

Energy is
only wasted
when we
waste it

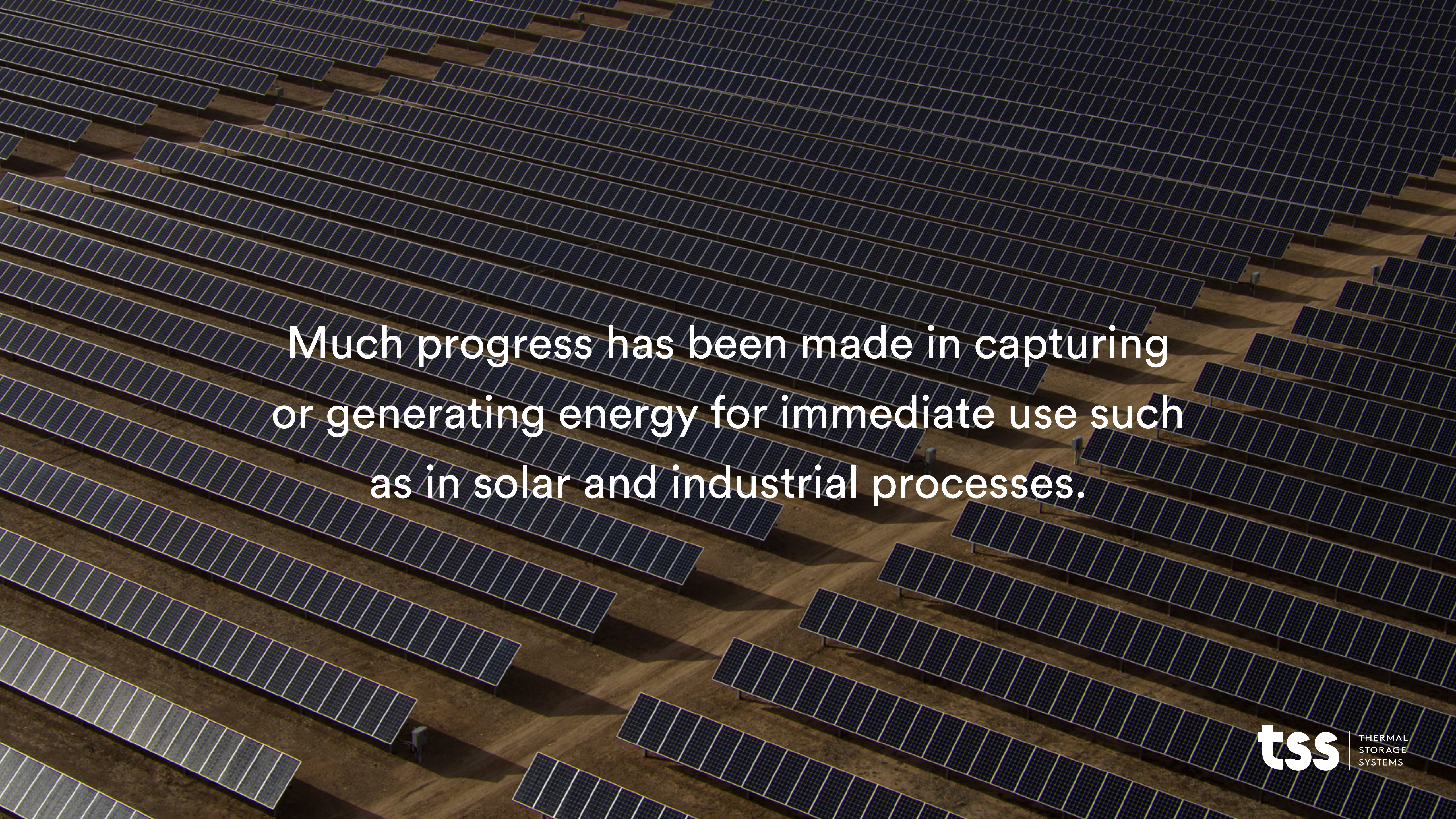
Thermal Storage Systems
5646 Valley Oak Dr.
Los Angeles, CA 90068
Tel: +1 323 841 6571
Email: info@thermalstoragesystems.com



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A big piece of the puzzle in achieving a carbon neutral future, lies in storage.



