TOU Rate Design Pilot Update

Lon Huber

Strategen Consulting

September 8, 2017

Agenda

1. Stakeholder and customer feedback to date
2. Findings from data analytics
3. Time-of-use rate design methodology
4. Draft of rate design for stakeholder feedback
5. Potential pilot program design elements

Stakeholder & Customer Feedback to Date

Summary from Stakeholder Meetings

Suggestions for Pilot Objectives from Stakeholders
• Identify how to provide adequate price signals to encourage customers to shift load
• Identify what outreach methods are most effective at encouraging different customer segments to shift load
• Understand to what extent particular customer groups had the ability to respond and how much money they saved or lost
• Understand how specific practices increased or decreased customer participation and satisfaction
• Understand how TOU might facilitate the cost-effective integration of renewables

Summary from Stakeholder Meetings

Pilot Design Suggestions from Stakeholders
• Indemnify low-income customers
• Use an opt-out approach
• Provide rates that accurately reflect the costs of energy
• Balance precision and practicality, both for the utility and for customers
• Give customers adequate tools to access and understand their usage data

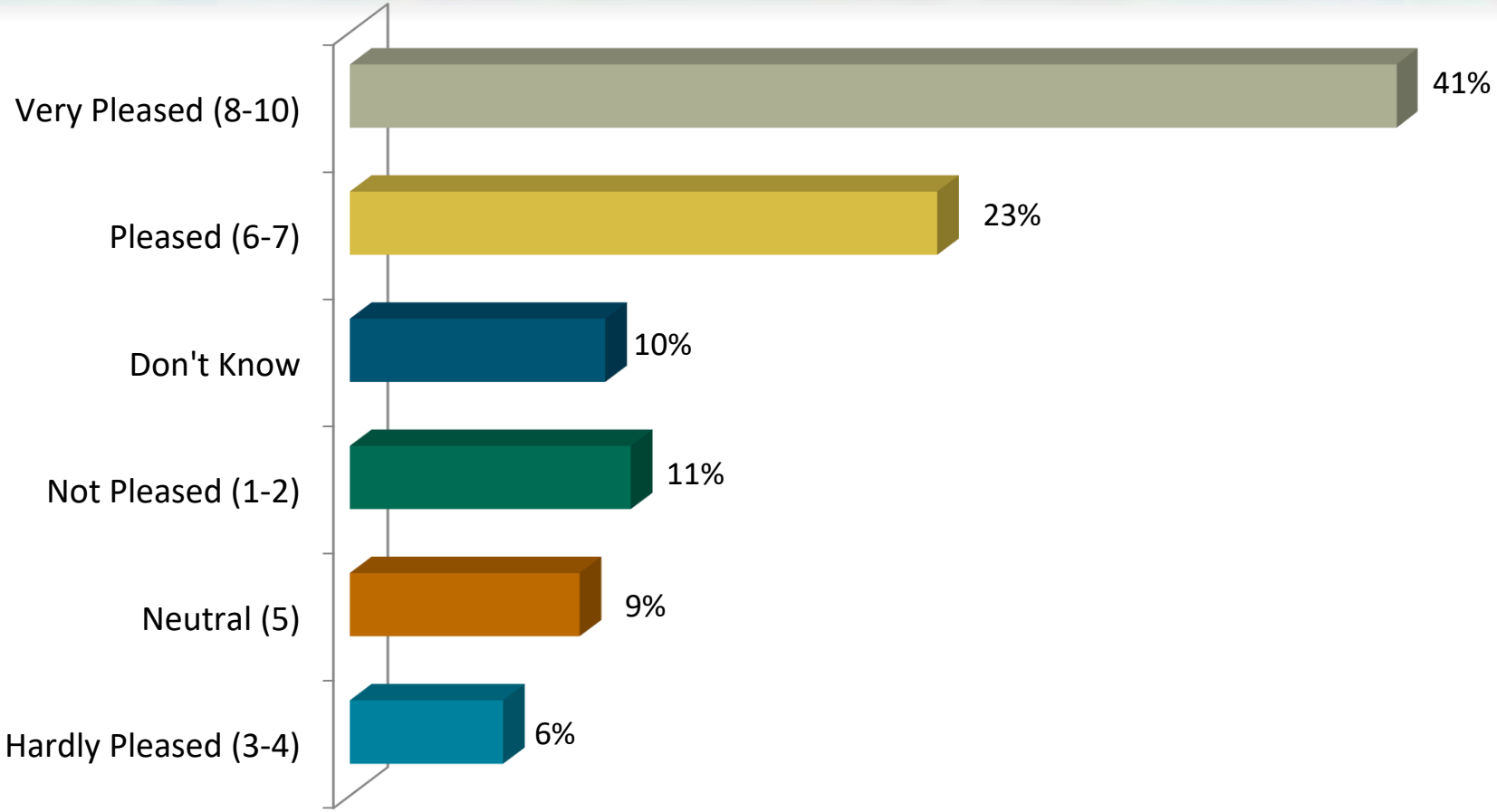
Summary from Stakeholder Meetings

Suggested Goals for TOU Rate from Stakeholders
• Reduce peak demand-related system costs to mitigate need for future investments in the system
• Increase customer satisfaction
• Increase customer participation
• Shift customer energy use to overnight periods when wind generation is highest
• Promote conservation to the maximum reasonable extent

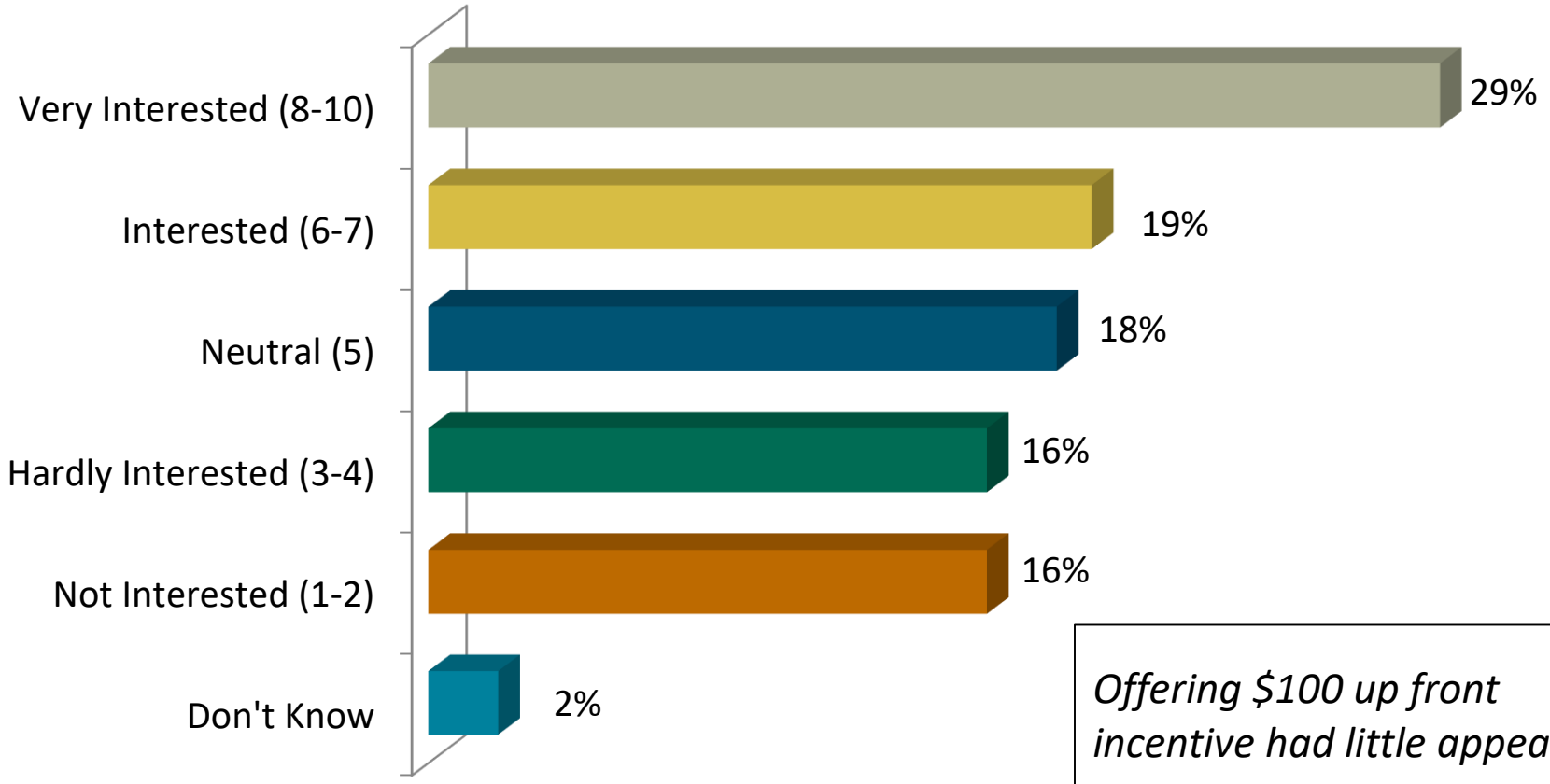
Summary of Customer Survey

- Objectives
  - Baseline customer knowledge
  - Rate Pilot interest
  - Communications
- Methodology
  - Online survey fielded Jul 25 – Aug 4 and Aug 22 – Sept 5
  - Random sample of 26,000 residents with active email accounts
  - 6% response rate (typical response rate is 2%)

Customer Interest - Q. How Would You Feel If You Were Placed on a Trial "Peak & Off-Peak" Program That Gave You the Option to Return to Your Normal Plan at Any Time?



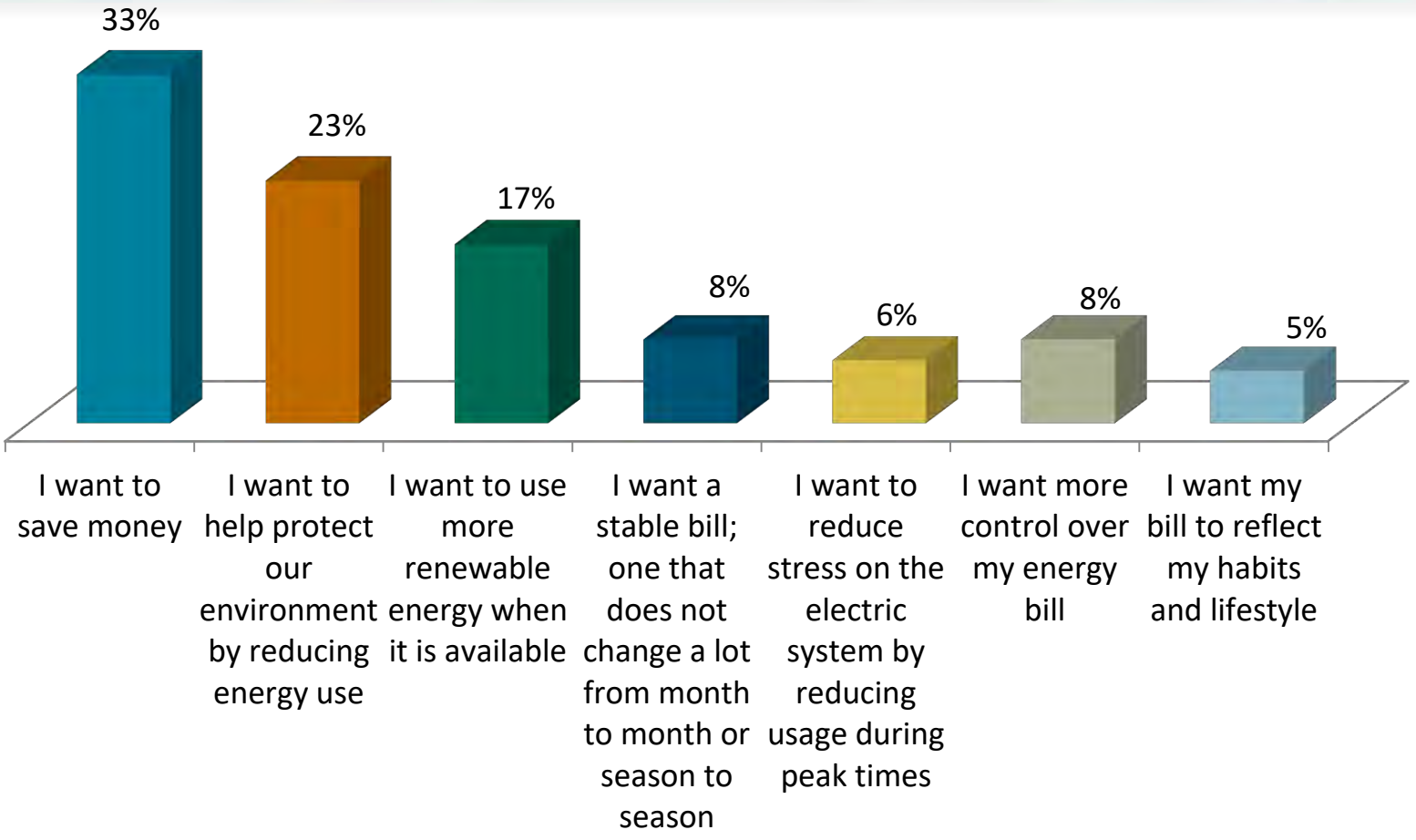
Among Customers Neutral or Negative Toward a Peak Program, Offering a Guaranteed Lower Rate Increases Interest



Offering $100 up front incentive had little appeal

Q. If Xcel Energy guaranteed the lower rate of either your "Peak & Off Peak" pricing or your normal pricing (in other words, you're no worse off) how interested would you be in the pilot program?

