

# **The Grid of the Future: Evolving to Meet America's Energy Needs**

***Ladeene Freimuth***

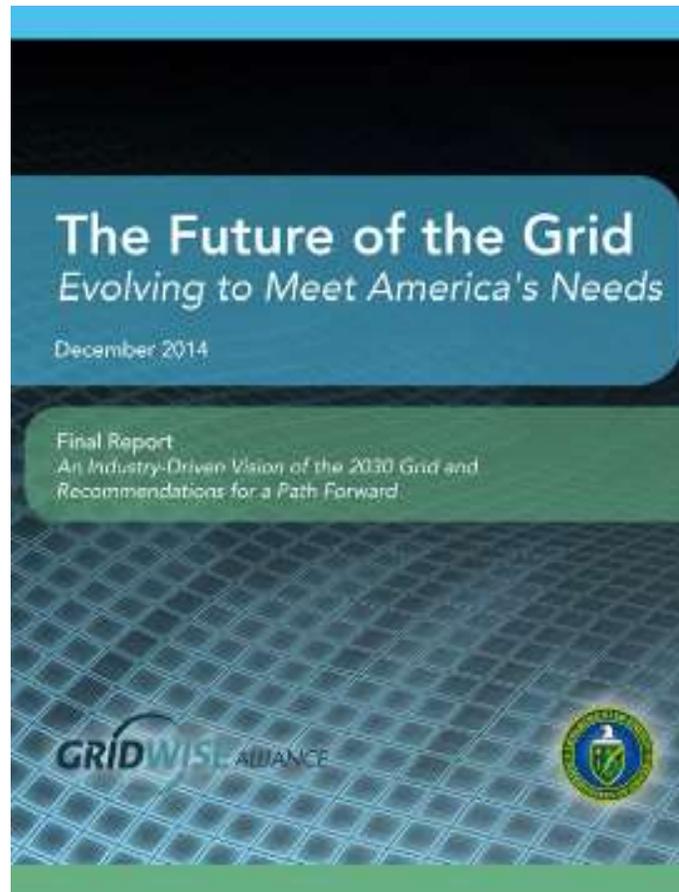
***Policy Director***

***GridWise Alliance***

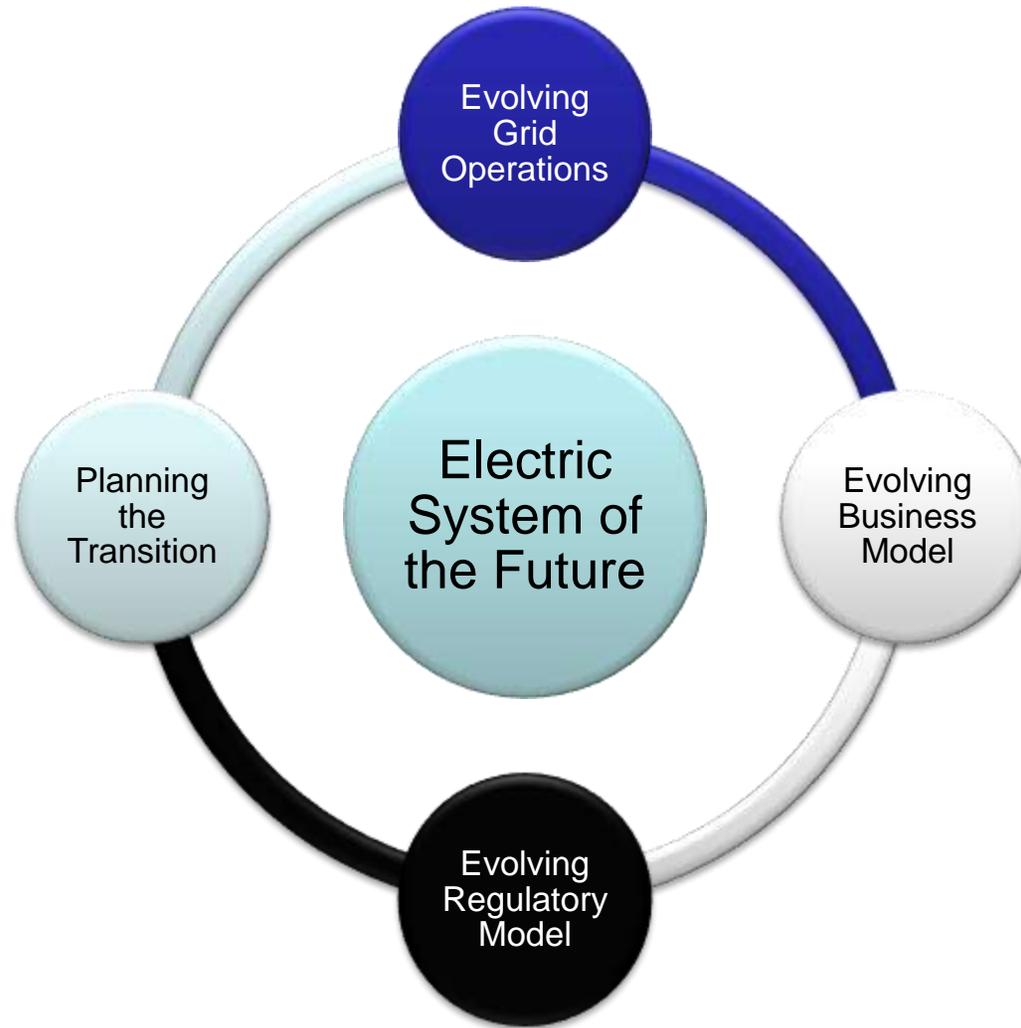
***February 5, 2015***



# Future of the Grid Initiative



# GridWise's Framing of the Discussion



# Characteristics of the Future Electric System

- The grid will be the “enabling platform.”

The electric system also will consist of:

- Centralized and distributed generation sources;
- Dispatchable and non-dispatchable resources;
- Energy storage;
- Microgrids; and, more.

# Characteristics of the Future Electric System (cont'd.)

- More consumers will become “prosumers” – i.e., producers and users of energy.
- There will be a market for both regulated and competitive services.
- New third-party unregulated players will become involved.
  - Need to develop new roles and responsibilities.
  - Need to define future regulated and unregulated components.

# Key “Grid of the Future” Themes: Evolving Grid Operations

The grid will transform, as follows:

- One-way to two-way (and multiple) flows of power and information.
- It must be agile and “fractal” - flexible, adaptable, responsive.
- The distribution grid will resemble the transmission grid to a greater extent.
- Balancing supply and demand will be increasingly complex and important.

# Evolving Business Model

Future value proposition for grid operators, while maintaining a safe, reliable, and affordable grid, includes:

- Integrating all types of generations;
- Increasing grid efficiency;
- Facilitating a retail market for consumers to buy and sell services/enabling customers to provide services back to the grid;
- Optimizing asset utilization; and,
- Facilitating the provision of highly reliable and resilient energy services to end consumers.

# Evolving Business Model (cont'd.) – Portfolio of Services

A range of services could consist of:

- Basic service;
- Enhanced service;
- High-reliability services;
- Microgrid services;
- Financing services; and,
- Buying/selling ancillary services, such as:
  - VAR Support;
  - Voltage Support;
  - Frequency Response;
  - Spinning Reserve; and,
  - Backup Power Support.

# Evolving Regulatory Model – Challenges for Regulators

- Providing regulatory clarity during a time of significant change.
- Better aligning regulatory processes with the pace of technological innovation and policy, market, other forces.
- Balancing public policy objectives with the needs and desires of consumers and shareholders.
- Addressing future consumer and utility obligations.

# Recommendations

- Establish clear and comprehensive guiding principles.
- Develop a unifying architecture to ensure interoperability across the entire grid.
- Create a framework for guiding investments and develop state/regional roadmaps.
- Drive solutions through stakeholder engagement and education.
- Address technological challenges and limitations through robust research and analysis.

