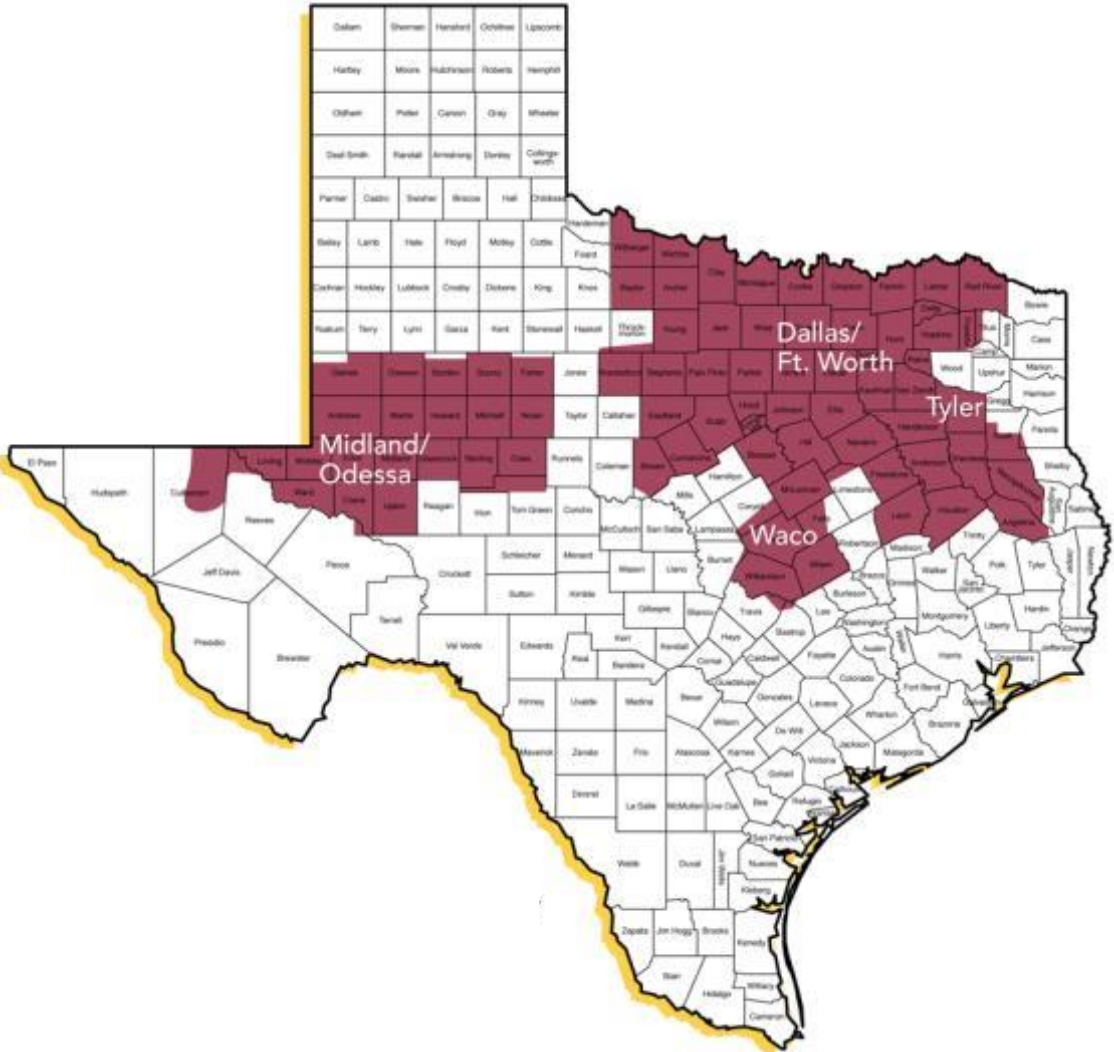


Residential Demand Response

Program Opportunities in the Texas Deregulated Market



Wi-Fi Enabled Thermostats



Texas Deregulated Electricity Market



Your electricity bill

Your service plan: Standard Rate

Charges for electricity services

Cost of electricity you used

Customer account charge	\$1.89
Delivery service charge	\$14.55
Environmental benefits surcharge	\$4.73
Federal environmental improvement surcharge	\$0.09
System benefits charge	\$1.60
Power supply adjustment*	\$0.90
	\$2.70
	\$1.86
	\$2.10
	\$39.00

