

KONVERZIJA TERMoeLEKTRANA NA UGALJ U SISTEME ZA SKLADISTENJE ENERGIJE

Dr. Sasha Savic
E2S Power

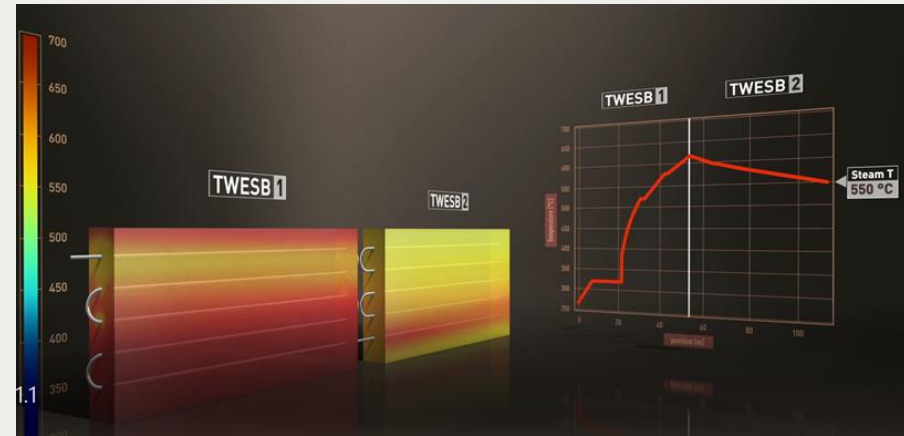


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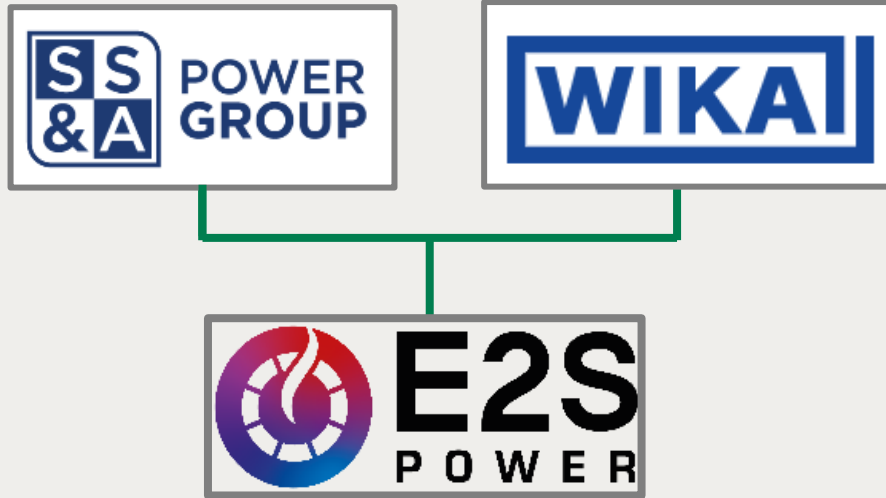
For power system expertise

About SS&A Power Group

- **SS&A Power Group** is a multinational group of companies sharing the same vision: develop solutions to support the transition to a carbon-free future.
- **SS&A Power Development** holds controlling packages of the following companies:
 - ✓ **G2P Adriatic** focused on building a first Hydrogen fired GT Plant
 - ✓ **S2P Electric GmbH** focused on developing Solar Power Plants
 - ✓ **E2S AG** focused on Developing Thermal Energy Storage solution
- **SS&A Power Consultancy** - global Leader for Gas Turbines & Turbomachinery technology and maintenance strategies consultancy
- **SS&A Power Engineering A.D.** - wide range of engineering services (thermal and mechanical, electrical, controls and design)