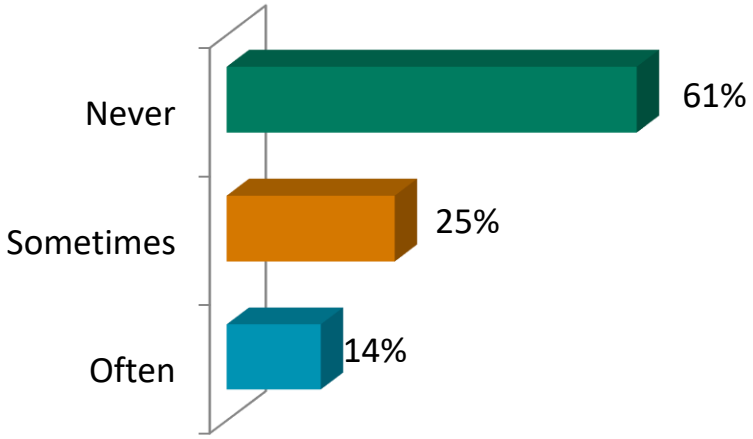
Saving Money & Protecting Environment Are Top Drivers to Using Less Energy During Peak Periods



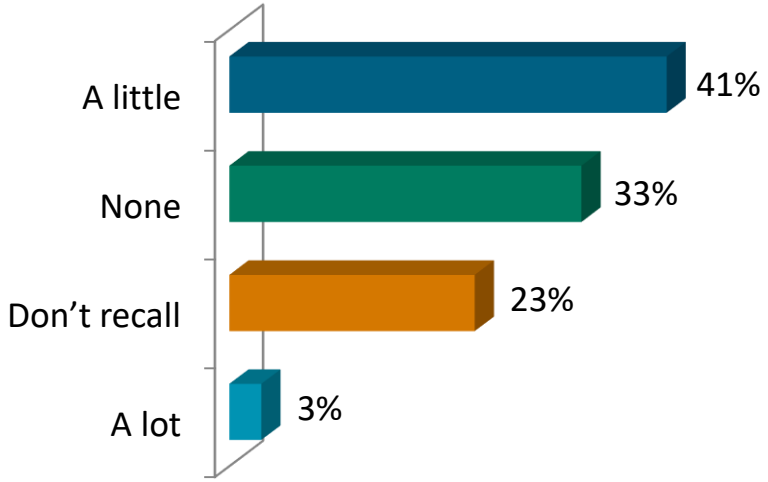
Q. Which of the following statements best describes your current attitude toward reducing your energy bill?

A Portion of Customers Have Already Tried to Shift Electric Use to a Different Time of Day

39% of Customers Have Tried to Shift Electric Use to a Different Time of Day



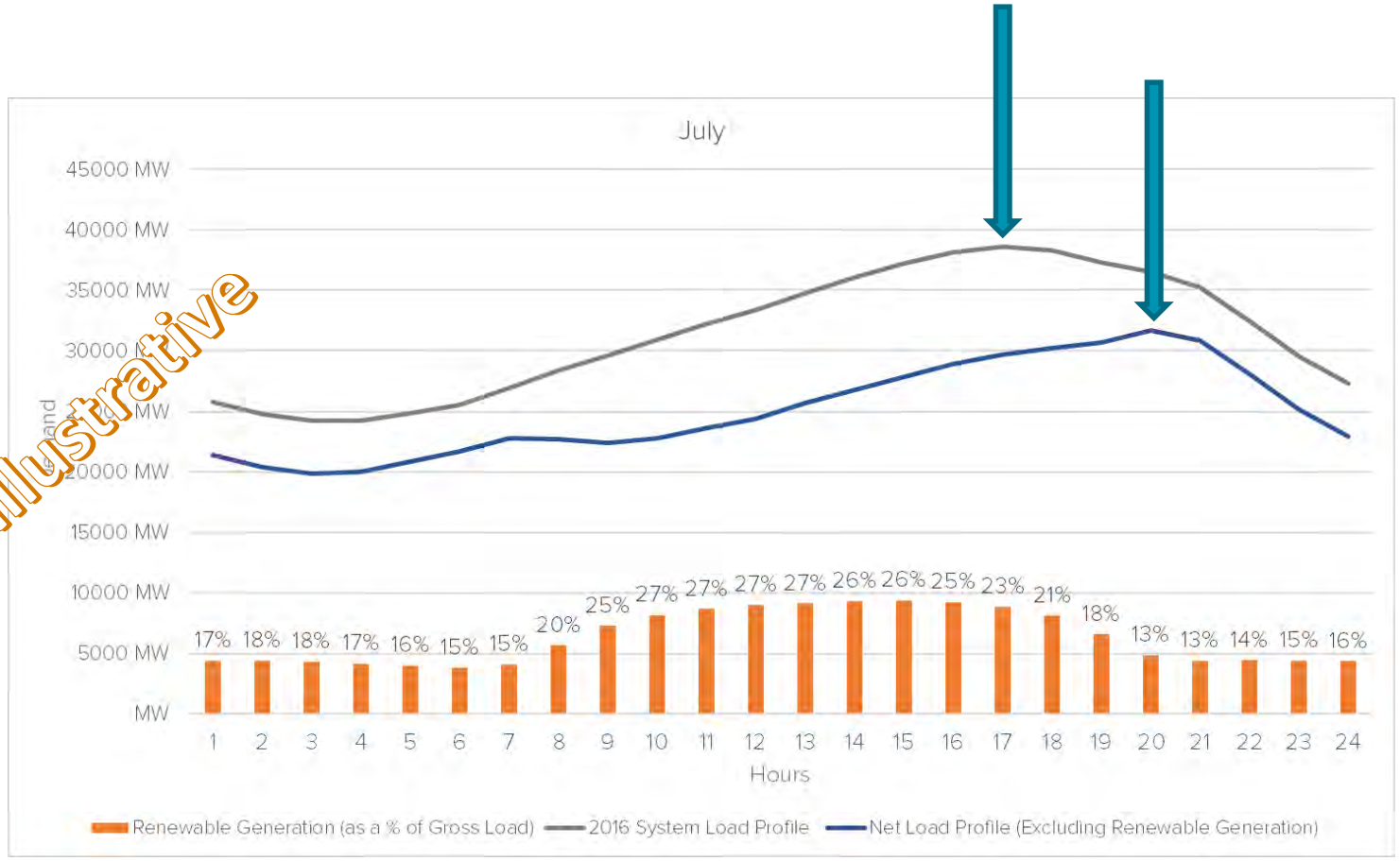
Among Those Who Shifted Use, Most Could Not Recall Savings or Had No Savings



Q. In the past, have you tried to save money on your bill by shifting electricity use to a different time of day, such as evenings?

