



Northeast Energy Efficiency Partnerships

Putting More Energy into Peak Savings: Integrating Demand Response and Energy Efficiency Programs

August 25, 2016

Summer Study 2016

NORTHEAST ENERGY EFFICIENCY PARTNERSHIPS



“Accelerating and transforming markets for energy efficiency in the Northeast & Mid-Atlantic States”

Mission

Accelerate energy efficiency as an essential part of demand-side solutions that enable a sustainable regional energy system

Vision

Region embraces Next Generation Energy Efficiency as a core strategy to meet energy needs in a carbon-constrained world

Approach

Overcome barriers and transform markets via Collaboration, Education and Enterprise



One of six Regional Energy Efficiency organizations (REEOs) funded by the U.S. DOE to support state efficiency policies and programs.

Integration of Energy Efficiency and DR: Integrated Demand Side Management (IDSMS)

IDSMS programs “...support two out of the three demand side technology types (EE, demand response, and distributed generation).

-California Public Utilities Commission



Outline:

Toward Integrated Demand Side Management (IDSMS)

1. EE & DR Policy Drivers
2. DR Program Strategies
3. Integration of Energy Efficiency and Demand Response
4. Evaluating Benefits and Costs
5. Lessons Learned
6. The Road Ahead

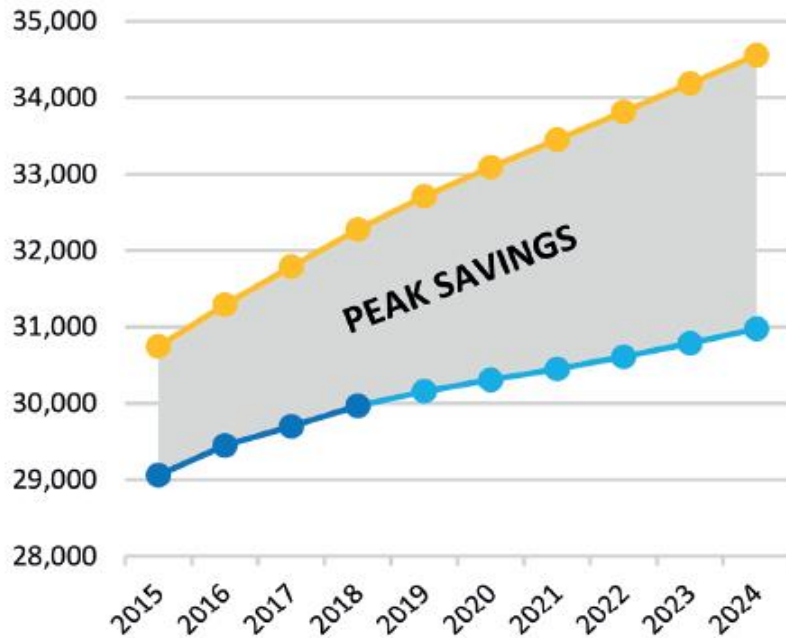


IDSMS Policy Drivers: Declining Load Factor

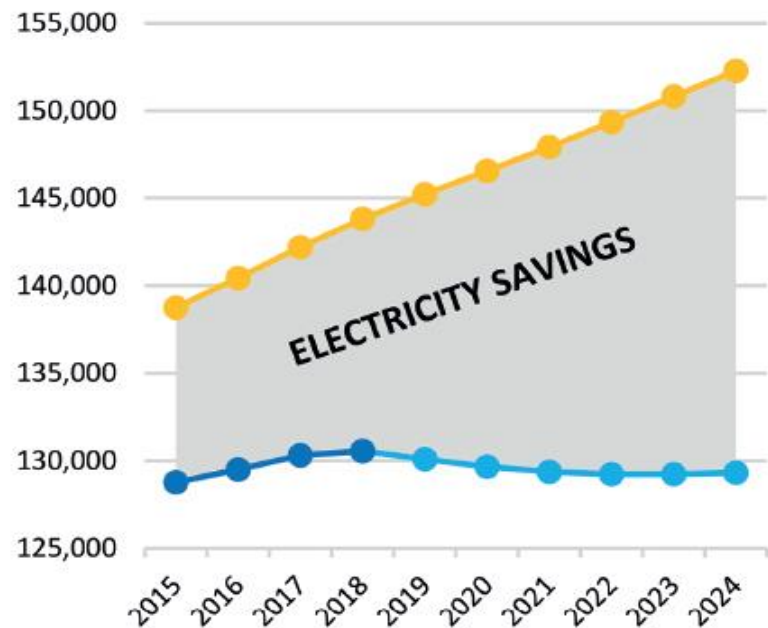


In ISO-NE, investment in energy efficiency will decrease overall load growth, but peak demand continues to grow spreading MW costs over fewer MWhs.

