UM 1751 WORKSHOP 1

Implementation of HB 2193, Section 3 (1)

Energy Storage Guidelines

January 27, 2016

***Reminder* – Please add your name to the sign in sheet.**

Agenda

- Welcome and introductions
- Overview of HB 2193
- Energy storage elsewhere
- Goals for Phase 1
- Discuss questions 1-5
- Phase 1 scheduling
- Next steps, comments request

Welcome & Introductions

- Welcome and thank you for your participation.
- Reminders:
  - Sign In: Please add your name & contact information to the sign-in sheet.
  - Phone Participants Sign in – please email your name and contact information to elaine.prause@state.or.us to “sign-in” electronically.
  - Microphone Use – please speak into the microphone (5 inches away) for the benefit of phone participants.
  - Notice List – Sign up for the UM 1751 notice list by emailing a request to puc.hearings@state.or.us (include UM 1751 in subject line).

Overview of HB 2193

- Section 1. Definitions
- Section 2. Mandates

  Electric company shall procure on or before January 1, 2020

  - Capacity to store at least 5 MWh
  - May not exceed 1% of company's peak load for 2014
- Section 3(1). Phase 1, Guidelines for project submittals
- Section 3(2). Phase 2, Utilities submit proposals
- Section 3(3). Phase 3, Commission review and procurement

Overview of HB 2193

Phase 1	Phase 2	Phase 3
PUC adopts guidelines by 1/1/17 for proposals submitted in Phase 2 • Rule or Order, PUC staff prefer Order • Docket UM 1751 • Workshops start January 2016	**Utilities submit one or more ES project proposals to the commission by 1/1/18** • Data to identify potential system locations • Complements other planning efforts • Project details and cost-effectiveness evaluation • Treatment of confidential information	**Commission may authorize projects** • Consistency with guidelines • Reasonable and in the public interest • May have above market cost
2016	**2017**	**By 2020**

Phase 1: Guidelines (by 1/1/17)

(a) Examine the potential value of applying energy storage system technology

A. Deferred generation and T&D
B. Reduced need for generation during peak demand
C. Improved renewable resource integration
D. Reduced greenhouse gas emissions
E. Improved reliability of T&D systems
F. Reduced portfolio variable power costs
G. Any other value reasonably related to application of energy storage

Phase 1: Guidelines (by 1/1/17)

(b) Consider ways in which to encourage electric companies to invest in different types of energy storage systems

(c) Consider any other factor reasonably related to the procurement of qualifying storage systems

Phase 2: Utilities submit proposals

a) Submit by 1/1/18

b) Potential Assessment
   - "Current operations and system data including customer side data, distribution data, transmission data, and data related to the existing energy storage system".
   - Identify areas…with opportunity to incentivize the value potentially derived from ESS*
   - How the ESS would complement other proposed planning actions (IRP linkage)

c) Project description
   - Technical specifications
   - Project cost
   - Benefits to the system – in-state, regional, system wide
   - Cost effectiveness evaluation

d) Treatment of sensitive data

* Energy storage system

Phase 3: Commission review and authorization for development

a) Review for consistency with guidelines, reasonable balance of values for ratepayer and utility operations and costs, in the public interest
b) Commission may authorize utility to develop ESS