Findings from Data Analytics

Solving for Net Load Peak

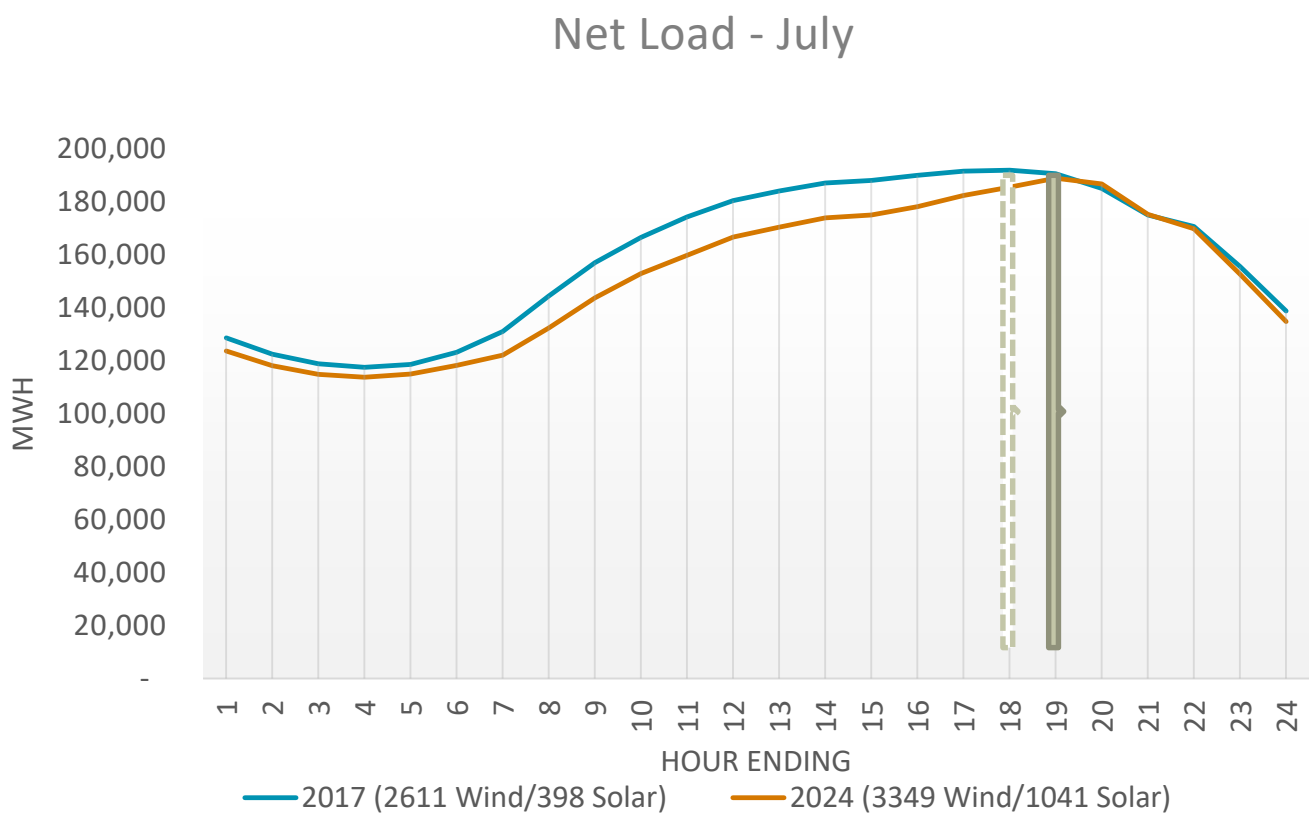


Scenarios Modeled

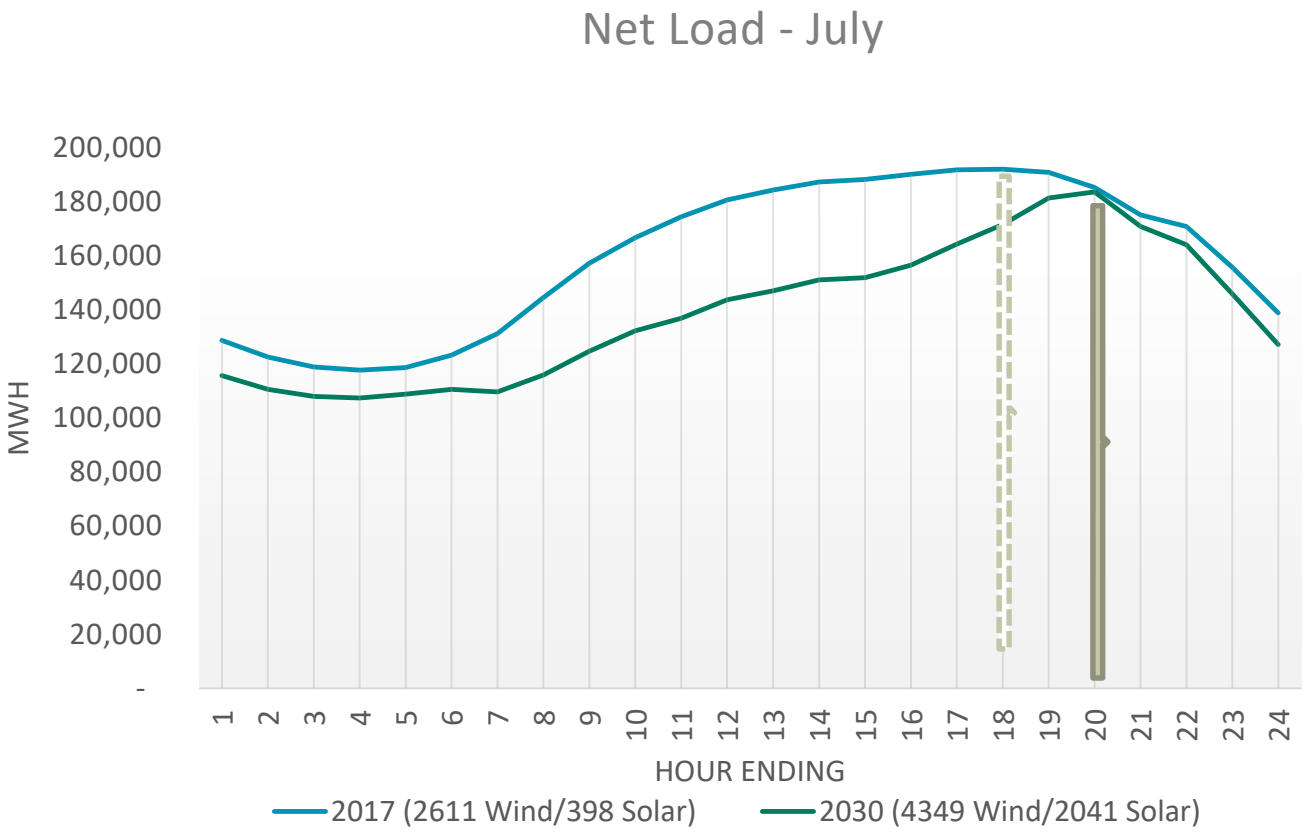
	2017	2024		2030
Wind (MW)	2,611	3,349	+ 1000 MW	4,349
Solar (MW)	398	1,041	+ 1000 MW	2,041

IRP case accounts for load growth and retirements

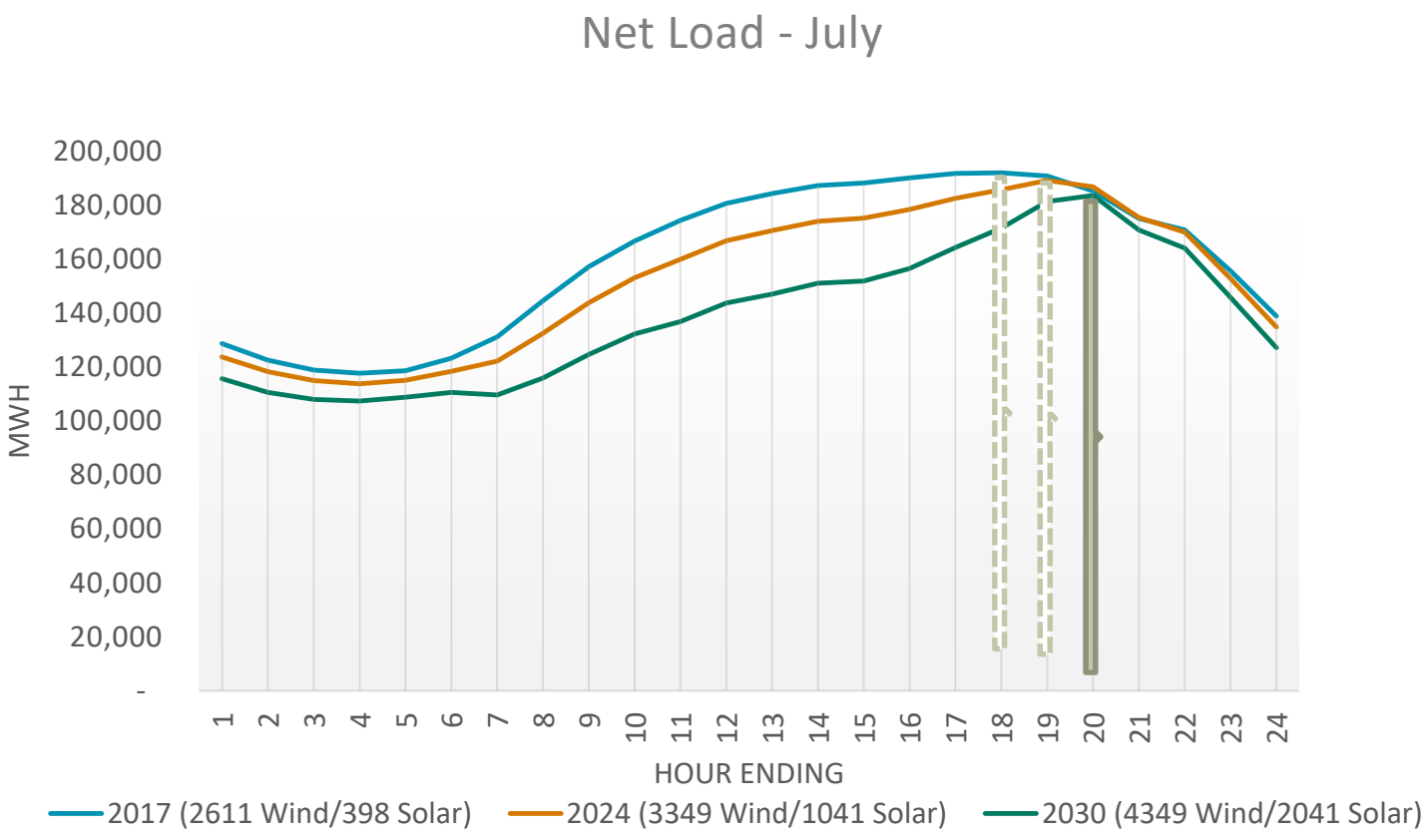
Results - 2024



Results - 2030



Results: 2017-2030



Today

2017 (2611 Wind/398 Solar)

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
1	105,641	98,195	103,513	92,598	87,901	108,816	128,641	126,480	90,198	95,807	84,214	108,912
2	101,986	94,650	101,398	89,331	84,514	103,658	122,522	120,558	87,554	93,294	81,340	105,657
3	99,381	91,990	101,084	87,152	82,993	100,452	118,847	116,450	85,765	90,610	80,824	103,753
4	98,186	90,755	101,878	85,242	82,554	98,913	117,588	114,130	85,670	88,997	80,827	103,471
5	100,443	91,851	104,753	85,706	84,798	100,809	118,601	114,731	87,571	90,937	83,218	105,113
6	108,912	98,392	113,028	92,209	89,130	105,239	123,188	120,137	92,650	97,371	91,094	112,664
7	123,137	110,809	126,382	99,830	95,520	113,004	131,077	127,181	104,266	108,081	103,448	125,769
8	132,876	116,780	131,089	105,090	106,179	124,439	144,545	138,529	115,818	114,693	111,266	135,969
9	134,285	114,474	132,462	107,713	114,842	132,648	157,091	150,994	126,615	118,795	111,612	136,185
10	136,414	114,977	132,781	106,246	118,183	139,052	166,625	160,068	133,968	121,067	111,864	137,320
11	137,734	116,894	133,678	104,786	123,035	146,432	174,313	168,580	141,616	122,076	114,093	139,226
12	136,787	116,189	132,522	104,070	126,429	149,839	180,518	174,766	145,718	121,818	114,493	138,489
13	135,962	115,070	130,791	104,161	126,494	151,529	184,186	178,670	148,963	121,229	113,830	136,029
14	134,657	114,459	129,194	104,157	124,807	152,720	187,195	182,071	149,295	120,232	113,296	133,355
15	132,456	113,254	125,892	104,287	123,328	151,457	188,149	183,674	149,487	119,632	111,947	131,159
16	131,054	112,990	122,767	104,220	123,398	151,589	190,028	185,013	148,348	119,790	113,209	130,334
17	135,648	115,801	122,694	104,663	122,452	151,184	191,662	186,369	148,184	122,790	117,575	138,303
18	145,749	124,383	125,576	106,515	122,174	150,393	191,976	186,463	148,746	128,327	120,922	148,090
19	145,448	130,092	130,289	109,769	122,245	148,798	190,699	183,802	143,488	128,806	119,851	145,962
20	141,809	128,382	131,240	112,027	121,101	148,727	185,187	176,763	140,043	126,858	116,965	142,906
21	137,740	124,775	129,473	115,705	122,694	146,688	175,049	172,243	136,034	121,277	113,147	139,009
22	131,555	119,155	123,711	111,865	121,199	145,655	170,741	165,625	122,002	114,437	107,470	132,963
23	121,579	110,317	115,182	103,619	107,896	133,297	155,574	149,823	105,721	106,341	98,715	123,721
24	113,264	102,717	107,345	97,036	94,379	118,676	138,842	134,606	94,762	98,364	90,483	113,551

Peak Hour

Green is low load conditions

2024 (28% RE)

2024 (3349 Wind/1041 Solar)	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
1	94,265	93,42	21	75,735	72,914	102,062	123,712	118,667	81,480	86,519	74,053	102,770
2	90,331	89,854	[illegible]	72,298	70,455	97,297	118,170	113,561	79,675	84,541	71,210	99,788
3	87,817	87,053	89,899	69,945	69,724	94,551	114,926	109,996	78,266	81,965	71,094	97,974
4	86,410	85,683	87,730	67,535	69,497	92,995	113,774	107,938	78,535	80,107	71,102	97,831
5	88,812	86,555	90,634	67,680	71,759	94,704	114,969	108,498	80,638	82,249	73,550	99,157
6	98,221	93,301	99,571	74,063	73,661	97,010	118,322	112,949	85,297	88,998	81,703	106,435
7	114,490	106,248	114,153	79,027	75,510	100,836	122,129	116,230	95,603	99,863	94,689	118,842
8	125,470	111,057	115,696	82,239	84,829	110,161	132,449	124,309	104,622	104,046	102,454	128,786
9	124,152	103,011	114,658	84,280	94,108	117,290	143,826	135,531	114,163	105,647	99,002	125,923
10	124,055	102,192	113,546	81,851	97,506	123,759	152,982	144,133	120,600	105,994	97,483	125,514
11	125,435	104,752	114,764	79,453	104,094	131,891	159,906	153,157	127,870	106,794	99,674	128,081
12	123,581	103,318	112,855	77,936	108,632	136,044	166,771	159,619	132,286	105,986	99,620	127,740
13	122,909	101,382	110,058	77,988	109,489	138,098	170,559	163,411	135,798	105,562	98,894	124,871
14	121,227	100,624	108,194	77,885	107,393	139,450	173,991	167,310	135,208	104,365	98,053	121,002
15	117,784	98,784	103,838	78,120	104,862	138,286	175,100	169,134	135,316	103,974	96,986	118,114
16	116,028	98,861	100,542	78,713	105,286	139,513	178,277	171,083	134,258	105,375	100,139	117,482
17	125,286	104,068	101,994	81,381	105,055	140,516	182,469	174,573	135,935	111,772	109,351	129,587
18	139,984	118,651	108,854	86,771	106,685	141,483	185,629	177,464	140,856	122,741	113,683	141,050
19	139,769	126,271	117,969	94,318	109,635	142,323	189,039	178,015	138,002	123,879	111,738	138,916
20	135,480	124,524	119,514	97,793	109,903	145,093	186,774	171,821	134,053	120,804	108,360	135,831
21	130,747	120,910	117,794	102,828	111,540	142,624	175,382	166,892	128,595	113,881	104,238	131,946
22	123,445	115,017	110,643	97,779	109,311	141,168	169,923	158,706	113,026	106,409	98,240	125,732
23	111,997	105,772	100,819	87,855	93,237	127,642	152,777	141,325	96,049	97,789	89,009	116,789
24	102,994	98,137	92,276	80,311	78,755	112,071	134,822	125,698	85,160	89,261	80,337	106,827

