Energy storage within SB 100

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CALIFORNIA ENERGY STORAGE ALLIANCE

About CESA

The **California Energy Storage Alliance (CESA)** is a 501c(6) membership-based advocacy group committed to advancing the role of energy storage in the electric power sector through policy, education, outreach, and research. CESA was founded in January 2009 by Janice Lin and Don Liddell.

CESA's mission is to make energy storage a mainstream energy resource in helping to advance a more affordable, clean, efficient, and reliable electric power system in California.

85+ CESA Members

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Key Takeaways and Recommendations

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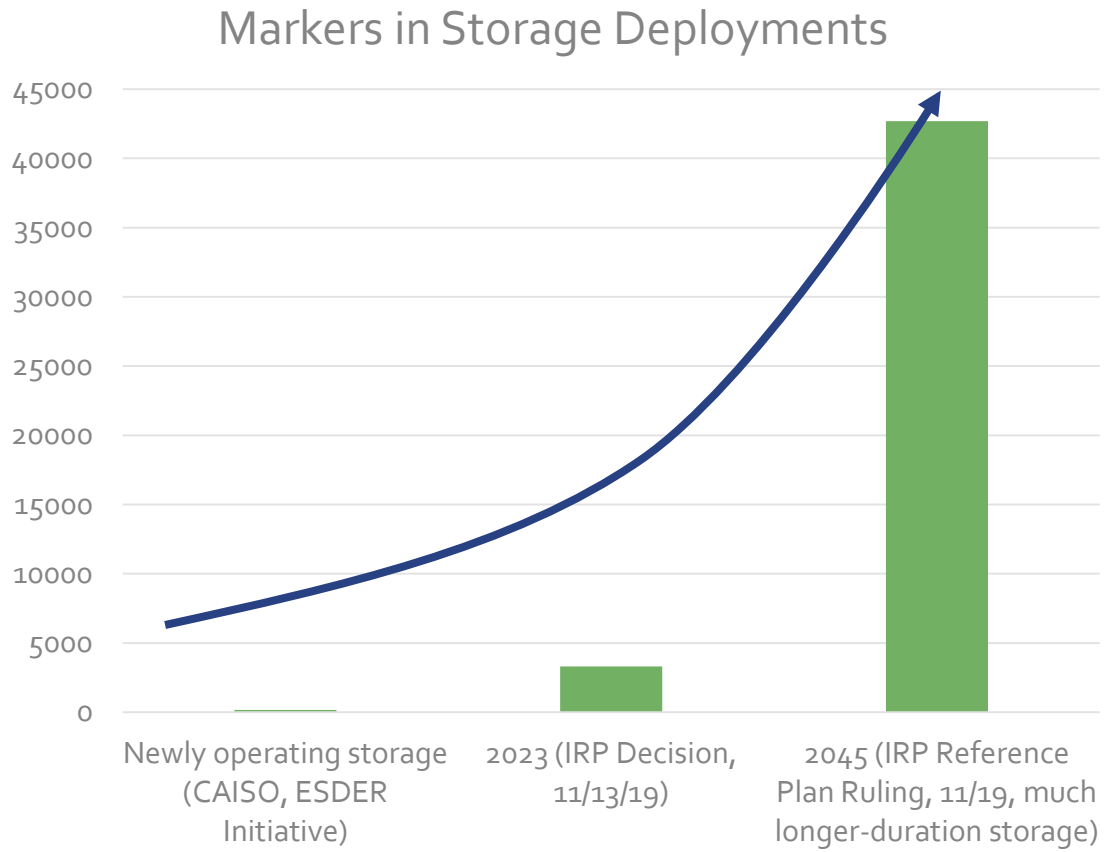
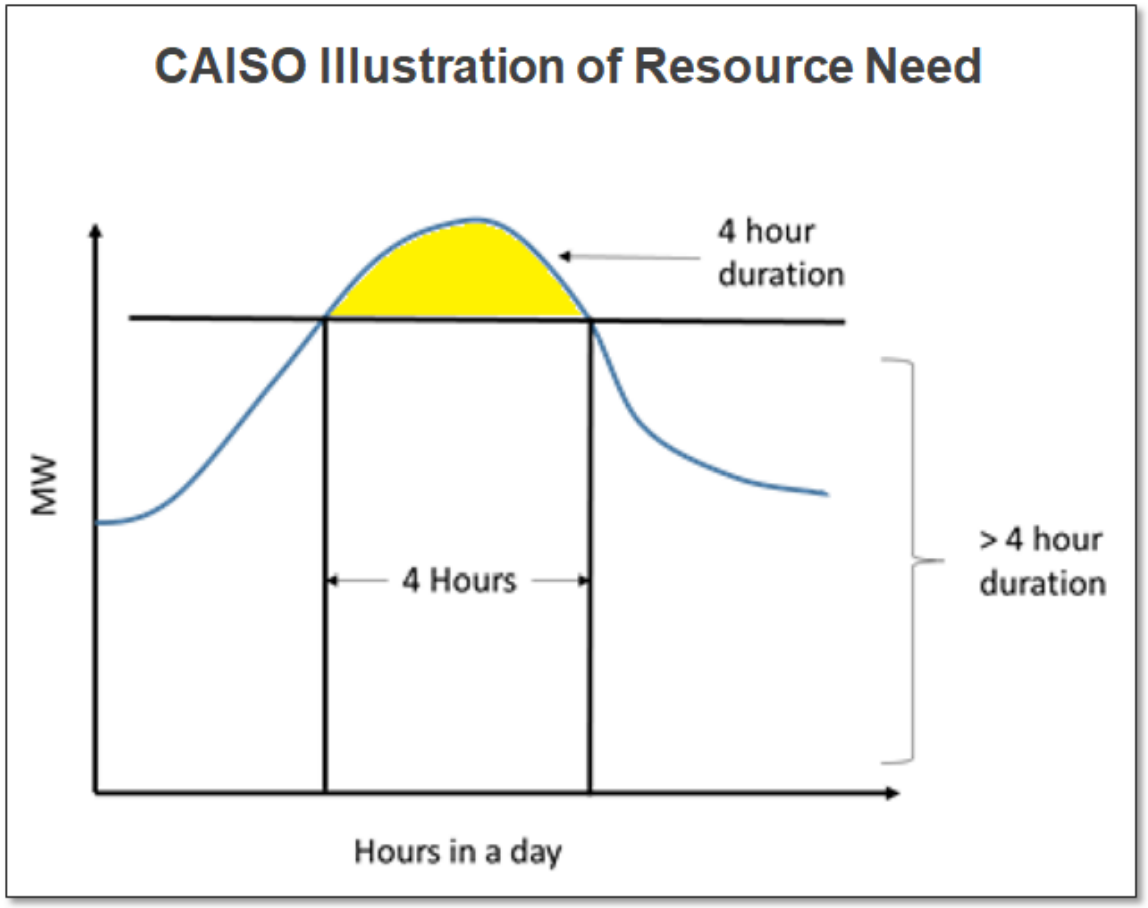
- Energy storage solutions are essential to deep renewable integration and to the transition away from fossil-fueled generation
- The storage needs for CA are mammoth!
- CA should continue to develop its energy storage tool-kit to be ready:
  - Get started now
  - Explore storage diversity
  - Build longer-duration storage
  - Mitigate resiliency with resources that can be useful year-round
  - Actualize MUAs