Summer Peak (MW)



Annual Energy (GWh)



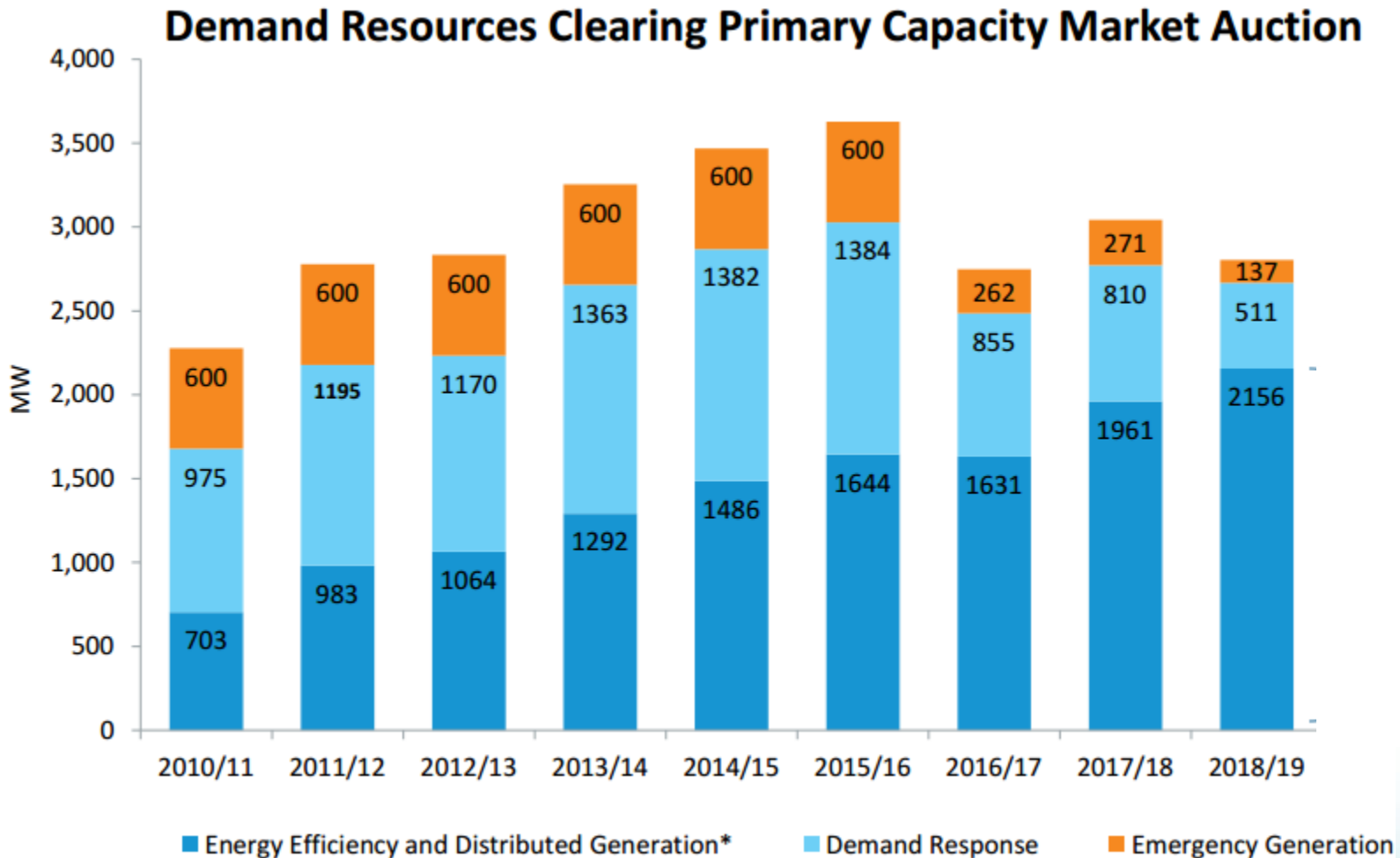
The gross forecast of peak demand and energy use