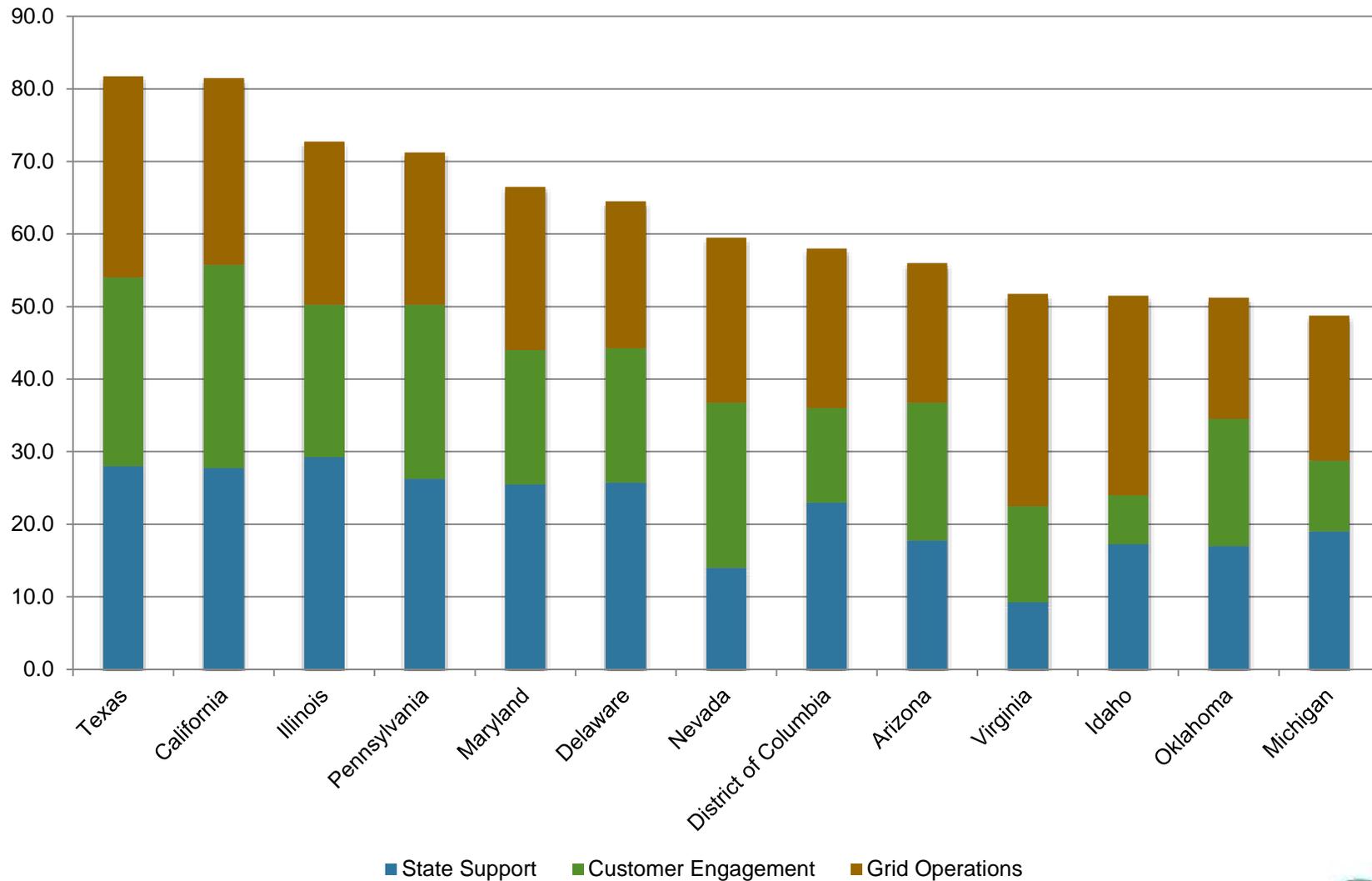
# 2014 Grid Modernization Index

The GMI ranks states on grid modernization accomplishments, based on three components:

- **State Support:** State policies and regulatory mechanisms that facilitate grid investment;
- **Customer Engagement:** Investments across a state in customer–enabling technologies and capabilities; and,
- **Grid Operations:** Investments in grid-enhancing technologies and capabilities.

