



Northeast Energy Efficiency Partnerships

Efforts to Integrate Energy Efficiency and Other Demand Resources in the Northeast

Connecticut
Informational Meeting on
Demand Resources in New England

October 27, 2016

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

IDSM 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 (IDSMD)

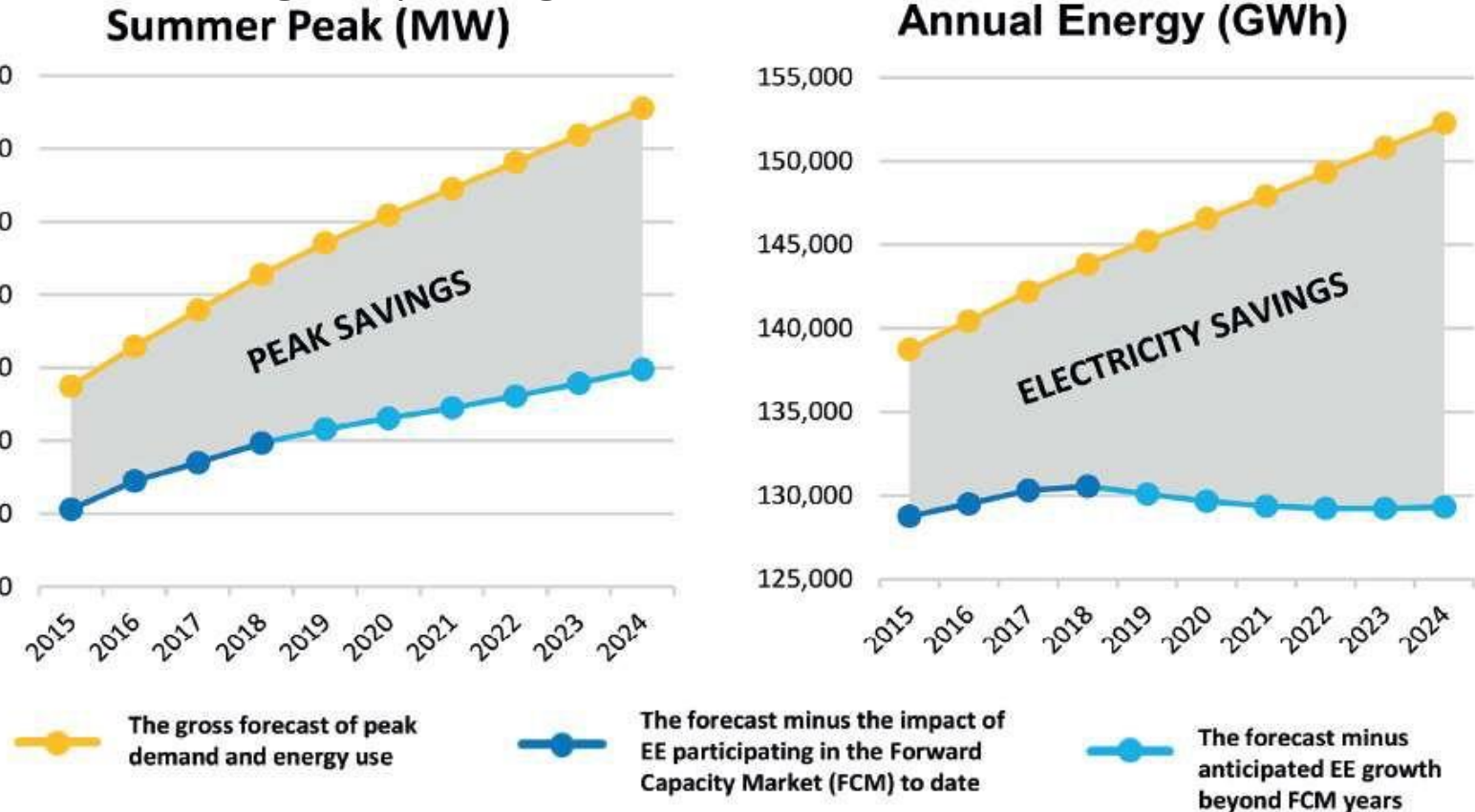
1. EE & DR Policy Drivers
2. DR Program Strategies
3. Integration of Energy Efficiency and Demand Response
4. Evaluating Benefits and Costs
5. Challenges and Opportunities
6. The Road Ahead



IDS Policy Drivers:

