U.S. DEPARTMENT OF ENERGY

Office of Electricity Delivery & Energy Reliability

OE Activities:

Resources for NASEO E-MAP Pilot States

Caitlin Callaghan

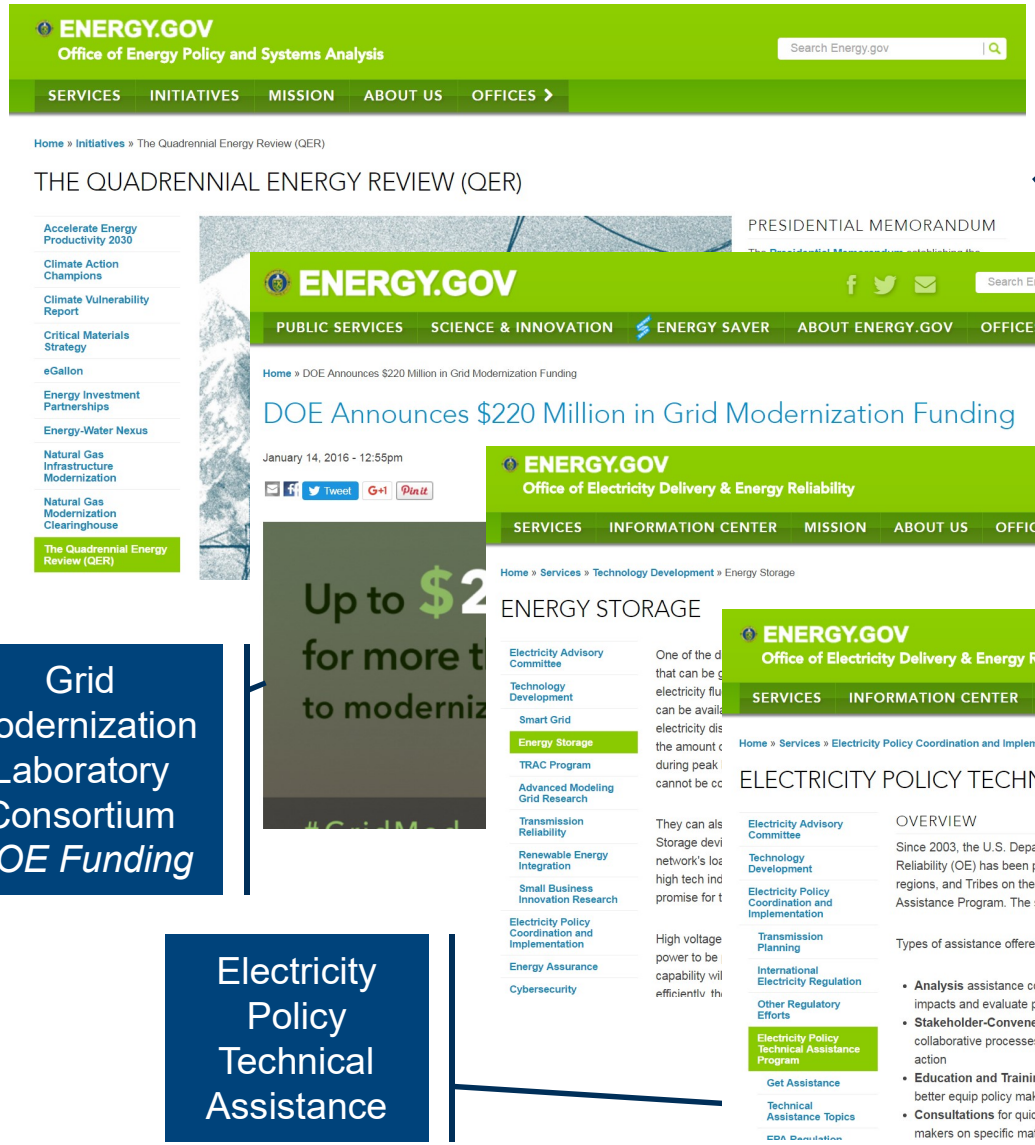
Transmission Permitting and Technical Assistance Division

November 10, 2016

DOE Acronyms/Abbreviations

OE	Office of Electricity Delivery and Energy Reliability
QER	Quadrennial Energy Review 1.1 – First Installment 1.2 – Second Installment
GMI	Grid Modernization Initiative
GMLC	Grid Modernization Laboratory Consortium
GridMod	Grid Modernization
QTR	Quadrennial Technology Review
MYPP	Multi-Year Program Plan
DER	Distributed Energy Resources
EPTA	Electricity Policy Technical Assistance (Program)
TA	Technical Assistance

