



Rethinking the Architecture of the Grid – Visions for 2030

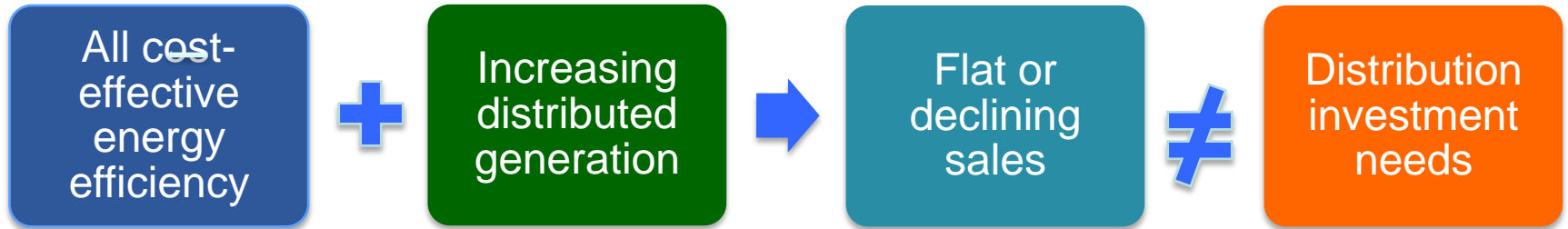
Janet Gail Besser, Vice President
Policy and Government Affairs

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The “Smart” Grid



Changing Electricity Context

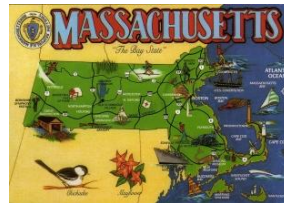


Different Responses



Massachusetts Makes Smart Grid Mandatory

A new law requires smart meters, grid planning, and new models to value it all.



Jeff St. John
December 31, 2013

Massachusetts has joined a growing list of states demanding that its investor-owned utilities invest in the smart grid -- and find new models for how those investments should be valued. Consider it the latest move in a state-by-state reconfiguration of utility business models, aimed at creating new rules for sharing the costs and benefits of grid modernization between utility shareholders and customers.

Monopoly Utilities Doomed Jim Rogers on the Pivot Ahead

BY MARTIN ROSENBERG EDITOR-IN-CHIEF, ENERGYBIZ 1-20-14

The many challenges ahead are going to fundamentally change this industry. Leaders in this industry in the future are going to have to run to the problems that they see on the horizon, embrace the problems, and then try to convert the problems and challenges they see into opportunities to create value for their customers as well as their investors.

MA Grid Modernization Goals

2012 Notice of Investigation

- Enhance the reliability of electricity services
- Reduce electricity costs
- Empower customers to better manage their use of electricity
- Develop a more efficient electricity system
- Promote clean energy resources
- Provide new customer service offerings



December 2013 Straw Proposal

- Reduce the effects of outages
- Optimize demand, including reducing system and customer costs
- Integrate distributed resources
- Improve workforce and asset management

Value for Customers

- More and enhanced products and services
- Controlling/managing energy usage
- Managing/reducing energy costs
- Integrating and optimizing use of distributed energy resources
- Hedging price volatility
- Increasing choices
- Reducing environmental impacts

Clean Energy's Grid Modernization Principles



Integration of distributed energy resources (DER) into utility system to capture full value

- Planning to take DER into account
- Visibility into status of system (information to utilities)
- Time varying rates (information to customers)
- Evaluating benefits and costs broadly
- Regulatory framework that supports investment
- Customer education and protection

Planning for a Modern Grid

- Long-term focus
- Create “optionality”
- Assess effects on reliability, resiliency, operations, usage, peak load, prices and bills
- Integrate distributed energy resources to benefit customers and system

Business Case Approach

- Accounts for benefits and costs broadly, including
 - Value to customers
 - Quantifiable and difficult to quantify benefits
 - System benefits to utility
 - Societal benefits that contribute to state policy goals
- More fully accounts for the effects of new technologies
- Considers risk and uncertainty

