UNITIL
Smart Grid TOU Pilot Project

Unitil Energy Systems, Inc.

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EESE Board Meeting April 18, 2012

Introduction

- Unitil is a public utility holding company, headquartered in Hampton, New Hampshire, that provides for the necessities of life – safely and reliably delivering natural gas and electricity throughout northern New England.
- Our principal business is the local distribution of electricity and natural gas in the states of New Hampshire, Maine and Massachusetts.
- Our affiliates serve more than 101,400 electric customers and nearly 71,900 natural gas customers.
- We offer basic energy service to our customers while providing the option for customers to choose their own competitive energy supply.
- Unitil also offers comprehensive energy efficiency programs and provides interconnection and net metering services to eligible customer-generators.
- Unitil completed its Advanced Metering Infrastructure investment in 2008, enabling two-way automated meter reading and communication with all electric meters on its system.

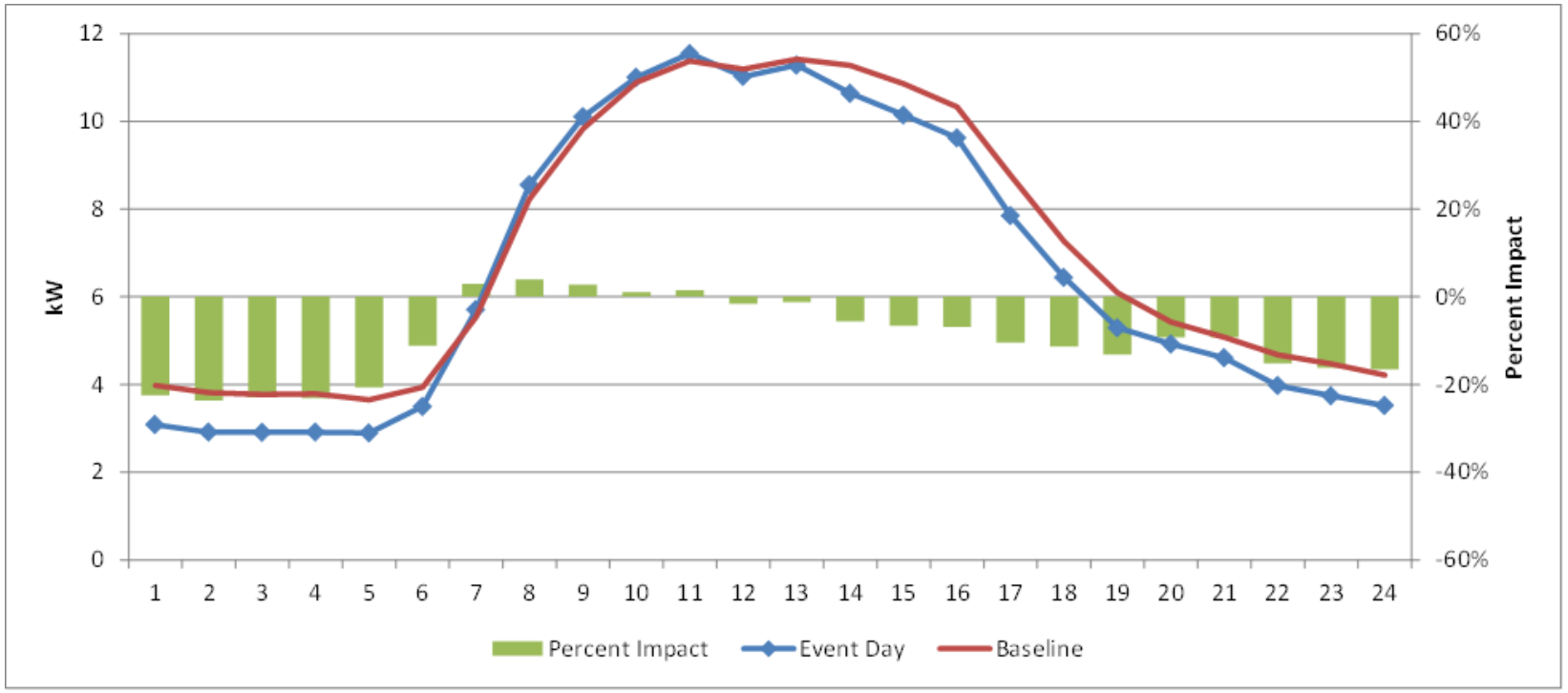
Background

- PUC docket DE 06-061, January 22, 2008:

  "Based on the evidence presented at hearing, we conclude that the potential benefits of time-based rates deserve further inquiry in order to determine how best and on what schedule to implement the federal standard.