Highlights



Quadrennial Energy Review
Second Installment

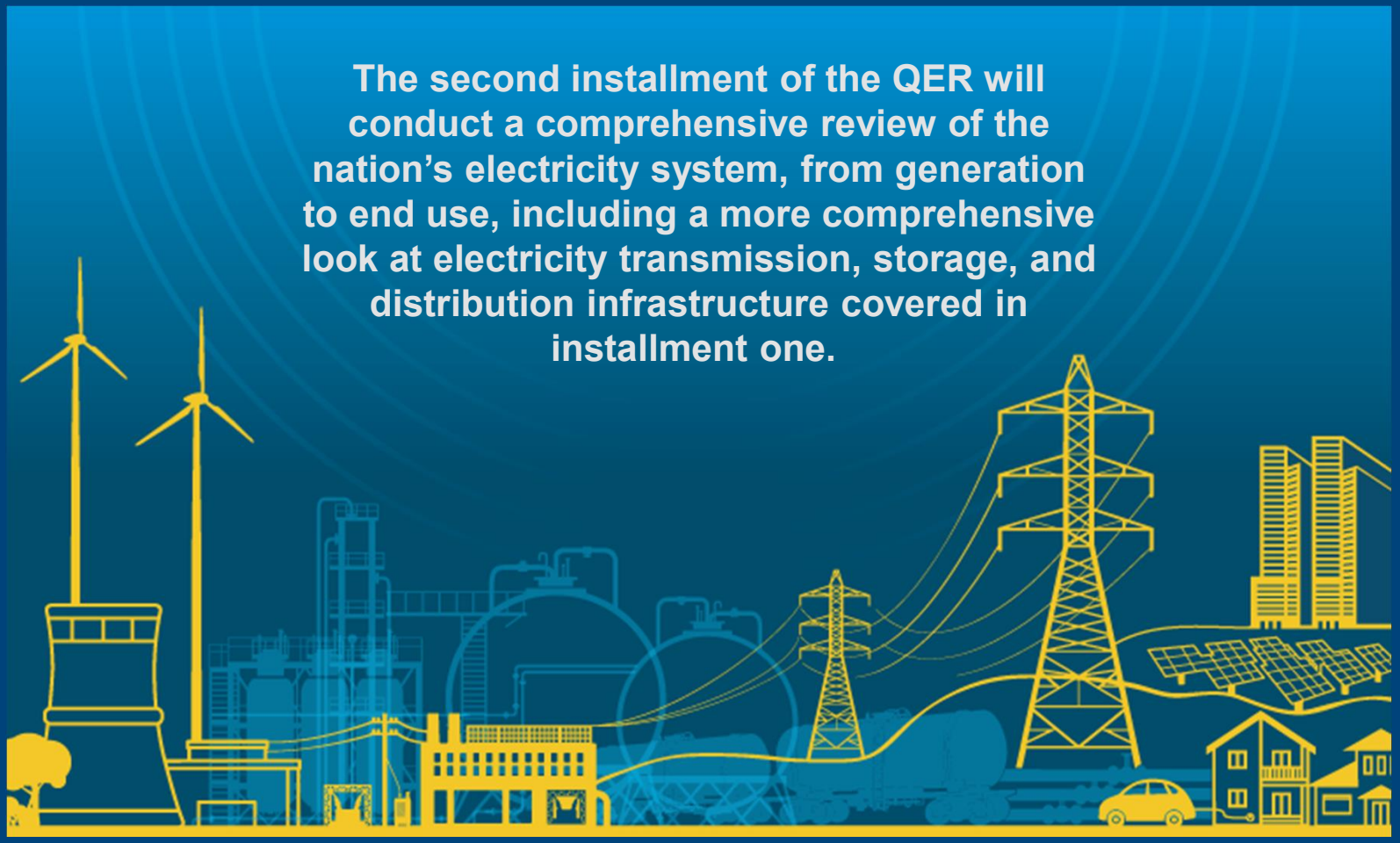
OE's Energy Storage Program

Grid Modernization Laboratory Consortium
DOE Funding

Electricity Policy Technical Assistance

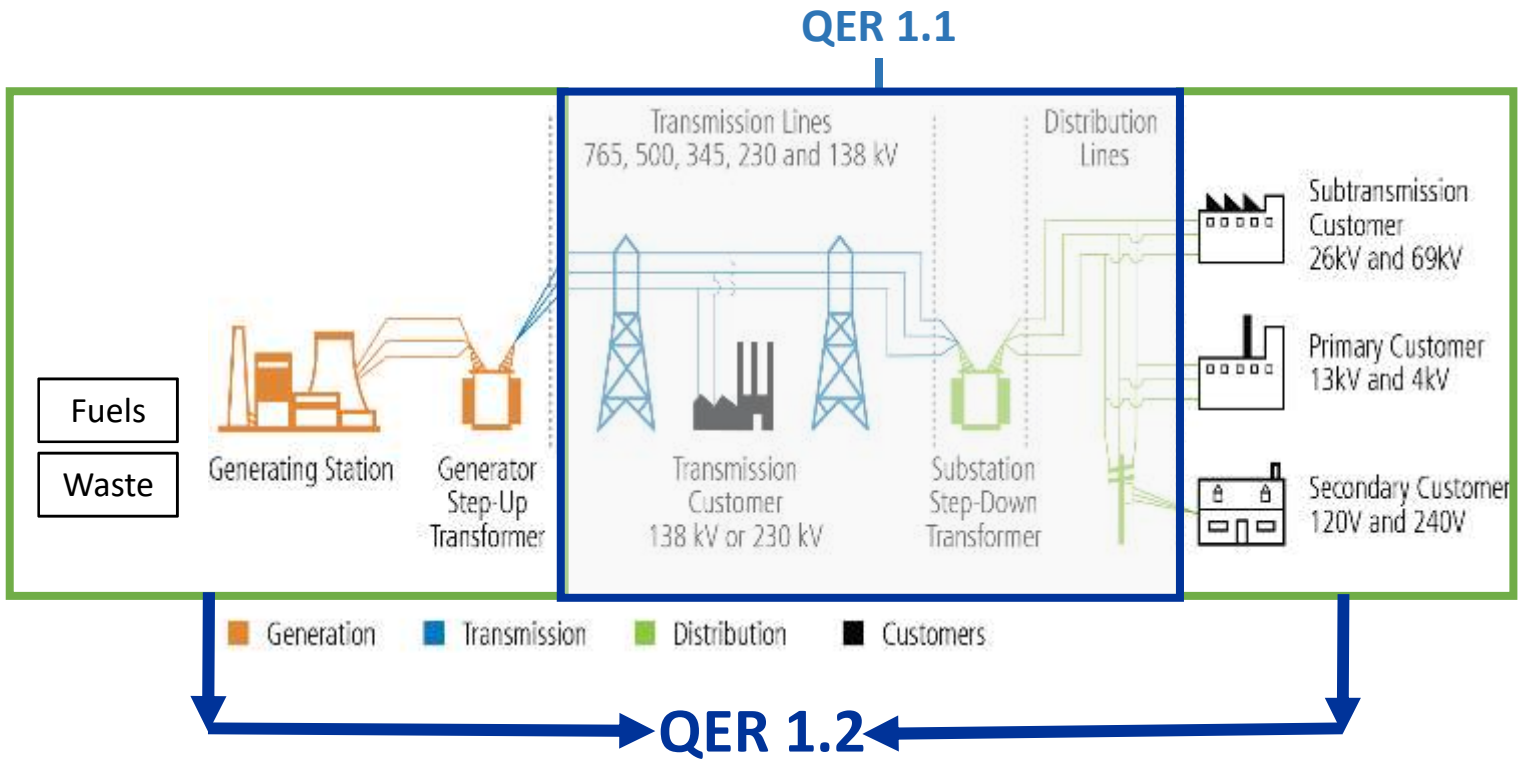
U.S. DEPARTMENT OF ENERGY | Office of Electricity Delivery & Energy Reliability

Quadrennial Energy Review 1.2
An Integrated Study of the Electricity System



http://energy.gov/epsa/quadrennial-energy-review-second-installment

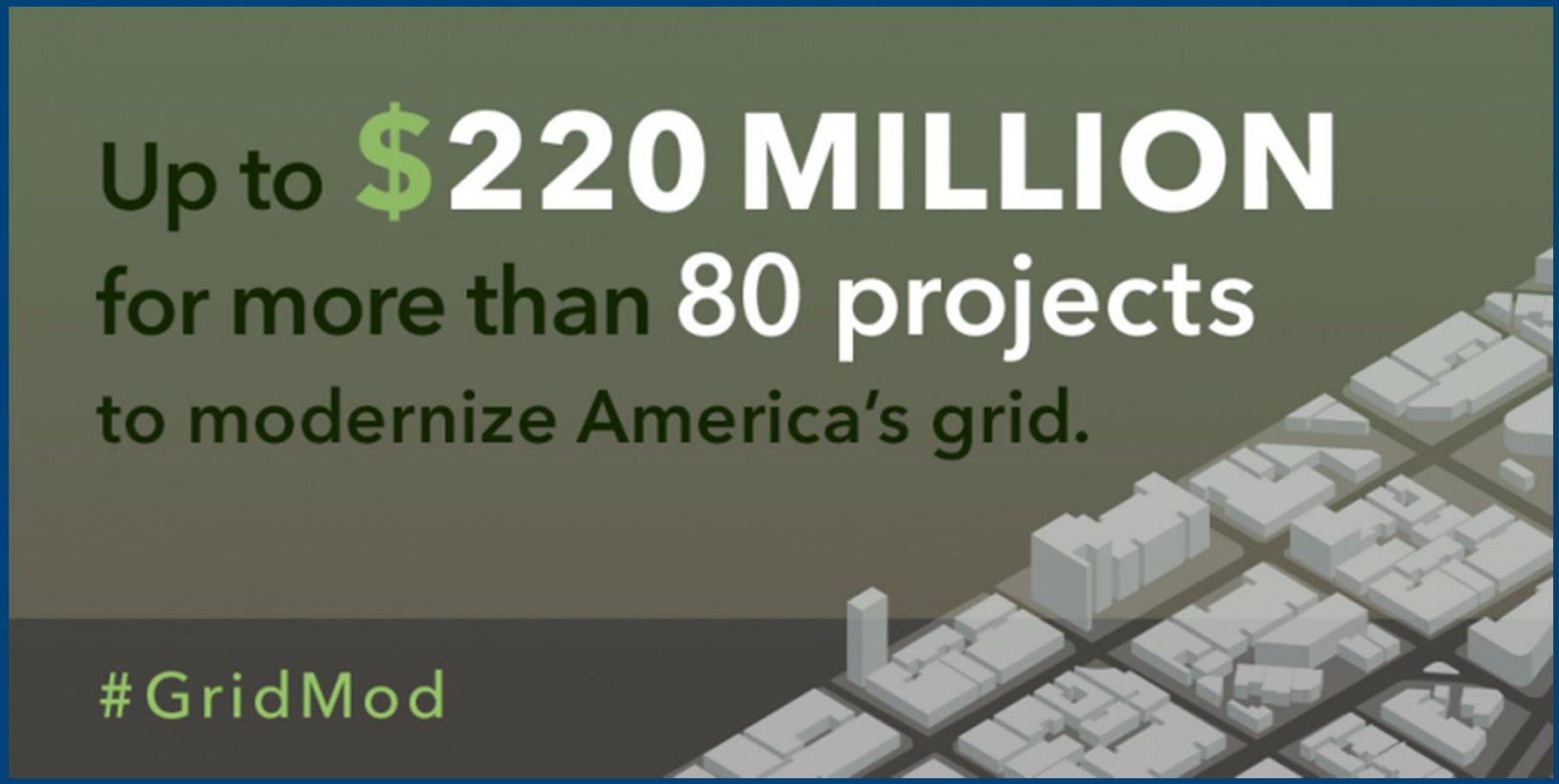
Linking QER 1.1 and 1.2



NASEO Annual Meeting, Providence, RI

Monday, Sept 12 – QER Update and Opportunities for State Collaboration with DOE's Karen Wayland

