Better Buildings Residential Network Peer Exchange Call Series: *The Ultimate Retrofit: Zero Energy Ready Homes*

April 13, 2017

Call Slides and Discussion Summary

Agenda

- Agenda Review and Ground Rules
- Opening Polls
- Brief Residential Network Overview and Upcoming Call Schedule
- Featured Speakers
  - **Danny Parker**, Principal Research Scientist, Florida Solar Energy Center
  - **Ian Hammon-Hogan**, Research Manager, BIRAenergy
- Discussion
  - How has your organization incorporated deep retrofits or considered near-zero energy use in home retrofits?
  - What challenges have you encountered? What strategies have helped your program overcome challenges?
  - What advice or recommendations can you offer for how residential energy efficiency programs can move into the deep energy retrofit space and increase demand for zero energy ready homes?
  - Other questions/issues related to zero energy ready homes?
- Closing Poll

Better Buildings Residential Network

Better Buildings Residential Network: Connects energy efficiency programs and partners to share best practices and learn from one another to increase the number of homes that are energy efficient.

Membership: Open to organizations committed to accelerating the pace of home energy upgrades.

Benefits:

- Peer Exchange Calls 4x/month
- Tools, templates, & resources
- Recognition in media, materials
- Speaking opportunities
- Updates on latest trends
- Voluntary member initiatives
- Residential Program Solution Center guided tours

Commitment: Provide DOE with annual number of residential upgrades, and information about associated benefits.

For more information or to join, email bbresidentialnetwork@ee.doe.gov, *or go to* energy.gov/eere/bbrn *and click Join*

Peer Exchange Call Series

We hold one Peer Exchange call the first four Thursdays of each month from 1:00-2:30 pm ET

Calls cover a range of topics, including financing & revenue, data & evaluation, business partners, multifamily housing, and marketing & outreach for all stages of program development and implementation

Upcoming calls:

- April 27: Just What the Doctor Ordered: Integrating Health Benefits into Energy-Efficiency Programs
- May 4: Multifamily-Focused Network Collaborations
- May 11: Are You Ready? Opportunities and Challenges of Home Energy Management Systems
- May 18: Innovation Station: The Latest Advances in Energy Efficiency Technology

Send call topic ideas to peerexchange@rossstrategic.com

See the Better Buildings Residential Network Program website to register

Program Experience: Florida Solar Energy Center

U.S. DEPARTMENT OF ENERGY

FLORIDA SOLAR ENERGY CENTER™

Creating Energy Independence

RETROFIT TOWARDS ZERO: Results in Monitored Florida Homes

Danny Parker

Karen Sutherland, Dave Chasar and Eric Martin

Ultimate Retrofit: Zero Energy Ready Homes

Better Buildings Network Peer Exchange

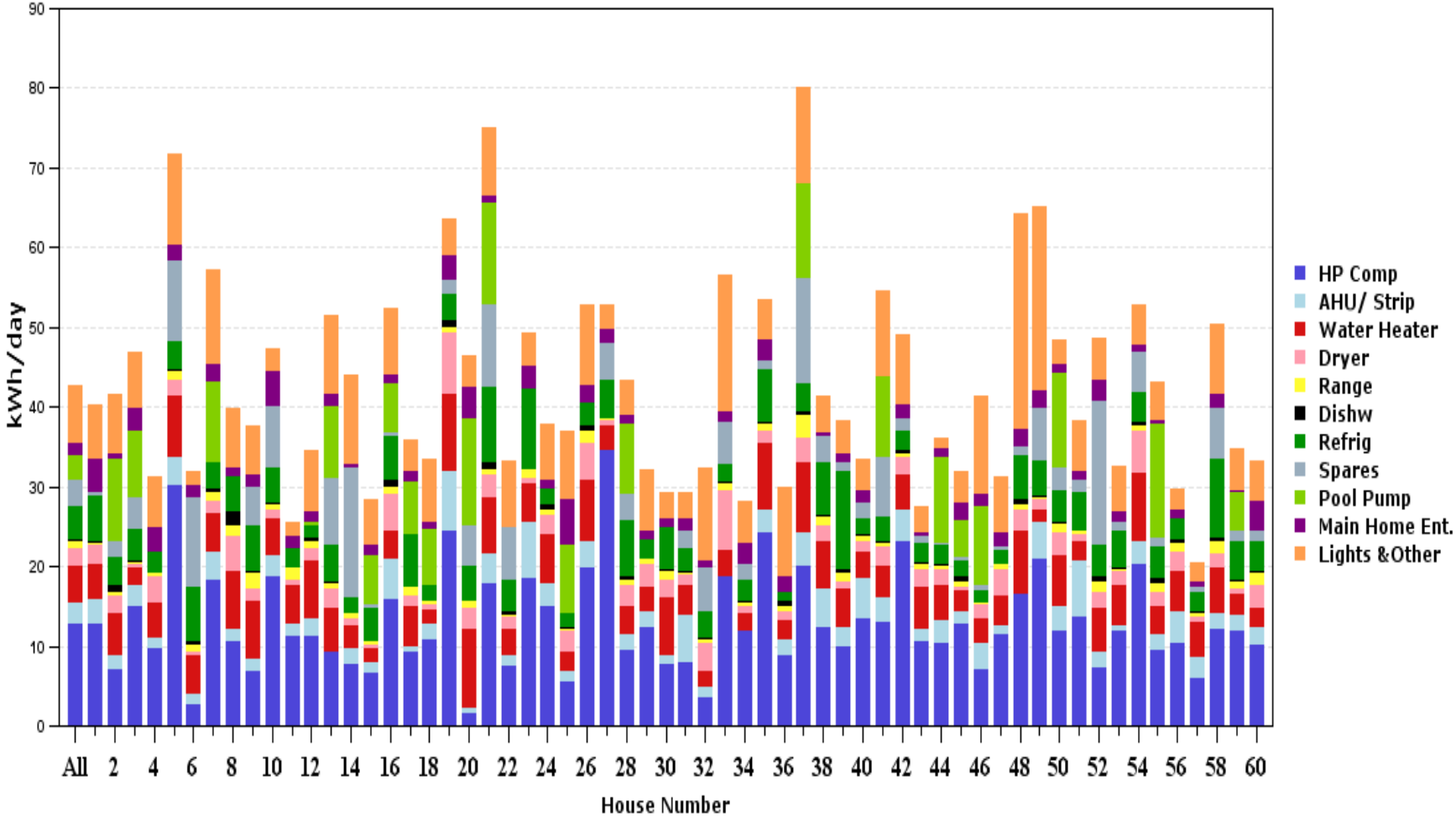
April 13, 2017

A Research Institute of the University of Central Florida

FSEC and Building America

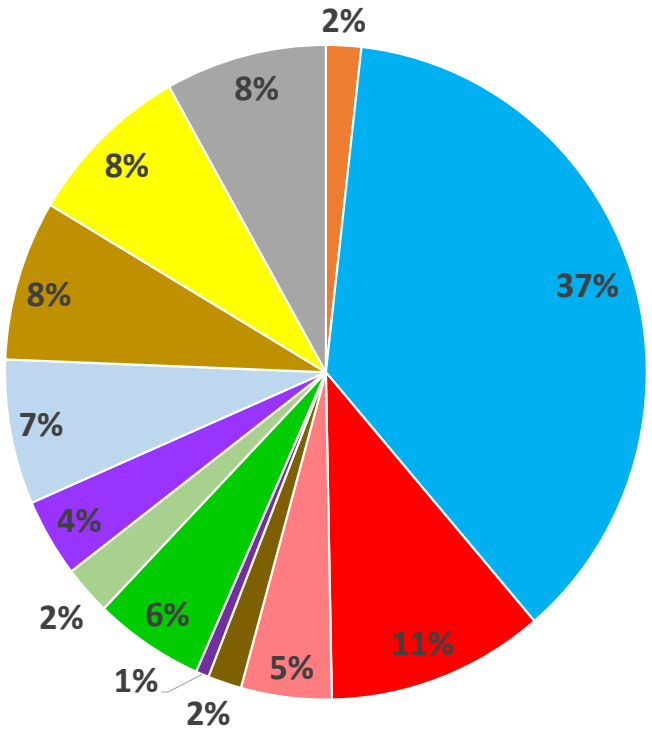
- Goal: Near Zero Energy w/large reductions in existing homes
- BA: detailed monitoring of energy reduction opportunities
- Appeal to utilities: real world evaluation of performance measures and technologies both energy & peak
- Phased Deep Retrofit (PDR) Project: partnership with FPL targeting retrofit packages – shallow & deep, and advanced technology
  - Shallow: Largely lighting & water heating measures; low cost; pass thru
  - Deep: Major equipment (HPs & HPWH), envelope measures, appliances
- Evaluate and measure consumer acceptance and interactions
  (e.g. what are realistic savings of connected thermostats)
- Enthusiastic homeowners used retrofits as springboard to zero

It's Complicated: Mix & Size of End-Uses at Each Site Unique



Cooling Largest Energy End-Use

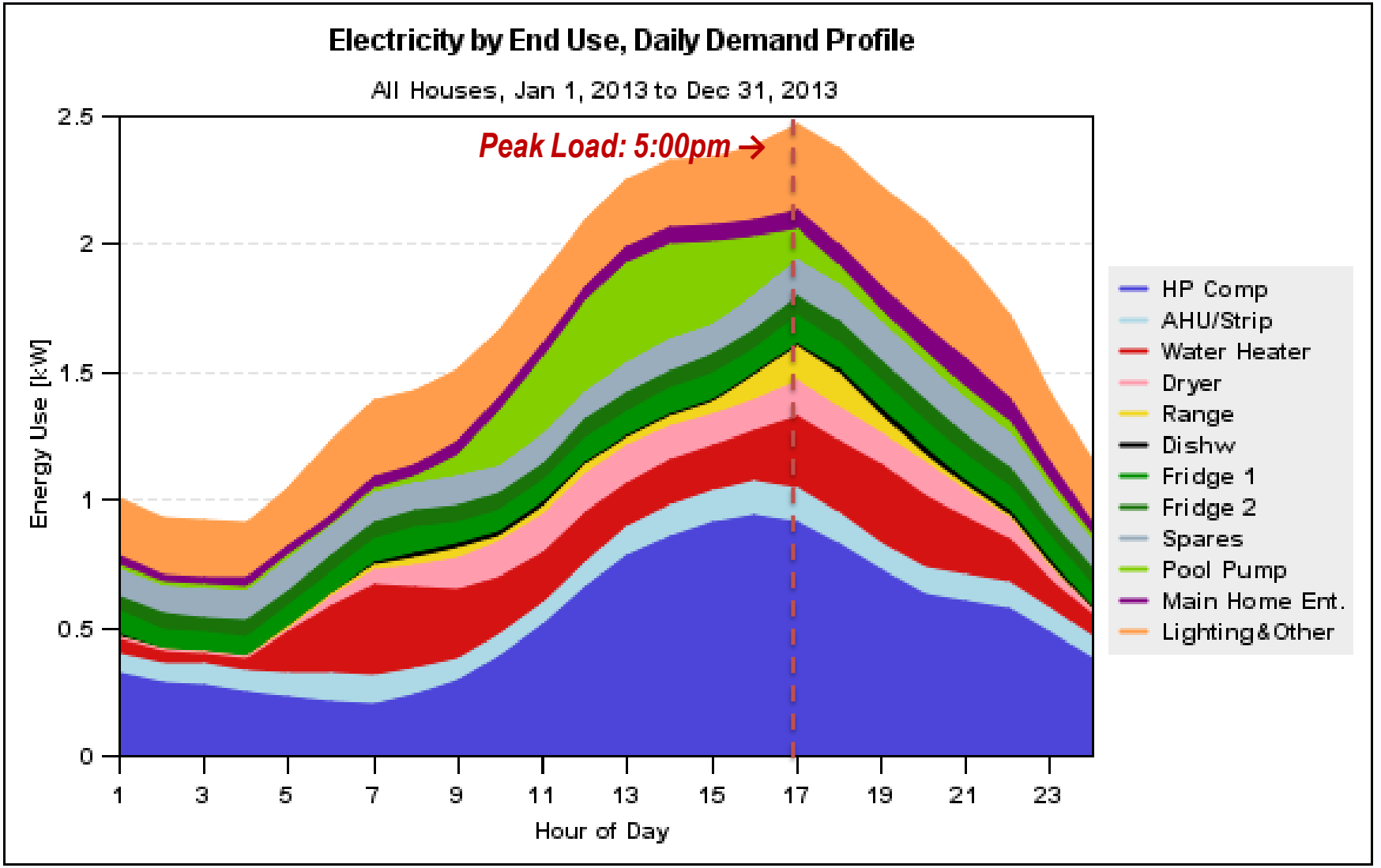
- Average Home Total = 44.1 kWh/day; 16,080 kWh/year



End Use	kWh/day	kWh/yr
Heating	0.78	285
Cooling	16.29	5946
DHW	4.83	1763
Dryer	2.01	734
Range	0.75	274
Dishwasher	0.29	106
Refrigerator	2.44	891
2nd Refrigerator	1.07	391
Main TV	1.71	624
Pool Pump	3.15	1150
Spares	3.49	1274
Lighting	3.67	1340
Plugs & Fans	3.58	1307
	44.06	**16,082**

No single end-use dominates; Conventional loads (space heat/cool & water heat) only 45% of total; lighting & plug loads large difficult to address category

What Makes Up the Peak Load?