The forecast minus the impact of EE participating in the Forward Capacity Market (FCM) to date

The forecast minus anticipated EE growth beyond FCM years

Forward looking program administrators are targeting system peaks on a temporal and locational basis through focus on peak coincident energy efficiency measures, demand response, and geo-targeting.

IDSMS Policy Drivers: Declining DR Bids in Wholesale Markets



*DG less than 5% of total Passive DR

Source: Eric Winkler, ACEEE 2015 Intelligent Efficiency Conference

IDSMS Policy Drivers: A Revolution in Customer Engagement

Moving beyond switches, toward a proliferation of connected devices

- Smart Phones, T-Stats, Hot Water Heaters, Heat Pumps, EMS, ARTUs, CALCs, PEVs, energy storage, etc.

Program Administrators Offering Demand Response

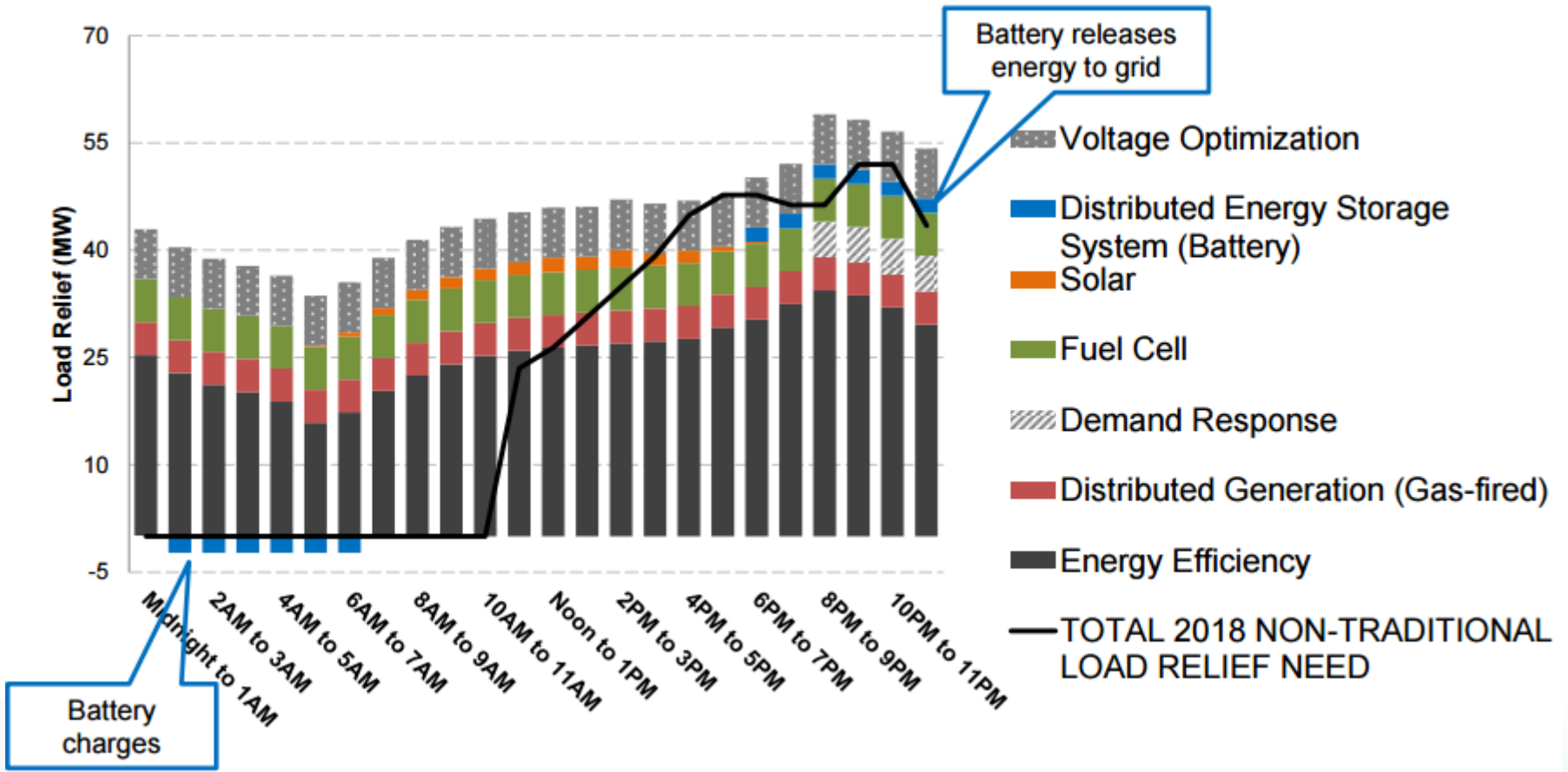
- NWA projects throughout the country
- Mass. 2016-18 Plan
- Conn. 2016-18 C&LM Plan
- Pennsylvania Act 129 Phase III
- NHEC Go Beyond the Peak
- Maryland BGE Smart Energy Rewards
- NY Dynamic Load Management Plans, Smart Home Rate in REV Track II Order