Declining Load Factor

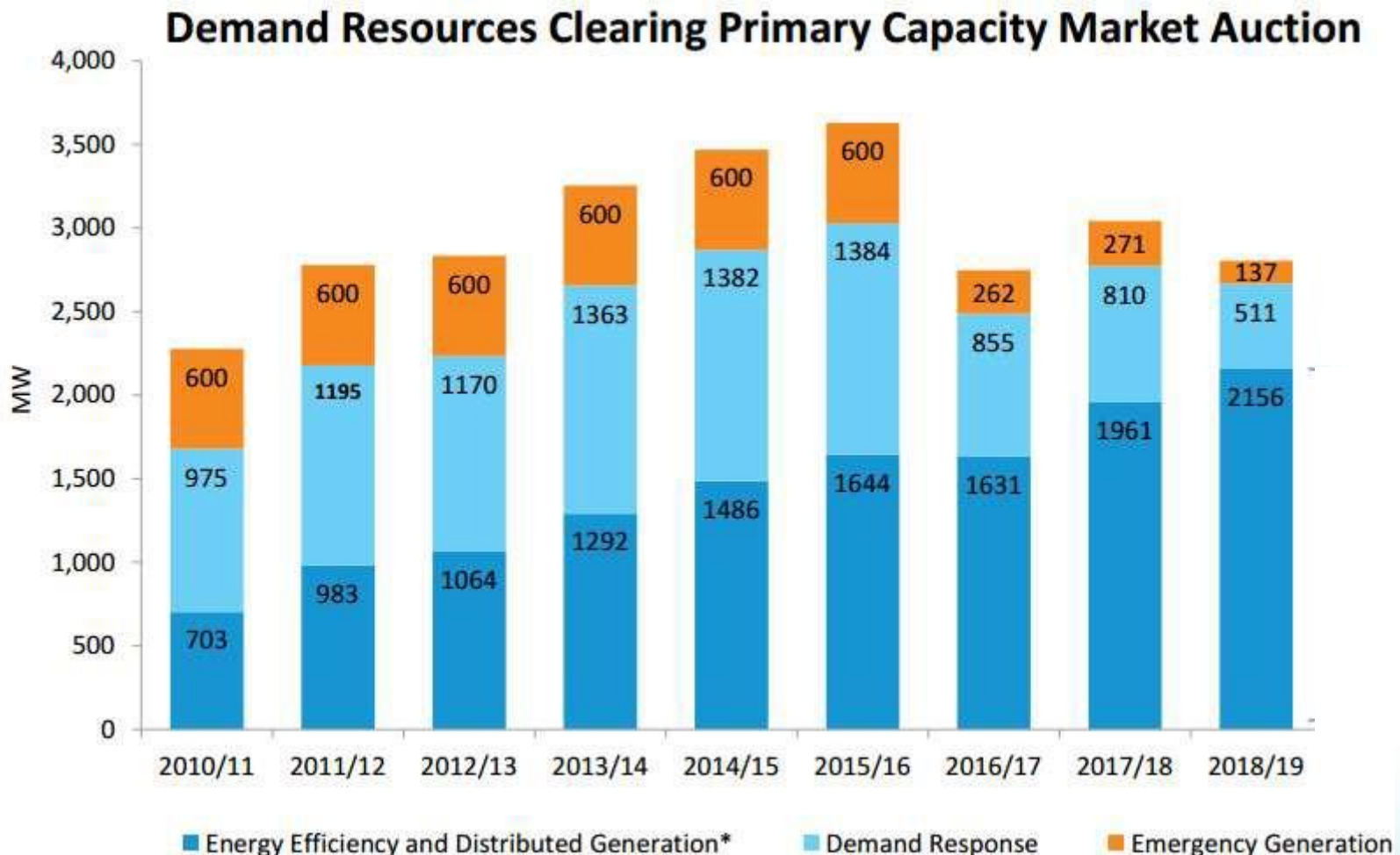
In ISO-NE, investment in energy efficiency will decrease overall load growth, but peak demand continues to grow spreading MW costs over fewer MWhs.



