

September 29, 2016  
Energy Storage Subcommittee Report  
**Activities and Plans**

Presented by the Subcommittee Chair, Merwin Brown, CIEE  
To the Electricity Advisory Committee, September, 29, 2016



# Energy Storage Subcommittee 2016-2017 Plans

1. Update on Biennial Storage Assessment and 5-Year Storage Plan (Merwin Brown for Ramteen Sioshansi, Integrated Systems Engineering, The Ohio State University)
  - a. Seek EAC Approval this Meeting
2. Update on High Penetration of Energy Storage Work Product (Chris Shelton) —
  - a. Finish 2017

# “2016 Storage Plan Assessment” Report Motivation

- Energy Independence and Security Act of 2007 (EISA)
  - Energy Storage (Technologies) Subcommittee of EAC formed in March 2008 in response to Title VI, Section 641(e)
- Title VI, Section 641(e) has two parts pertaining to this subcommittee
  - **Section 641(e)(4):** “... every five years ... the Council [i.e., the Energy Storage Technologies Subcommittee, through the EAC], in conjunction with the Secretary, shall develop a five-year plan for ... domestic energy storage industry for electric drive vehicles, stationary applications, and electricity transmission and distribution.”
  - **Section 641(e)(5):** “... the Council shall (A) assess, every two years, the performance of the Department in meeting the goals of the plans developed under paragraph (4); and (B) make specific recommendations to the Secretary on programs or activities that should be established or terminated to meet those goals.”
- The “2016 Storage Plan Assessment Report” is proposed to fulfilled both “requirements of EISA Title VI, Section 641(e)(4) and (e)(5)”
- Approval slated for September 2016 EAC meeting

# “2016 Storage Plan Assessment” Report History

1. The ‘2012 Storage Report: Progress and Prospects: Recommendations for the U.S. Department of Energy,’ approved 24 January, 2014, fulfilled both requirements
2. The ‘2014 Storage Plan Assessment: Recommendations for the U.S. Department of Energy,’ approved 25 September, 2014, fulfilled the second requirement
3. The ‘2016 Storage Plan Assessment: Recommendations for the U.S. Department of Energy,’ is proposed to address both

# “2016 Storage Plan Assessment” Report History of Scope

1. The 2012 report focused on storage-related activities of OE
2. The 2014 report expanded this scope to include OE, EERE, ARPA-E, and SC
  - a. The report also examined coordination between the DOE and other Federal agencies (e.g., NSF and DoD)
  - b. This was in line with offices and agencies included in DOE’s overall strategy
3. The 2016 review maintains the same broad scope
  - a. This review expands the scope of ‘storage’ beyond electricity in/electricity out to include power-to-gas, thermal, and virtual storage
  - b. This expanded scope covers more potential storage technologies that should be within DOE’s portfolio and overall storage-related strategy

# “2016 Storage Plan Assessment” Report Background

1. 2016 review was broad in program and technology scope
2. 2016 review focused on recommendations that were derived from the assessment and that can inform the five-year plan.
3. As such, for brevity, 2016 review omits background information on the Department's energy storage-related RD&D programs and goals.

# “2016 Storage Plan Assessment” Report Process

1. 2016 review intended to reflect the assessment of the EAC, its Energy Storage Technologies Subcommittee, and, in particular, members of the 2016 review Working Group
2. 2016 review partially informed by 16 interviews conducted by the Working Group with representatives of users, implementers, and researchers involved in the energy storage industry.
3. The interviewees offered wide-ranging views on some topics, while other views were shared nearly unanimously.
4. However, note that this 2016 review reflects the views of the EAC, and not necessarily those of any interviewees.

# “2016 Storage Plan Assessment” Report Process - Interviewees

<b>Interviewee</b>	<b>Affiliation</b>
Chris Campbell	Schneider Electric
Hector Pulgar	University of Tennessee, Knoxville
Curt Kirkeby	Avista
Stu Bressler and Scott Baker	PJM Interconnection
Babu Chalamala	Sandia National Laboratory
Paul Denholm	National Renewable Energy Laboratory
Kenneth Ragsdale	Electric Reliability Council of Texas
Mark Irwin	Southern California Edison
Andrew Cotter	National Rural Electric Cooperative Association
Carla Peterman	California Public Utilities Commission
Seyed Madaeni and Brian Zimmerly	SolarCity
Tim Ash and Kiran Kumaraswamy	AES Energy Storage
Janet Joseph, Ravi Tetambre, Jason Doling, Michael Worden, Leka Gjonaj, Matt Wallace	New York State Energy Research and Development and New York State Department of Public Service
Jay Emler	Kansas Corporation Commission
Beth Trumbold	Public Utilities Commission of Ohio
Todd Bianco	Rhode Island Public Utilities Commission



