

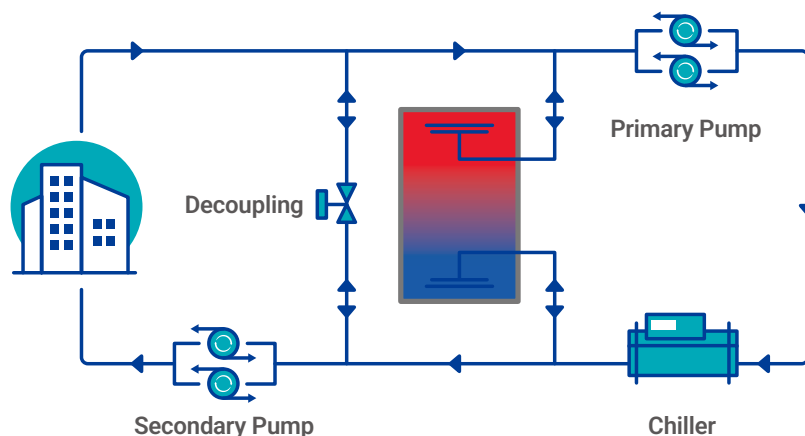
FT ENERGY



Chilled Water Thermal Energy Storage (CW TES) System

Thermal Energy Storage System

Chilled water thermal energy storage system utilizes off-peak electricity which is usually cheaper than on-peak electricity to cool off water. The system utilizes only the sensible heat of water for cooling energy storage in a chilled water storage tank and discharges the stored coldness for air-conditioning in on-peak time. This operation scheme will reduce the total energy consumption and operation cost.



CW TES has long history of installation and widely applied around world including U.S.A., Japan, Korea and Middle East Asia.

Features of CW TES System

- | | |
|---|--|
| 01 Low Cost & Simple Structure | Enables installation with low initial investment and without additional equipment. |
| 02 Energy Saving | Improves system efficiency by approximately 30% by utilizing existing chillers. |
| 03 Flexible Scalability | Existing systems can be converted by simply adding storage tanks. |
| 04 Multi-Purpose Application | Can be converted for heating applications and also used as firefighting water storage. |
| 05 Eco-Friendly System | Minimizes environmental impact by eliminating the use of brine. |

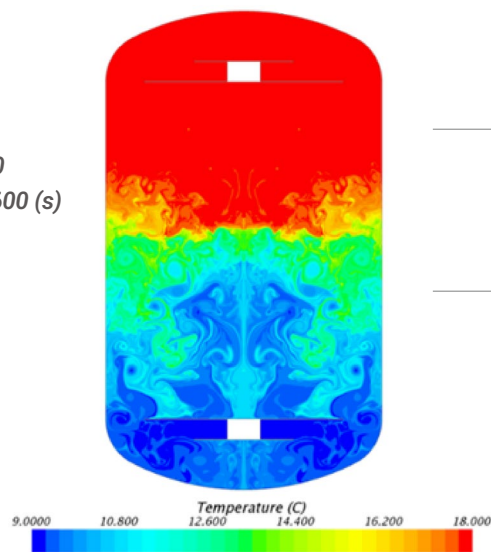
Considerations

Requires larger installation area and storage volume compared with Ice Storage System.

FT Energy CW TES System

Stratification in CW TES

Iteration 60000
Time Step 3000
Solution Time 600 (s)



13.3°C

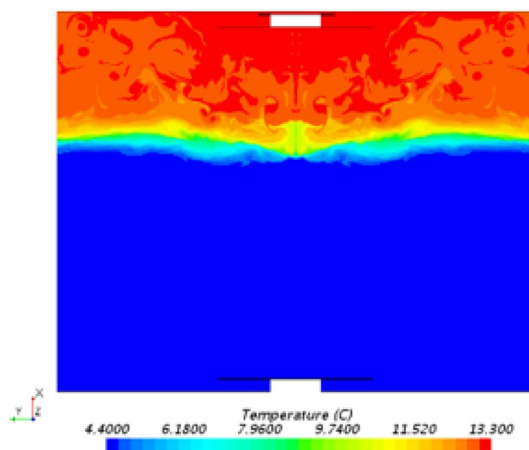
Thermal Stratification

4.4°C

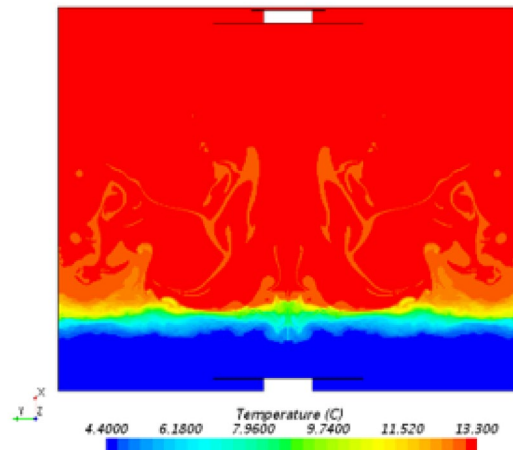
Key Technology of CW TES

The key technology of CW TES system is the diffuser design which ensures thermal stratification of chilled water and warm water by density difference. FT Energy's Technology is the state-of-the-art technology which is recommended at ASHRAE's design guideline.