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

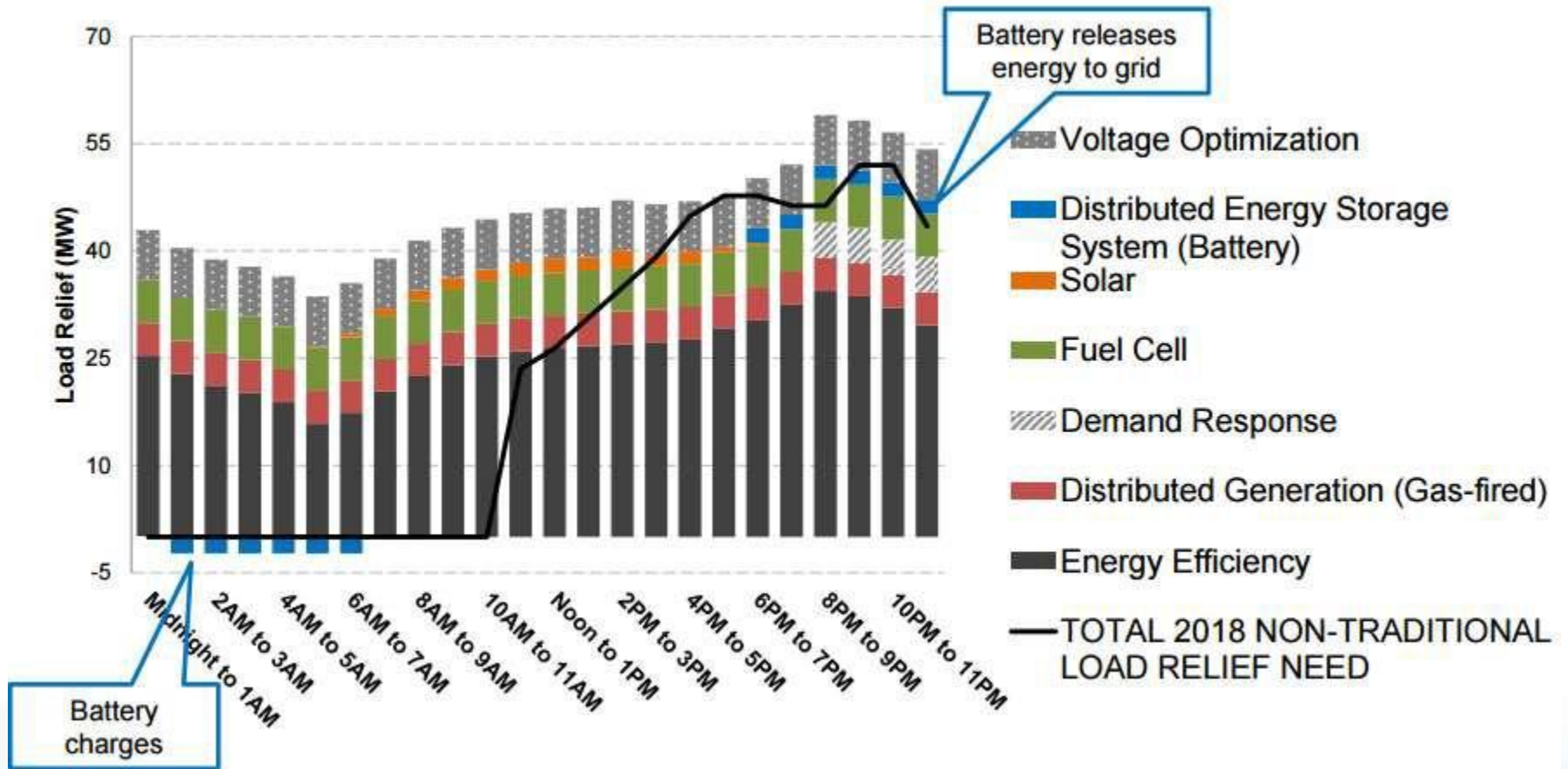
- NWA/[geo-targeting](#) projects throughout the country
- Mass. 2016-18 Plan
- Conn. 2016-18 C&LM Plan
- Rhode Island LCP Plan
- Pennsylvania Act 129 Phase III
- NHEC Go Beyond the Peak
- Maryland BGE Smart Energy Rewards
- NY Dynamic Load Management Plans, Smart Home Rate in REV Track II Order



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
- Consumers value connectivity as much as cost savings
- National Governor's Association [report](#) outlining opportunities

