

Team Better/e

THE FUTURE OF GRID-LEVEL ENERGY STORAGE



1 year ago...

Liquid Metal Battery for energy storage



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ACADEMY

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Team Better/e: Who are we?

Floor den Ouden
Chemical Engineering



Erik Nijkamp
Chemical Engineering



Alexandra Vacaru
Mechanical Engineering



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Societal Challenge

Mismatch between energy demand and renewable energy supply

Balancing the electricity grid (peak shaving)

Existing Solutions

Pumped Hydroelectric

Slow response time

Geographically constrained



Lithium Ion for power storage

Very costly

Hard to scale up

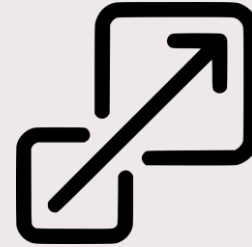
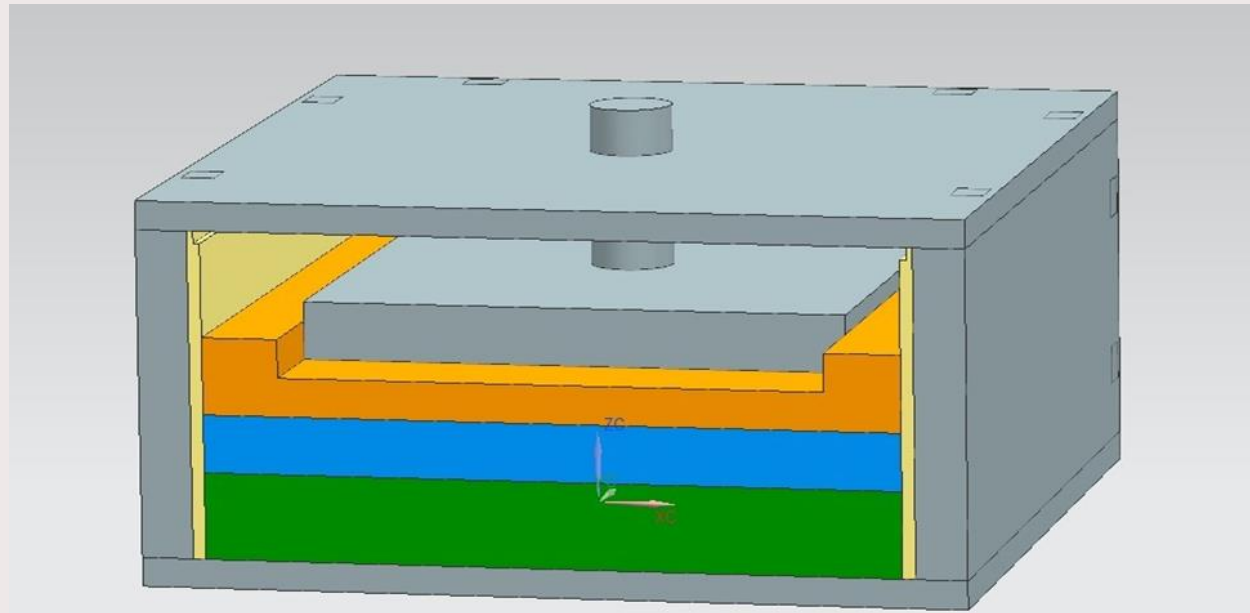
Shorter life span



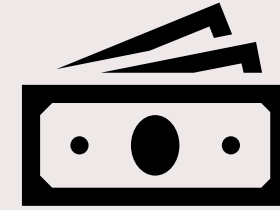
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Solution: Liquid Metal Battery