An aerial photograph of a vast solar farm. The solar panels are arranged in neat, parallel rows that stretch across a dry, brownish landscape. The perspective is from a high angle, looking down at the panels, which are tilted towards the sun. The rows create a strong sense of depth and repetition.

Much progress has been made in capturing or generating energy for immediate use such as in solar and industrial processes.

However, in order to achieve a carbon neutral future, it is critically important to solve the storage question and re-capture the unutilized energy that is generated.



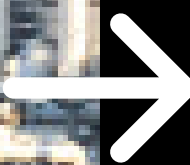


Waste



Energy

Waste



Energy



Waste



Energy



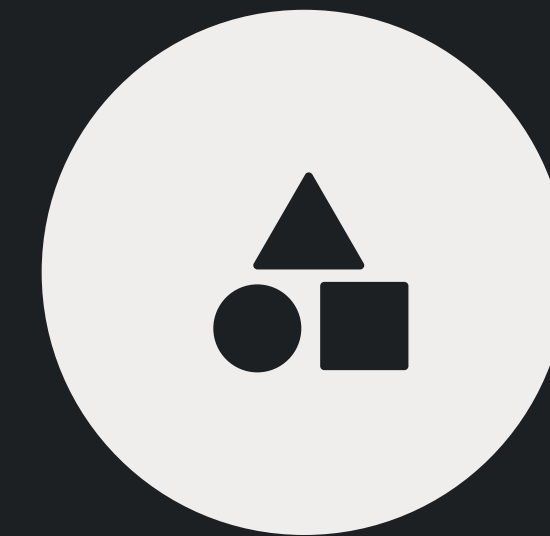
Our mission

We explore the power of technology for social good, so that together, we can create a safe, sustainable world for future generations.

About us

What does TSS do?

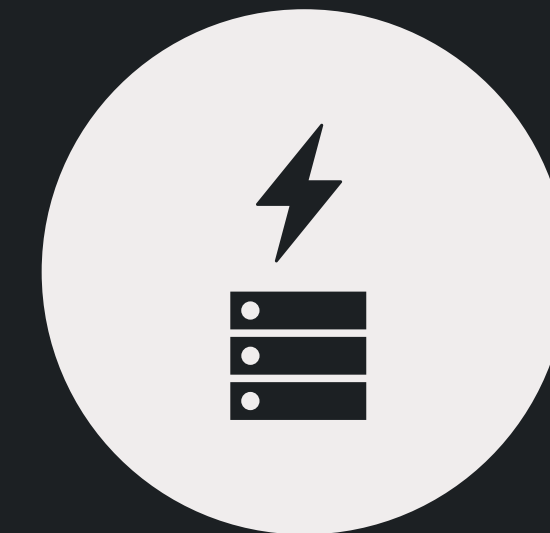
TSS, a US based technology startup, has developed a novel and cost-effective approach to the storage of thermal energy. It is a latent heat storage technology which operates at a high temperature and has a very high energy and power density. The merits of the technology are its simplicity, its compactness, and its ability to drive high-efficiency heat conversion engines. When operated in the latent heat mode, it can provide a constant temperature power source for a heat engine, such as a turbine. Operation in a combined latent and sensible heat mode doubles the stored energy density. The source of heat can be waste heat from industrial processes, nuclear heat or any other form of high temperature thermal energy.



Simple



Compact



Efficient

Our technology

High power density, high energy density

TSS's core technology is a proprietary compact high temperature thermal storage system first developed to form the heart of a deployable tankless solar hot water system for use at US Army forward operating bases (FOBs).

The TSD stores energy as a combination of sensible and latent heat over a range of approximately 200 to 660° C in a proprietary Phase Change Material (PCM).

The result is a novel and efficient passive thermal storage device that has a high power density and a high energy density, and very different from any other heat storage methods.

What makes us different?