IDSMS Policy Drivers: Non-wire Alternatives



Source: BQDM Q1 2015 filing

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

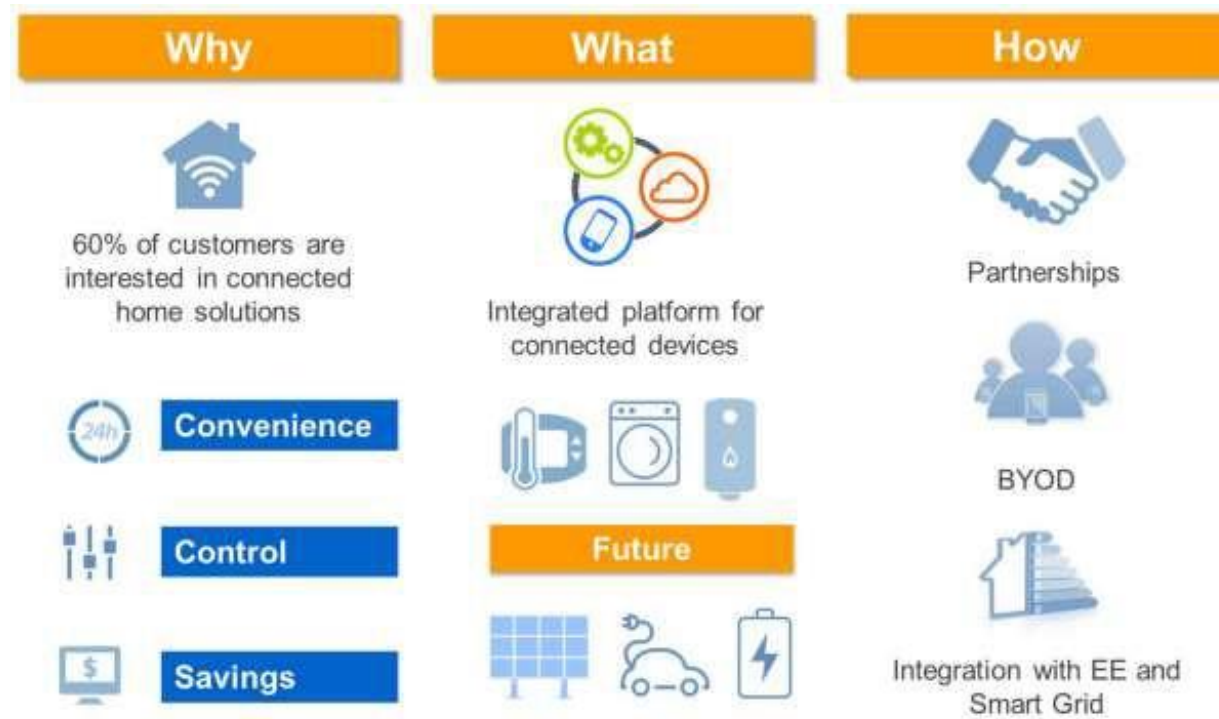
New York

New York Dynamic Load Control Demand Response Programs

Program type	Total participants	Total capacity (MW)	Incentives per customer	annual program incentives	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)

Integrated Demand Side Management Synergies for Energy Efficiency and Demand Response



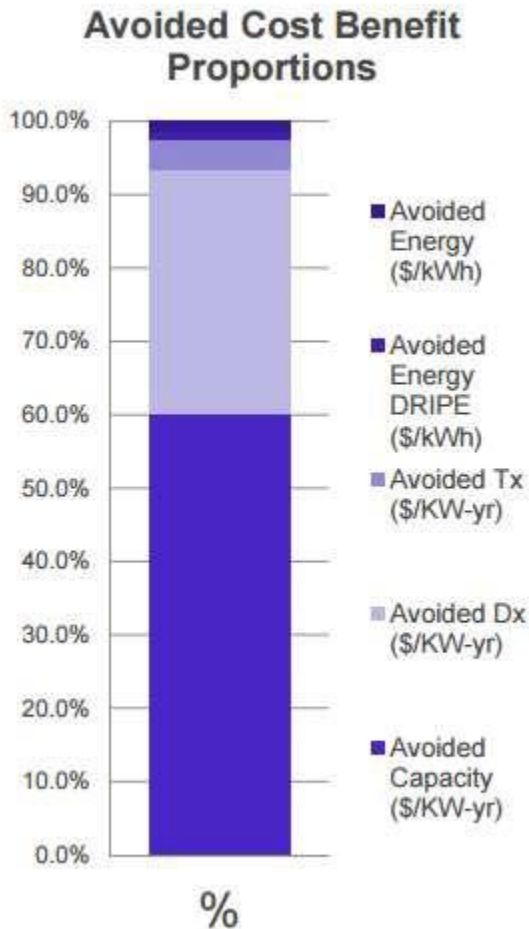
Source: National Grid

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 Cost-Effectiveness/Program Design Considerations



Source: MA EEAC demand savings sub-committee

- Program overlap and attribution
- Lifecycle
- Customer motivation and incentive ranges
- Weather variability
- Enrollment v. control
- FCM v. ICR
- Are the incentives to customer a transfer payment or a cost?

