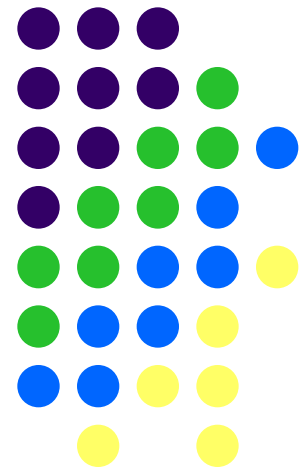


Reforming the Energy Vision: New York State's Response to Superstorm Sandy

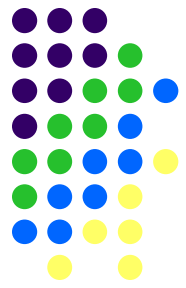
ELAEE Latin American Energy Conference
16 March 2015
Medellin, Colombia

Lori Smith Schell, Ph.D., ERP
Empowered Energy

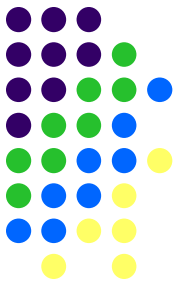
174 N. Elk Run, Durango, CO 81303 USA
Tel: +1 (970) 247-8181 • Fax: +1 (970) 247-3761
E-Mail: LSchell@EmpoweredEnergy.com



Superstorm Sandy: Devastating Impact; Slow, Costly Recovery

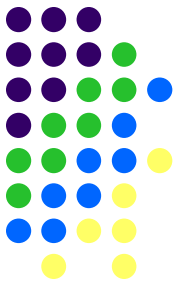


Reforming the Energy Vision (REV): Motivating Factors



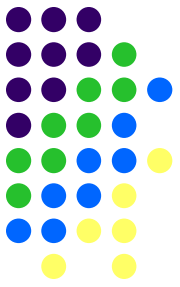
- Devastating impact of extreme weather events
 - Superstorm Sandy's painful & costly response
 - ConEd: \$521 million for NYC and O&R Counties
- Required electricity infrastructure investment
 - \$30 billion over the next decade vs. \$17 billion in past decade just to maintain current capabilities
- Visionary Leadership
 - Governor Andrew Cuomo
 - NYPSC Chair Audrey Zibelman

REV: Motivating Factors, Continued...



