

WATER WORLD

Copenhagen is a city of Water. One could say that the landscape of this region is more aqueous than terra firma. The water land relationships within the city create an urban environment that is almost unprecedented in the world. The context of water must be understood before one can begin to understand the city - how it works, how people navigate it, how does one design and create public space. It is not surprising then that when architects and urban planners make proposals to reorganize space within the city it also, of necessity, requires a redefinition of water to land territories. Water is the mobile medium through which new ground is established.

Our proposal looks to exploit a matrix of water to land relationships, where Water is both the generative catalyst and the natural process through which a new hybrid landscape is created on the competition site. Our design couples two sustainable power generation technologies - Osmotic Power and Thermal Solar Ponds - into an inter-connective system. It is our hope that the processes needed to sustain and generate power within these two systems will be adapted into a dynamic hybrid landscape for Public use and activity year round. In other words, what if the processes through which renewable energies were produced, created its own unique form of landscape environment for the city to inhabit. Ecological / technological processes are integrated with urbanization and city life in a symbiotic way.

The Osmotic Power's potential to generate intense water pressure (enough to lift water 120m in the air!) will be adapted into 3 leaning towers that push the water to a height of 50m just be pressure gradient differential between a salt water and fresh water reservoir at the base of the towers. The rest of the remaining water pressure will pass thru micro turbines to generate electricity. The resulting salt water discharged from the osmotic process will rain down periodically to a vast water plaza below. Collecting ponds gather the water and hold it and distribute it to a vast horizontal field of colored / reflective solar ponds. The field of ponds become an opportunity to create a new kind of aqueous Urban Plaza where the color and reflective atmosphere of the ponds become the setting for untold activities and events. The serene and quiet feel to the ponds is interrupted occasionally by loud dramatic downpours of water from the Osmotic Towers. If the occupant had not already made their mind up, they will by now be impelled to approach the waterfalls and ascend up into the towers to access the observation decks. This contrast of moods between towers and field will make for a dynamic experience.

Once one is within the plaza, a series of voids within the floor of the plaza will reveal access to a subterranean / sub-aqueous environment of baths and other thermal spaces that take advantage from the radiant heat of the Solar Ponds. The dark passageways periodically open back up to voids looking up to the sky or out to the harbor from a below sea level position.

Power generation Potential (2 sources):

#1 - Osmotic power is currently a clean viable, though expensive, energy technology. Accounting for ongoing developments with the membrane technologies used to create the pressure differential, This Power plant has the capacity of at least 1000 Megawatts. 40% of the power is currently being used in this design to "demonstrate" the power potential in the form of huge waterfall. When the waterfalls are in operation, the power potential would be reduced to 600 Megawatts, still a significant power source.

#2 - Solar Ponds have a direct relationship between power potential to land area and Solar gain. Oriented due south the solar pond field maximizes its solar gain and will successfully produce power throughout the year regardless of atmospheric temperature (the lowest layer of high-concentration salt water is insulated from above by 2 additional layers of lower concentration salt water, yet it still receives 100% of the insolation from the sun). Based on a current design area of 22,000sm of pond surface and annual output of 184 MWh is anticipated, which is roughly 4MWh per Solar Pond on site.

SITE DESIGN CONTENTS:

1. OSMOTIC PROCESSING TOWERS:

Fresh or low salt water is brought in from an underground aquifer and funneled up through a series of tubes to a 50m high position, generating electricity, while at the same time demonstrating the enormous pressure created in a salinity gradient system. This water is then released periodically as a fantastic waterfall feature. There structure has a built-in circular ramp providing access to an observation deck.

1.1. OBSERVATION DECKS:

A platform sits just above water level and provides 360 degree views of the surrounding city and seascape.

2. COLLECTION PONDS:

Three elevated sculptural basins collect the effluent salt water that discharges from the Osmotic power process. These platforms can be accessed for an up-close encounter with the waterfall.

3. HOLDING PONDS:

A series of ponds takes the water collected from the basins and holds the water, allowing it to settle down, and be distributed into channels as a recharge water source for the Solar Ponds.

4. SOLAR PONDS:

A vast field of solar ponds store the salt water discharge from the Osmotic Towers and convert the solar heat generated by the bottom-most layer of high-concentration salt water into an additional energy source. The energy can go directly into the electric grid, or a percentage of energy produced can go into desalination of the Harbor water - effectively eliminating the need for any remote fresh water source the process has been started.

5. EVAPORATIVE SALT PONDS:

These dry salt beds process and harvest the salt accumulation from the solar ponds. This salt may be sold commercially as well as be used for mixing the salt water reservoir to sustain the Osmotic power process on site. The changing color of the water due to the salinity levels as well as the reflective optical qualities make the field a dynamic landscape that changes atmosphere constantly over the course of the day and/or year.

6. LANDSCAPE PARCELS :

Remaining subdivisions of land within the Solar Field are left open for green space and future public development opportunities; be it a pocket park, orchard, event space, etc. These fields also leave open the potential for more Solar ponds and energy generation as well.

7. SUNKEN THERMAL POOLS:

Due to the ample heat produced at the bottom of the Solar Ponds, a sub-sea underground space can be carved out beneath the ponds for public use as Thermal Baths. A dark cavernous environment of water and steam that is punctuated by moments that open up to the sky, allowing access to the Osmotic Processing Towers for views above.

ENERGY SYSTEMS COMPONENTS:

A. Brackish harbor water fed into Osmotic Process

B. Fresh water fed in from underground aquifer or from reprocessed desalinated water.

C. Fresh water and salt water mixing chamber.

D. Micro turbines near top of tower process water pressure into energy, discharges water seeps into a pool at the top.

E. Discharged salty water channels downhill into a series of Solar Ponds as a recharge salt water source.

F. Hot water from bottom layer of Solar Pond brought into condenser machine to generate steam for electricity.

G. Excess Salt water can go back to osmotic process of feed into top layer of Solar Ponds.

