September 29, 2015

Energy Storage Subcommittee Report

Activities and Plans

Presented by the Subcommittee Chair, Merwin Brown, CIEE

Energy Storage Subcommittee 2015-2016 Plans

1. "Distributed Energy Storage in the Electric Grid " White Paper – a joint effort by the EAC Smart Grid (lead) and Energy Storage Subcommittees. – *Finish in 2015*
2. "Implications of High Penetrations of Energy Storage into Electric Transmission and Distribution Systems" White Paper – *Finish 2016*
3. Biennial Storage Program Assessment – *Finish 2016*

If high penetration of energy storage deployments occur as expected, what would be the electric grid consequences?

- High penetrations of energy storage are expected to bring substantial benefits to the production, delivery and use of electricity.
- Energy storage might be…
  - just another competing technology providing traditional grid service, and/or
  - a disruptive technology for the grid, i.e., electric delivery temporal power flow capability, including "product warehousing."
- High penetrations of energy storage also could result in dislocations and difficulties for the function, operation, form and critical success factors of the electric grid.

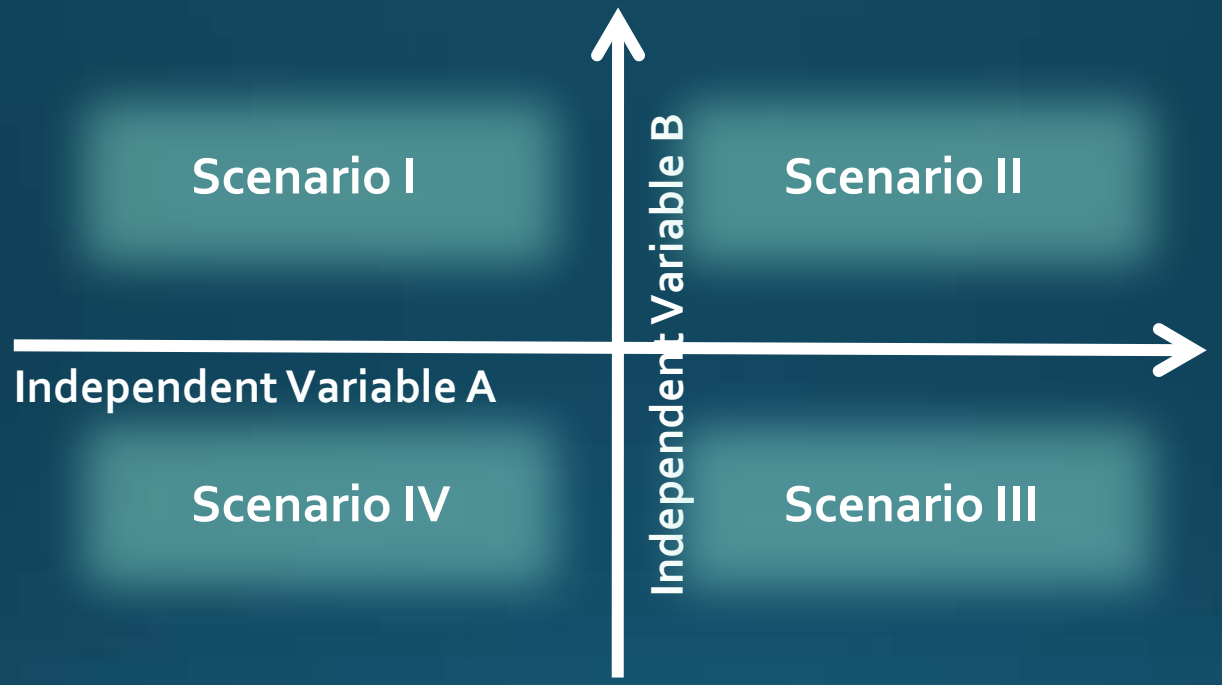
Grid needs better understanding of the potential benefits vs. dislocations of high penetrations of energy storage.

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.