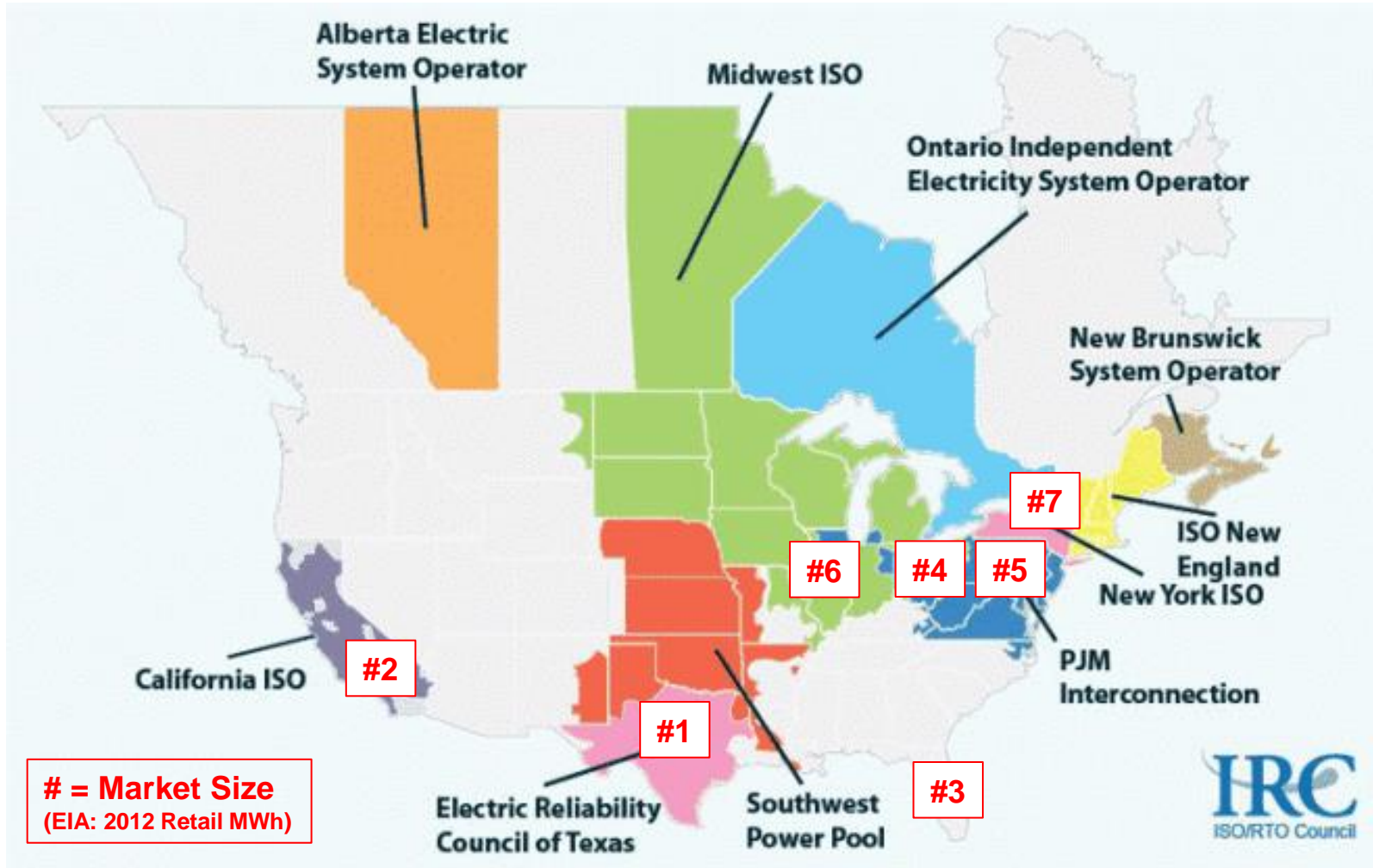
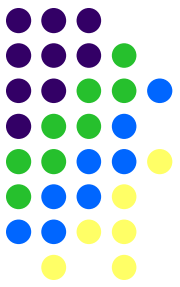
- Increasing dependence of modern economy on electricity; increasing cost of outages
- Peak demand growth with limited load growth resulting in reduced system efficiency
- Increased natural gas generation reduces fuel diversity, increases price volatility
- Increased technology developments
- Susceptibility to cyber & physical attacks
- Need to reduce carbon emissions

REV: Six Primary Objectives for *Customer-Oriented* Reform

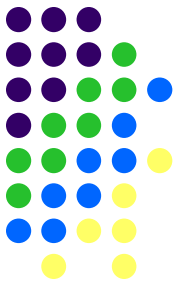


- Enhance customers' knowledge & tools for effective management of their total energy bill
- Animate Distributed Energy Resource (DER) market & leverage ratepayer funds
- Increase system-wide efficiencies through Distributed System Platform (DSP) design
- Diversify fuels & resources
- Increase system reliability & resiliency
- Reduce carbon emissions

