

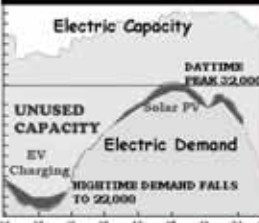


THE ENERGY OF THE SUN

The energy of the Sun is hard to be compared with any other source of power that people are currently dealing with. In one hour sun gives earth the energy equal to world's annual energy demand. This natural power plant based on nuclear fusion strikes average square meter of earth's surface with 1200W of energy. The only question is how to acquire it.

SOLAR POWER PLANT

Limited to one location on earth's surface, solar power plant is forced to deal with sunlight absence during nights and overcast days. The amount of electricity produced is directly related to the amount of sunlight received. But not only energy production changes during the day.



DAILY ELECTRIC POWER DEMAND

The electricity demand during the day varies significantly and reflects human activity during 24 hour cycle. The minimum energy demand occurs at about 3 A.M. and from then it starts to increase continuously to hit its daytime peak at about 3 P.M. Afterwards electricity demand decrease but remains still on high level. At 8 P.M. local evening peak is acquired. After that rapid decrease of energy demand is observed.

REDISTRIBUTING ENERGY

How to reconcile timetable of solar powerplant energy production with the electricity demand?



ELECTRIC ENERGY STORAGE

At the dawn of superconductors era
Predominant feature of superconductors is the complete absence of electrical resistance. Following this fact in toroid ring made from superconductor an electric current can be induced and persist there for an extremely long time. This makes superconductors perfect and simple technology for storing electric energy. In fact this is the only one that store electric current directly. The hitch is that superconductors are technology at early phase of development and they still need very low temperatures to work, which makes them expensive.

PHOTOVOLTAICS choosing the system

Photovoltaics are one of the most popular way of transferring sun radiation into electricity. Opposite to solar thermal power plant these installations don't need to include innovative parts like mirrors, heliostats, additional water/steam circulations or steam turbines and generators. Photovoltaic solar power plant changes solar radiation directly into electric DC current with conversion ratio raging presently from 12% up to 23%. Photovoltaics have strong connection with space technology from where they originate. The simplicity of their construct results in using them as off-grid power generators that supply varied moveable devices, vehicles or dwellings. There is also a great flexibility of merging photovoltaics with architecture.

PUMP STORAGE HYDROELECTRICITY

Using potential energy of gravity for storing energy requires relatively big amount of operating medium to store electric power. Nevertheless it has certain advantages, especially when operating medium is conveniently accessible. This type of energy storing process is supported in pump-storage hydroelectricity or simply water as an operating medium. Pumped from a lower elevation reservoir to a higher elevation water stores potential energy. When the process is reversed, water turbines which work as electric pumps before changed to highly efficient electricity generators. The efficiency of storing electricity in that system reaches up to 80% and it is not affected by storing time period. The process is a physical phenomenon and it neither utilizes water chemical properties nor creates contaminants. The amount of stored energy is only limited by the size of two water reservoirs.