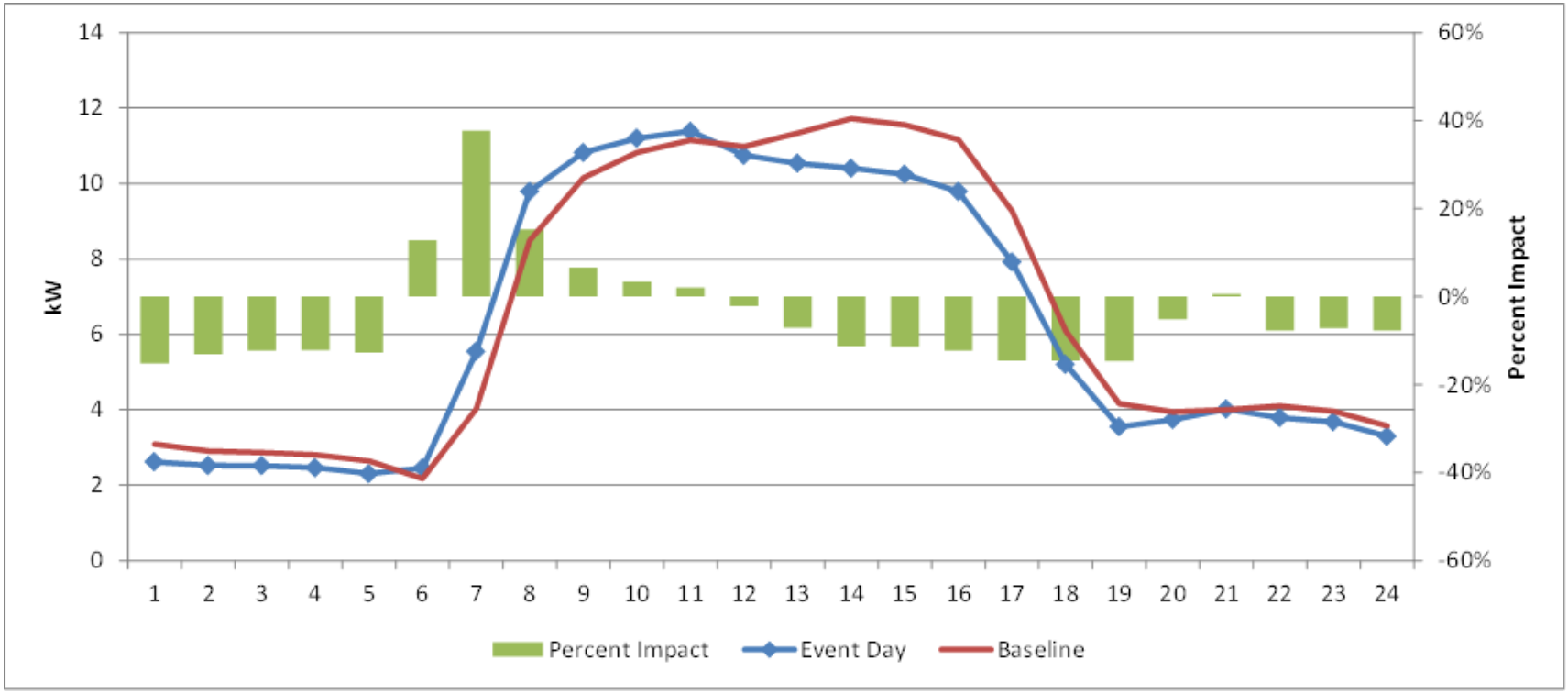
- On August 5, 2009 , Unitil filed (Docket DE 09-137) a proposal to invest in DER and to conduct a default service TOU pilot program.
  - On February 26, 2010, the Commission approved a settlement agreement for the TOU pilot program.
- MA Green Communities Act (2008) required the filing of a smart grid pilot by April 1, 2009.
  - On April 12, 2010, the MDPU approved Unitil's proposed pilot program.
- Residential TOU Proposal – to implement a 2-state pilot program testing Simple TOU, Enhanced TOU and direct Thermostat Control for residential customers with central A/C over the summer months.
- C&I Pilot – in January 2011, the NH PUC approved an additional C&I CPP Pilot Program targeted to 30 customers on a single circuit.

