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Item 13: Indian Energy LLC.

October 12, 2022, Business Meeting

Mike Gravely, Team Lead and Senior Electrical Engineer
Energy Systems Research Branch
Energy Research and Development Division

Energy Storage Benefits to Californians

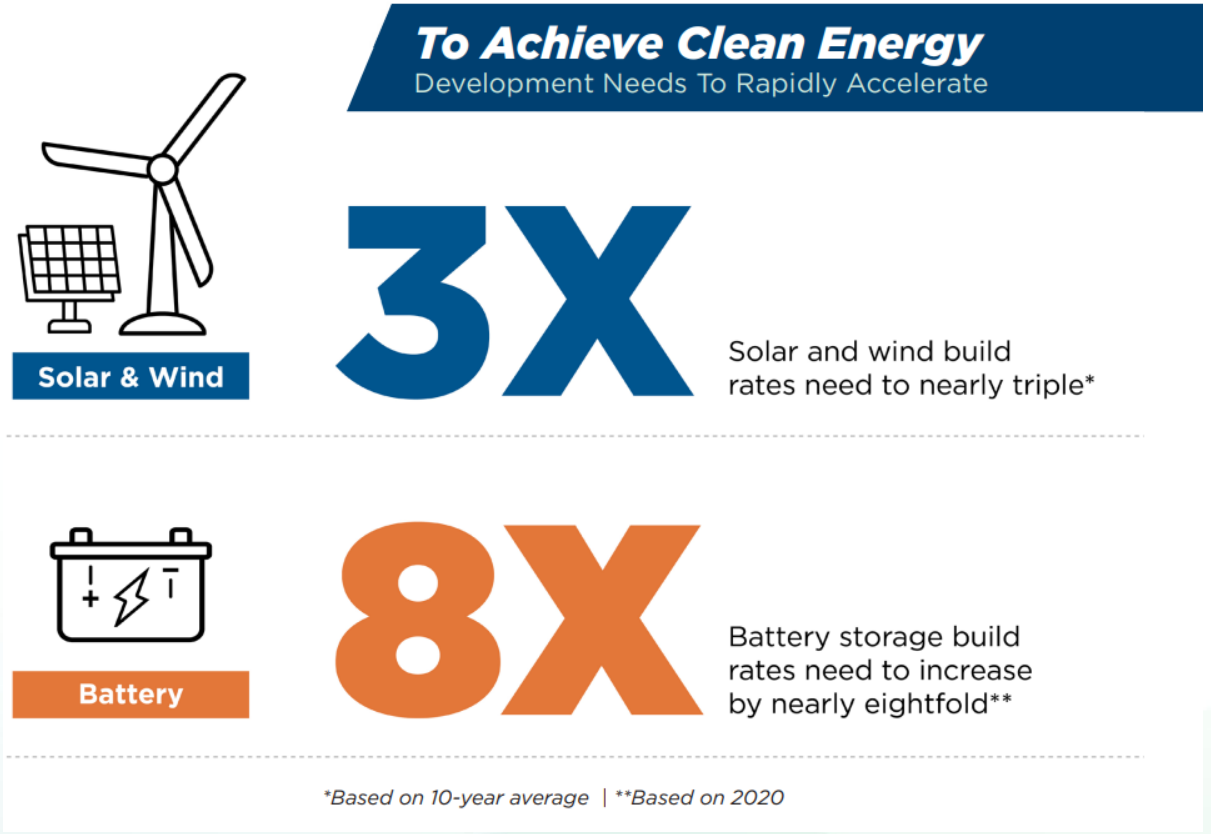
- 3.6 GW battery storage currently installed
- 15 GWs battery storage needed by 2032 (per CPUC)
- 1 GW identified for Long Duration Energy Storage
- 40 – 50 GWs of energy storage needed by 2045