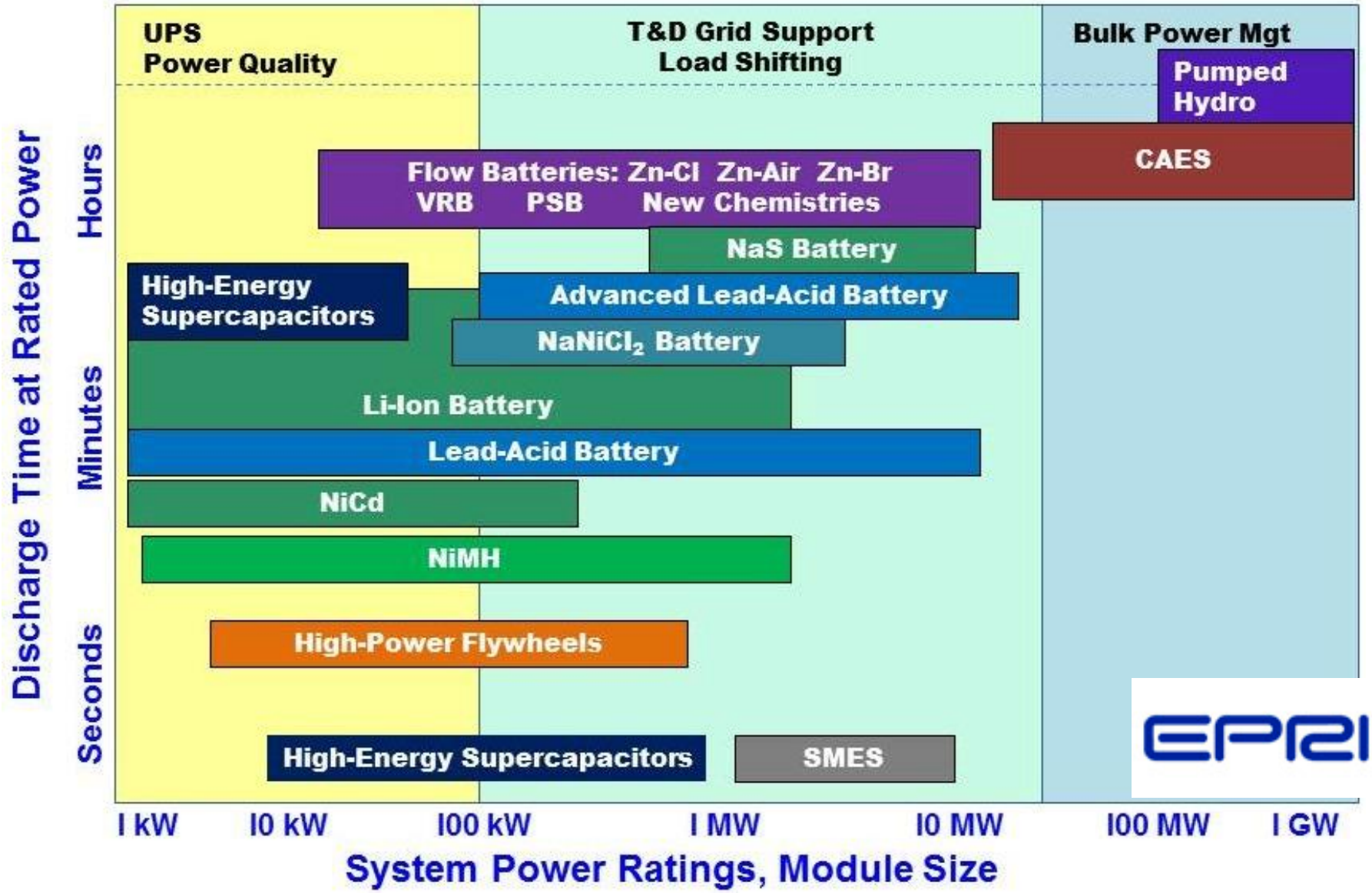
Commission may require use of competitive bidding guidelines prescribed by the Commission

Section 4 – Report to the Legislative Assembly by Sept 15, 2016

Examples of Energy Storage Work

a) Research: USDOE/PNNL/Sandia/RMI/others
b) States:
    a) Oregon
    b) California
    c) Washington
c) Markets: PJM activity

Electrical energy storage (EES) Options



EPRI - Electricity Energy Storage Technology Options 1020676

Examples of Energy Storage Work

PNNL

- Technology development
- BSET – system optimization tool, value stacking
- WA demonstration projects