Average Load, Baseline, and Impacts For C&I CPP Pilot



	Event kW	Baseline kW	kW Impact	% Impact
Hours 10-12	*11.19*	*11.15*	*0.04*	*0.3%*
Hours 13-18	*9.33*	*9.99*	*(0.66)*	*-6.6%*
Hours 19-21	*4.94*	*5.53*	*(0.59)*	*-10.7%*
Daily kWh	*158.21*	*169.90*	*(11.69)*	*-6.9%*

Only The C&I Customers that Tried to Respond to Events



	Event kW	Baseline kW	kW Impact	% Impact
Hours 10-12	*11.11*	*10.99*	*0.12*	*1.1%*
Hours 13-18	*9.02*	*10.19*	*(1.17)*	*-11.5%*
Hours 19-21	*3.77*	*4.03*	*(0.26)*	*-6.5%*
Daily kWh	*150.56*	*157.00*	*(6.45)*	*-4.1%*

Key Process Findings

- AMI system functions appropriately for metering and billing, but data streaming (interval data) requires enhanced bandwidth
- We noted several barriers to C&I pilot success:
  - Distance / disconnect between decision maker and building users
  - Need for more extensive education
  - Bill protection undermines incentive to change
- We used the ISO DR Calculation Method for estimating C&I program impacts, but noted a significant variance between this method versus Statistical Modeling:
  - Based on the RES TOU program -

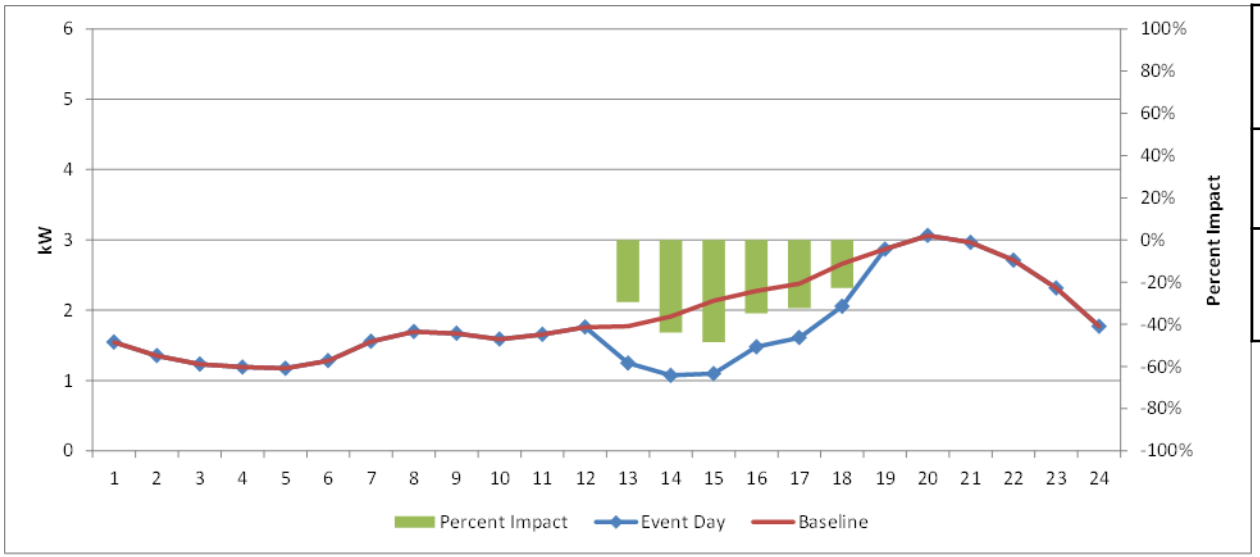
Item	ISO Method	Stat. Model	kW Difference between ISO and Stat. Model	% Difference between ISO and Stat. Model
kW Savings – CPP Hours (HE 13-18)	-0.87	-1.56	-0.69	79.3%