Peak Hour

Green is low load conditions

2030 (36% RE)

2030 (4349 Wind/2041 Solar)	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
1	83,845	85,828	77,704	66,598	63,411	96,403	115,614	113,885	70,070	77,822	60,024	93,867
2	79,827	82,158	76,172	63,172	61,046	91,649	110,486	108,812	68,944	76,508	57,391	91,347
3	77,102	79,181	76,620	60,944	60,881	89,021	107,868	105,272	67,918	74,001	57,663	89,823
4	75,302	77,481	77,782	57,953	60,951	87,250	107,316	103,154	68,623	71,723	57,735	89,737
5	77,925	77,911	80,828	57,672	63,477	88,943	108,696	103,588	71,058	73,918	60,283	91,072
6	87,992	84,379	89,922	63,667	62,782	88,749	110,555	107,407	75,196	80,435	68,641	98,445
7	105,218	97,132	104,289	63,540	58,006	87,419	109,553	106,034	83,700	90,194	81,866	110,735
8	[illegible]97	99,732	100,474	61,603	63,139	93,007	115,861	109,384	88,552	89,357	89,262	120,787
9	1[illegible]	83,303	95,631	60,261	70,291	97,252	124,638	117,874	95,713	87,124	80,445	113,356
10	107,28[illegible]	[illegible]61	92,125	54,553	71,959	102,442	132,155	124,182	99,717	84,467	76,047	110,139
11	108,050	[illegible]	93,534	49,712	78,637	110,241	136,822	131,701	105,628	84,727	78,311	113,331
12	104,855	81,1[illegible]	[illegible]30	46,619	83,985	114,104	143,658	137,337	110,374	82,967	77,331	113,264
13	104,563	78,132	[illegible]44	46,941	85,611	115,703	147,017	140,407	114,148	82,915	76,649	109,920
14	102,303	77,415	83,674	47,230	82,840	116,778	150,965	144,592	112,704	81,651	75,588	104,585
15	97,608	74,962	78,181	48,544	80,169	115,325	151,873	146,884	113,080	82,065	75,240	101,072
16	95,834	75,976	75,130	51,248	82,917	118,797	156,463	150,178	112,574	85,574	81,175	100,908
17	111,229	85,052	79,469	57,902	85,278	122,377	164,190	157,584	117,816	97,183	96,704	118,693
18	129,932	107,896	92,397	68,656	91,107	126,819	171,418	165,922	129,840	115,297	101,551	132,079
19	129,574	117,130	107,829	82,998	99,717	132,351	181,224	172,443	130,773	115,967	98,777	129,665
20	125,167	115,552	109,582	88,017	103,003	140,129	183,579	168,612	125,645	110,882	95,211	126,523
21	120,615	112,241	107,507	92,730	104,384	138,066	170,767	162,760	118,305	103,076	90,975	122,533
22	113,516	106,663	99,210	87,625	101,976	136,464	163,989	153,947	102,026	95,642	84,792	116,224
23	101,856	97,552	89,019	77,887	84,576	122,434	145,735	136,664	84,364	87,680	75,134	107,593
24	93,205	90,327	80,352	71,095	69,123	106,374	127,084	120,784	73,356	79,525	66,357	97,918

Peak Hour

Green is low load conditions

Net Load Peak in 2024

2024 (3349 Wind/1041 Solar)	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
1	94,265	93,423	88,921	75,735	72,914	102,062	123,712	118,667	81,480	86,519	74,053	102,770
2	90,331	89,854	87,045	72,298	70,455	97,297	118,170	113,561	79,675	84,541	71,210	99,788
3	87,817	87,053	86,899	69,945	69,724	94,551	114,926	109,996	78,266	81,965	71,094	97,974
4	86,410	85,683	87,730	67,535	69,497	92,995	113,774	107,938	78,535	80,107	71,102	97,831
5	88,812	86,555	90,634	67,680	71,759	94,704	114,969	108,498	80,638	82,249	73,550	99,157
6	98,221	93,301	99,571	74,063	73,661	97,010	118,322	112,949	85,297	88,998	81,703	106,435
7	114,490	106,248	114,153	79,027	75,510	100,836	122,129	116,230	95,603	99,863	94,689	118,842
8	125,470	111,057	115,696	82,239	84,829	110,161	132,449	124,309	104,622	104,046	102,454	128,786
9	124,152	103,011	114,658	84,280	94,108	117,290	143,826	135,531	114,163	105,647	99,002	125,923
10	124,055	102,192	113,546	81,851	97,506	123,759	152,982	144,133	120,600	105,994	97,483	125,514
11	125,435	104,752	114,764	79,453	104,094	131,891	159,906	153,157	127,870	106,794	99,674	128,081
12	123,581	103,318	112,855	77,936	108,632	136,044	166,771	159,619	132,286	105,986	99,620	127,740
13	122,909	101,382	110,058	77,988	109,489	138,098	170,559	163,411	135,798	105,562	98,894	124,871
14	121,227	100,624	108,194	77,885	107,393	139,450	173,991	167,310	135,208	104,365	98,053	121,002
15	117,784	98,784	103,838	78,120	104,862	138,286	175,100	169,134	135,316	103,974	96,986	118,114
16	116,028	98,861	100,542	78,713	105,286	139,513	178,277	171,083	134,258	105,375	100,139	117,482
17	125,286	104,068	101,994	81,381	105,055	140,516	182,469	174,573	135,935	111,772	109,351	129,587
18	139,984	118,651	108,854	86,771	106,685	141,483	185,629	177,464	140,856	122,741	113,683	141,050
19	139,769	126,271	117,969	94,318	109,635	142,323	189,039	178,015	138,002	123,879	111,738	138,916
20	135,480	124,524	119,514	97,793	109,903	145,093	186,774	171,821	134,053	120,804	108,360	135,831
21	130,747	120,910	117,794	102,828	111,540	142,624	175,382	166,892	128,595	113,881	104,238	131,946
22	123,445	115,017	110,643	97,779	109,311	141,168	169,923	158,706	113,026	106,409	98,240	125,732
23	111,997	105,772	100,819	87,855	93,237	127,642	152,777	141,325	96,049	97,789	89,009	116,789
24	102,994	98,137	92,276	80,311	78,755	112,071	134,822	125,698	85,160	89,261	80,337	106,827

Takeaways

1. Early AM hours will be low load throughout the year – offering a consistent “super-off peak” period
2. Later evening hours remain regularly high throughout the year - offering a consistent on-peak period
3. Spring months during mid-day hours will be highly saturated with solar energy
   - Some hours experience over a 50% reduction in load vs. today
4. Delta between off peak and peak marginal energy prices ~ 2x

Renewable Energy on Margin - 2016

MISO North Region – Hours 1-6

Hours 1-6	Fuel Type				
Month	Coal	Gas	Hydro	Other	Wind
1.00	57.15%	20.14%	0.00%	0.00%	23%
2.00	36.41%	15.21%	0.00%	0.00%	48%
3.00	27.97%	15.52%	0.00%	0.00%	57%
4.00	17.60%	13.61%	0.00%	0.00%	69%
5.00	19.32%	12.85%	0.05%	0.00%	68%
6.00	59.60%	12.80%	0.00%	0.00%	28%
7.00	63.57%	17.79%	0.00%	0.00%	19%
8.00	53.86%	25.57%	0.00%	0.00%	21%
9.00	56.46%	13.92%	0.00%	0.00%	30%
10.00	56.10%	6.86%	0.00%	0.00%	37%
11.00	38.83%	16.19%	0.00%	0.00%	45%
12.00	45.18%	4.98%	0.00%	0.08%	50%
Grand Total	42.44%	14.63%	0.01%	0.01%	42.92%

Top Hour Ranking in July - 2024

Hour	Pctile	Rank
1	56.3%	20
2	54.5%	24
3	55.9%	21
4	55.6%	22
5	55.3%	23
6	57.9%	19
7	61.3%	17
8	68.7%	16
9	75.7%	14
10	80.6%	13
11	86.2%	11
12	91.9%	9
13	92.4%	8
14	93.4%	7
15	94.6%	6
16	97.5%	5
17	99.8%	3
18	100.0%	1
19	99.9%	2
20	97.6%	4
21	90.0%	10
22	85.0%	12
23	72.8%	15
24	59.6%	18

6 hours below 58% of peak hour

5 hours within 97.5% of peak hour

Based on top 6 weekdays in July.

Top Hours in July - 2016

Hour	Net Load
1	62.8%
2	59.3%
3	57.2%
4	56.0%
5	56.6%
6	60.5%
7	66.8%
8	72.8%
9	76.4%
10	80.0%
11	84.4%
12	88.0%
13	91.5%
14	95.4%
15	98.0%
16	99.9%
17	100.0%
18	98.9%
19	96.8%
20	94.4%
21	92.5%
22	91.0%
23	84.7%
24	78.4%