DOE's Grid Modernization Initiative & Grid Modernization Laboratory Consortium

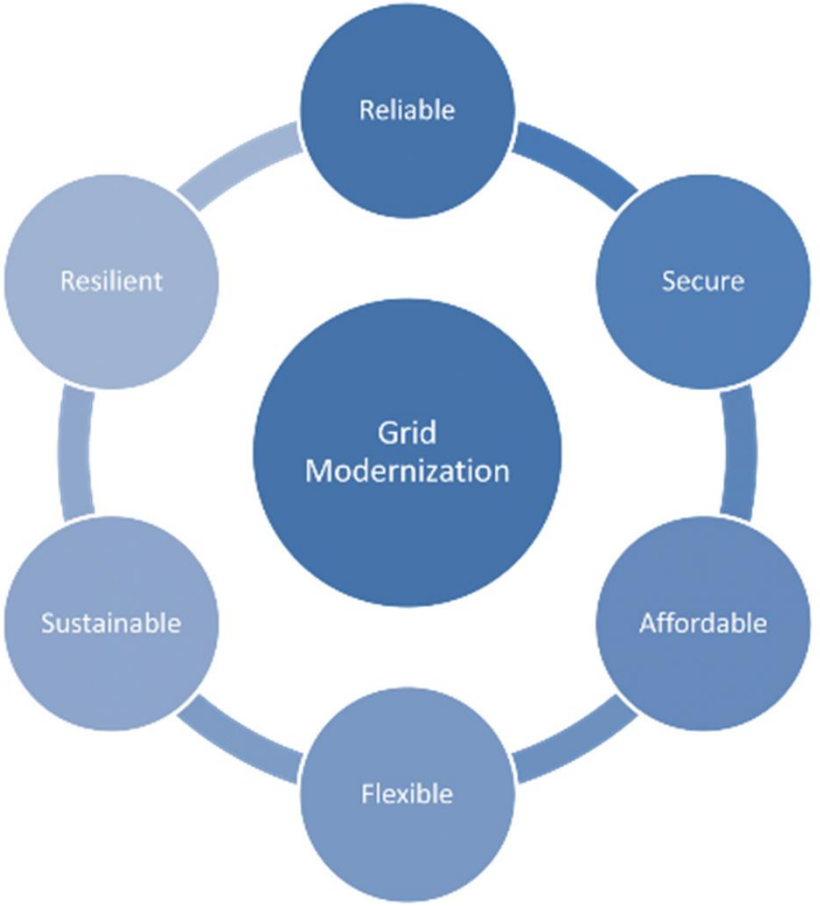


http://energy.gov/articles/doe-announces-220-million-grid-modernization-funding

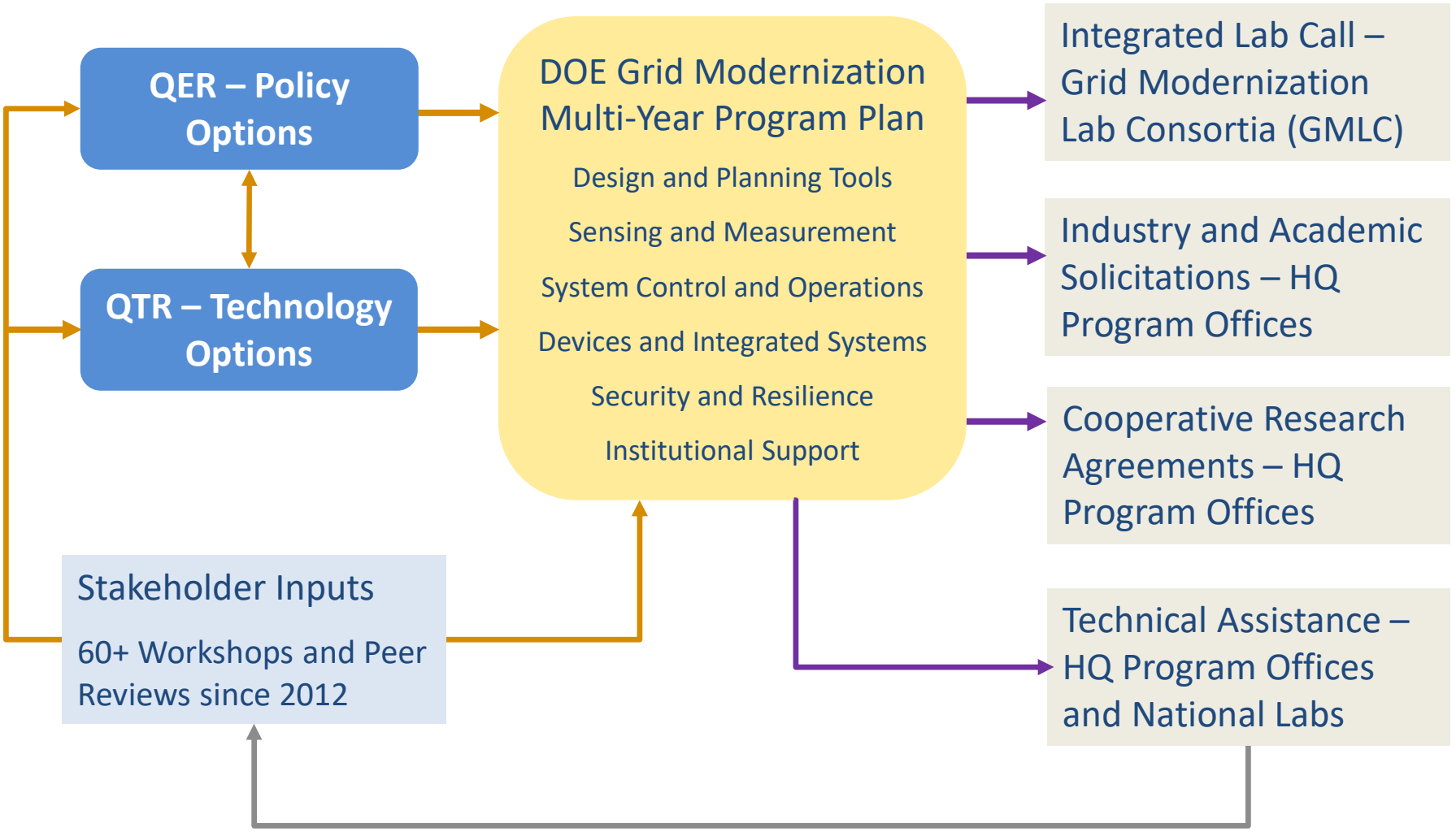
Grid Modernization Initiative

The vision of DOE's Grid Modernization Initiative (GMI) is:

- A future grid that will solve the challenges of seamlessly integrating conventional and renewable sources, storage, and central and distributed generation.
- The future grid as a critical platform for U.S. prosperity, competitiveness, and innovation in a global clean energy economy.
- A future grid that will deliver **resilient, reliable, flexible, secure, sustainable,** and **affordable** electricity to consumers where they want it, when they want it, how they want it.



Connectivity to Other DOE Activities



Additional Information

QER: http://energy.gov/qer

QTR: http://energy.gov/qtr

GMI: http://energy.gov/under-secretary-science-and-energy/grid-modernization-initiative

GridMod MYPP: http://energy.gov/downloads/grid-modernization-multi-year-program-plan-mypp

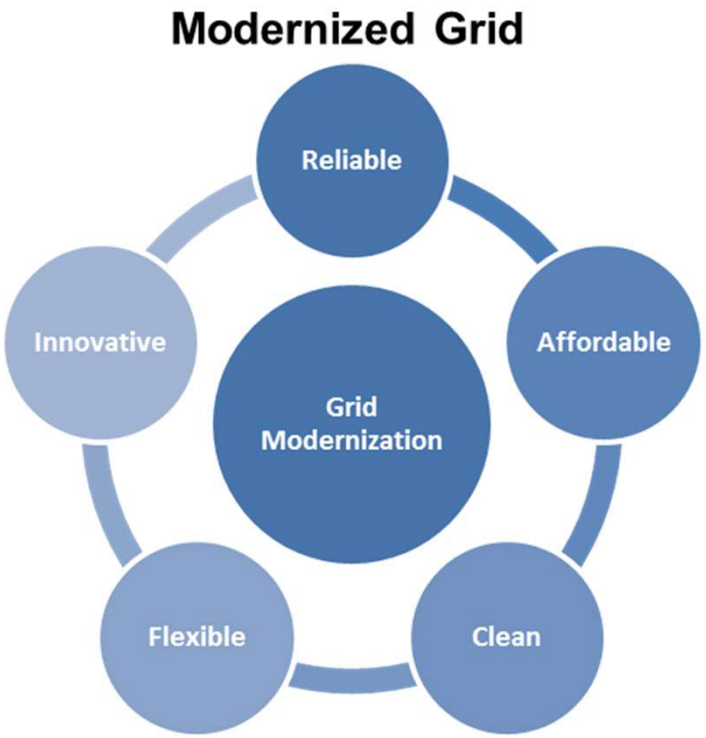
GMLC Portfolio: 88 Projects, $220 Million, 3 years

Multi-year Program Plan

- Devices and Integrated Systems
- Sensing and Measurement
- System Operations and Control
- Design and Planning Tools
- Security and Resilience
- Institutional Support

Topical Areas for Regional and State Partnerships

- Distributed Energy Resources (DER)
- Resilience
- Grid Architecture



For project-level information, go to:
http://www.energy.gov/doe-grid-modernization-laboratory-consortium-gmlc-awards

GMLC Projects

http://energy.gov/under-secretary-science-and-energy/doe-grid-modernization-laboratory-consortium-gmlc-awards

The 88 projects selected are broken down into the below categories (number of projects in each area also noted)

Foundational Selections
- Core Activities (6)
- Pioneer Regional Partnerships (11)
- Crosscutting Activities (13)

Program Specific Selections
- Building Technologies Office (6)
- Fuel Cells Technologies Office (2)
- Solar Energy Technologies Office (16)
- Vehicle Technologies Office (4)
- Wind and Water Power Technologies Office (7)

Topic Area Selections
- Advanced Grid Modeling (4)
- Advanced Distribution Management Systems (3)
- Energy Systems Risk and Predictive Capabilities (3)
- Energy Storage (2)
- Smart Grid (2)
- Transmission Reliability (4)
- Transformer Resilience and Advanced Components (3)
- Cybersecurity for Energy Delivery Systems (2)

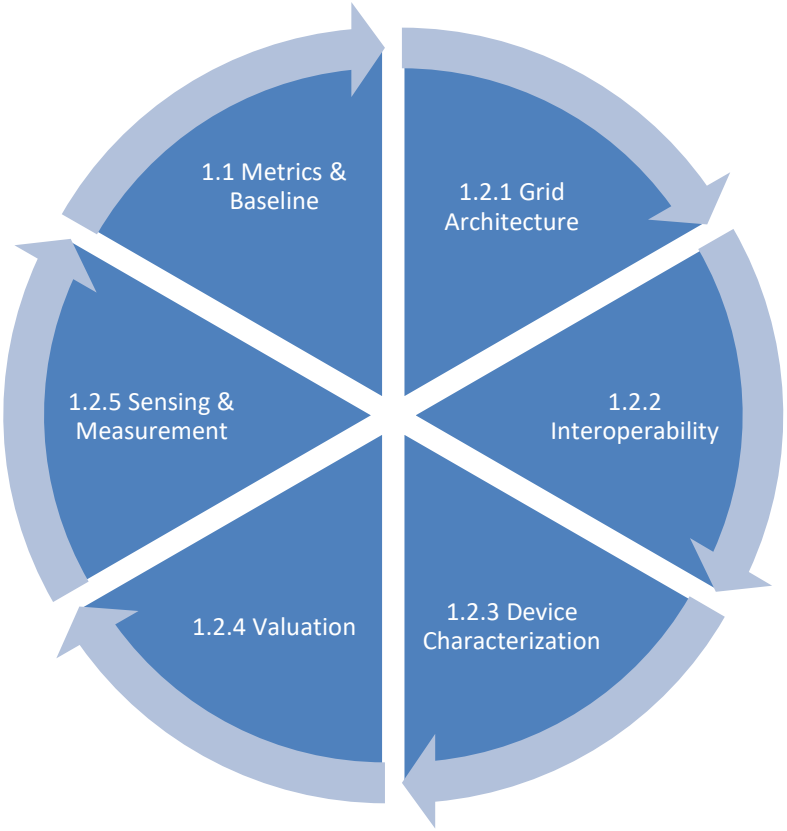
GMI's Integrated Technical Thrusts

Institutional Support	• Provide tools and data that enable more informed decisions and reduce risks on key issues that influence the future of the electric grid/power sector
Technology Innovation: Design and Planning Tools	• Create grid planning tools that integrate transmission and distribution and system dynamics over a variety of time and spatial scales
Technology Innovation: System Operations, Power Flow, and Control	• Design and implement a new grid architecture that coordinates and controls millions of devices and integrates with energy management systems
Technology Innovation: Sensing and Measurements	• Advance low-cost sensors, analytics, and visualizations that enable 100% observability
Technology Innovation: Devices and Integrated System Testing	• Develop new devices to increase grid services and utilization and validate high levels of variable generation integrated systems at multiple scales
Technology Innovation: Security and Resilience	• Develop advanced security (cyber and physical) solutions and real-time incident response capabilities for emerging technologies and systems

Core Activities

The Foundational Research projects provide the fundamental knowledge, metrics, and tools needed to support all the Cross-Cut R&D and regional partnerships. They provide the framework to enable an integrated DOE grid modernization strategy, including:

- ***Metrics and Baseline***: fundamental metrics to guide and evaluate national progress in grid modernization;
- ***Grid Architecture***: future grid and industry design elements to guide consideration of new industry paradigms;
- ***Interoperability***: standards and protocols for interoperability and testing of all grid devices from high voltage to customer premises;
- ***Device Characterization***: an integrated testing network that spans the National Labs as well as industry and academia;
- ***Valuation***: a consensus framework for valuing emergent grid technologies and services; and
- ***Sensing Strategy***: a strategy for observing and monitoring the future grid system in a way that meets expectations for predictive control, real-time operations and security.



