



Review of Demand Priorities, Timeline Update, and Next Steps



Why Focus on Summer?



Top Ten Highest Hourly LMPs in 2016 to date			Top Ten Highest System Loads in 2016 to date		
Date	Hour	Real Time LMP	Date	Hour	System Load
8/11/16	15	\$1,438.97	8/12/16	15	25,521
8/11/16	18	\$1,390.82	8/12/16	16	25,495
8/11/16	17	\$930.55	8/12/16	14	25,206
8/11/16	16	\$518.04	8/12/16	17	25,074
8/14/16	19	\$508.23	8/11/16	17	25,037
8/11/16	19	\$407.05	8/11/16	18	24,968
8/11/16	14	\$387.32	8/11/16	16	24,845
8/12/16	15	\$379.95	8/11/16	15	24,672
8/12/16	16	\$365.81	8/12/16	13	24,600
1/5/16	8	\$360.00	8/12/16	18	24,446

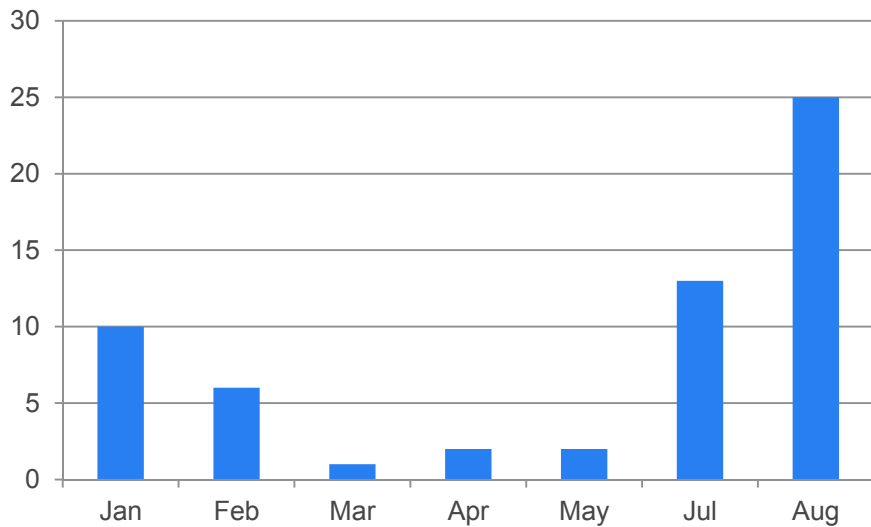
- Highest hourly LMPs occur throughout the year
 - In 2016 to date:
 - 9 of the 10 highest LMPs were in the summer
 - 1 in Winter
- Highest system loads are consistently in the summer and within consistent time frames

Top 1% of 2016 LMPs and System Loads

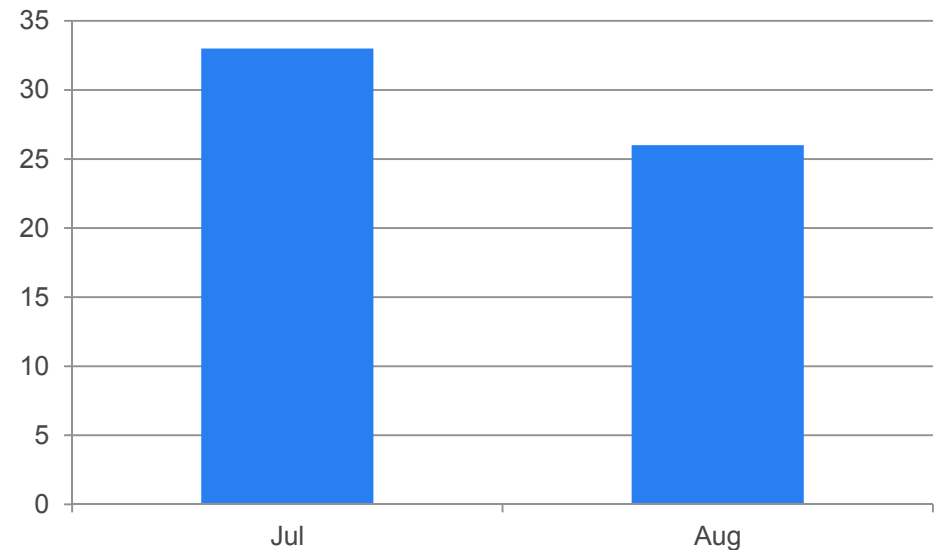


The general trend of a wide temporal distribution of LMPs but more concentrated system loads holds true when examining the top 1% of hours

When did the top 1% of 2016 LMPs occur?