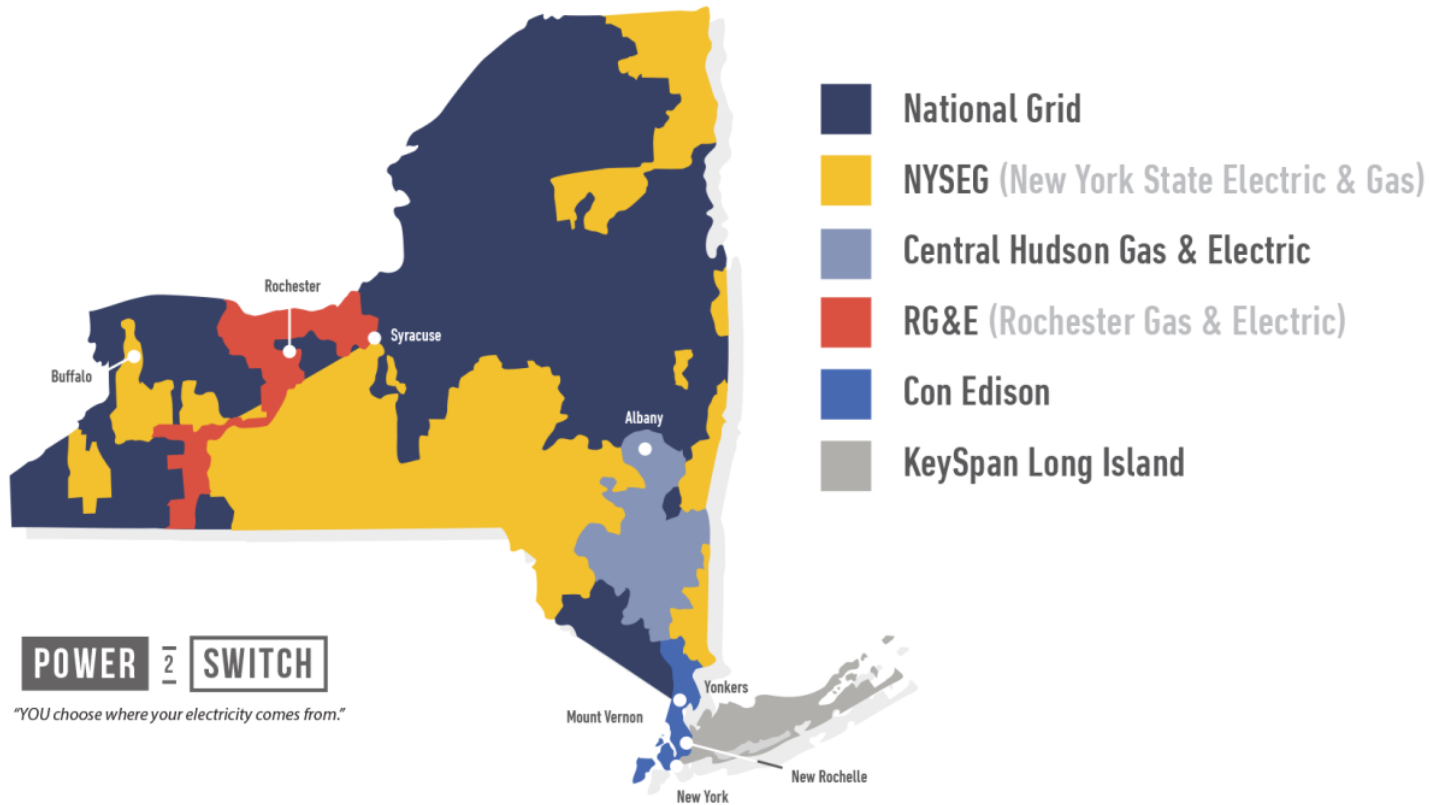
New York State (NYS): Unique Opportunity to Lead Reform?



