Solar thermal energy helsinki

Solar thermal energy helsinki

Hot Heart - a series of islands with the dual function of storing thermal energy storage and serving as a hub for recreational activities - has won the Helsinki Energy Challenge, which aims to decarbonize the heating system of the Finnish capital by 2030. The project was developed by CRA-Carlo Ratti Associati in collaboration with Ramboll, Transsolar, Danfoss Leanheat(R), Schneider Electric, OP Financial Group, schlaich bergermann partner and Squint/Opera.

A trans-disciplinary team, coordinated by international design and innovation office CRA-Carlo Ratti Associati, has developed the finalist proposal for the Helsinki Energy Challenge. Titled Hot Heart, the project is based on an archipelago of heat-storing basins with the dual function of storing thermal energy and serving as a hub for recreational activities. The "islands" will also be home to tropical forests and ecosystems from around the world, giving the Finnish capital additional public space and a new educational attraction. Unprecedented in scale, the project was designed by Ramboll, Transsolar, Danfoss Leanheat(R) and Schneider Electric, with the coordination of OP Financial Group, schlaich bergermann partner and Squint/Opera.

Located off the coast of Helsinki, Hot Heart will be the largest infrastructural facility of its kind. The project consists of a set of 10 cylindrical basins, each measuring 225 meters in diameter. They collectively can hold up to 10 million cubic meters of water. The system functions like a giant thermal battery: low- or negative-cost renewable energy is converted into heat, stored in the tanks and withdrawn into the city"s heat distribution channels during the winter.

Hot Heart was developed as part of the Helsinki Energy Challenge organized by the municipality of Helsinki to accelerate the city"s transition towards carbon-neutrality in heating by 2030. The project is also highly adaptable and could be replicated by other cities with similar climatic characteristics pursuing sustainable heating solutions.

In addition to its thermal storage properties, Hot Heart doubles as an accessible recreational venue. Four of the 10 hot water reservoirs are enclosed in transparent domes containing the "Floating Forests" - tropical ecosystems from the world"s key rainforest zones naturally heated by the basins underneath. The "Floating Forests" provide visitors with a place to socialize and enjoy the sunlight, even in the harsh Nordic winter, thanks to the use of powerful Sun-like LED Technology. They create a unique public space for local residents and provide an attraction to international travelers.

"Production of renewable energy is getting cheaper, but storage is still extremely expensive. Our idea is to use the giant "thermal batteries" to store energy when prices are at low or even negative levels, and extract it when required by the district heating system when demand is high. This model would also be applicable to many coastal cities with similar climates," says Carlo Ratti, founding partner of CRA. "In addition, Hot Heart offers a unique experience, bringing the natural and artificial worlds together. It is inspired by the Finnish concept of

Jokamiehen Oikeudet, which could be translated as "every person"s right": the right to reflect and unwind while peacefully enjoying nature."

CRA worked with an international group of consulting and manufacturing firms and energy optimization experts to develop the project"s central concept: using seawater heat pumps to convert wind, solar and other forms of power into heat, which is stored in Hot Heart"s reservoirs. The system, operated by artificial intelligence, synchronizes the production and consumption of thermal energy, which helps stabilize the national energy grid in relation to fluctuating supply. The whole system is expected to cover the entire heating needs of Helsinki, estimated at 6,000 GWh, by the end of the decade, all without any carbon emissions and at an estimated cost 10% lower than today.

Hot Heart is the latest project to highlight CRA"s vision to improve the urban environment through innovative climate remediation strategies. Similar projects by the studio include Living Nature, a pavilion at the Milan Design Week 2018 that created climate-controlled gardens corresponding to each of the four seasons. Developed in conjunction with the Museum of the Future in Dubai, the 2017 installation Sun& Shade was equipped with a set of sunlight-tracking mirrors that reflected excessive light and heat. The Cloud Cast, presented at the UAE Government Summit 2015, employed motion tracking technology to emit clouds of mists above people to achieve a localized cooling effect.

Having just won the Helsinki Energy Challenge, Hot Heart is planned to enter the master planning phase in 2021 and projected to be fully implemented in 2028.

CreditsCRA-Carlo Ratti Associati (Design)Ramboll (General Engineering)Transsolar (Climate Engineering)Danfoss Leanheat(R) (Demand Management Engineering)Schneider Electric (Technology Partner for Sustainability and Energy Efficiency)OP Financial Group (Financial Analysis)schlaich bergermann partner (Lightweight Structural Engineering)Squint/Opera (Communications Partner)

Renderings by CRA graphic team: Gary di Silvio, Pasquale Milieri, Gianluca Zimbardi

Located off the coast of Helsinki, Hot Heart will be the largest infrastructural facility of its kind. The project consists of a set of 10 cylindrical basins, each measuring 225 meters in diameter. They collectively can hold up to 10 million cubic meters of water. The system functions like a giant thermal battery: low- or negative-cost renewable energy is converted into heat, stored in the tanks and withdrawn into the city"s heat distribution channels during the winter.