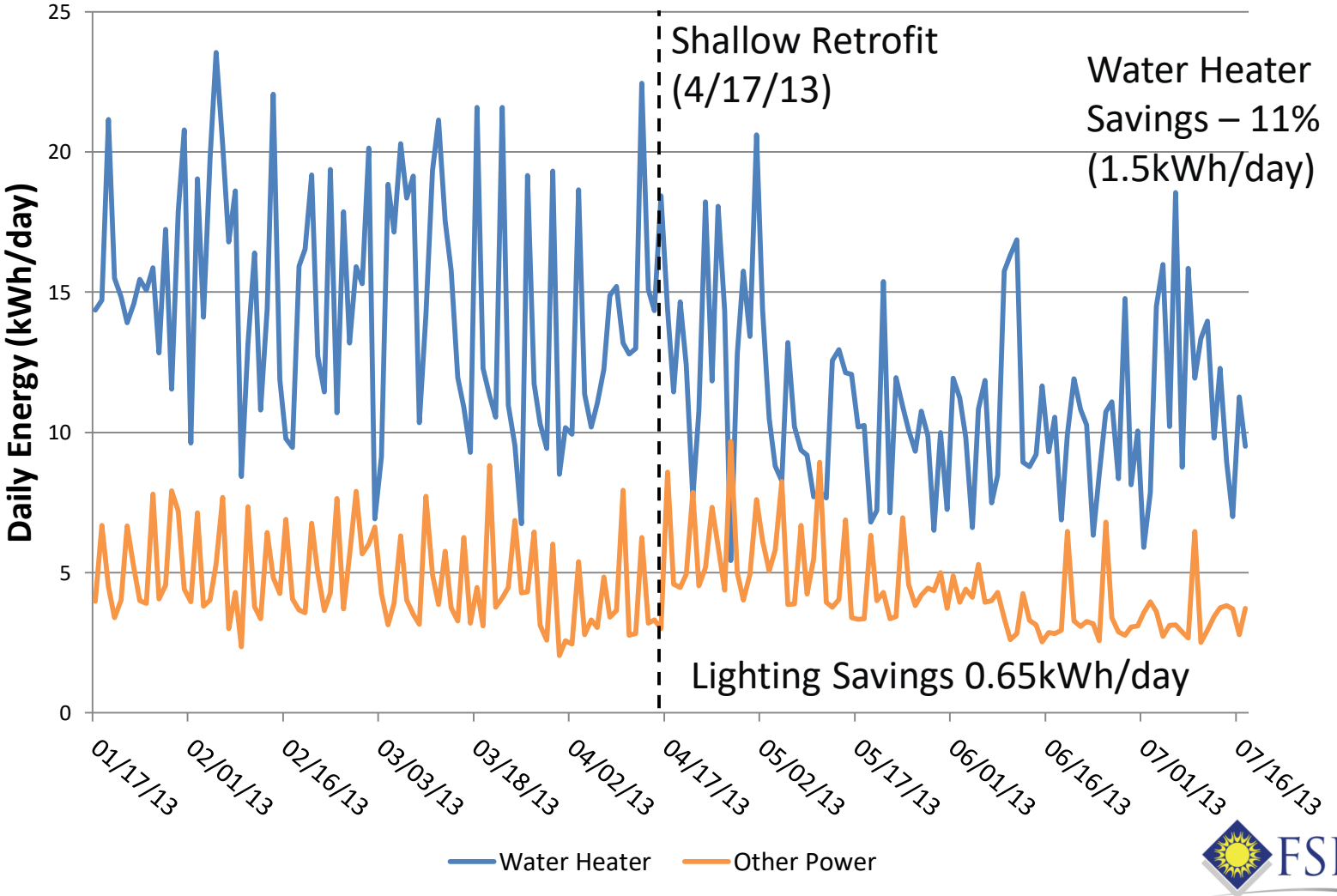


Site 19 – 1988 Home Details and History

Component	Original	Shallow Retrofit	Deep Retrofit
Occupancy	3 adults (2 permanent, 1 periodic)		
Construction	CMU walls, average 10.6 ft ceilings		
Floor	Slab-on-grade / 2,554 ft^2		
Attic/roof	Vented / light colored asphalt shingle		
Windows	Double glazed mix of clear/tint pane, metal/vinyl frame		
Attic Insulation	R-19		R-38
Space conditioning	SEER 10 5-ton heat pump		SEER 16 2-speed, heat pump
Thermostat	Manual		Nest thermostat
Water heater	50-gal Electric resistance	Tank/pipes insulated (R3), 2 new showerheads	80-gal, Heat pump water heater
Appliances	Refrigerator, dishwasher, washer/dryer		Energy efficient washer
Lighting	89 Lamps, 3.39kW	89 Lamps, 1.53kW	
Envelope Leakage	6.51 ACH @50Pa		
Duct leakage	0.09 Qn, out		0.05 Qn, out

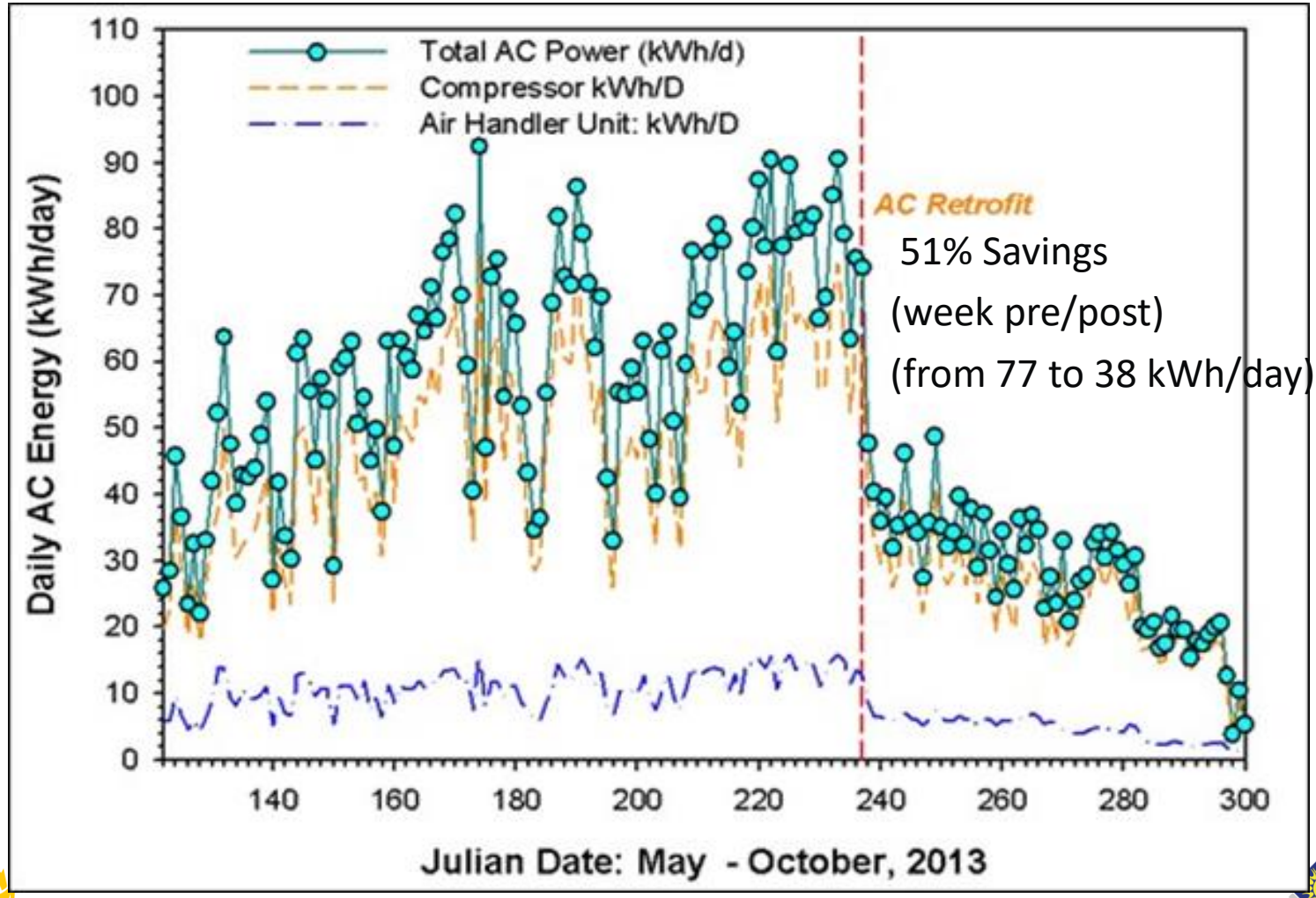
Site 19 – Shallow Retrofit Savings:

Water Heating and Lighting Energy



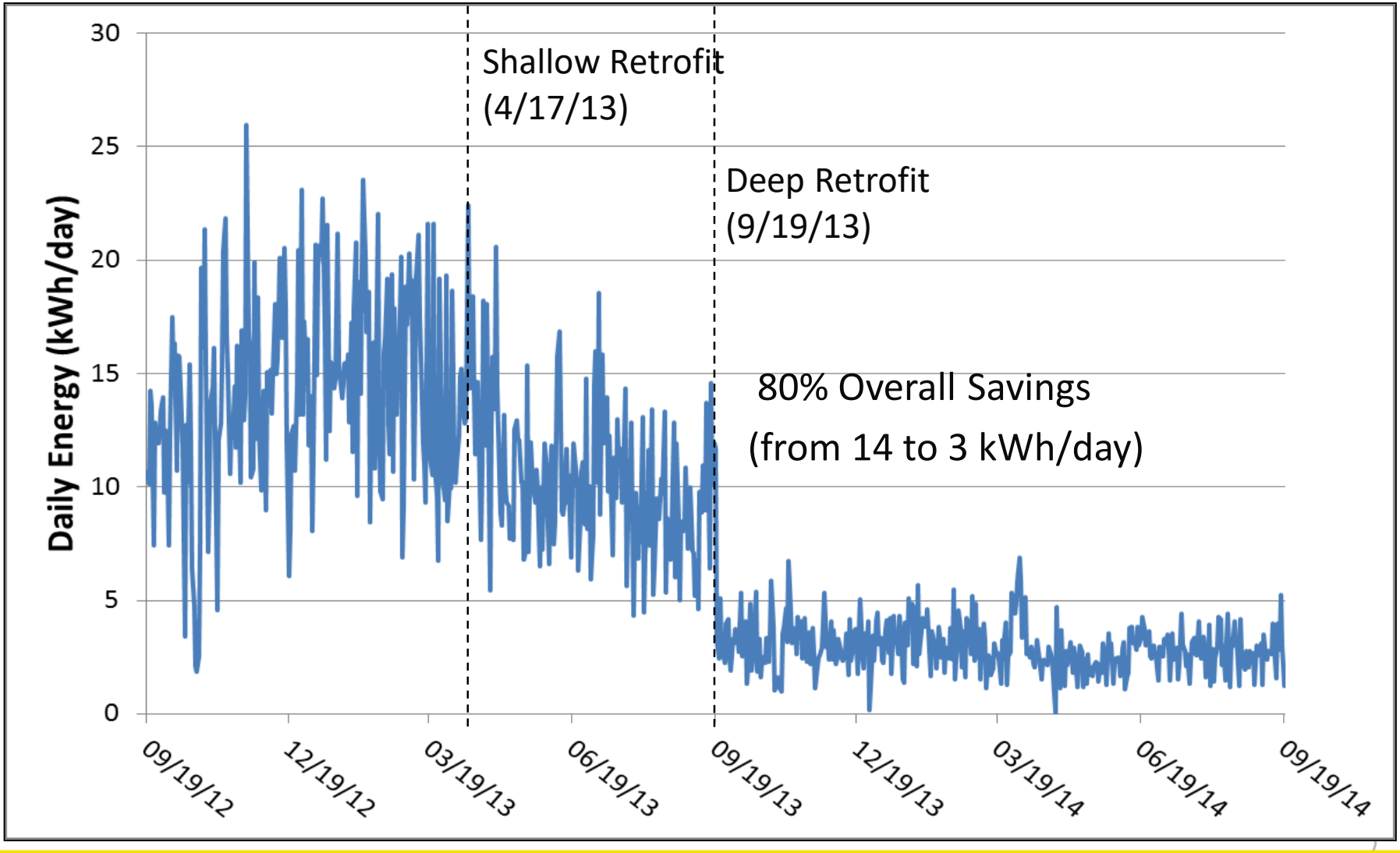
Site 19 – Deep Retrofit Savings:

Cooling Energy Use

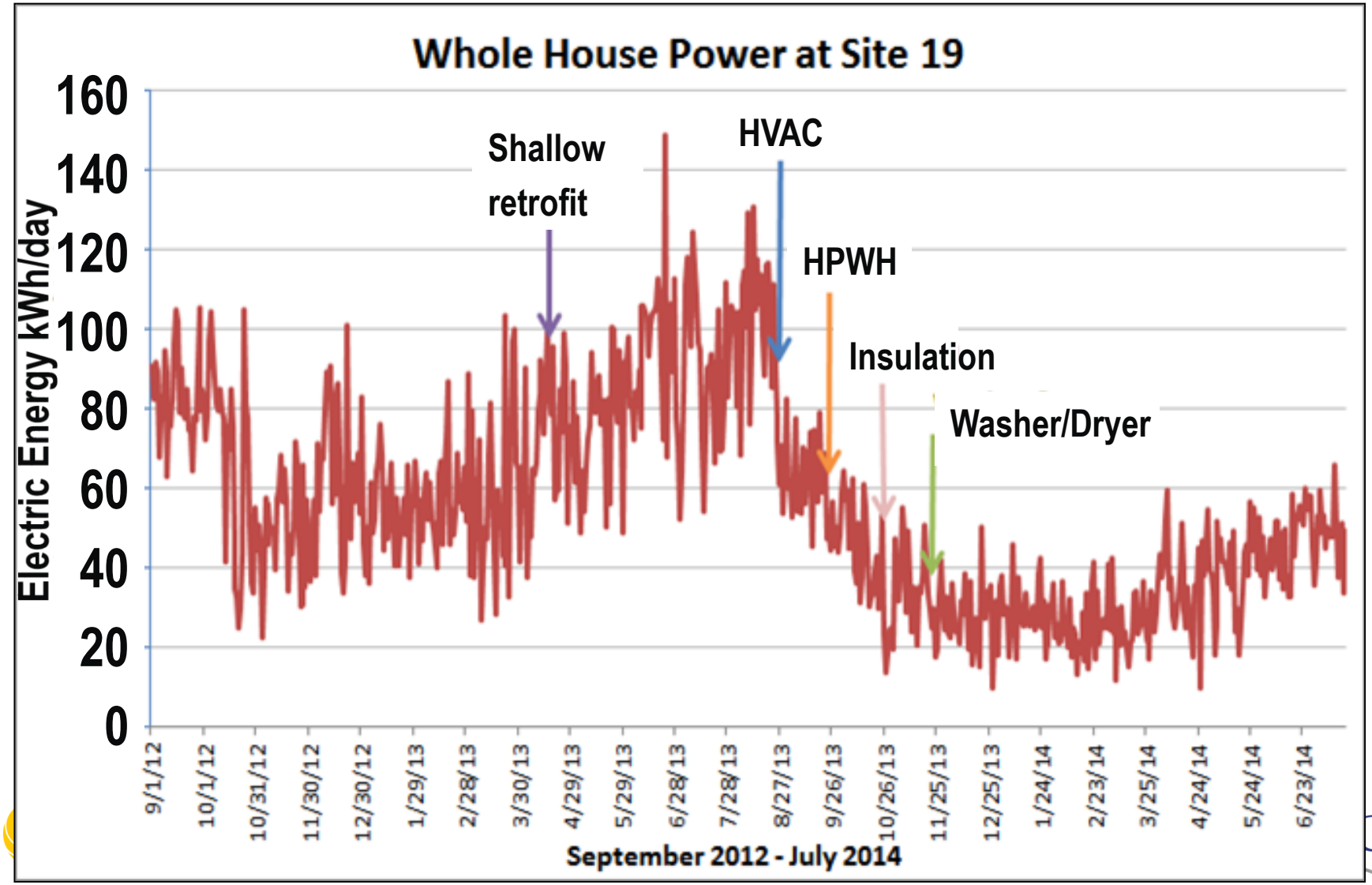


Site 19 – Deep Retrofit Savings:

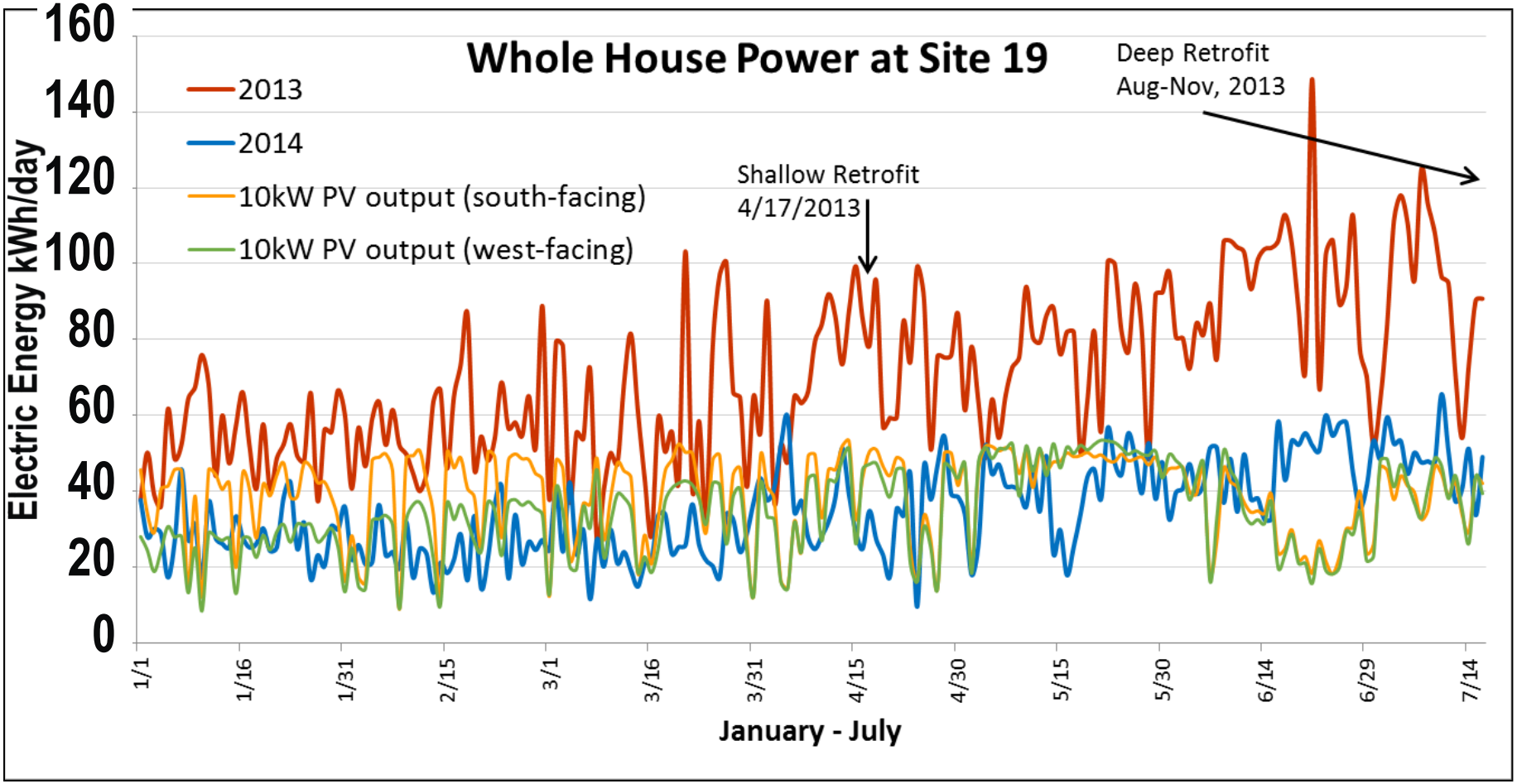
Water Heating Energy



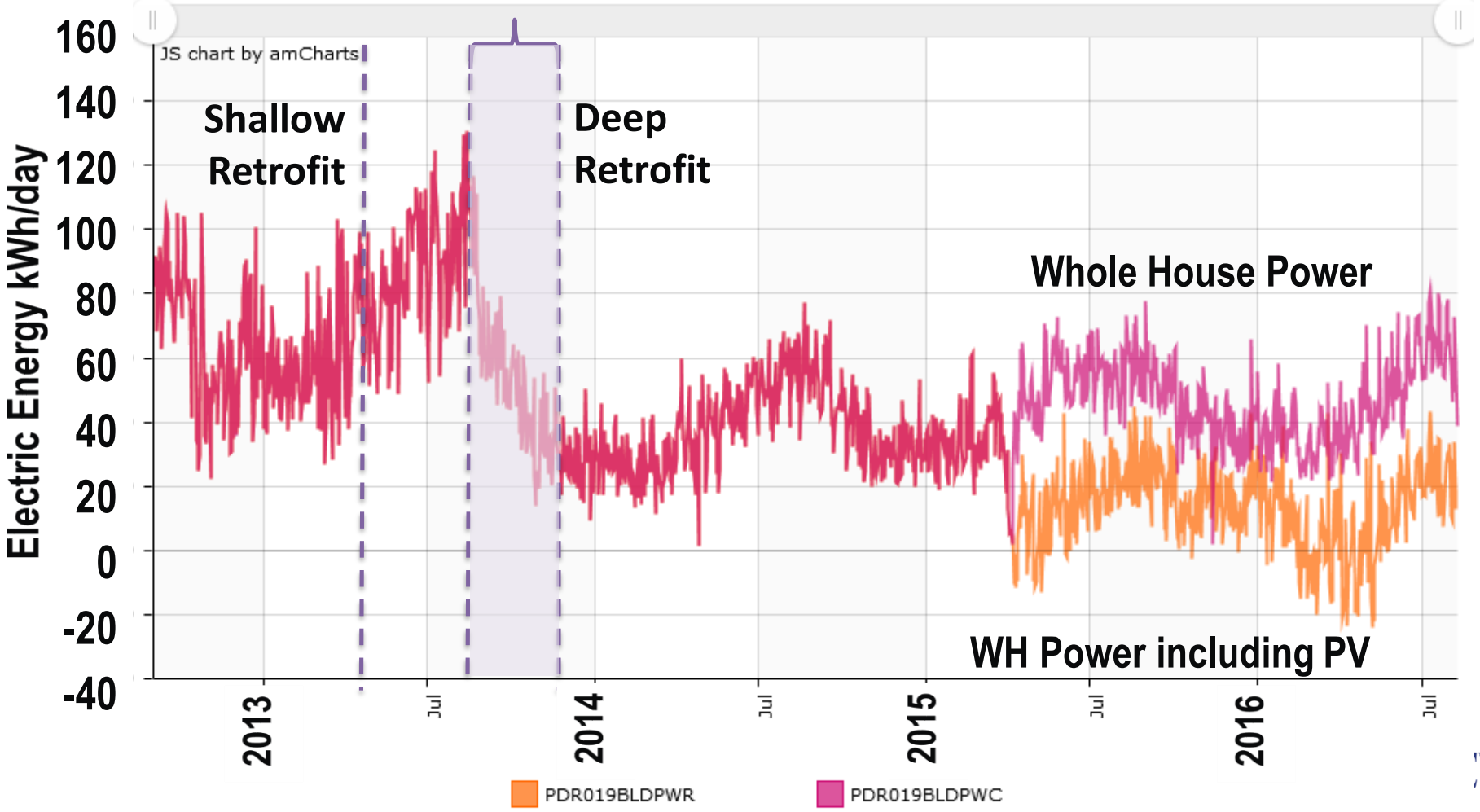
Site 19 – Retrofit Effects on Whole House Power



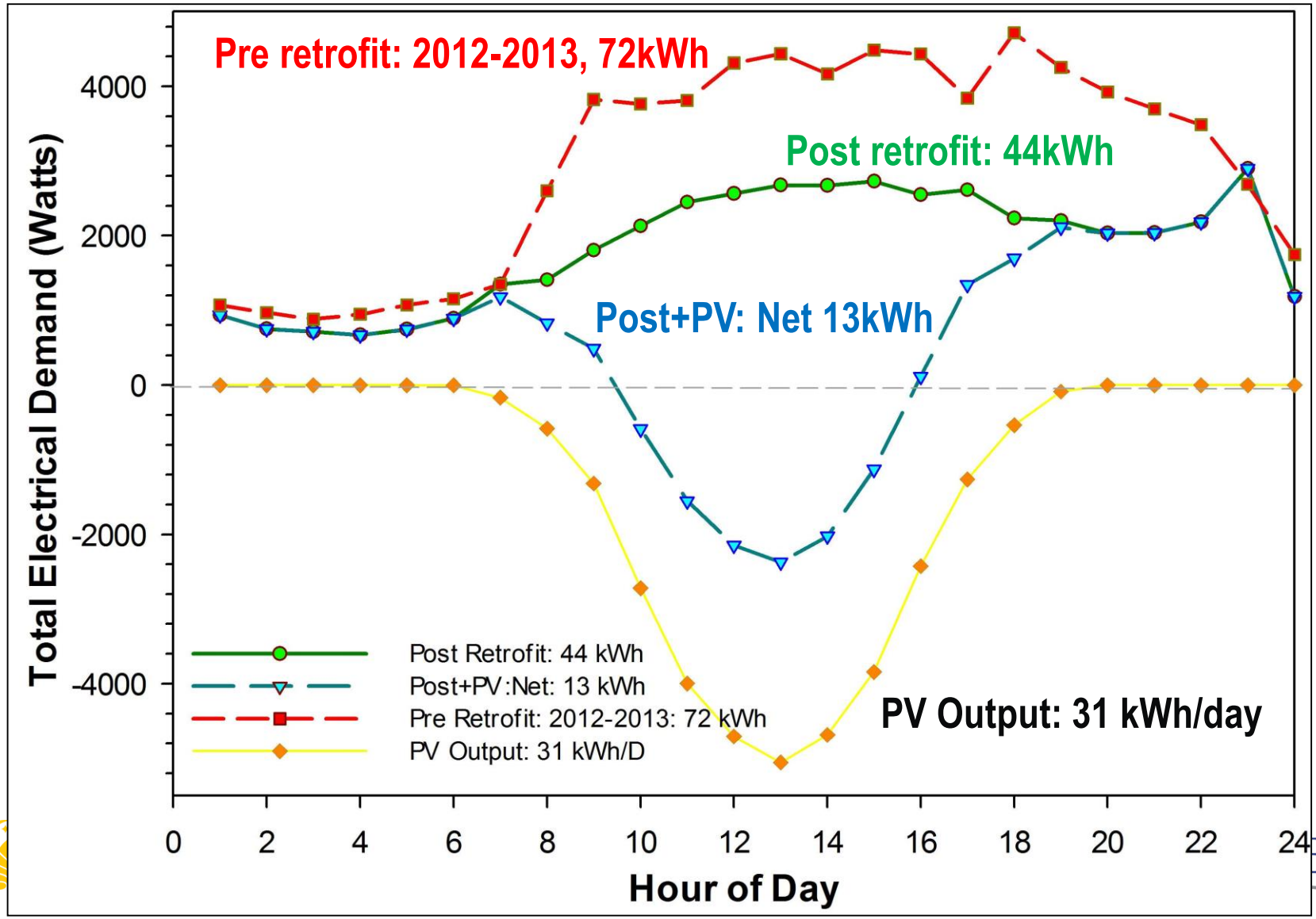
Site 19 – Measured Savings & Simulated PV Output (Beopt)



Site 19 – Whole House Power (including PV)
Sep-2012 to Aug-2016



Site 19 – Average Daily Load Profiles



Retrofit to Zero: Site #19 Example

- **Site 19 – Measured annual consumption reduced by 47%**
  - From 24,483 to 12,862 kWh/year
- Summertime consumption from April – August, 2013 vs. 2014 dropped from 87 to 46 kWh/day
- Retrofit measures include:
  - Efficient lighting
  - Added attic insulation
  - Heat pump water heater
  - Duct sealing
  - High-efficiency heat pump
  - Smart thermostat
  - Heat pump clothes dryer

- **10 kW PV system installed April 2015**:
  - Avg net electricity use of 13 kWh/day w/ PV system output (31 kWh/day) — an **82% reduction towards zero energy**

Phased Deep Retrofit: Conclusions

- Findings from a detailed field metering FL pilot study point to home energy savings retrofit packages:
  - Shallow (9% savings; 1356 kWh/yr)
  - Deeper retrofits (38% savings; 7067 kWh/yr)
  - Hi performance Technologies that enable Zero Energy Home
- Planning Stages for Large-scale study in California
  - How will existing CA homes to reach Net Zero Energy?
  - Realistic assessment of smart metering load disaggregation
  - Evaluation of PV across geography & electrical storage
  - Legacy sample for long-term tracking of consumption trend
    - What are emerging loads?

Thank you

Danny Parker, Karen Sutherland

FOR MORE INFORMATION: LINKS:

Phased Retrofits in Existing FL Homes Phase I: Shallow and Deep Retrofits http://fsec.ucf.edu/en/publications/pdf/fsec-cr-2018-16.pdf
Phase II: Shallow Plus Retrofits http://fsec.ucf.edu/en/publications/pdf/fsec-cr-2019-16.pdf

Papers:

Evaluation of the Space Heating and Cooling Energy Savings of Smart Thermostats in a Hot-Humid Climate using Long-term Data
http://www.fsec.ucf.edu/en/publications/pdf/fsec-rr-647-16.pdf
Measured Performance of Ducted and Space-Coupled Heat Pump Water Heaters in a Cooling Dominated Climate
http://www.fsec.ucf.edu/en/publications/pdf/fsec-rr-644-16.pdf
Measured Performance of Heat Pump Clothes Dryers http://www.fsec.ucf.edu/en/publications/pdf/fsec-rr-645-16.pdf
Evaluation of Mini-Split Heat Pumps as Supplemental and Full System Retrofits in a Hot Humid Climate
http://www.fsec.ucf.edu/en/publications/pdf/fsec-rr-646-16.pdf
From Energy Guzzler to Near-Zero Energy Home: Lessons from the Phased Deep Retrofit Project
http://www.fsec.ucf.edu/en/publications/pdf/fsec-rr-648-16.pdf
Measured Retrofit Savings from Efficient Lighting and Smart Power Strips http://fsec.ucf.edu/en/publications/pdf/FSEC-RR-508-14.pdf

Presentation Highlights: Florida Solar Energy Center (1 of 2)

- **There's not one single magic bullet**: an integrated package with multiple energy efficiency measures is needed to achieve zero energy homes.
  - At one of the sites, Florida Solar Energy Center (FSEC)'s Phased Deep Retrofit (PDR) study achieved an average of 82% reduction of energy use through both shallow and deep upgrades (solar photovoltaic included).
- **Home energy technologies are fast evolving** (e.g. mini split heat pumps, smart thermostats), thus creating an opportunity for even greater savings and expansion of zero energy homes.
- **Solar PV systems are often the next step in the process:**
  - In some cases, the high energy savings encouraged PDR participants to go even further and add a solar PV system.

Presentation Highlights: Florida Solar Energy Center (2 of 2)

Key project features and results:

- **FSEC's PDR** study was funded by the U.S. Department of Energy (DOE). **Average costs were:**
  - **Shallow retrofits**: ~$375 per home.
  - **Deep retrofits**: ~ $14,300 per home.
- **Payback period:** Shallow retrofits had a short payback period of ~ 2 – 2.5 years, while deeper retrofits of ~10.5 years.
  - The homeowner had to be in the market to replace their HVAC system to qualify for the study, which reduced the payback period.
- **Not all measures proved to be cost-effective.**
  - FSEC found that the change of refrigerator, for example, didn't yield significant energy savings.
  - The biggest expenses involved upgrading the heat pump, pool pump, and/or water heater.