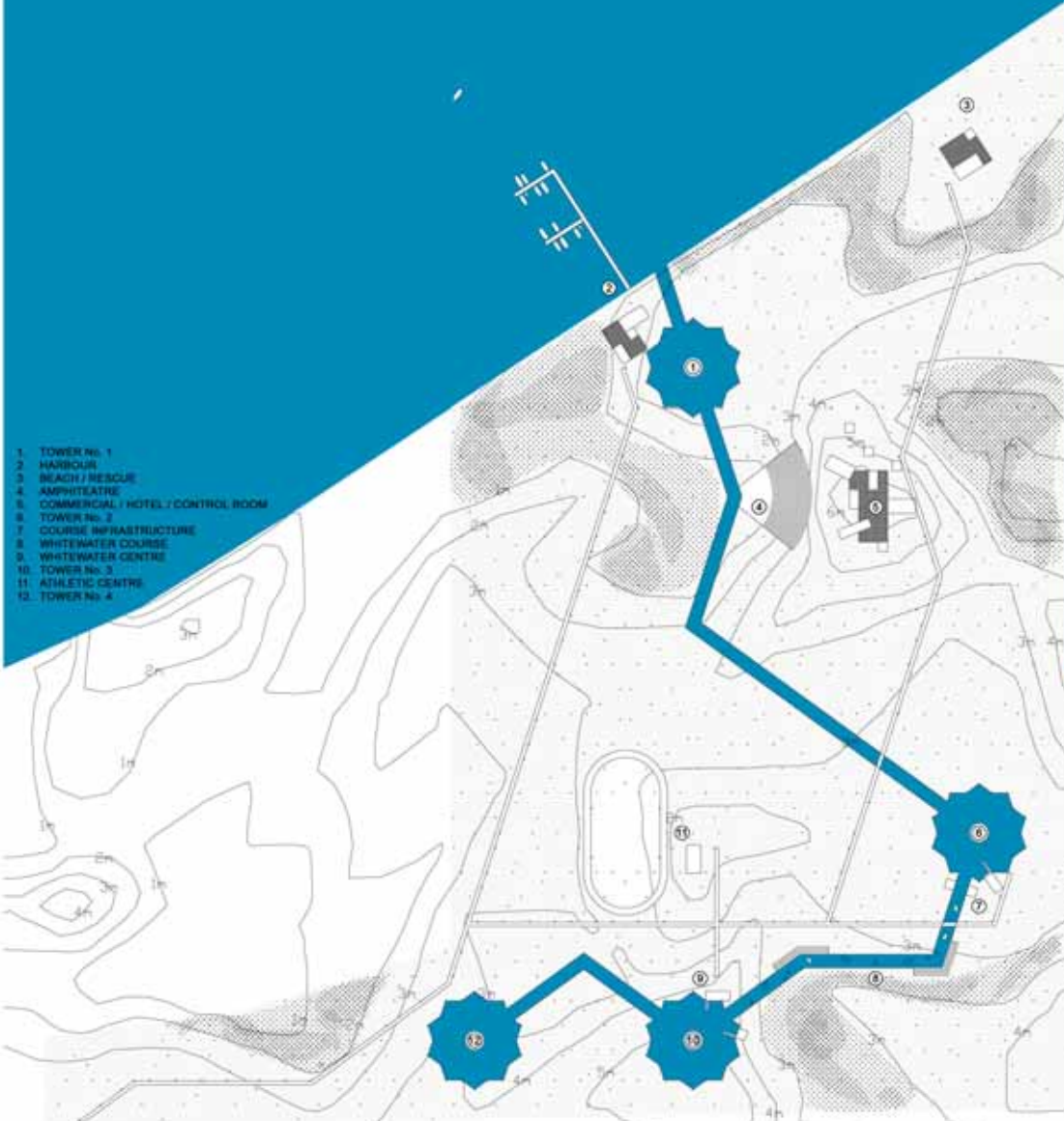


LAGI 2

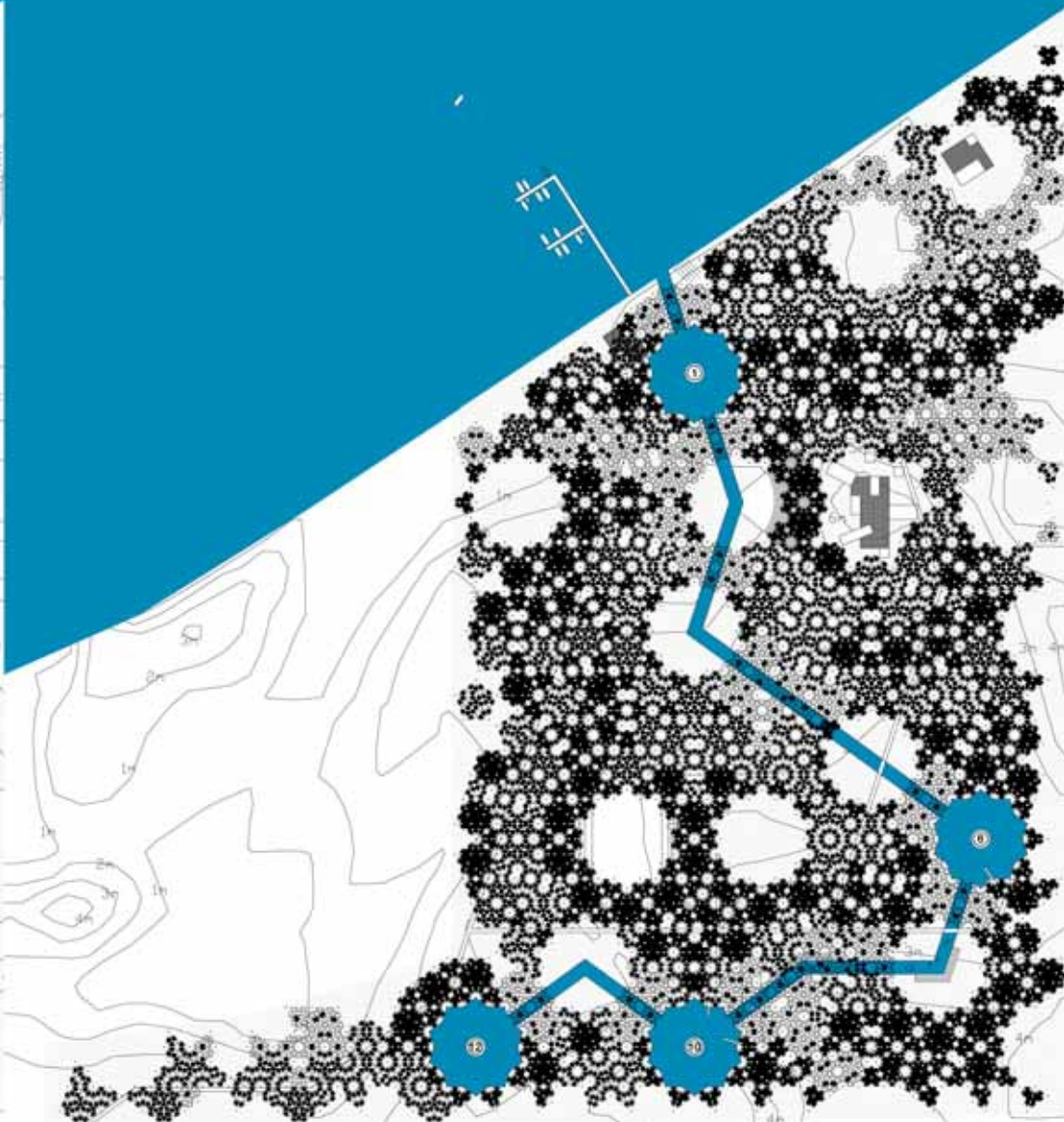


THE GRID - dan Sae

Looking back in time to art and architecture of Arab World, it's hard not to see that close connection with geometry. Highly developed mathematics led to impressive other fields in many ways. Geometry as graphic representation of mathematics ruled the architectural form and ornamentation. The latter was usually based on hexagonal or octagonal grid which defined periodic geometrical patterns able to cover entire walls with repetitive motifs. However the first turning point came with diagonal grid which allows to generate aperiodic tessellation patterns. This ornamentation systems, composed of few types of tiles, called 'Ishik' tiles, creates in fact the pattern of 'regular irregularity'. Moreover, 'Ishik' tiles behave in a way that fractals do. The composition of tiles in particular levels can create the same types in a large scale.