Investor-Owned Utilities (IOUs) Dominate; Limited in Number

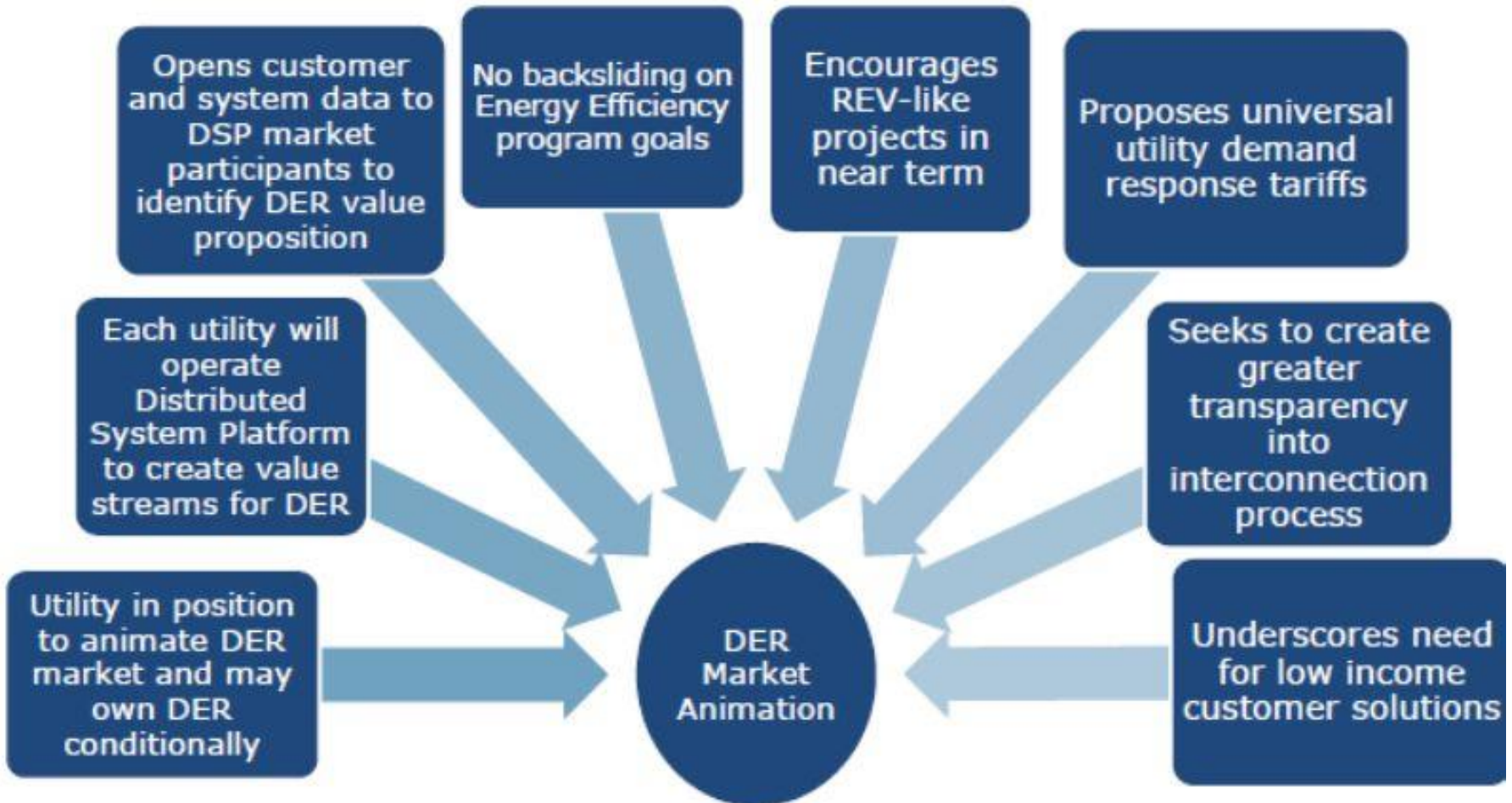
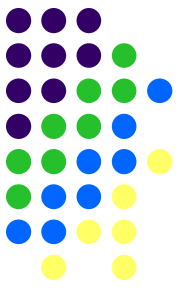


New York Energy Service Area Map

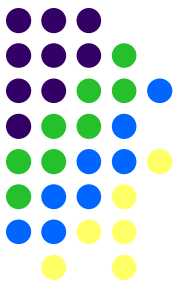


Source: https://power2switch.com/NY/utility_territory_map/

1: Enhance Tools for Customer Total Energy Bill Management



2. Animate market & leverage ratepayer funds

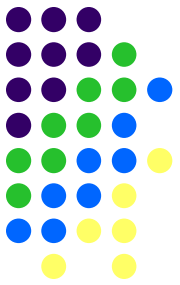


TRACK 1: Initiated (April 2014) Straw Proposal (August 2014) Public Comments & Final Order (February 2015)

TRACK 2: Straw Proposal (June 2015)...