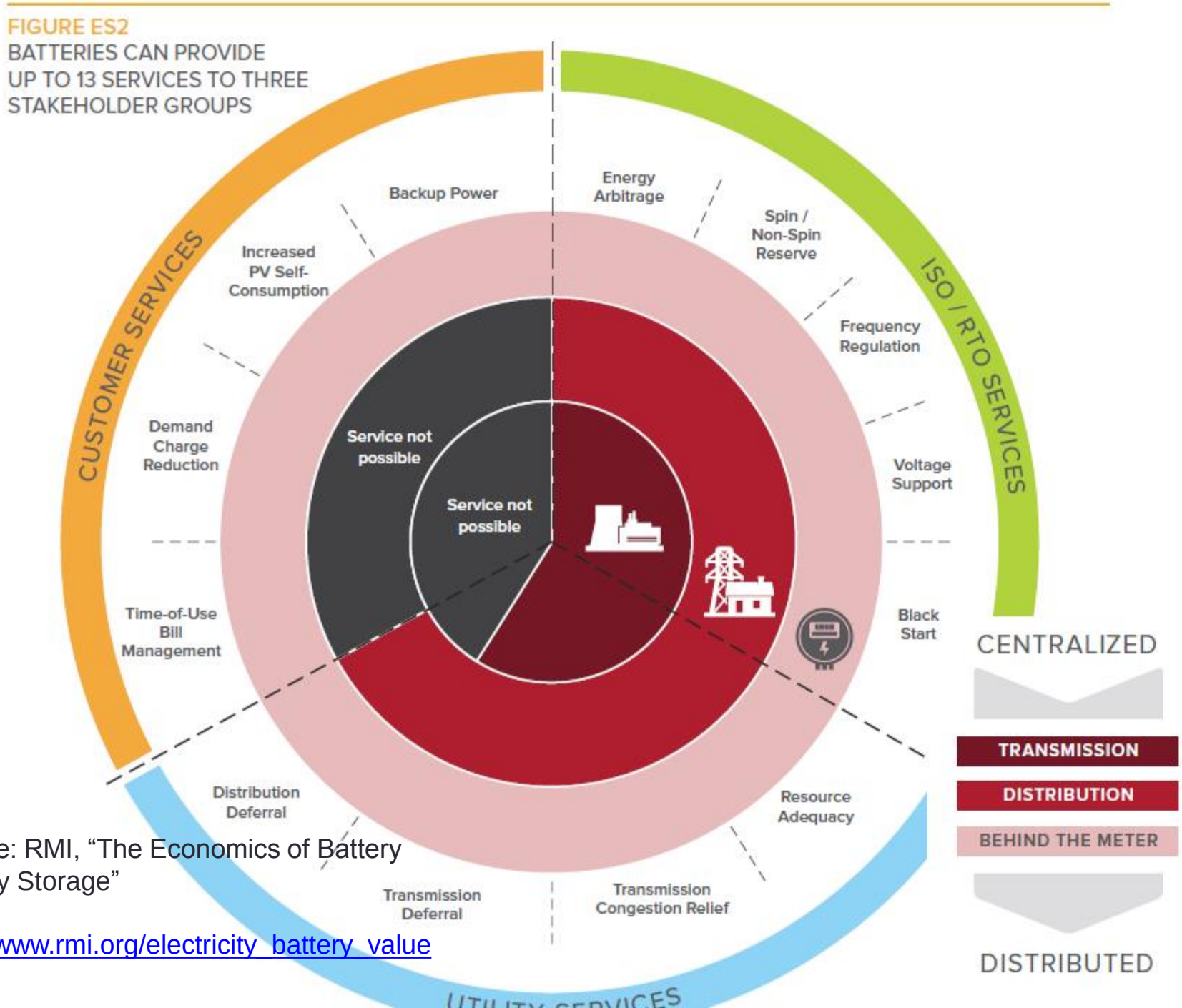
USDOE/Sandia/EPRI

- "DOE/EPRI 2013 Electricity Storage Handbook in collaboration with NRECA"
- Energy Storage Valuation Tool - ESVT
- "Methodology to Determine the Technical Performance and Value Proposition for Grid-Scale Energy Storage Systems"
- "Evaluating Utility Owned Electric Energy Storage Systems: A Perspective for State Electric Utility Regulators"

Sandia Labs, Table 1: Functional uses for EES systems and their associated value metrics