Solution Time: 7200 (s)



Solution Time: 18000 (s)



Uninterruptible Chilled Water Supply (UCS) Tank for Data Center

Data Center

FT Energy implemented an emergency thermal storage system that enabled a high density data center to survive a power outage without costly thermal damage to servers. The system based on auxiliary chilled water storage tanks kept the data center cool when an outage caused the chillers to shut down.

Why is this system important for data center

- **01 Rapid Temperature Rise During Power Outages**

In high-power, high-heat data centers, temperatures can rise rapidly in the event of voltage drops or power outages.
- **02 Imbalance Between Cooling System and Server Operation**

While the cooling system may stop, servers continue to operate on UPS power and continuously generate heat.
- **03 Risk of Thermal Management Failure**

A rapid temperature increase within a short period can increase the risk of server damage and operational interruption.
- **04 Problem Solving with TES System**

FT Energy applies Thermal Energy Storage systems to large-scale data centers to support emergency cooling response.
- **05 Stable Cooling Even During Power Outages**

Based on pressurized tanks storing chilled water, the system maintains normal cooling operation until backup power becomes available.

FT Energy's Advantage and Technology



Optimized design for peak flow and storage capacity.



Flexible back up time adjustment design.

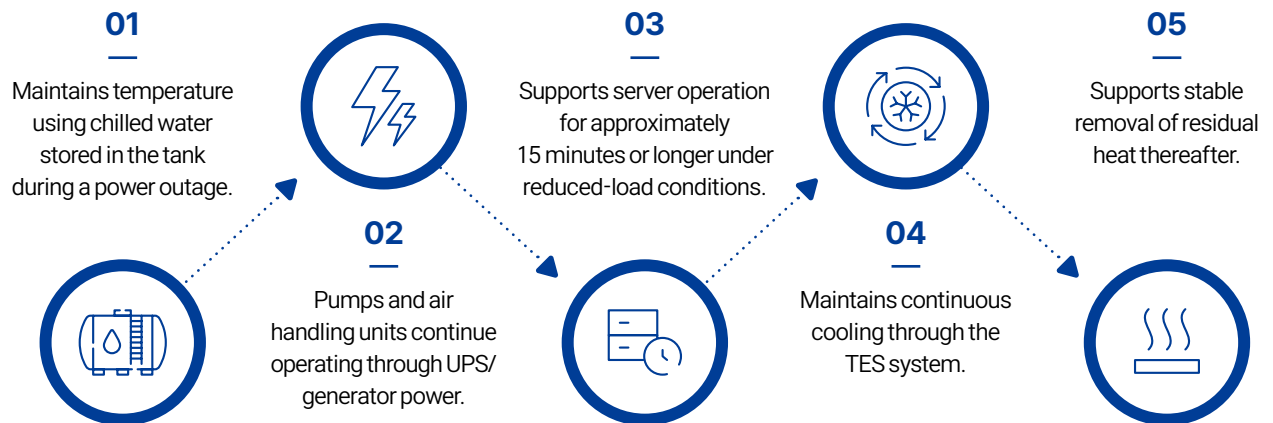


Design and manufacture of pressure tank according to ASME code.

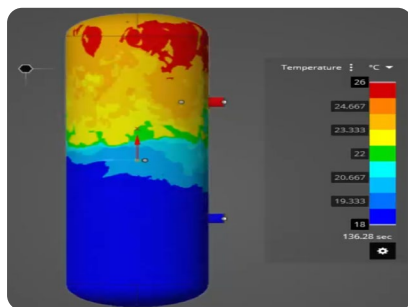


Not only vertical but also the recently developed horizontal tank type can be designed.

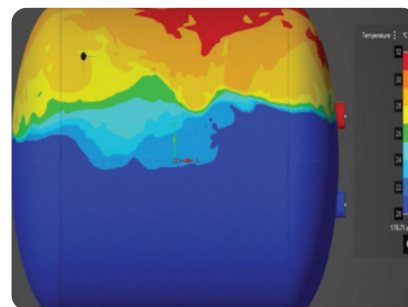
Data center Operation



CFD Pictures of Vertical and Horizontal Type Tank

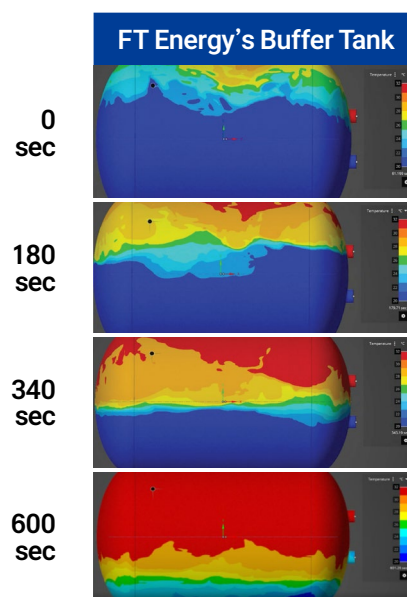
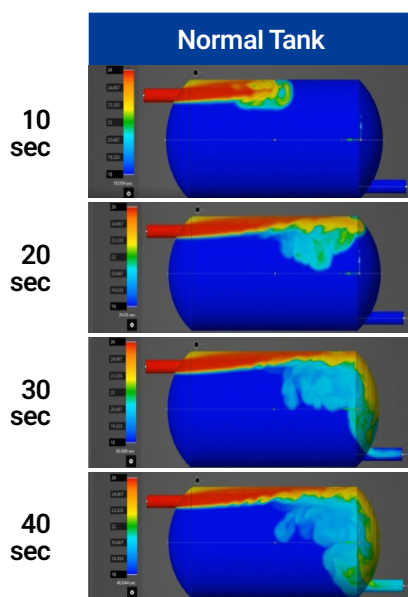


