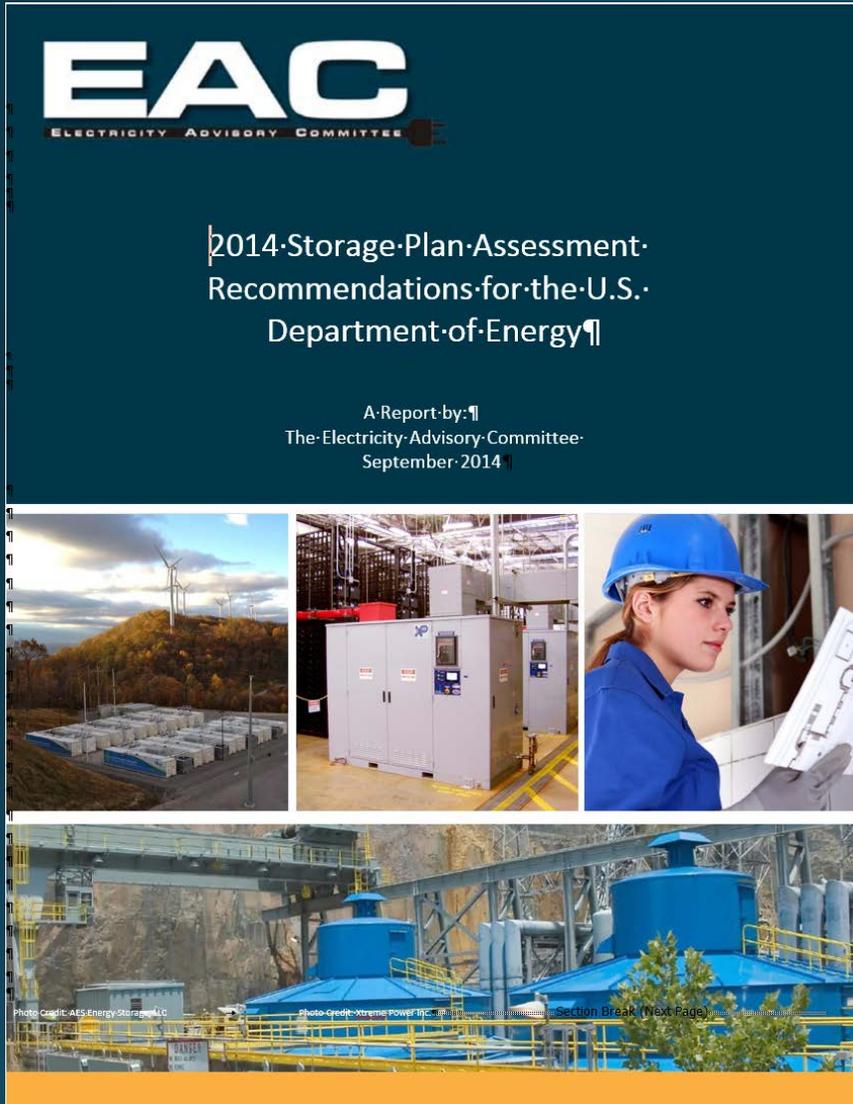


Biennial Storage Program Assessment 2014 Report



1. Based largely on DOE December 2013 report, “Grid Energy Storage” featuring:
 1. A broadened agency and department scope
 1. Continues with the Office of Electricity Delivery and Energy Reliability (OE)
 2. Added DOE offices of Office of Science, Energy Efficiency and Renewable Energy (EERE), and Advanced Research Projects – Energy (ARPA-E), and
 3. Added other federal agencies, e.g., Department of Defense (DOD).
 2. DOE overall energy storage strategy & department-level strategies.
2. Assessment also based on individual and institutional observations and experience.

Overall Findings of EAC 2014 Assessment

The federal energy storage program strategies and activities are comprehensive and largely responsive to the needs of U.S. industry and public agencies.

- However, since EAC's previous assessment and even as recent as the period in which DOE developed the DOE 2013 Report, U.S. energy industry and policy expectations and strategies for the development and deployment of energy storage devices and systems have changed.
- The recent emergence of market transformations, public policy developments and technology trends related to the U.S. energy storage industry, and global market trends more generally, have begun to shift the energy storage landscape.