Utility of the Future, Today

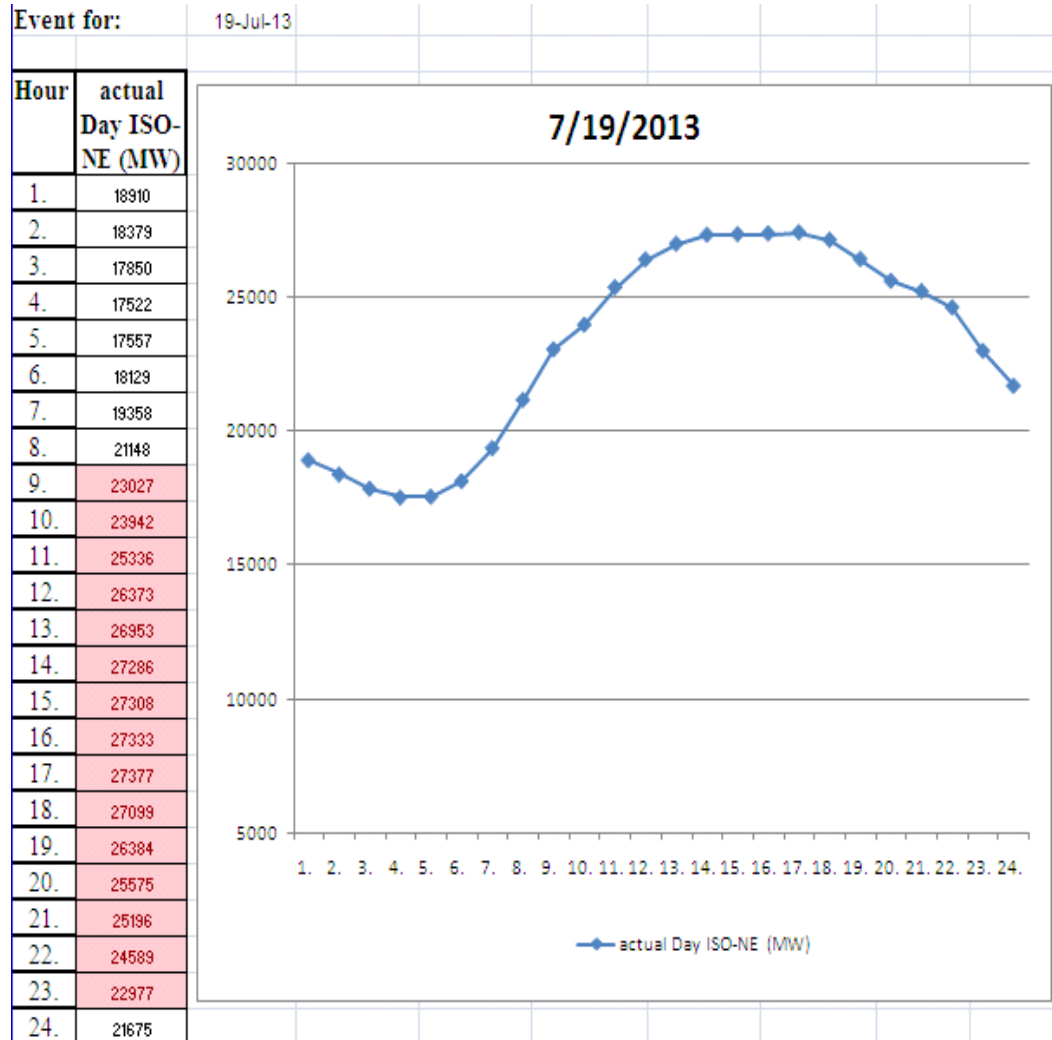
- A new regulatory framework
 - Forward looking and performance-based
 - Applies to grid modernization and all spending
 - Forecasted multi-year rate case
 - Capital investment plan consistent with grid modernization objectives
 - “Business case” for investment, taking into account benefits, costs, risks and uncertainty
 - Annual reconciliations after review of performance

Other Key Elements

- Time Varying Rates
- Distribution Services Pricing
- Stakeholder Engagement
- Data Access