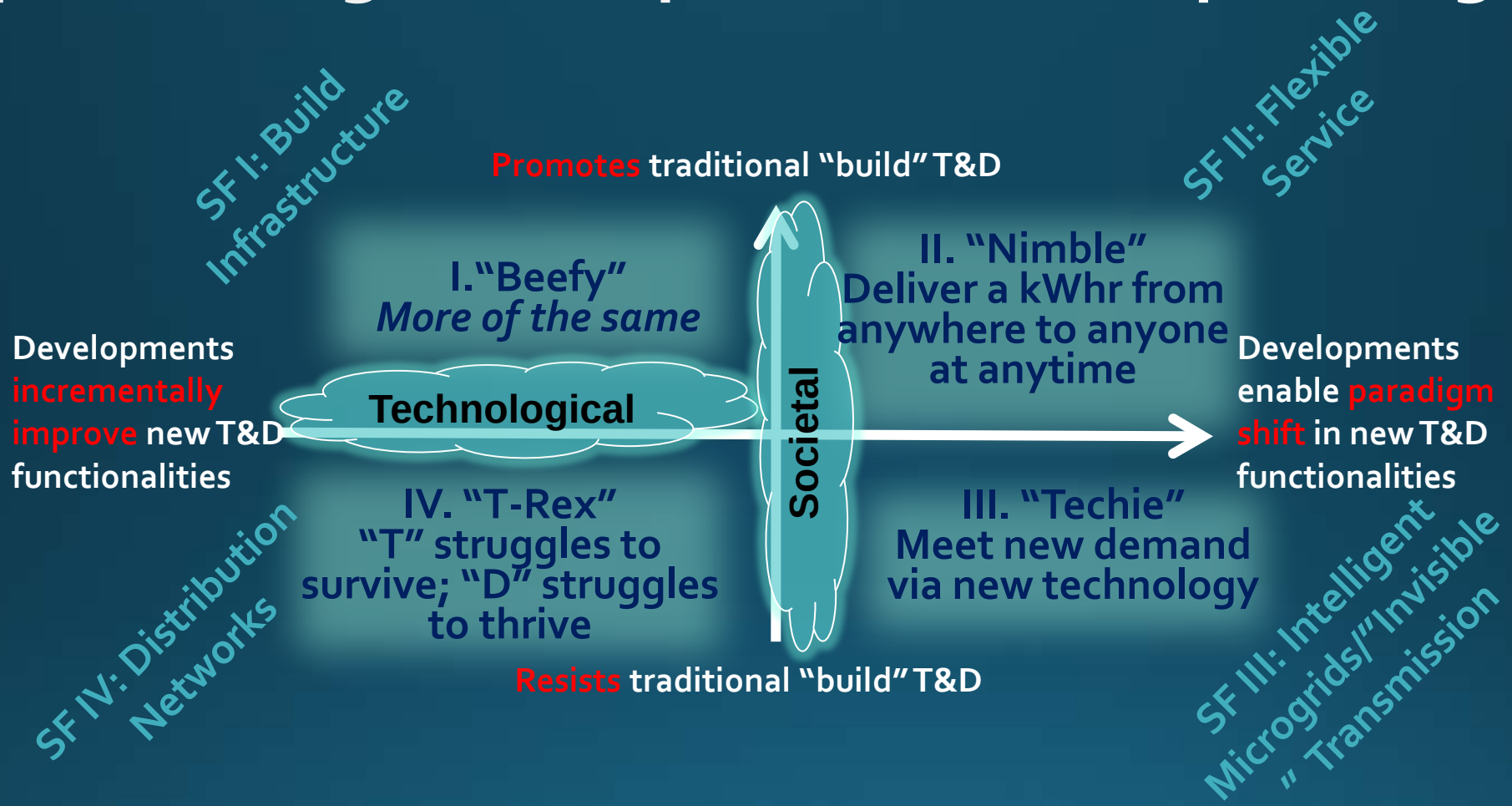
The DOE is assumed to be the focal audience for white paper.

The Energy Storage Subcommittee is using a simplified scenario planning process.



Different plausible futures, i.e., scenarios, are the logical implications of cause & effect interactions in each quadrant between two highly uncertain variables.

Example of using the simplified scenario planning process.



Four future scenarios for T&D result for various degrees of uses of "traditional build" and "technology innovation".