Functional Use		Value Metric	Possible Analysis Approaches
Bulk energy	1. Electric Energy Time Shift	The price differential between energy price during charge and discharge. This inclues: arbitrage, RE firming and integration,	Production cost modeling; optimization using historical and projected data; use specific valuation tools
		Electric supply capacity: the avoided cost of new generation capacity to meet requirements	Long term planning models; production cost modeling
T&D	2. Transmission upgrade deferral	The avoided cost of deferred infrastructure	Long term planning models
	3. Distribution upgrade deferral	The avoided cost of deferred infrastructure	Long term planning models
	4. Transmission voltage support	The avoided cost of procuring voltage support services through other means	Power flow modeling
	5. Distribution voltage support	The avoided cost of procuring voltage support services through other means	Power flow modeling
Reserve	6. Synchronous Reserve	The avoided cost of procuring reserve services through other means	Production cost modeling; optimization using historical and projected data; use specific valuation tools
	7. Non synchronous reserve	The avoided cost of procuring reserve services through other means	Production cost modeling; optimization using historical and projected data; use specific valuation tools
	8. Frequency regulation	The avoided cost of procuring services through other means	High resolution production cost modeling; optimization using historical and proejcted data; use specific valuation tools
Customer	9. Power Reliability	The avoided cost of new resources to meet reliability requirements	Distribution modeling: power flow; use specific valuation tools; simple internal modeling
	10. Power Quality	The avoided cost of new resources to meet power quality requirements, or avoided penalties if requirements not being met.	Distribution modeling: power flow; use specific valuation tools; simple internal modeling

“Evaluating Utility Procured Electric Energy Storage Resources: A Perspective for State Electric Utility Regulators”, Bhatnagar, 2012