- 1. TOWER No. 1
- 2. HARBOUR
- 3. REACT / RESCUE
- 4. AMPHITHEATRE
- 5. COMMERCIAL / HOTEL / CONTROL ROOM
- 6. TOWER No. 2
- 7. COURSE INFRASTRUCTURE
- 8. WHITEWATER COURSE
- 9. WHITEWATER CENTRE
- 10. TOWER No. 3
- 11. ATHLETIC CENTRE
- 12. TOWER No. 4



PROJECT

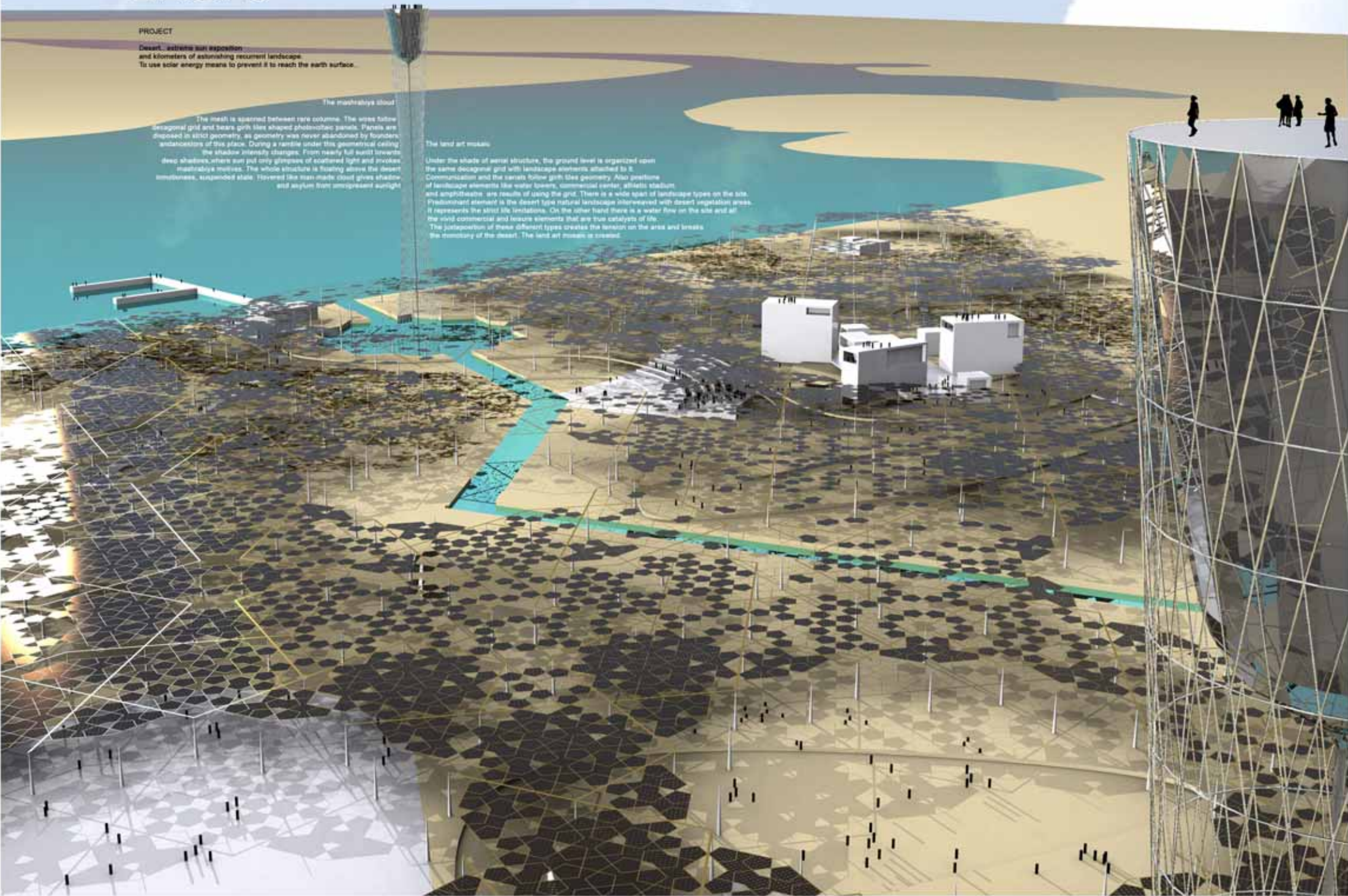
Desert... extreme sun exposition
and kilometers of astonishing recurrent landscape.
To use solar energy means to prevent it to reach the earth surface.