6 hours below 60.5% of peak hour

5 hours within 96.8% of peak hour

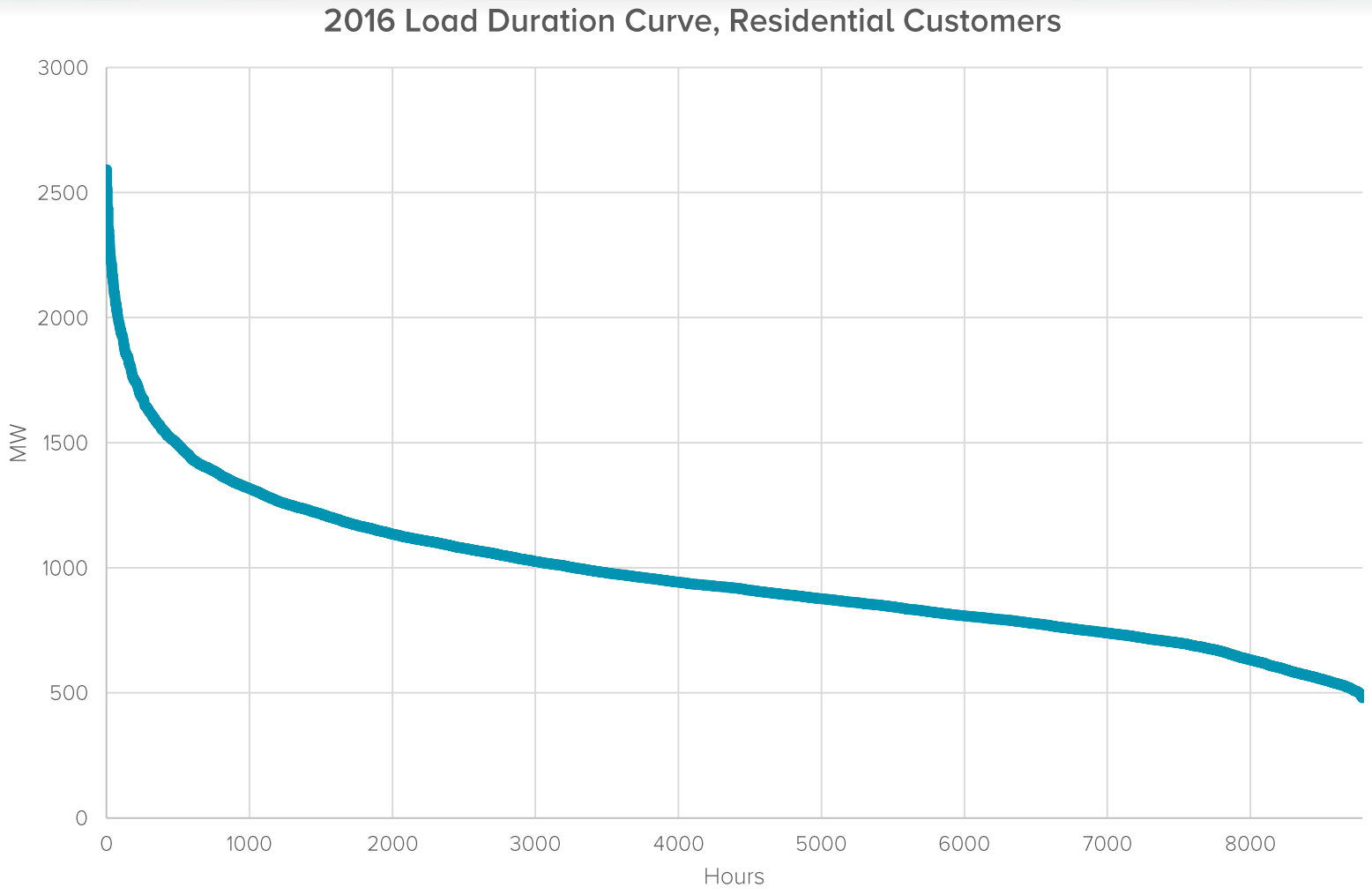
Based on top day in July.

How Does Five Hours Compare?

- Hawaii – (5-10 PM)
- Arizona IOUs – (3-8 PM)
- California IOUs – (4-9 PM- SDG&E)

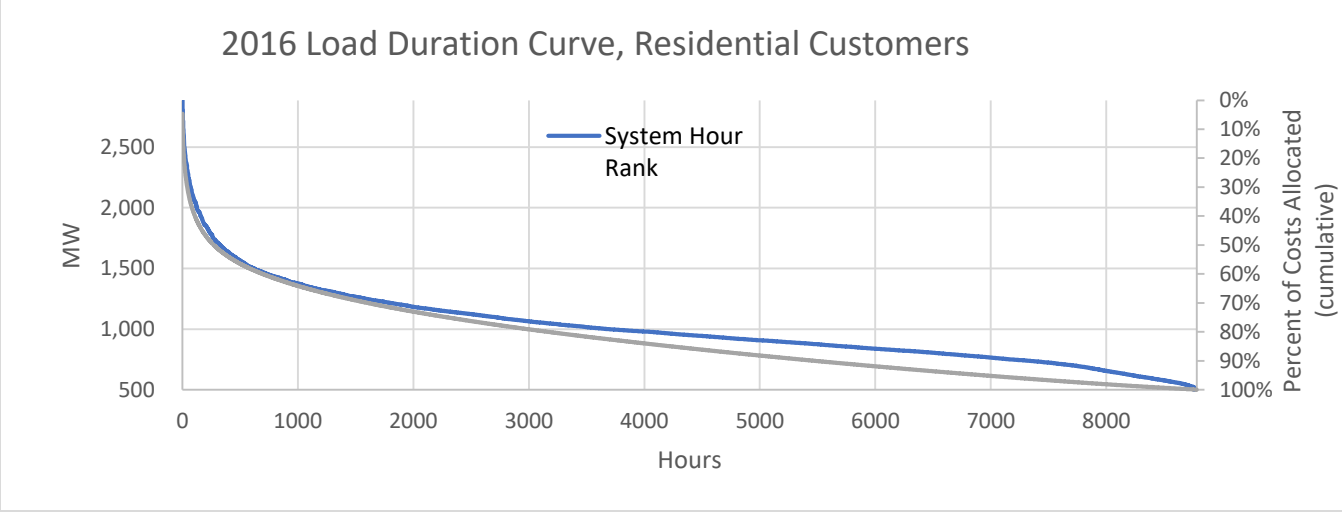
Time-of-Use Rate Design Methodology

NSP Load Duration Curve



Method

- "Cost Duration Method"
  - Uses net system load in 2024 to assign production and demand related costs over 8760 hours based on the incremental load level of each ranked hour
  - Residential load is used for distribution related costs
  - Non demand related costs are not included in allocation
- Revenue neutral for the average residential load profile



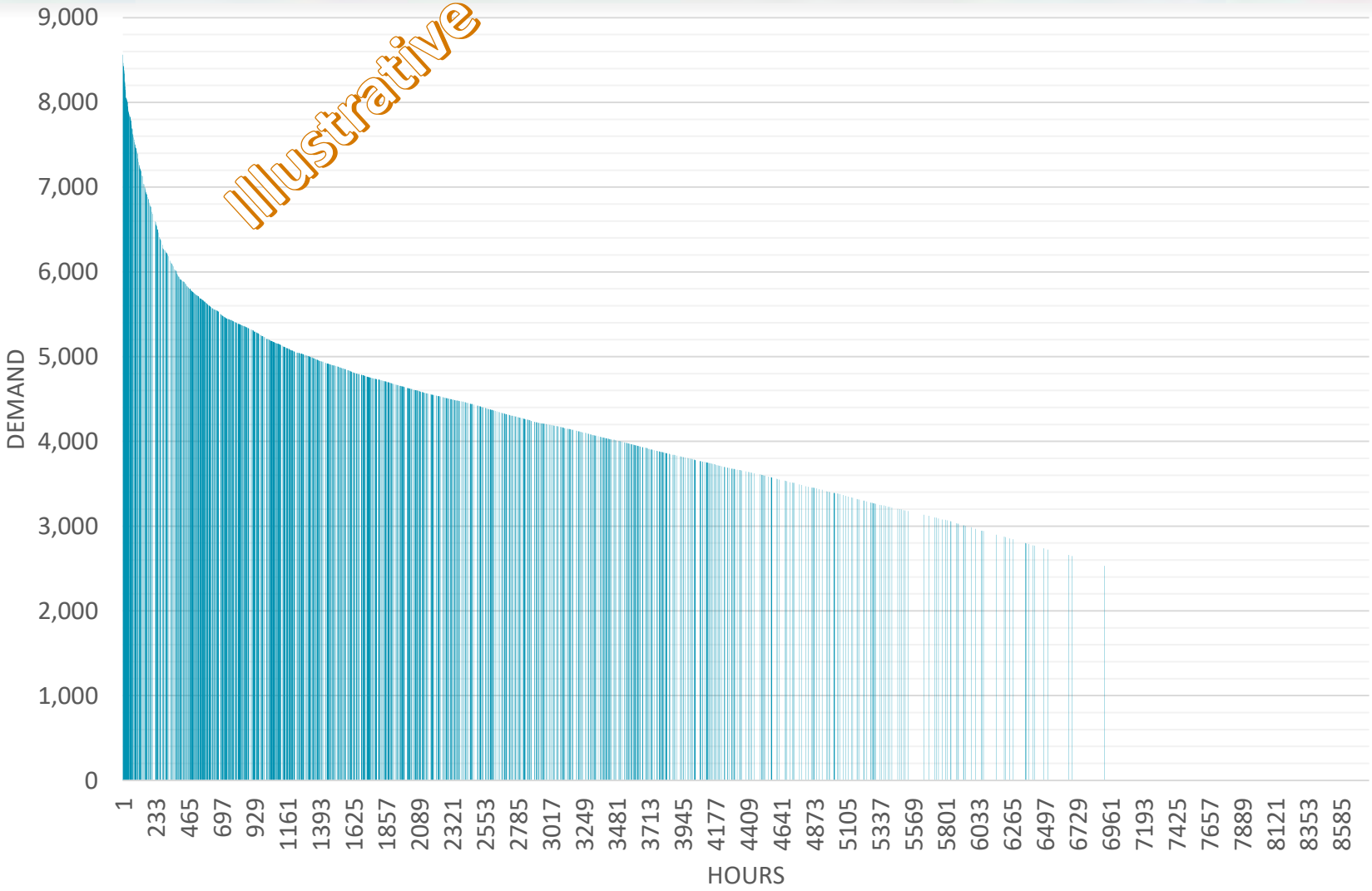
Lauriol Method for Allocating Costs

Xcel Energy®

Illustrative

Hour (Rank)	Load	Allocated Cost, % of Rev Req (Lauriol Method)	Cumulative
1	2591	4.11%	4.11%
2	2527	1.65%	5.76%
3	2515	1.42%	7.19%
4	2515	1.41%	8.60%
…	…	…	…
8757	483.4	0.002%	99.994%
8758	482.9	0.002%	99.996%
8759	480.2	0.002%	99.998%
8760	479.8	0.002%	100%

Example TOU Allocation for Demand Costs



Draft of Rate Design for Stakeholder Feedback

Disclaimer

- Rates and program design are not final – intentionally.
  - Refinements are on going
  - Additional research is underway
  - Feedback is needed

Grounding the Price Signals

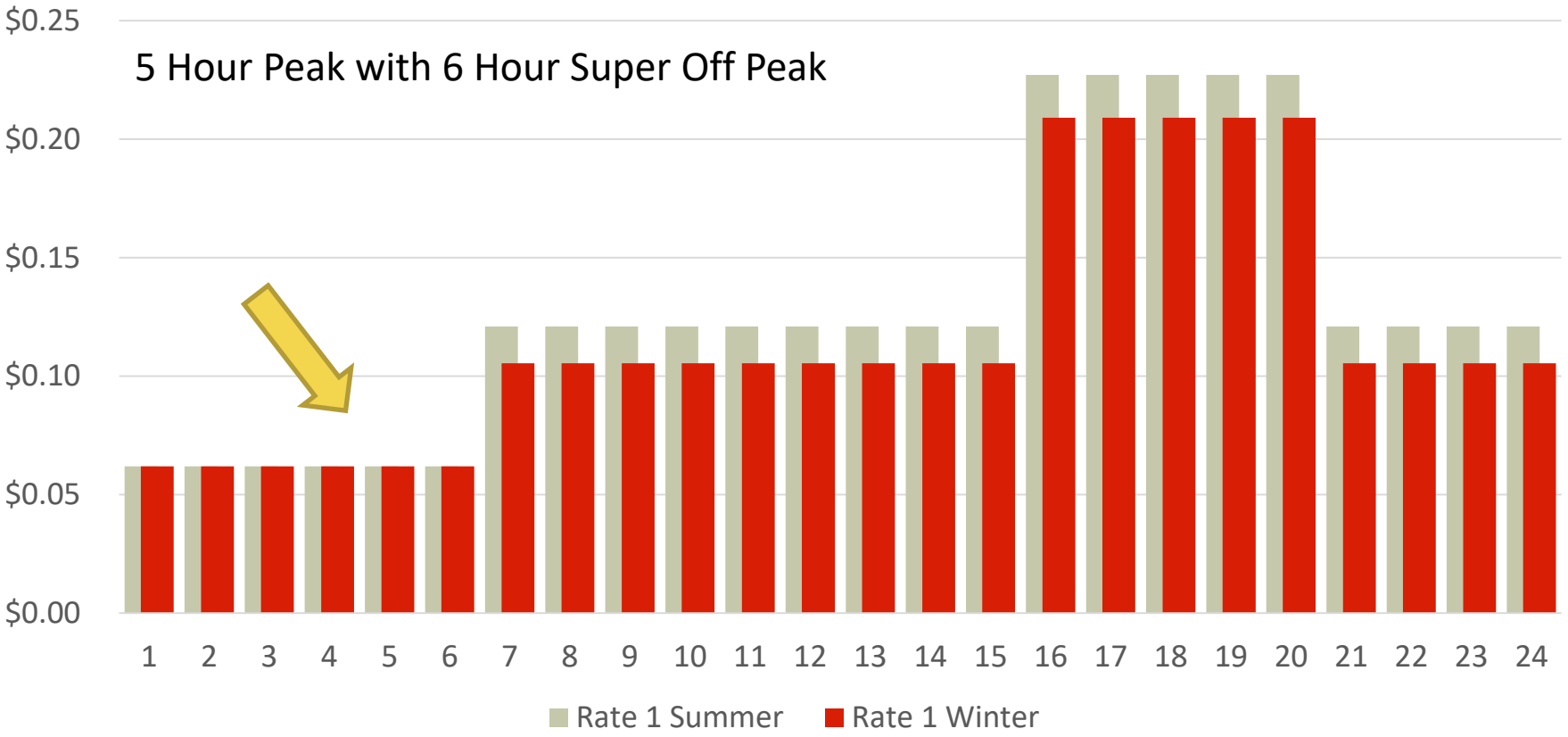
- Five hour peak duration 14.5% capacity factor
- The LCOE of a new frame CT with an equal capacity factor to a five hour on-peak weekday TOU rate is 13.4 cents/kWh