Residential TOU

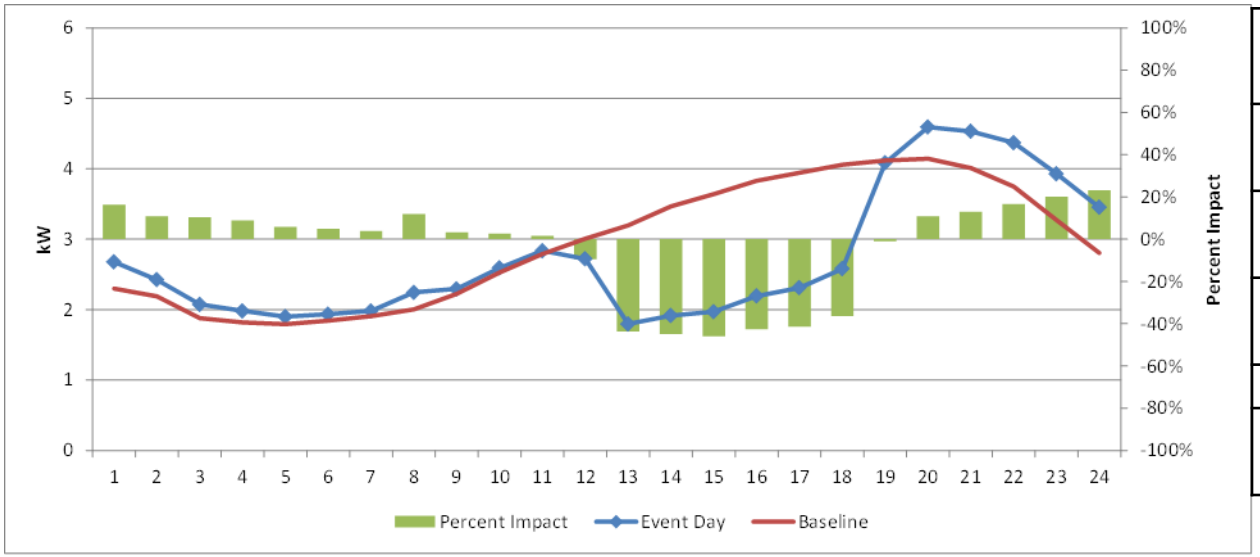
Treatment Group	Rate Plan	Enabling Technologies	Information Feedback
Simple TOU	Time-of-Use with Critical Peak Price (TOU-CPP)	None	Written educational materials Daily total usage and cost via utility hosted web portal
Enhanced Technology	Time-of-Use with Critical Peak Price (TOU-CPP)	Tendril HAN w/web portal, PCT, IHD, Controllable outlet	Written educational materials Sub-hourly feedback on usage and cost through HAN web portal Daily total usage and cost via utility hosted web portal
Smart Thermostat	Pre-existing fixed flat rate	Programmable controllable thermostat (PCT)	Written educational materials Daily total usage, web-based thermostat control and monitoring and cost via utility hosted web portal

Hours	(Peak / Off-Peak / CPP)	Rate ($/kWh)
6 p.m. - 12 p.m. Non-Holiday Weekdays, all hours Weekends and Holidays	Off-Peak	$0.05131
12 p.m. - 6 p.m. Non-Holiday Weekdays Only	Peak	$0.08487
12 p.m. - 6 p.m. Non-Holiday Weekdays Only	Critical Peak	$0.61494