*DRIPE: Demand Reduction Induced Pricing Effect

Integrated Demand Side Management

Challenges and Opportunities



- **Limit silos** between programs; joint marketing efforts can provide cost-saving synergies with attribution being key consideration
- Consider piloting statewide initiatives through **NWA programs**
- Consider obligation for **lifecycle longer than one year**
- 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 and **quick cycle feedback**, rather than singular seasonal incentive
- Opportunities for **consistency and standardization of reporting** to allow apples to apples comparison and further identification of regional benefits
- **Interactive effects** between efficiency and demand response

Integrated Demand Side Management

The Road Ahead

- Potential Studies- Monte Carlo [potential analysis](#) available for every state in Eastern Interconnect
- 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](#)

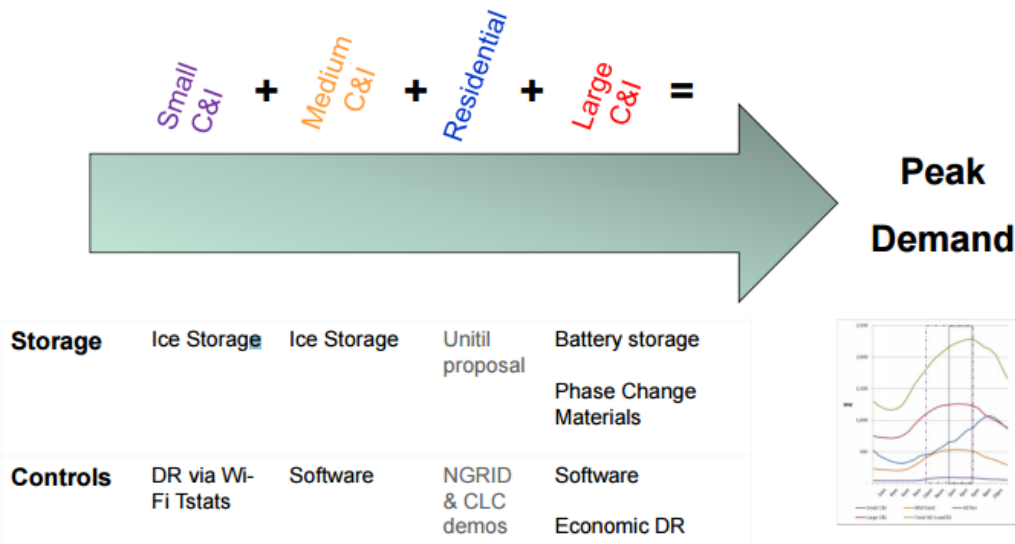


Bonus Slides: Insights from Massachusetts Pilots and proposals- Eversource, MA



Peak Demand Solutions for Each Customer Class

EVERSOURCE
ENERGY



Solution Technology	Total Participant Incentive + STAT	Year(s) of Testing	Anticipated # of Customers	Range of On-Peak Savings Per Project Per Year (MW)
Battery Storage	\$5,000,000	2018	5-30	3.56-5.33
Thermal Storage	\$3,900,000	2018	50-115	0.38-8.53
Software & Controls	\$4,140,000	2017-2018	80-400	4.44-6.67
Active Demand Response	\$5,270,000	2017-2018	840-1150	3.79-7.72
Large C&I	\$3,250,000	2017-2018	40-150	3.33-5.0
Small C&I	\$2,020,000	2017-2018	800-1000	0.46-2.72
Total	\$18,310,000		975-1,695	12.17-28.25

Source: Eversource MA,
[EEAC presentation](#)

Bonus Slides: Insights from Massachusetts Pilots and proposals- National Grid, MA



What's Next



- Scale Programs
- New Wi-Fi enabled device integration
 - Nov 2016 - Launch Washers and Dryers
 - Q1 2017 - Launch Hybrid Hot Water heaters
 - Q2 2017 - Electric Hot Water Heaters, Mini-splits and Smart Window AC