Vertical Type Tank



Horizontal Type Tank

Comparison (Normal Tank VS FT Energy's Buffer Tank)

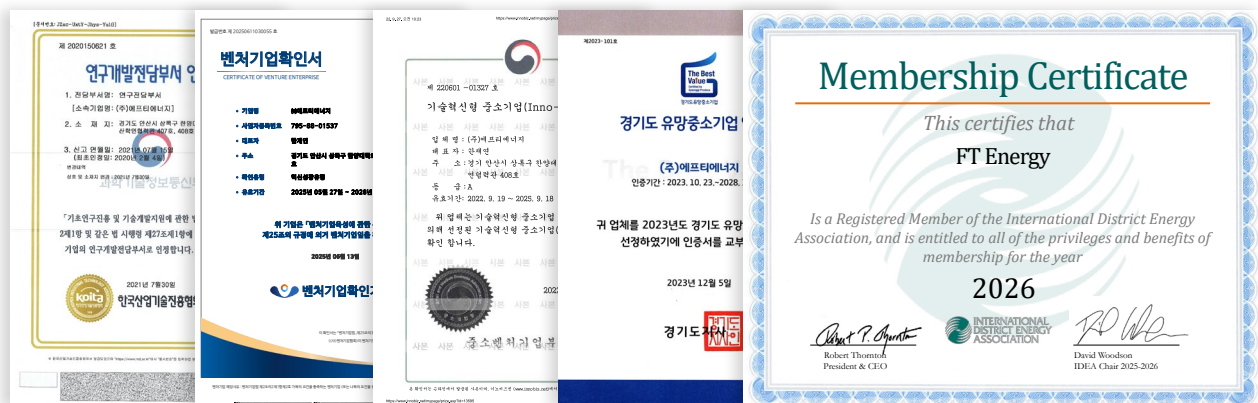


FT Energy Patents & Trademarks

No.	Category	Title	Date
1	Design	Thermal Diffuser Design	2020-08-14
2	Patent	Operating Method of Ice Thermal Storage Tank Using Temperature Difference Between Water and Brine	2020-11-27
3	Patent	Convertible Open/Closed Type Thermal Storage System and Operation Method	2020-12-30
4	Patent	Thermal Storage Tank System for Improving Cooling Backup Efficiency in Data Centers	2021-03-30
5	Trademark	UCS (Uninterruptible Chilled Water Supply)	2021-08-04
6	Trademark	FTE (FT Energy Brand)	2022-02-07
7	Patent	Closed-Type Thermal Storage Tank System for Improving Continuous Chilled Water Supply Efficiency for Data Centers	2022-07-19
8	Patent	Diffuser Using Collision of Vortex Rings and Thermal Storage Tank System Including the Same	2023-12-01
9	US Patent	Thermal Energy Storage System for Increasing Efficiency of Continuous Cold Water Supply for IDC	2023-12-01
10	US Patent	Diffuser Using Collision of Vortex Rings and Heat Storage Tank System Including the Same	2024-11-21

Certifications

FT Energy Certifications, including Patents and IDEA Certification



Global Market Expansion

FT Energy plans to expand not only into the Middle East and Asia-Pacific region, but also into the North American market. To achieve this, the company will focus on building local partnerships and developing customized solutions tailored to each market.

Going forward, FT Energy will participate in various international exhibitions to strengthen its global brand awareness and will continue to drive innovation in TES technologies through ongoing R&D.

India

Qualcomm Data Center



India

Amazon HYD-111



Korea

STT Hyosung Data Center



Korea

AESPA Data Center / Digital Edge



Korea

SK Broadband Data Center at Yangju



UAE

Khalifa Data Center



UAE

Al Ain Air College



UAE

KDC Phase II



Korea

KAKAO Data Center



Korea

KAKAO Data Center



Korea

KAKAO Data Center



UAE

Jebel Ali Data Center



UAE

Dubai Investment Park



Qatar

MPH at Lusail



KSA

Jubail industrial College





55, Hanyangdaehak-ro, Sangnok-gu, Ansan-si, Gyeonggi-do, Korea

TEL +82 10 8271 8170 **E-mail** [jyhan@ftenergy.kr](mailto: jyhan@ftenergy.kr) / [tsoh@ftenergy.kr](mailto: tsoh@ftenergy.kr)