When did the top 1% of 2016 system loads occur?

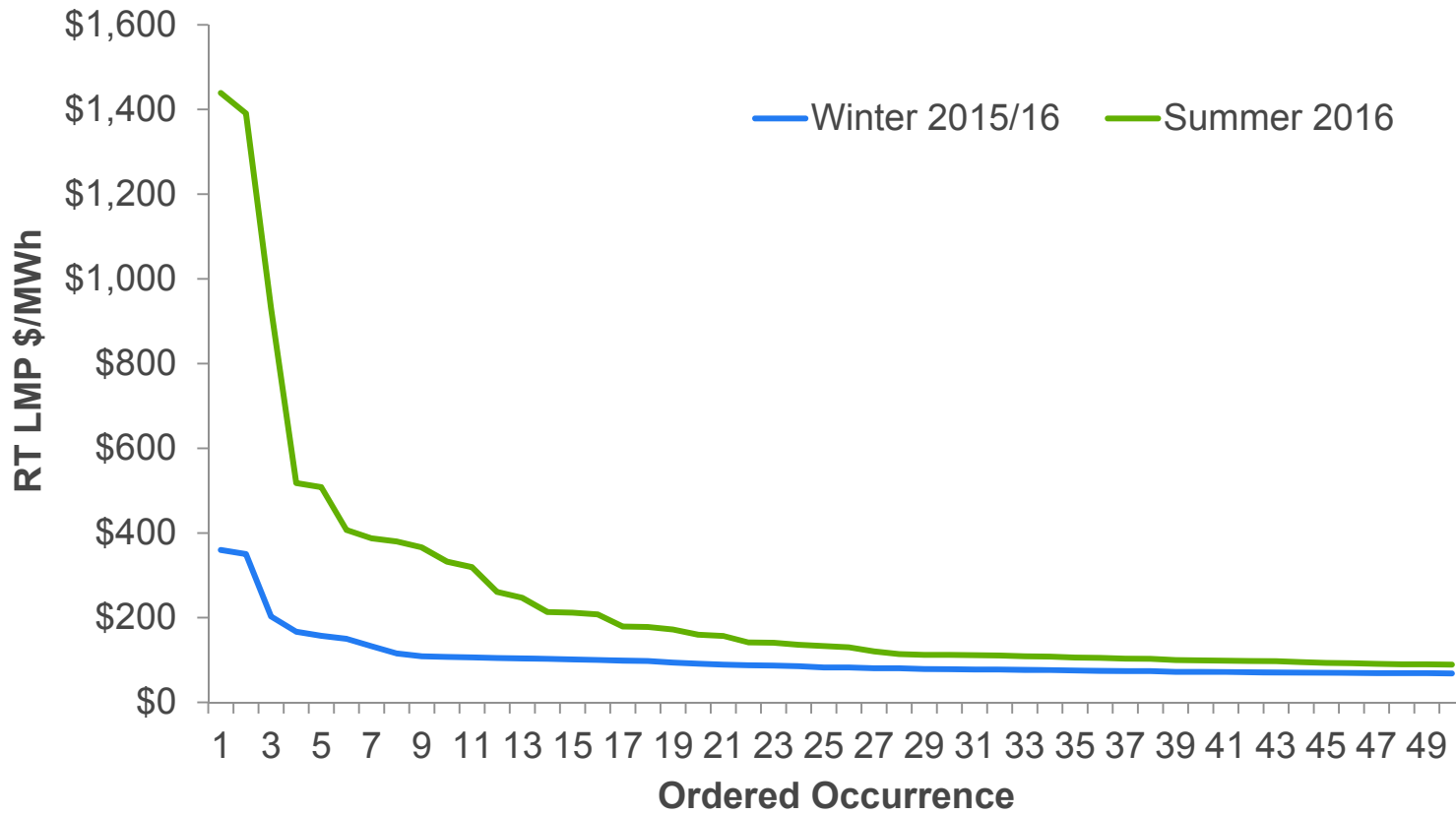


- Top 1% of hours in 2016 is 59 observations to date
- 42% of the hours in the top 1% of LMP hours are in the top 1% of load hours

