

Electrical Energy Storage U.S. Policy Issues

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Without technological breakthroughs in efficient, large scale Energy Storage, it will be difficult to rely on intermittent renewables for much more than 20-30% of our Electricity.

Secretary Chu, Feb. 2010

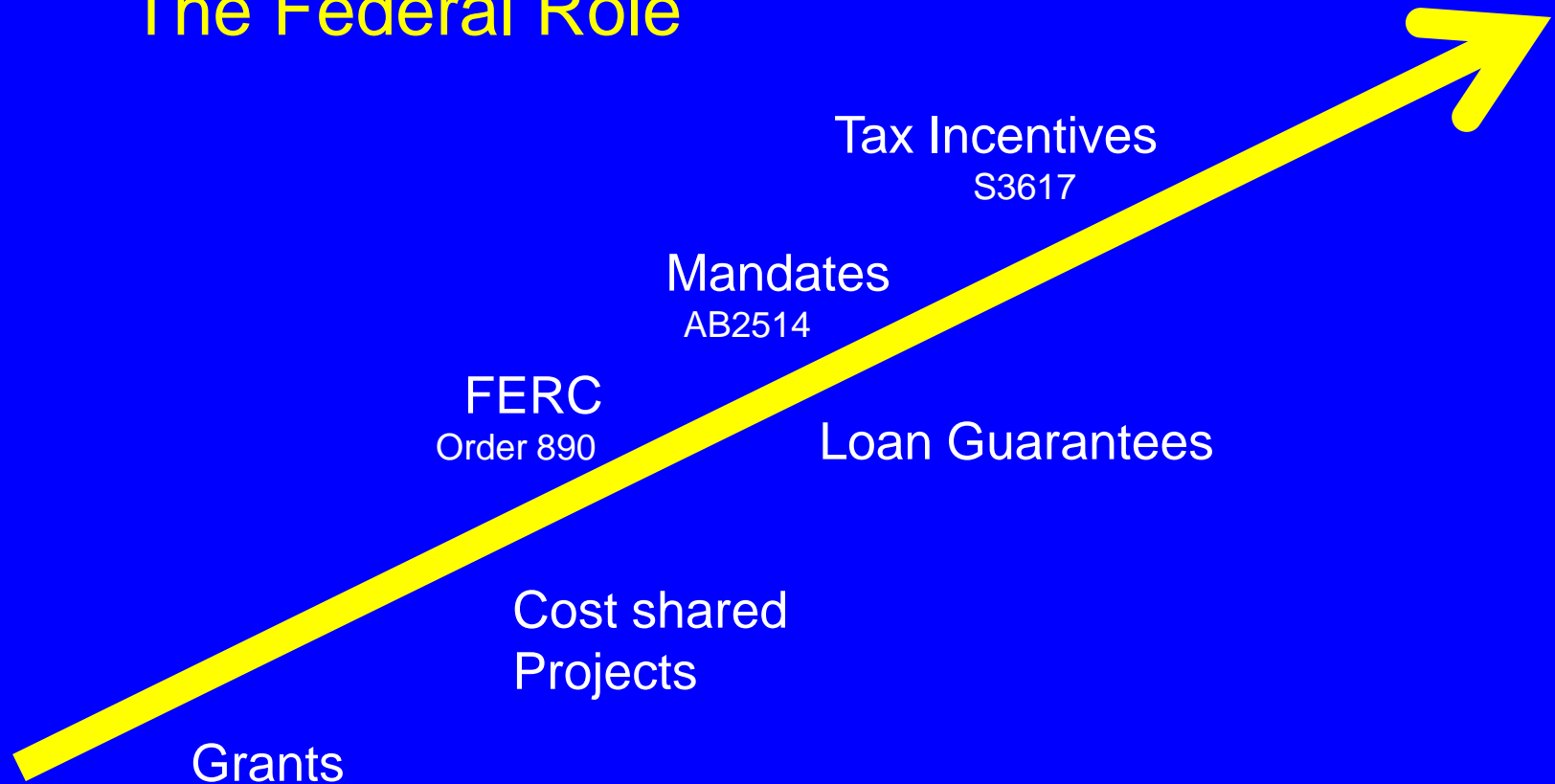
The need for regulation services can dramatically increase as the amount of variable renewable resources is increased. Local storage is among the best means to ensure we can reliably integrate renewable energy resources into the grid.

Chairman Wellinghoff, FERC, March 2010

Transmission and storage capacity are key issues for energy resource planning. If you like wind power, you have to love transmission and storage.

Terry Boston , CEO, PJM, June 2010

The Federal Role



Research Development Demonstration Niche Market Mass Market

There are some 3000 Electric Utilities in the U.S!!!

Many of these are controlled by Independent Systems Operators such as PJM, MISO, CAISO, ERCOT ...
In addition Utilities must clear tariffs, permits, etc.
With a Public Utilities Commission (PUC)

The **Federal Energy Regulatory Commission (FERC)** has Overall Jurisdiction and has recently shown increasing Interest in storage.

FERC Order 890, requires ISOs to develop tariffs, market rule, and control algorithms, to open markets for new technologies to provide ancillary **services**

Bingaman, Wyden Shaheen Bill:

Provides \$1.5B in Tax Credits to provide a 20% Rebate for Grid Connected Storage.

California AB2514:

California Public Utility Commission (CPUC) is to "open a proceeding to determine appropriate targets, if any, for each load-serving entity to procure viable and cost-effective energy storage systems".