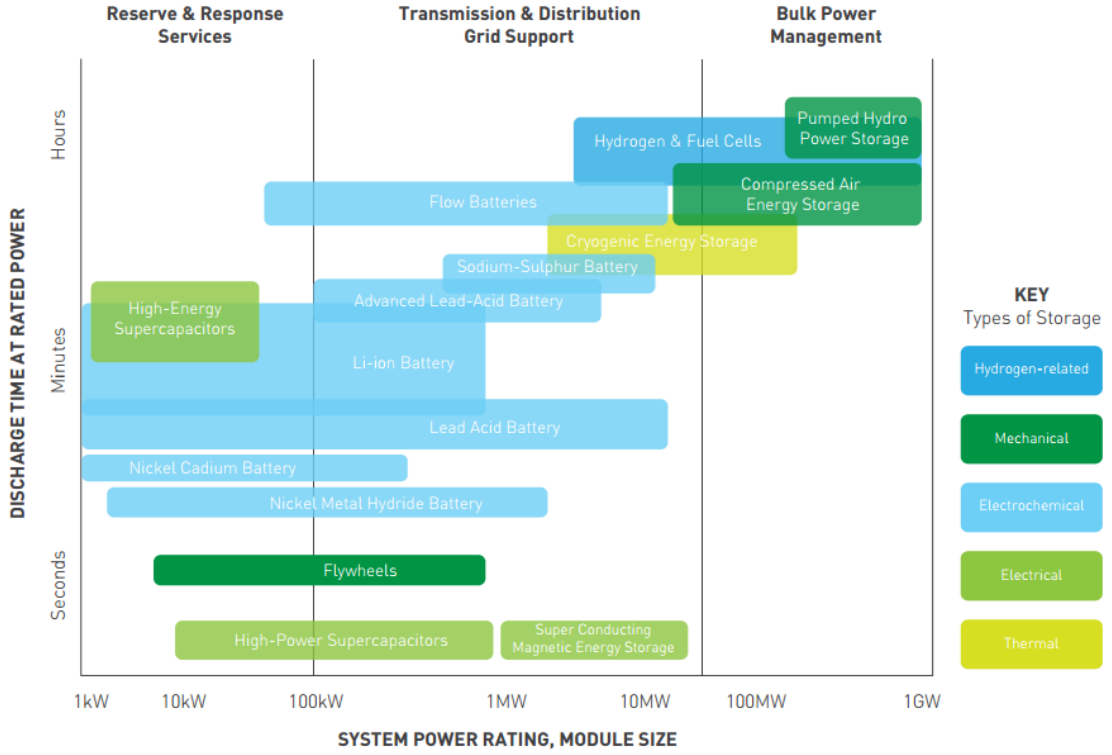
Storage is essential to meet future grid needs