# “2016 Storage Plan Assessment” Report Timing

1. 2016 review is intended to meet the requirements of EISA Section 641(e)(5) (the two-year requirement) and those of EISA Section 641(e)(4) (the five-year requirement).
  - a. Per the statutory requirements of EISA, the two-year requirement must be met this year in 2016,
  - b. whereas the five-year requirement could be met with a separate report next year in 2017.
2. The EAC has opted to meet both requirements this year with this single report for two reasons.
  - a. 2016 review contains many recommendations based on time-sensitive information. It would be a disservice to the Department, the interviewees, and the energy storage industry to “wait” on the recommendations.
  - b. The Department may have new leadership beginning in early 2017. The EAC believes it would be beneficial for Department leadership to have this report available now to provide suggestions on further developing the Department's high-quality energy storage-related RD&D programs.

# “2016 Storage Plan Assessment” Report Format of Findings, Assessment, and Recommendations

1. 2016 review contains 15 recommendation areas, which are organized into the following three broad thematic categories:
  - a. General Assessments and Recommendations,
  - b. Technology Development, and
  - c. Economics and Markets.
2. Each recommendation area is discussed in greater detail in the 2016 review and includes the following:
  - a. *Comments:* A summary of the feedback and comments that were received from interviewees or EAC members, and which provide framing context behind the recommendation area.
  - b. *Recommendations:* Specific recommendations for the Department that are derived from the comments and feedback received.

# “2016 Storage Plan Assessment” Report Summary of Recommendations

1. Improve *visibility and publicity* of the Department's high-quality energy storage--related RD&D.
2. Make *RD&D publicly available* through industry conferences and open-access journal publications.
3. Address the need for energy storage *operational and planning models*.
4. Commission studies to understand *market-design and regulatory impediments* to capturing energy-storage value.
5. *Educate state regulators and utilities* on energy storage technology

# “2016 Storage Plan Assessment” Report Summary of Recommendations (continued)

6. *Broaden and add energy storage-related goals* to the Department's existing list.
7. Provide *additional funding and resources* for energy storage RD&D.
8. Encourage *better coordination* of energy storage RD&D between OE and EERE.
9. *Make energy storage safety experts available* as a source of informed and unbiased information.
10. Provide *short-term seed funding* for energy-storage development and deployment.

# A Call for EAC Discussion and Vote on “2016 Storage Plan Assessment” Report & Recommendations



# Update on High Penetration of Energy Storage Work Product (Chris Shelton)



*Grid needs better understanding of the potential benefits vs. dislocations of high penetrations of energy storage.*

# **Purpose of white paper, “*Implications of High Penetrations of Energy Storage into Electric Transmission and Distribution Systems,*” is to:**

1. Examine qualitatively the implications of high penetrations of energy storage into electric transmission and distribution systems.
2. Provide a framework for ...
  - a. Identifying quantitative measures to more thoroughly characterize the vision of energy storage as an agent in the grid, both physically and institutionally, and
  - b. Defining a grid technology R&D program that would enhance the benefits and mitigate the dislocations of high penetrations of energy storage.

***The DOE is assumed to be the focal audience for white paper.***

# EAC Discussion and Suggestions





# History of Biennial Storage Program Assessment

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  - a. Energy Storage (Technologies) Subcommittee of EAC formed in March 2008 in response to Title VI, Section 641(e)
2. Title VI, Section 641(e) has two parts pertaining to this subcommittee
  - a. Section 641(e)(4): "... every five years ... the Council [i.e., the Energy Storage Technologies Subcommittee, through the EAC], in conjunction with the Secretary, shall develop a five-year plan for ... domestic energy storage industry for electric drive vehicles, stationary applications, and electricity transmission and distribution."
  - b. Section 641(e)(5): "... the Council shall (A) assess, every two years, the performance of the Department in meeting the goals of the plans developed under paragraph (4); and (B) make specific recommendations to the Secretary on programs or activities that should be established or terminated to meet those goals."
3. The "2012 Storage Report: Progress and Prospects: Recommendations for the U.S. Department of Energy," approved Jan. 24, 2014, fulfilled both "requirements of EISA Title VI, Section 641(e)(4) and (e)(5)"
4. The 2014 Storage Plan Assessment Recommendations of the EAC Report, approved Sept. 25, 2014, fulfilled Title VI, Section 641(e)(5)