Storage Research within DOE:

Office of Electricity, ARRA Projects

EERE – Vehicle Program (EV systems)

EERE – Hydro Program (Pumped Hydro)

BES - 6 Energy Frontier Research Centers

ARPA-E – 12 Grid Storage Projects

DOE Storage Research Funding :

PNNL, Sandia - (Flow Batteries, Na-Ion, Li-Ion,
Advanced Concepts)

SBIR - (Li-Ion, Flow Batteries, CAES, Flywheels)

ARRA – (Flywheels, Li-Ion, Flow Batteries, Na-Ion, CAES)

BES – Applied Electrochemistry

ARPA-E (SMES, Flywheels, Metal Air, Flow Bat., Li-Ion)

To Improve → Cost, Cycle Life, Safety

Grid Storage Application Areas:

Grid Stability: Regulation , Peak Shaving,
Transmission Constraints

Renewable Integration: Flutter, Ramping,
Diurnal Energy Management

Distributed Storage: Community Energy
Storage, Re-use of Vehicle Batteries

OE Grid Storage Budgets:

FY 09: \$ 4M

FY 10: \$ 14M

FY 11: \$ 40M request

FY 12: \$ 57M request

ARRA Stimulus Funding for Storage Demonstration Projects (\$185M)

A ten-fold Increase in Power Scale!

Large Battery System (3 projects, 53MW)

Compressed Air (2 projects, 450MW)

Frequency Regulation (20MW)

Distributed Projects (5 projects, 9MW)

Technology Development (5 projects)

533MW - \$585M Costshare!

Loan Guarantee Program

Beacon Power

\$43M for 20MW Frequency Reg.

AES / A123

\$17M for 20MW Frequency Reg.

Vehicular Battery Manufacturing Grants:

\$300M A123, Exide, EastPenn

Outreach to other Federal Programs and Industry

Consortium Initiated
to explore Re-use of EV Batteries for Grid
Storage Applications

DOE – OE, Storage Program

DOE – EERE, EV Program

EPA – Vehicle and Fuel Emissions Lab

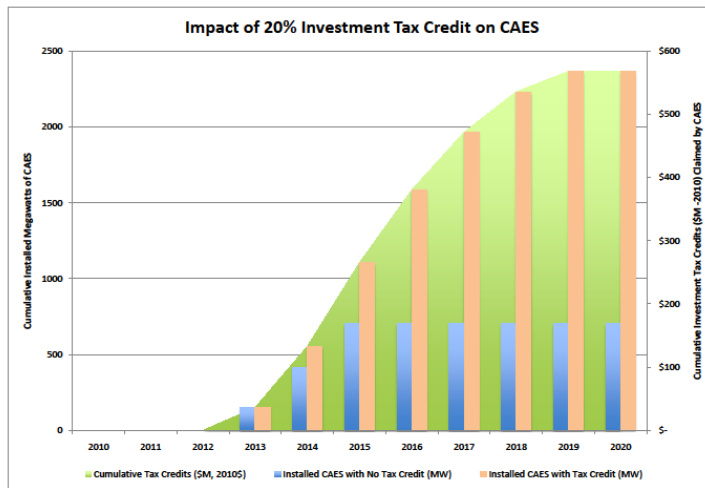
ORNL – Sustainable Electricity Program

Nissan, General Motors

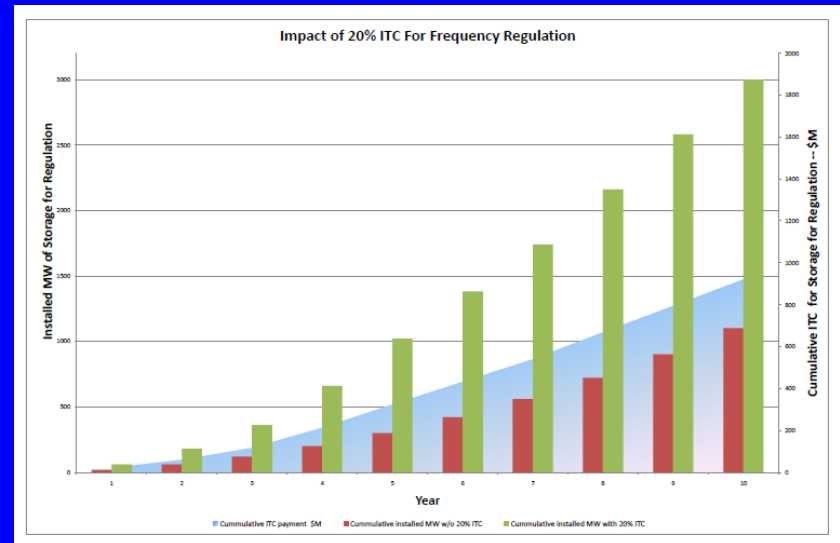
Industry 10 year Expectations

Without Investment Tax Credit

- 1,500 MW Pumped Hydro
- 700 MW CAES
- 1,500 MW Renewable Integr.
- 12,000 MW T&D Support
- 1,100 MW Frequency Reg.
- 2,100 MW Thermal Storage



20% Investment Tax Credit
for Storage Facilities
Currently considered in
Congress



Our Goal is to make

Energy Storage

Ubiquitous

on the Electric Grid!!

RESOURCES:

www.sandia.gov/ess

www.electricitystorage.org

EPRI/DOE Energy Storage Handbook

EESAT, Oct. 16-19, San Diego, CA