Top LMPs - Winter vs Summer



The top 50 LMP hours for Winter 2015-16 vs Summer 2016 show that the summer costs are consistently higher



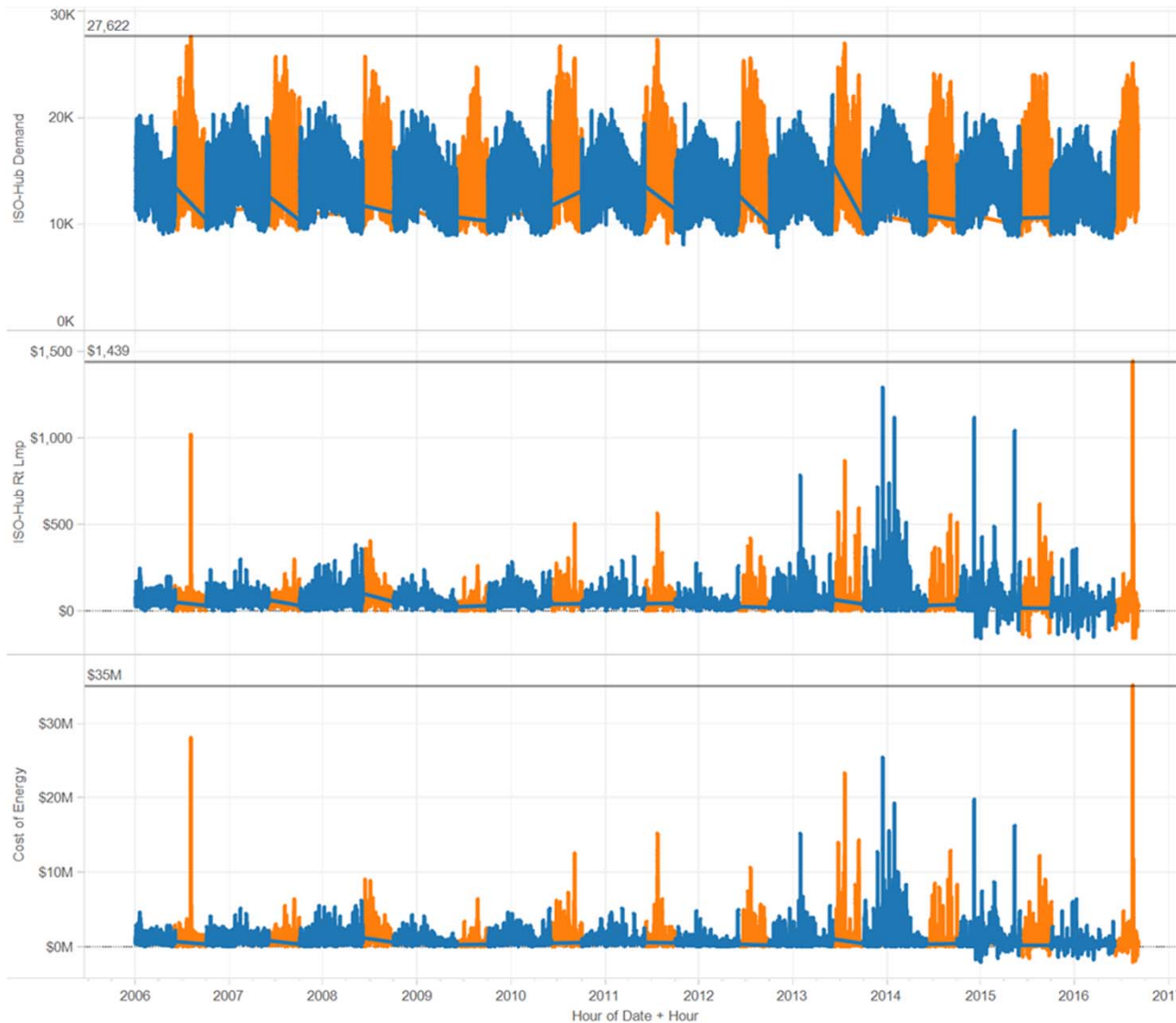
More effective to focus on reducing peak demand than to chase pricing peaks