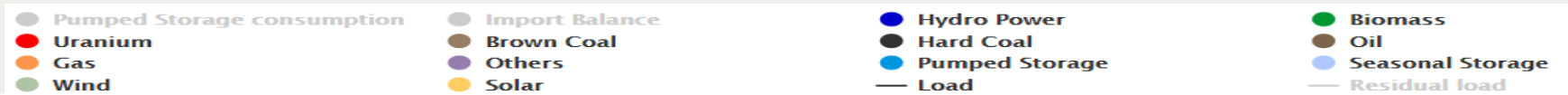
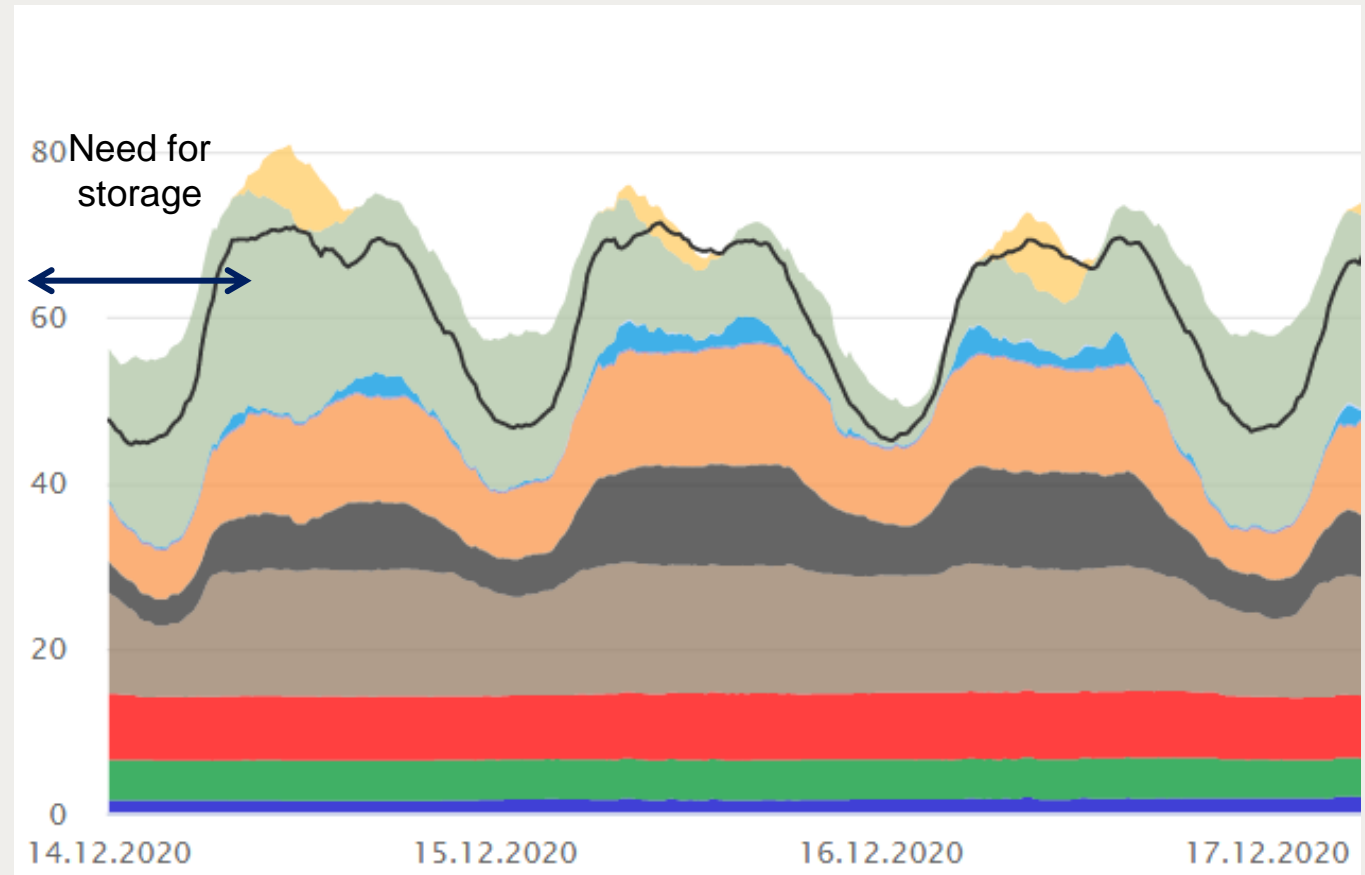
E2S is a joint venture between SS&A and WIKAI