A tool-kit with many storage technologies will help in SB 100 acheivement

- Energy storage is a resource class compromised of many technologies with distinct applications and degrees of maturity
- The tool-kit is being built but more diversity and sophistication should be pursued
  - Tool-kit should meet grid needs: reliability, renewable shifting, local 'long-hold', flexibility, resiliency, customer, hybridization.

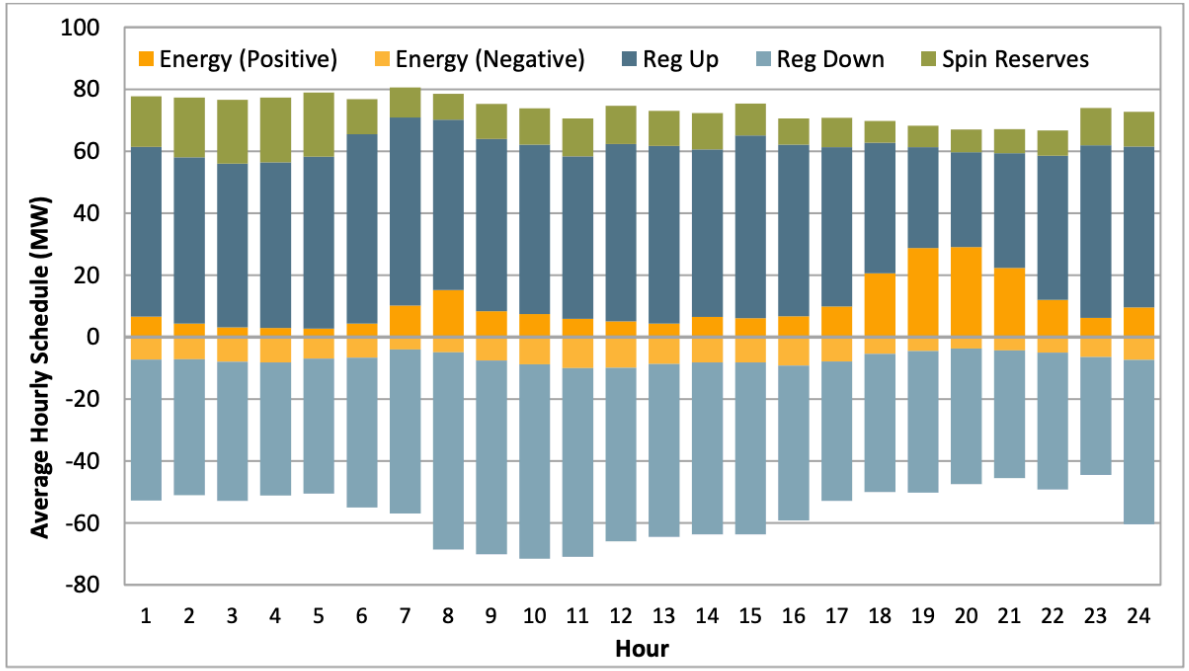


Graph source: University of Strathclyde's Energy Storage Research Institute, Technology Options, http://www.esru.strath.ac.uk/EandE/Web_sites/14-15/Industrial_autonomy/2_1_technology_options.html