The EAC offers areas where programs and initiatives could be amended, refocused, augmented or scaled back in order to better meet the objective of the Department and the strategic goals enumerated in the 2013 DOE Report

It's really a matter of degree.

Program Assessment & Recommendations

1. Assessment: DOE goals tied to grid-related applications, but OS and NSF focused on basic science and component technologies.
Recommendation: More grid-focused research support is needed in these venues.
2. Assessment: DOE focused on reliability and safety issues.
Recommendation: Broadened focus to include some additional issues energy storage might address, e.g., increasing grid asset utilization and operations economic optimization.
3. Assessment: ARRA demonstrations important to DOE strategy, but not clear there is capacity to continue at ARRA levels.
Recommendations: (1) Similar demonstration levels continue with funding from coordinated public (federal and state) and private sources. (2) National Laboratories involved in storage research; more public-private partnerships to help leverage research synergies.

Program Assessment & Recommendations (continued)

4. Assessment: Offices in DOE seem to collaborate and understand each other's projects, but it is not clear how research results are transferred among them.
Recommendation: Augment and strengthen inter-agency coordination around energy storage research results transfer, and make more transparent.
5. Assessment: While some of the DOE research is applicable generically to "utility" and "distributed" scale energy storage, research focus on applications has emphasized the former.
Recommendation: Because distributed energy storage applications have recently increased, and exhibit some unique grid interactions, an increased research focus on energy storage interconnecting at the electric distribution level is needed.

Program Assessment & Recommendations (continued)

6. Assessment: The many recent energy storage demonstrations at utility and distributed scale have revealed inadequacies in the availability of tools, especially those based on non-deterministic models that can, for example, account for the effects of market, resource and system uncertainties.

Recommendation: The development of such tools could lead to improved energy storage operation, resource assessment and decision making. Furthermore, given the evolution in generation mix, especially the increase in central and distributed variable renewable generation, the strategy for storage developments must be broad enough to cover any possible generation mix of the future.

Program Assessment & Recommendations (continued)

7. Assessment: Recent energy storage demonstrations have also revealed the lack of validated reliability and safety codes and standards. DOE's impartial views of the energy storage industry and of proposals submitted to code bodies, and role as neutral arbiter to make clear the rationale behind specific proposals are of high value.
Recommendation: DOE should continue to convene planning activities and to provide technical support to standards and codes bodies.
8. Assessment: Pumped hydro (PHS) and compressed air (CAES) energy storage are routinely projected to have high levels of deployment in studies of high renewable penetration scenarios.
Recommendation: New PHS and CAES resource and technology assessments need to be conducted to reflect changes in resource and technology characterization to improve the assumptions used in capacity expansion models used for scenario analysis.

Program Assessment & Recommendations (continued)

9. Assessment: The knowledge DOE provides regarding energy storage technology, costs and systems is a vital resource.
Recommendation: DOE should continue, and expand, the development of resources, e.g., 2013 EPRI/DOE Storage Handbook and the DOE Energy Storage Database. Note, due to a lack of information, a time series of power electronics costs and learning rates would be of value.
10. Assessment: Today's restructured electricity systems relying on a mix of competitive and traditional cost-of-service regulation market designs, can create inefficiencies for storage assets that can provide multiple services that straddle the two market classifications.
Recommendation: Conduct comprehensive study of competitive and regulated market designs, and their effects on storage, to assist technology developers, device and system vendors, utilities, market managers and regulators.

Program Assessment & Recommendations (continued)

11. Assessment: Integration of grid-connected renewable generation at both the transmission and distribution levels is a major value proposition for energy storage.

Recommendation: DOE conduct comprehensive study of the implications of different competitive market and regulatory mechanisms on efficiently signaling the value of these generation services so that the full value of energy storage can be considered.

Energy Storage Subcommittee 2015 Plans

1. “National Strategy for Distributed Energy Storage in the Electric Grid “ White Paper – a joint effort by the EAC Smart Grid (lead) and Energy Storage Subcommittees.
2. Role of Electric Vehicles as Grid Storage
3. Role of Energy Storage in Grid Asset Utilization and Economic Efficiencies.