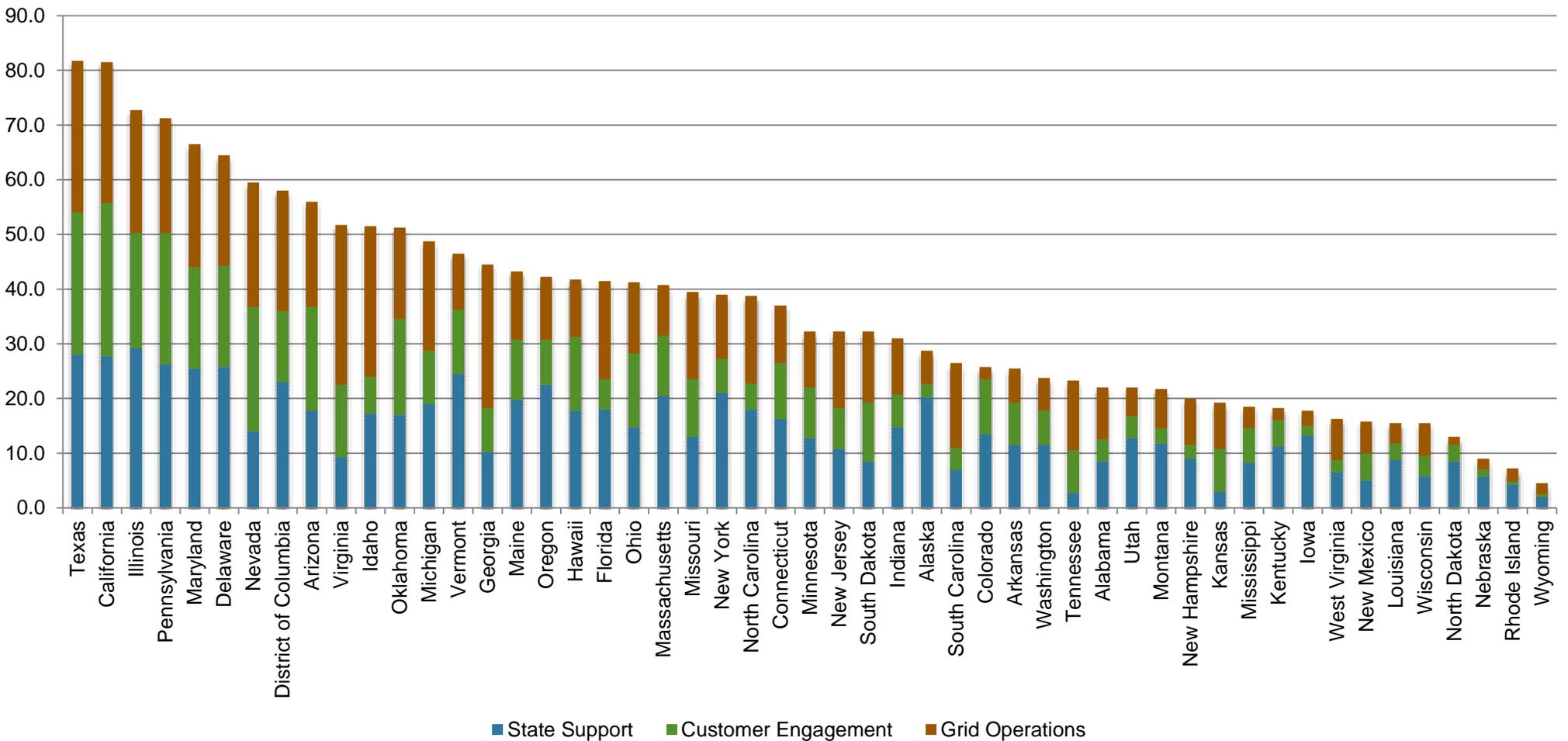
# 2014 GMI – Top States

## Leading States - Top 25 Percent



# 2014 GMI – All Results

## 2014 Grid Modernization Index



# 2014 GMI Key Insights

- States that received ARRA grants have higher overall GMI scores, reflected most in Grid Operation scores.
- States with more than 50 percent penetration of Advanced Metering Infrastructure (AMI) have higher average scores for all three GMI components.
- Higher penetration of DERs, particularly rooftop PV, is starting to drive an increasing urgency for grid modernization to enable the effective integration of these resources in many jurisdictions.
- RPSs, EERSs, etc. often contribute to higher GMI rankings, as well.

# 2014 Key State Activities

## ■ California

- Has Distribution Resource Planning efforts underway.
- Has energy storage targets – IOUs are conducting planning to achieve these targets.

## ■ Texas

- Leads in the implementation of deregulated retail services.
- Effectively integrates large scale wind generation including large scale energy storage.
- ERCOT has an effort underway to “rethink” the entire existing set of ancillary services.

## ■ Illinois

Increased its 2014 GMI ranking by 13 points from the prior year, which reflects the implementation of 2011 "Energy Infrastructure and Modernization Act."

## ■ Massachusetts

Developed Commonwealth-wide Grid Modernization Plan.

## ■ New York

Initiated a State-wide Reforming the Energy Vision (REV) process in April 2014 to define a new role for distribution utilities and establish a retail market.

## ■ Hawaii

Increased penetrations of rooftop solar, which has led to the need to focus on the modernization of the electric grid to effectively integrate these DERs.



**Thank You!**

**Ladeene Freimuth**

**[ladeene@freimuthgroup.com](mailto:ladeene@freimuthgroup.com)**

**(202) 550-2306**

