



LDES COLLABORATION EFFORTS WITH STATES

- SNL signed MOU with NYSERDA and CEC to actively engage, support and collaborate in Long Duration Energy Storage Efforts.

NY and CA State – Energy Storage Goals

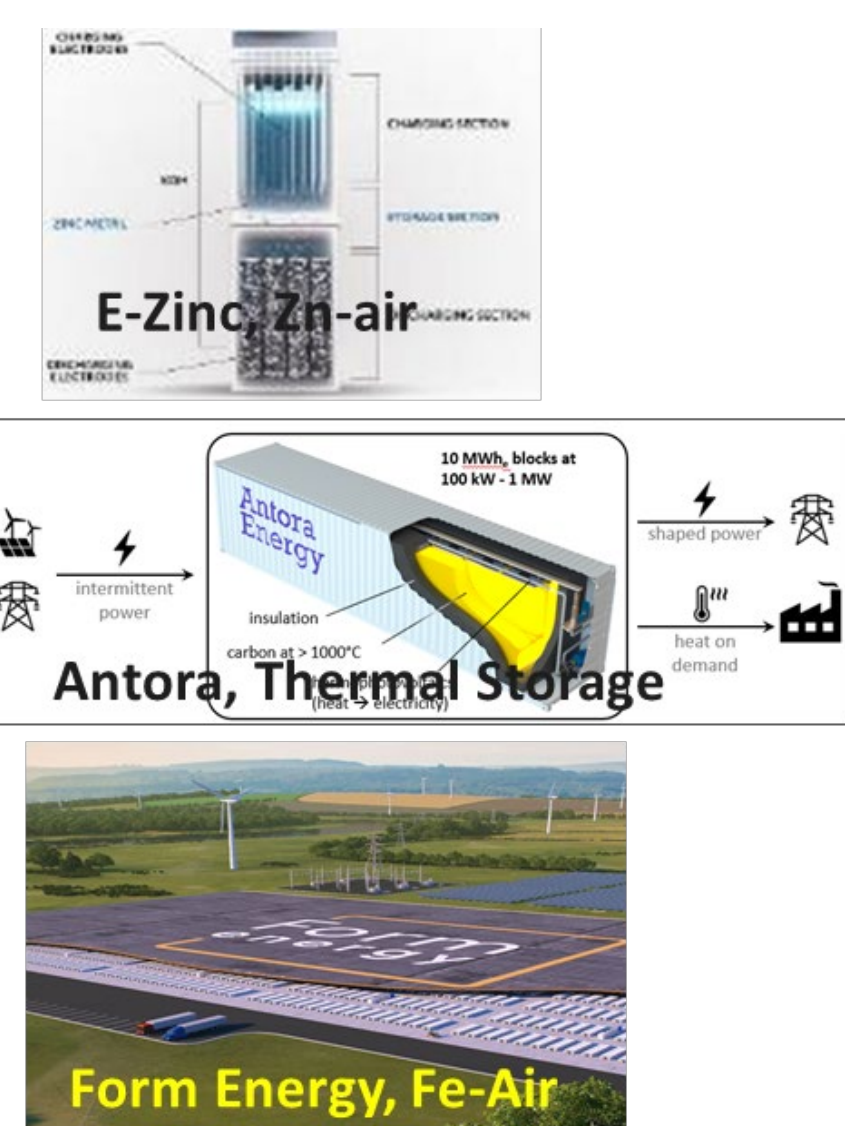
- CA has a goal to install 52GW of energy storage by 2045.
- To date in 2023 CA installed more than 5GW of battery energy storage. Predominately it is Li-ion battery systems.
- CEC is interested in evaluating non Li ion battery LDES storage technologies for safety and cost reasons.
- Under the EPIC (Electric Program Investment Charge) program, CEC funded \$140M in 2022-23 and budgeted >\$150M in 2023-24 for LDES.
- CEC awarded 3 Grants to Demonstrate 100 Hour Energy Storage Systems. Antora (Thermal storage), Form Energy (Fe-Air) and e-Zinc (Zn-air). 3 Projects under development. Viejas Band of Kumeyaay Indians Microgrid in San Diego (60MWh hybrid system (Invinity V redox flow battery and Eos Zinc hybrid system), Paskenta Band of Nomlaki Indians Microgrid in Northern CA (20MWh flow battery energy storage systems), PG&E Front-of-the-meter System in Bay Area (First-of-its-kind 5MW / 100h Form Energy Iron-Air System)
- SNL activity under MOU.
- Along with CEC, visited few installation sites and battery manufacturing sites. Due diligence evaluations were performed.
- To leverage DOE funding, CEC submitted two demonstration project proposals under DOE-LDES demonstration projects FOA (DE-FOA-0002867). SNL participated in both along with the Energy Storage project developers, end users, and battery manufacturers (Indian energy, Faraday, Valley children's hospital, RedFlow and Eos). Valley Children's project with RedFlow Zn-Br flow battery is selected for DOE funding (34.4 MWh back up power replacing Diesel generators).
- CEC provided a letter of support for the DOE - LDES demonstration (National Labs only FOA) and pledged \$6M financial support, to work with e-Zinc (Zn-Air battery) for the demo installation at SNL-CA facility. DOE selected this project for demonstration (500kW, 24+hr storage).
- Actively working on a CRADA (Collaborative Research and Development Agreement) with CEC to increase further collaborative efforts
- **New York State** has a roadmap for 6 GW of energy storage by 2030.
- LDES Technology and Product Development –\$33.6 M funding with some cost share as part of Renewables Optimization and Energy Storage Innovation Program.
- NYSERDA provided a letter of support for ROVI (Rapid Operational Validation Initiative) and LDES demonstration for the National Labs FOAs.
- SNL supported the judging of NYSERDA LDES solicitation bids. Participating in the NY Grid scale battery fires investigation.
- Actively working to participate in new solicitation bids in collaboration with DOE FOAs and ES4SE (Energy Storage for Social Equity) demonstration projects.