Why should utilities should get in the game? Survey Says...

- Those who are enthusiastic about smart tech identify as enthusiastic about EE; 52 percent, v. 27 percent of the general population
- Customers value connectivity almost as much as cost savings
- NGA report outlining opportunities

IDSMS Policy Drivers: Non-wire Alternatives



Region's IDSM DR Program Strategies Overview



Program	Sector	Details
Manual Curtailment	C&I	<ul style="list-style-type: none"> Based upon contractual commitments 50-100kW usage reductions Reservation v. voluntary enrollment Opportunity for bonus payments
Direct Load Control (DLC)	Res./ Small C&I	<ul style="list-style-type: none"> Based upon direct communication between a program administrator Smaller usage reductions (~1kW)
Legacy DLC	Res./ Small C&I	<ul style="list-style-type: none"> Switch based, one way signal Cycling an A/C condensing unit, heat pump, pool pump, or hot water heater Minimum verification required
Two-Way DLC	Res./ Small C&I	<ul style="list-style-type: none"> Behind the meter information and communication technologies (ICT) transit data over HAN/Broadband
Behavioral Demand Response	Res.	<ul style="list-style-type: none"> Based upon customer engagement Can provide incentive or use behavioral triggers AMI Required

Region's IDSM DR Program Strategies

Maryland



Maryland EmPOWER Demand Response Program (Baltimore Gas and Electric)

Program type	Direct load control (A/C condenser, heat pump)	Direct load control (Two-way thermostat pilot)	Direct load control (Winter water heater)	Behavioral (Smart Energy Rewards)
Sector	Residential	Residential	Residential	Residential
Total participants (final year)	356,000	2,600	29,000, plus 59,000 legacy devices	1,100,000
Capacity saved per customer/device (kW)	~1.2kW			0.22
Total capacity (MW)	413			309
Incentives per customer	Cycle 50%: \$50 sign-on/annually Cycle 75% \$75 sign-on/annually Cycle 100% \$100 sign-on/annually	Pending	Cycle 100% \$25 sign-on/annually	\$1.25/kWh saved compared to similar weather day baseline
Program average annual incentives (2015)	\$24,075,969			\$40,566,666
Average annual non-incentive costs (2015)	\$13,577,940			Unclear
Benefit/cost ratio (TRC)	3.3			1 (assumed)

Source: Baltimore Gas and Electric Semi-Annual Report for Third and Fourth Quarters — July 1 through December 31, 2015. (BGE 2016)

Region's IDSM DR Program Strategies

Pennsylvania



. Pennsylvania Act 129 Phase III Demand Response Programs (Projections)

