

sources of Puha



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“The Northern Paiutes believe in a force called Puha that gives life to the physical world. It is the power that moves the elements, plants, and animals that are a part of that physical realm. Humans are seen to be very much a part of that world, not superior or inferior, simply another component.” W. Walker & K. Venzor in Contemporary Archaeologies of the Southwest

The native Pauite people recognize Puha as the energy of life, as a physical and spiritual flux. Shamans could draw Puha from sacred sites, specific topographic landmarks, hot and cold springs, caves... Puha is energy, in a holistic definition.

Sources of Puha want to embody this holistic energy in striking and integrated artworks, in human/nature hybrid sculptures emerging from the unique physical and metaphysical geologic landscape of the Black Rock desert. Inspired by the existing man made geysers of Fly Ranch, Sources of Puha are structures that work symbiotically with Nature: they are geothermal heat and power gathering systems combined with outdoor thermal baths. Their geometry is inspired by the formation of the Fly geyser, combining a vertical spiraling heat exchanger, connecting soil and sky and a horizontal spiraling series of pools, returning water back to the landscape.

Sources of Puha consist of four main parts: a geothermal well, a heat to water exchanger to produce domestic water, a heat to vapor exchanger to produce electricity and cascading thermal pools for body wellness.

1.Geothermal well.
The underground well reaches the faults where water is boiled by the heat produced by the nuclear reactions in Earth's core: this hot mineralized water is set free at the surface and slowly forms a man-made geyser. Only this time the heat coming from the geyser will be harvested by the sculpture and distributed on site for diverse uses in different forms (heat, electricity, vapor...).

2.Domestic hot water.
The spiraling metal structure that crowns the sculpture is an aluminum frame holding a spiraling copper coil acting as a heat exchanger between the geothermal mineralized water/vapor from the geyser and a loop of demineralized water (direct use of water from the geyser would clog the pipes). The resulting hot domestic water (around 60°C/140°F) will be distributed via a network of pipes across the Fly Ranch site and could be extended to the nearby town of Gerlach. It can be used in various ways, directly or mixed with cool water from the artesian wells to reach ideal temperature for heating and cooling of any building on site (floor and wall heating/cooling), bathrooms, cooking, kitchens...

3.Electricity.
It is tempting to suggest producing electricity from the geothermal heat at Fly Ranch, but, according to the data, the temperature of the existing geyser is too low for a “classical” geothermal electricity plant (using direct vapor from the ground to power a turbine, like they do in Iceland). Instead there is a solution for low temperature geothermal sources: binary



geothermal plants. That would be the way Sources of Puha produce electricity: the heat from the geyser is transferred to a loop containing a low boiling point fluid that can vaporize at low temperature. This vapor powers a turbine producing electricity. In order to be reused, this fluid needs to be condensed back to liquid form. We could do this by transferring the excess heat back to the thermal pools, so no heat is wasted. Since geothermal energy is not dependent on daily or seasonal cycles, the electricity would be produced continuously, on demand, without major storage needs, which is a significant advantage compared to other sustainable electricity generation systems.

4.Thermal baths.
After heating the copper coils, the water from the geyser would be recovered in a series of cascading thermal pools made of ferrocement (method for the easy construction of free-form and light structures using metal meshes covered with a thin layer of concrete) that would support human activities without damages. The pools are semi-buried in the landscape and filled with mineralized water from the geyser, ranging in temperature from 40°C/104°F to 20°C/68°F. The pool surrounding the geyser is too hot for bathing but can be accessed for viewing from a path that also distributes every pool, avoiding damage to the surrounding vegetation. As the water from the geyser moves from pool to pool, it cools and its minerals are deposited on the concrete and create with time a second skin, covering the pools in a natural orange stone. In the hottest pools, the conditions would be perfect for thermophilic bacteria to flourish and give a green tint to the water. The last pool would be the largest and deepest, allowing for swimming. Its water would overflow in the desert like the other geysers and penetrate the subsoil, returning to the underground fault where it came from, closing the loop.

Prototype.
As a proof of concept we propose to build a scaled version of the sculpture, using hot water from an existing geyser to test the heat exchange systems. In a second time, we could build a scaled version with new geothermal drilling, then build the full scale project.

Material needs.
For the full scale sculpture: 2500m of copper tube, 650m of aluminum beams are needed. The depth of the drill depends on geological surveys. Around 250m3 of concrete and steel meshes for the ferrocement pools are needed. A 1/5 scale prototype would need 20% of the listed materials.