A few examples of CEC - EPIC Program Energy Storage Projects



Courtesy of Mike Gravely, CEC

100 Hour LDES Demonstration awards

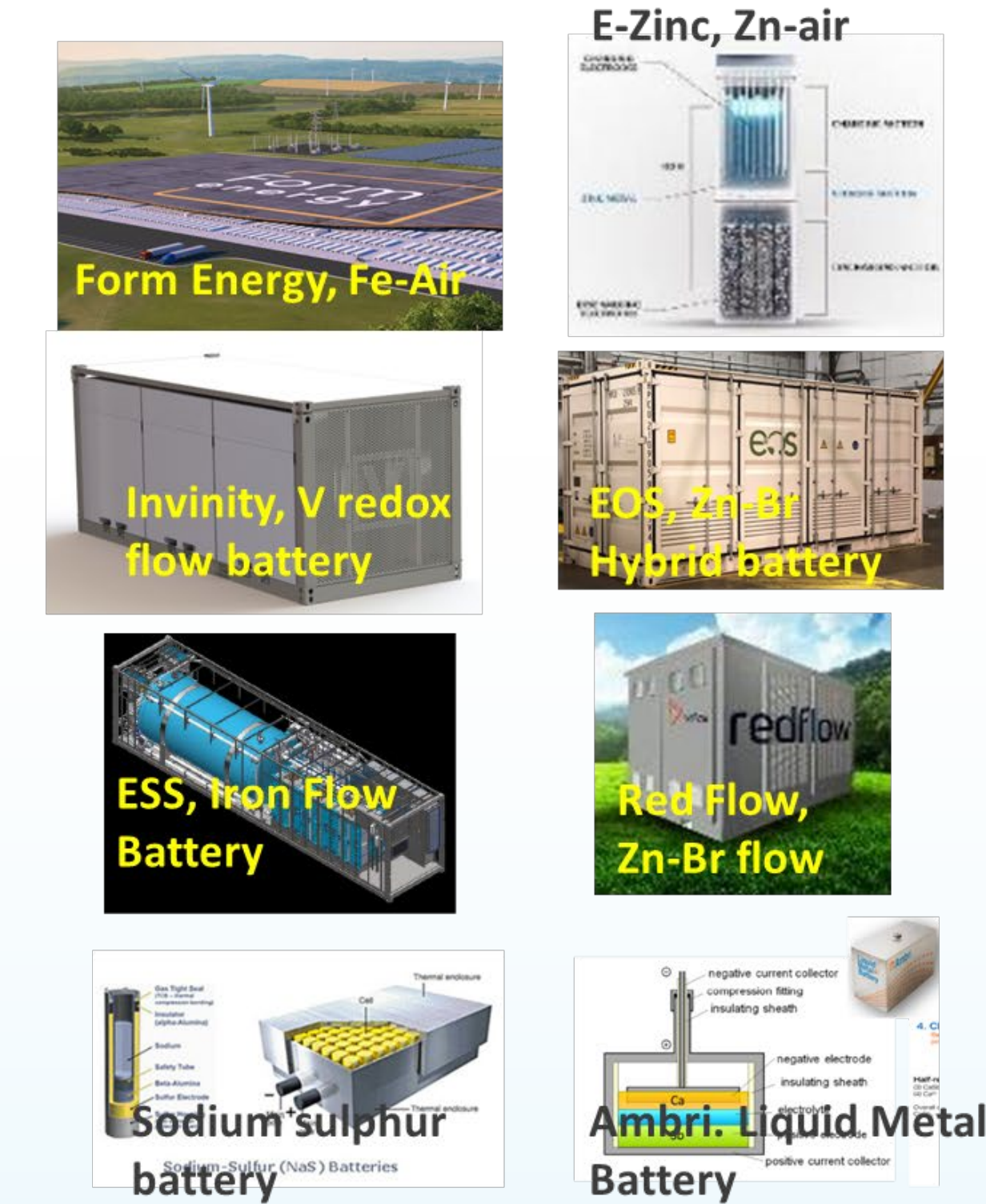


A Few Examples of Different Non-Li LDES Technologies