+ T&D costs ~6.7 cents/kWh (adjusted from ~2 cents/kWh)*

~20 cents/kWh

*T&D related expenses are location specific particularly for distribution. Demand related network infrastructure still must be there to handle the peak hours 5% from the top peak hour

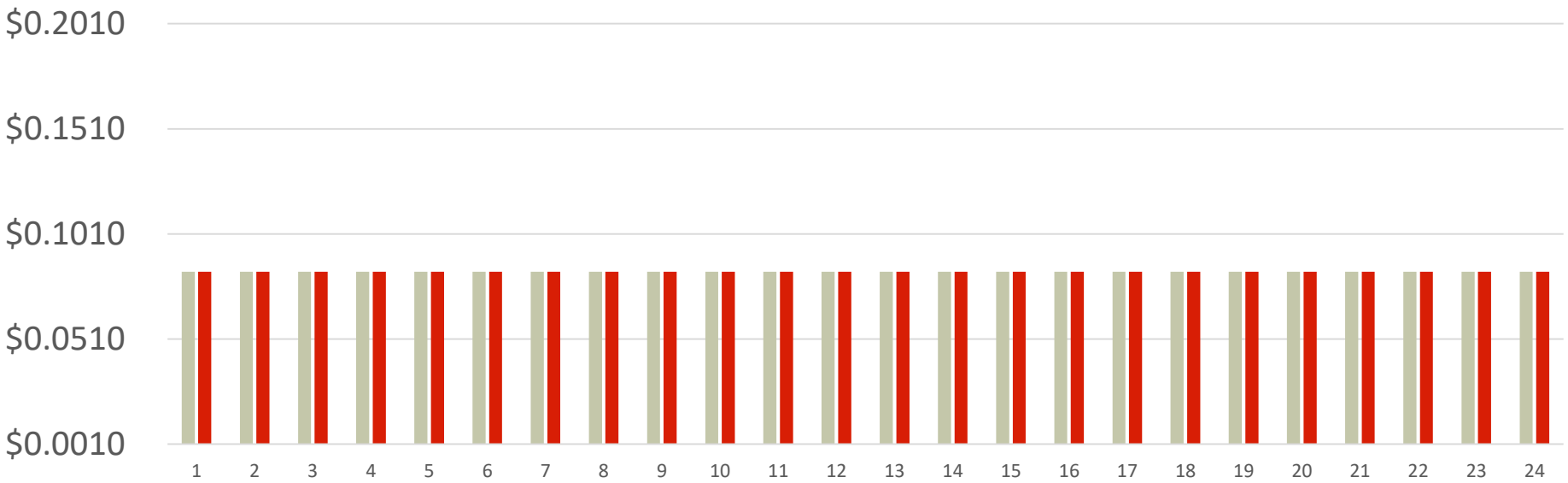
Base Rate Design



		Summer	Winter
On-Peak	3:00 - 8:00 PM	$0.22	$0.20
Off-Peak	6:00 AM – 3:00 PM & 8:00 – 11:59 PM	$0.115	$0.11
Super-Off	12:00 – 6:00 AM	$0.06	$0.06

- **Weekends and holidays are only off-peak and super-off-peak**

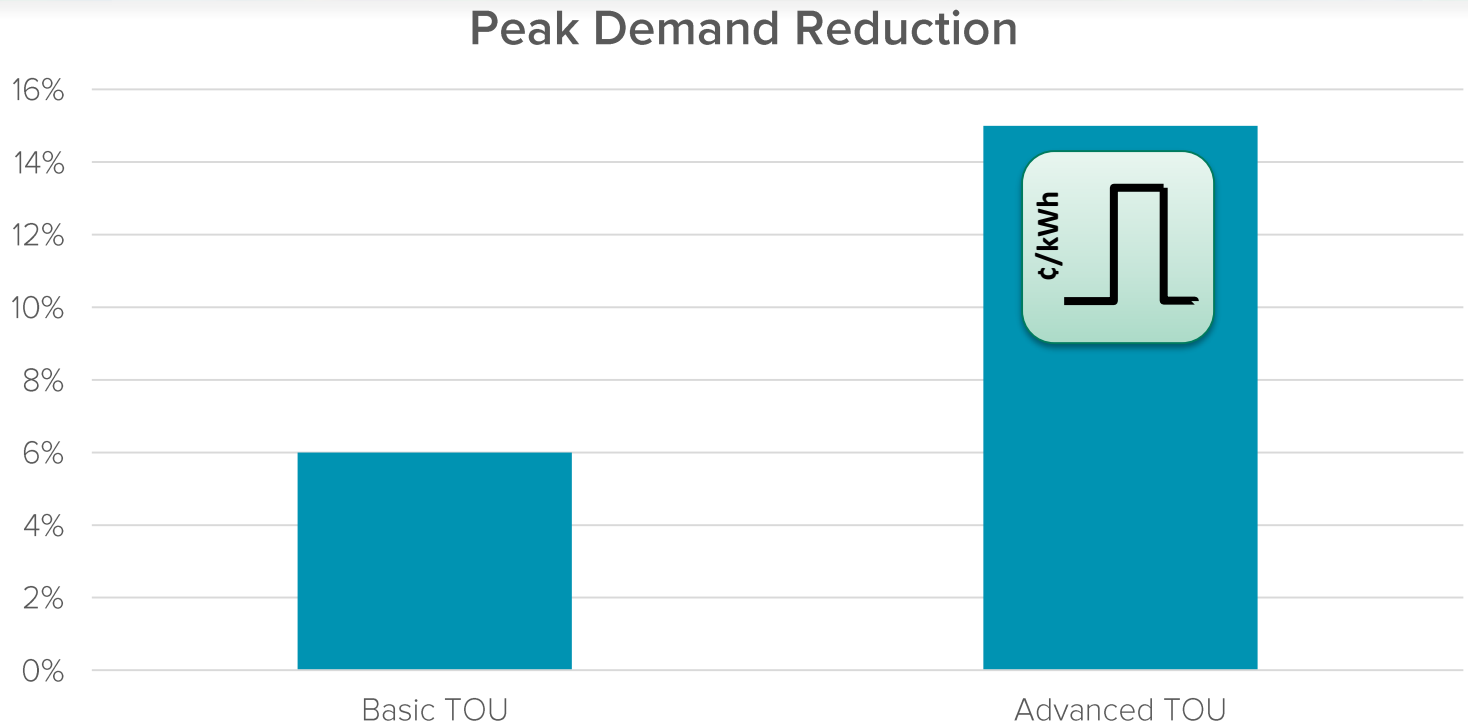
Super Off Peak Weekends?



Off Peak Weekends and Holidays		
		Rate
On-Peak	3:00 - 8:00 PM	$0.22
Off-Peak	6:00 AM – 3:00 PM & 8:00 – 11:59 PM	$0.115
Super-Off	12:00 – 6:00 AM	$0.06

Super Off Peak Weekends and Holidays		
		Rate
On-Peak	3:00 - 8:00 PM	$0.22
Off-Peak	6:00 AM – 3:00 PM & 8:00 – 11:59 PM	$0.127
Super-Off	12:00 – 6:00 AM	$0.083

Strategy 1: Advanced TOU Rate Design



- Low on-peak to off-peak ratio (<2:1)
- Long peak time window

- High on-peak to off-peak ratio (e.g. >4:1)
- Narrow peak time window (e.g. <4 hrs)

Source: U.S. DOE, November 2016, Final Report on Customer Acceptance, Retention, and Response to Time-Based Rates from the Consumer Behavior Studies, https://www.smartgrid.gov/document/CBS_Results_Time_Based_Rate_Studies.html