- Cost-effective and unique
- Compact and requires no pumping of molten materials
- No moving parts
- Insensitive to ambient temperature
- Scalable from residential to utility-sized systems
- Highest energy storage density (kW-hrs per cubic meter) of any existing approach
- Ideal for use with solar and other heat-based power systems
- Enables a constant source of power
- Non expendable (lifetime >10yrs)
- No consumables
- Green and sustainable



Sustainable



High lifetime value



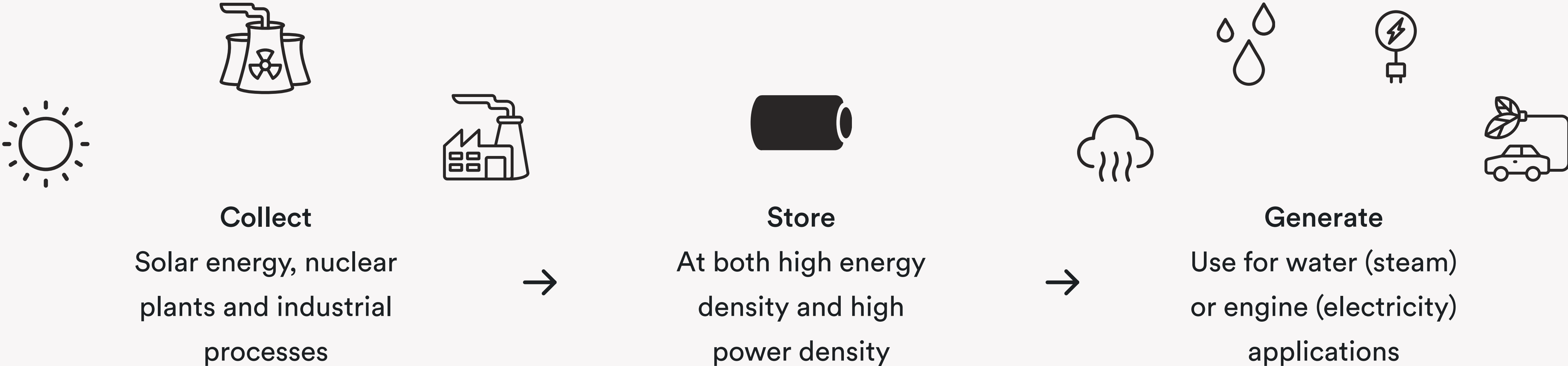
Recycles waste heat

Our technology

Reduce dependence on fossil fuel, decrease generation costs

The patented technology means our system can store heat for long periods of time. It reduces intermittence and dependence on backup (fossil fuel) energy sources. It increases operational stability and has improved asset utilization (return on capital). Heat storage at this level of efficiency translates in important “peak-shaving” ability (time-shifted operation) and dramatically reduces generation cost.

Efficiency through density



Why TSS?

1. Simple and efficient

The TSS battery is a quite simple and relatively inexpensive design that is easily scaled from quite small to large units that can operate on a utility scale. Energy can be added by directly heating the battery⁸, from a transfer fluid, or, for example, from the exhaust of a diesel generator. This makes our technology simple and efficient.

Why TSS?

2. High energy density and high power density

Batteries and other storage systems are typically optimized either for high energy density or for high power density. Generally, one cannot have both high energy density and high power density. This trade off is exemplified in the diagram on the right. We use a Phase Change Material (PCM) with high energy density and power density.