Meter number: 62295

Meter reading cycle

Amount of

Meter reading on

Meter reading on

Total electricity

Average

Competitive Rules - TDUs



- Energy efficiency - 30% of average load growth
- No competitive services
- Use 3rd parties to provide energy efficiency services
- Remain market neutral

Residential Market Enablers



RDR Pilot Program

- Can we retrieve and analyze the data?
- How do we measure savings?
- The program should be scalable to meet energy efficiency portfolio needs
- Cost effective
- Deploy only during ERCOT EEA Level 2 grid emergency

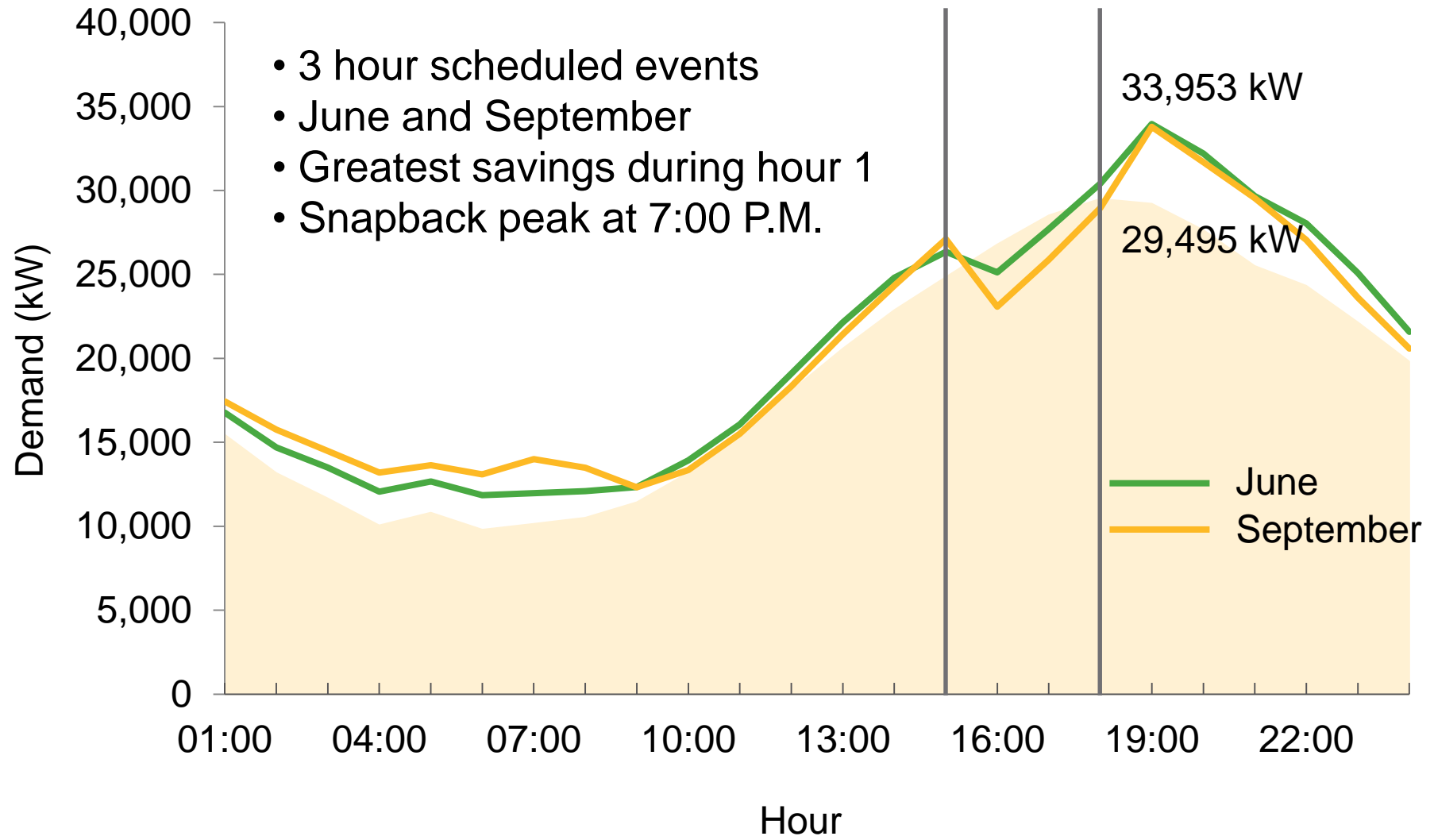
AMI Data Management

The screenshot displays an Excel spreadsheet with the following data columns:

rdng_dtmgmt	meas_unit	rdng_value	enrgy_dir
01/01/2015 12:15:00 AM	KWH	1.308	+
01/01/2015 12:30:00 AM	KWH	2.248	+
01/01/2015 12:45:00 AM	KWH	2.719	+
01/01/2015 1:00:00 AM	KWH	0.527	+
01/01/2015 1:15:00 AM	KWH	1.339	+
01/01/2015 1:30:00 AM	KWH	1.685	+
01/01/2015 1:45:00 AM	KWH	1.442	+
