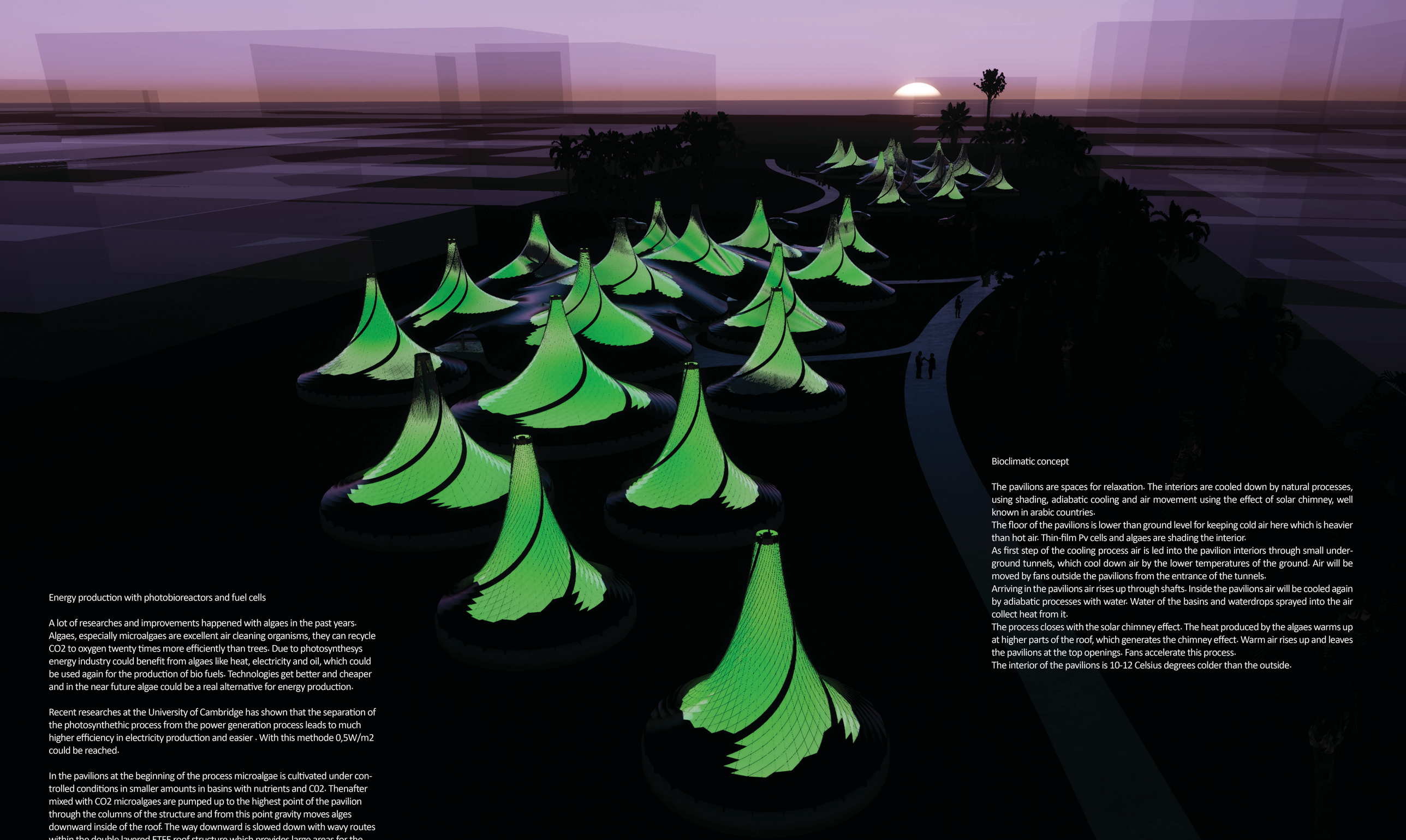

Bioclimatic concept

The pavilions are spaces for relaxation. The interiors are cooled down by natural processes, using shading, adiabatic cooling and air movement using the effect of solar chimney, well known in arabic countries.
The floor of the pavilions is lower than ground level for keeping cold air here which is heavier than hot air. Thin-film Pv cells and algaes are shading the interior.
As first step of the cooling process air is led into the pavilion interiors through small underground tunnels, which cool down air by the lower temperatures of the ground. Air will be moved by fans outside the pavilions from the entrance of the tunnels.
Arriving in the pavilions air rises up through shafts. Inside the pavilions air will be cooled again by adiabatic processes with water. Water of the basins and waterdrops sprayed into the air collect heat from it.
The process closes with the solar chimney effect. The heat produced by the algaes warms up at higher parts of the roof, which generates the chimney effect. Warm air rises up and leaves the pavilions at the top openings. Fans accelerate this process.
The interior of the pavilions is 10-12 Celsius degrees colder than the outside.

Energy production with photobioreactors and fuel cells

A lot of researches and improvements happened with algaes in the past years. Algaes, especially microalgaes are excellent air cleaning organisms, they can recycle CO2 to oxygen twenty times more efficiently than trees. Due to photosynthesys energy industry could benefit from algaes like heat, electricity and oil, which could be used again for the production of bio fuels. Technologies get better and cheaper and in the near future algae could be a real alternative for energy production.

Recent researches at the University of Cambridge has shown that the separation of the photosynthethic process from the power generation process leads to much higher efficiency in electricity production and easier . With this methode 0,5W/m2 could be reached.

In the pavilions at the beginning of the process microalgae is cultivated under controlled conditions in smaller amounts in basins with nutrients and C02. Thenafter mixed with CO2 microalgaes are pumped up to the highest point of the pavilion through the columns of the structure and from this point gravity moves alges downward inside of the roof. The way downward is slowed down with wavy routes within the double layered ETFE roof structure which provides large areas for the photosynthetic process the growth of the algaes.
Leaving the lowest point algaes flow to power generation units. At the end of the circle a part of the algaes are pumped up again to the roof, and another part must be harvested as oil and biomass. This could be used either for biofuel production or the production of bioplastics. The biophotovoltaic process converts C02 to oxygen.