The mashrabiya about

The mesh is spanned between rare columns. The wires follow hexagonal grid and bears girth like shaped photovoltaic panels. Panels are disposed in strict geometry, as geometry was never abandoned by founders and ancestors of this place. During a handle under this geometrical ceiling the shade intensity changes. From heavily full sunlit towards deep shadows where sun put only glimpses of scattered light and provides mashrabiya motives. The whole structure is floating above the desert emptiness, suspended state. Inverted like man-made cloud gives shadow and asylum from omnipresent sunlight.

The land art makes

Under the shade of aerial structure, the ground level is organized upon the same hexagonal grid with landscape elements attached to it. Communication and the streets follow grid like geometry. Also positions of landscape elements like water towers, commercial center, athletic stadium and amphitheatre, are results of using the grid. There is a wide span of landscape types on the site. Predominant element is the desert type natural landscape interweaved with desert vegetation areas. It represents the strict life limitations. On the other hand there is a water flow on the site and all the world commercial and leisure elements that are true catalysts of life. The juxtaposition of these different types creates the tension on the area and breaks the monotony of the desert. The land art museum is created.



LAGI 4

Water towers

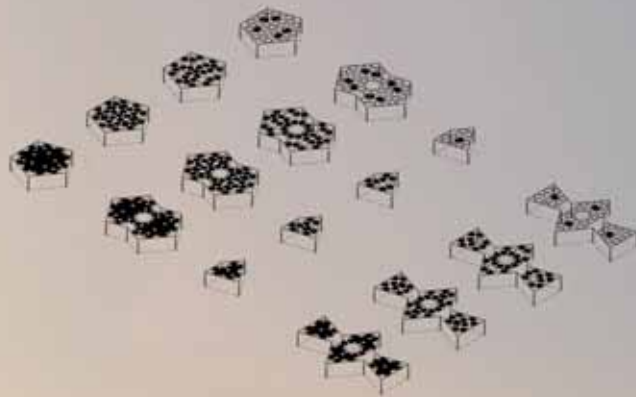
Four slender towers, exceed above the height of the photovoltaic carpet. Prevailing over the vicinity, they emphasize the role they play in power plant installations.

Water towers are in fact the pump-storage hydroelectricity capable of storing electric power created by photovoltaics. They return electric energy, when photovoltaics stops to create it.

During towers daily cycle, thousand of liters travel from the top tank toward the water reservoir underneath and back. All ground level water reservoirs are connected by canals. They are deep and narrow to avoid excessive evaporation. The water reservoirs and canals are connected with the bay creating communicated vessels system.

The primary aim of water towers is storing the electrical power. Nevertheless, as they use water for this purpose, they produce water current, that makes the water in the canals flow. This is used to create whitewater course. At the top of each tower the viewing platform is located.

The construction of the towers is based on hyperboloid structures. They are characterized by high strength and low material use.



TECHNICAL SPECIFICATION

PHOTOVOLTAICS POWER PLANT

Photovoltaics area: 100 116 m²
Average solar energy on the earth surface: 1000 Wh/m²
Photovoltaics efficiency: 15 %
Photovoltaic power plant nominal power: 18,52 MW

PUMP-STORAGE HYDROELECTRICITY

Towers height: 150 m
Top reservoir capacity: 4 x 7 812 m³
Center of water mass height: 120 m
Potential energy of water mass (height): 4 x 10 375 MJ
PWR efficiency: 80 %
PWR power capacity: 4 x 2,4 MWh
PWR nominal power during 10 hours: 4 x 0,24 MW