California
Clean Electricity Resources

	Existing Resources	Projected New Resources	
	2019*	2030**	2045**
Solar (Utility-Scale)	12.5 GW	16.9 GW	69.4 GW
Solar (Customer)	8.0 GW	12.5 GW	28.2 GW
Storage (Battery)	0.2 GW	9.5 GW	48.8 GW
Storage (Long Duration)	3.7 GW	0.9 GW	4.0 GW
Wind (Onshore)	6.0 GW	8.2 GW	12.6 GW
Wind (Offshore)	0 GW	0 GW	10.0 GW
Geothermal	2.7 GW	0 GW	0.1 GW
Biomass	1.3 GW	0 GW	0 GW
Hydrogen Fuel Cells	0 GW	0 GW	0 GW
Hydro (Large)	12.3 GW	N/A†	N/A†
Hydro (Small)	1.8 GW	N/A†	N/A†
Nuclear	2.4 GW	N/A†	N/A†

Need Portfolio Approach to Energy Storage

- Lithium-ion is dominant technology for energy storage.
- Lithium-ion has several challenges including supply chain security and safety.
- Reliance on lithium-ion could impede state's ability to meet its clean energy goals.
- Diverse set of energy storage technologies are needed.
- Non-lithium technologies struggle to compete with more mature lithium-battery systems



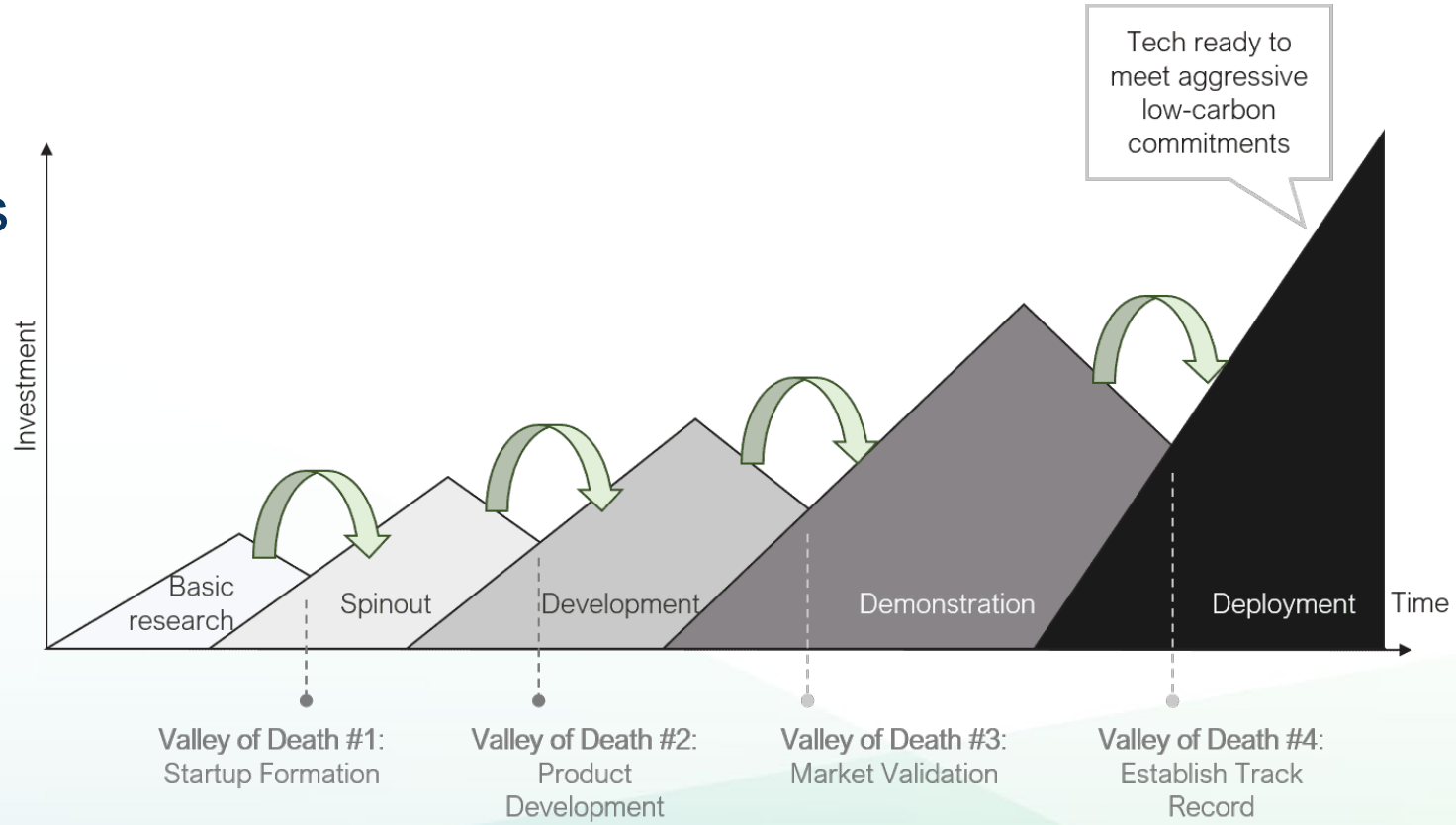
CEC Programs Provide a Bridge to Bankability