What CAISO storage does today

- ~ 150 MW of installed energy storage capacity in CA (excluding pump-hydro)
  - CAISO capacity ~ 50,000 MW
- Batteries to date often scheduled for Regulation Service
  - 'Premium' product so compensated most highly
  - Market will saturate quickly, e.g. 400-800 MW.
  - Regulation is $189 million out of $10.8 billion a year
- More 'energy arbitrage' roles expected as penetrations of storage increase

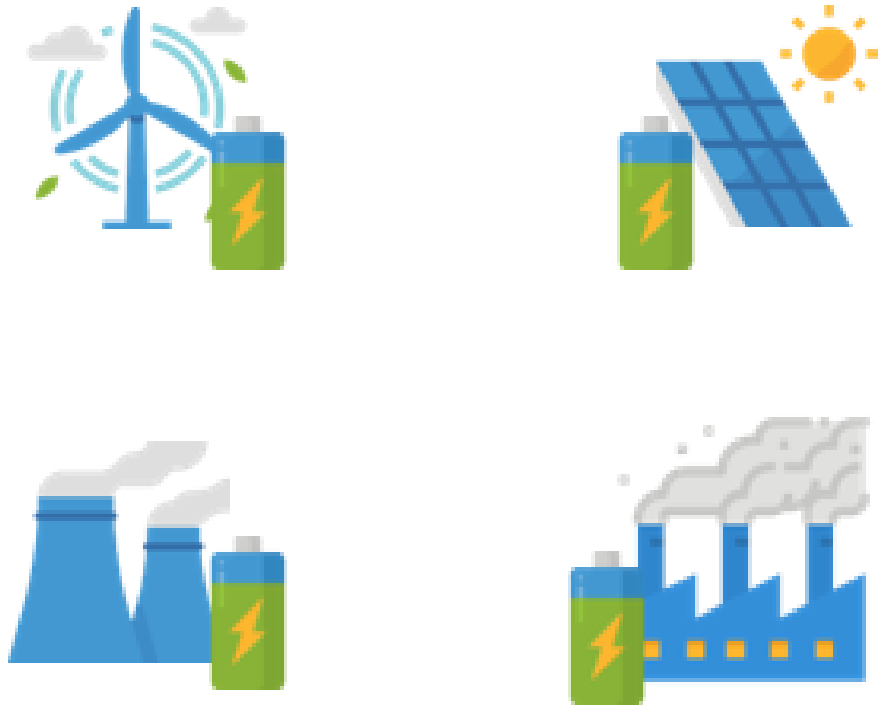
Figure 1.11 Average hourly battery schedules (2018)



Graph source: CAISO, Annual Report on Market Issues and Performance, 2018, p. 39, http://www.caiso.com/Documents/2018AnnualReportonMarketIssuesandPerformance.pdf

