



New England's Evolving Energy Infrastructure: Grid Modernization

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Introduction



The New England Clean Energy Council's and the NECEC Institute's mission is to accelerate New England's clean energy economy to global leadership by building an active community of stakeholders and a world-class cluster of clean energy companies.

Industry Context



- Changing energy landscape
 - Proliferation of distributed energy resources and increasing energy efficiency
 - Flat or declining deliveries/sales
 - Increasing investment needs
 - Replacement
 - Modernization
- Stresses utility business model and financial integrity
- Need to change regulatory framework
 - To align utility interests with interests of customers, stakeholders, and energy and environmental policy

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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.

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MA Grid Modernization Process



- Massachusetts DPU 12-76 NOI, October 2012
- Established Grid Modernization Steering Committee and subcommittees
- Steering Committee met December 2012 to July 2013
- Steering Committee Report Filed with DPU July 2, 2013
- DPU Order with Straw Proposal, December 23, 2013
- Comments on Straw Proposal filed January 17, 2014
- Panel hearings February 24-27, 2014
- Reply comments due March 21, 2014

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MA Grid Modernization Objectives



October 2012 NOI Objectives

- Reduce frequency and duration of customer outages
- Empower customers; reduce costs
- Improve the operational efficiency of the grid,
- Reduce T &D operation/maintenance/construction costs
- Reduce system peaks
- Facilitate the integration of DER & new technologies
- Enhance the success of MA energy efficiency initiatives
- Reduce greenhouse gas emissions

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Participants on the Grid Mod Steering Committee



Table 1-1: Steering Committee Member Organizations

State Agencies (5)	Clean Energy Cluster (9)
MA Clean Energy Center	Bloom Energy & ClearEdge Power (Fuel Cells)
MA Dept. Telecom/Cable (ex officio)	ChargePoint (EV/Charging)
MA DOER	Conservation Services Group (Energy Efficiency)
MA DPU (ex officio)	Electricity Storage Association & AMBRI (Storage)
MA EOEEA (ex officio)	EnerNOC (Demand Response)
Utilities (4)	New England Clean Energy Council
National Grid	Northeast Clean Heat & Power Initiative (CHP)
NSTAR	Northeast Energy Efficiency Partnerships (EE)
Unitil	SEBANE/SEIA (Solar) ²
WMECO	Environmental Groups (1)
Independent System Operator (1)	ENE
ISO New England	Competitive Suppliers (2)
Consumer Groups (3)	Constellation
Low Income Network	Direct Energy
Cape Light Compact	
MA Office of the Attorney General	

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July 2, 2013 Report to DPU



- Ch. 1: Introduction, Process & Overview
- Ch. 2: Goals, Objectives & Barriers
- Ch. 3: Grid Modernization Taxonomy
- Ch. 4: Background Information & Joint Fact Finding Road-Map
- Ch. 5: Principles and Recommendations
- Ch. 6: Regulatory Framework Proposals
- Ch. 7: Cost-Effectiveness Frameworks
- Ch. 8: Next Steps for the Regulatory Framework

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Grid Modernization Principles



- Participants had different goals
- NECEC brought together “Clean Energy Caucus” around set of principles, as well as regulatory framework
- Focused on integration of distributed energy resources to capture full value for customers *and* for utility system
- Requires utility to
 - Take into account variety of new distributed energy resources in distribution planning
 - Modernize grid to have visibility into status of system
 - Move toward time varying rates to provide information to customers

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Clean Energy's Grid Modernization Principles



Integration of distributed energy resources into utility system to capture full value for customers and for utility

- What this involves
 - Planning the distribution (and transmission) system to take into account variety of new distributed energy resources
 - Visibility into status of system (information to utilities)
 - Time varying rates (information to customers)
 - Evaluating benefits and costs broadly
 - Regulatory framework that supports needed investment
 - Customer education and protection

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Planning for a Modern Grid



- Long-term focus
- Plans should keep options open
 - Be flexible, allow for updates and accommodate evolving technology
 - Account for long-term, multi-year objectives and investments and “right size” equipment to address expected needs and desired outcomes
- Assess effects on reliability, operations, usage, peak load, prices and bills
- Integrate distributed energy resources to benefit grid operations as well as provide customer service options