01/01/2015 2:00:00 AM	KWH	1.46	+
01/01/2015 2:15:00 AM	KWH	2.248	+
01/01/2015 2:30:00 AM	KWH	1.37	+
01/01/2015 2:45:00 AM	KWH	0.64	+
01/01/2015 3:00:00 AM	KWH	1.452	+
01/01/2015 3:15:00 AM	KWH	1.535	+
01/01/2015 3:30:00 AM	KWH	1.338	+
01/01/2015 3:45:00 AM	KWH	2.165	+
01/01/2015 4:00:00 AM	KWH	1.307	+
01/01/2015 4:15:00 AM	KWH	1.284	+
01/01/2015 4:30:00 AM	KWH	1.798	+
01/01/2015 4:45:00 AM	KWH	1.236	+
01/01/2015 5:00:00 AM	KWH	1.151	+
01/01/2015 5:15:00 AM	KWH	1.153	+
01/01/2015 5:30:00 AM	KWH	2.119	+
01/01/2015 5:45:00 AM	KWH	1.888	+
01/01/2015 6:00:00 AM	KWH	1.535	+
01/01/2015 6:15:00 AM	KWH	1.97	+
01/01/2015 6:30:00 AM	KWH	1.084	+
01/01/2015 6:45:00 AM	KWH	1.033	+
01/01/2015 7:00:00 AM	KWH	2.322	+
01/01/2015 7:15:00 AM	KWH	1.499	+
01/01/2015 7:30:00 AM	KWH	0.497	+
01/01/2015 7:45:00 AM	KWH	1.68	+
01/01/2015 8:00:00 AM	KWH	1.315	+

The calendar view on the right shows data for May and June 2015. The 'enrgy_dir' column contains values such as '096' and '080'.