Modify program based on learning from the first year

- Program design – incentives, outreach strategy
- Events – number, length, trigger criteria
- Enrollment process and customer engagement
- Online portal and mobile features

Additional testing

- DR ready homes in New Construction
- Geo targeting events
- Geo targeting marketing

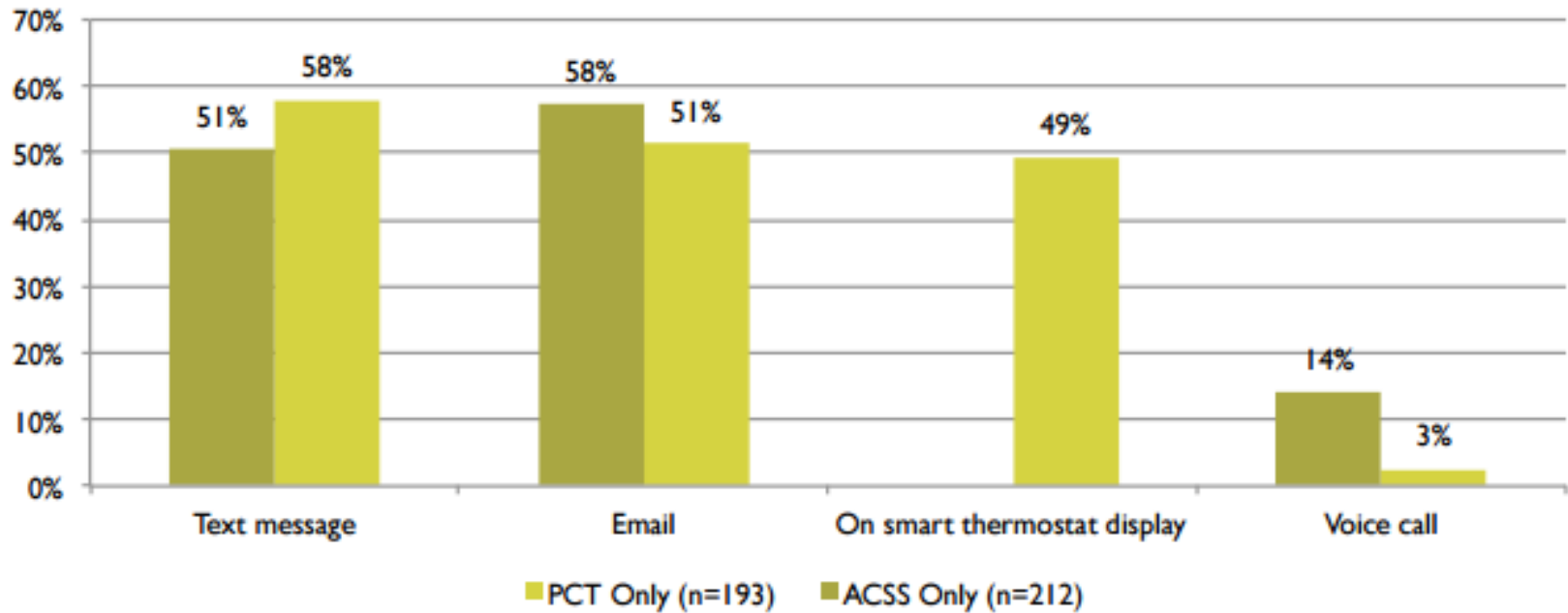


Bonus Slides: Lessons from California SDGE DR Program Process Evaluation (April 2016)



Lesson 1: People do not like phone calls.