Need for Energy Storage – Conversion of Legacy Plants

Germany Example

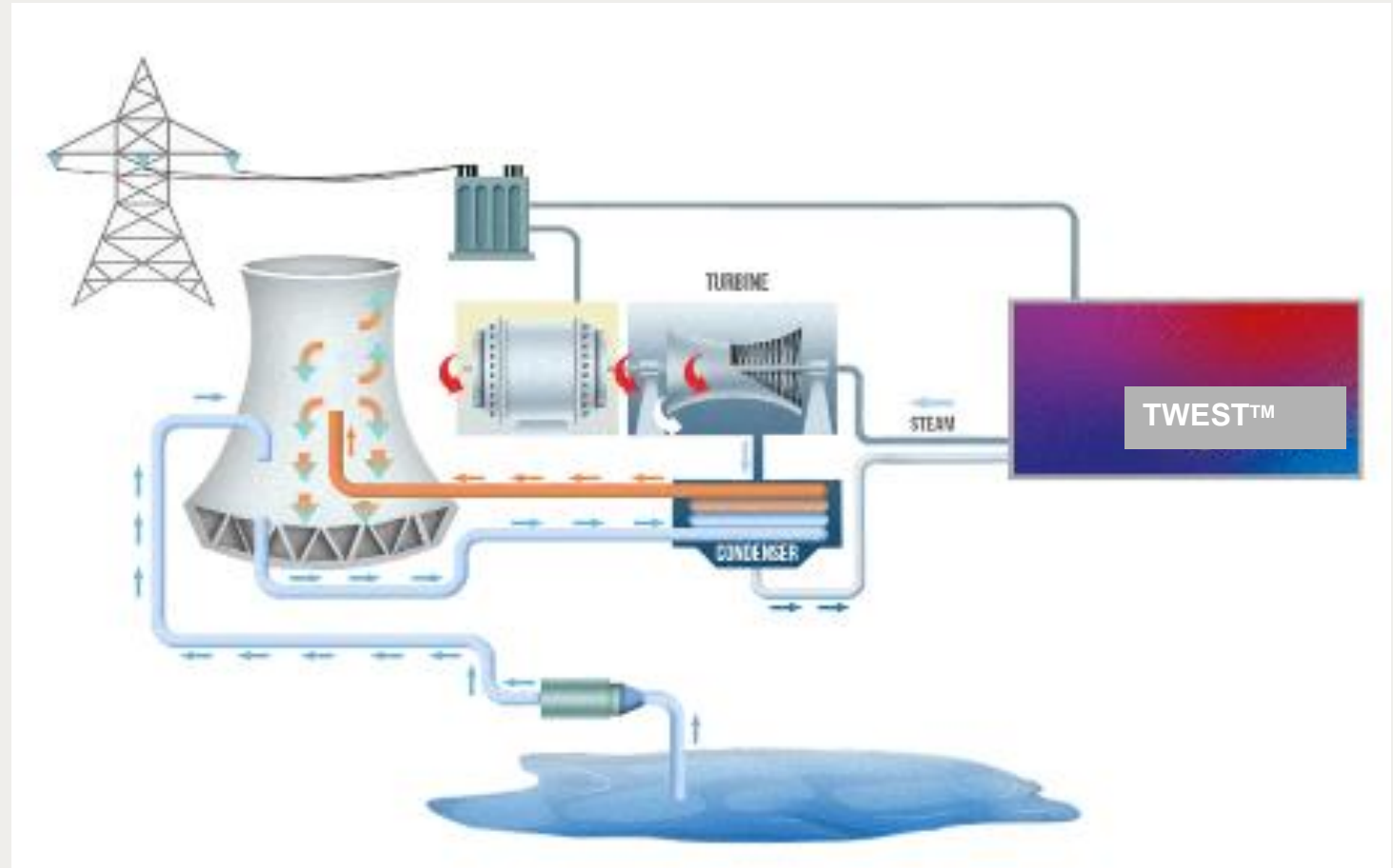
- Higher share of intermittent renewable energy will require energy storage
- A large number of legacy fossil fueled power plants will be phased out or repurposed



Coal Power Plants Phase out Resulting in Stranded Assets

- 30 GW of coal and lignite to be shut down in Germany by 2022 with an additional 20 GW by 2030. All coal to be shut down by 2038.
- Over 4GW of coal have shut down in 2020 in the UK with all unabated coal plants to be shut down by 2024.
- Total of about 200 GW projected to shut down in Europe.
- A substantial portion of the US 236 GW of coal to be shut down by 2030

There is an opportunity to utilize valuable infrastructure, reduce decommissioning costs and preserve jobs

