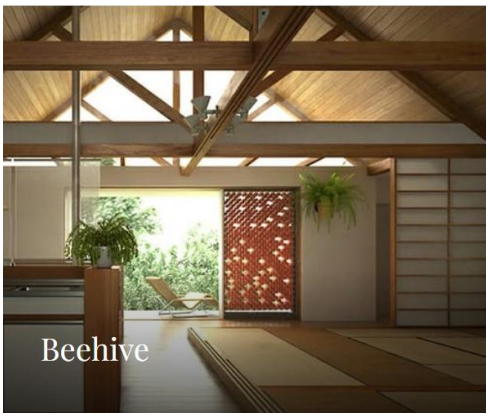
ECO-FRIENDLY EVAPORATIVE AIR-COOLING SYSTEM MADE OF NATURAL MATERIALS IN INDIA

The Beehive innovative cooling system has been created and developed by Monish Siripurapu, an architect based in New Delhi and founder of the CoolAnt Studio design firm. This new device was inspired by the design of a beehive and by the principles of evaporative cooling, an ancient technique that uses water and local materials to lower temperatures.

In 2018 the project to design the CoolAnt Beehive received a startup grant from UN Environment as one of 12 winners at the Asia-Pacific Low-Carbon Lifestyles Challenge. UN Environment highlighted that this innovative cooling system addresses a massive problem because the building sector in India consumes about 40% of generated electricity, a proportion that is expected to increase to 76% by 2040. Use of refrigeration and air conditioning systems is a major part of this energy demand. The current systems also employ powerful greenhouse gases, hydrofluorocarbons, to achieve cooling effects, causing serious damage to the environment.

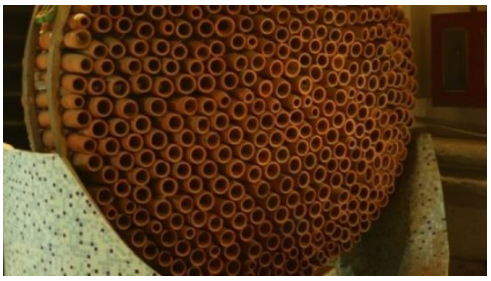


Motivated to contribute to addressing these problems, made even more urgent and global by the ongoing climate change effects, and convinced that architecture can make an important contribution by designing efficient systems of passive cooling, the architect founder of Ant Studio used an old method to provide an effective solution.

Evaporative cooling is an ancient technique tracing back to the Egyptian period, that cools the surroundings by reducing the temperature using water and local materials. The eco-friendly Cool Ant Beehive adopted this ancient method and has been customized through advanced computational analysis and modern calibration techniques. The system passes water through earthen cones that facilitate evaporative cooling, using a fraction of the energy power of regular units and zero carbon-intensive refrigerants. The use of cylindrical cones was provided for a larger surface area to maximize the cooling effect. Recycled water at room temperature is allowed to run on the surface of the cylinders, cooling the hot air passing through the pots. The water requirement is minimal, since the water is circulated and pumped over again when the installation is in use.

Working on active-direct evaporative cooling, this system provides an alternative solution and can complement the existing air-conditioning units, reducing load on energy. The Beehive system was first tested at the Deki Electronics factory in India, where temperatures upwards of 40°C can threaten the health and wellbeing of workers, as well as their productivity. Measuring the impact after installing the system, the Ant Studio team found that the solution reduced the indoor temperature around the installation from 42°C to

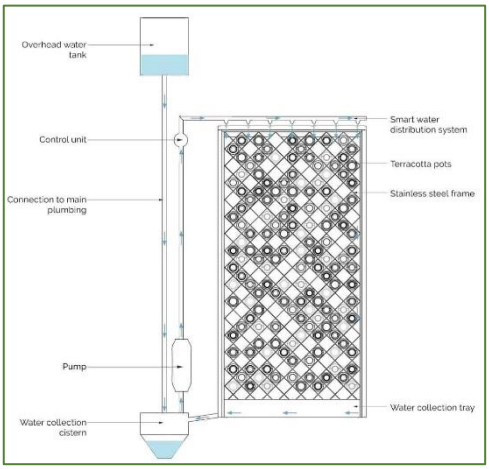
36°C, a difference of 6°C on a hot day. The airflow around the installation site was also reduced providing additional and important thermal comfort benefits.



The technical characteristics and functioning mechanisms of the Beehive system are described in detail on different pages of the CoolAnt Studio website.

From the point of view of its users, the Ant Beehive system brings environmental, economic and aesthetic benefits. In particular:

- It is a cost-efficient solution. This system requires minimal electricity for the water pump and the energy consumed compared to other mechanical cooling solutions is 10x lower, generating substantial cost savings.
- The Beehive air cooling combines evaporative cooling and natural ventilation. As an alternative or complement to the use of traditional air conditioning units, il helps to fight climate change and improve the environment avoiding the diffusion of current powerful greenhouse gases and hydrofluorocarbons.
- Clay materials, that have been chosen for their hygroscopic qualities, absorbing water in a vapor phase as well as liquid, contain no complex components or chemicals and are completely recyclable. The clay material is also low cost, robust and requires a low maintenance.
- Designed with a modular and scalable structure, the CoolAnt Beehive system can be interpreted as an aesthetic architectural installation. It can be used in private homes as an element of façades that cools the space through evaporative cooling and natural ventilation. Beehive units can be also used in cafes, railways and metro stations, in other public spaces and services.



Made from earth and using traditional production methods of local artisans, every aspect of the Beehive system is nature friendly. By promoting the spread of the use of this natural cooling system, in particular, the Ant Studio team is strongly motivated to help revive the ancient art of pottery, facing its decline, favoring its development and the generation of new jobs in artisan workshops.

The Ant Studio team continues to invest its efforts to improve the technology and scale up the production and installation of Beehive air cooling systems in India and abroad. Beehive is one of the innovative solutions created by Ant Studio, framed in a vision for bioclimatic architecture which adopts local methods and materials for natural cooling and reduces energy use, bringing benefits to people and the environment.

The CoolAnt Beehive natural cooling systems has won many national and international architectural competitions and has been published in renowned architectural journals. In 2021 the Sustainable Energy for All initiative published an article presenting the Beehive installation as a natural, artistic air cooling and purifying solution that does not warm the planet and directly engages the local communities.

To know more

Beehive in CoolAnt website

Ant Studio website

CoolAnt Studio website

Ant Beehive

Ant Studio Solutions - Impact

Ant Beehive - How it works

Article in UNEP website

Article in Sustainable Energy for All initiative

Article in United Nations in India

Article in coolcoalition.org

Article in designdekko.com

Video in theindexproject.org

Article in stirworld.com

Evaporative cooling in greenpassivesolar.com

Evaporative cooling in Wikipedia