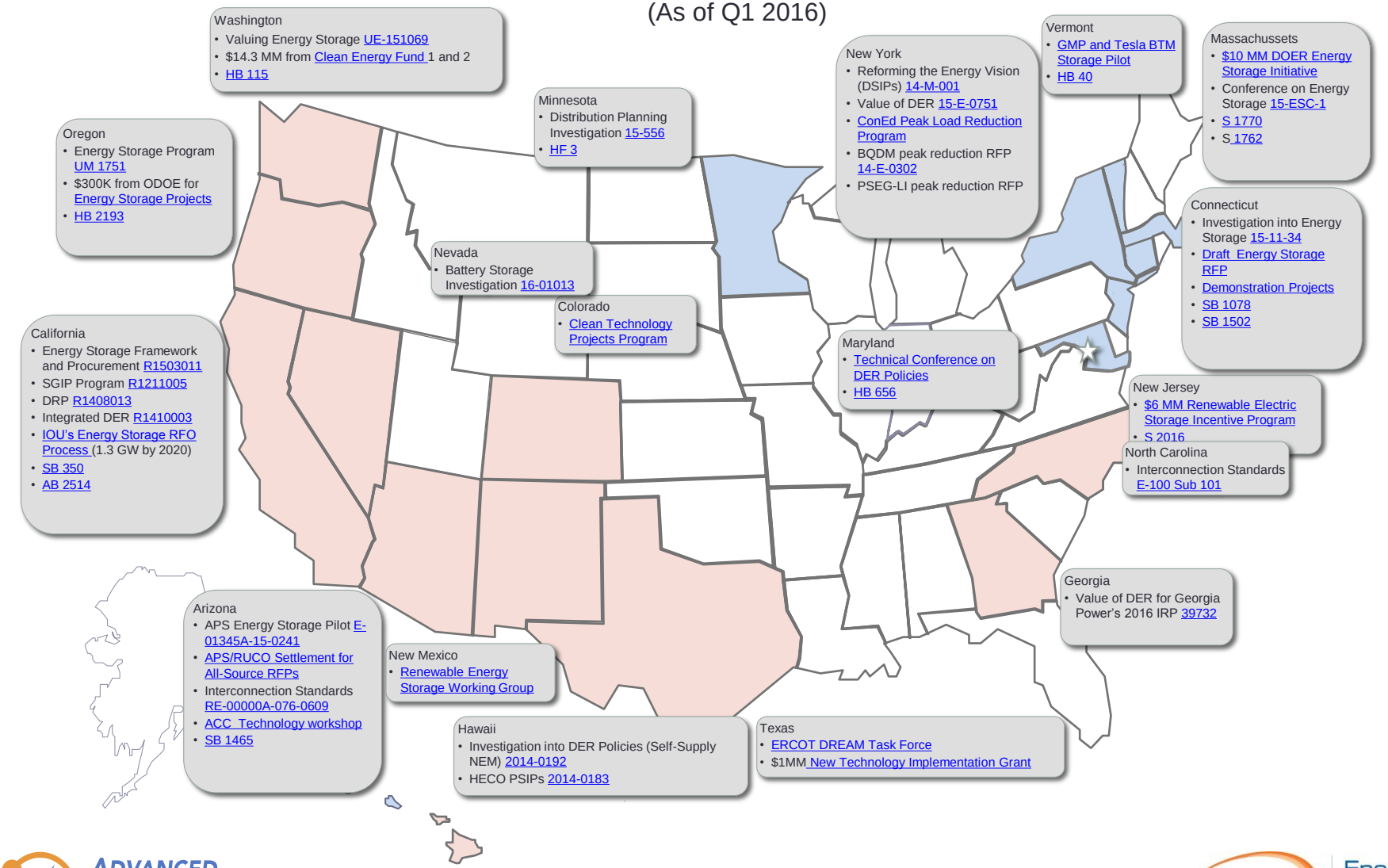


Source: RMI, “The Economics of Battery Energy Storage”

http://www.rmi.org/electricity_battery_value

Key State Regulatory and Legislative Energy Storage Policies and Actions

(As of Q1 2016)



ADVANCED ENERGY ECONOMY

Contact: Coley Girouard, cgirouard@aee.net, 202.309.0647

ESA Energy Storage Association

Examples of Energy Storage Work

Oregon

- ODOE/USDOE $300k project grant
- PGE Salem Smart Power Center

California

- Mandate approach. 1,325 MW by 2020 across 3 IOUs
- Energy Storage Procurement Framework and Design Program
- Targets set by utility, by “grid domains” T/D/C
- Cost effectiveness
  - CPUC first proposed requiring analysis of CE using EPRI and DNV KEMA models (Consistent basis for comparison)
  - Later allowed utility to propose their own methodology, project specific
  - Consistent evaluation protocol (CEP)
    - Quantitative look at net market value, 4 benefits, 6 costs
    - Qualitative, 20 possible end uses identified, not all additive

Examples of Energy Storage Work

Washington – UE 151069, Modeling Energy Storage in IRPs

- August, 2015 workshop
- Staff whitepaper outlining challenges (e.g. lack of markets) traditional integrated resource
  - IRP modeling tools may not adequately capture the full range of potential benefit
  - Supplemental analytical methods and modeling tools can be used?
- PNNL presentation on valuation of ESS, stacking of benefits
- Comments from parties, examples
  - Ancillary services tariffs
  - Allow for flexibility in utility evaluation of services

Examples of Energy Storage Work

PJM Market

- 2009 PJM/AES battery storage project
  - Full load/discharge operations not optimum for batteries
  - Restructured to provide better payments for fast-ramping ES resources (RegA vs RegD)
  - Capability and performance
- First ISO to offer quick start, fast ramp services, $40-$50/MWh since 2012
- 200 MW of storage for frequency regulation (Nov 2015), with 300MW+ planned

Goals for Phase 1

1. Adoption of guidelines by order
2. Guidelines provide direction to utilities regarding what needs to be included in their proposals
   - Consider values listed in statute plus “other”
   - Staff prefers less focus on “how”, flexible
   - Consider encouraging different types

Questions

1. How should values and metrics, 3(1)(a)(A-F) be defined in guidelines?
2. What other values and metrics should be considered, 3(1)(a)(G), in the guidelines?
3. What methodologies, if any, should be prescribed in the guidelines in order to *assess* values A-G?
4. What ideas should be considered as ways to encourage investment in different types of systems, 3(1)(b)?
5. What other considerations should be addressed in the guidelines?

Questions

Q1. How should values and metrics, 3(1)(a)(A-F) be defined in guidelines?

A. Deferred generation and T&D
B. Reduced need for generation during peak demand
C. Improved renewable resource integration
D. Reduced greenhouse gas emissions
E. Improved reliability of T&D systems
F. Reduced portfolio variable power costs

Staff questions:

- What costs are avoided due to presence of these values?

Questions

Q2. What other values and metrics should be considered, 3(1)(a)(G), in the guidelines?

Staff questions:

- Should additional functions/use cases be specified?
- Does E. include all applicable ancillary services?

Questions

Q3. What methodologies, if any, should be prescribed in the guidelines in order to *assess* values A-G?

Staff questions:

- Quantitative and qualitative values?
- Need for consistency vs. over-prescription?
- Evaluation plan requirements?
- Guidelines to address “stacking” of benefits? e.g. Avoiding double counting?

