SOLAR DUNES

Inspired by seductive and mysterious imagery of Martian deserts gathered by NASA's Mars Reconnaissance Orbiter, this proposal produces an alien landscape on earth. The design consists of a field of artificial sand dunes made with pneumatic membrane bubbles covered with layers of sand accumulated from desert winds over time. The bubbles act as scaffolds for shaping sand at a massive scale.

The bubbles are made of fitted, welded polyethylene membrane- similar to clothing patterns- so they take specific shapes when inflated. Air-beams sewn into the bubbles give additional overall support and help articulate crease and fold lines in the bubbles. Bubbles will be tied down to the ground with a tension net embedded with a vascular hydronic system. The ground is a simple foundation of sand, hardened through a microbially-induced chemical reaction. No heavy foundations or superstructures are needed. Everything required for construction can be folded, rolled, or otherwise compacted for delivery to the site, similar to the way large structures in outer space are deployed.

Like Robert Smithson's Spiral Jetty, this project operates at Google Earth scale. Nevertheless, underneath the flying dunes are deep shaded areas and lush grottos at the human scale, making the piece visitor friendly. Water inlets, which feed these grottos and provide evaporative cooling, also supply water to the vascular nets. Moreover, by breaking the hard edge of the site boundary, these inlets will allow for aquatic ecologies develop on the site over time.

Thin-film solar cells appear and disappear in striking patterns across the dunes. Their pattern simultaneously responds to the path of the sun but also to painterly concerns. The image is therefore not one of technological efficiency, but of something vibrating between geology, technology, and synthetic ornament.

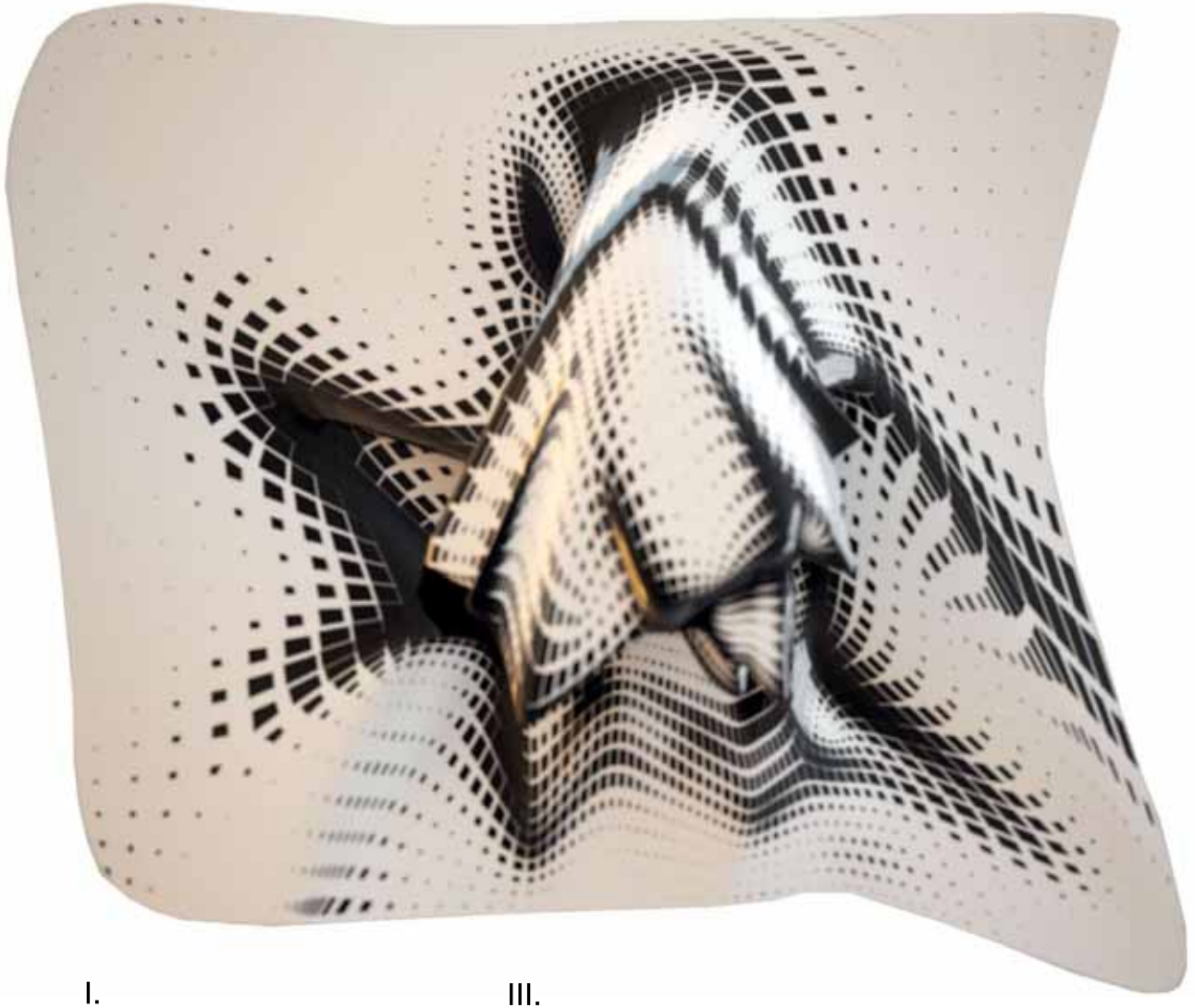
The energy output is nonetheless significant-- in the range of 1.45 megawatts-- which is enough to supply over 500 houses with power. This method of generating electricity reduces carbon dioxide emissions by 1,500 tons a year. In arid conditions, it is critical that the thin-film solar system is cooled and also kept clean in order to maintain its performance. During the day, the vascular nets act as heat-exchange systems, sucking heat away from solar surfaces, while at night, valves on the nets are opened, releasing water mist to clean away sand.