Grid Architecture Information

About Grid Architecture:
Grid Architecture views the grid as a network of structures, including electrical structure, industry, regulatory, and market structure, information systems and communications, and control and coordination structures and provides the means to understand and plan their interactions. It illustrates how organized central wholesale markets are integrated with bulk system control, how distribution level changes related to penetration of Distributed Energy Resources impact both distribution and bulk systems operations, and how certain existing grid structures limit the ability to implement forward-looking changes to the grid.

Links to recent reports: (other reports and presentations are available through the PNNL link below)

- **Foundational Paper (January 2015)** - http://gridarchitecture.pnnl.gov/media/white-papers/Grid%20Architecture%20%20-%20DOE%20QER.pdf
- **Grid Architecture 2 (January 2016)** - http://gridarchitecture.pnnl.gov/media/white-papers/GridArchitecture2final.pdf

PNNL Grid Architecture Website:

- http://gridarchitecture.pnnl.gov/

State and Regional Engagement

List of Projects on State/Regional Map

Foundational/Pioneer Regional Partnerships

- 1.3.1 Southeast Regional Consortium [Project 7]
- 1.3.4 Kentucky Industrial Microgrid Analysis and Design for Energy Security and Resiliency [Project 8]
- 1.3.5 Siting and Optimization Tool for California [Project 9]
- 1.3.9 Smart Reconfiguration of Idaho Falls Network [Project 10]
- 1.3.10 Vermont Regional Partnership Enabling Use of Distributed Energy Resources [Project 11]
- 1.3.11 Grid Analysis and Design for Energy and Infrastructure Resiliency for New Orleans [Project 12]
- 1.3.21 Affordable, Clean, Reliable and Scalable Island Power Systems for Rural Alaska [Project 13]
- 1.3.22 Technical Support for the NY Reforming the Energy Vision Initiative [Project 14]
- 1.3.29 Coordinated Grid Support from Inverter-based Resources and Loads – Hawaii [Project 15]
- 1.3.33 Eastern and Western Interconnection Seams Study and Optimal HVDC Overlay [Project 16]
- Transactive Campus Demonstration [Project 17]

California Distributed Resource Planning

Drivers of change

- ★ Changing Electricity Supply Mix
- Growing Threats to Resilience and Reliability
- ★ New Market Opportunities for Consumers
- ★ Information and Control Technologies
- Aging Infrastructure

- **Challenge:**
  AB 327 requires the electric utilities in California to file Distribution Resources Plans (DRPs) to identify optimal locations for the deployment of distributed resources
- **Solution from MYPP:**
  Deliver an online open-access integrated distributed resource planning and optimization platform
- **Partners:**
  CA Public Utility Commission
  Pacific Gas & Electric
  Southern California Edison
  NYSERDA
  Metropolitan Washington Council of Governments
- **Expected impact:**
  Identify meaningful behind-the-meter DER adoption patterns, potential microgrid sites and demand-side resources, and evaluate the impacts of high renewable penetration feeders on the distribution and transmission grid

Primary Technical Area of MYPP

Design and Planning Tools

Grid Analysis and Design for Energy and Infrastructure Resiliency for New Orleans

Drivers of change

- Changing Electricity Supply Mix
- ★ Growing Threats to Resilience and Reliability
- New Market Opportunities for Consumers
- ★ Information and Control Technologies
- ★ Aging Infrastructure

- **Challenge:**
- Coastal cities in the Southeastern United States face a range of severe weather threats, including hurricanes, floods, and tornadoes. These threats can cause significant damage and disruption to cities, including loss of life, business interruptions and economic losses, and failure of critical infrastructure services. Many of these impacts occur because of failures in the electrical power system, so maintaining effective operations of critical systems and services during a major extended power outage is a growing concern to these cities
- **Solution from MYPP:**

  Conduct technical evaluations to assess energy and critical infrastructure vulnerabilities, and to identify cost effective options to improve the resiliency of both the electrical grid infrastructure and the community.
- **Partners:**

  City of New Orleans, Rockefeller Institute, Entergy, US Army Corps of Engineers

Areas of MYPP

Security and Resilience

DOE's Grid Modernization Initiative Website

http://energy.gov/under-secretary-science-and-energy/grid-modernization-initiative

ENERGY.GOV

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Home » Grid Modernization Initiative

GRID MODERNIZATION INITIATIVE

Sign-up for Updates

- GMI Home
- About
- GMLC
- Funding Opportunities
- Resources

Through the Grid Modernization Multi-Year Program Plan, the U.S. Department of Energy will coordinate a portfolio of activities to advance the grid. Photo courtesy of Berkeley Lab.

WHAT WE DO

The Grid Modernization Initiative (GMI) works across the U.S. Department of Energy (DOE) to create the modern grid of the future. Our extensive, reliable power grid has fueled the nation's growth since the early 1900s; however, the grid we have today does not have the attributes necessary to meet the demands of the 21st century and beyond.

STAY CONNECTED

Sign up to receive news, updates, and funding opportunities from GMI.

Email:

SUBSCRIBE

GMI NEWS

AUGUST 25, 2016

OE Announces Investment in New Research to Address Risk and Uncertainty in the Grid

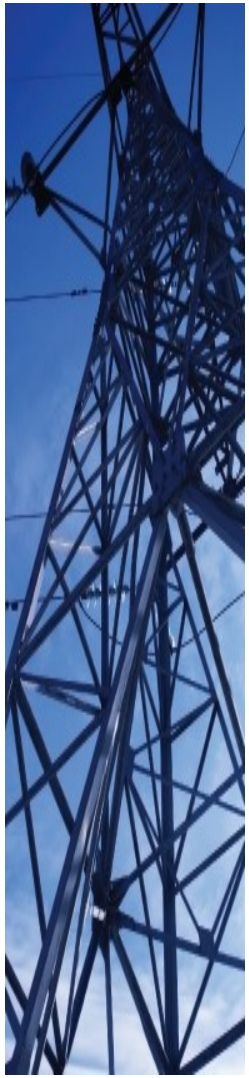
AUGUST 16, 2016

Energy Department Announces $137 Million Investment in Commercial and Passenger Vehicle Efficiency

More GMI News

RESOURCES

Office of Electricity Delivery & Energy Reliability



Our Mission

OE drives electric grid modernization and resiliency in the energy infrastructure.

OE leads the Department of Energy's efforts to ensure a resilient, reliable, and flexible electricity system. OE accomplishes this mission through research, partnerships, facilitation, modeling and analytics, and emergency preparedness.

Office of the Assistant Secretary

Advanced Grid Research & Development (AG R&D)	Transmission Permitting & Technical Assistance (TPTA)	Cybersecurity & Emerging Threats Research & Development (CET R&D)	Infrastructure Security and Energy Restoration (ISER)

http://energy.gov/oe/about-us/our-organization

OE Energy Storage Program

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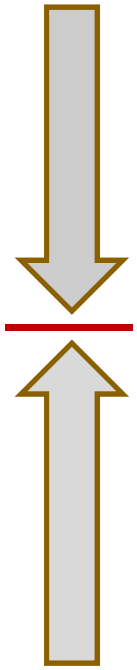
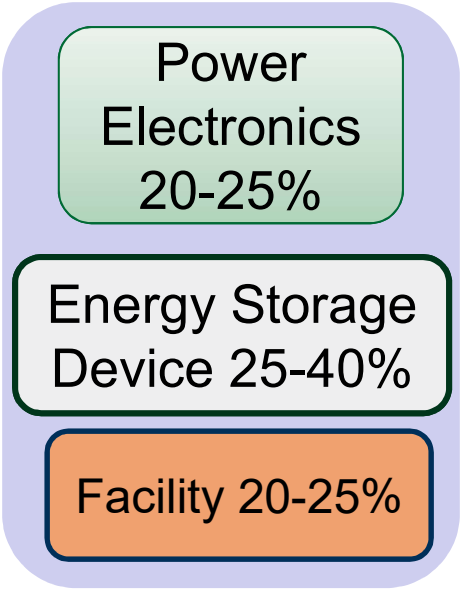
http://energy.gov/oe/services/technology-development/energy-storage

Energy Storage Economics



The Cost of a Storage System depends on the Storage Device, the Power Electronics, and the Balance of Plant

The Value of a Storage System depends on Multiple Benefit Streams, both monetized and unmonetized



LCOE depends on Application! Policy is important!

Working with States & Localities

Massachusetts - MA DOER Resilient Power Initiative

- **Microgrid/Storage Project** (Sterling, MA) – expands capacity of Police HQ and Dispatch Center to provide resiliency
- **Microgrid/Storage Project** (Northampton, MA) – leverages biomass, PV, diesel and energy storage to improve resilience on 3 abutting campuses (DPW, high school, hospital)
- **Flow Battery Projects** (Worcester and Everett, MA) – installation of battery containers; ARRA project

Vermont – Public Service Department

- **Green Mountain Power** (Rutland, VT) – island-capable resilient microgrid installation installed on a brownfield area to serve a high school and emergency center

Washington – State Clean Energy Fund

- **Flow Battery Projects** (WSU and UWA) – battery projects that will provide use case assessments and performance analysis

Oregon – Eugene Water and Electric Board

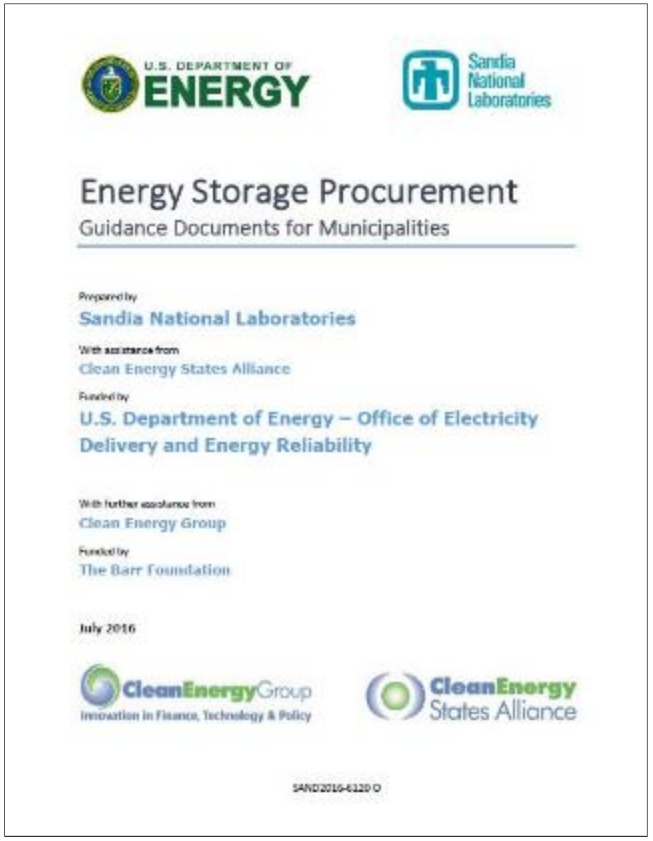
- **Grid Edge Demonstration Project** (Eugene, OR) – aggregation of energy storage with PV and diesel generation to provide grid services (e.g., peak shifting, transmission congestion relief, capacity/resource adequacy)

NEW RESOURCE

Energy Storage Procurement, Guidance Document for Municipalities

This document was a response to requests from Massachusetts municipalities engaged in energy storage procurement, for assistance in drafting RFPs for equipment and services. It is now available for use by any entity procuring storage.

