Pacific Northwest
NATIONAL LABORATORY

Energy Storage Regulatory Issues: Data and Information Implications

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Energy Storage Workshop

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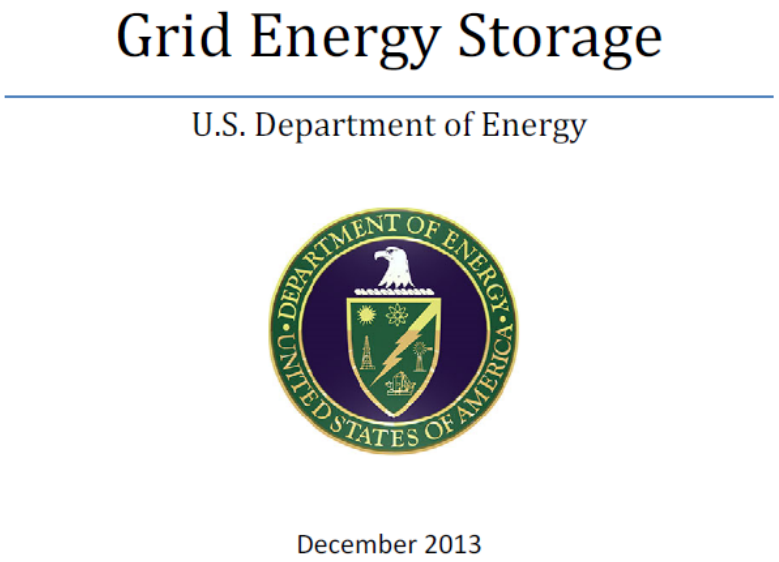
Agenda

- Office of Electricity's Energy Storage Program Overview
- Emerging Regulatory Issues for Energy Storage
- Data and Information Implications