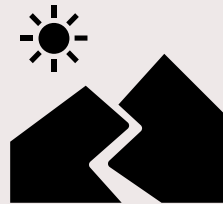
Scalable



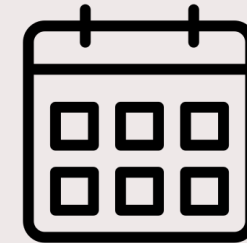
Low storage costs



No thermal runaway



Not dependent on weather or location



Long lifetime



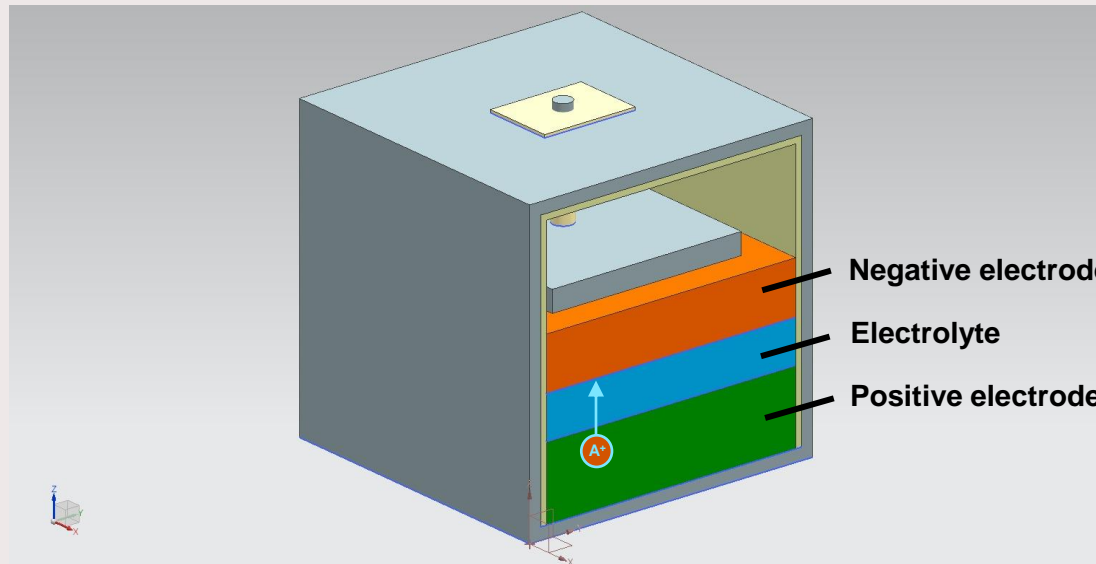
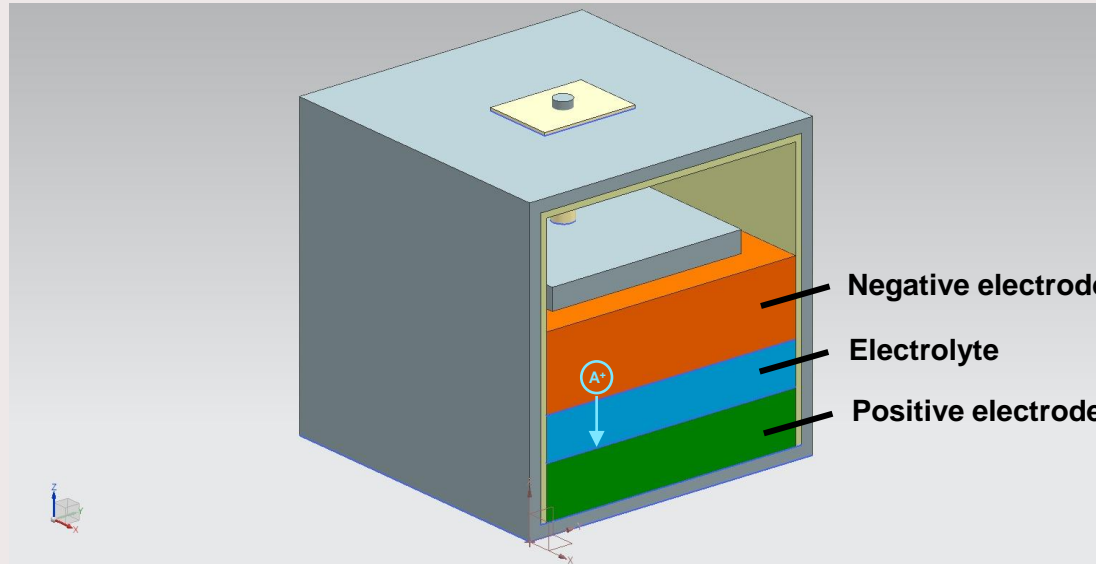
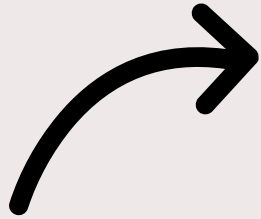
Power density



