of Pavegen's intelligent track surface which converts biker's kinetic energy (motion) into electricity will be deployed in a loop around the park. As cyclists ride, their energy is translated into electrical power that is used to light the path and support ancillary services. The track is programmed to only light the area around a cyclist as they move. Different colors can be assigned to traffic speed, density, weight and direction. In this way, data about movement around the city will be translated into artistic patterns of light and color in real time. Extra energy will be returned to the grid.

Est. Annual Output: **225,000 kWh** +

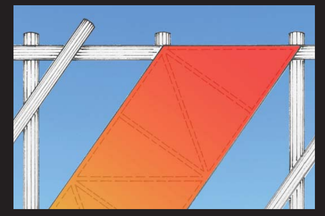
Air - Wind



The Refshaleoen Motion Actuation Tower is the primary energy generator in the Park. The upper tower is clad in 4,800 specially designed helix shaped vertical axis wind turbines, similar to models manufactured by Windside. With an average wind speed of 12 m/s at grade, and higher at elevation, the 120 meter tower is simultaneously an experiential work of art and a power plant. The 3 meter high turbines follow the helical ramps of the tower while their stainless steel surface and movement give the open-air structure a shimmering and diaphanous quality as they create patterns of light, shadow and morays across its surface. At night, the tower glows from within and becomes a shining beacon on the harbor skyline.

Est. Annual Output: **7,205,600 kWh** +

Sky - Solar



The lower portion of the Motion Actuation tower is a steel structure that is partially clad in a series of exterior grade fabric wrapped panels coated with 2,400 square-meters of thin film organic photovoltaic cells (OPVC). This surface provides a translucent enclosure to the space under the tower and generates power regardless of orientation or direct sun. This installation is meant to demonstrate how inexpensive technologies can be deployed and made beautiful. Over time, this surface can be changed as technologies shift and efficiency is improved.

Est. Annual Output: **985,500 kWh**

Estimated Production: 8,553,100 kWh per year

AT THE CENTER OF THE HELICAL RAMPS AND DIRECTLY UNDER THE OCULUS OF THE TOWER SITS THE LITTLE MERMAID AT THE INTERSECTION OF WATER, LAND AND SKY. HERE, SHE SURROUNDED BY IMAGES OF COPENHAGEN'S PAST AND AN TRANSFORMATIVE VISION FOR THE FUTURE.