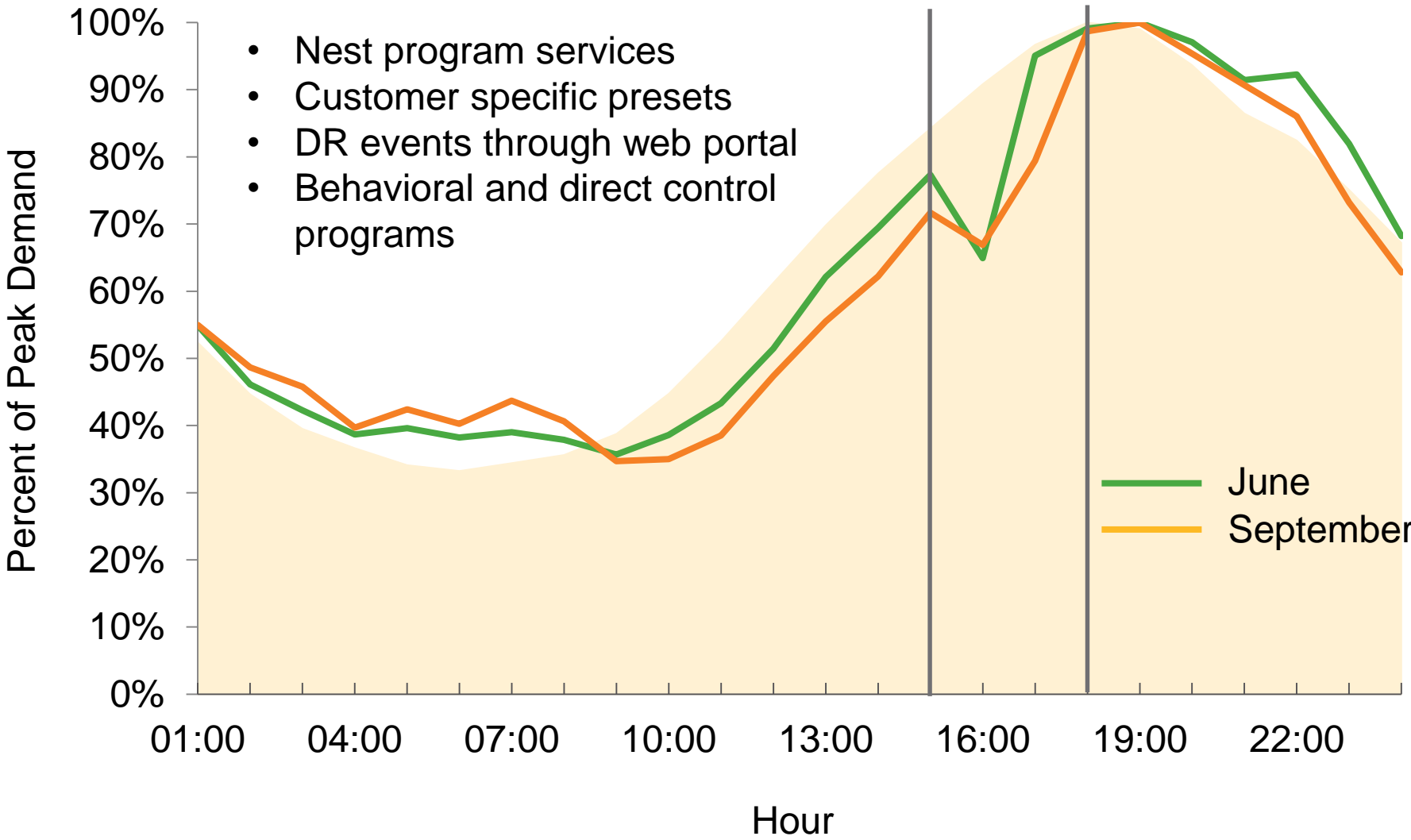
Portfolio Results



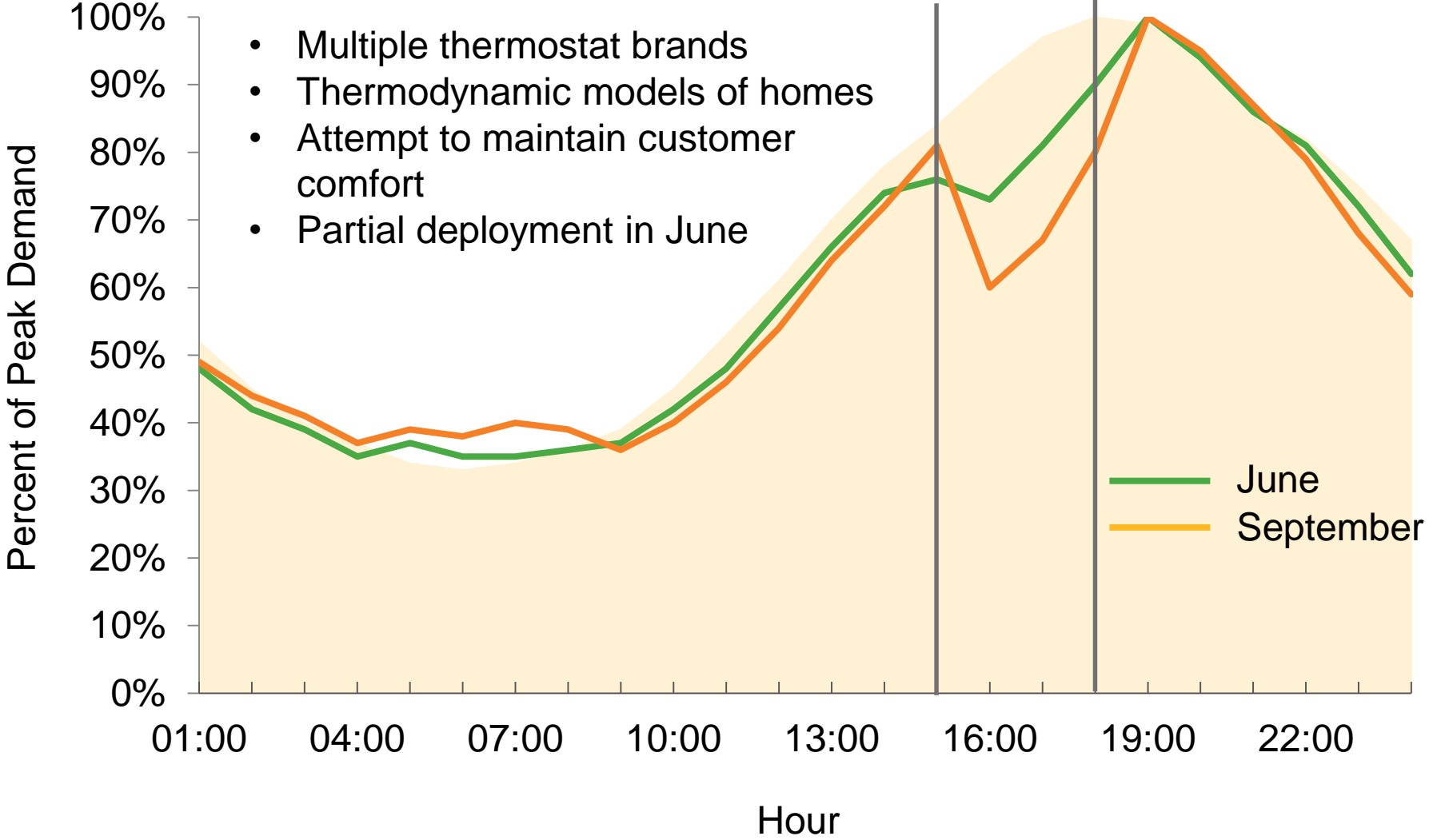
Portfolio Results

Year	Participants	Customers	Reported Savings (kW)	Average kW / Customer
2015	1	3,960	6,886	1.72
2016	4	6,958	4,775	0.69