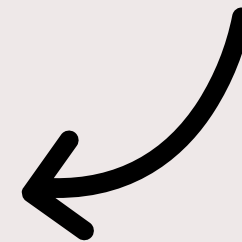
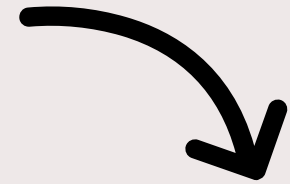
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Charge



Discharge

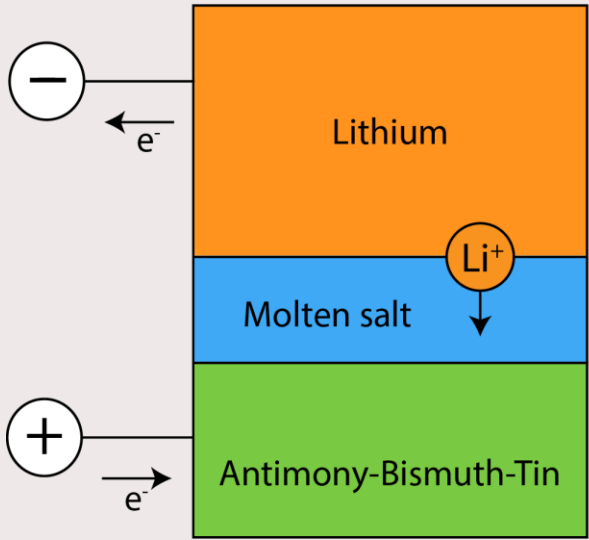


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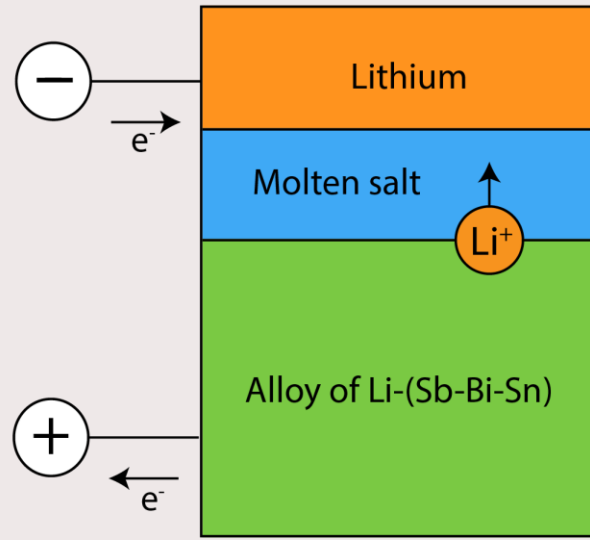
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Technical Explanation

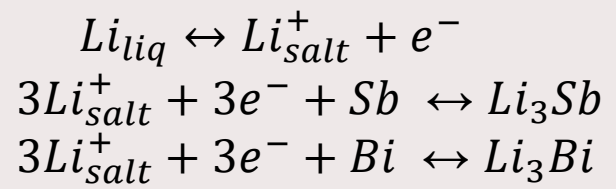
Discharging



Charging



- Metal alloys help reduce temperature and create deeper charging.
- All liquid composition allows for superior reaction kinetics.



Our plan

Funding

- **CE3** with Steven van Huiden (TU/e) & Mark Cox (Honors Academy)
- **MRE** with Jan Hubers (The Future) & Team RenewCO2 (Honors Team)

Proof of Concept

- Single cell

What are the challenges of the cell?

Novelty Technology

- Plenty of research & development

High Temperature

- Insulation
- Resistant materials

Reactivity with air

- Special testing equipment

Efficiency

- Correct material selection



To work towards the goal...



Are there any questions?