- Incremental transition to full implementation
- TRACK 1: Market design & policy issues
 - Creation of Distributed System Platform (DSP)
 - Rules for mitigation of market power
 - Removal of customer engagement barriers
- TRACK 2: Ratemaking issues
 - Rate design, filing requirements, process
 - Design & execution of new cost-benefit analyses

3. Increase system-wide efficiencies



THE DISTRIBUTED SYSTEM PLATFORM (DSP)

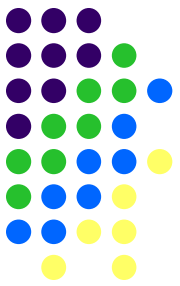
The DSP is an intelligent network platform that will provide safe, reliable and efficient electric services by integrating diverse resources to meet customers' and society's evolving needs.

Key Functions of the DSP

- Design and plan distribution system that integrates DERs as primary means of meeting system needs
- Plan for and accommodate new distributed generation and demand response
- Balance production and load in real time
- Monetize system & social values
- Coordinate interactions between customers, with the distribution system and with energy services markets (DSP markets and NYISO)

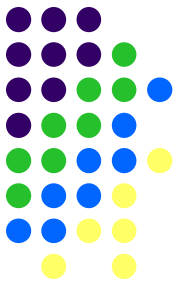


DSP Functional Requirements



Grid	Customer/DER/Microgrid	Market
<ul style="list-style-type: none"> • Real-time load monitoring • Real-time network monitoring • Adaptive protection • Enhanced fault detection/location • Outage/restoration notification • Automated feeder and line switching (FLISR/FDIR) • Automated voltage and VAR Control • Real-time load transfer • Dynamic capability rating • Power flow control • Automated islanding and reconnection (microgrid) • Real time/predicted probabilistic based area substation, feeder, and customer level reliability metrics (MTTF/MTTR) 	<ul style="list-style-type: none"> • Direct load control • DER power control • DER power factor control • Automated islanding and reconnection • Algorithms and analytics for Customer/DER/Microgrid control and optimization 	<ul style="list-style-type: none"> • Dynamic event notification • Dynamic pricing • Market-based demand response • Dynamic electricity production forecasting • Dynamic electricity consumption forecasting • M&V for producers and consumers (premise/appliance/resource) • Participant registration and relationship management • Confirmation and settlement • Billing, receiving and cash management • Free-market trading • Algorithms and analytics for market information/ops

Source: Developing the REV Market in New York: DPS Staff Straw Proposal on Track One Issues, August 22, 2014, Table 2, p. 20.
<http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={CA26764A-09C8-46BF-9CF6-F5215F63EF62}>



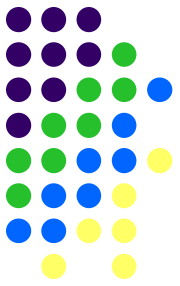
DSP: Incumbent Utility* or Newly- Created Third Party?


* With limited ability
for DER ownership.

Utility and DSP Roles and Responsibilities	Utility	DSP
Market Functions		
Administer distribution-level markets including:		
- Load reduction Market		X
- Ancillary services		X
Match load and generator bids to produce daily schedules		X
Scheduling of external transactions		X
Real-time commitment, dispatch and voltage control		X
Economic Demand Response		X
Demand and Energy Forecasting	X	X
Bid Load into the NYISO	X	
Aggregate Demand Response for sale to NYISO	X	X
Purchase Commodity from NYISO	X	
Metering	X	
Billing	X	X
Customer Service	X	X
System Operations and Reliability		
Monitor real-time power flows	X	X
Emergency Demand Response Program	X	X
Ancillary Services	X	X
Supervisory Control and Data Acquisition	X	X
System Maintenance	X	
Engineering and Planning		
Engineering	X	
Planning / Forecasting	X	X
Capital Investments	X	
Interconnection	X	X
Emergency Response		
Outage Restoration / Resiliency	X	X