Electric Program Investment Charge

- Supports new technologies across the earlier stages.

LDES Program

- Fills a critical funding gap in the later stages.



Source: https://www.third-derivative.org/blog/climate-techs-four-valleys-of-death-and-why-we-must-build-a-bridge

Long Duration Energy Storage 2023 Lookahead

CalSEED (applications due winter 2023)

- Proof-of-concept and prototype development

RAMP (applications due winter 2023)

- Pilot-production manufacturing

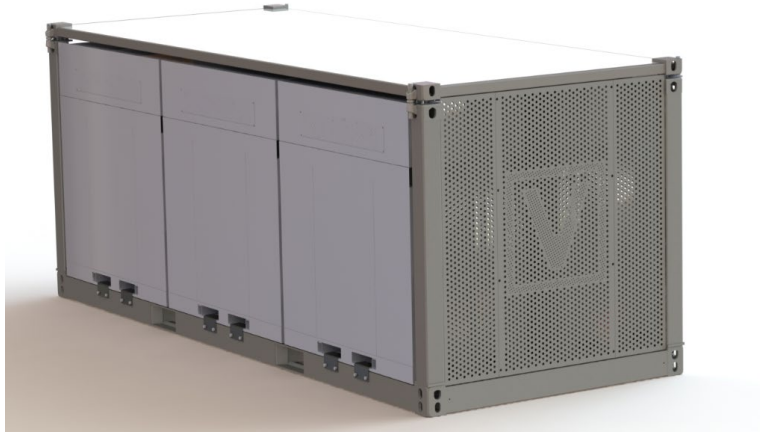
Federal Cost Share (application due date is specific to FOA)

Large non-lithium LDES Competitive Solicitation(s) (to be released in 2023)

- $50 - $180 million in total funding (EPIC and LDES)
- Public workshop to solicit input on solicitation design and requirements

CEC EPIC Program has Extensive History of Energy Storage Research

- Over $100 million invested by CEC in energy storage through 2020
- Field demonstrations of non-lithium-ion long duration energy storage
- 8 demonstrating 10+ hours of energy storage duration
- 3 early-stage grants providing up to 100+ hours of energy storage duration



Selection Criteria for Initial LDES Grants

- Previously awarded EPIC competitive solicitation
- Met or exceeded technical milestones
- Can achieved scale and duration targets (> 1 MW for 10+ hours)
- Successful field demonstration history
- Previously attracted significant private capital to scale-up manufacturing
- Pathways to 50-100 MW system in time for 2025-30 utility procurement
- Can support near-term grid reliability

Viejas Project Overview

Microgrid with LDES on the Viejas Band of Kumeyaay Indians Reservation

- 60MWh hybrid system (flow battery and Zinc hybrid system)
- Integrated microgrid system with 15MWs PV and distribution system upgrade
- Provided critical support for key tribe facilities
- Provides emergency services to community during outages
- Provide grid resiliency support when needed

Non-Lithium-Ion LDES Project Overview

Non-Lithium-Ion Long-Duration Energy Storage Technologies

- Zinc electrolyte-based chemistry
- No rare earth minerals required, de-risked supply chain
- Wider operating temperature range
  - -20 to 45°C vs 15 to 25°C (Lithium-Ion)
- Designed and manufactured in United States

- Flow Battery chemistry
- Safe and stable chemistry of the vanadium electrolyte
- Can perform in the field for 25+ years
- Deployed around the world

Staff Recommendation

- Approve grant agreement
- Adopt staff's determination that project is exempt from CEQA