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MA Grid Mod Comprehensive Regulatory Frameworks



Table 6-1: Summary of Comprehensive Regulatory Frameworks

	Enhanced Regulatory Model		GM Expansion - Pre-approval Process	Expansion of Investment Caps	Future Test Year	Utility of the Future, Today
Customer-, grid-facing, or both	Grid	Customer	Both	Grid	Grid	Both
Summary	Enhance reliability and facilitate DG	Investigate / facilitate TVR, DLC and metering	DPU review and approval of GM plans	Build off current capex approach to include GM	Align rates with cost incurrence in future	GM and rate plan review with performance incentives
Pre-approved budgets	No	Yes	Yes - In GM case	Yes	Yes - In rate case	Yes - In rate case
Public cost-effectiveness	No	Yes	For some GM	Post install	Pre-install	Yes
Test year	Historic	Historic	Historic	Historic	Future	Future
Cost recovery	Base rates; DG customer	Base rates, opt-in, and direct assignment	Rider	Rider	Base rates & riders	Base rates & reconciliation mechanism
Rate design	Traditional, enhanced TVR to be considered	Traditional, enhanced TVR to be considered	Traditional, enhanced TVR to be considered	Reflect costs, enhanced TVR to be considered	Reflect costs, enhanced TVR to be considered	Start with traditional, reflect costs, enhanced TVR to be considered
Shareholder Incentives	Traditional	Traditional	Within GM Plan proposal	Current	Current	ROE Indexed on performance
Performance targets	SQ enhanced, with additional targets, tbd.	SQ with additional targets, tbd.	Within GM Plan proposal	SQ	SQ	Enhanced - tbd

Note: See sections below for additional detail.

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Endorsers of Each Framework



Table 6-2: Support for Comprehensive Regulatory Frameworks

Regulatory Model Option	First Choice	Acceptable (first choice and other choices can likely support if first choice not an option)
The Enhanced Regulatory Model	Office of the Attorney General, Low Income Network.	Office of the Attorney General, Low Income Network.
GM Expansion - Pre-approval Process	NSTAR, WMECO, Unitil.	NSTAR, WMECO, Unitil, National Grid, Cape Light Compact, General Electric, MA DOER.
Expansion of Investment Caps		National Grid, Unitil.
Expansion of Investment Caps with a Multi-Year Plan		National Grid, , Unitil.
Future Test Year Model		National Grid, Unitil.
Future Test Year with Multi-Year Plan Model		National Grid, Unitil, EnerNOC, ENE, General Electric, NECEC, CSG.
Utility of the Future, Today ³⁵	ISO-NE, SEIA/SEBANE, Cape Light Compact, NECHPI, ClearEdge Power, NEEP, ENE, NECEC, Mass CEC, EnerNOC, MA DOER, Ambri, CSG, General Electric, Bridge Energy Group, Ambient, Retailers, National Grid.	ISO-NE, SEIA/SEBANE, Cape Light Compact, NECHPI, ClearEdge Power, NEEP, ENE, NECEC, Mass CEC, EnerNOC, MA DOER, Ambri, CSG, General Electric, Bridge Energy Group, Ambient, Retailers, National Grid.

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Utility of the Future, Today



- Forward looking and performance-based model
- For grid modernization and all capital investments
- Forecasted multi-year (3-5) rate case
- Capital investment plan consistent with grid modernization objectives
- Stakeholder input
- “Business case” for investment, taking into account benefits, costs, risks and uncertainty
- Symmetric performance metrics provide accountability

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Evaluating Benefits and Costs



- Making the “Business Case”
- Accounting for benefits, costs, *risk and uncertainty*
- Benefits broadly defined
 - Quantified, difficult to quantify and un-quantified
 - Utility system, customer, participant, non-participant, policymaker, societal
- Costs, including opportunity costs (and costs of doing nothing)
- Risk and uncertainty
 - (Some) technologies are new, shorter-lived, evolving
 - Some haven’t been invented yet (innovation)

