



Cape Light Compact

Demand Response Demonstration Offering 2016 Results & 2017 MTM

MA EEAC
March 15, 2017



Planned Demonstration Offering Overview

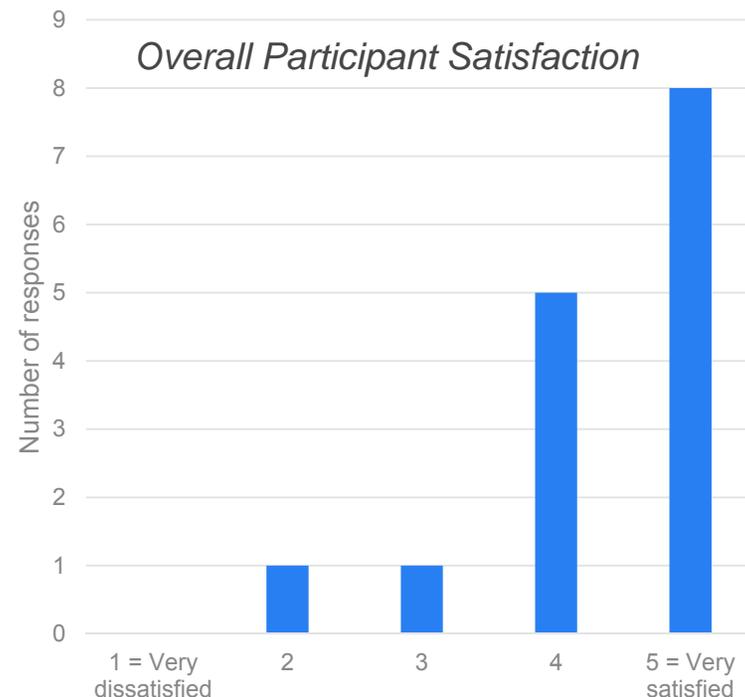


- CLC included a DR Demonstration Offering in 2016-2018 Plan
 - Offered participants a WiFi thermostat and energy monitoring equipment, monitored/controlled via app and/or web
 - Participants must have central a/c controlled by wall-mounted thermostat
 - Participants' thermostat set points were adjusted during DR events called by CLC
 - 4-hour events (most called 2-6 pm)
 - Events called based on weather and ISO load predictions
 - Participants notified of events via app and email day before
 - DR Offering design informed by CLC's Residential Behavior/Feedback core initiative
 - Residentially-focused