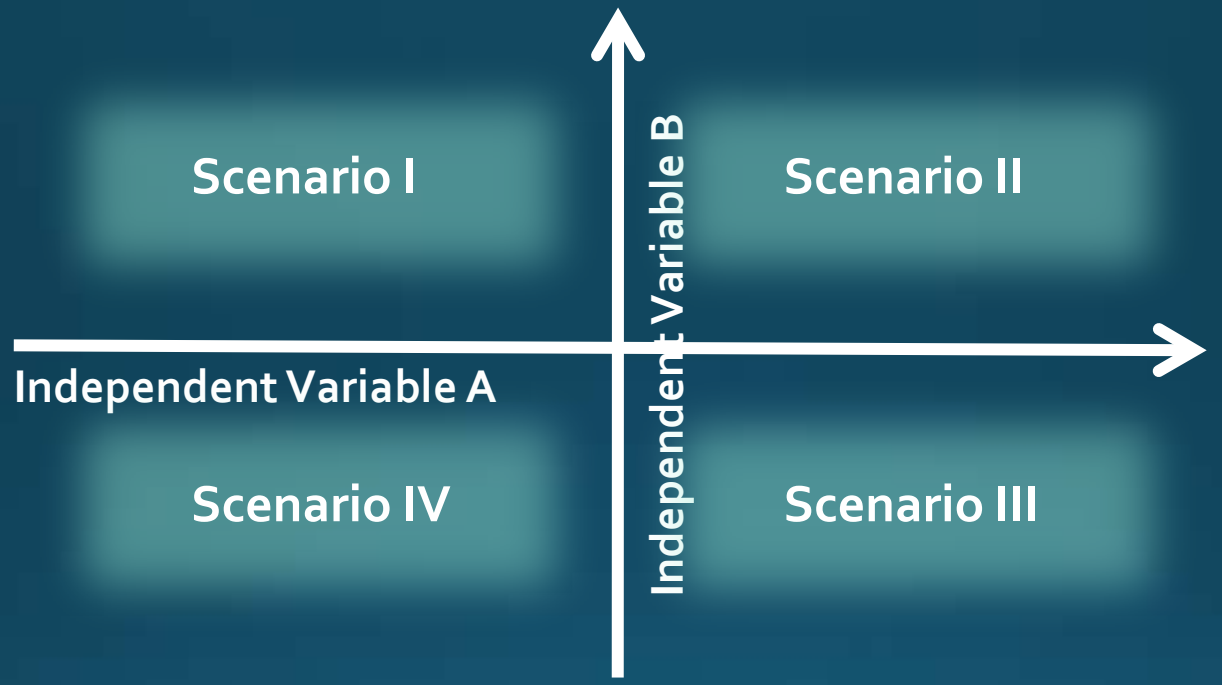
Subcommittee Work in Progress

Step 1: Identify focal Issue or decision, i.e., question.

What electric grid technology developments are needed …

… *to maximize benefits and mitigate difficulties for the electric grid of high penetrations of energy storage?*

Step 2: Key Factors Influencing the Success or Failure in Addressing an Issue



Identify and select Factors with greatest uncertainty and importance in working scenario development meeting on September 30, 2015, Noon – 3 PM, lunch included.

History of Biennial Storage Program Assessment

1. Energy Independence and Security Act of 2007 (EISA)
   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)

Continued…

Scope of Biennial Storage Program Assessment

5. Purpose: 2016 Biennial Storage Program Review Report is to fulfill Title VI, Section 641(e)(5) of Energy Independence & Security Act of 2007 (EISA)
6. Nature of report focused:
   a. On assessing the DOE storage program and the Committee's recommendations, probably in "letter" scope and format
   b. Not on energy storage technology status that can be referenced elsewhere.

Continued...

Plans for Biennial Storage Program Assessment

7. Proposed Candidate Review Sources:
   a. Revisit the "2012 Storage Report: Progress and Prospects: Recommendations for the U.S. Department of Energy," approved Jan. 24, 2014
   b. Revisit 2014 Storage Plan Assessment Recommendations of the EAC , approved Sept 25, 2014
   c. Dr. Imre Gyuk presentation on the OE Energy Storage Program (Web presentation)
   d. The OE Strategic Plan for Energy Storage Safety in the work product <http://www.sandia.gov/ess/saf_stategicplan.html>
   e. The OE Energy Storage Program State Initiatives in the work product.
   f. Quadrennial Technology Review Sept 2015
8. Approval slated for September 2015 EAC meeting
9. There's an opportunity for someone from the EAC to take the lead (hint, hint)

EAC Discussion and Suggestions