Team Better/e – Balancing the energy grid

Contact info:

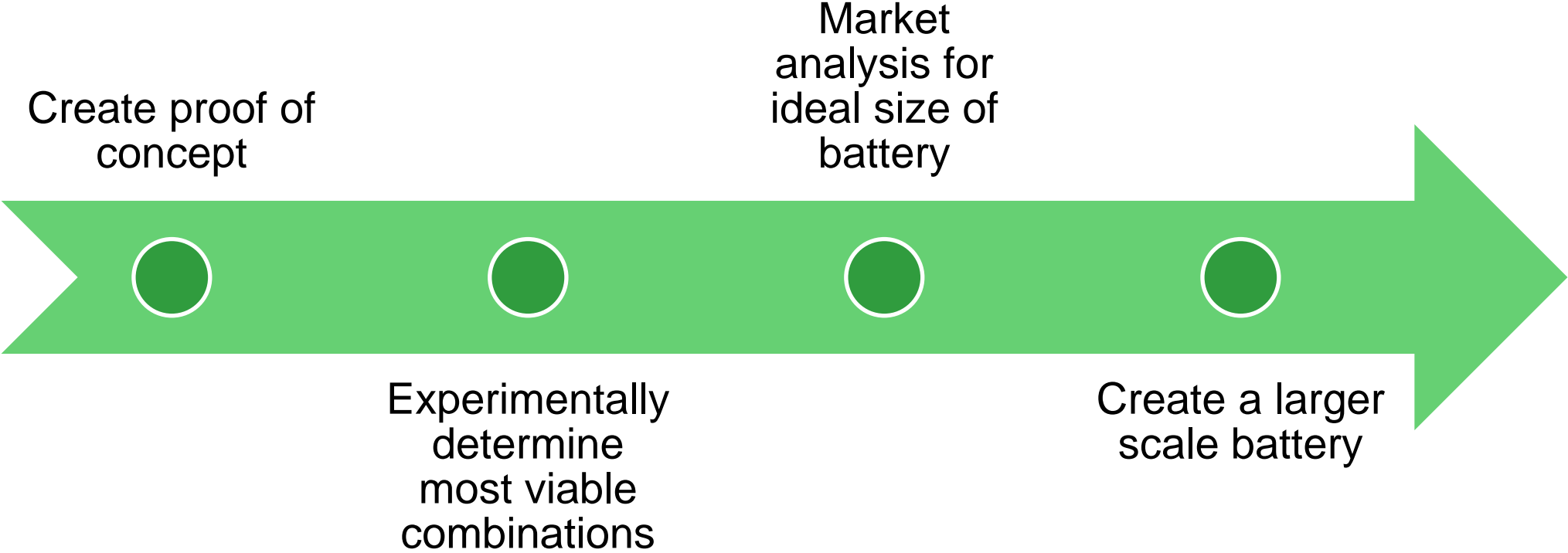
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