Top Ten Highest Hourly LMPs in 2015			Top Ten Highest System Loads in 2015		
Date	Hour	Real Time LMP	Date	Hour	System Load
5/10/15	21	\$1041.38	7/20/15	17	24,437
8/15/15	17	\$615.48	7/29/15	17	24,437
2/21/15	19	\$487.32	7/29/15	18	24,399
1/03/15	18	\$425.39	9/08/15	16	24,368
9/07/15	18	\$422.92	7/20/15	18	24,365
8/24/15	17	\$387.34	7/20/15	16	24,357
8/24/15	16	\$377.65	9/08/15	17	24,338
9/08/15	15	\$375.40	9/08/15	15	24,291
9/08/15	16	\$365.18	7/20/15	15	24,291
12/21/15	18	\$350.03	9/09/15	17	24,275

- Highest hourly LMPs occur throughout the year
 - In 2015:
 - 6 of the 10 highest LMPs were in the summer
 - 1 in Spring
 - 3 in Winter
- However, highest system loads are consistently in the summer and within consistent time frames

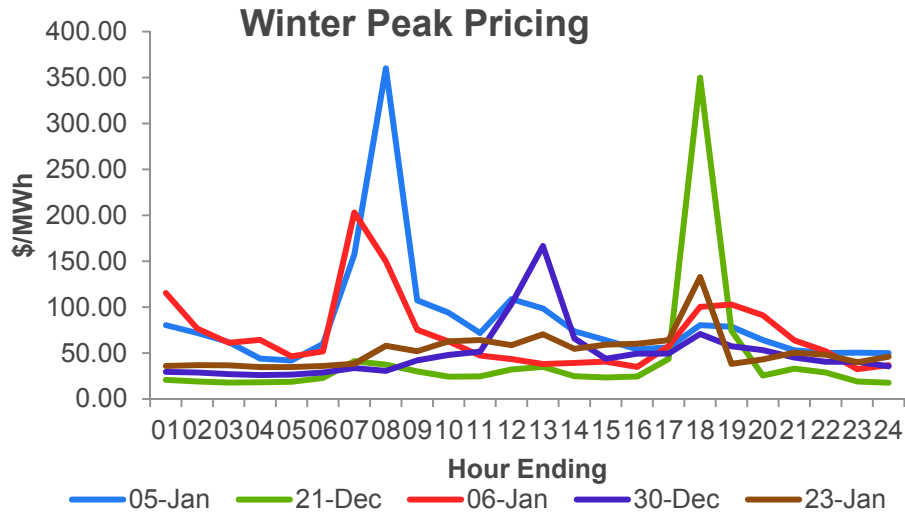
10 Year Summer vs. Winter View



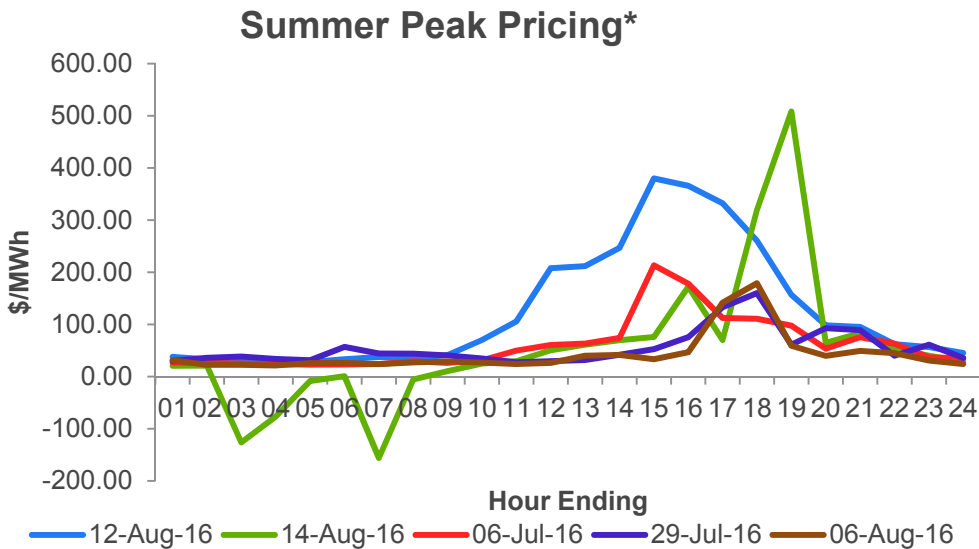
Key Points:

- Summer load has been higher than winter load
- Winter price spikes don't necessarily correlate with load
- PAs will prioritize summer reductions but will explore if technologies can be applied in winter as well

Pricing Peaks are Different in Summer and Winter



- Winter peak prices do not appear to be sustained for long time periods
- Prices spike and then recede



- Summer peak price spikes appear to persist over longer time periods
- Sustained higher loads are likely a contributing factor

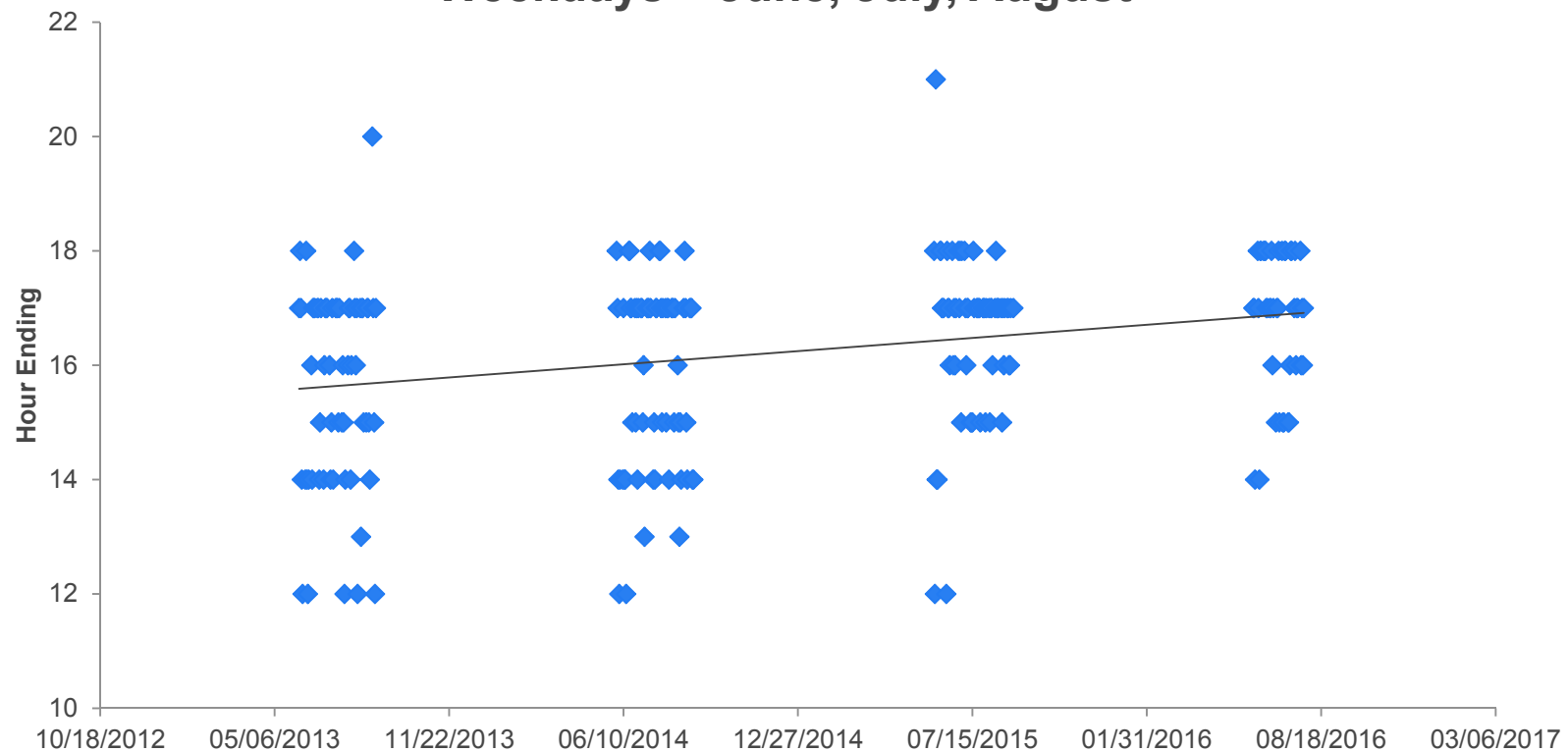
* Does not include Aug. 11

Peaks are getting later in the day



It is becoming increasingly important to develop programs that can have an impact later on the day

Hour When Daily Peak Occurred – Non-Holiday Weekdays – June, July, August



Proposed Demonstration Projects by Sector



PA	Residential	C&I		
		Small	Mid	Large
National Grid	<ul style="list-style-type: none"> WiFi Tstat DLC (Central A/C) 	<ul style="list-style-type: none"> WiFi Tstat DLC 	<ul style="list-style-type: none"> WiFi Tstat DLC 	<ul style="list-style-type: none"> Interruptible load approaches
Eversource (contingent on EEAC and DPU approval)		<ul style="list-style-type: none"> EMS Lighting/HVAC controls WiFi Tstat DLC 	<ul style="list-style-type: none"> Software & Controls Onsite training Process audits Batteries Thermal storage 	<ul style="list-style-type: none"> Software & Controls Onsite training Process audits Real time info Batteries Thermal storage Demand response
CLC	<ul style="list-style-type: none"> WiFi Tstat DLC (Central A/C) Behavioral DLC on DMSHP, window A/C 	<ul style="list-style-type: none"> BTM thermal storage 	<ul style="list-style-type: none"> BTM thermal storage 	
Unitil (contingent on EEAC and DPU approval)	<ul style="list-style-type: none"> Battery Storage 			<ul style="list-style-type: none"> Operations Changes to Reduce Demand

DLC – Direct Load Control
 DMSHP – Ductless Mini-Split Heat Pumps
 BTM- Behind the Meter