Potential Pilot Program Design Elements

Program Design Choices

Enrollment

- Opt-out
- One Core Rate Design
- ~10,000 participants
- 2 years

Education

Incentives

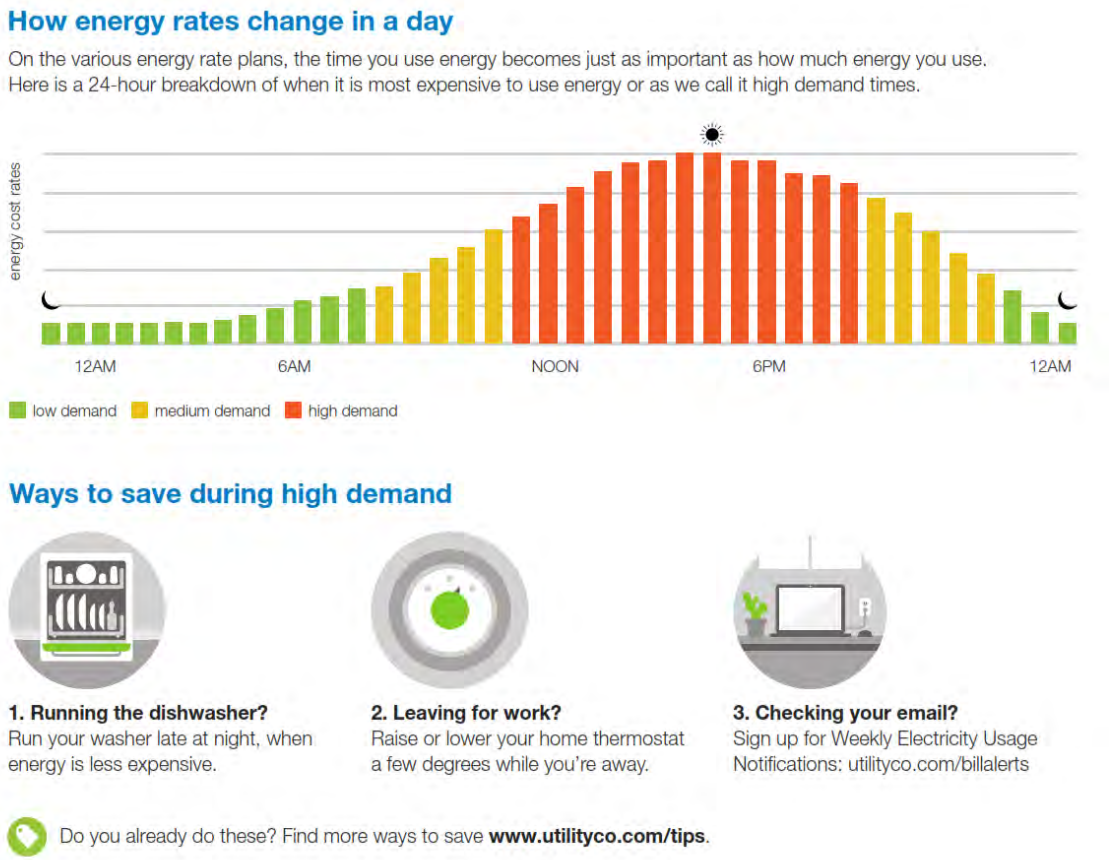
Participant Types

- Residential
- TBD
- TBD

Technology

Program Features

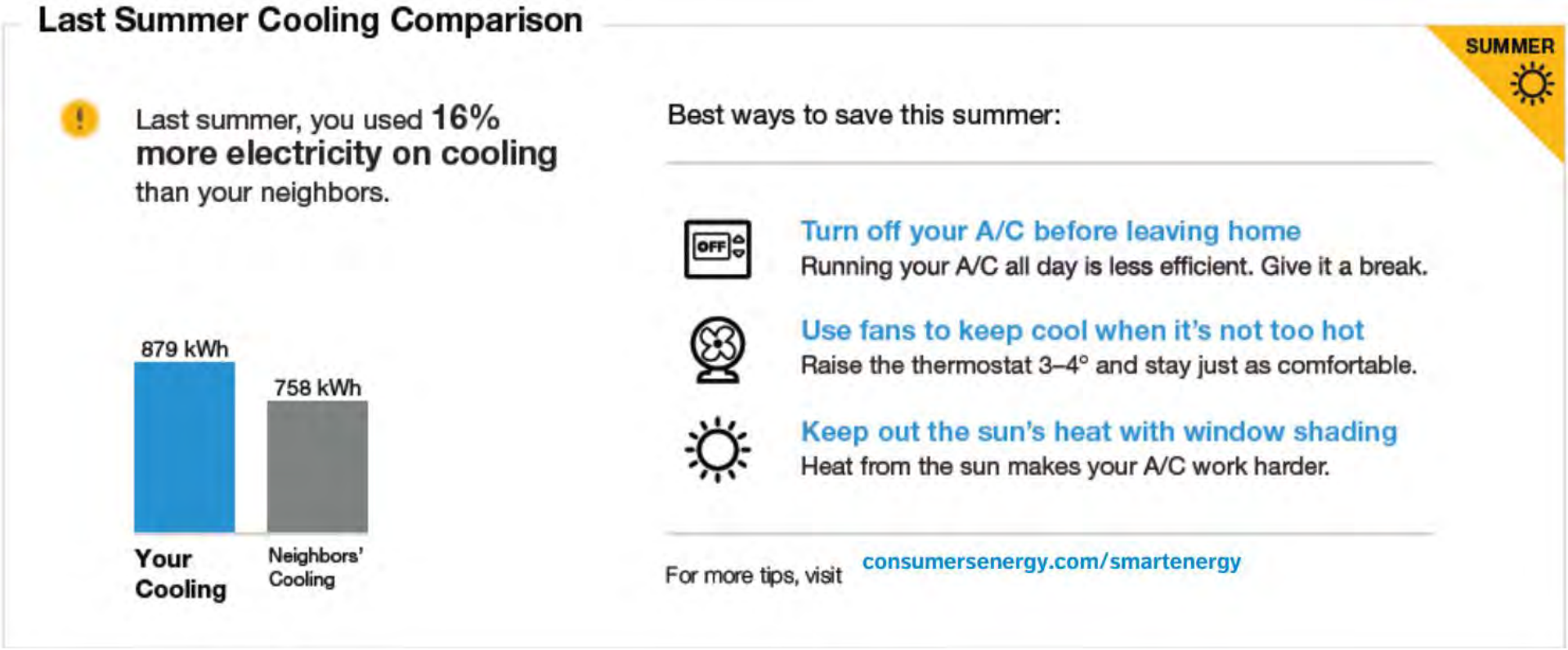
- General Rate Education



Courtesy of Oracle

Potential Program Features

- Behavioral Demand Response – Customized disaggregation



Courtesy of Oracle

Potential Program Features

- Behavioral Demand Response – Peak Days Education

UtilityCo

<MONTH XX, XXXX>

<FULLNAME>
<ADDRESS_LINE_1>
<ADDRESS_LINE_2>
<ADDRESS_LINE_3>

Join your community on peak days to save electricity this summer

On the hottest summer days, electricity costs can rise right along with the thermometer. You've been selected to participate in our peak days program, giving you the opportunity to join your neighbors and save electricity on a few of the hottest days of the year.

Joining your community on peak days is a breeze. We will notify you when peak days are approaching and let you know afterwards how much electricity you used. To lower your use, you can take small actions like turning up the temperature on your thermostat a few degrees or delaying the use of large appliances.

If you have questions or would like to learn more about this program, please call us at (800) 555-1234 or visit UtilityCo.com/peakdays.

Flip this letter over for your peak day savings plan.

Saving on peak days is easy. Participate this summer with these simple steps:

Before:
Look out for notifications
We'll notify you via phone or email to let you know about the upcoming peak day.

During:
Lower your use
Take simple steps, like those on the back of this report, to lower your energy use during the peak day.

After:
See how you did
A few days later, we'll show you how much electricity you used on the prior peak day.

Here's how you can save on peak days

Your participation in the peak day program is optional, but each small step you take can have a significant impact.

Plan an outing to stay cool

One of the easiest and most effective ways to reduce your home's electricity use during peak hours is to not be home.

Make plans with family or friends to see a movie, eat out, get some ice cream, or do other fun activities that can help you stay cool until nighttime. Before you leave home, make sure to raise your thermostat temperature by 10°F.

Use fans and reduce air conditioning

During peak days, when electricity demand is high, the need to stay cool tends to increase as well. Small actions during peak hours can have big impacts.

Most people find they can raise the thermostat temperature by 3–4°F and still stay comfortable. Close curtains and blinds to keep sunlight from entering your home and stay close to fans instead of using air conditioning to keep cool.

Put off household chores

Appliances can account for up to 25% of total energy use in a typical household and can unintentionally heat up your home.

To help your community save energy on peak days, try steps like running the dishwasher after peak hours or doing laundry on the weekends. You can also talk with your household to make plans for peak days and identify what other appliance-related chores you can postpone.

To learn more about peak days and find even more ways to save, visit UtilityCo.com/peakdays.

UtilityCo.com/reports | (800) 555-5678 | reports@utilityco.com

UtilityCo

Courtesy of Oracle

Potential Program Features

- Behavioral Demand Response – Peak Event Alert

Courtesy of Oracle

Potential Program Features

- Behavioral Demand Response – Peak Event Follow-up

Courtesy of Oracle

PTR?

UTILITIES

New Orleans' Peak-Time Rebate a Strong Draw for Low-Income Customers

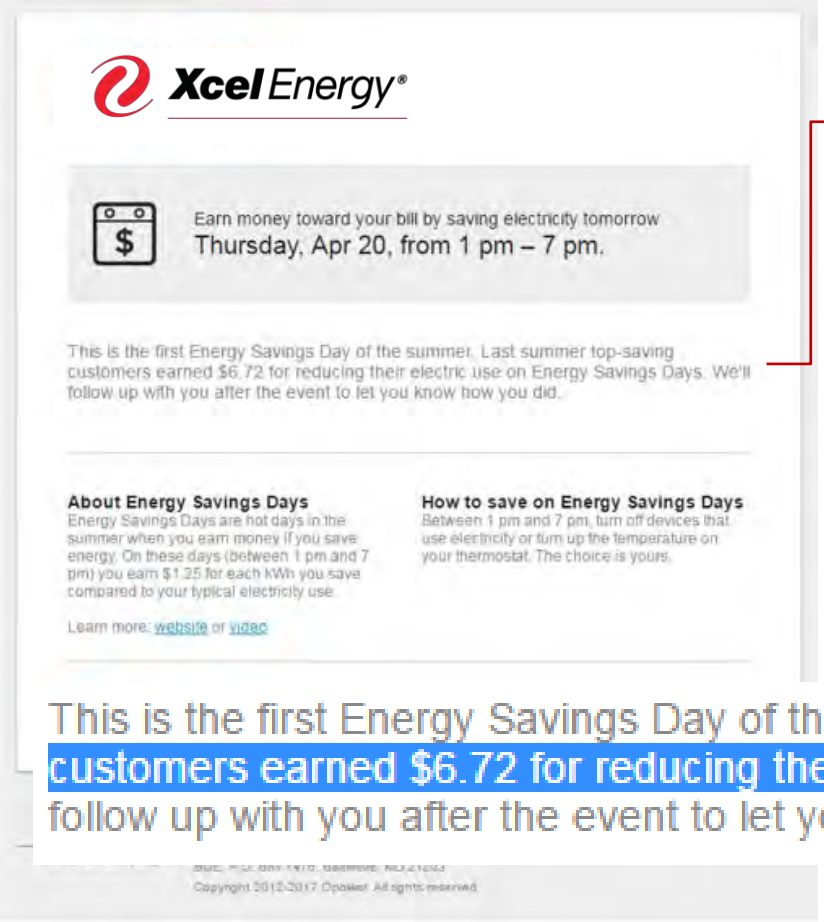
This residential program boasts a 96 percent approval rating. What will Entergy New Orleans do next?

by Katherine Tweed
March 26, 2014

GTM

Potential Program Features

- PTR – Pre-Event Communication



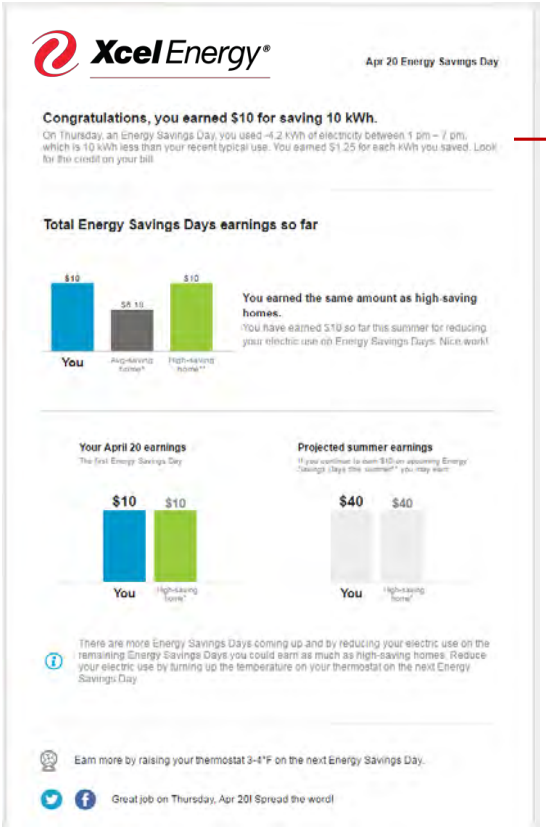
First Event Simple Money, Money Compare

This is the first Energy Savings Day of the summer. Last summer top-saving customers earned $6.72 for reducing their electric use on Energy Savings Days. We'll follow up with you after the event to let you know how you did.

Courtesy of Oracle

Potential Program Features

- PTR – Post-Event Communication



Saved, Money Comparison

Congratulations, you earned $20 for saving 18 kWh.

On Wednesday, an Energy Savings Day, you used -13.5 kWh of electricity between 2 pm – 5 pm, which is 18 kWh less than your recent typical use. You earned $1.25 for each kWh you saved. Look for the credit on your bill.