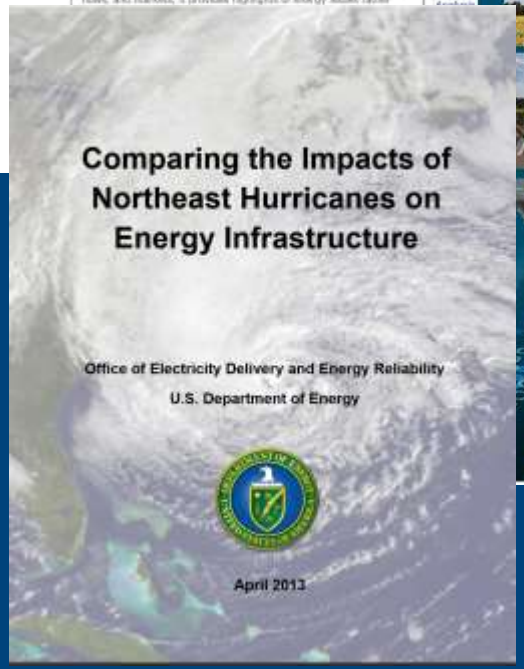
- Developed by Sandia National Laboratories
- Funded by DOE-OE
- Produced in partnership with CESA
- Contains two sample RFPs developed with Sterling, MA, plus a matrix of elements to include in an energy storage RFP

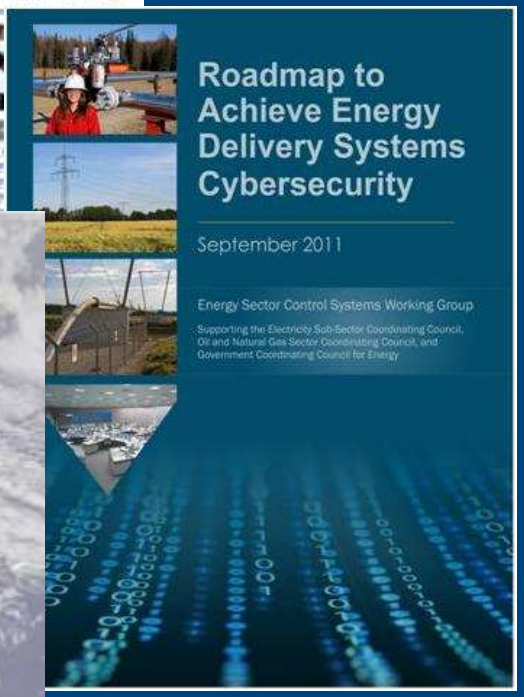


This document has generated a lot of interest, including from IEEE, which invited SNL to present on it at their PES GM Supersession on July 19 in Boston.

http://www.sandia.gov/ess/publications/SAND2016-6120.pdf

OE State, Local, Tribal, & Territoria Energy Assurance Program





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State, Local, Tribal, & Territorial (SLTT)
Energy Assurance Program Manager
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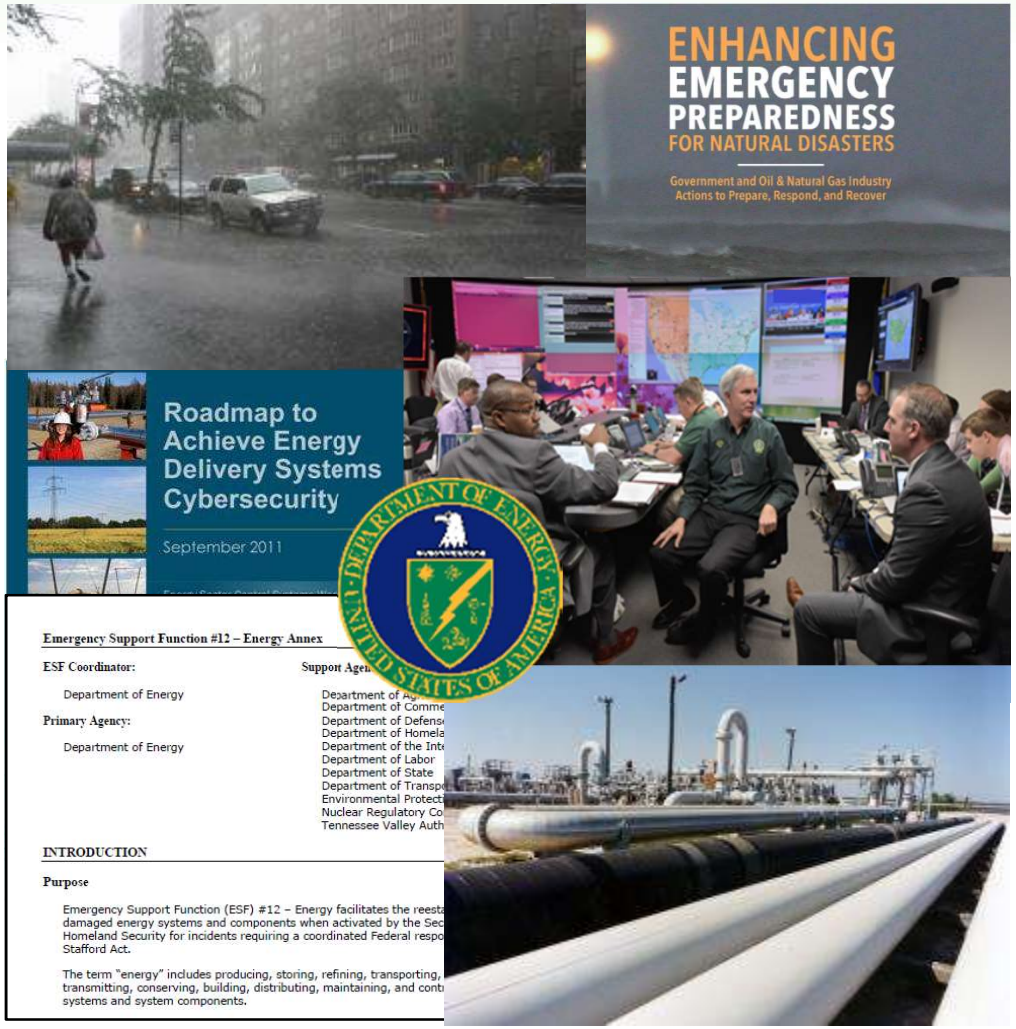
http://energy.gov/oe/services/energy-assurance

Threats to the Energy Environment and Federal Initiatives to Address Them

- Energy Sector Threat Landscape
- Overview of DOE Emergency Response and Emergency Support Function (ESF) #12
- DOE Initiatives
  - *FAST Act Authority*
  - *Energy Emergency Assurance Coordinators (EEAC) Program*
  - *EMP/GMD*
  - *Cyber Incident Coordination*



Natural Risks and Hazards to Energy Environment

West Coast Region

- Most Frequent: Earthquake
- Highest Property Loss: Wildfire

Rocky Mountain Region

- Most Frequent: Flood
- Highest Property Loss: Thunder/Lightning

Midwest Region

- Most Frequent: Flood
- Highest Property Loss: Flood (Thunder/Lightning is 2nd)

Gulf Coast Region

- Most Frequent: Flood
- Highest Property Loss: Hurricane

Eastern Region

- Most Frequent: Flood
- Highest Property Loss: Flood (Hurricane is 2nd)

Emerging Threat:

- Space Weather

Source: http://energy.gov/oe/mission/energy-infrastructure-modeling-analysis/state-and-regional-energy-risk-assessment-initiative

State, Local, Tribal, & Territorial (SLTT) Energy Assurance Program

The SLTT Energy Assurance Program works closely with State and local governments on energy assurance issues. The office develops products and tools to inform and educate State and local officials to support their energy emergency response activities. This is done through forums, web-based training, and table top exercises for federal, State, local, tribal, and territorial energy officials to exchange and share information.

