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July 5, 2018

MEMORANDUM

TO: Council Members

FROM: Ben Kujala

SUBJECT: Briefing on Demand Voltage Reduction Implementation

BACKGROUND:

Presenter: Shawn Dolan, VP Engineering and Technical Services, Kootenai Electric Cooperative, Inc.

Summary: This will be a high-level overview of a demand voltage reduction program being implemented at Kootenai Electric Cooperative.

Background: Kootenai Electric Cooperative, Inc. (KEC) is a member-owned electric utility in Hayden, Idaho. The Cooperative provides competitively priced, quality energy services to its members and is governed by an independent seven-member elected Board of Directors. Kootenai Electric has more than 23,000 member accounts and more than 2,000 miles of electric line in parts of Kootenai, Benewah, Bonner and Spokane counties. Kootenai Electric employs 80 people and is the largest electric cooperative in Idaho.

More Info: <https://www.kec.com/>

Demand Response at Kootenai Electric



Shawn Dolan, P.E
VP of Engineering and
Technical Services

About Kootenai Electric



- Kootenai Electric is Located in Northern Idaho
- It is a Nonprofit Electric Cooperative
- It Serves 27,000 Meters
- Peak Load is 114,000 MW
- Has Been Involved in Demand Response Since 2008

Demand Response Programs

- Was Part of Bonneville Power Administration's Peak Project – Demand Response Pilot in 2008-2010.
 - Involved Residential Thermostat and Water Heater Control
- In 2016 Implemented Demand Response by Voltage Control System Wide.

The Demand Side Management Paradigm Shift

Prior to Bonneville implementing their tiered rate methodology, utility wholesale demand charges in the Pacific Northwest were too low to cost justify implementing a demand side management system.

Now demand charges are high enough to cost justify implementing a demand side management system in the Northwest!

The Demand Side Management Paradigm Shift

Prior to 2011 BPA Demand Charges were below \$3.00 per kW

Now BPA above contract high water mark (CHWM) Demand Charges are between \$6.96 and \$11.64 per kW each month. (PF-18 Rates)

BPA PF-18 Demand Charges

<i>Month</i>	<i>Rate in \$/kW</i>
October	10.51
November	10.57
December	11.33
January	11.43
February	11.64
March	9.65
April	8.19
May	7.00
June	6.96
July	9.63
August	11.58
September	11.18

* Plus \$2.10+/kW for BPA Transmission Demand Charges

Why Did We Choose Voltage Control Demand Reduction?

Benefits:

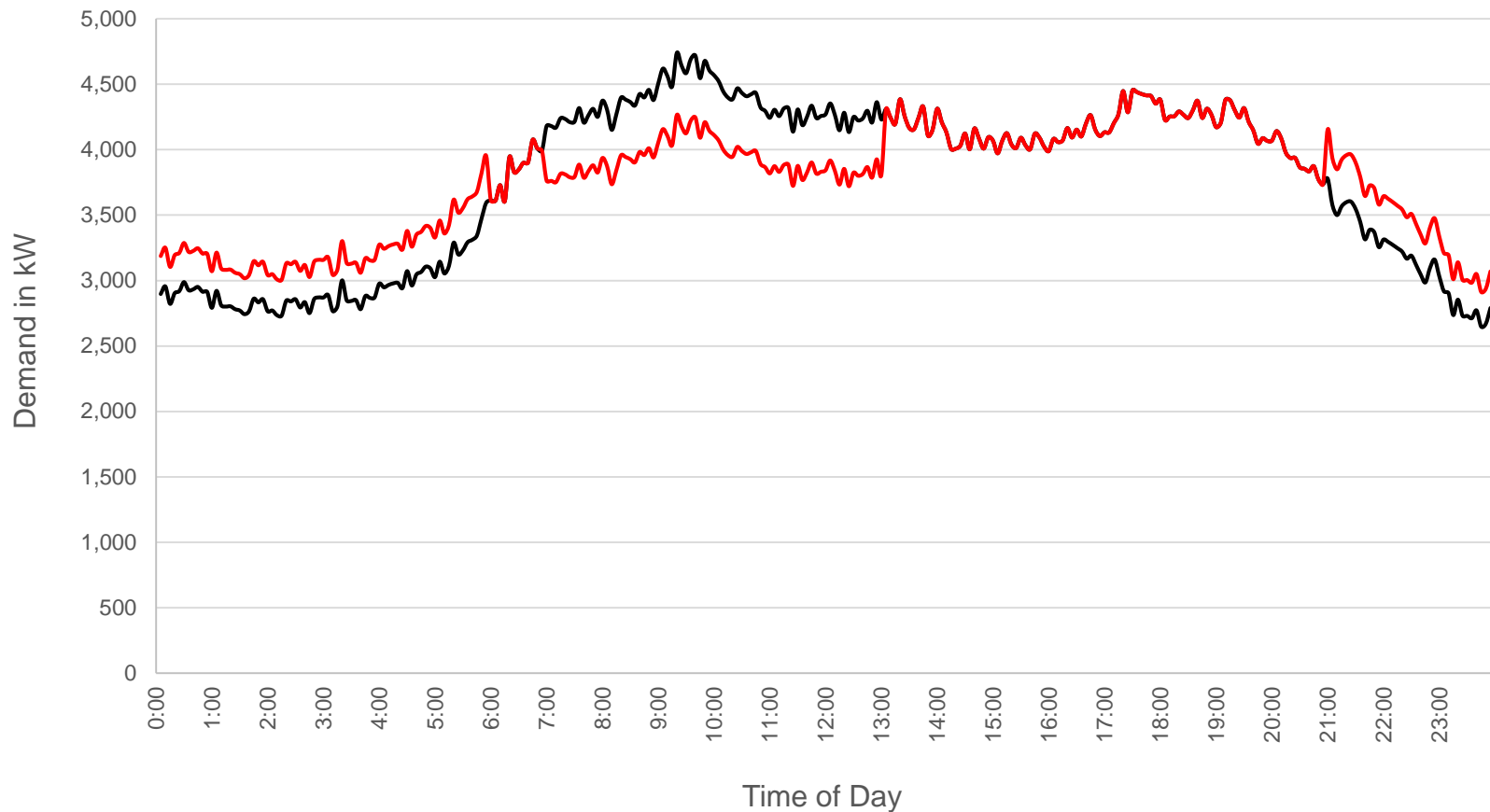
- Can shave peak demands by 1.5% to 5%
- Transparent to customers
- Has been used for years in the Midwest and East Coast
- Can save a utility a significant amount of money.