Did Not Save, Money Comparison

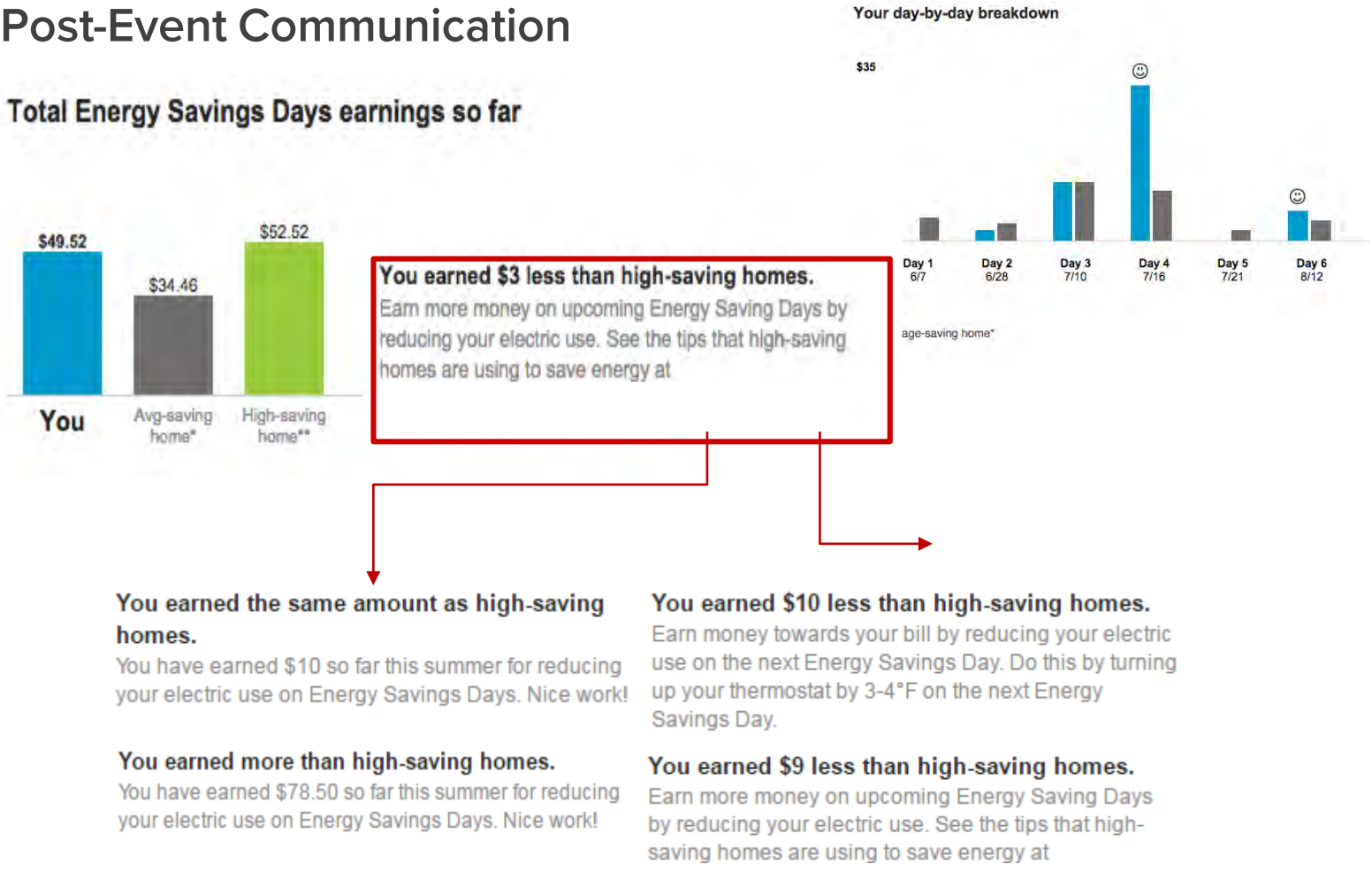
You earned $0 because you did not save electricity.

On Thursday, an Energy Savings Day, you used 12.5 kWh of electricity between 2 pm – 5 pm, which is 8 kWh more than your recent typical use. Earn credits toward your bill by reducing your electricity use on upcoming Energy Savings Days.

Courtesy of Oracle

Potential Program Features

- PTR – Post-Event Communication



Courtesy of Oracle

Learning from Other Programs

1. Happier customers
2. Everyone can participate in BDR and PTR (77% in GWP)
3. BDR has reliability shown savings
4. PTR has reliability shown savings (10-15% savings in BGE)

BUT:

1. Implementation and program execution is not free
   - IT integration cost can be significant
2. Setting a baseline or PTR must be done intelligently
3. Requires AMI

Breakdown of Treatment/Control Groups

Treatment/SS/BDR	Treatment/BDR/PTR	Control/SS	Control/HER
Impact of BDR on non-SS events	Impact of PTR rebate on event days	Baseline SS savings	Baseline HER savings
Impact of SS + BDR on coupled event days		Baseline TOU savings	Baseline TOU savings

SS = Saver's Switch
BDR = Behavioral Demand Response
PTR = Peak time Rebate
HER = Home Energy Report

Program Design Choices

Enrollment

- Opt-out
- One Rate Design
- 10,000
- 2 years

Education

- Community outreach
- Marketing
- Staff training
- IT support

Incentives

- Peak Time Rebate

Participant Types

- Residential
- TBD
- TBD

Technology

- AMI meters
- Behavioral software

Bill Protections – Low Income

- Low Income Definition: Customers who have received an energy assistance payment within the last 12 months.
- Year 1
  - Monthly bill protection
  - Customers will receive a credit if their bill was higher on the pilot vs. their standard billing. If their bill was lower on the pilot, there will not be a true-up charge.
- Year 2
  - Annual 10% bill protection
    - Customers must remain in the pilot for the full 12 months of the second year to receive a credit for anything over 10% of their bill difference.
    - If customer moves out or opts out of the pilot prior to the end of year 2, no bill protection will be applied.

Bill Protections – Non-Low Income

- Annual 10% bill protection for Year 1
  - Customers must remain in the pilot for the full 12 months
  - Customers will receive a credit for anything over 10% of their bill difference.
  - If customer moves out or opts out of the pilot prior to the end of year 1, no bill protection will be applied.

- No bill protection for Year 2

Saver's Switch

- Saver's Switch customers will not be excluded from pilot.
- The pilot Saver's Switch credit will have a different credit structure than the standard Saver's Switch Credit.
  - Saver's Switch customers not on the pilot will see no change – they will continue to receive a 15% monthly credit June – September.
  - Saver's Switch customers on the pilot would move to an annual $ credit.

Program Design Choices

Enrollment

- Opt-out
- One Rate Design
- 10,000
- 2 years

Education

- Community outreach
- Marketing
- Staff training
- IT support

Incentives

- Bill protection
- Peak Time Rebate
- Free technology (e.g. load control switch for SS)

Participant Types

- Residential
- TBD
- TBD

Technology

- AMI meters
- Behavioral software

TOU Pilot Design Overview

- Opt-out
  - ~10,000 participating in pilot
  - Can opt-out at anytime
  - Full and monthly bill protection for Energy Assistance (EA) customers year one
  - Bill protection if difference exceeds 10% for all others if they stay in pilot for a year
  - Year two no bill protection (10% buffer for EA)
- Goals and study
  - Peak demand reduction
  - Customer satisfaction and savings
  - Impacts on different customer segments
- Education
  - Welcome packets and surveys
  - Targeted communications
- Tech couplings
  - Traditional Saver's Switch and Smart Thermostat Saver's
  - Behavioral demand response
  - Peak time rebates

Preliminary Scorecard

Suggestions for Pilot Objectives from Stakeholders	
• Identify how to provide adequate price signals to encourage customers to shift load	In Position
• Identify what outreach methods are most effective at encouraging different customer segments to shift load	In Process
• Understand to what extent particular customer groups had the ability to respond and how much money they saved or lost	In Process
• Understand how specific practices increased or decreased customer participation and satisfaction	In Process
• Understand how TOU might facilitate the cost-effective integration of renewables	In Position

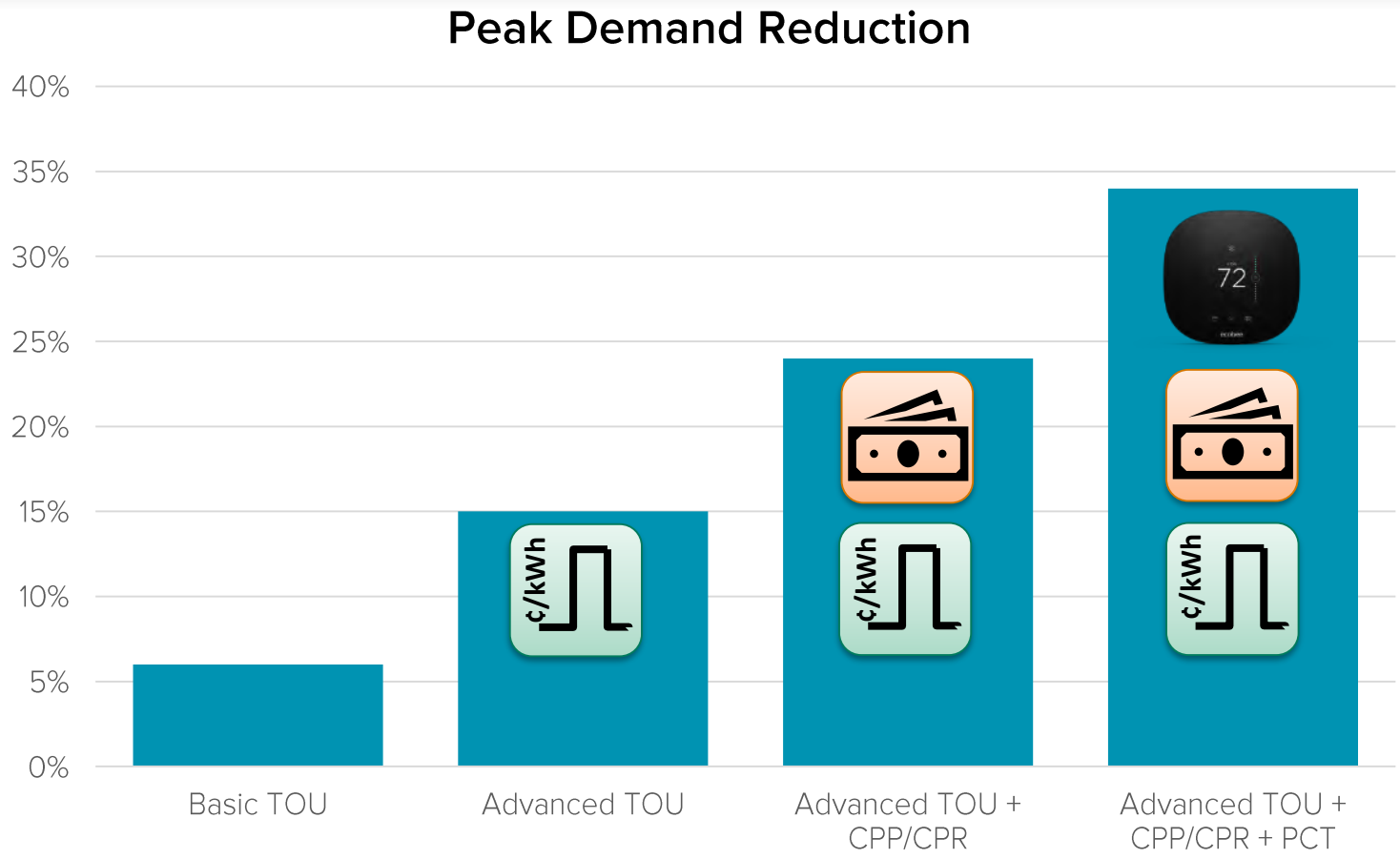
Preliminary Scorecard

Pilot Design Suggestions from Stakeholders	
• Indemnify low-income customers	Check
• Use an opt-out approach	Check
• Provide rates that accurately reflect the costs of energy	Check
• Balance precision and practicality, both for the utility and for customers	Check
• Give customers adequate tools to access and understand their usage data	Check

Preliminary Scorecard

Suggested Goals for TOU Rate from Stakeholders	
• Reduce peak demand-related system costs to mitigate need for future investments in the system	In Position
• Increase customer satisfaction	In Position
• Increase customer participation	In Position
• Shift customer energy use to overnight periods when wind generation is highest	In Position
• Promote conservation to the maximum reasonable extent	In Position

Combined Approach



Source: U.S. DOE, November 2016, Final Report on Customer Acceptance, Retention, and Response to Time-Based Rates from the Consumer Behavior Studies, https://www.smartgrid.gov/document/CBS_Results_Time_Based_Rate_Studies.html

Questions?

Thank you!

Lon Huber
Strategen Consulting, LLC
Email: lhuber@strategen.com
Phone: 928-380-5540

Appendix

Misc. Rate Design

Holidays

HOLIDAYS:

- New Years
- Good Friday
- Memorial
- Independence
- Labor
- Thanksgiving
- Christmas


Xcel Energy®