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MA Grid Modernization Cost-Effectiveness Proposals



Table 7-1: Summary of Cost-Effectiveness Proposals Submitted

Issue	Option A: Office of the Attorney General, Low Income Network	Option B: Distribution Utilities, Clean Energy Caucus, MA DOER, CLC, Retailers, General Electric	Option C: ENE
Which Grid Mod activities should be subject to a public cost-effectiveness analysis? ²⁴	All customer-facing activities, except those where service is only provided upon customer request and where customer covers the cost. (Note: Grid-facing investments will be evaluated as they are today.)	All activities for which utilities seek pre-approval.	Might be more appropriate for some activities than others. An issue for further consideration.
When should such Grid Mod activities be subject to a public cost-effectiveness analysis?	For customer-facing, prior to implementation on a projected basis, and as part of a rate case based on the actual costs and benefits.	Prior to implementation.	Prior to implementation. As part of GM planning process.
Should all costs and benefits be quantified in dollars in order to be included in the public cost-effectiveness analysis?	For customer-facing, yes. Costs or benefits that cannot be quantified in dollars should not be included in the analysis.	No. Quantify as many as possible, but include qualitative as well.	No. Quantify as many as possible, but include qualitative as well. Qualitative impacts may be weighted.
Which costs and benefits (i.e., impacts) should be included in the public cost-effectiveness analysis?	For customer-facing, quantifiable costs and benefits linked to the costs and rates paid by the utility customer should be included in the cost-effectiveness analysis. No participant or societal impacts.	The impacts to the utility, plus qualitative impacts related to utility investment, including reliability and safety among others. No benefits and costs that accrue solely to private, participant, third party included.	The impacts to the utility, participants, and society. The DPU may review analyses both with and without participant costs and benefits as part of the decision-making process.

²⁴ For the purposes of this Chapter, “public cost-effectiveness” generally means a cost-benefit evaluation that is reviewed by the Department and other stakeholders, as opposed to a cost-benefit evaluation that is developed internally by an LDC.

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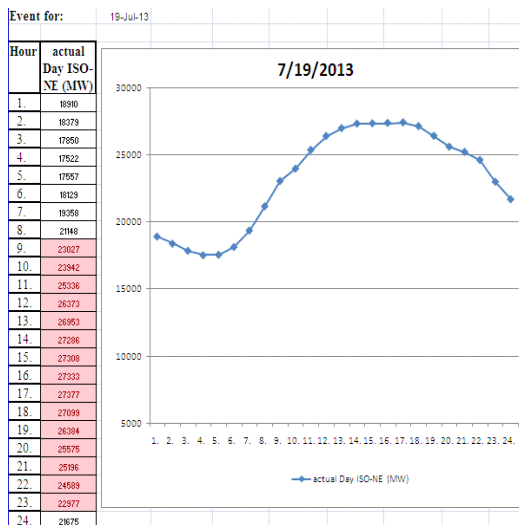
Other Key Elements

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

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Time Varying Rates (TVR)

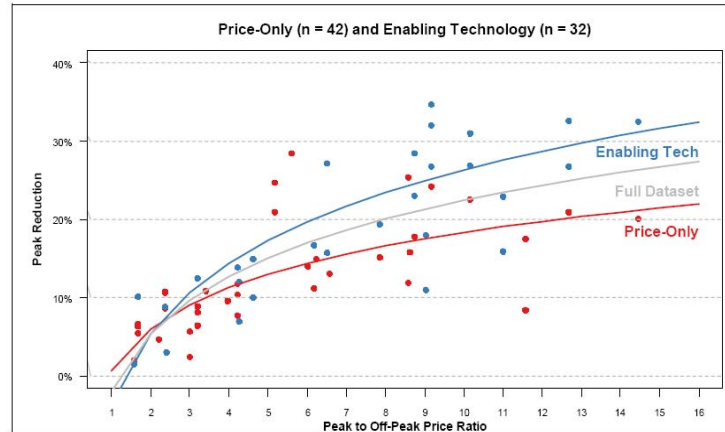
- Certain periods of day and year require greater amounts of capacity at higher energy cost to serve
- Provide this information to customers through time varying rates (RTP, CPP, TOU)
- Customers can reduce need through energy efficiency, controlled demand response, self-generation