Simple TOU Impacts
Non-CPP Day vs. CPP Day

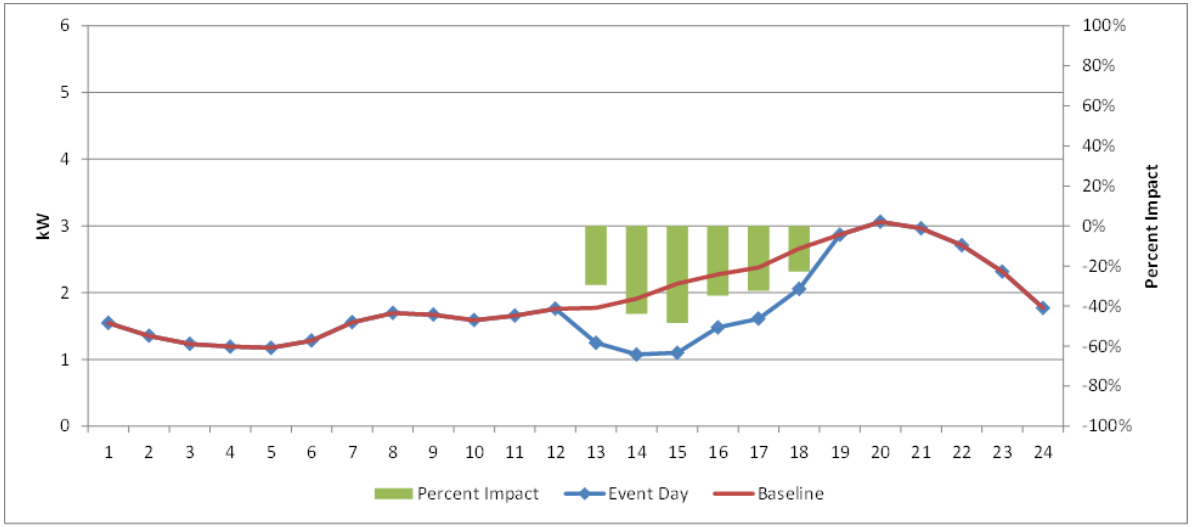


	Event kW	Base kW	kW Impact	% Impact
Ave.	*1.57*	*1.99*	*(0.42)*	*-21.2%*
Daily kWh	*40.09*	*42.63*	*(2.53)*	*-5.9%*

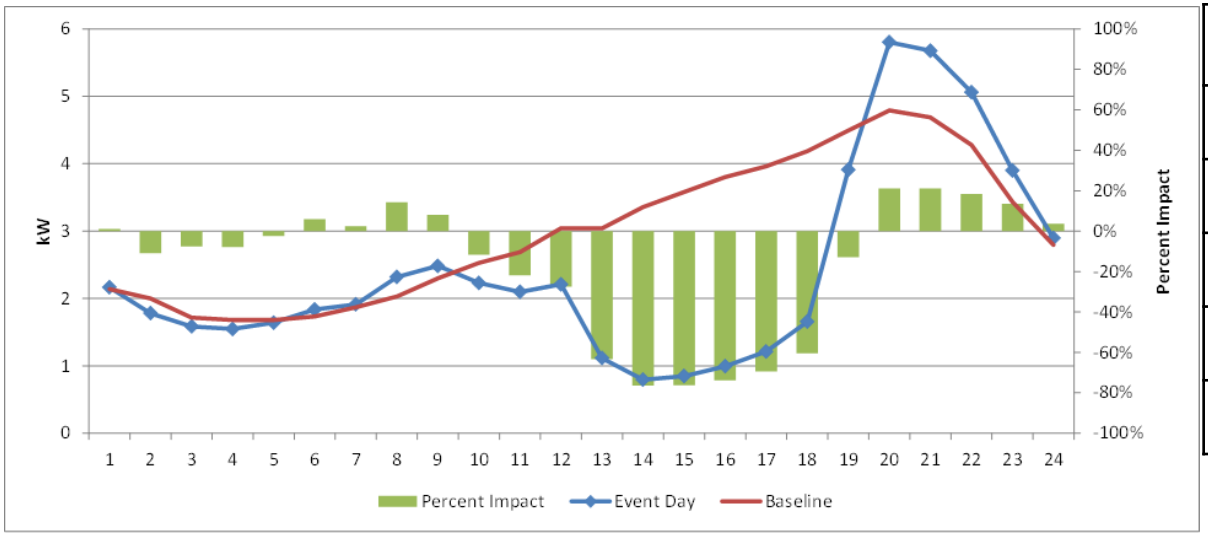


	Event kW	Base kW	kW Impact	% Impact
Hours 10-12	*2.72*	*2.78*	*(0.06)*	*-2.1%*
Hours 13-18	*2.13*	*3.69*	*(1.56)*	*-42.3%*
Hours 19-21	*4.40*	*4.09*	*0.31*	*7.6%*
Daily kWh	*65.40*	*70.53*	*(5.13)*	*-7.3%*