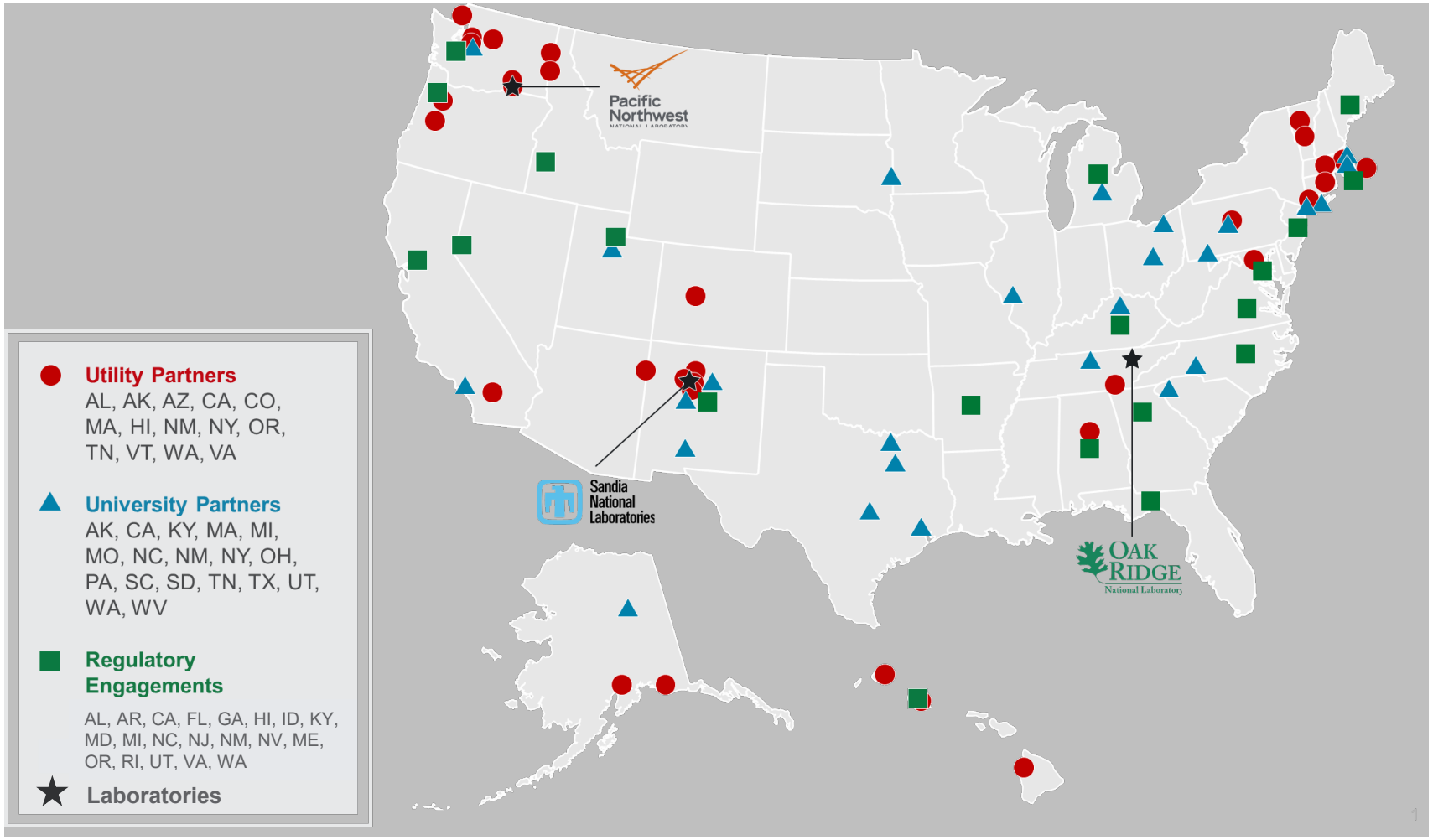
Energy Storage Program Overview

The Department of Energy's Grid Energy Storage report (2013) identified a four-pronged strategy to facilitate energy storage deployment:

- Cost-competitive energy storage technology development;
- Validated reliability and safety;
- Equitable regulatory environment; and
- Industry acceptance



Energy Storage Program Engagements



State Regulatory Issues: A Tale of Two Workshops

It was the west of times,

Energy Storage Seminar for Western State Regulatory Staff (2017)

Prospective Tone

- Only 2/10 states had proceedings involving storage
- What will be the practical implications of energy storage?
  - What policies/regulations will incent storage investments?
  - How will regulations need to be adapted?
  - How should storage be reflected in resource planning?
  - What are best practices for pilot or procurement program design?

21 Months

It was the east of times

Southeastern Energy Storage Symposium and Workshop (2019)

Reactive Tone

- 7/9 states had proceedings involving storage
- How can we manage the practical implications of storage?
  - Storage deployment happening independent of policy direction
  - How do we determine prudence of proposed utility investments?
  - Developer/utility debates regarding optimal approach to hybridization
  - “In the weeds”: Interconnection, taxation, certification, ownership

Energy Storage Regulatory Issues

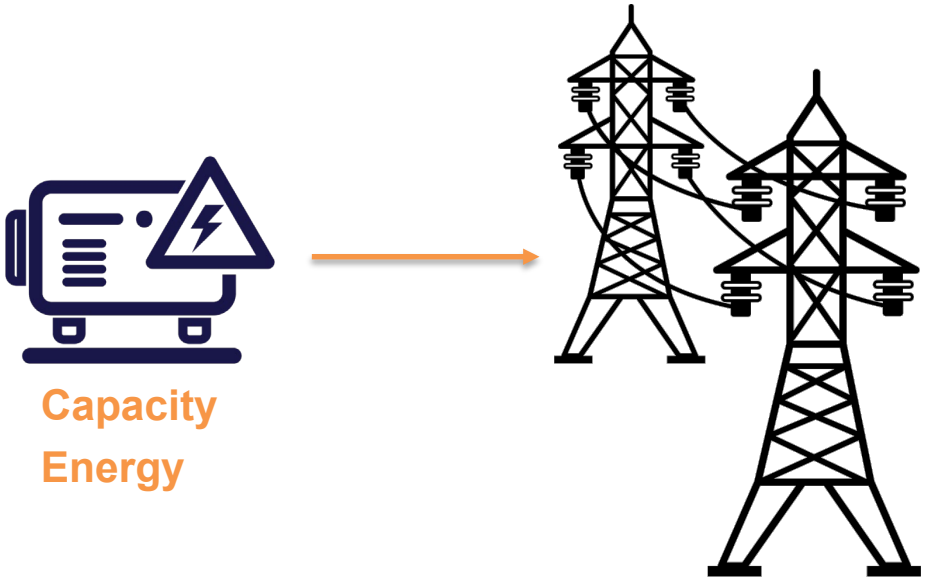
A quick inventory:

- **Resilience:** What is storage's role in improving grid resilience, and can it reduce the cost of doing so by providing other grid services?
- **Hybrids (especially solar + storage):** How can optimal interconnection (AC or DC) and charging regimes be determined?
- **Modeling:** What are best practices for including energy storage in resource plans? Are there accessible tools that DOE and the labs can provide?
- **Retrofits:** Can existing generation resources be cost-effectively and fairly (to customers and other developers) retrofit with energy storage? What are the engineering challenges?
- **Ownership models:** Who should own energy storage assets? What are the pros and cons to various ownership models?
- **Interconnection:** What are best practices for safely interconnecting energy storage?
- **Taxation:** States tax different assets in different ways (generation, transmission, etc.); how does a multi-use asset like storage factor in?
- **Certification:** Many states require utilities to receive pre-certification for generation and transmission infrastructure. Should storage be defined as a generator for that purpose?

Resilience

The advent of cost-competitive energy storage options has enabled us to go from:

Mission-critical resilience

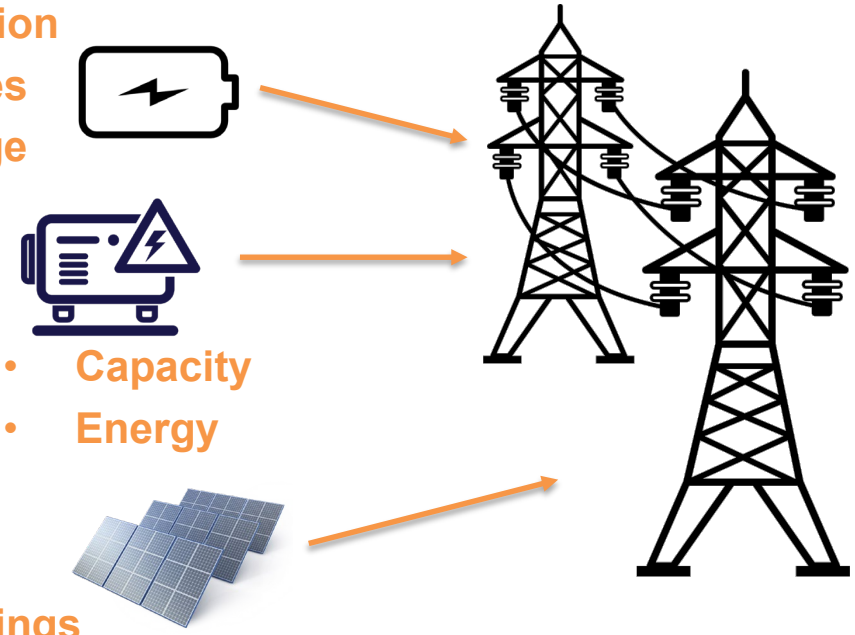


- Capacity
- Energy

to

Economic Resilience

- Regulation
- Reserves
- Arbitrage
- …



- Capacity
- Energy

- Capacity
- Energy
- Fuel Savings

- Limited opportunities for grid participation
- High cost
- Limited to facilities in which resilience is mission critical

- Increased opportunities for grid participation
- Offsetting revenues reduce system costs
- Viable resilience for broader range of facilities