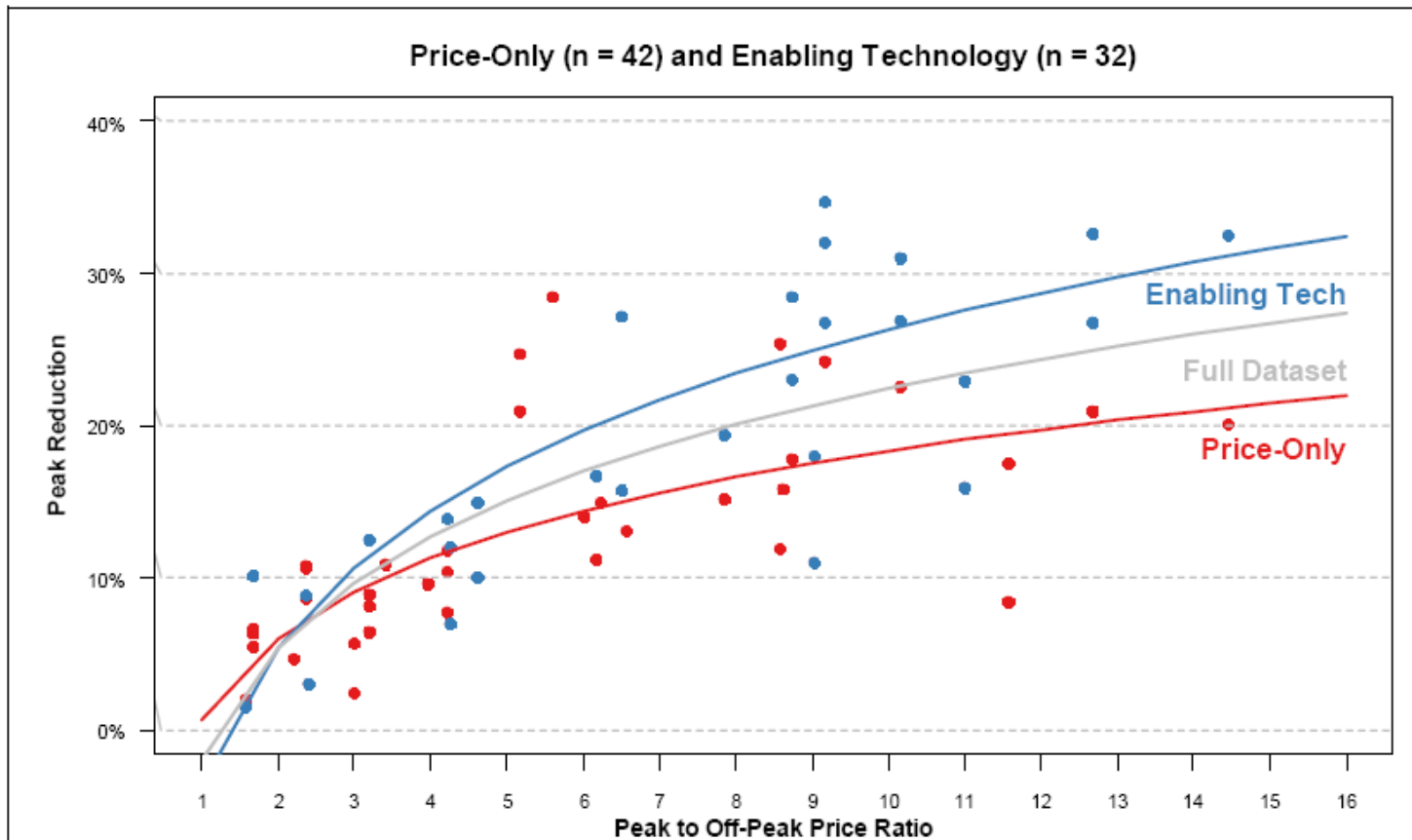
Time Varying Rates (TVR)

- Certain periods of day and year require greater amounts of capacity at higher energy cost
- Provide this information to customers through time varying rates (RTP, CPP, TOU)
- Customers can reduce need through energy efficiency, controlled demand response, self-generation



TVR and Enabling Technology

Figure 4-2: Peak Reduction Relationships to Price Ratio & Enabling Technology



Distribution Services Pricing

- Prices for distribution services reflect costs
- Distributed resources compensated for value
- Past distribution delivered power one way
- DG creates two way power flow
- Grid will manage load and local generation for customer choice and benefit

Stakeholder Engagement

- Engaging stakeholders – policymakers, regulators, clean energy industry, business, technology, engineering consumer and environmental advocates
 - To identify new technologies
 - To identify benefits and costs
 - To ensure diverse interests are addressed
 - To take comprehensive approach
 - To facilitate timely regulatory review
- Process can be formal or informal

Data Access

- In near real-time
- For customers, 3rd parties (and utilities
- Enables customers to make informed decisions
- Provides utility visibility to behind the meter generation
- Open access, interoperable utility grid platform for innovative service and product applications

Conclusion

- Can utilities turn challenges into opportunities
- Can regulatory leadership
 - Align utility, customer and other interests
 - To provide reliability, resiliency, security, operational efficiency, reduced costs, enhanced capabilities, DER integration, greater customer choice and environmental improvement

Additional Information

- MA DPU 12-76 NOI, October 2, 2013
<http://www.env.state.ma.us/dpu/docs/electric/12-76/10212dpuvtord.pdf>
- MA Grid Modernization Steering Committee Report to DPU, July 2, 2013
<http://www.mass.gov/eea/docs/dpu/electric/grid-mod/ma-grid-mod-working-group-report-07-02-2013.pdf>
- MA DPU Order 12-76-A, December 23, 2013
<http://www.mass.gov/eea/docs/dpu/electric/12-76-a-order.pdf>
- New York Working Group Paper, February 26, 2014
<http://info.aee.net/21st-century-ny-energy-industry-wg-position-paper>
- For additional information, contact Janet Gail Besser at
jbesser@cleanenergycouncil.org