Enhanced TOU Impacts
Non-CPP Day vs. CPP Day

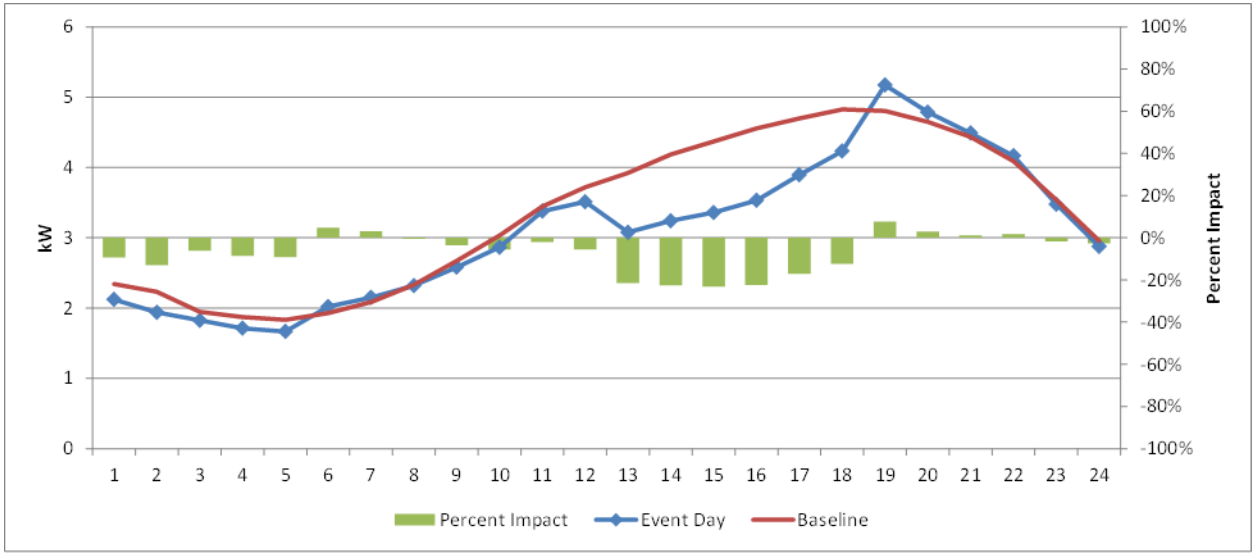


	Event kW	Base kW	kW Impact	% Impact
Average	*1.43*	*2.19*	*(0.76)*	*-34.8%*
Daily kWh	*41.97*	*46.54*	*(4.57)*	*-9.8%*



	Event kW	Base kW	kW Impact	% Impact
Hours 10-12	*2.18*	*2.75*	*(0.57)*	*-20.8%*
Hours 13-18	*1.10*	*3.66*	*(2.55)*	*-69.8%*
Hours 19-21	*5.13*	*4.66*	*0.47*	*10.2%*
Daily kWh	*57.68*	*71.81*	*(14.14)*	*-19.7%*