I.

II.

III.

IV.



I.
Solar Concentrator Plant

BrightSource 400 Megawatt Plant, proposed for the Mojave Desert. *Solar Dunes* is an attempt to move away from this mechanical, high-tech paradigm towards a collapse of technology and affect.

II.
Martian Sand Dunes

Barchan dunes of frozen water and carbon dioxide are created by persistent Martian winds. Non-indexical form and scale, somewhere between sand dunes and ice crystals.

III.
Martian Dune Tattoos

NASA's Mars Reconnaissance Orbiter reveals traces of dark sub-layer sand from dust-devils in 2009. We can understand this as the expression of material forces and as a painting simultaneously.

IV.
Blue Lake Cave Grotto, Brazil

Eroded limestone creates deep, cool aquatic involutions. Solar Dunes is intended to develop an aquatic ecology on the barron site, while also allowing for shade and passive cooling effects for visitors.

The pattern of solar cells simultaneously responds to the path of the sun but also to painterly concerns. The image is therefore not one of technological efficiency, but of something vibrating between geology, technology, and synthetic ornament.

Combining the eerie affect of frozen martian sand dunes, embedded solar and hydronic technology, and the allure of the grotto...

LAND ART GENERATOR COMPETITION: SITE 2

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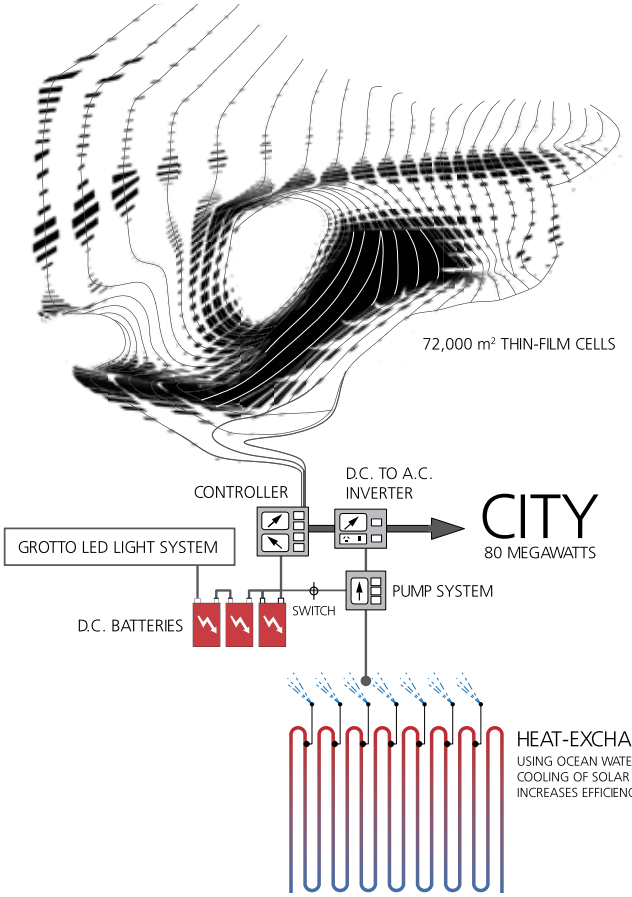
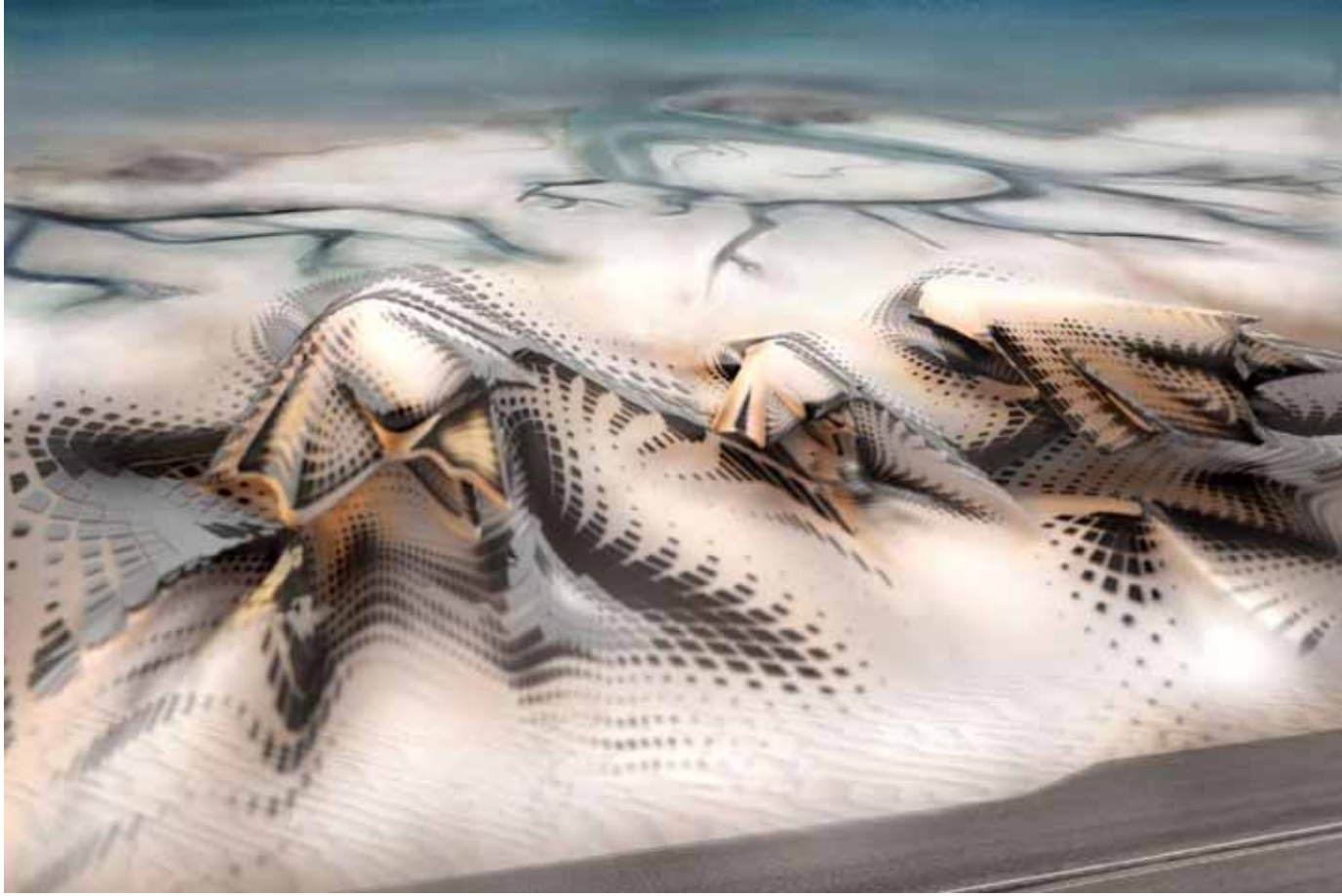
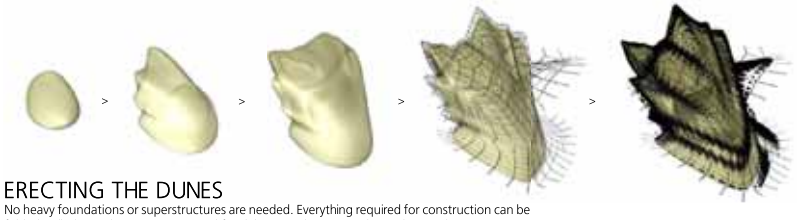