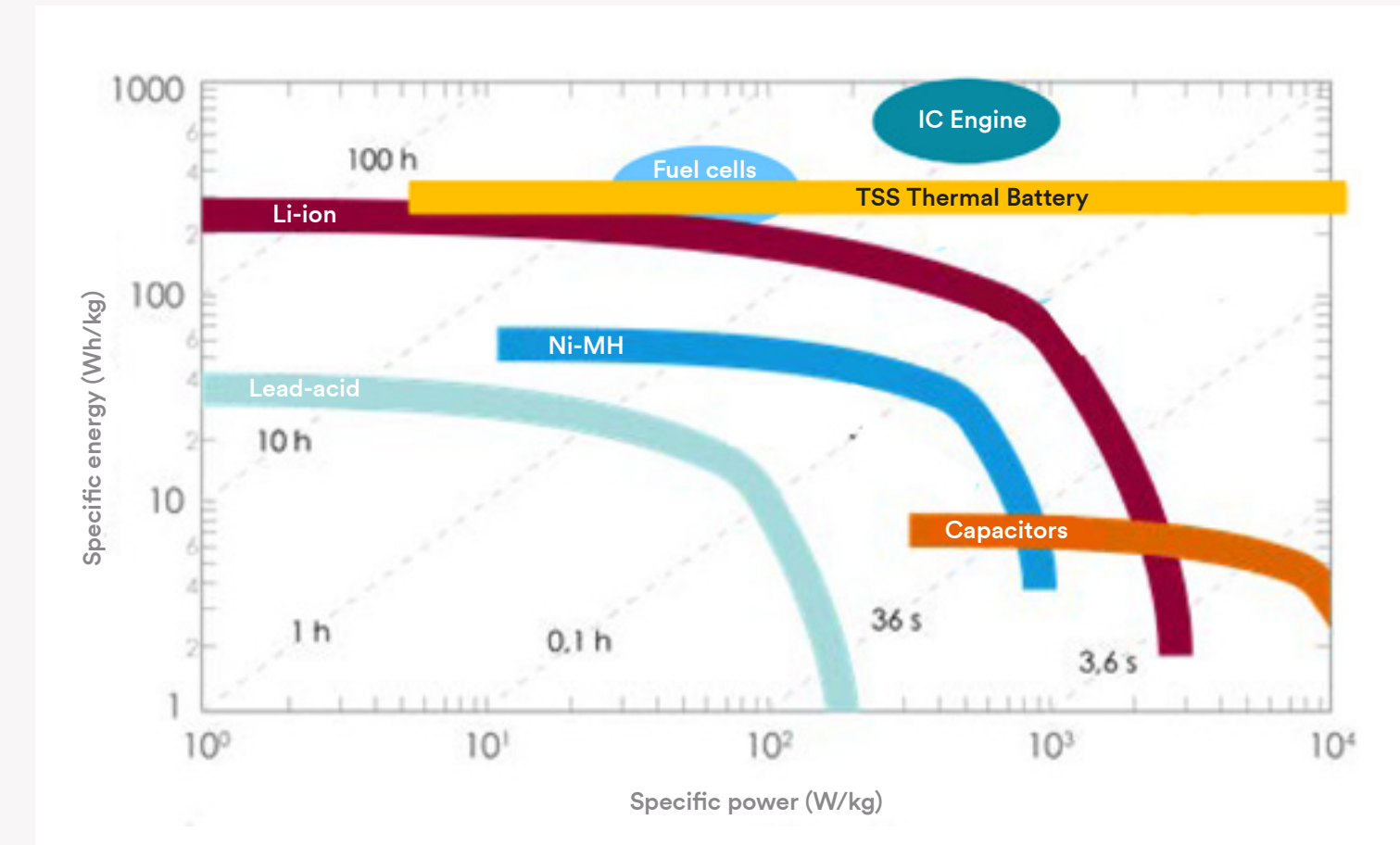


Figure 1: Ragone Plot for Typical Energy Storage Systems

This diagram plots energy density, expressed as watt-hours/kg along the vertical axis and power density, expressed as watts/kg, on the horizontal axis. The plot is slightly misleading because for each battery type the curve represents a range of designs rather than the characteristics of a single battery. For example, lithium batteries can be optimized either for high power density or high energy density, but not both. But even for a single battery, if one extracts energy quickly one cannot extract all the energy that is stored.

By contrast, the power density of the TSD is very high and is mostly independent from its energy density. As can be seen on the diagram, the energy density of the TSS battery is approximately 160 Wh/kg, which is similar to that of lithium batteries that are optimized for high energy density. Power density, on the other hand, may be greater than any of the batteries shown on the diagram.

Why TSS?

3. Constant temperature operation in the thermodynamically most optimal range

When operated in its latent heat mode, a large amount of energy can be delivered at a constant temperature. The temperature at which this occurs is from 580° - 600°C, which is an ideal temperature for the operation of Stirling engines. Approximately 50% of the total energy stored in the TSS battery will be in the form of latent heat.

Don't waste your energy.



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world for future
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