Program Experience: BIRAenergy

U.S. DEPARTMENT OF ENERGY

The Very Efficient Retrofit Package at Beechwood, in Lancaster, California

A Replicable & Scalable Method to Design Energy Efficient Retrofit Packages for Low-Income Multifamily Buildings

Ian Hammon-Hogan
Research Manager

biraenergy

Project Partners

CEC PIER program

Dustin Davis, Project Manager

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The Beechwood Community

4: 10-Plex's
2: 8-Plex's
22: Duplex's
1: Community Center

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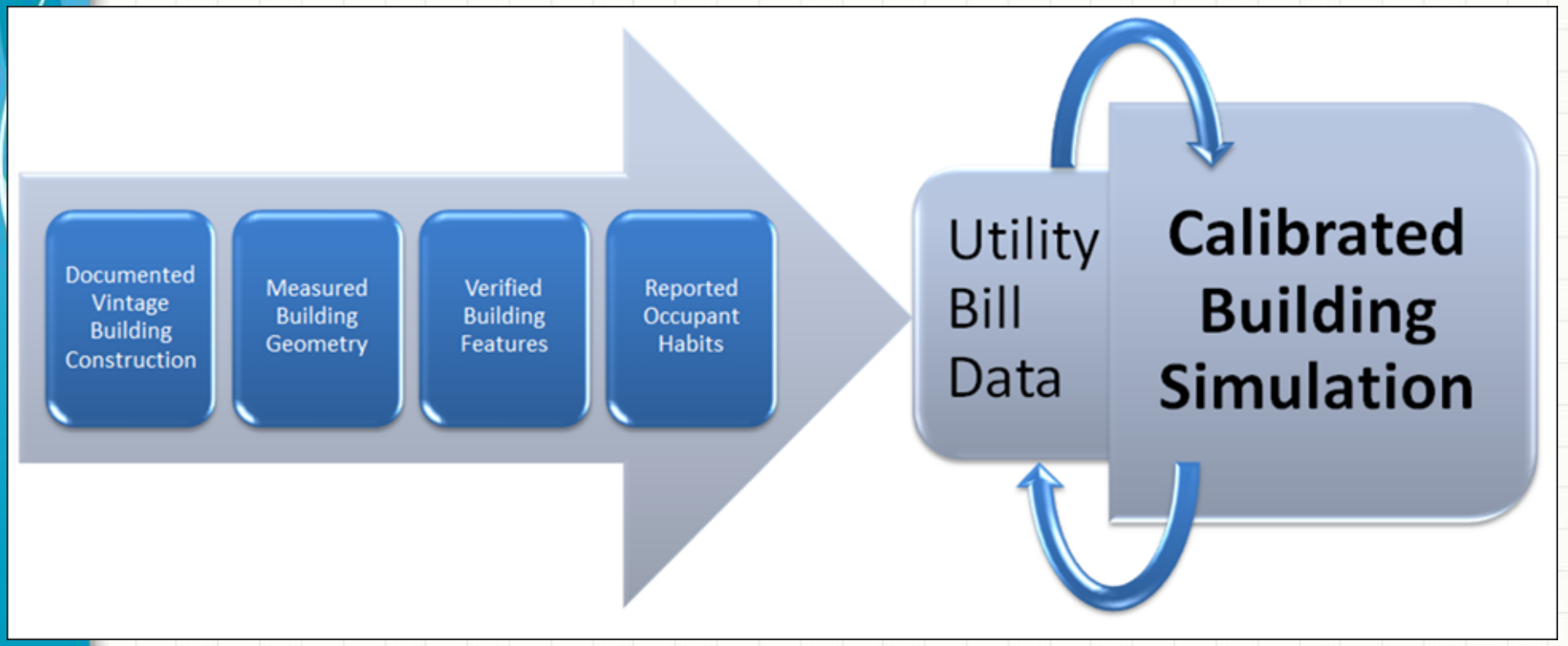
Baseline Features

- Site Visit

Calibrated BEopt Models



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Calibrated BEopt Models

- MELs Survey

CATEGORY	ELECTRIC USE	QUANTITY	FREQUENCY OF USE					ADDITIONAL INFORMATION
			DAILY	NUMBER OF HOURS	WEEKLY	MONTHLY	INFREQUENT OR NEVER	
APPLIANCES	OVEN							
	REFRIGERATOR							
	MICROWAVE							
	COFFEE MAKER							
	TOASTER							
	TOASTER OVEN							
	WAFFLE IRON							
	BLENDER							
	ELECTRICAL GRILL/GRIDDLE							
	DEEP FRYER							
	SLOW COOKER/CROCK POT							
	HAIR DRYER							
	CURLING IRON							
	ELECTRIC SHAVER							
ELECTRONICS/ENTERTAINMENT	TELEVISION							
	DVD PLAYER/VCR							
	VIDEO GAMING SYSTEM							
	CLOCK RADIO							
	HOME STEREO/PORTABLE STEREO							
	SUBWOOFER							
	CABLE BOX							
	CABLE/DSL MODEM							
	COMPUTER - LAPTOP							
	COMPUTER - DESKTOP							
	PRINTER							
	CHARGER - CELL PHONE							
	CHARGER - DIGITAL CAMERA							
	CHARGER - MP3 PLAYER							
MISCELLANEOUS	MEDICAL EQUPMENT							
	FISH TANK							
	CEILING FAN							
	THERMOSTAT							
	BATHROOM HEATER							
	ELECTRIC SPACE HEATER							
	FAN (PORTABLE)							
	AIR CLEANER							
	HEATING PADS							
	CLOTHES IRON							
	BABY MONITOR							

Baseline Features

- Site Visit

Modeling Parameter	Beechwood Base Case Package
Miscellaneous Electric Load	1273 kWh/year per unit
Attic Insulation	Ceiling Assembly U-Factor = 0.1220
Roof Material	Light colored gravel (Absorptivity = 0.75 , Emissitivity = 0.91)
Window Types	Double pane, metal frame (E Factor = 0.76, SGHC = 0.67)
Air Leakage	14.1 ACH50
Refrigerator	Top-mounted freezer, 480 kWh/year
Dishwasher	318 kWh/year
Lighting	100% Incandescent Lighting
Air Conditioner	12 SEER
Furnace	80% AFUE
Ducts	32% Leakage, Uninsulated
Water Heater	Multiplex: Shared portion of 100gal Boiler (0.80 EF)
	Duplex: 40gal Storage (0.62 EF)

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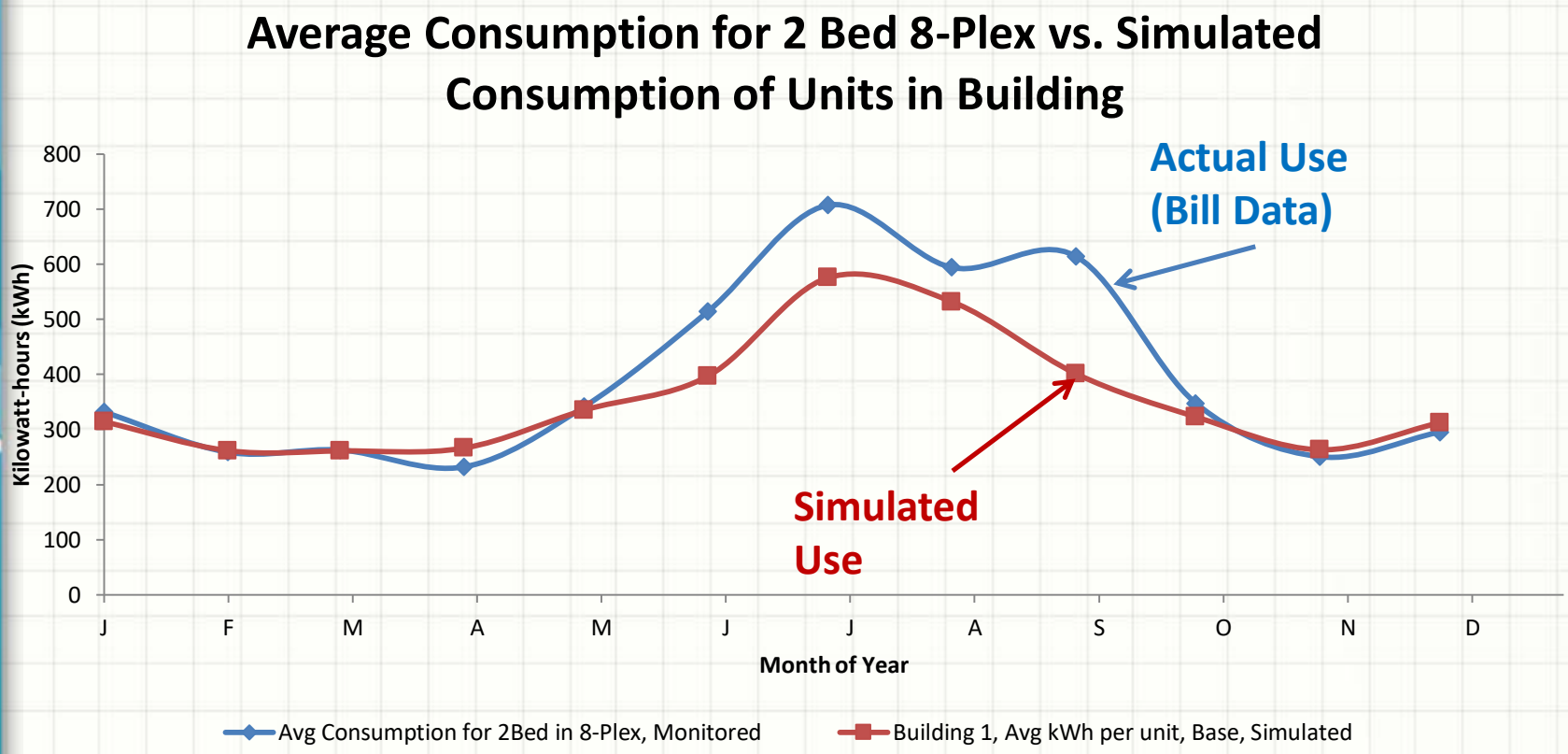
Calibrated Models: Pre-Retrofit