2016 Results



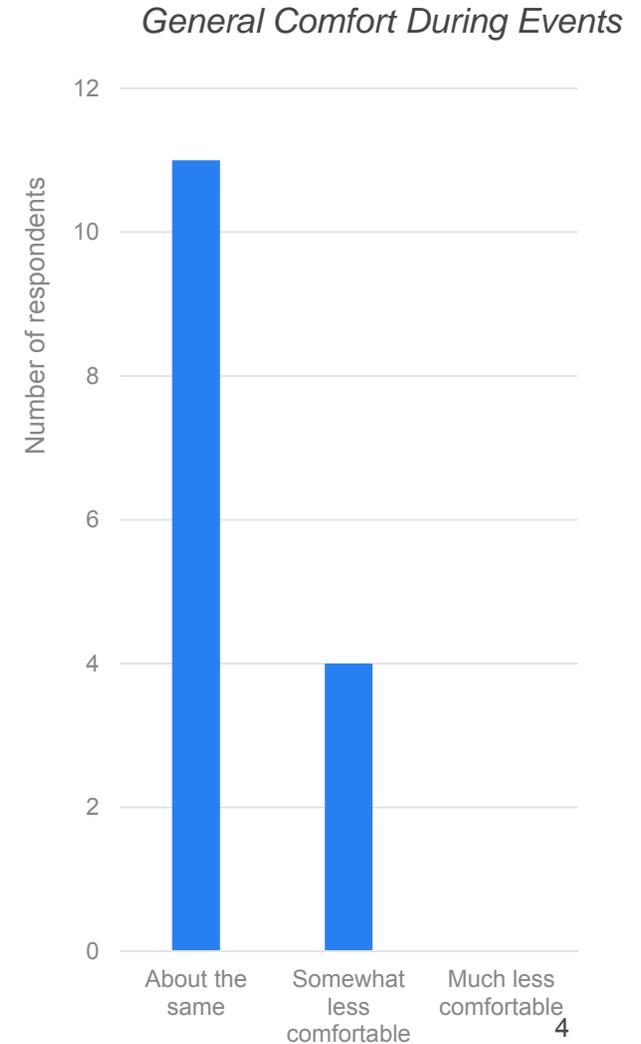
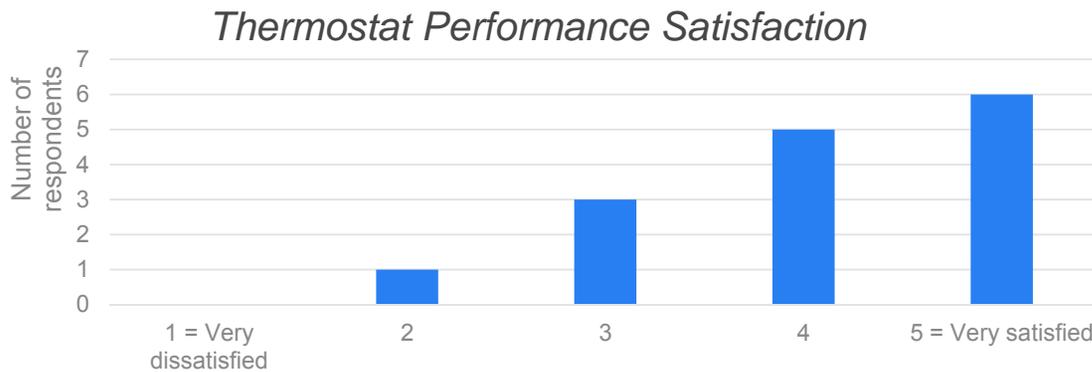
- Demonstration Offering goal: Learn how to best engage residential customers in demand response, use experience to inform further DR program development in the areas of:
 - Overall satisfaction
 - Enrollment motivators
 - Customer acceptance
 - Technology
 - Effect on comfort
 - Event participation
 - Fatigue within events
 - Opt-in vs. opt-out approach