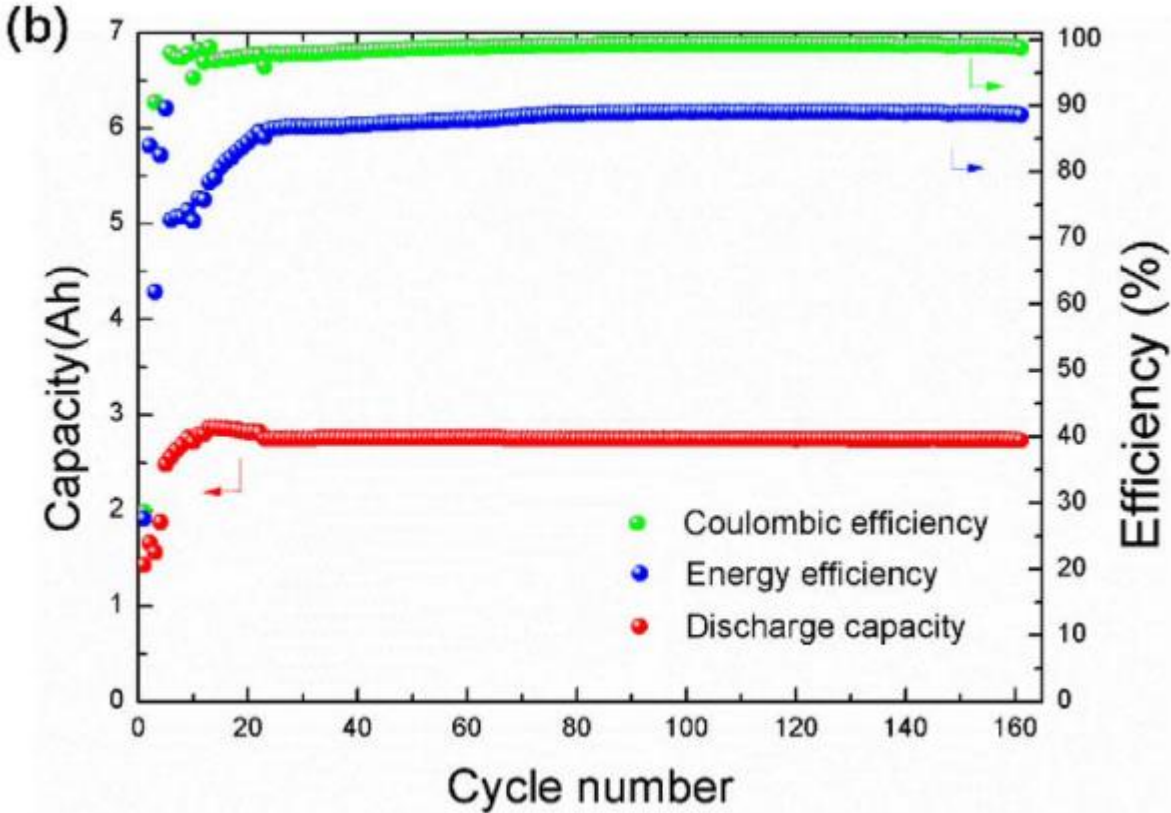
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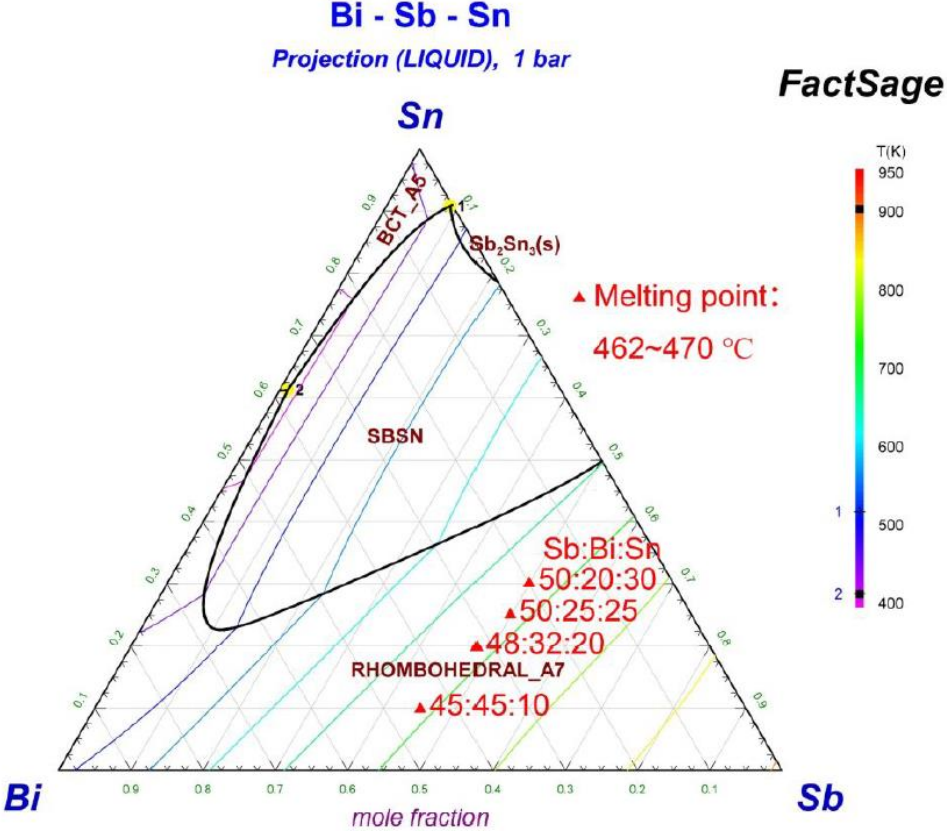
Appendix - 1