Program type	Sector	Total participants (final year)	Energy saved per customer/device (kW)	Total capacity (MW)	Incentives per customer	Average annual incentives (PY 2-5)	Average annual non-incentive costs	Benefit /Cost Ratio
Duquesne								
Direct load control BYOD	Residential	~6,000	0.35	2.2	\$28/season	\$182,498	\$146,188	0.7
Manual curtailment	Large C&I	27	387.9	10.5	\$32-\$40/kW	\$416,096	\$823,565	2.3
Manual curtailment	Dual enrolled large C&I	108	387.9	31.4	\$16-\$20/kW	\$624,144		2.1
Met Ed								
Behavioral DR	Residential and small C&I	50,000	0.07	3.5	\$0	\$0	\$206,093	1.5
Manual curtailment	Large C&I	20	256	22.5	\$6,127	\$60,858	\$88,670	1.7
Manual curtailment	Dual enrolled large C&I	2	256		\$3,063	\$13,524	\$22,969	
Manual curtailment	Small C&I	57	801	202.9	\$9,614	\$547,722	\$798,032	1.2
Manual curtailment	Dual enrolled small C&I	6	801		\$19,228	\$121,716	\$202,077	

Source: Duquesne and Met Ed Act 129 Phase III Proposals (Duquesne 2015; Met Ed 2015).

Region's IDSM DR Program Strategies

New York



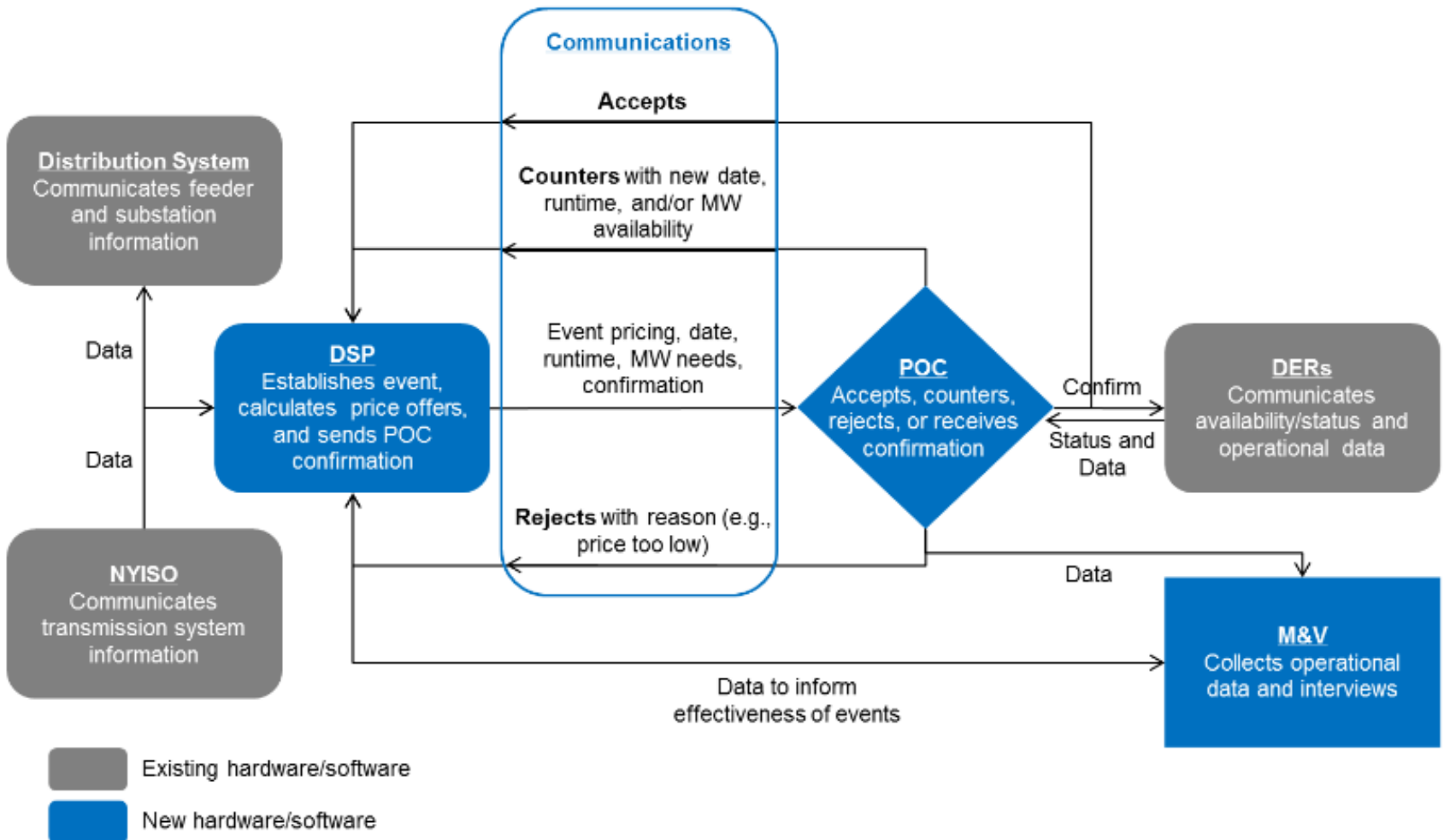
New York Dynamic Load Control Demand Response Programs