2016 Results (cont.)



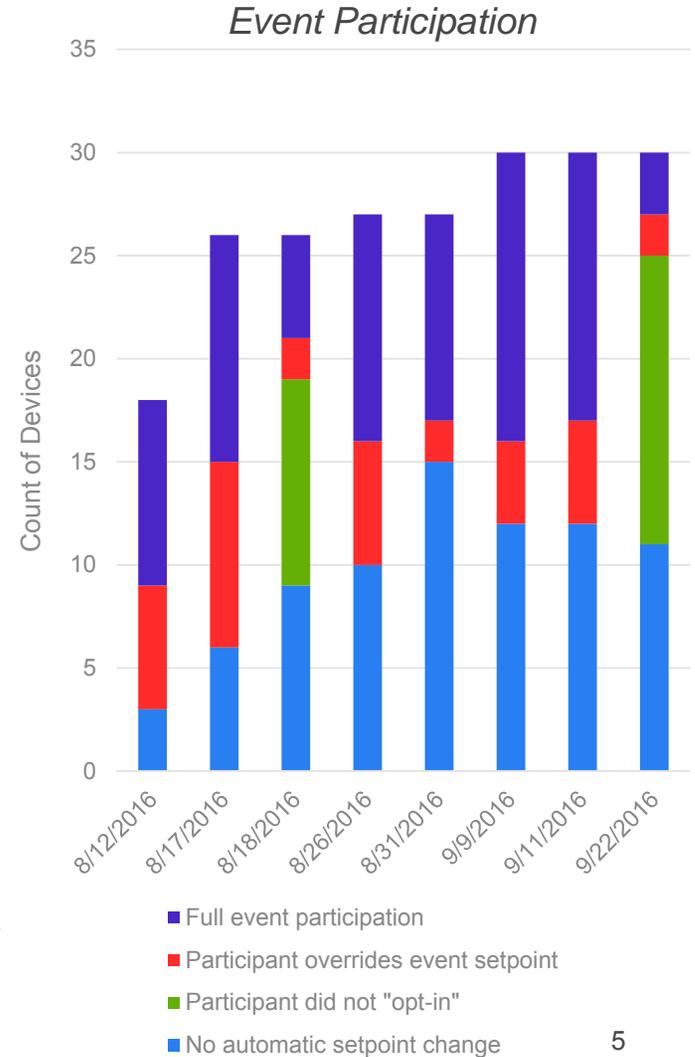
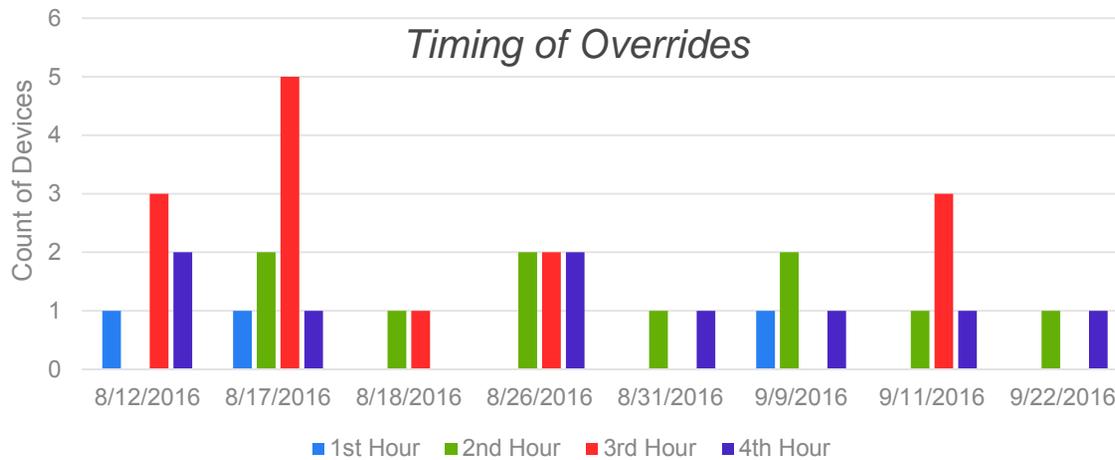
- Most customers were satisfied with the performance of their thermostat
- Most customers did not report a decrease in comfort (vs. days of similar temperature)
- Customers were active users of technology & information
- Most cited participation motivators were to save money, receive free thermostat, and ability to remotely control thermostat
 - Participation incentives were not significant motivators



2016 Results (cont.)



- 22 participants in 8 events
 - Currently 39 participants enrolled, 56 devices
- Most participants that did not receive set point change had A/Cs off
- Opt-out rate averaged 32%*
 - 4 “serial opt-outers” accounted for 60% of opt-outs
 - Most overrides occurred in 3rd hour



*Results not statistically significant due to limited sample size

2016 Takeaways



- High customer satisfaction
- Technology concept was well-received
- Opt-out design is most effective
- Some event fatigue occurred (usually in hour 3)
- Curtailment degradation after event hour 2
- Some pre-cooling and snapback occurred
- Limited pool of participants
- No smart metering is a challenge

2017 Residential DR Demonstration Offering



- Expansion and adjustment of current demonstration offering
- Technology
 - Moving to Honeywell Lyric Thermostat (improve thermostat offering)
 - Incorporating mini-splits (expand participant eligibility)
 - No real-time monitoring equipment (reduce costs and deployment time)
- Events
 - All events will be called as opt-out (better participation rates)
 - Call shorter events (address event fatigue)
 - Stagger thermostat setbacks (address curtailment degradation)
 - Stagger event times across participants (address pre-cooling & snapback)