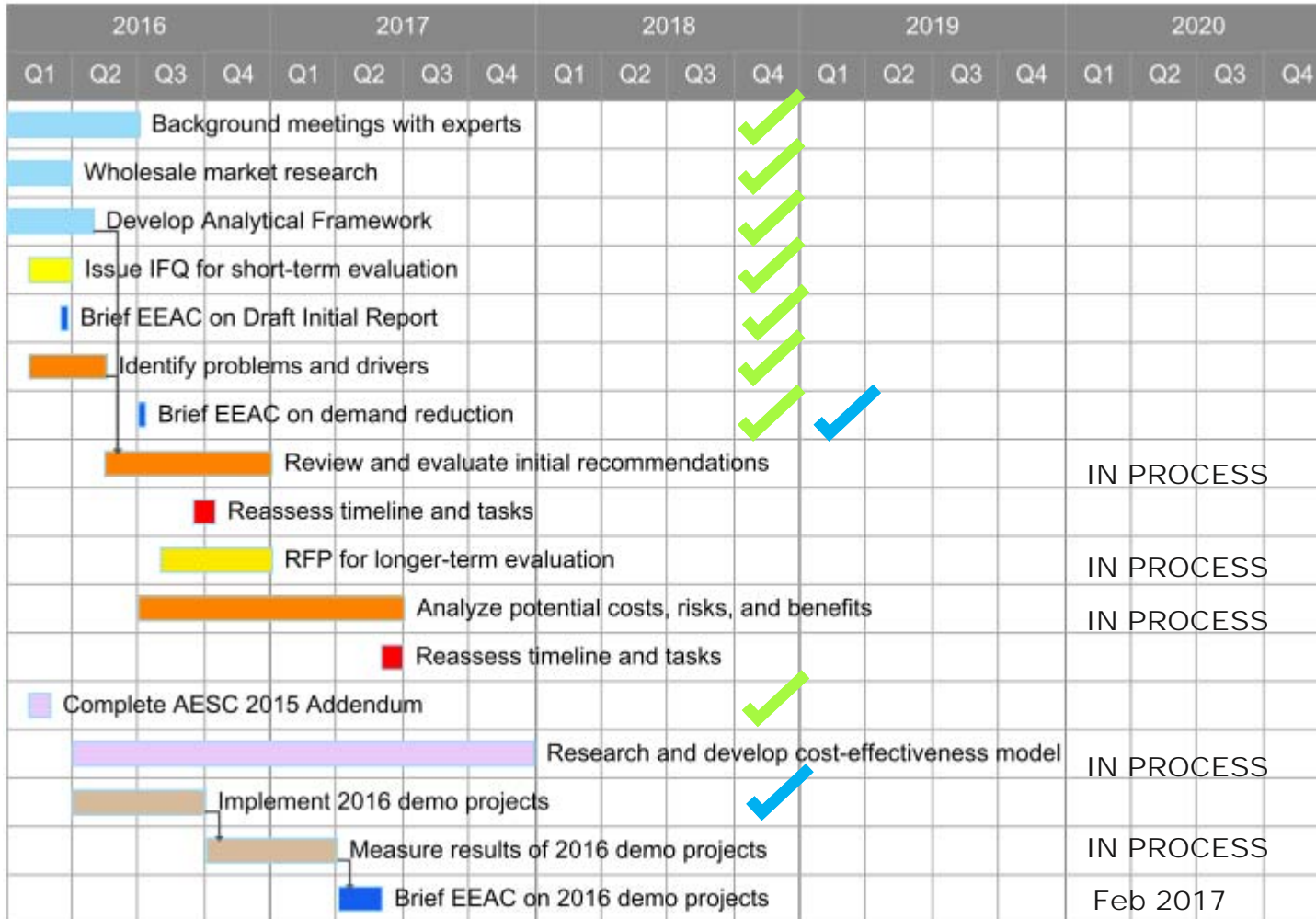
May impact winter load

Demonstration Projects – Coordination



- By coordinating with each other, the PAs are collectively able to deploy and test a slew of technologies in a strategic, low cost manner
 - Together, proposed PA demos cover the residential, and small, medium and large C&I customer sectors.
 - The projects examine direct load, energy system management, battery storage, thermal storage, behavior, training, and permanent load shift approaches.
- PAs have discussed various approaches to demonstration projects, and coordinated with each other to examine various technologies
 - Example: The PAs issued a joint statewide RFI to help assess potential technologies and solutions.
- This collaborative approach allows the PAs to collectively test a variety of potential initiatives and leverage each others results.

Timeline – Progress to Date



Highlights:

- CLC and NGRID completed 2016 demo projects
- PAs released RFI for technology based solutions
- Unitil and Eversource proposed demonstration projects
- Conversations with experts continued

Analytical Framework – Progress to Date and Next Steps



	Research complete	In-field	Next Steps
Identify the problems			
Identify system and customer challenges	✓	IP	Demo projects, research
Determine the specific drivers of those challenges	✓	IP	Demo projects, research
Identify drivers of capacity and energy costs.	✓	n/a	n/a
Determine how changes in ICR, ICAP tags, and demand forecasts impact customers and rates.	✓	n/a	n/a
Evaluate solutions			
Who and where should we target?	✓	IP	Demo projects, other PAs
Is the solution material to overall customer and system issues?	IP	IP	Demo projects
What types of technologies and solutions will customers adopt?	✓	IP	Demo projects
What are the potential impacts and value at the wholesale, distribution, retail, and customer levels?	IP	IP	Demo projects, research, other PAs
What are the potential benefits?	✓	n/a	n/a
Are there timing and/or geographic constraints?	IP	IP	Demo projects, research, other PAs
Analyze costs, risks, and benefits			
How much will this cost?	IP	IP	Demo projects
Are there any unforeseen risks or unintended consequences?	✓	IP	Demo projects, research, other PAs
What additional benefits can be quantified?	IP	IP	Demo projects, other PAs
Are there issues with T&D planning?	✓	IP	Show persistence