The most appropriate type of thermal storage air conditioning system such as water-type or ice-type system can be selected depending on the scale and size of the installation space.

- Water thermal storage system
  Underground space which is usually left unused (underground pit) is used as the thermal storage tank. The water in the thermal storage tank can be used for extinguishing fires or for domestic use during disasters or emergencies.

- Ice thermal storage system
  Ice is made in the thermal storage tank to store cold energy. The tank size can be kept smaller than with water thermal storage tanks.

The thermal storage air conditioning system responds to peaks in cooling loads during the day by combining cold energy stored during the night with that produced during daytime. Consequently, the size of the installation capacity can be kept to almost half that of systems that do not utilize thermal storage.
**Effects or Remarks**

- **Reduction in the daytime peak power demand (power load leveling)**
  The leveling of power load can be achieved as the system can transfer the power used during the peak hours in the daytime to the nighttime. Introduction of the heat pump/thermal storage system makes approx. 20% reduction in the daytime peak power demand by supplying half the cold thermal energy required for the air-conditioning during the daytime from the thermal storage system.

- **Energy conservation and environmental friendliness**
  The use of thermal storage tanks makes it possible to operate heat pumps efficiently at a constant rate without being affected by ever-changing air-conditioning load. The use of the cool outside air in the night for the generation of cold thermal energy when cooling is required leads to further improvement in the efficiency of the heat pumps. (The operational efficiency of the heat pump at 25 degrees is approx. 20% better than at 35 degrees.)

- **Cost saving**
  As this system allows the reduction in the capacity of the heat source unit, the contract demand can be reduced. The reduction in the contract demand means the reduction in the electricity charge. This system allows the use of lower-priced nighttime power.

- **As a measure of BCP (Business Continuity Plan)**
  The water in the thermal storage tanks can be used as domestic water or for firefighting at the time of emergency and disaster. There were cases where water in thermal storage tanks was used as domestic water in the relief effort after the Great East Japan Earthquake.

**Installation in Practice or Schedule**

**Domestic**
- Total no. of installations: 33,666 (2016)
- Peak shift effect in domestic power demand from thermal storage air conditioning system installation: 1.96 million kW (2016)

**Heat Storage Air Conditioning System**

<No. of Heat Storage Air Conditioning Systems Installed Domestically>

![Graph showing the number of heat storage air conditioning systems installed domestically from 1990 to 2016](image)

**Installation Examples**

- **Daytime power reduction**
  - 20% power reduction in the daytime.
  - Air-conditioning, lighting, etc.

- **Efficient thermal storage at a constant rate**
  - Thermal radiation in the non-shaded parts.

- **Use of the system at the time of disaster**
  - Temporary toilet, face and hand washing, etc.

- **Ice Heat Storage**
  - Eco-Ice mini
  - Individual Eco-Ice Distributed Type
  - Eco-Ice Central Type

**Contact:** Heat Pump and Thermal Storage Technology Center of Japan
International & Technical Research Department
1-28-5 Hulic Kakigaracho Bldg., 6F, Kakigaracho Nihonbashi, Chuo-ku, Tokyo, Japan
Tel: +81-3-5643-2404 Fax: +81-3-5641-4501 URL: http://www.hptcj.or.jp/e/index.html