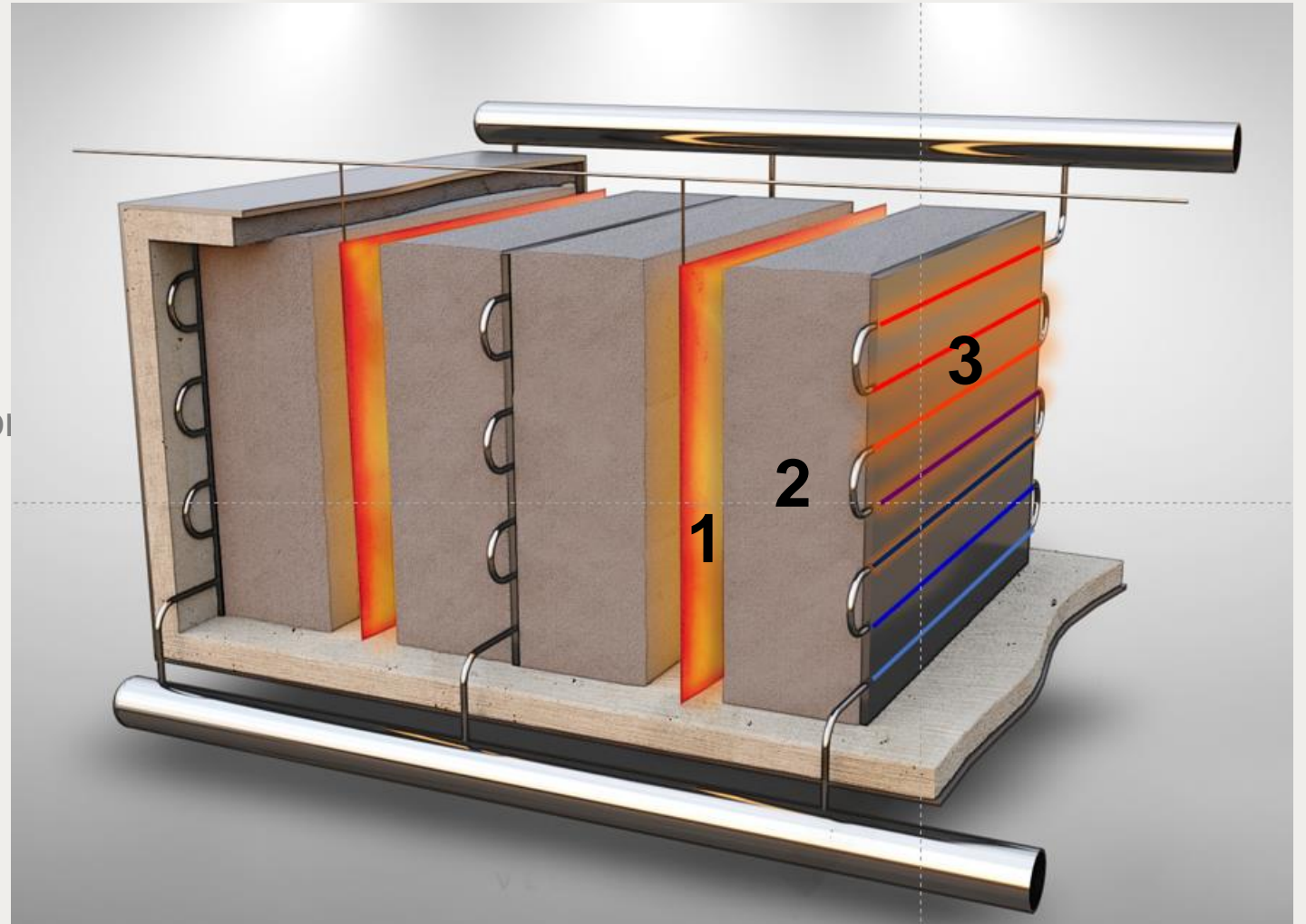


E2S Proprietary Technology - TWEST™

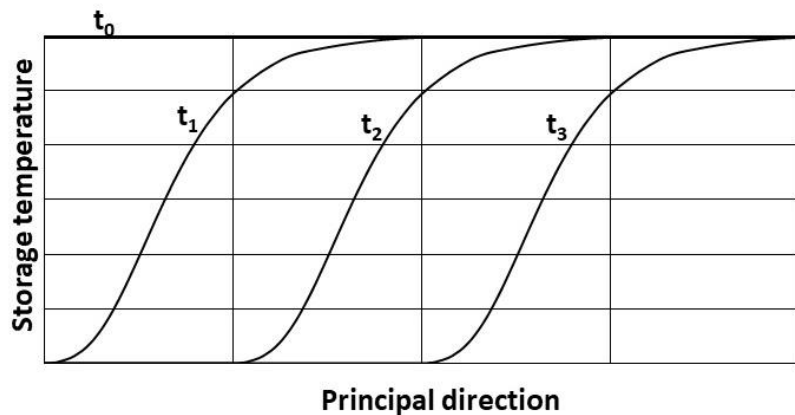