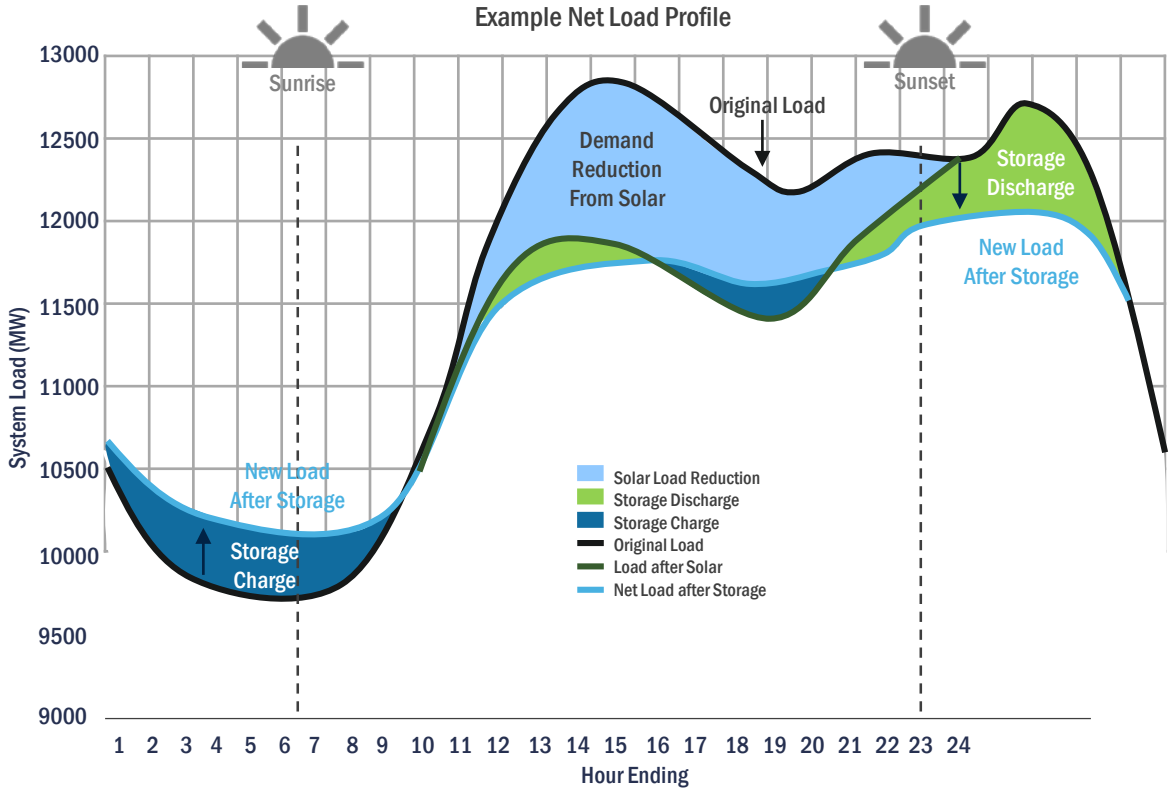
What storage will do in the future

- Storage is fundamental to further renewable integration
  - Firm renewable generation
  - Enable time arbitrage
- Storage can accelerate the transition away from fossil-fueled generation
  - Improve operational characteristics
- These applications are technologically feasible today;
- Regulatory and market structures need to continue to evolve



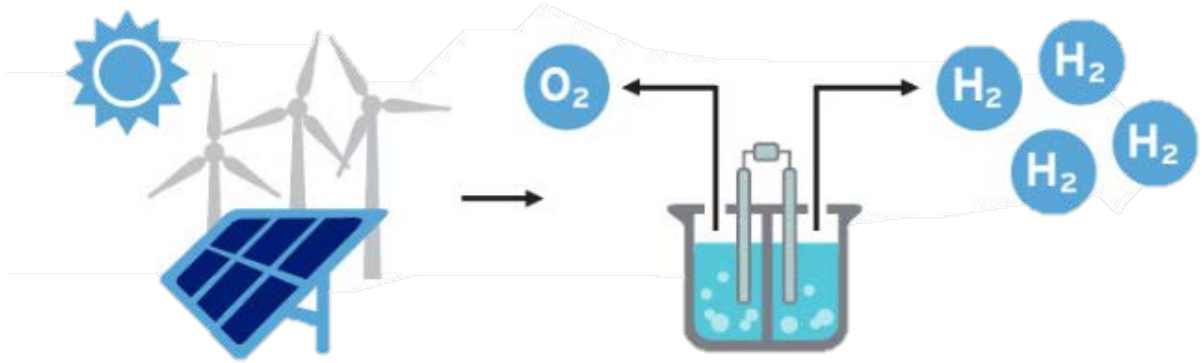
What storage will do in the future

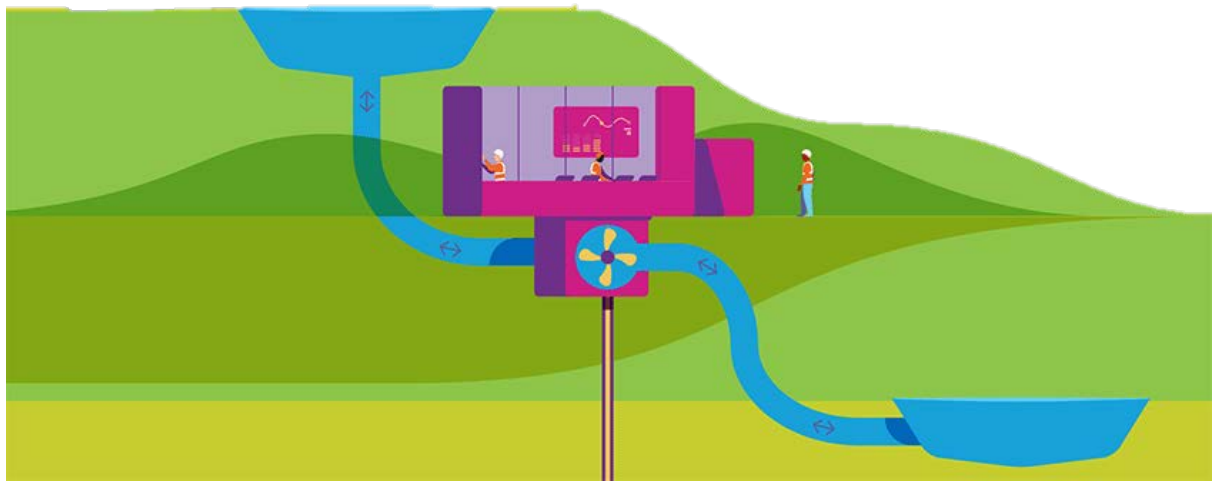
- Energy storage is projected to provide daily arbitrage of solar resources