Build and Maintain Relationships

- **Driver:** Relationships and accurate contact data are essential for a successful energy assurance community.
- **Programs/Projects:**
  - Energy Emergency Assurance Coordinators (EEAC) Program
  - N-Group Joint Energy Assurance Policy Committee
  - Participate in Forums

Educate/Train/Exercise

- **Driver:** Provide opportunities to develop and test energy assurance skills, understanding, and plans.
- **Programs/Projects:**
  - NGA Governors Retreat on Power Outages
  - NASEO Western Regional Emergency Fuels Meeting
  - APPA National Table-top Exercise on Mutual Aid
  - NASEO Energy Sector Cyber Exercise (Newport RI)

Develop and Maintain Energy Assurance Plans

- **Driver:** Over eighty percent of Energy Assurance Plans are three years or older; best practice is to revise plans every two years.
- **Programs:**
  - Develop energy assurance planning tools and templates to assist planners
  - Emergency Fuel Allocation Plan Template
  - Engage SLTT partners on cyber incident coordination

Office of Electricity
Electricity Policy Technical Assistance Program

http://energy.gov/oe/services/electricity-policy-coordination-and-implementation/electricity-policy-technical

OE Electricity Policy Technical Assistance Program

[Utility Business Models](#)
[Ratepayer-Funded Energy Efficiency](#)
[Demand Response](#)
[Recovery Act Assistance](#)
[Uniform Methods Project](#)

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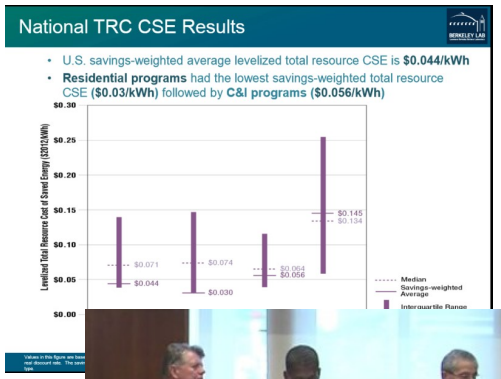
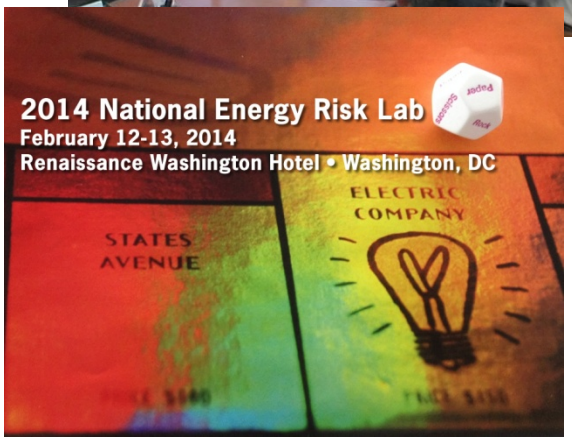
http://energy.gov/oe/services/electricity-policy-coordination-and-implementation/electricity-policy-technical

OE Electricity Policy Technical Assistance Program

Types of Assistance





- **Analysis** assistance consisting of data collection and assessment activities to determine impacts and evaluate policy options and technology and market strategies
- **Stakeholder-Convened Discussions** by organizing task forces, working groups, and collaborative processes to tackle key issues and build consensus for preferred courses of action
- **Education and Training** through workshops and webinars to raise knowledge levels and better equip policy makers to address local and regional needs
- **Consultations** for quick-turnaround assignments involving technical experts advising policy makers on specific matters of interest

How Eligible Entities and Organizations Get Assistance

HOW TO GET ASSISTANCE

TA generally provided in response to requests from eligible entities

Requests for assistance can be submitted

- directly to the OE program contacts
- through a national laboratory
- through a national or regional organization

TA is provided as appropriate and based on available resources

- existing resources leveraged, if possible
- similar requests may be aggregated for economic/efficiency reasons
- other DOE program offices may be engaged to address relevant subject matter

ELIGIBLE ENTITIES

- State public utility commissions
- State legislatures
- National associations of state decision-makers
- Regional associations of state decision-makers
- Federal officials
- Governors' offices
- State energy offices
- Governing boards of public power and cooperative utilities

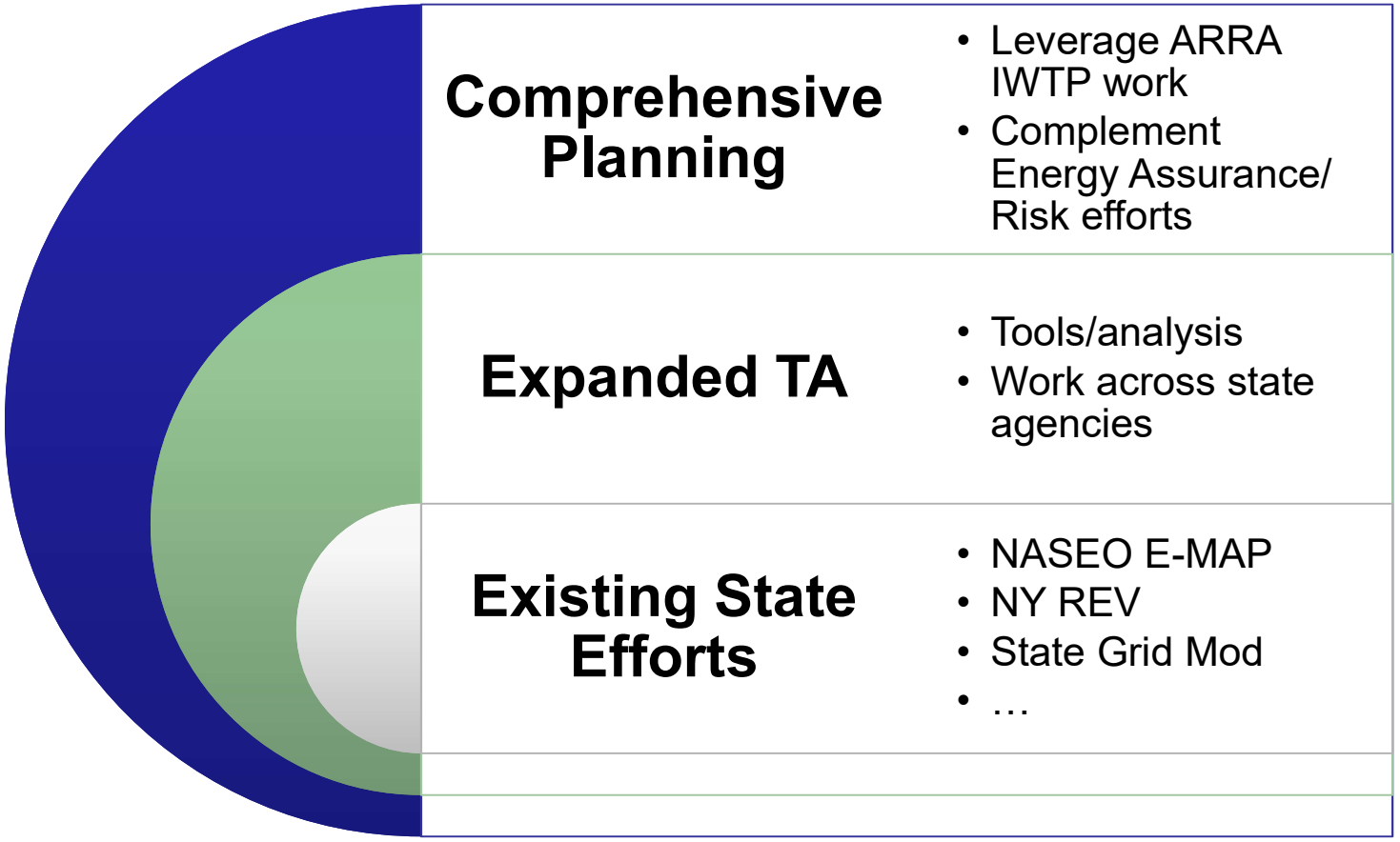
To request TA, contact Program Staff or visit: https://emp.lbl.gov/projects/technical-assistance-states

Who are the experts?

how/where they engage

Experts	Engagement
DOE staff	provide information about DOE programs/projects/initiatives relevant to TA request
National Labs	provide expert consultations, analytical support/guidance, develop tools/resources, provide training
Third-Party Experts (e.g., Regulatory Assistance Project, Clean Energy States Alliance)	provides expert consultation (e.g., NY REV), author issue papers/reports (e.g., Future Electric Utility Regulation series), inform identification of research areas/initiatives (LBNL advisory group)
N-group members	participate in document reviews, workshops and other discussions to develop resources (e.g., topical committees/ subcommittees)
Regional Groups (e.g., WGA, MGA, EISPC)	facilitate development of resources and tools (e.g., RAPID toolkit, Energy-Water Decision Support Tool, Energy Zones Mapping Tool) to inform state-based activities

Helping with Energy System Planning



NASEO Energy Markets and Planning
Pilot Project

NASEO
National Association of State Energy Officials

E-MAP: Phase Two Key Deliverables

6

- Facilitate analysis in selected pilot states
  - Conduct inventory of each states' challenges and opportunities
  - Develop written summaries for each pilot state
  - Prepare briefing report to be used to set baselines for each pilot state
- Plan and assist states in executing pilots
  - Assist states in developing schedule for meetings and teleconferences
  - Assist states in developing agendas and meeting summaries
  - Assist states in preparing final report
- Facilitate ongoing technical assistance to states
  - Conduct monthly coordination calls with states to discuss progress and identify technical assistance needs
  - Arrange for appropriate technical assistance via presentations, trainings, etc.

naseo.org/emap

- NASEO Energy Markets and Planning Pilot effort takes more holistic approach to addressing changing energy markets, flows, and challenges to deliver greater economic growth, improved environmental quality, and increased energy system resilience
- 3 state pilots: competitively selected; engage public/private energy leaders and other stakeholders; prepare state energy profiles and needs assessments; identify "best practices" (roadmap exercise)
- Develop NASEO toolkit for other states to use in their planning and market/policy designs

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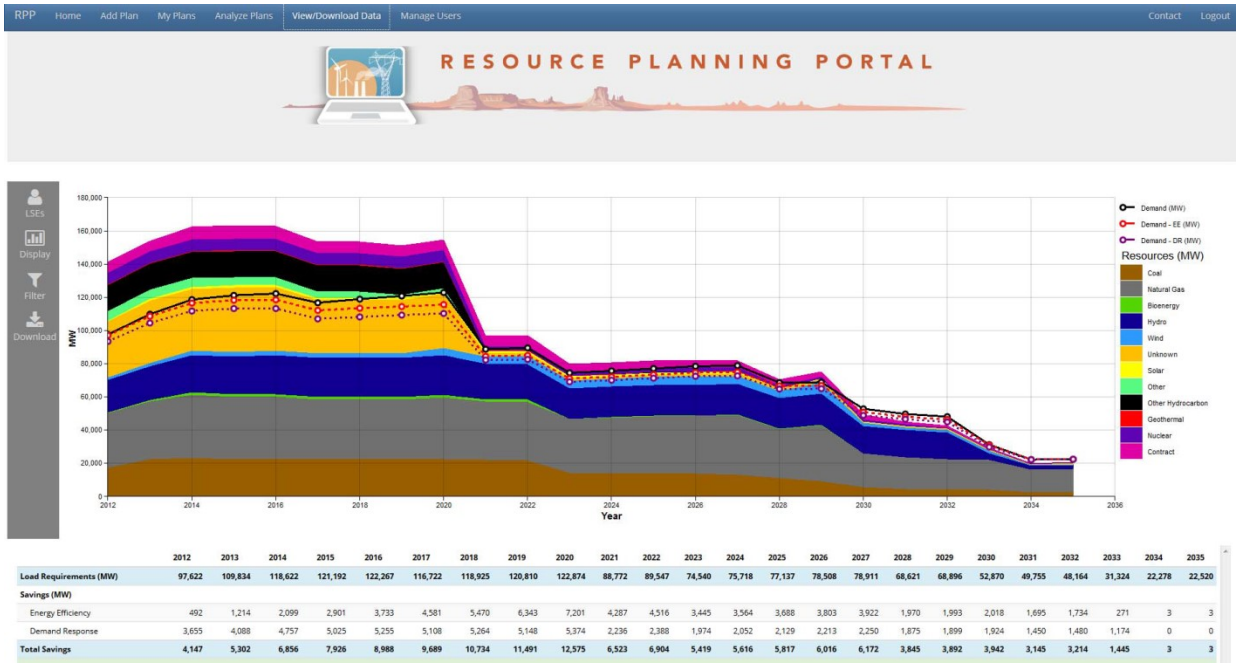
Resource Planning Portal