Controlled T-Stat Impacts



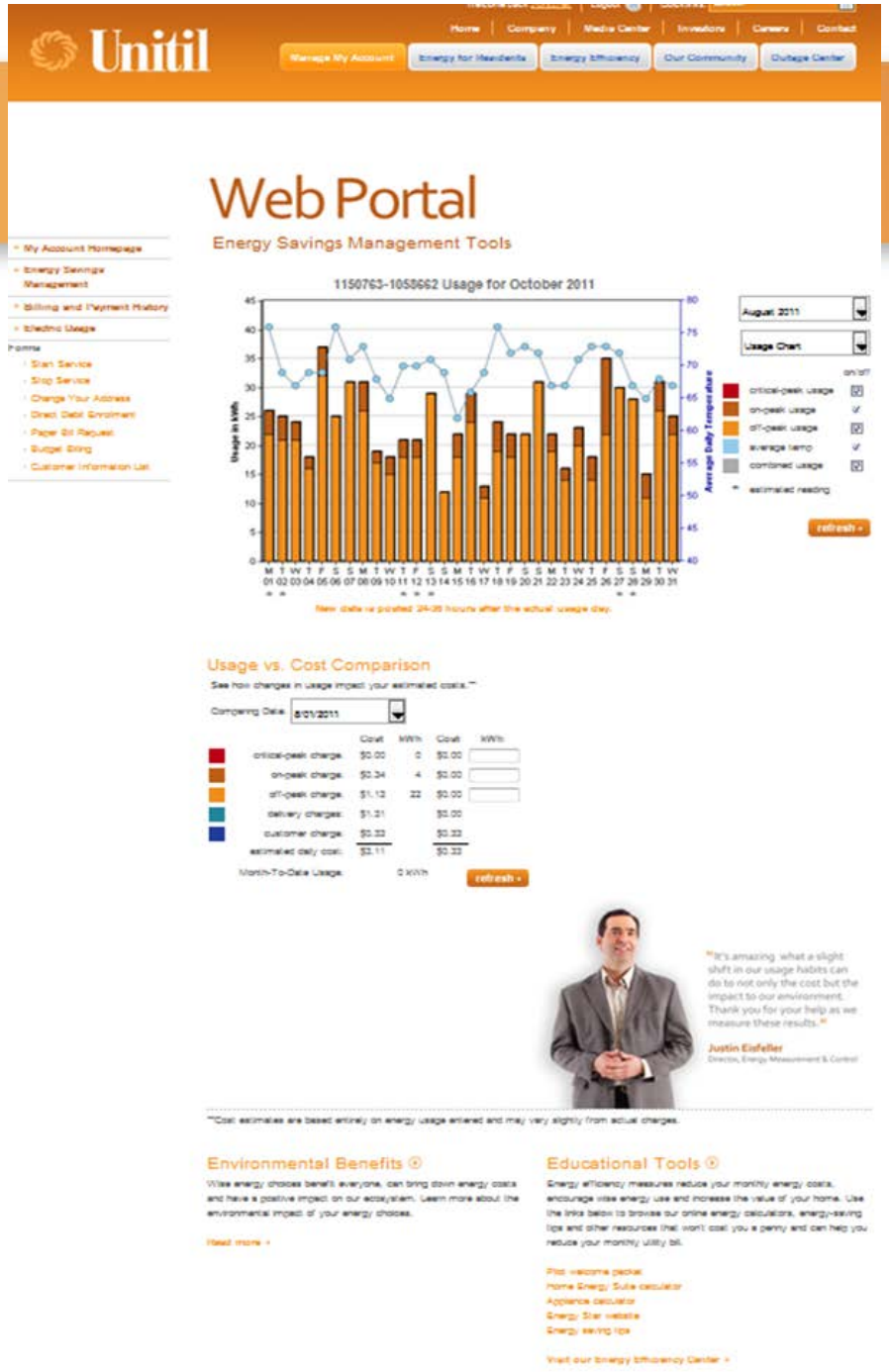
	Event kW	Baseline kW	kW Impact	% Impact
Hours 10-12	*3.25*	*3.40*	*(0.15)*	*-4.3%*
Hours 13-18	*3.56*	*4.43*	*(0.87)*	*-19.7%*
Hours 19-21	*4.82*	*4.63*	*0.19*	*4.0%*
Daily kWh	*74.41*	*80.48*	*(6.07)*	*-7.5%*

Key Process Findings

- Significant technical challenges were experienced with Enhanced TOU equipment
  - Thermostats as specified were incompatible in many locations: multiple zones / damper systems
  - In home communication interfaces were "touchy"
  - Data gaps were not able to be fully resolved
- Installation and operation of controlled thermostats went as expected
- AMI system functions appropriately for metering and billing of TOU/CPP, but processes are far too manual
  - Full deployment will require complete MDM system and significant CIS upgrades
  - Resolved meter programming issue with back-to-back CPP days

Key Process Findings (cont.)