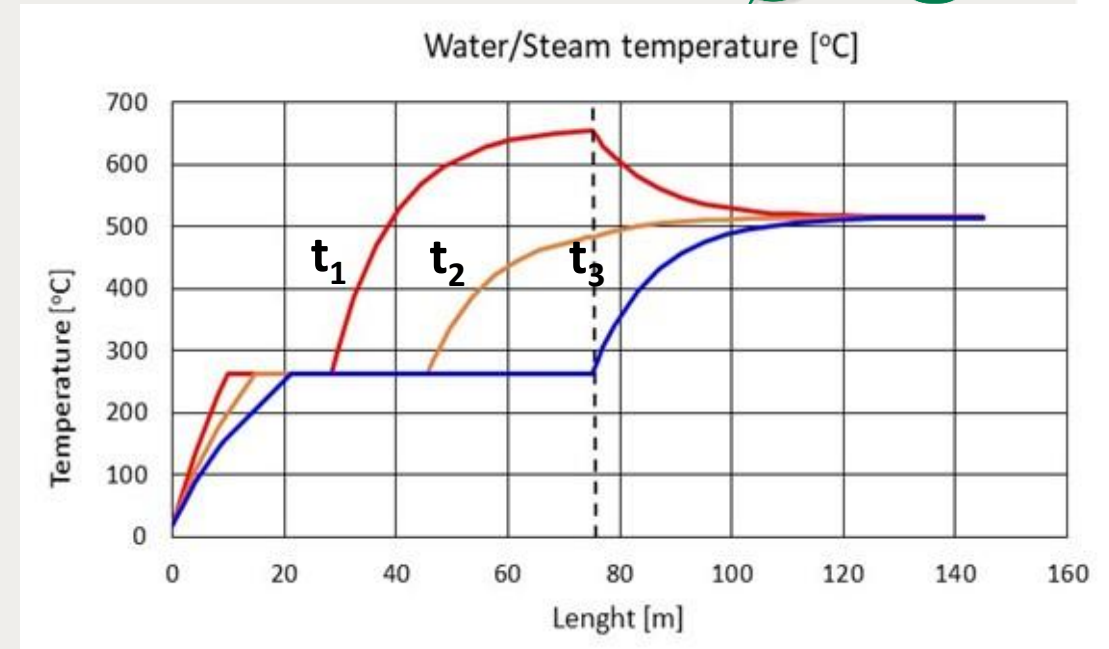
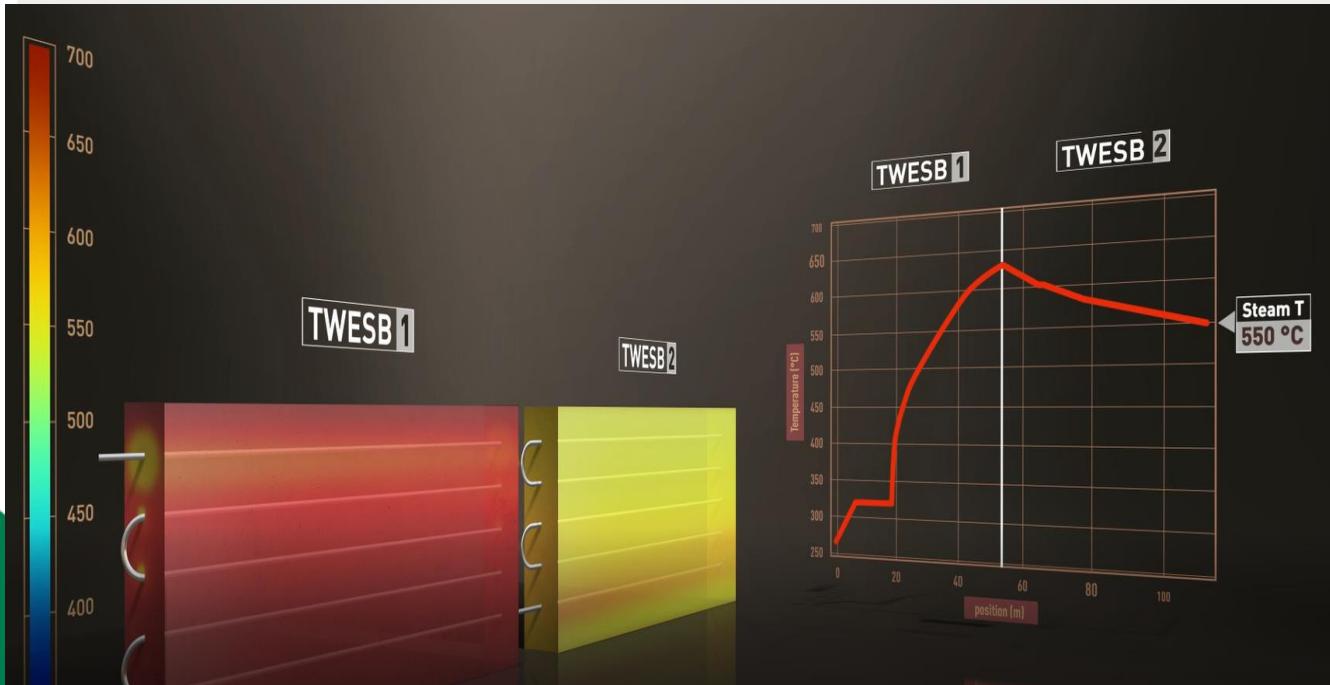
TWEST™ consists:

- 1) Electric Radiating Heaters
- 2) MGA storage bricks
- 3) Steam Generator

- Compact designed
- Heat transfer via radiation or direct conduction
- No need for additional blowers
- No additional auxiliary consumption
- Maximal efficiency



E2S Proprietary Technology - TWEST™

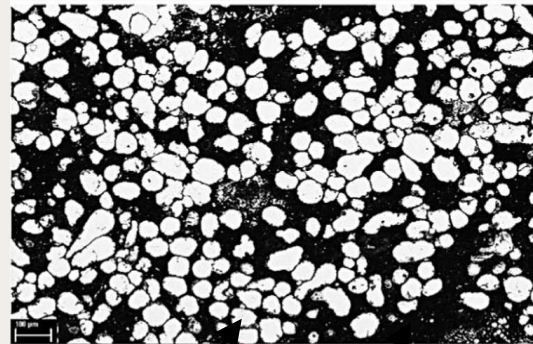


- TWEST Technology ensures that steam is delivered to the turbine with required properties (temperature, massflow and pressure)
- Minimal modifications of the existing control system
- Regulation is performed without any control valves – self regulated system

E2S Unique differentiator - MGA Storage Material

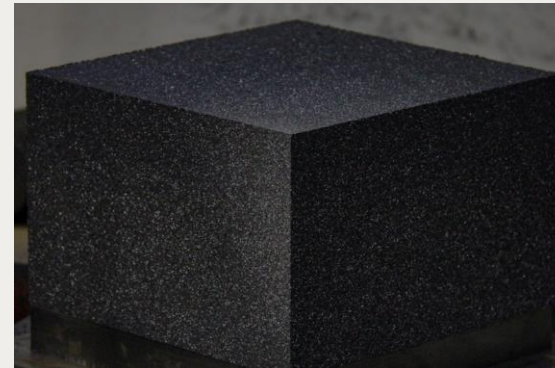
MGA (Miscibility Gap Alloys) made of :

- Aluminum and Graphite
- Aluminum melts and store latent heat
- Graphite remains solid and acts as a matrix
- Thanks to phase change superior energy density
- Graphite + Aluminum are abundant and safe