Initial Concerns

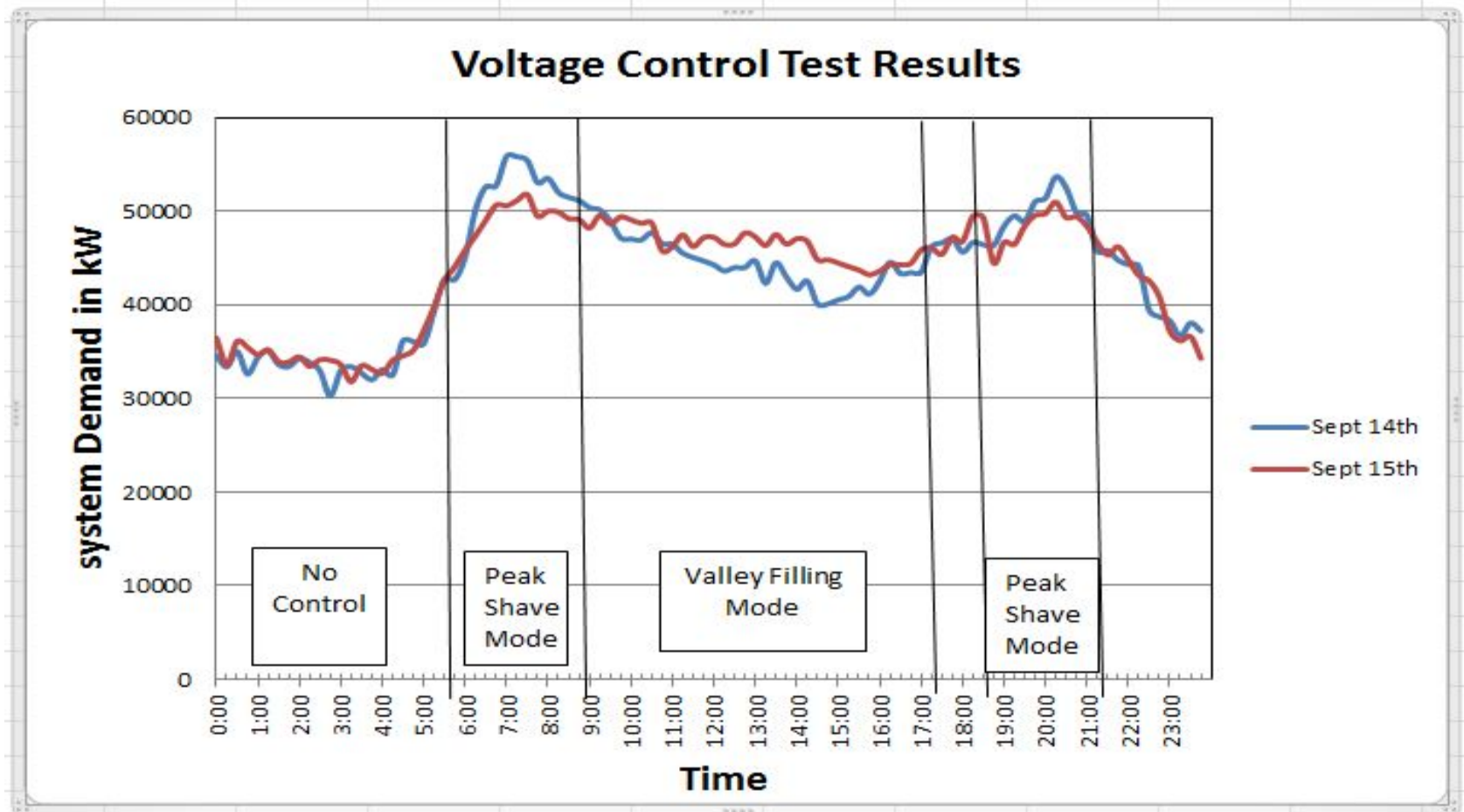
- Maintaining End of Line Voltage
- Effectiveness in a Rural Area