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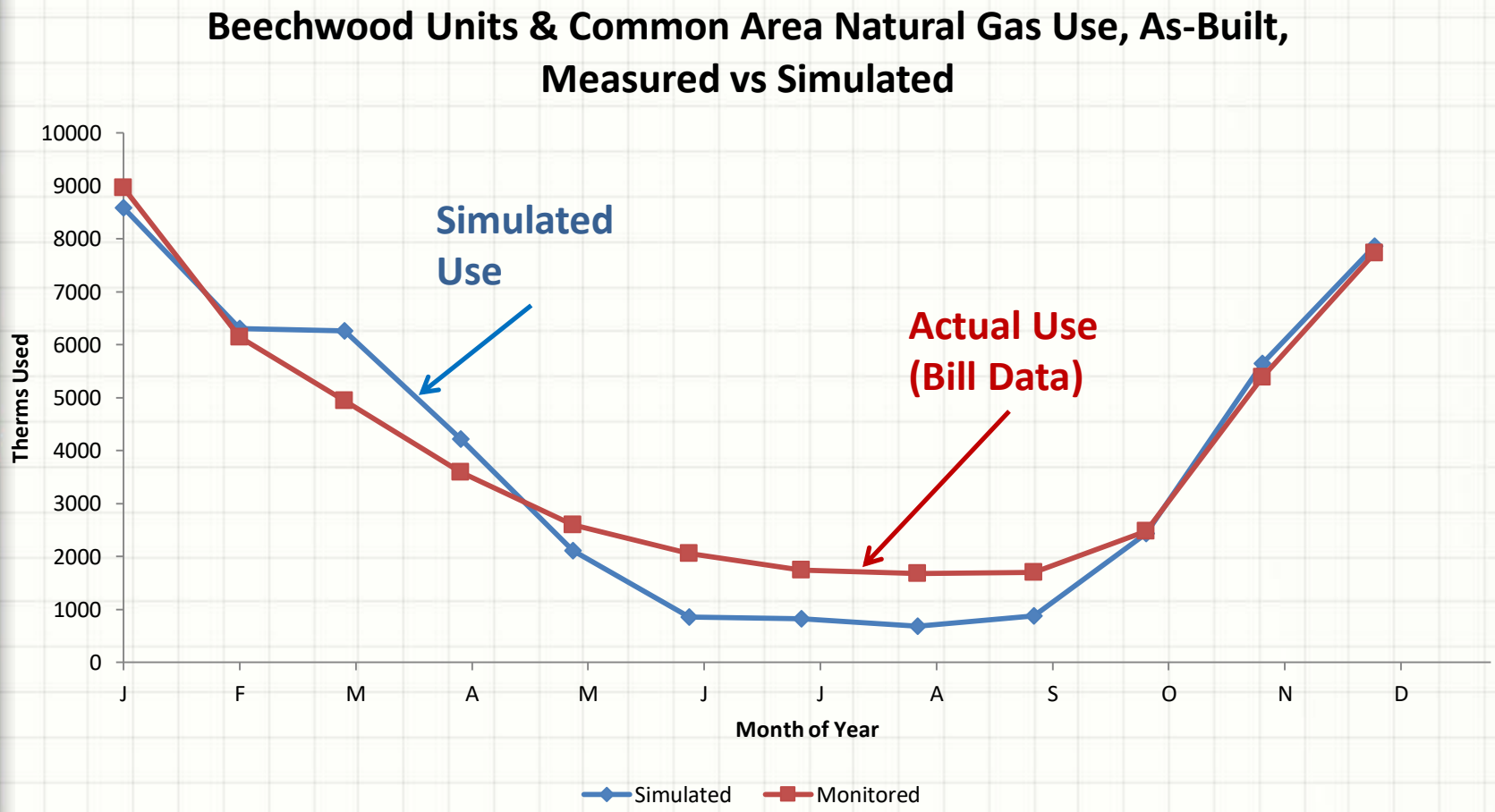
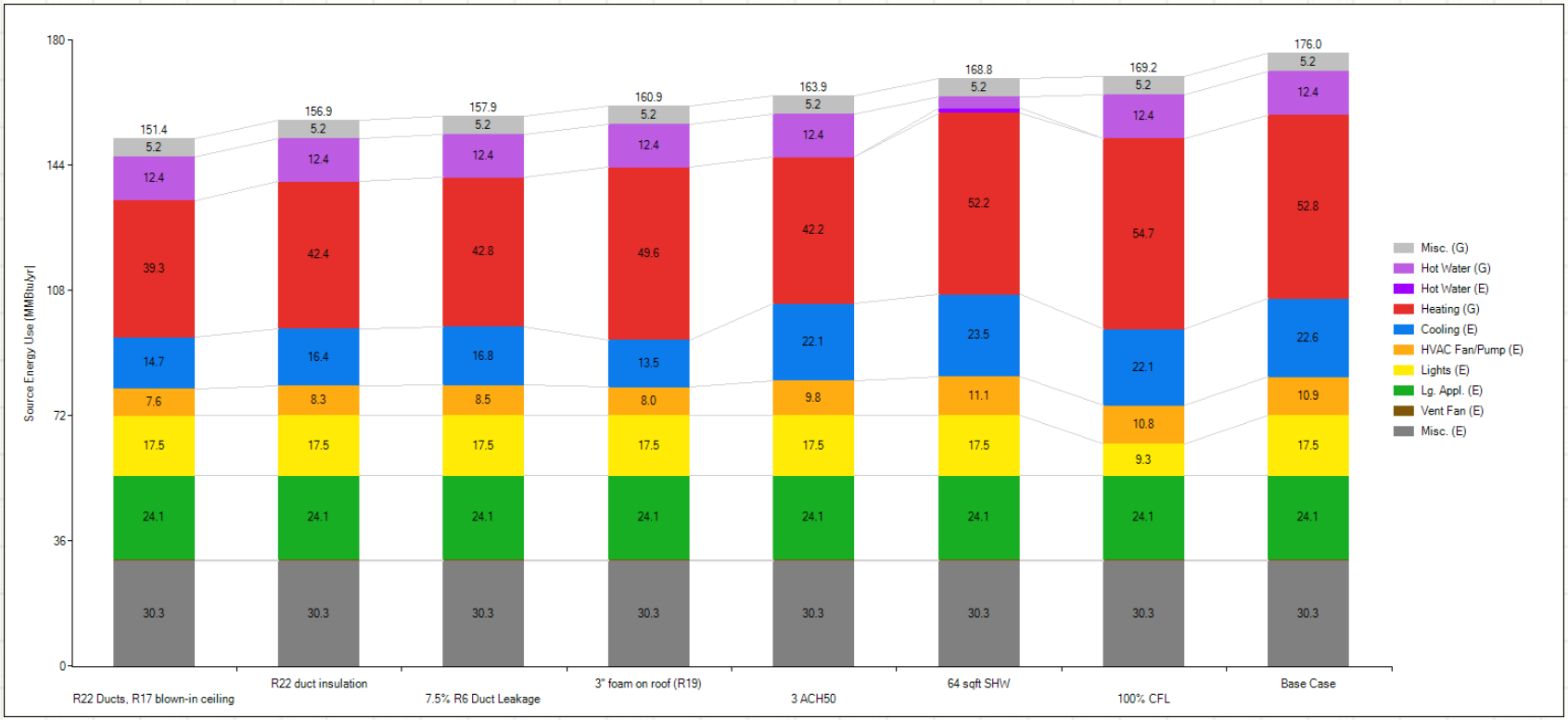
Calibrated Models: Pre-Retrofit



Development of EE Package

- Sensitivity Analysis



Development of EE Package

- Impacts of Individual Features

Single Feature Replace-ment #	Base Case Single Feature Replacement Package	Source Energy Use (s-Mbtu/yr)	% Source Energy Savings	Cost of Feature	Cost : Benefit ($/kBtu)	Annual Estimated Change in Utility Bill	Simple Payoff (Years)	Used in Initial VER Packages?
1	R-20 XPS Roof	179.2	22%	$ 4,871	$ 0.10	$ 453	11	Y
2	Ducts in Conditoned Space	180.0	21%	$ 4,871	$ 0.10	$ 448	11	Y
3	R8 Ducts, 7.5% Leakage	187.6	18%	$ 1,949	$ 0.05	$ 378	5	Y
4	3.0 ACH50	203.7	11%	$ 2,214	$ 0.09	$ 210	11	Y
5	56 sqft SHW	214.5	6%	$ 2,885	$ 0.20	$ 102	28	Y
6	8.4 ACH50	215.6	6%	$ 1,476	$ 0.11	$ 111	13	Y
7	0.29 / 0.31 Windows	216.2	5%	$ 5,140	$ 0.41	$ 104	49	N
8	Duct Sealing	216.8	5%	$ 2,406	$ 0.20	$ 108	22	Y
9	R-13, Gr. 1, Cellulose Walls	217.8	5%	$ 4,826	$ 0.44	$ 98	49	N
10	Radiant Barrier	218.6	4%	$ 494	$ 0.05	$ 98	5	N
11	R13, Gr. 3, Cellulose Walls	218.5	5%	$ 4,826	$ 0.47	$ 92	53	N
12	100% LED	219.7	4%	$ 1,045	$ 0.11	$ 113	9	Y
13	16 SEER AC (2-Stage)	222.5	3%	$ 1,200	$ 0.19	$ 86	14	N
14	0.96 EF Tankless Condensing DHW	223.5	2%	$ 910	$ 0.17	$ 48	19	Y
15	0.21 / 0.21 Windows	224.4	2%	$ 5,188	$ 1.18	$ 36	143	N
16	Cool Roof	224.7	2%	$ 1,476	$ 0.36	$ 56	27	N
17	EnergySTAR Frig & DW	226.8	1%	$ 1,934	$ 0.97	$ 23	86	Y
18	2013-T24 Low Slope Roof	227.1	1%	$ 4,871	$ 2.77	$ 29	169	N
19	Home Energy Management Syste	227.6	1%	$ 600	$ 0.50	$ 15	41	Y
	Base Case, Building 20, avg unit	228.8						
20	2 Smart, Premium Ceiling Fans	229.6	0%	$ 800	$ (0.99)	$ (9)	-86	N
21	Induction Cooktop	230.7	-1%	$ 1,879	$ (1.07)	$ (32)	-58	N
22	6 Smart, Premium Ceiling Fans	231.1	-1%	$ 2,400	$ (1.08)	$ (28)	-86	N

VERs Package Installation

- Final Package Recommendations

Feature	Beechwood VER Case Model Package Features
Miscellaneous Electric Load	Home Energy Management System and Communicating Tstats (est 12% MELS savings)
Attic Insulation	Additional 7" blown fiberglass in est. 1/4 of ceiling area
	R-15 (ballasted) or R-20 XPS (on Building 3 only)
Air Leakage	3.0 ACH50 (1.5 SLA)
Refrigerator	Top-mounted freezer, EnergySTAR, 348 kWh/year
Dishwasher	EnergySTAR, 290 kWh/year
Lighting	100% LED
Ducts	Ducts in Conditioned Space, 6% leakage
Water Heating	Multiplex: SHW with first 100gal Boiler backup 0.94 EF
	Duplex: 0.96 EF tankless condensing DHW

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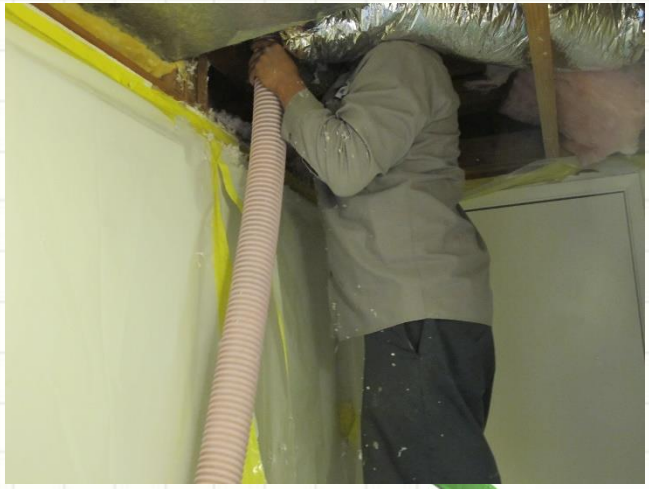
VERs Package Installation



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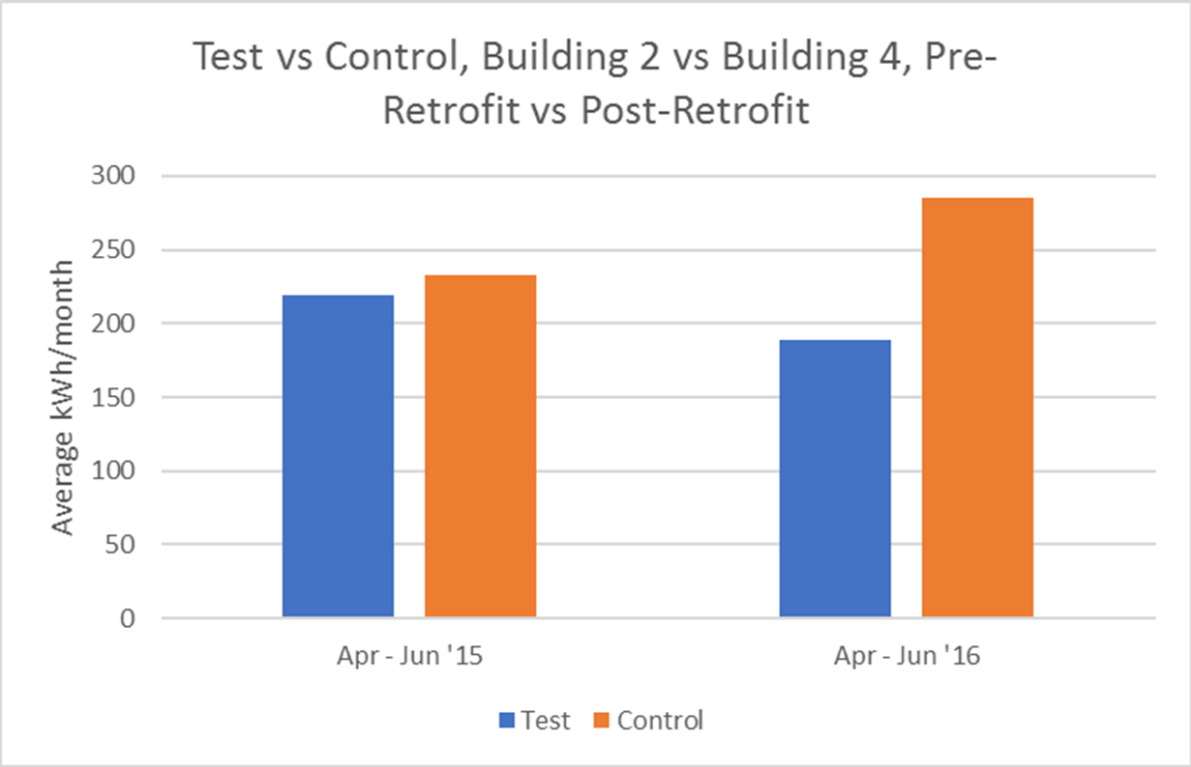
Estimating the Savings Against Control Group