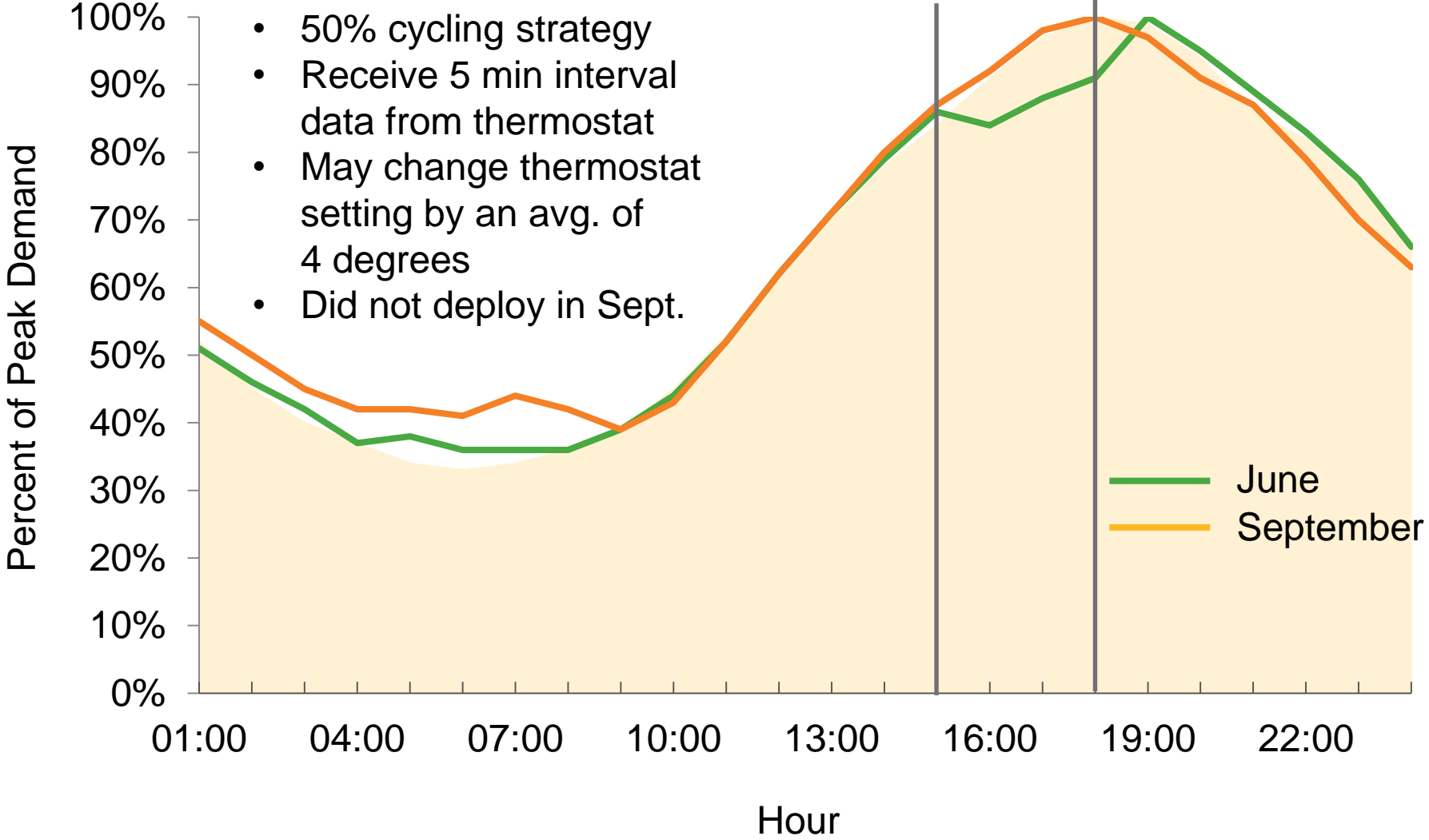
Participant 1



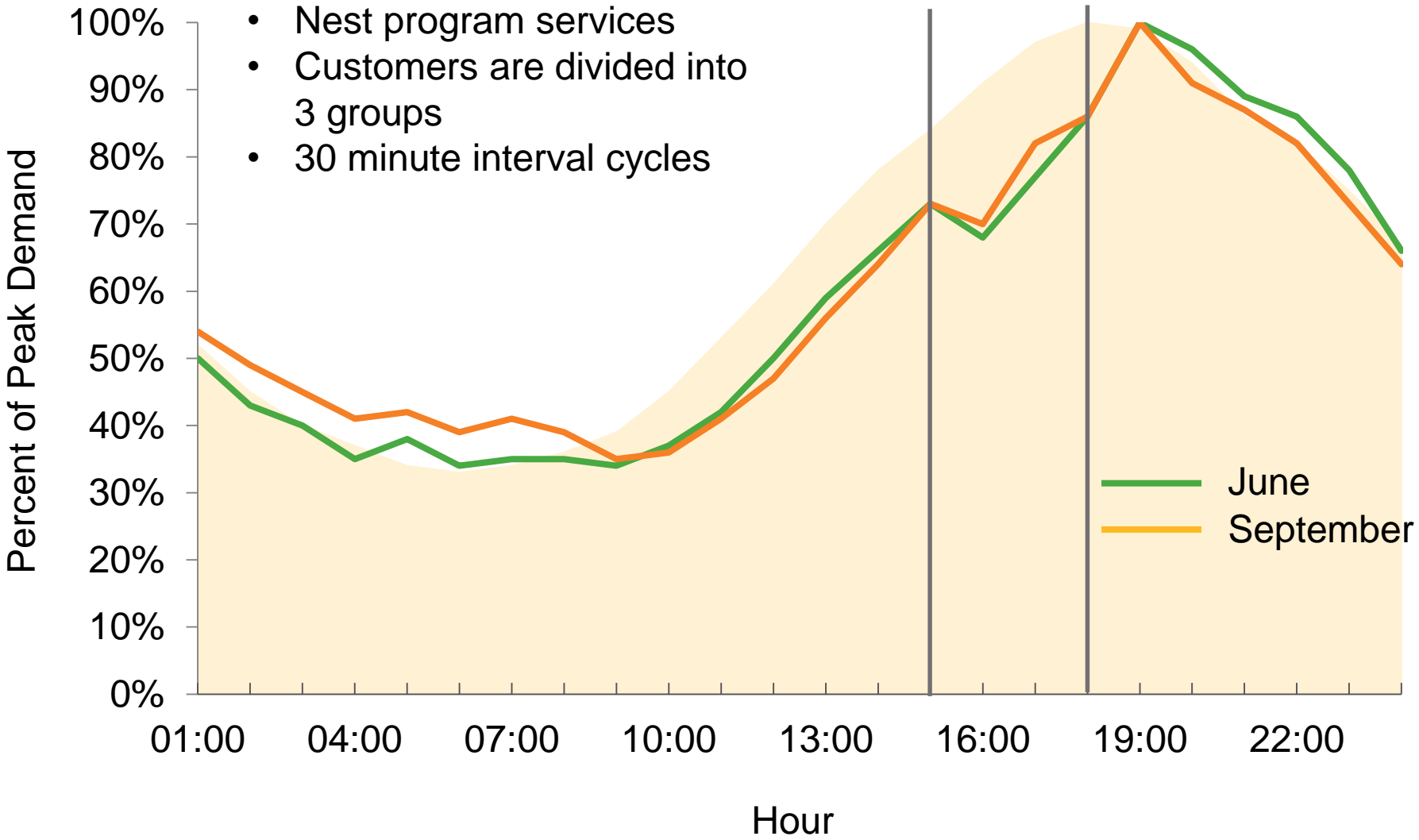
Participant 2



Participant 3

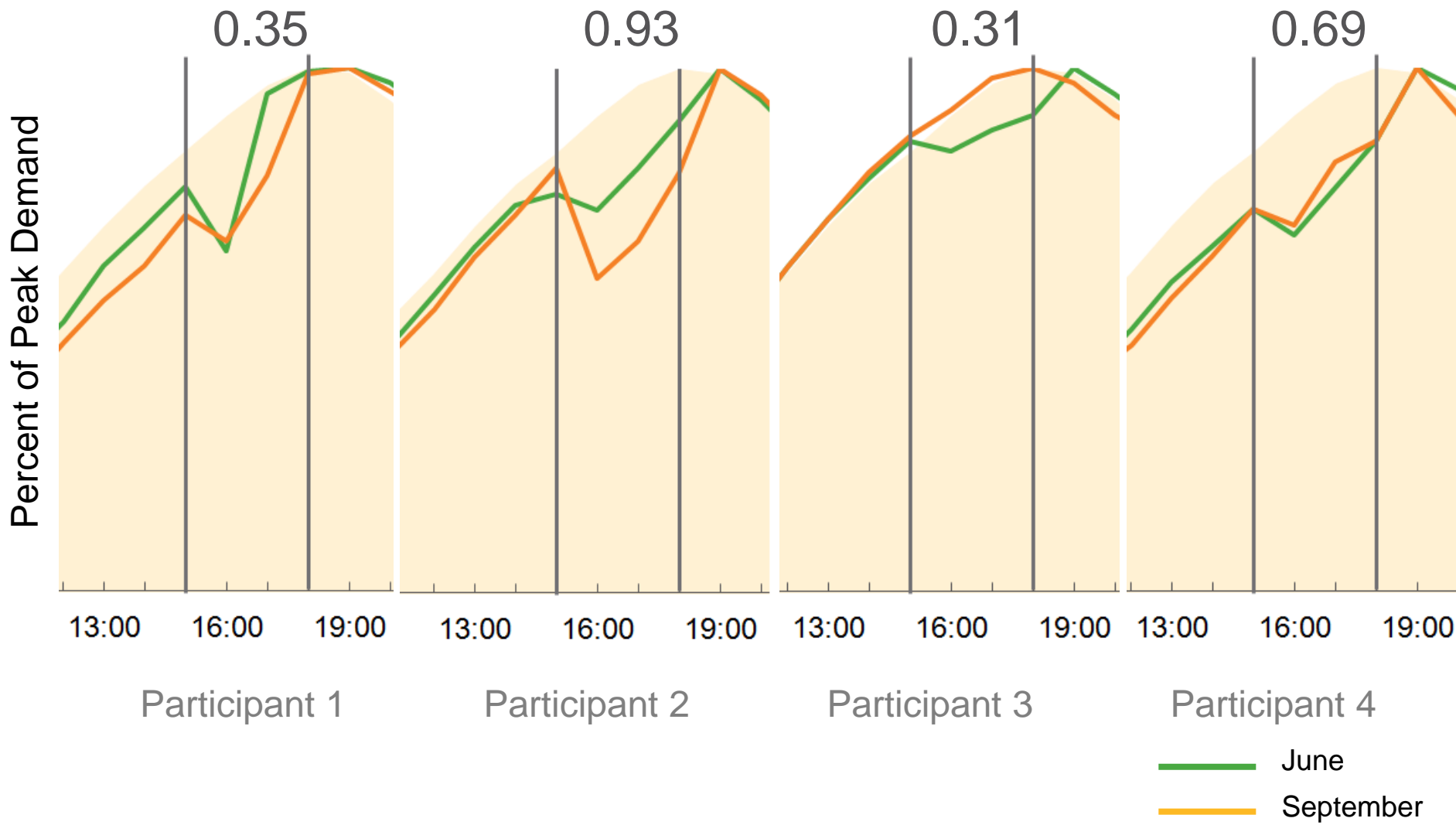


Participant 4



Participant Performance

kW /customer



Lessons Learned

Performance

- Participants with active thermostat management programs have better results
- Event timing and duration has an impact on overall performance and creates a secondary peak
- Methods to manage deployment issues

Internal capabilities

- Processes to manage AMI data anomalies
- Software and analytic capabilities for large datasets

Where are We Going?



- Move from Pilot to Standard Offer Program in 2017
- Expand program to 20,000 customers
- Increase analytic capabilities

Opportunities

- Evaluate potential annual energy savings for actively managed thermostats?
- Add devices such as water heating and pool pumps?
- Feeder level demand response?

Thank You!

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