Figure 19: Preferred Event Notification Method



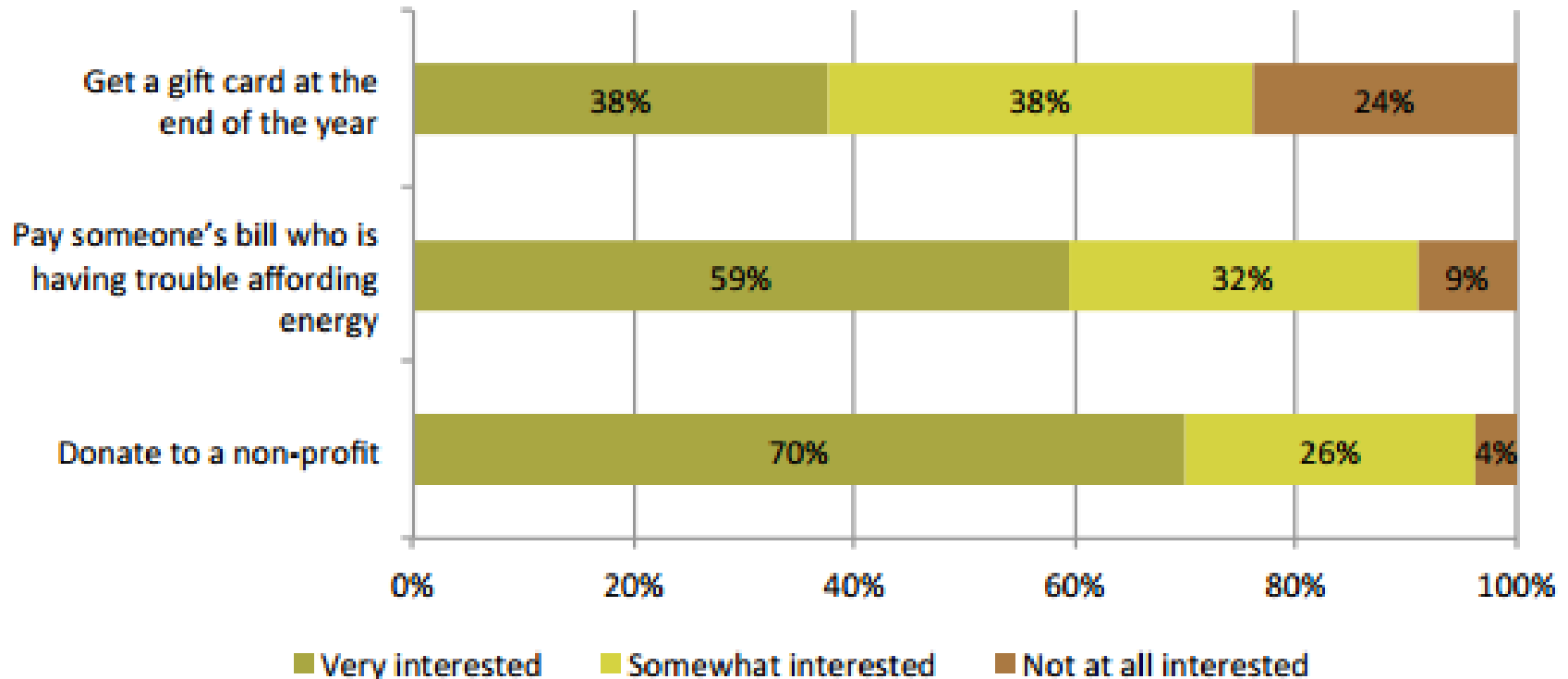
Source: [SDGE DR Program Evaluation](#) (April 2016)

Bonus Slides: Lessons from California

SDGE DR Program Process Evaluation (April 2016)



Lesson 2: People like feeling benevolent



Source: [SDGE DR Program Evaluation](#) (April 2016)