resourceplanning.lbl.gov



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Load Requirements (MW)	97,622	109,834	118,622	121,192	122,267	116,722	118,925	120,810	122,874	88,772	89,547	74,540	75,718	77,137	78,508	78,911	68,621	68,896	52,870	49,755	48,164	31,324	22,278	22,520
Savings (MW)																								
Energy Efficiency	492	1,214	2,099	2,901	3,733	4,581	5,470	6,343	7,201	4,287	4,516	3,445	3,564	3,688	3,803	3,922	1,970	1,993	2,018	1,695	1,734	271	3	3
Demand Response	3,655	4,088	4,757	5,025	5,255	5,108	5,264	5,148	5,374	2,236	2,388	1,974	2,052	2,129	2,213	2,250	1,875	1,899	1,924	1,450	1,480	1,174	0	0
Total Savings	4,147	5,302	6,856	7,926	8,988	9,689	10,734	11,491	12,575	6,523	6,904	5,419	5,616	5,817	6,016	6,172	3,845	3,892	3,942	3,145	3,214	1,445	3	3

LBNL's Western Resource Planning Portal will help policymakers, planners, and other stakeholders evaluate regional planning activities and compliance across the WECC footprint.

The Resource Planning Portal currently contains long-term planning assumptions for ~40 load serving entities, which represent about 90%of total WECC delivered load.

The Resource Planning Portal is a web-based tool that allows users to:

- **Input electric utility planning information in a consistent format**
- **Benchmark planning assumptions across jurisdictions**
- **Output results in a standardized format for deeper analysis.**

Eastern Renewable Generation Integration Study

NREL Supercomputing Model Provides Insights from Higher Wind and Solar Generation in the Eastern Power Grid

- Data and analysis to help planners and regulators understand implications of higher wind and solar generation
- High-resolution model of the Eastern Interconnection, simulated at 5-minute intervals
- Four hypothetical scenarios used to analyze how the Eastern Interconnection might function in 2026, when the power system could have significantly less power generation from fossil fuels

Key outcomes:

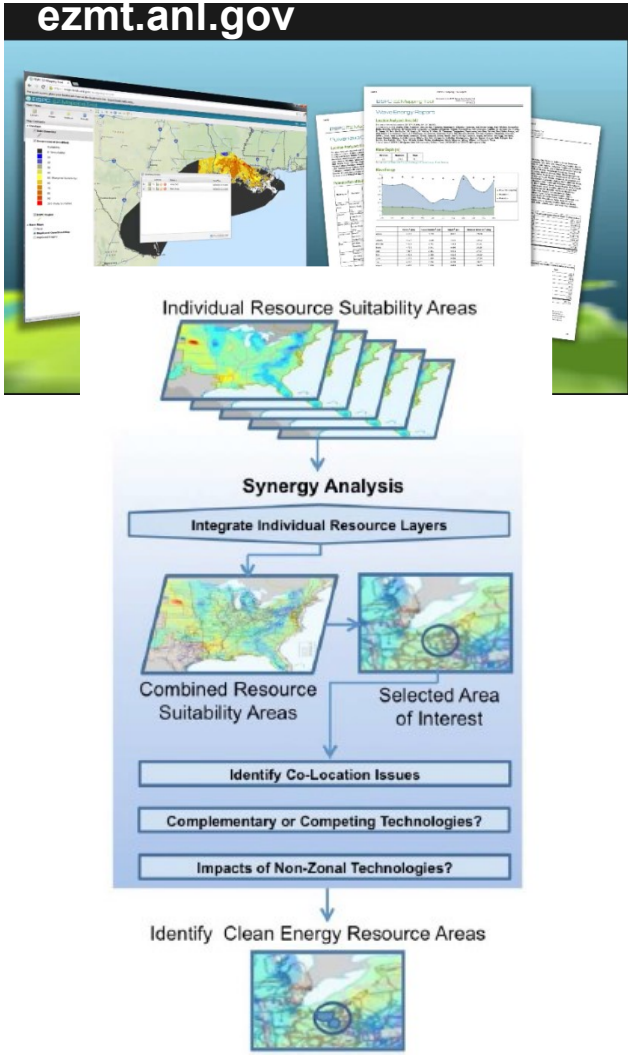
- Complex model that solves in substantially reduced time
- Insights into increased penetration of wind and solar in the system
- New tools for understanding the system implications

Disclaimers: Model did not look at…

- capital costs, land use and siting, market design, gas pipeline, and other factors
- all aspects of reliability considered by system planners and operators, including system dynamics and AC power flow

Visit: nrel.gov/ergis

Eastern Interconnection
Energy Zones Mapping Tool



- Web-based EZ Mapping tool looks at 9 clean energy resource for development in the East
  - ~1100 registered users
- Developed by ANL under ARRA for EISPC, but being leveraged more broadly
  - Evaluation of potential transmission facility locations in sensitive areas or resource-constrained areas
  - 368 Corridor Study
- Produces user-customized maps of areas that fit the screening factors and criteria for various electrical power generation technologies
- ANL continues its stakeholder outreach campaign and technical assistance for the EZ Mapping Tool
  - New data layers added as needed/requested (FY14 - national trails, energy-water)
  - Periodic updates of energy policy and law

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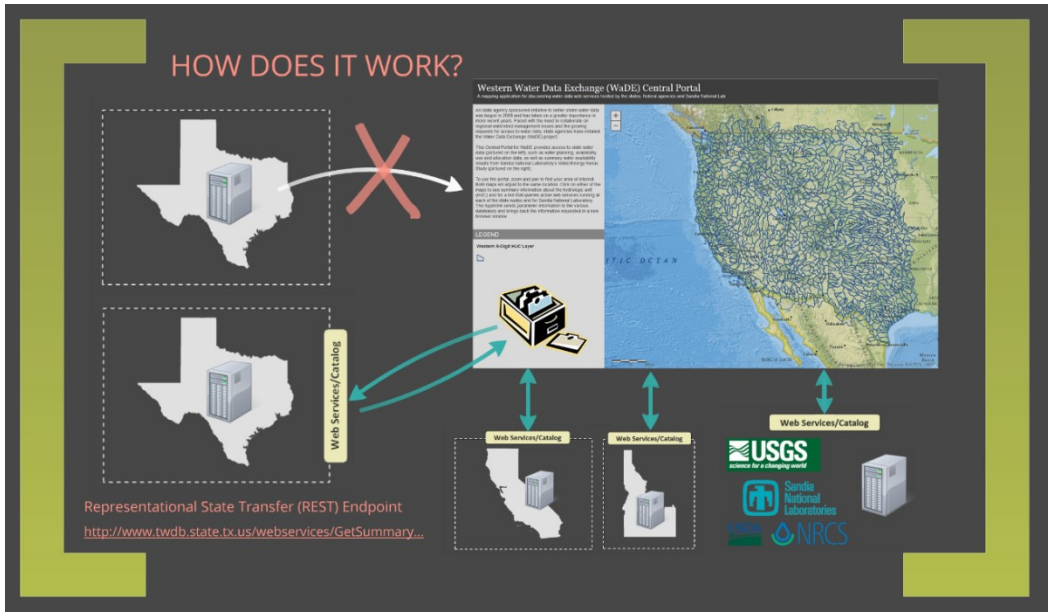
Energy-Water Nexus Decision Support System



- National Labs develop models to analyze state energy-water data
- Use Web Services to transfer data
- Data Stay at the Source (i.e. the states)
- Provide transparent link between state data and integrated water metrics
  - Link to metadata
  - Changes in state data are automatically reflected in metrics

* This interface developed under ARRA-funded work for the Western Interconnection and ERCOT to inform transmission planning; now expanding to the Eastern Interconnection. Available Online: http://energy.sandia.gov/?page_id=17849

Broaden Awareness — Showcase recent applications of current tool to wider range of grid planners, operators and regulators across the U.S.

Obtain Relevant Data — Collect data and other water resource and accessibility information for each interconnection; dynamic data exchange with state water managers.

Develop Tool/Interface — Work with Sandia Lab and test group of users to maximize applicability of tool to energy/water challenges in each interconnection.

Determine Next Steps — Provide other assistance if needed to enable users to address emerging water/energy issues; maintain and expand tool capabilities for more applications.

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Regulated Utility Business Models

Future Electric Utility Regulation Series

A new series of reports from Lawrence Berkeley National Laboratory taps leading thinkers to grapple with complex regulatory issues for electricity.

The electric sector in the United States is seeing significant changes in technologies, customer desires, load growth, and federal and state policies and regulations. This new series of reports takes a unique point-counterpoint approach to highlight different views on the future of electric utility regulation and business models and achieving a reliable, affordable and flexible power system.