Questions

Q4. What ideas should be considered as ways to encourage investment in different types of systems, 3(1)(b)?

Staff questions:

- Set mix by interconnection level? Use case? Technology? Specify more than one and different?

Questions

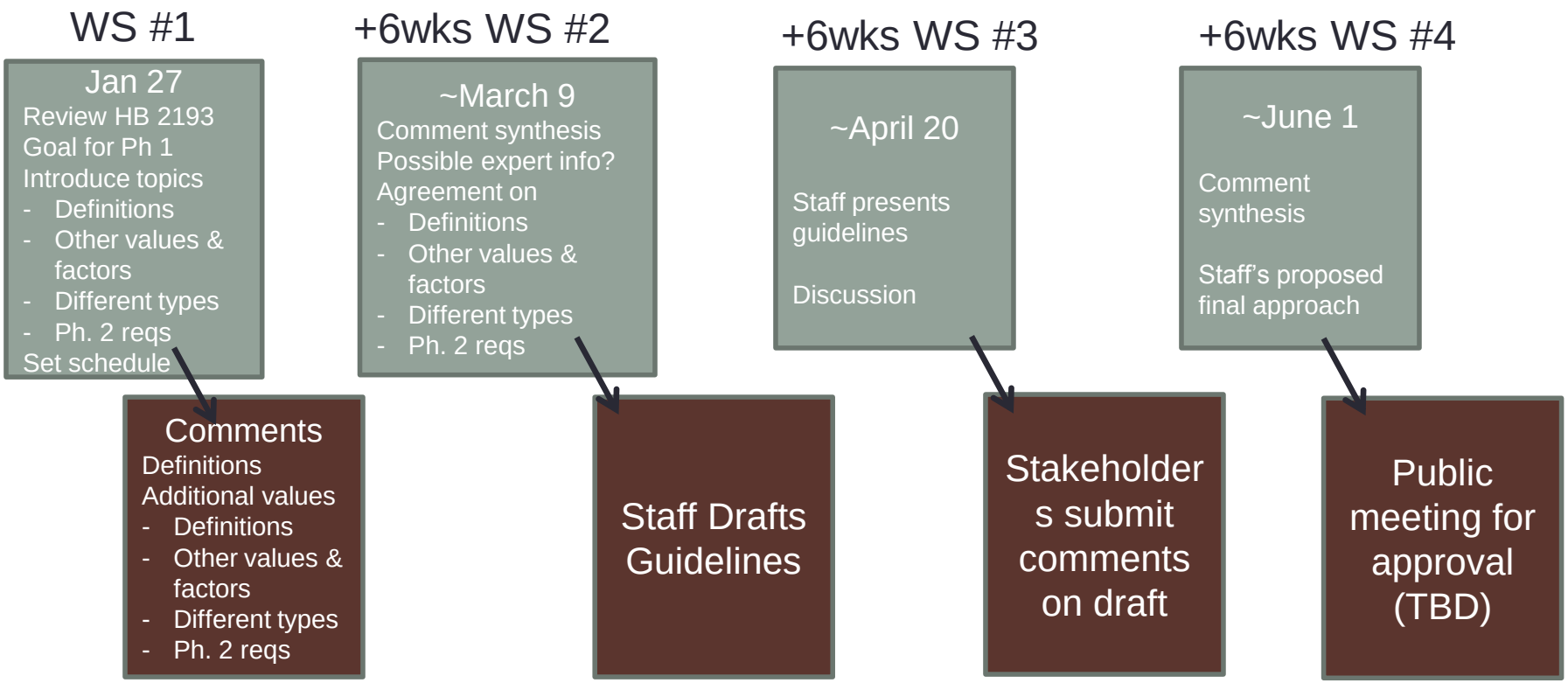
Q5. What other considerations should be addressed in the guidelines?

(May need to expand upon areas in Section 3. (2) within guidelines if clarification is needed, e.g.…)

- Evaluation of potential
- Project description
- Evaluation of cost effectiveness
- Confidentiality

Strawman Phase 1 Schedule

UM 1751 Draft Schedule



Next Steps

- We want to hear from you! Comments, please.
- Next workshop