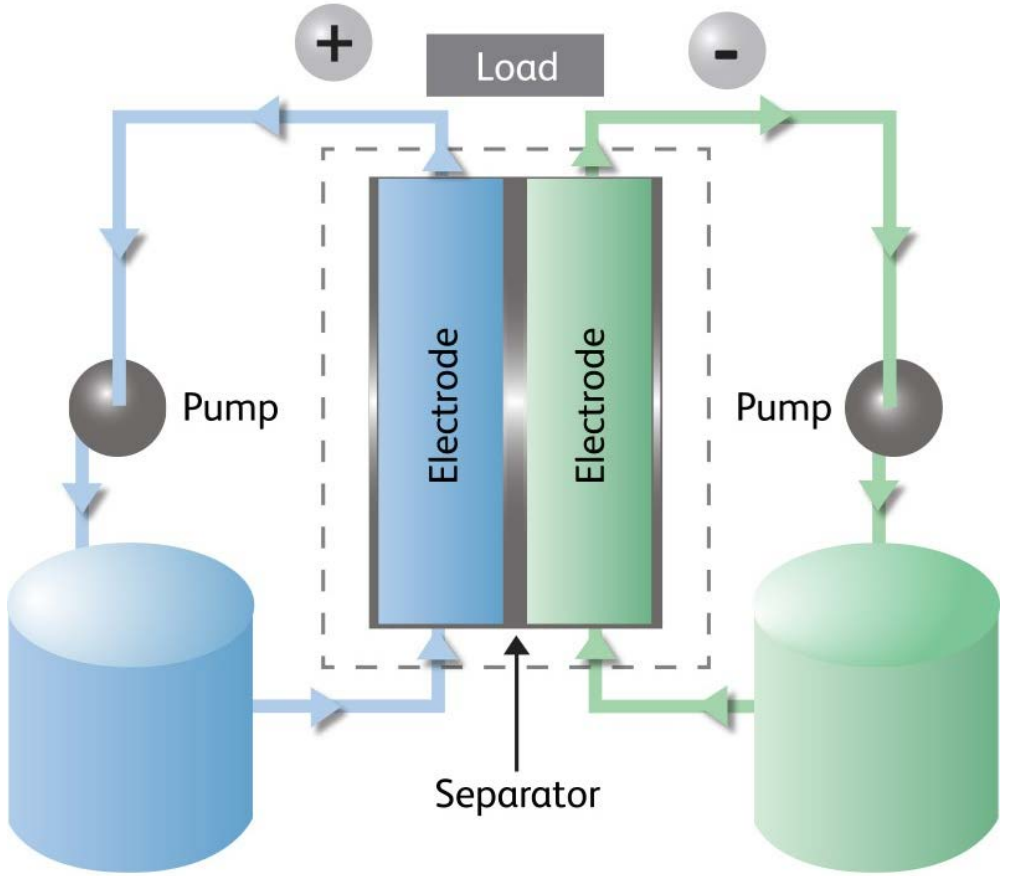


Source: Adapted from Massachusetts Department of Energy Resources, Mass Clean Energy Center, "State of Charge: A Comprehensive Study of Energy Storage in Massachusetts" (2017) https://www.mass.gov/files/2017-07/state-of-charge-report.pdf

CESA supports competition, and many technologies want to serve CA Storage needs







Recommendations

- Plan for the essentialness of energy storage
  - Continue building our tool-kit – ensure that we are ready
  - Grow/mature industry sectors that will be important, e.g. long-duration
  - Unleash and properly value storage: RPS rules, hybrids, MUAs, resiliency, fast flexibility, etc.
- Plan ahead to manage scale of increases and allow useful competition

Thank you!

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