- Participant recruitment was more challenging than anticipated – but cash incentive was not required
- Critical peak declarations and communications were executed successfully
  - Expected average daily temperature was a reliable indicator
  - All 5 CPP events occurred in July – two sets were back-to-back
  - Communication channels were effective
- The Unitil TOU pilot web portal, providing daily information, was effective and well-received by customers
  - Some enhancements and improved CIS integration is required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Energy Efficiency
Our Community
Outage Center
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Energy Savings Management Tools
My Account Homepage
Energy Savings Management
Billing and Payment History
Electric Usage
Forms
Start Service
Stop Service
Change Your Address
Direct Debit Enrollment
Paper Bill Request
Budget Billing
Customer Information List
1150763-1058662 Usage for October 2011
August 2011
Usage Chart
refresh »
Usage vs. Cost Comparison
See how changes in usage impact your estimated costs.**
Comparing Date: 8/31/2011
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"It's amazing what a slight shift in our usage habits can do to not only the cost but the impact to our environment. Thank you for your help as we measure these results."
Justin Eisfeller
**Cost estimates are based entirely on energy usage entered and may vary slightly from actual charges.
Environmental Benefits
Wise energy choices benefit everyone, can bring down energy costs and have a positive impact on our ecosystem. Learn more about the environmental impact of your energy choices.
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Energy efficiency measures reduce your monthly energy costs, encourage wise energy use and increase the value of your home. Use the links below to browse our online energy calculators, energy-saving tips and other resources that won't cost you a penny and can help you reduce your monthly utility bill.
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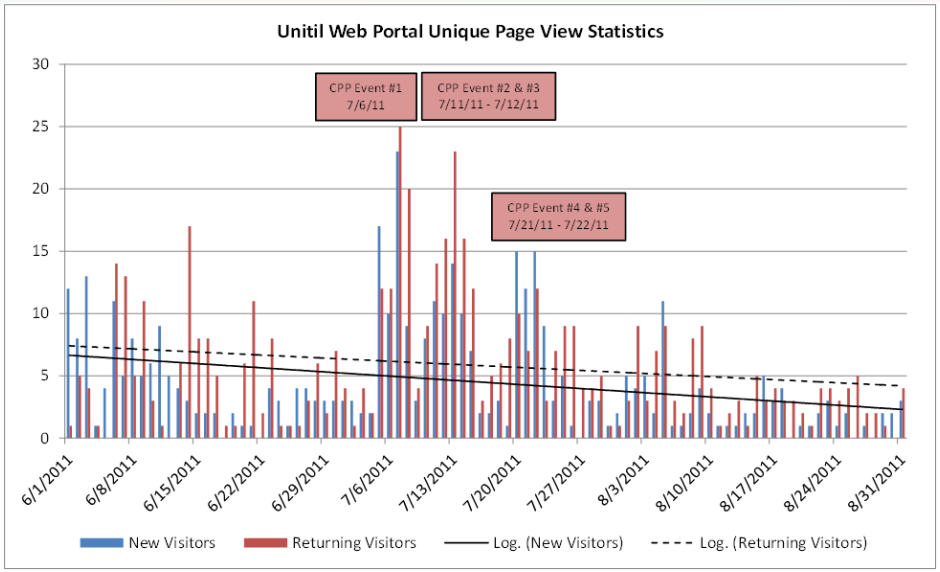
Unitil Web Portal Unique Page View Statistics
CPP Event #1
7/6/11
CPP Event #2 & #3
7/11/11 - 7/12/11
CPP Event #4 & #5
7/21/11 - 7/22/11
New Visitors
Returning Visitors
Log. (New Visitors)
Log. (Returning Visitors)

Conclusion

- Broader deployment will require the resolution of a variety of issues:
  - Technical enhancements to CIS, MDM and related systems
  - Ratemaking considerations: fairness, equity, efficiency and simplicity
  - Roll-out - mandatory vs. OPT-IN or OPT-OUT
  - Energy supply market considerations
  - Financial considerations and the importance of revenue decoupling
- The benefits may be significant but the process will take time and resources.

Questions?