MTM Request - 2017 C&I DR Demonstration Offering



- Background: CLC sought to expand its DR Demonstration Offering as part of its 2017 Energy Efficiency Surcharge filing (DPU 16-177) to include thermal storage
 - Proposed to stay within overall 2016-2018 approved budget
 - Would have been able to deploy thermal storage before summer 2017
 - DPU did not allow DR Offering increase, required EEAC review and a separate DPU filing
- In coordination with other PAs, CLC proposes to expand its Offering to include thermal storage for C&I customers
 - Also expand and improve current Res. DR Offering
 - Reduce Residential Behavior Initiative spending
- Testing additional technology will broaden scope of Offering learning for CLC/PAs to better inform future demand response offerings

Project Description



- Ice Bear technology targets summer peak loads from air conditioning by creating ice during off-peak hours and using thermal mass instead of a/c compressor to cool air during peak hours
 - Load-shifting, behind-the-meter DR technology
- Goal to deploy at 5 to 10 sites before summer 2018
 - Likely 10 to 15 units
- Locations being selected to demonstrate potential to deliver customer- and grid-facing benefits, in areas with high seasonal population fluctuation

Why Ice Bears?



- Dispatch has no impact on customer comfort = no customer fatigue
- Dispatch and resulting load reduction is reliable
 - Remotely dispatchable
 - Does not rely on any customer action to dispatch
 - Dispatch cannot be overridden by customer
- It is relatively simple – the core components are the same as an a/c unit = can be maintained by local a/c technicians
- There are no safety concerns, unlike many other storage technology types
- Storage capability does not degrade over time
- System performance is continuously monitored in real-time
- It has been successfully deployed elsewhere in the United States
- Can operate every day of the cooling season, over multiple hours
 - High probability of overlap with ISO-NE peak load day and hour, which reduces ICAP tags and can lower power supply costs

C&I DR Demonstration Offering

Research Questions



- Which value streams are the most important to customers?
 - In the future, could the customer value be sufficient to motivate them to pay some of the costs to purchase/install the technology?
 - Within the commercial rate class, which customer/business types can get the most value from the technology?
 - Could customer pair it with a power supply contract to increase customer value?
- How will it operate in the Compact territory's climate?
 - Will it be enough to cover the Cape Cod and Martha's Vineyard and/or system peak? Could it cover a longer period?
- What are the grid-facing benefits?
 - Is it reliable enough to potentially defer T&D upgrades?
 - Can it be brought to scale in order to potentially defer T&D upgrades?
 - How are the T&D benefits quantified?
- Vendor to analyze several of these questions in advance of full demonstration implementation, which will assist in site selection

Participation Goals



- Targeting 5-10 sites in order to deploy on a range of C&I customers in order to inform future expanded DR programs
 - DR reduction is very site-specific and temperature-dependent, but expected range of reduction for the C&I demonstration is 100-250kW*
- Targeting customers representative of range of C&I customers on Cape Cod/Martha's Vineyard that have consistent cooling load
 - Primary focus is on implementation experience
 - Examples will be used to understand potential variables in modeled vs realized DR impacts and barriers to future program implementation
- Customer types for DR Demonstration Offering
 - Municipal – mix regular hours and all-hours occupation
 - Hospitality/Lodging – higher loads later in the day, longer cooling season
 - Healthcare – consistent loads/space conditions
 - Restaurant – more site-specific loads
 - Retail – consistent load during daytime/operating hours

*based on preliminary information provided by vendor (typical reduction of ~1.1 kW/ton) ¹²

Why have demonstration projects?