Appendix - 2



Discharge capacity, coulombic efficiency, and energy efficiency as a function of the number of cycles. For Li-Sb

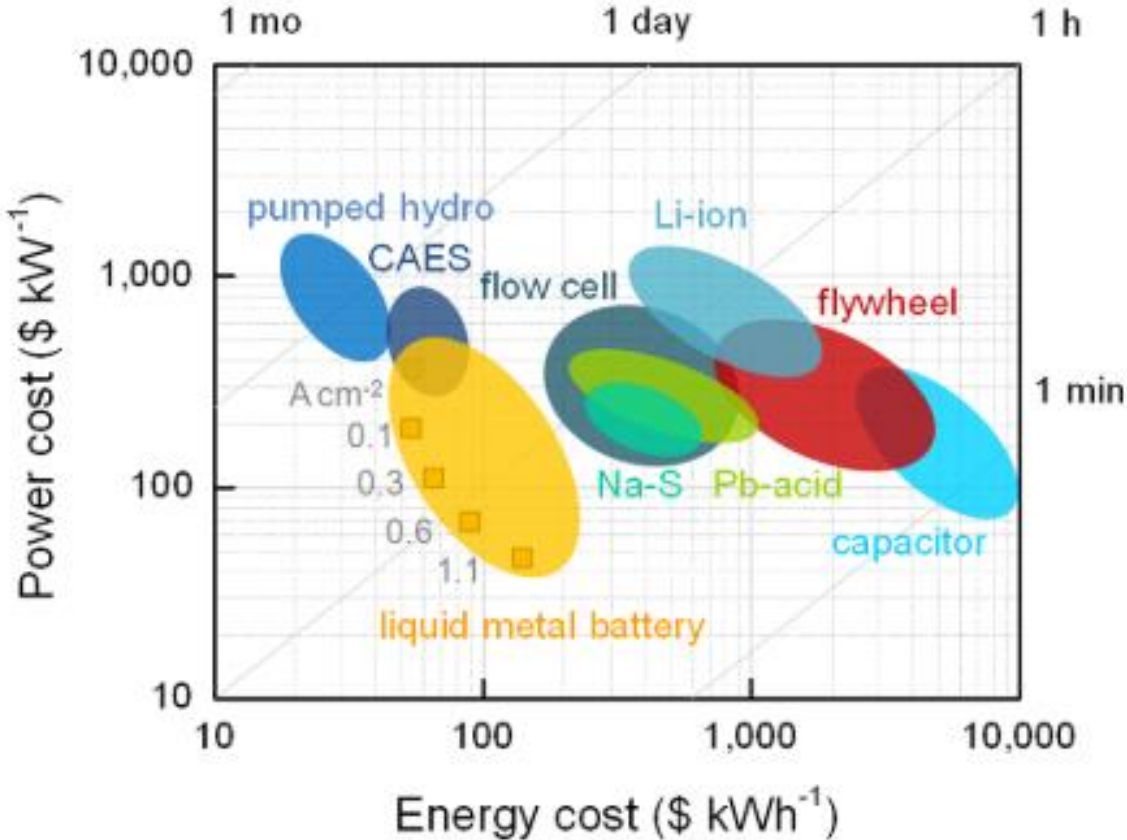


Liquidus projection of the ternary Sb-Bi-Sn system, in which four red triangles mark out compositions of four alloys.

The melting pointing data of the alloys as marked are estimated by the FactSage® software.



Appendix - 2



Cost of energy versus power plot indicating various energy storage technologies

Adapted from Liquid Metal batteries: Past, Present and Future (2013)