Program type	Total participants	Total capacity (MW)	Incentives per customer	Average annual program incentives	Average annual non-incentive costs	Benefit /Cost Ratio
NYSEG						
C&I Manual curtailment distribution load relief program	none	TBD	Reservation Payment Option: \$2.75/kW Month + \$.15/kWh Bonus Payment= \$.30kWh Voluntary Option: \$.15kWh	\$0	\$10,640	4.419
C&I Manual curtailment commercial system relief program	8	1.2	Reservation Payment Option: \$2.75-3.00/kW Month + \$.15/kWh Voluntary Option: \$.15/kWh	\$3,678	\$28,577	
Residential/small business direct load control	31	TBD	Free Load Control Device \$25 sign up (Electronic Gift Card) \$25/year for 80% of event hours	\$1,375	\$114,192	.005
Orange and Rockland (O&R)						
C&I Manual curtailment distribution load relief program	9	1.47	Reservation Payment Option: \$3.00/kW Month + \$0.50/kWh Voluntary Option: \$1.00kWh	\$12,824	\$34,121	1.02
C&I Manual curtailment commercial system relief program	8	1.2	Reservation Payment Option: \$4.00-5.00/kW Month + .50-1.00/kWh Voluntary Option: \$1.00-1.50/kWh	\$11,708	\$33,967	
Residential/Small Business Direct load control	286 Customers 375 Devices	TBD	Direct Install: free smart t-stat BYOT: \$85 sign up, \$25/year	\$31,875	\$82,065	1

Source: O&R and NYSEG Dynamic Load Management Annual Reports (O&R 2015; NYSEG 2015)