- Behavior Changes with the weather



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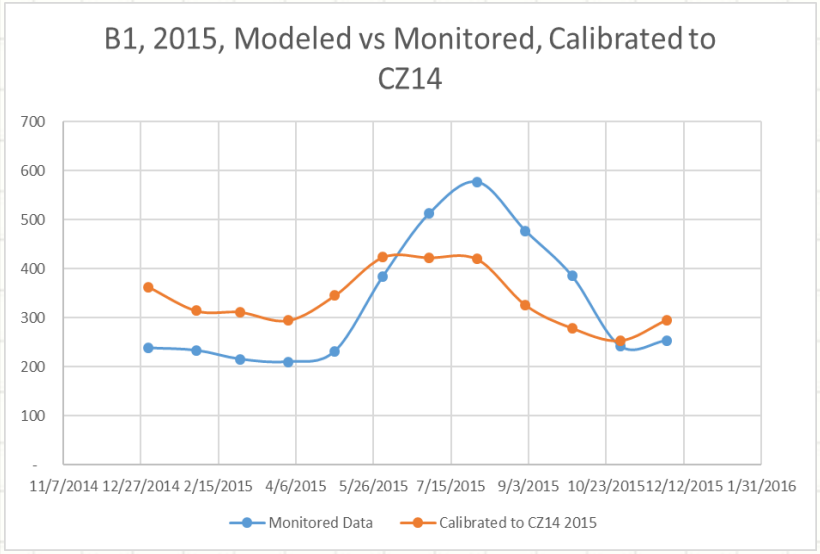
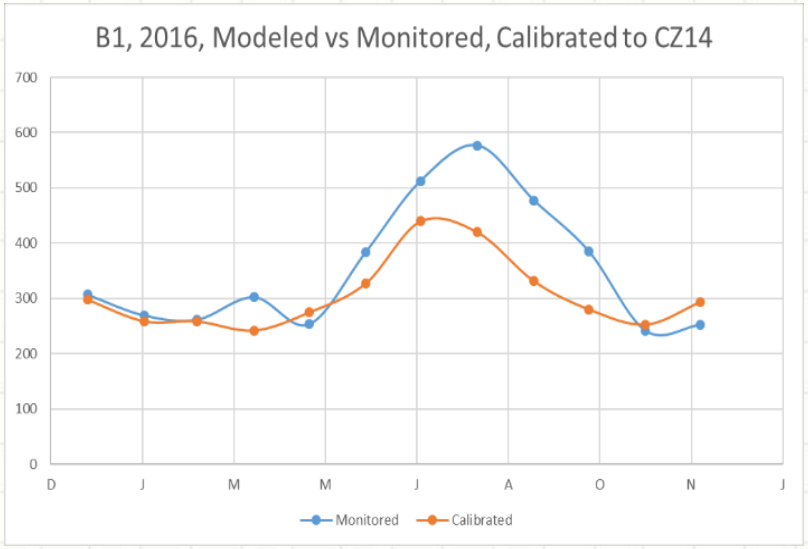
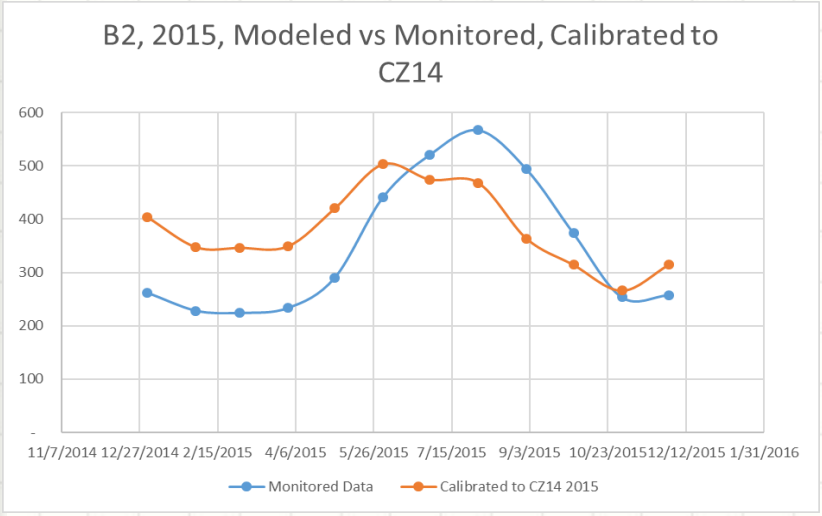
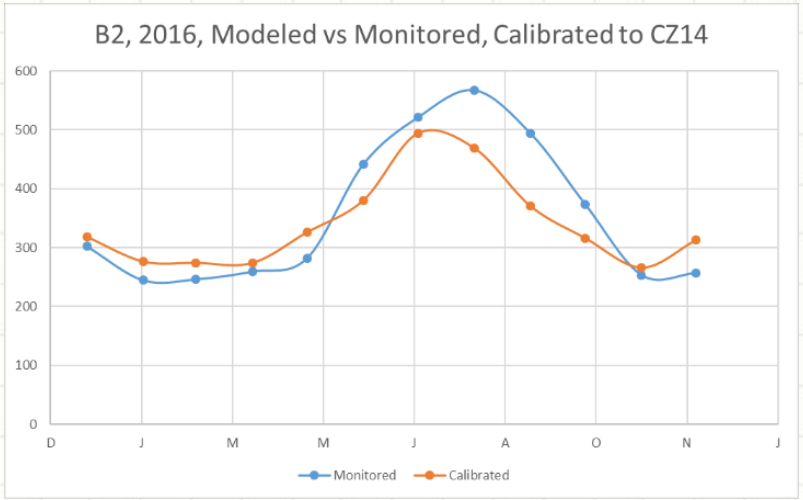
Calibrated Models: Post-Retrofit









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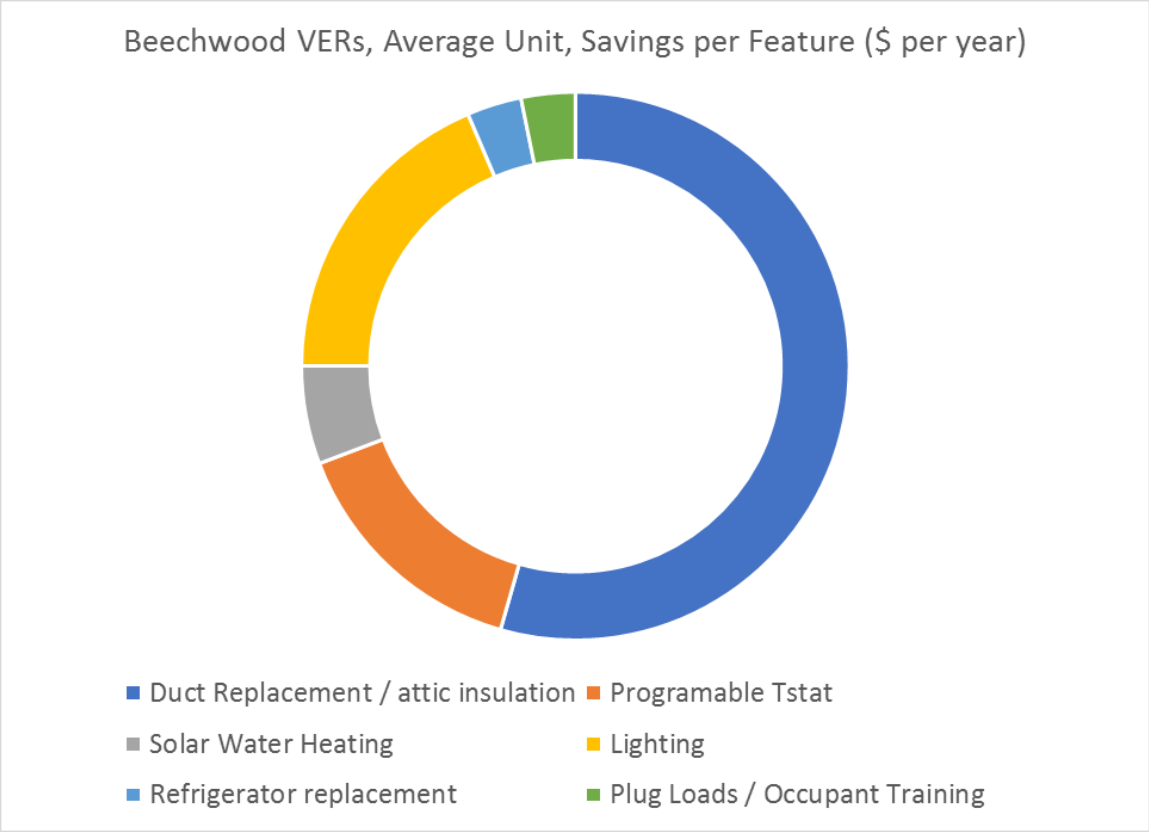
VERS: Very Efficient Retrofit

~25% Electrical Savings



~50% Gas Savings

	$ Saved Per Year	Rate	Cost	Simple Payoff
Gas	$ 4,280	$0.92	$ 368,281	86
Electric	$ 7,194	$0.165	$ 368,281	N/A
Total EE	$ 11,474	N/A	$ 368,281	32
PV	$ 19,390	$0.165	$ 331,800	N/A
Gas + PV	$ 23,671	N/A	$ 700,081	30
EE + PV	$ 30,864	N/A	$ 700,081	23

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Capture All the Savings

- Ideally, Financial Incentives should be Equally Available to all Fuel Types
- With Combined Gas & Electrical Savings, the VERs can be cost-effective in 23 years or less

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Additional Details

- The Community Center Retrofit

Feature Category	Base Case (Unimproved Features)	Very Efficient Retrofit (VER) Package
Wall Insulation and Framing	R-8 Fiberglass Batt, 2x4, 16 in o.c.	R-8 Fiberglass Batt, 2x4, 16 in o.c.
Wall Sheathing	OSB	OSB
Exterior Finish	Stucco, Light	Stucco, Light
Attic Insulation & Type	Ceiling R-19 Fiberglass, Vented	Ceiling R-19 Fiberglass, 3" SPF (R18), Vented
Roof Type & Material	Flat roof, graveled	Flat roof, graveled
Radiant Barrier	None	None
Window Type	Double-Pane, Clear, Metal Frame	Double-Pane, Clear, Metal Frame
Air Leakage	10 ACH50	7 ACH50 (Aeroseal)
Mechanical Ventilation	None	None
Central Air Conditioner	SEER 14	SEER 14, with economizer
Furnace	Gas, 80% AFUE	Gas, 80% AFUE
Ducts	30% Leakage, Uninsulated	7.5% Leakage, R-4
Smart Thermostat?	No	Yes
Water Heater	Gas, 100gal tank, 0.62 EF	Gas, 100gal tank, 0.62 EF
Distribution	Uninsulated, TrunkBranch, Copper	Uninsulated, TrunkBranch, Copper
Lighting	100% CFL	100% LED
Refrigerator	Standard Efficiency, 19 cu ft	Standard Efficiency, 19 cu ft
Cooking Range	Gas, Conventional	Gas, Conventional
Dishwasher	318 Annual kWh	318 Annual kWh
Clothes Washer	In Laundry Room	In Laundry Room
Clothes Dryer	Gas. In Laundry Room	Gas. In Laundry Room