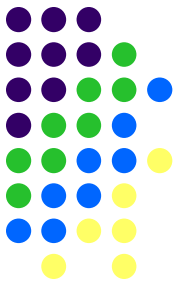
Source: Developing the REV Market in New York: DPS Staff Straw Proposal on Track One Issues, August 22, 2014, Table 1, p. 20.
<http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={CA26764A-09C8-46BF-9CF6-F5215F63EF62}>

4. Diversify fuels & resources

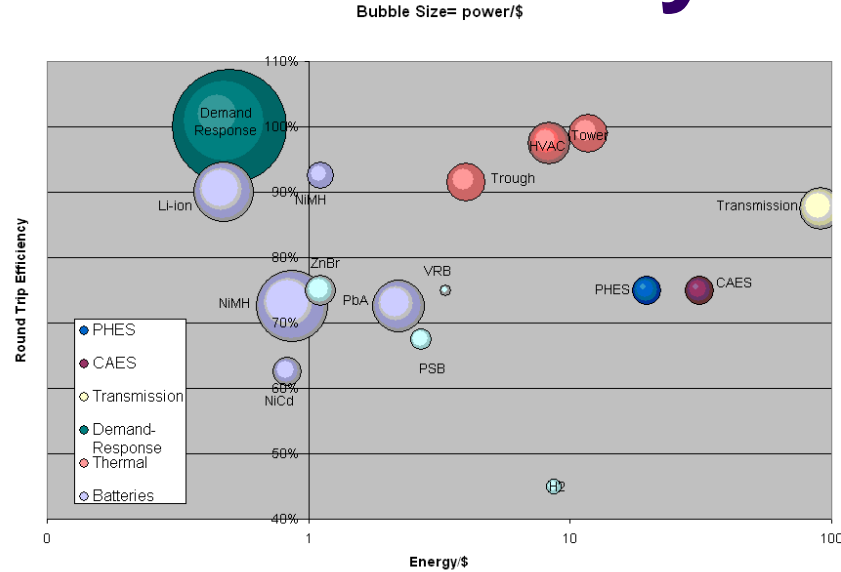


- Increase DER asset base
 - Distributed generation, energy storage, energy efficiency, demand side management (DSM)
 - Goal: Peak demand reduction
- Reduce dependence on natural gas 
 - Sets market price for electricity 50% of the time
- Demonstrate suitability of DERs as core system resources; monetize value streams
- Remove barriers to DER adoption

5. Increase system reliability & resiliency

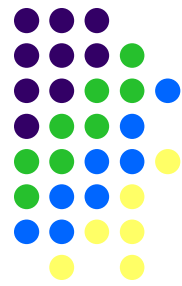


- Energy Storage
- Microgrids
 - Ability to island



- Design and develop utility-specific DSPs
- Implement statewide standardization
- Example: 2014 Brooklyn-Queens Demand Management proposal: \$200 million in DSM + \$300 million in substation investments vs. proposed \$1 billion subsystem upgrade

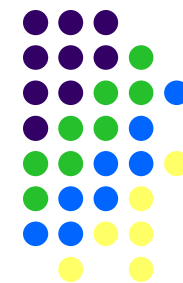
6. Reduce carbon emissions



BENEFITS	PERSPECTIVE		
	RIM (rates)	Utility Cost (bill)	Societal
<u>Bulk System</u>			
Avoided Generation Capacity (ICAP) Costs, Including Installed Reserves and Losses	✓	✓	✓
Avoided Energy (LBMP) Costs, including Losses	✓	✓	✓
Avoided Ancillary Services (e.g. operating reserves, regulation, etc.)	✓	✓	✓
Wholesale Market Price Impacts	✓	✓	-
<u>Distribution System</u>			
Avoided T&D Capacity Costs	✓	✓	✓
Avoided O&M Costs	✓	✓	✓
Avoided Distribution Losses	✓	✓	✓
<u>Reliability/Resiliency</u>			
Avoided Restoration Costs	✓	✓	✓
Avoided Outage Costs*	-	-	✓
<u>External (net)*</u>			
Avoided GHG*	-	-	✓
Avoided Criteria Air Pollutants*	-	-	✓
Water*	-	-	✓
Land*	-	-	✓
Non-Energy Benefits (e.g., health impacts, employee productivity, property values)			✓
*note: only the portion not already included above, net of any added external costs			
COSTS			
Program administrative costs (including M&V)	✓	✓	✓
Added Ancillary Service Costs	✓	✓	✓
Incremental T/D/DSP Costs (Including Incremental Metering and Communication)	✓	✓	✓
Participant DER Cost	-	-	✓
"Lost" Utility Revenues	✓	-	-
Incentives	✓	✓	-
Non-Energy Costs (e.g., indoor emissions, noise disturbance)			✓
RISKS (net)			
Compare Variability of Benefits to Variability of Costs	✓	✓	✓