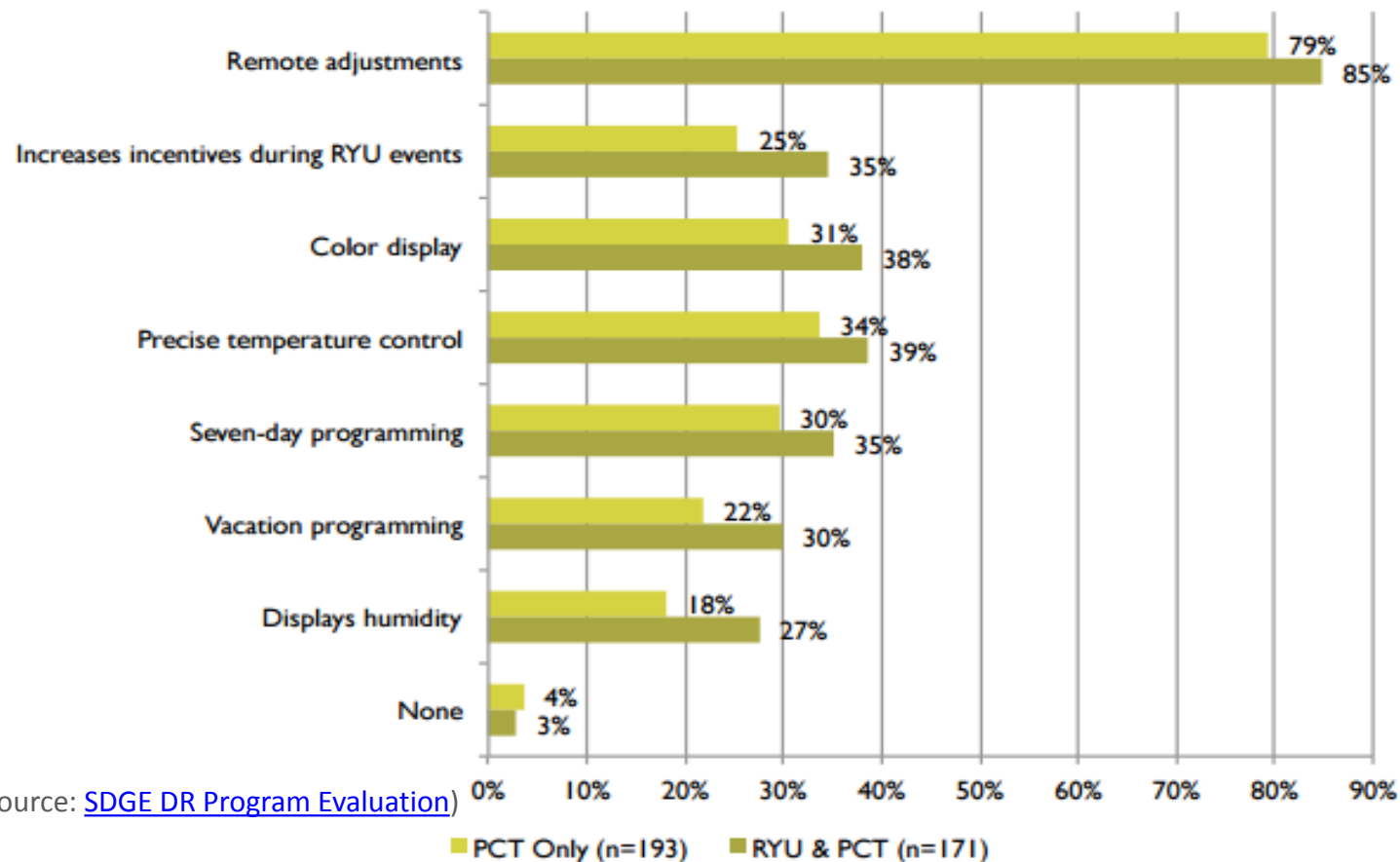
Bonus Slides: Lessons from California

SDGE DR Program Process Evaluation (April 2016)



Lesson 3: People *really* like remote adjustment capability

Figure 9: Favorite Aspects of the PCT Program Smart Thermostat



Bonus Slides: Insights from Massachusetts Pilots and proposals- Metrics for Evaluation

Potential Metrics for Evaluating Projects

Metric	Category	Type	Definition
Baseline calculation	Scalability	Qual	Hard to calc baseline?
How automated is the solution	Scalability	Qual	Scale of customization for each customer
% of load solution is applicable to	Scalability	Quant	Load solution is applicable to/ total load
YoY Participation Increase	Scalability	Quant	(2018-2017)/2017
Evaluability	Scalability	Qual	How hard to evaluate, calc savings?
Policy Hurdles	Scalability	Qual	Any regs that would complicate execution?
Enrollment Rate	Scalability	Quant	# of enrolled/# eligible
Opt-out Rate	Reliability	Quant	# opt-outs/program participants
Achieved Savings	Reliability	Quant	MW achieved/MW called
Peak kWh cost	Cost	Quant	Program cost/peak kWh saved
Cost of customer acquisition	Cost	Quant	\$ on outreach(marketing)/# of participants
Total Program Cost	Cost	Quant	Total \$ spent on implementation
Rate Impacts	Cost	Quant	Program cost per customer/avg monthly bill
Solution Materiality - System	Materiality	Quant	Solution savings/system peak (or company)
Solution Materiality – Customer Class	Materiality	Quant	Solution savings/customer class usage
Solution Savings	Savings	Quant	Total peak kWh reduced
Coincident peak savings	Savings	Quant	Peak kWh savings/total kWh savings
Customer peak savings	Savings	Quant	% of facility peak load reduced
Customer financial savings	Savings	Quant	\$ savings on bill
Customer Satisfaction	Customer Sat	Qual	Do customers like the program
Operational Interference	Customer Sat	Qual	Level of operational interference

Source: Eversource MA, [EEAC presentation](#)

Thank you.

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