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TVR and Enabling Technology

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



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Complementary Regulatory Policies

Table 6-3: Summary of Complementary or Targeted Regulatory Policies

	Distribution Services Pricing	DR&TVR	GM Advisory Council
Customer-, grid-facing, or both:	CF	Both	CF or both
Rationale, Summary of, Model:	rates designed for new dist. goals	DPU approval for DR & TVR	stakeholder input
Regulatory Oversight:			
Utility pre-implementation filing:	Yes	Yes	yes
DPU review and approval of filing:	Yes	Yes	yes
Utility pre-approved budgets:	Yes	Yes	yes
Stakeholder input	Yes	Yes	yes
Utility reporting requirements	Yes	Yes	annual
Cost-Effectiveness:			
Explicit, public cost-effectiveness:	Yes	Yes	yes
Internal analysis by utility	---	---	---
Ratemaking and Cost Recovery:			
Test year:	historic or future	historic or future	---
Frequency of rate cases:	Current	Current	---
Cost recovery (base rates, riders)	forward rider	forward rider	---
Cost allocation (among customers):	case by case	case by case	customer class
Cost assignment (e.g., to 3rd party)	case by case	case by case	---
Rate design	based on dist. goals	TVR	tbd
Utility shareholder incentives:	case by case	case by case	ROE +
Performance Targets or Metrics:			
Role of performance targets	case by case	case by case	rewards & penalties
Performance targets used:	---	---	from GMAC

Note: See sections below for additional detail.

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Distribution Services Pricing



- Prices for distribution services should reflect costs and planning needs of the utility
- Distributed resources should be compensated for services they provide to utility
- Historically, distribution delivered power one way to the customer
- Greater amounts of customer generation will create two way power flow on the system
- Utility of the future will provide connection services to customers, both load and generation
- Grid will integrate and manage customer load and local generation for customer choice and benefit

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Stakeholder Engagement



- Engaging stakeholders – policymakers, regulators, clean energy industry, business, technology, engineering consumer and environmental advocates – is important
 - 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

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Data Access



- Customers, 3rd parties (and utilities) must be able to access data easily in near real-time to realize full value of grid modernization
 - Enables customers to make informed decisions about energy usage
 - Enables utility visibility to behind the meter generation
- Open access, interoperable grid platform is key to unleashing innovation of service and product applications

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MA DPU Straw Proposal



- Issued December 23, 2013
- Requires distribution companies to file 10-year Grid Modernization Plans (GMPs) and 3-year Comprehensive Advanced Metering Plans (CAMPs)
- Recognizes advanced metering as foundation of grid modernization
- Proposes “pre-approval” of CAMPs, cost recovery after investment made
- Adopts Business Case Analysis for evaluating benefits and costs
- DPU opens separate proceedings on EVs (13-182) and TVR (14-04)

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Next Steps



- Massachusetts
 - TVR comments filed March 10, 2014
 - Grid Modernization Reply Comments due March 21, 2014
- Grid Modernization / Utility of Future / 21st Century Utility discussions expanding
 - New York
 - Rhode Island

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Conclusion



- Pressure on current utility model will continue to increase
- Can utilities turn challenges into opportunities?
- Regulatory leadership in Northeast seeking
 - To align utility and other stakeholder interests
 - To provide reliability, resiliency, security, operational efficiency, reduced costs, enhanced capabilities, DER integration, greater customer choice and environmental improvement

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Which way do we go?



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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>
See also stakeholder comments dated July 24, 2013
- MA DPU Order 12-76-A, December 23, 2013
<http://www.mass.gov/eea/docs/dpu/electric/12-76-a-order.pdf>
See also Initial Comments dated January 17, 2014
- For additional information, contact Janet Gail Besser at
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