Include Societal Values in Cost-Benefit Analysis

REV Implementation in Context: It's Not a Blank Page

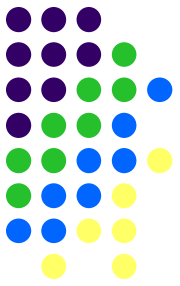


SUMMARY OF PAST, PRESENT AND REASONABLY FORESEEABLE FUTURE ACTIONS THAT INTERACT WITH THE PROPOSED REV AND CEF PROCEEDINGS

	PAST	PRESENT/NEAR-TERM
STATE/REGIONAL	<ul style="list-style-type: none"> • Office Petroleum Overcharge Restitution Fund • 1988 System Benefit Charge • New York Energy Smart Program • Electricity Restructuring • Revenue Decoupling • Energy Efficiency Portfolio Standards (EEPS) • Renewable Portfolio Standard (RPS) • Climate Action Council 	<ul style="list-style-type: none"> • New York State Energy Plan • Regional Greenhouse Gas Initiative (RGGI) • Executive Order 24 (Goals and Climate Action Plan) • Energy Efficiency Portfolio Standards (EEPS) • Renewable Portfolio Standard (RPS) • Technology and Market Development Program • NY-Sun Initiative • Green Bank • NY Energy Highway • Climate Smart Communities • Smart Growth Public Infrastructure Policy Act • Transportation and Climate Initiative • ReCharge NY; Charge NY • Five Cities Energy Master Plans • Build Smart NY; ReBuild NY • Cleaner Greener Communities
FEDERAL	<ul style="list-style-type: none"> • Energy Policy Act (1992, 2005, 2007) • Kyoto Protocol • Energy Independence and Security Act of 2007 • Emergency Economic Stabilization Act of 2008 • Production, Investment, and Advanced Energy Manufacturing Tax Credits 	<ul style="list-style-type: none"> • President's Climate Action Plan • CAA Section 111(d) Clean Power Plan • EPA Greenhouse Gas Reporting Rule • Renewable Fuel Standard (RFS) • EPA Energy Star • Executive Order 13653: Preparing the U.S. for the Impacts of Climate Change

Source: Final Generic Environmental Impact Statement in CASE 14-M-0101 – Reforming the Energy Vision and CASE 14-M-0094 – Clean Energy Fund, Exhibit 5-7, p. 5-53.

NYS Leadership Quotes on Reforming the Energy Vision



“By introducing and embracing information technology and clean energy solutions, millions of New Yorkers will benefit from a 21st century power grid, enabling them to better manage and reduce their energy costs while protecting and preserving the environment.”

- NY Governor Andrew Cuomo

Source: April 24, 2014, State of New York News Release,
<http://www.governor.ny.gov/news/governor-cuomo-announces-fundamental-shift-utility-regulation>

“I don’t want to create mediocre wires companies. I want to create excellent, innovative companies that have third parties wanting to come to New York and build businesses around DER because they see it’s a marketplace where they can be successful and then we can lead everywhere else.”

- NYPSC Chair Audrey Zibelman

Source: *The Energy Gang* by Greentechmedia.com, 24 September 2014 Podcast,
<http://www.greentechmedia.com/articles/read/beyond-technology-targets-how-new-york-is-creating-the-most-innovative-grid>