VIEW FROM ROADWAY



ERECTING THE DUNES

No heavy foundations or superstructures are needed. Everything required for construction can be folded, rolled, or otherwise compacted for delivery to the site, similar to the way large structures in outer space are deployed.

TECHNOLOGY

THIN-FILM SOLAR CELLS
One micron thick, using amorphous silicone. From the National Renewable Energy Laboratory, US Gov.

STILLSUIT
Microvascular array cools and recycles fluids. From David Lynch's *Dune*.

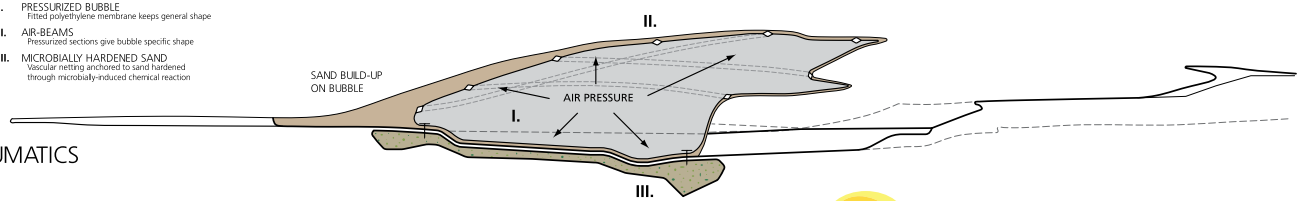
PNEUMATIC BUBBLES
Inflatable bubble acts as scaffolding for desert sand. Lightweight with low embodied energy.

PNEUMATICS

I. PRESSURIZED BUBBLE
Fitted polyethylene membrane keeps general shape

II. AIR-BEAMS
Pressurized sections give bubble specific shape

III. MICROBIALLY HARDENED SAND
Vascular netting anchored to sand hardened through microbially-induced chemical reaction



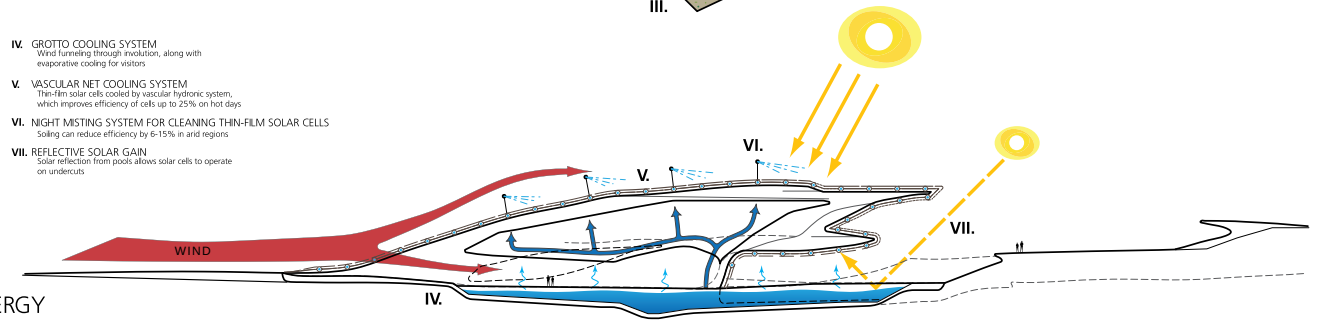
ENERGY

IV. GROTTO COOLING SYSTEM
Wind funneling through involution, along with evaporative cooling for visitors

V. VASCULAR NET COOLING SYSTEM
Thin-film solar cells cooled by vascular hydronic system, which improves efficiency of cells up to 25% on hot days

VI. NIGHT MISTING SYSTEM FOR CLEANING THIN-FILM SOLAR CELLS
Soiling can reduce efficiency by 6-15% in arid regions

VII. REFLECTIVE SOLAR GAIN
Solar reflection from pools allows solar cells to operate on undercuts



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