



## World's First Thermal Battery Plant Unveiled in Andhra Pradesh

The world's first-ever thermal battery plant has been inaugurated in Andhra Pradesh.

- The plant will be operated by the Bharat Energy Storage Technologies Pvt Ltd (BEST) and is seen as a potential alternative to the energy produced using fossil fuels.
- It aims to create a new energy storage form that is expected to have commercial applications, while also maintaining a low carbon footprint.

### Significance

- The solar energy is dependent on external factors like weather and it also requires a robust energy storage infrastructure.
- Even the existing energy storage technologies depend on Lithium-based batteries, which are expensive since their replacement is needed every six to seven years. They are also low on energy density and need a high footprint.
- Furthermore, Lithium's sensitivity to extreme temperatures requires the energy storage systems to be placed in conditioned temperatures, requiring about eight to ten per cent energy storage for the cause.
- Thus, the coming of thermal battery is a landmark development in the field of technology and environmental protection.

### Thermal Battery

- Thermal Battery was invented and patented by Dr Patrick Glynn in India 2016.
- It uses thermal energy to operate, i.e., the energy created by temperature differences. Therefore, the energy transfer in thermal batteries helps store heat when heat travels from one part of the battery setup to the other.
- A thermal battery consists of two parts: a cool zone known as sink, and a hot source called source.
- Both these sides consist of compounds known as phase-changing materials (PCMs), which can change their state of matter on the basis of a physical/chemical reaction.
- When the sink of a thermal battery receives heat, it transforms physically or chemically, thereby storing energy, while the source cools down.
- During operation, the sink is cooled down, so it releases the stored energy, while the source heats up.
- Depending on the nature of the battery, the system can derive heat from any source, which makes a thermal battery very versatile.

### Applications

- The energy storage device will help store renewable energy for various purposes and thereby help in mitigating carbon emissions, grid balancing and stabilisations.
- It will be used to store energy for telecommunication, commercial establishments, electric vehicles and highway charging stations.

- Since thermal batteries function as long as there is a heat source to drive their operation, they could help solve power issues in remote areas, and also address rising energy requirements from regional or national grids.
- The batteries are expected to reduce the country's dependence on fossil fuels and other non-renewable sources of energy.
- The facility will also manufacture storage devices that are environment-friendly with no use of hard metal or inflammable substances.
- It also aims at thriving in the global market by helping curtail global warming and carbon emissions and looks forward to helping achieve the Government of India's vision of electrified mobility by 2030.

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