



# Multi-Point, Multi-Access Energy Storage

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## SUMMARY

UCLA researchers in the Department of Mechanical and Aerospace Engineering have developed a novel multi-point, multi-access thermal energy storage system.

## BACKGROUND

As renewable energy sources become more prevalent on the grid, much more energy storage will be needed to meet electric demands during times of low generation capacity. For example, energy storage will be needed in solar power generation facilities to store energy collected during daylight hours for later use at night. Thermal energy storage (TES) systems offer a promising solution to meet this need. Currently, TES systems use thermal oil or molten salts for the energy storage medium. However, these materials have strict thermal limits below 400-565°C, and it can be costly and difficult to maintain high performance during operation. Moreover, as future TES systems will need to handle storage temperatures in excess of 600°C, there is a need for new configurations and materials that allow for tunable efficiency control during operation and higher operating temperatures at reduced costs.

## INNOVATION

This invention demonstrates a multi-access configuration that improves thermal energy storage efficiency, responsiveness to load and source, and cost-effectiveness. In this invention, twelve tanks/ heat exchangers represent locations where heat may be exchanged with a thermal storage medium (TSM). The tank arrangements provide a highly flexible multi-point, multi-access (MPMA) approach that can help achieve optimal system performance during operation and unprecedented control over the design parameters of single tanks. Moreover, this design uses inexpensive storage media, which significantly reduce costs. This invention is expected to operate at temperatures up to 1000 °C, thus cost-effectively achieving an extremely broad temperature range not possible with existing TES systems.

## APPLICATIONS

- ▶ Anywhere efficient thermal energy storage is required
- ▶ Combined heat and power systems
- ▶ Storage of energy from alternative and conventional power generation, including these:
  - ▶ Concentrated solar power (CSP)
  - ▶ Wind
  - ▶ Photovoltaics
  - ▶ Geothermal
  - ▶ Waste/Process Heat
  - ▶ Fossil fuels

## ADVANTAGES

- ▶ Operation at higher temperatures, up to 1000 °C
- ▶ Use of readily available, cost-effective materials
- ▶ TES materials possess high thermal stability
- ▶ Encapsulation configuration provides larger heat transfer surface area and extra barrier for minimized harmful interaction
- ▶ Optimal system performance during operation and unprecedented control over design parameters of single tanks

## PATENT STATUS

## CONTACT

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## OTHER INFORMATION

### KEYWORDS

Thermal energy storage, TES, energy storage, grid energy storage, utility energy storage, molten-salt energy storage, consolidated solar power storage, grid storage, utility storage, thermal oil energy storage, CSP storage

### CATEGORIZED AS

- ▶ **Energy**
  - ▶ Other
  - ▶ Solar
  - ▶ Storage/Battery

### RELATED CASES

2016-585-0

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,859,324	12/08/2020	2016-585

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