Alternate Approach - Load Profile Flattening

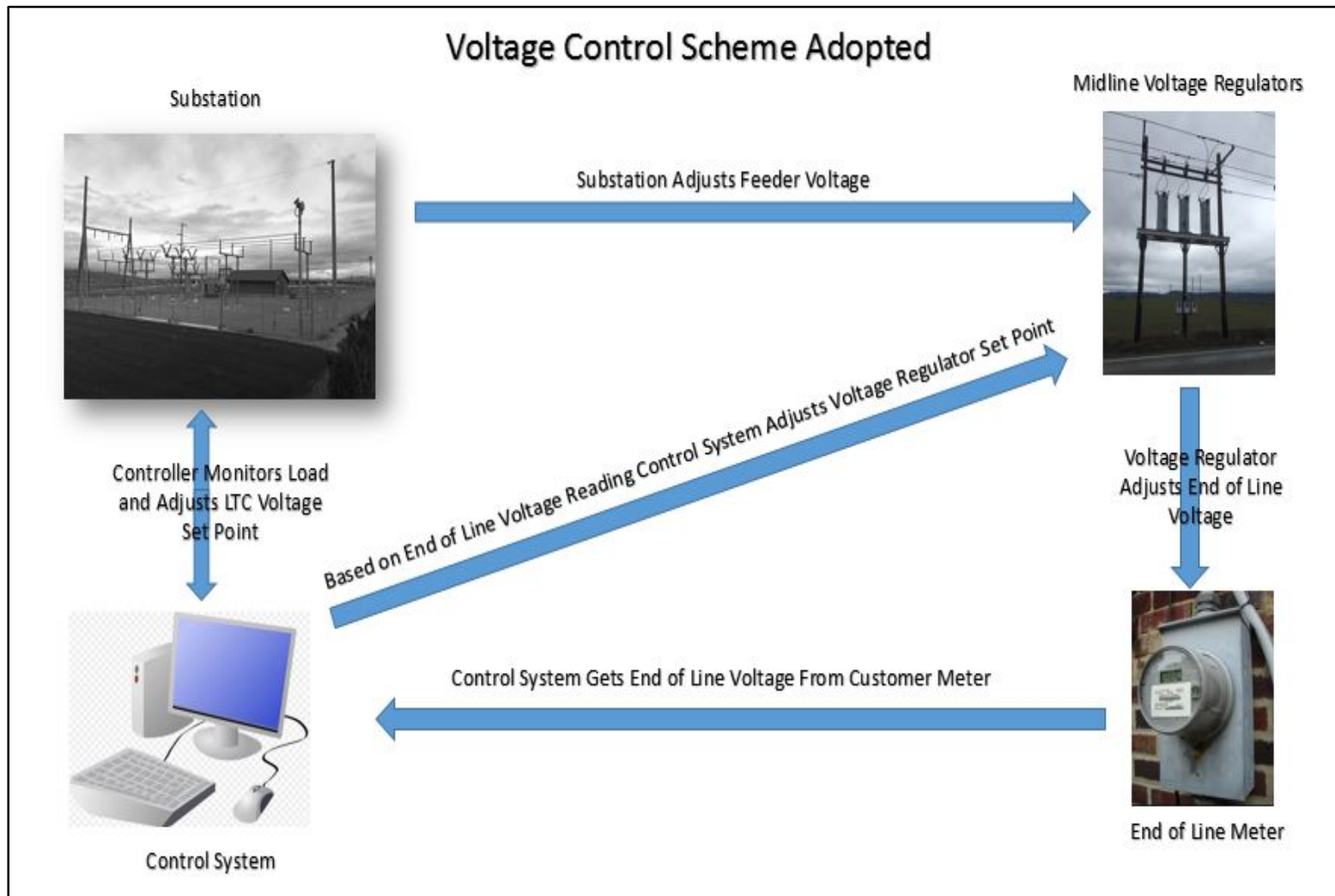
Load Shaping Approach (Peak Shaving and Valley Filling)