Resilience

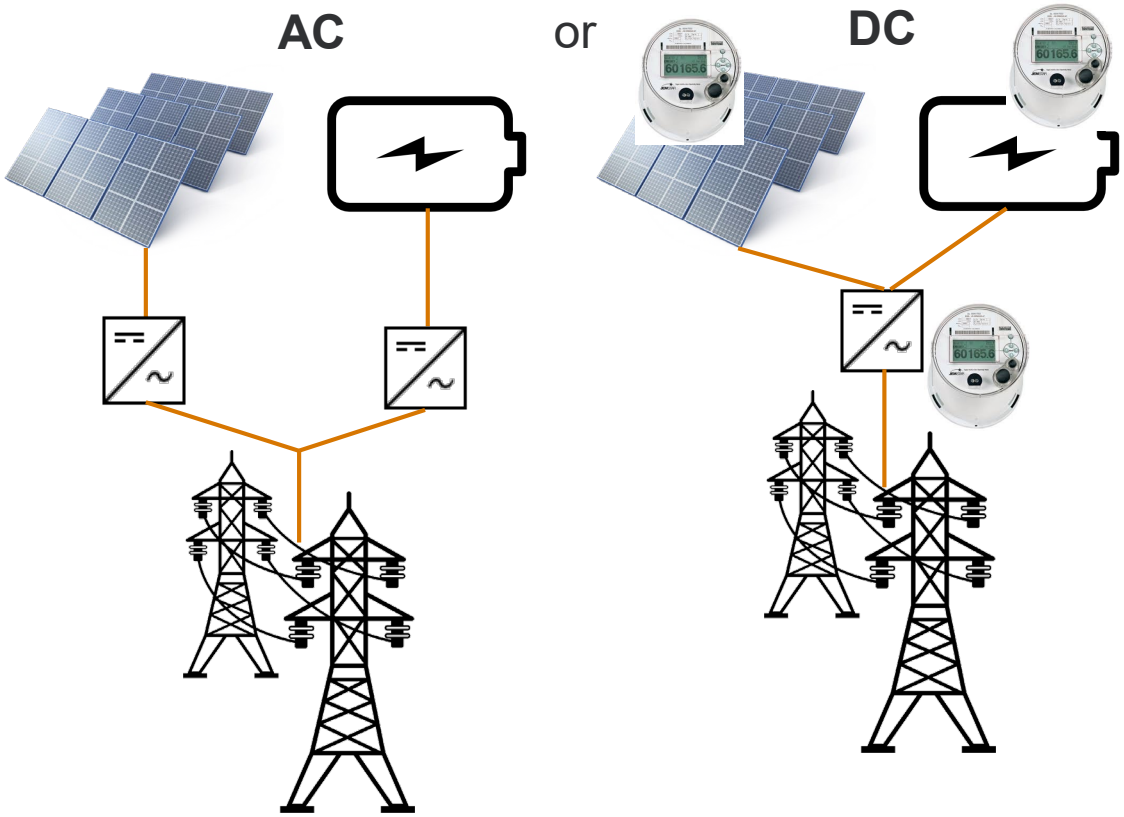
Storage has significant potential to cost-effectively increase grid resilience, but there are several lingering questions:

- What would resilience metrics look like?
  - Reliability planning is facilitated by metrics and standards – gives planning models the variable for which they must solve
  - Resilience is still a subjective concept – no metrics, standards, or even a definition
- How can resilience investments be cost effective?
  - Resilience is rarely needed – few opportunities to recover costs
  - How can optimal resilience investments be identified?
  - What infrastructure and regulatory mechanisms are necessary to enable provision of grid services during normal operating procedures?
- Who should own these assets, and how should they be compensated?
  - Where does utility ownership make sense?
  - How can rates and tariffs incent customer usage of distributed resources in grid-beneficial manners?
  - Who is benefitting from the resilient assets? How can cost allocation principles be adapted when the answer is “it depends”?

Hybridization

To optimize a solar + storage asset based on project needs, three technical questions must be addressed:

Coupling:



Metering:

Dual

or

Single

Charging Regime:

Standard	Solar charging requirement
Certain utility RFPs	100%
PURPA, ITC Eligibility	75%
Other	???

Relaxing the charging requirement may allow the storage component to provide a broader range of services. What are the economic tradeoffs?

Data and Information Implications

Given these issues, what types of data and information would be useful? Some thoughts for DOE agencies and the labs to consider:

- Clear, accessible information about different storage technologies and their characteristics
  - “Energy storage” refers to numerous technologies, each with different strengths and weaknesses
  - Lithium-ion batteries are particularly sensitive to how they are used, which can have significant impacts on their value and useful life
  - Better information about the tradeoffs of different technologies can better inform modeling and investment decisions
- More detailed, holistic cost information
  - Publicly available cost trends tend to focus on module costs and exclude additional hardware, software, and “soft” costs involved in a project
  - As with PV, technology costs can only decline so far; improving cost effectiveness for storage will require greater attention to soft costs

Data and Information Implications

Given these issues, what types of data and information would be useful? Some thoughts for DOE agencies and the labs to consider:

- A single, reliable database for existing energy storage assets
  - DOE-OE Global Energy Storage Database lists 377 bi-directional electricity storage projects in U.S.; most recent EIA Form 860 data lists 131 projects
  - Both track use cases, but don't use the same list; would help to define a resilience use case
  - Help regulators/policymakers answer the questions: Where and how is storage being used?

- Clearinghouse of pilot project reports
  - States and utilities have conducted dozens of storage pilots in last decade, but lessons have not been clearly communicated
  - A single, searchable database of pilot studies, findings, and recommendations would be a valuable tool to inform subsequent pilots and procurement design

Thank you

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