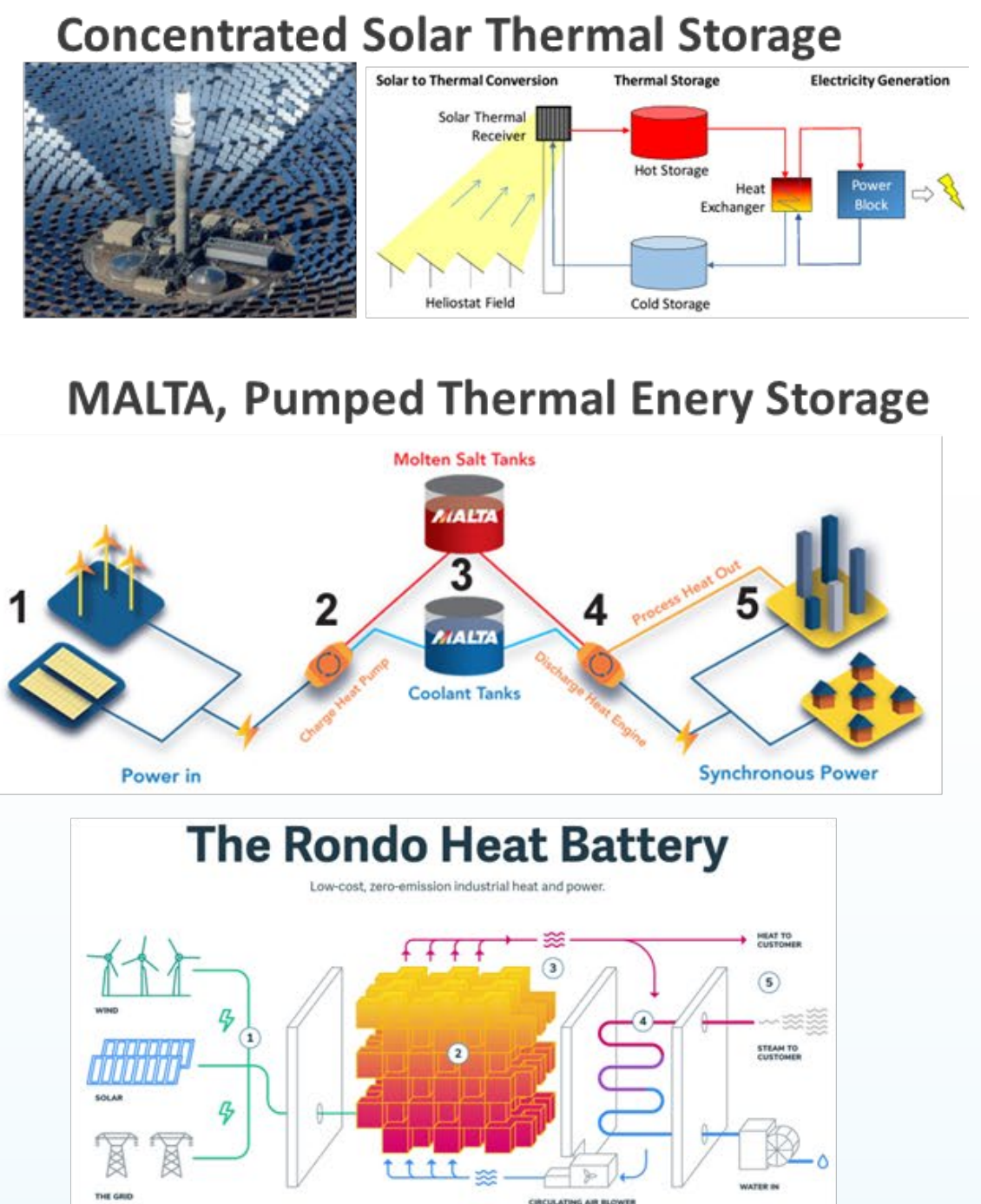
Mechanical Energy Storage



Electrochemical Energy Storage



Thermal Energy Storage



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