Example of Demand Reduction by Voltage Control Test

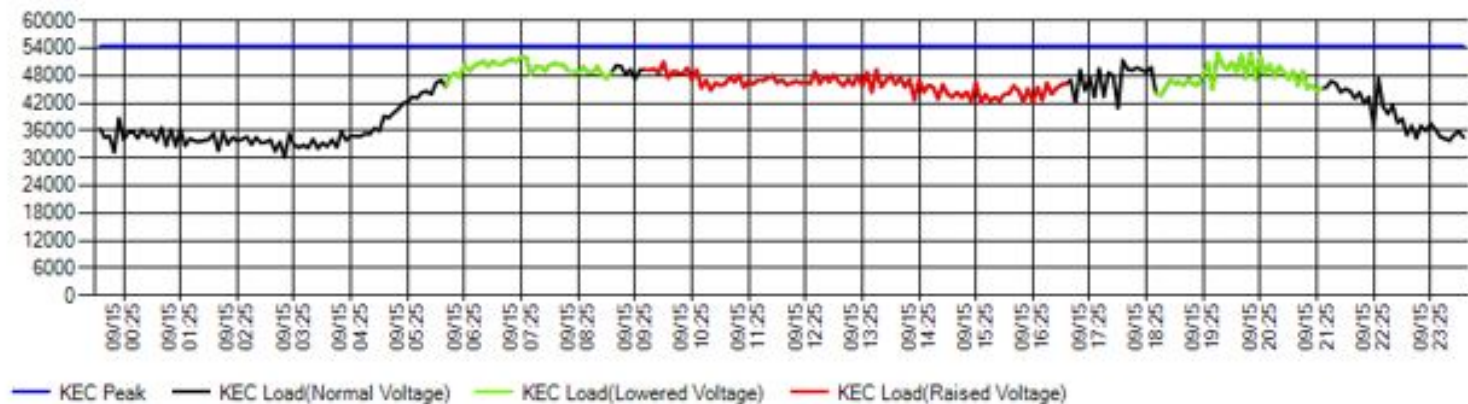


System Configuration

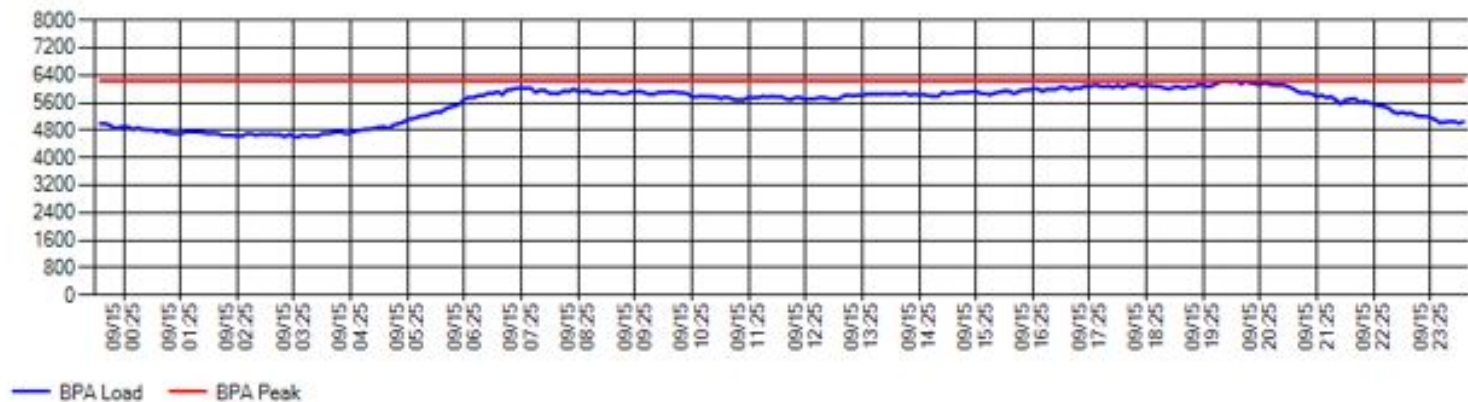


Tracks Utility and BPA System Demands

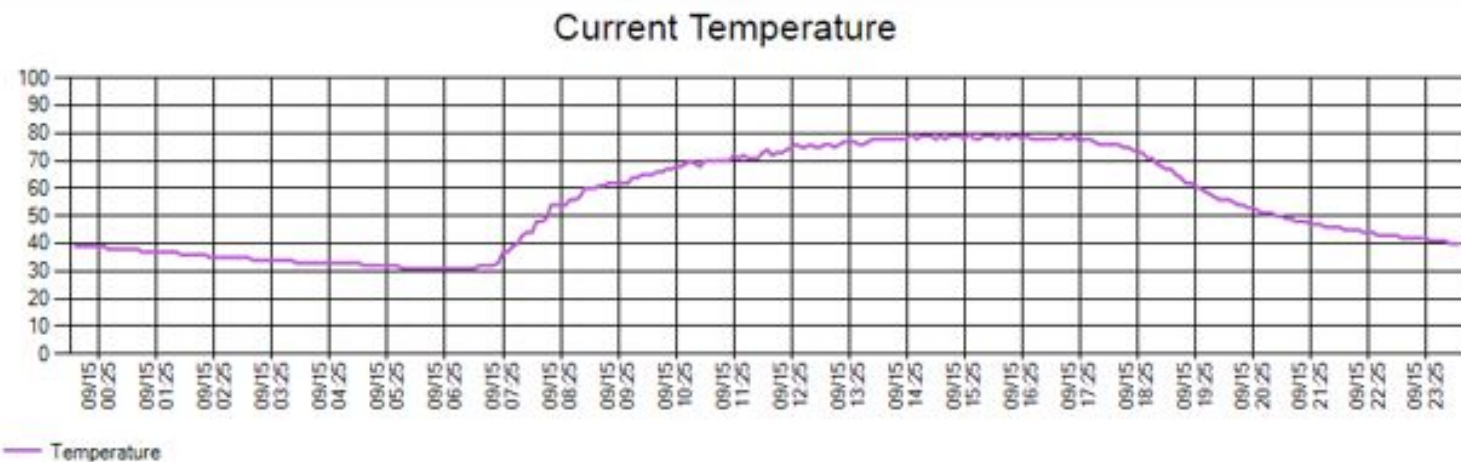
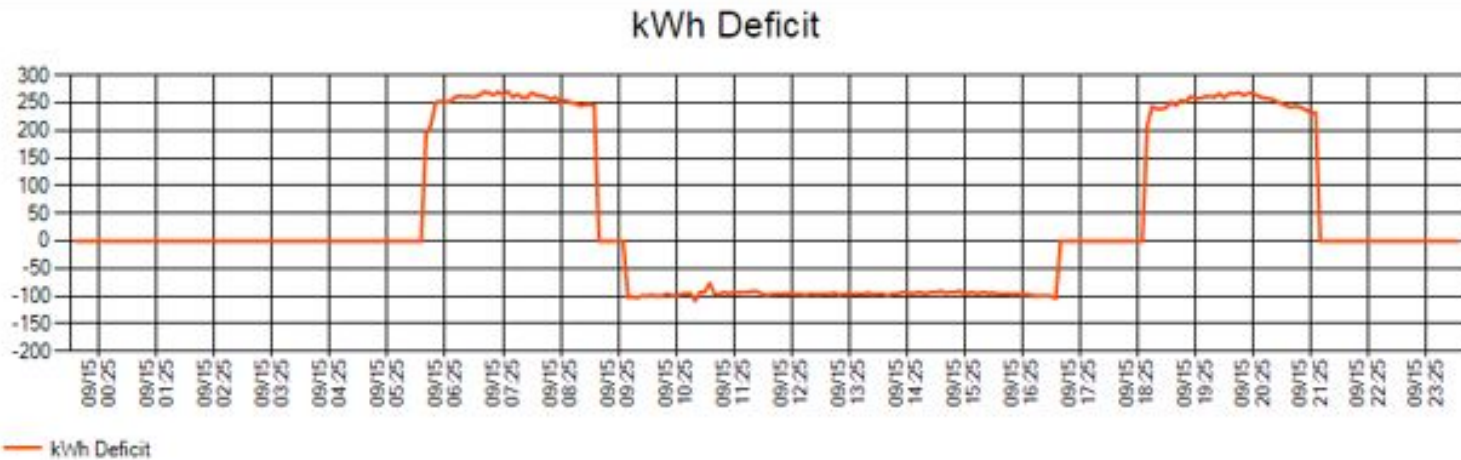
KEC Total Load kW



BPA Total Load MW



Tracks Current Temperature and Energy Deficit



Importance of Measurement and Baselines

Without Proper Testing and Baseline Comparison You Don't Know How Much You are Affecting Your Load Profile!

- For Thermostat and Water Heater Control We Instrumented the Circuits in Each Home Being Controlled to Determine the Impact.
- For Voltage Control System, Baseline Days During the Same Month with the Same Temperature and Weather Were Compared Against the Control Day.

Annual Savings Dec 2016-Oct 2017

Month	Peak (kW)	Demand Shaved (kW)	\$ Saved PBL Side of Bill	\$ Saved TBL Side of Bill	Total \$ Saved
Dec	104,015	4,797	\$50,414	\$10,001	\$60,415
Jan	110,725	5,181	\$55,898	\$9,948	\$65,846
Feb	97,763	4,612	\$49,163	\$9,198	\$58,361
Mar	81,706	3,989	\$36,422	\$8,660	\$45,082
Apr	71,917	874	\$7,659	\$1,810	\$9,469
May	61,458	2,605	\$20,709	\$5,432	\$26,141
Jun	67,882	3,370	\$28,075	\$7,028	\$35,103
Jul	81,371	3,968	\$39,167	\$8,274	\$47,441
Aug	84,672	0	\$0	\$0	\$0
Sep	60,235	2,280	\$26,035	\$4,753	\$30,788
Oct*	62,375	2,135	\$21,390	\$4,451	\$25,841
		Total	\$334,932	\$69,555	\$404,487



Questions?