Machine Landscape
Coal mining sites for hydro-pump electricity storage, Greene County, PA, USA

Sustainability concept
The proposal addresses the issue of the American power grid and provides a new scheme to upgrade its infrastructural network through the lens of geographical research and landscape design. The project envisions that the USA will face in the near future is the pressing need to increase electricity storage capacity. The USA estimates that domestic storage capacity will reach 24GW, which is over 2 times higher than the current level, by 2050. This pressing need derives from both an environmental and economic point of view: reducing the need for reserve power plants, cutting the cost of power failures, and increasing renewable energy. Currently, hydro-pump electricity storage accounts for more than 99% of the entire capacity in the USA, however, spatial requirements for them are significant and it is extraordinary challenging to build new ones.

The core of the proposal is to install hydro-pump electricity storage into abandoned underground coal mining sites, since these sites meet the site requirements that hydro-pump system asks for, proximity to a waterbody, transmission lines and elevation gap. Also repurposing existing infrastructural network is key from sustainability point of view.

The case study site is the Dooley Run underground mining site in West Pennsylvania. Mapping analysis identified that underground coal mining sites concentrate in this region, and the site is along the corridor of large electricity bound for metropolises along the east coast.

The highlight of spatial design is to embed five waterbodies for the purpose of exchanging water between ground level and underground mined-out spaces. Waterbodies are strategically located where they can connect to the existing headworks in order to efficiently reuse them. This way, during night time, electricity is consumed to pump-up water, and during peak electricity consumption hours, water is flushed to activate the turbines for generating electricity. Electricity is collected by the transmission substation at the center of the site.

Unlike the conventional image of power plants, the proposed system has the potential to furnish its surface level with electricity. The project intends to emphasize the dual function of land, acting as a machine-generator and simultaneously be an accessible destination for people as well as wildlife. The project intends to emphasize the dual function of land, acting as a machine-generator and simultaneously be an accessible destination for people. By deploying similar system along the extensive spread of Pittsburgh Sewer, the region will become a hub of electricity storage storage system. The project intends to emphasize the dual function of land, acting as a machine-generator and simultaneously be an accessible destination for people. By deploying similar system along the extensive spread of Pittsburgh Sewer, the region will become a hub of electricity storage storage system.

Image 1: The key concept of the proposal is to utilize abandoned or soon to be abandoned underground coal mining sites as potential sites to install hydro-pump electricity storage system. The project intends to emphasize the dual function of land, acting as a machine-generator and simultaneously be an accessible destination for people as well as wildlife. The project intends to emphasize the dual function of land, acting as a machine-generator and simultaneously be an accessible destination for people.

Notwithstanding the simplicity and ingenuity of the proposed technology, the submitted project recognizes its design potential, particularly its implications for landscape planning. The jury highly applauded the idea to combine abandoned infrastructures, energy production, and spatial design into a "machine" that is both useful and beautiful, one that performs a much needed function, one that is inherently sustainable, one that reuses and recycles deserted sites, and one that ultimately touches the senses.

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