Region's IDSM DR Program Strategies

New York's Move Toward LMP+D+E

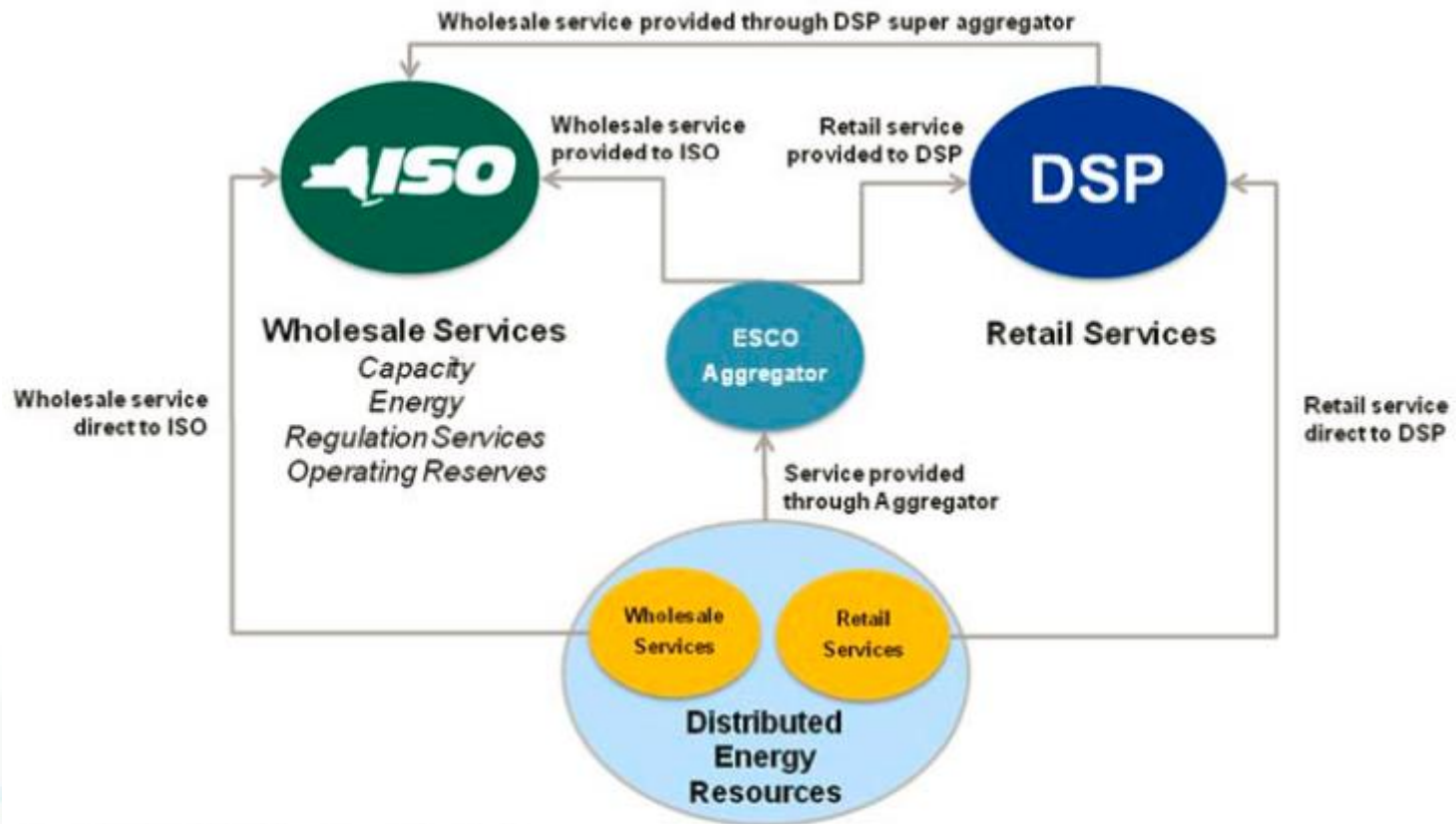


Region's IDSM DR Program Strategies

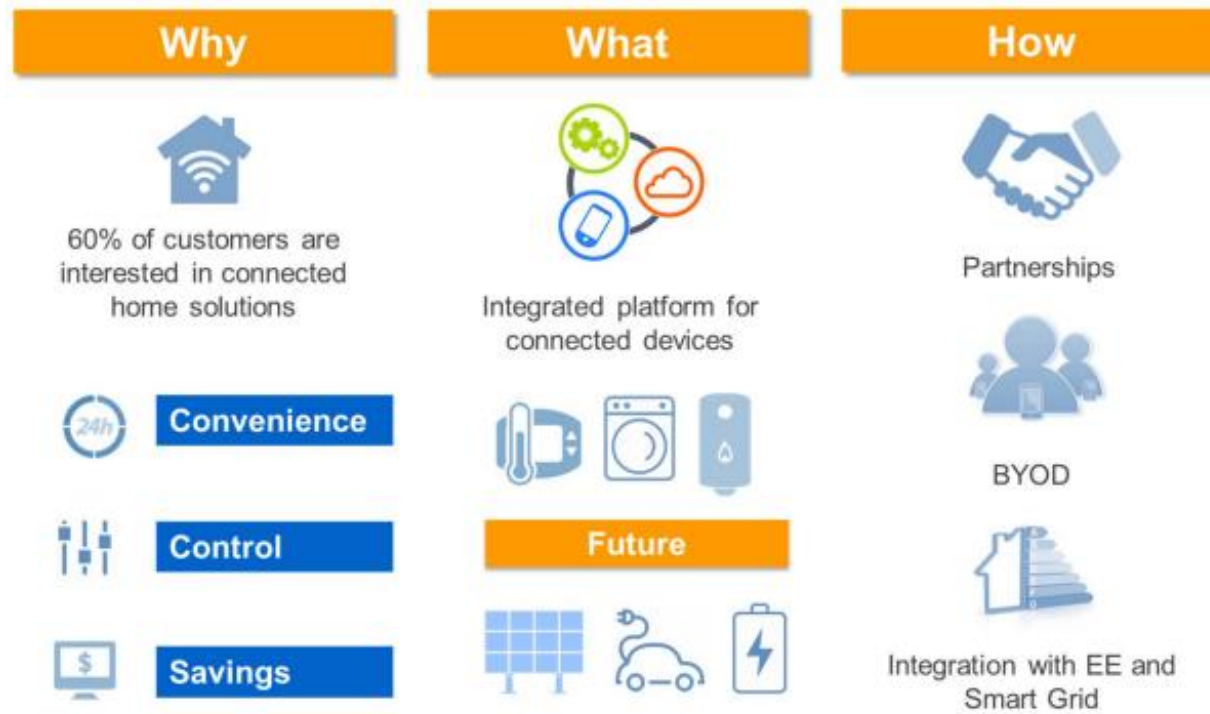
New York's Move Toward LMP+D+E



Integrating DER in Wholesale Electricity Markets



Integrated Demand Side Management Synergies for Energy Efficiency and Demand Response



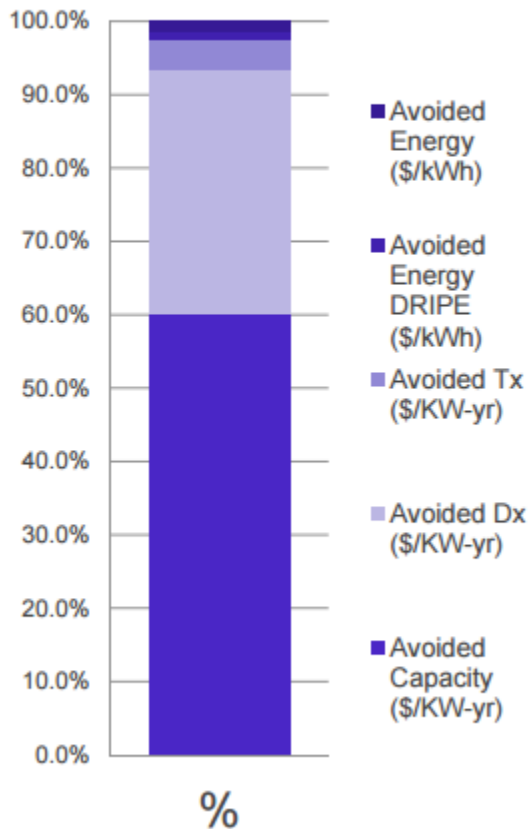
Source: National Grid

Combined program marketing efforts to save costs and reduce customer confusion

- Bring Your Own Device (BYOD) programs where DR-enabled technology leverages EE incentive
- Identify those who are unenrolled in an event as leads for weatherization efforts

Integrated Demand Side Management DR/IDSM Cost-Effectiveness Considerations

**Avoided Cost Benefit
Proportions**



- Program overlap and attribution
- Lifecycle
- Customer motivation and incentive ranges
- Weather variability
- Enrollment v. control
- FCM v. ICR

Source: MA EEAC demand
savings sub-committee

Integrated Demand Side Management

Lessons Learned



- Limit silos between programs; joint marketing efforts can provide cost-saving synergies
- Consider piloting statewide initiatives through NWA programs
- Consider wide range of technologies, including winter peaking in the northeast
- Ensure that incentive available upon initial device communication, not purchase
- Consider event specific incentives, rather than singular seasonal incentive

Integrated Demand Side Management

The Road Ahead

- Potential Studies- Monte Carlo potential analysis available for every state
- California EM&V Protocols provide foundation
- Pilot through NWA projects, then evolve into EE program planning process
- Further Resources
 - [MA EEAC DR Presentations \(Consultant/ISO-NE\)](#)
 - [MA Study](#)





Discussion

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