Following are reports completed or underway to date:

https://emp.lbl.gov/future-electric-utility-regulation-series

FINDER Model: The **FIN**ancial impacts of **D**istributed **E**nergy **R**esources model quantifies changes in utility costs and revenues with the addition of demand-side and distributed energy resources (DERs)

https://emp.lbl.gov/finder-model

Technical assistance to state utility commissions and energy offices considering possible changes to regulations and policies to advance public interests in the electricity sector

https://emp.lbl.gov/projects/technical-assistance-states

Future Electric Utility Regulation Report Series

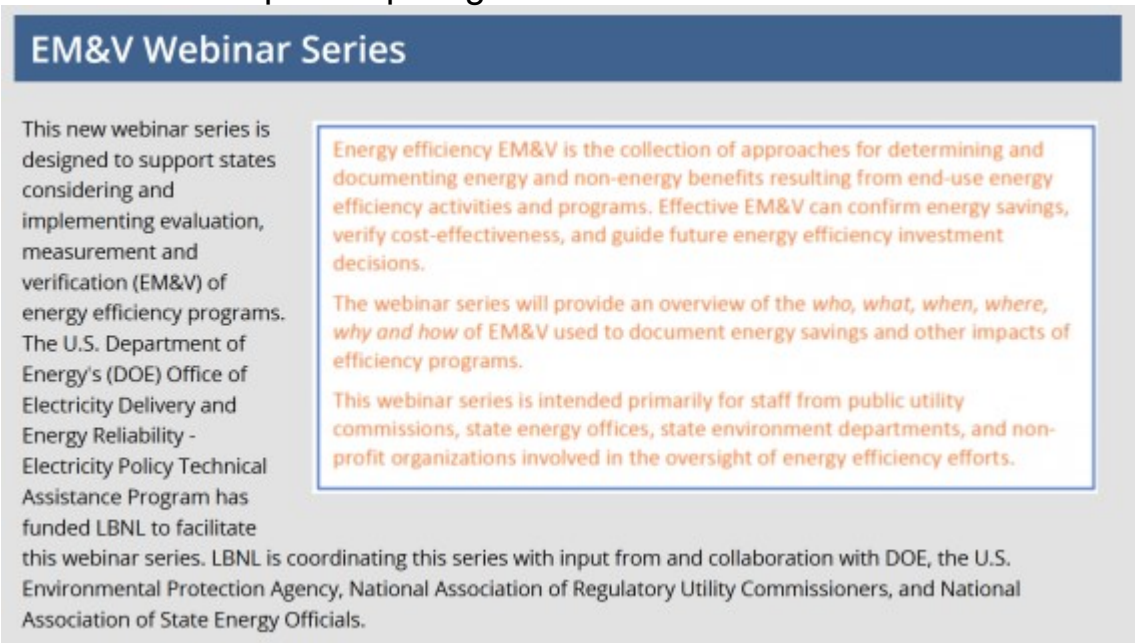
1. ***Electric Industry Structure and Regulatory Responses in a Distributed Energy Resources (DERs) Future*** - November 2015
   Steve Corneli (NRG) and Steve Kihm (Seventhwave)
   (Report PDF) (Presentation PDF) (Webinar Recording)
2. ***Distribution Systems in a High DER Future: Planning, Market Design, Operation and Oversight*** - October 2015
   Paul De Martini (California Institute of Technology) and Lorenzo Kristov (CAISO)
   (Report PDF) (Presentation PDF) (Webinar Recording)
3. ***Performance-Based Regulation in a High DER Future*** - January 2016
   Tim Woolf (Synapse Energy Economics) and Mark Lowry (Pacific Economics Group)
   (Report PDF) (Presentation PDF)(Webinar Recording)
4. ***Distribution System Pricing with Distributed Energy Resources*** - May 2016
   Ryan Hledik (The Brattle Group) and Jim Lazar (Regulatory Assistance Project)
   (Report PDF) (Presentation PDF) (Webinar Recording)
5. ***Recovery of Utility Fixed Costs: Utility, Consumer, Environmental and Economist Perspectives*** - June 2016 Lisa Wood (Institute for Electric Innovation) and Ross Hemphill (RCHemphill Solutions), John Howat (National Consumer Law Center), Ralph Cavanagh (Natural Resources Defense Council) and Severin Borenstein (UC-Berkeley) (Report PDF)(Presentation PDF)(Webinar Recording)
6. ***The Future of Electricity Resource Planning*** - September 2016
   Fredrich Kahrl (E3), Andrew Mills (LBNL), Luke Lavin, Nancy Ryan and Arne Olsen (E3) (Report PDF Presentation PDF Webinar Recording

Evaluation Measurement & Verification Webinar Series

The series will provide an overview of the *who, what, when, where, why and how* of EM&V used to document energy savings and other impacts of efficiency programs.

This webinar series is intended primarily for staff from public utility commissions, state energy offices, state environment departments, and non-profit organizations and offers an opportunity to engage with others in similar roles.

https://emp.lbl.gov/emv-webinar-series



New LBNL series funded by DOE's Office of Electricity Delivery and Energy Reliability Electricity Policy Technical Assistance Program, in collaboration with US EPA, NASEO, NARUC.

Latest Webinar Topics:

- **Evaluating Non-Energy Impacts of Energy Efficiency Programs, Dec 14**
- Opportunities and EM&V for Improving Electricity Transmission and Distribution (T&D) Efficiency
- Evaluation of Residential Behavior-Based Programs
- Setting Baselines for Planning and Evaluation of Efficiency Programs
- Using Deemed Savings and Technical Reference Manuals for Efficiency Programs and Projects
- Planning and Budgeting for the Evaluation of Energy Efficiency Programs

U.S. DEPARTMENT OF ENERGY | Office of Electricity Delivery & Energy Reliability

Upcoming/Available Resources…

Utility Business Models

- **LBNL FEUR Series**
  - See LBNL website for list of potential future topics
- **NGA Issue Brief**
  - Available online
- **NARUC Utility Business Model Lab**
  - Contact Miles Keogh (mkeogh@naruc.org)

RPS Collaborative

- **Webinar series**
- **Whitepapers**

Visit: http://www.cesa.org/projects/state-federal-rps-collaborative/

Energy Storage

- **NGA Issue Brief**
  - Available online
- **RPS Collaborative Paper**
  - Available online

EM&V

- **LBNL Webinar Series**
  - Next Webinar: Evaluating Non-Energy Impacts of Energy Efficiency Programs, 12/14/2016, 10:30am-11:45am PT

National Council on Electricity Policy

See NARUC website for more info

Nov – Transmission Planning in the East

Jan 5 – Valuation Meeting

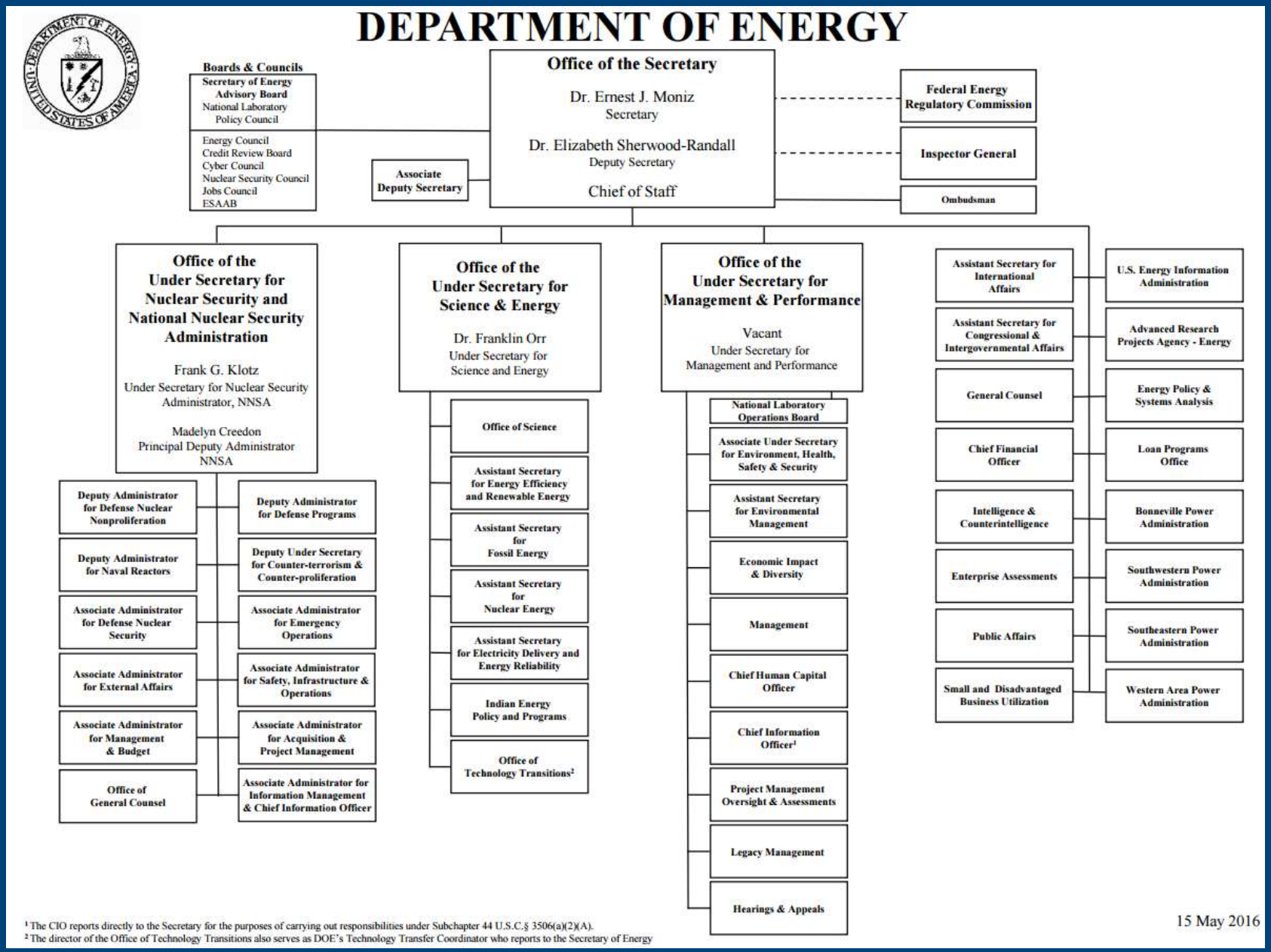
…Stay tuned for more from OE's EPTA Program and our collaborators

OE Activities

Resources for NASEO E-MAP Pilot States

caitlin.callaghan@hq.doe.gov
202.287.6345

DEPARTMENT OF ENERGY



[1] The CIO reports directly to the Secretary for the purposes of carrying out responsibilities under Subchapter 44 U.S.C.§ 3506(a)(2)(A).
[2] The director of the Office of Technology Transitions also serves as DOE's Technology Transfer Coordinator who reports to the Secretary of Energy

15 May 2016

http://energy.gov/leadership/organization-chart