- There are inherent locational differences both within MA and between MA and other areas
 - Rate structures, costs (project, avoided, market), load profiles, customer composition, climate
 - Data from demonstration projects accounts helps to identify these differences
- Demonstrations provide hands-on experience and in-the-field data which is used to:
 - Inform the development of potential future programs at a larger scale, incl. technology selection, program design, implementation, and goals
 - Evaluate customer acceptance & barriers to implementation
 - Recruit participants for future programs

Res. Behavior/Feedback Initiative



- As part of 2016-2018 Plan, Compact had an approved budget for its Residential Behavior/Feedback Initiative
 - Used near-real time energy monitoring equipment to inform participants of energy usage drivers and encourage load reduction through behavioral change
- Costs were high, maintaining equipment connectivity increasingly an issue, evaluation showed minimal savings
- Compact decreasing spending on Res. Behavior/Feedback by suspending enrollment
- Maintaining functionality for current participants

<u>Budget</u>	2016-2018 Plan				Proposed in MTM				Difference
	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2016-2018</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2016-2018</u>	<u>2016-2018</u>
Res. Behavior Feedback Initiative	323,850	326,115	329,832	979,797	170,611	153,448	147,635	471,695	(508,103)

DR Demonstration Offering Proposed Budget



2017-2018 C&I DR Demonstration Offering Budget

PP&A	Marketing	Participant Incentive & STAT	EM&V	Total Cost
-	-	820,000	150,000	970,000

- Incentive/STAT budget includes equipment, installation, and maintenance
- Budget based on pricing information from vendor

2016-2018 DR Demonstration Offering Budget, Current & Proposed

<u>Budget</u>	2016-2018 Plan				Proposed in MTM			
	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2016-2018</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2016-2018</u>
Demand Response Offering (total)	185,897	267,797	349,697	803,391	186,560	890,000	840,000	1,916,560
<i>DR C&I</i>	18,590	26,780	34,970	80,340	17,907	485,000	485,000	987,907
<i>DR Residential</i>	167,307	241,017	314,727	723,051	168,654	405,000	355,000	928,654

Budget Impact & EES



Overall Plan Budget Impact

<u>Budget</u>	<u>Difference: Approved vs. Proposed</u>			
	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2016-2018</u>
Res. Behavior Feedback Initiative	(153,239)	(172,667)	(182,198)	(508,103)
Demand Response Offering (total)	663	622,203	490,303	1,113,169
<i>DR C&I</i>	(683)	458,220	450,030	907,567
<i>DR Residential</i>	1,346	163,983	40,273	205,602
Grand Total	(152,576)	449,536	308,106	<u>605,066</u>

EES Rates (c/kWh)					
<u>Sector</u>	<u>2017 Planned</u>	<u>2017 In Effect</u>	<u>2017 Proposed</u>	<u>2018 Planned</u>	<u>2018 Updated</u>
Residential	1.706	2.051	2.058	1.677	1.964
Low Income	0.162	0.099	0.1	0.18	0.189
C&I	1.383	1.573	1.653	1.521	1.788

Thank you

Appendix: Bill Impacts Summary



- Residential
 - Overall, proposed 2017 & 2018 res. budget decrease from what was approved in 2017 EES (2017) and planned (2018) due to decrease in Res. Behavior/Feedback
 - 2017 res. rate will increase slightly from what is currently effective due to decrease in sales and RGGI revenue
- C&I
 - Rates higher than planned due to DR budget increases and decrease in RGGI revenue
- Low Income
 - Three-year LI budget is at 10.06%
 - Slight rate increases in 2017/2018 due to decrease in RGGI revenue

Appendix: Bill Impacts Summary



- Year-to-year bill impact analysis:
 - 2017 currently-effective vs. 2017 proposed
 - 2017 proposed vs 2018 updated
 - **None are greater than 1%**
 - Most residential are negative for 2017 proposed v. 2018 updated
- Replace EES rates included in approved Plan
 - 2017 planned vs. 2017 proposed
 - 2018 planned vs 2018 updated
 - **None are greater than 2%**