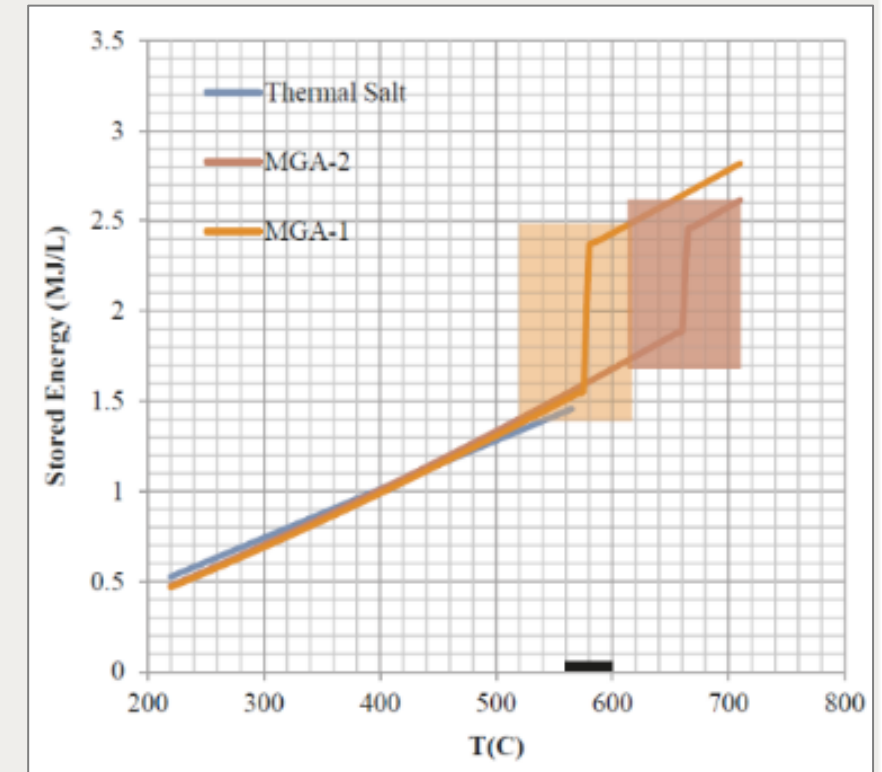


Aluminum

Carbon

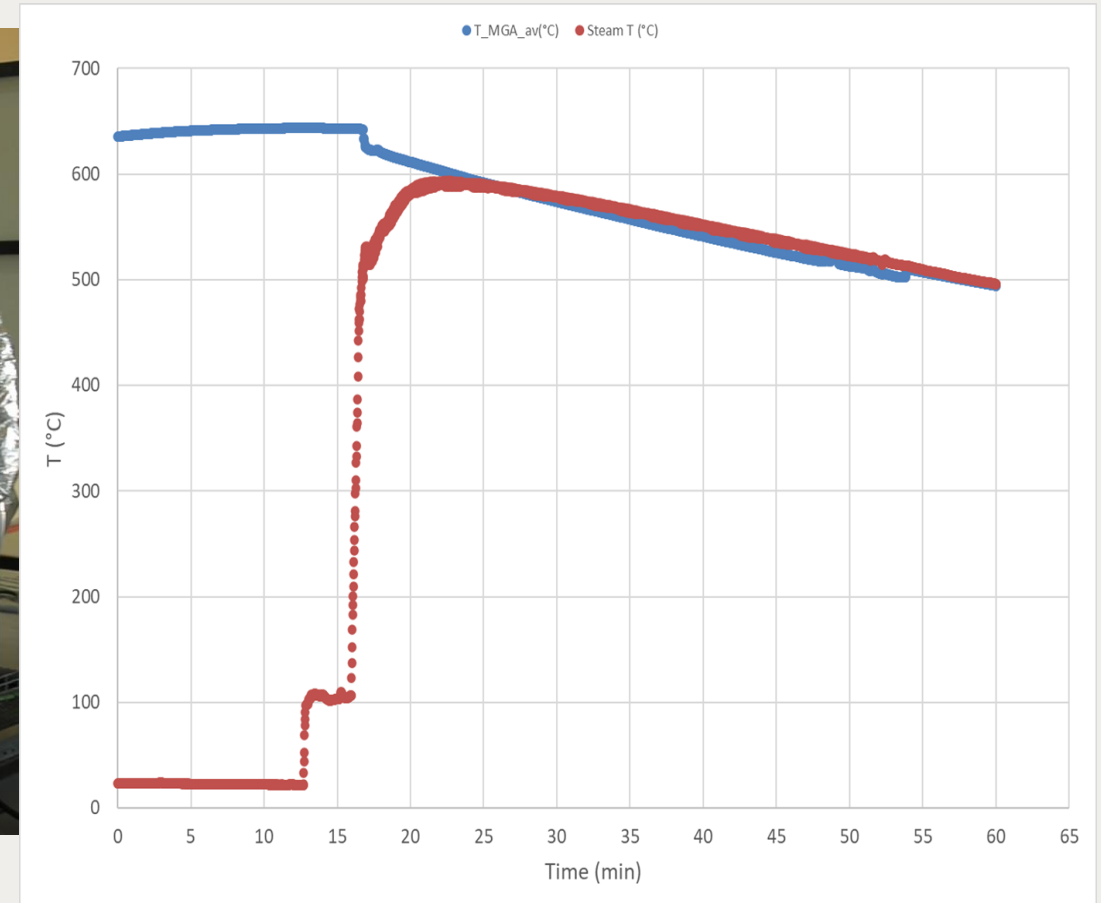


E2S has exclusivity with Australian company MGA Thermal



E2S Technology Demonstrator

Successful testing in our Test Centre



Current Status— Approach to Market

Technology Demonstration

- Successful technology demonstrator tests completed



Pilot Plant – Under Development

- TPP Pljevlja 260 MW in Montenegro –could be a great opportunity for a pilot application as an add on to existing boiler - Target 2022
- LOI Signed with EP Power Europe for the development of a 50 MWh pilot project – Target 2022
- Pilot with US utility under discussion

Commercial Scale Development Pipeline:

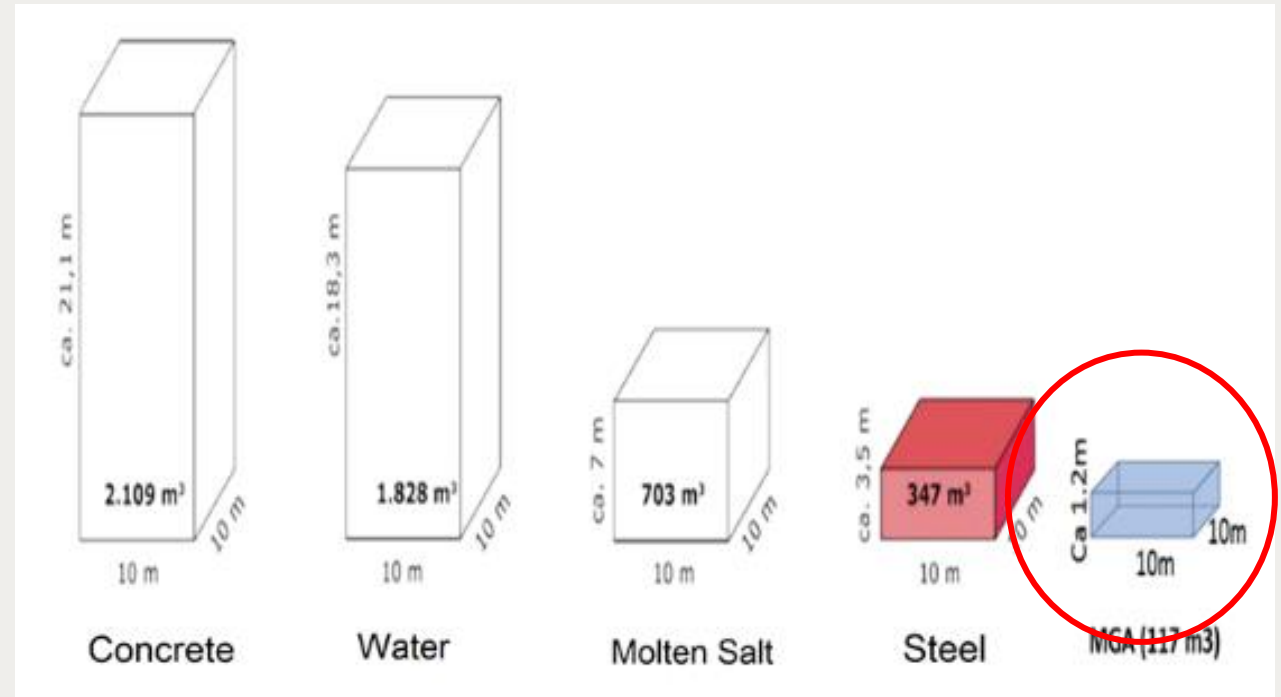
- Hybrid CCGT- thermal storage project
- 1,500 MWh commercial scale project in discussions
- MOU with major EPC Contractor for cooperation in North America. Started discussions with utility clients in US and Canada.



E2S Energy Storage Solutions Summary

- E2S TWEST™ the most **cost effective, compact, environmental friendly and efficient** energy storage
- Can eliminate **more than 1 Billion Tons of CO₂** p.a.
- Self-regulated, robust and flexible system
- Materials used are safe, abundant and recyclable
- Batteries, Hydrogen and Cryogenic Storage Systems are a complementary and not competitive
- E2S solution has the potential to save jobs and even create new jobs

Space requirements to store 50 MWh capacity for different systems



E2S designed for conversion of thermal plants into CO₂ free storage systems