biraenergy

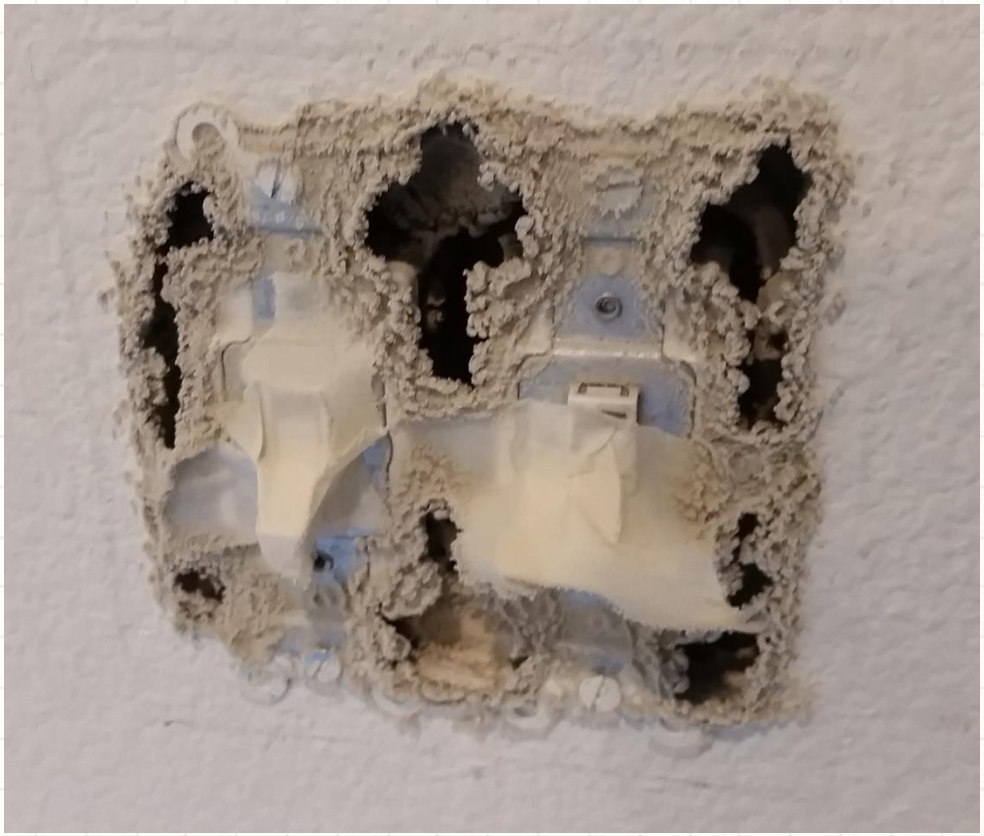
Additional Details

- The Community Center Retrofit

biraenergy

Additional Details

- The Community Center Retrofit



biraenergy

Additional Details

- Asbestos Abatement was costly

biraenergy

Presentation Highlights: BIRAenergy (1 of 2)

- **BIRAenergy used a building energy simulation program to identify a customized package of cost-effective zero energy measures for properties participating in the study.**
  - This also allowed BIRAenergy to provide a cost estimate for retrofits, since the project targeted low-income families.
  - To calibrate the building simulation model, BIRAenergy administered resident energy use surveys and used utility bill data provided by the electrical companies.
  - The building model was similar to the real energy savings, with only about ~7% error.
  - BIRAenergy's modeling was done using the Building Energy Optimization (BEopt) software.

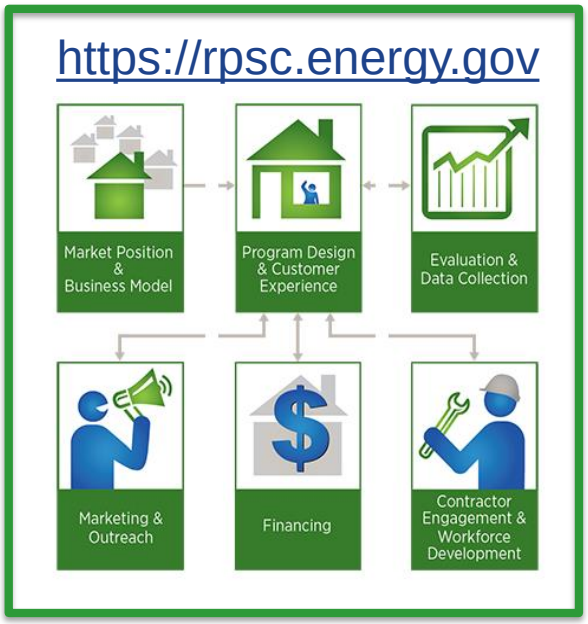
Presentation Highlights: BIRAenergy (2 of 2)

- **One at a time:** Energy upgrade measures were implemented gradually, which allowed BIRAenergy to evaluate the impact of each intervention on energy savings.
  - Able to meet 99% of electrical needs by installing an 80kWH solar PV system.
  - Duct replacement contributed to natural gas savings.
- **Controlling for behavior change:** Because the pilot occurred at a multi-family property, applying deep retrofits to a limited number of units created a natural control group of units that did not receive retrofits. Comparing the energy use differences allowed the researchers to confirm that the reductions were not a result of changes in resident behavior.
- **Payback:** For both electrical and gas savings, the payback period is estimated to be ~ 23 years.

Related Resources in the Residential Program Solution Center

Explore resources related to best practices on upgrades for zero energy ready homes:

- View this webinar providing an overview of the Zero Energy Ready Home program, including the business case and how to be recognized by DOE.
- Read this case study of a DOE Zero Energy Ready Home: Mantell-Hecathorn Builders, Durango, CO.
- Learn about how Enhabit used performance-based incentives to encourage deeper savings in this case study.



- Check out the latest Proven Practices post on Keeping the Program Simple.
- The Solution Center is continually updated to support residential energy efficiency programs—**member ideas are wanted**!

Additional resources

- Building Energy Optimization (BEopt) software
  - This software was used by BIRAenergy in their building energy simulation. BEopt has been developed by the National Renewable Energy Laboratory in support of the U. S. Department of Energy's (DOE) Building America program. It provides capabilities to evaluate residential building designs and identify cost-optimal efficiency packages at various levels of whole-house energy savings along the path to zero net energy. BEopt uses EnergyPlus, DOE's simulation engine.

- Vermont's Zero Energy Now Program
  - This program delivered 22 single-family home deep energy retrofit projects in 2016 as part of Green Mountain Power's (GMP) Community Energy & Efficiency Development (CEED) Program. The program was implemented by the Building Performance Professionals Association of Vermont (BPPA) and Energy Futures Group (EFG).

2017 Better Buildings Summit is one month away!

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#BBSummit17 registration is right around the corner. Get ready to learn about expert #EnergyEfficiency enhancements http://bit.ly/2iZCMsB

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Share with us your top stories on how your organization is accelerating energy savings through efficiency upgrades, strategies, and investment!

Better Buildings Twitter with #BBResNet

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We can't wait to hear from you!

U.S. Department of Energy Solar Decathlon

Oct 5-15, 2017 DENVER

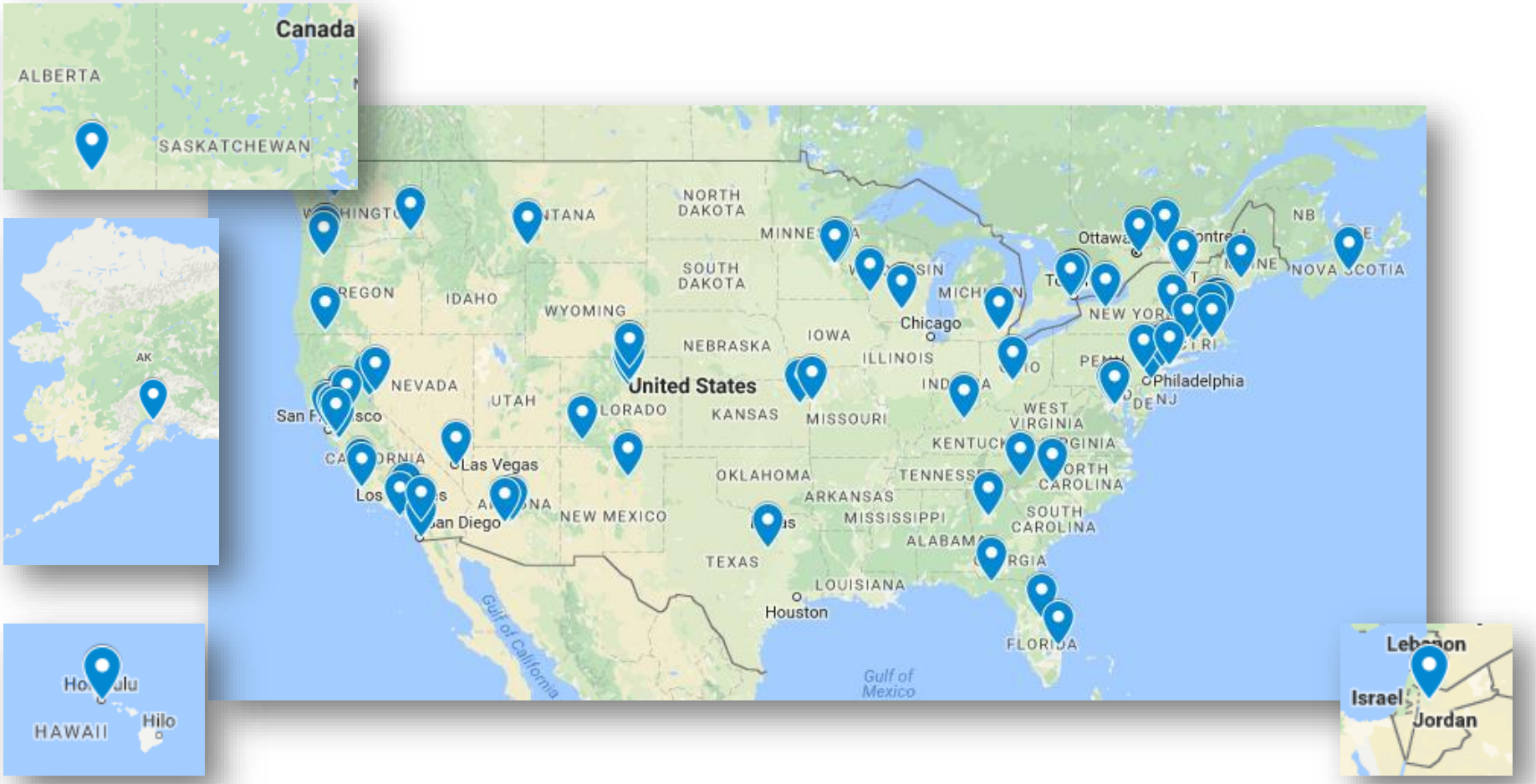
- 13 Collegiate teams compete in 10 contests
  - New for 2017: Innovation and Water
- Winning team best blends technology, market potential, design excellence with smart energy solar production and maximum energy and water efficiency.
- Large free public event – showcases best of clean energy technology
- Denver location: new, mixed use smart community on transit line near Denver International Airport
- Sponsorship Opportunities
- Info: www.SolarDecathlon.Gov

Solar Decathlon 2015 Teams in Irvine, Calif.
Credit: Thomas Kelsey/U.S. Department of Energy Solar Decathlon

Addenda: Attendee Information and Poll Results

U.S. DEPARTMENT OF ENERGY

Call Attendee Locations



Call Attendees: Network Members

- Alaska Housing Finance Corporation
- AppleBlossom Energy Inc.
- Build It Green
- Center for Sustainable Energy
- City of Berkeley
- City of Fort Collins
- City of Kansas City
- CLEAResult
- Earth Advantage Institute
- Efficiency Nova Scotia
- Efficiency Vermont
- Energy Efficiency Specialists
- Enhabit
- Katsujinken Foundation
- FMC Facility Management Consultores
- Fort Collins Utilities
- LEDVANCE
- La Plata Electric Association
- Mitsubishi Electric Cooling and Heating
- New York State Energy Research & Development Authority (NYSERDA)
- Ryan Taylor Architects, LLC
- Seventhwave
- South Burlington Energy Committee
- Stewards of Affordable Housing for the Future
- TRC Energy Services

Call Attendees: Non-Members (1 of 3)

- AEMEP Group
- Arizona State University
- BIRAenergy
- Brooklyn Green Home Solutions Inc
- BSHM Architects, Inc.
- Canadian Home Builders' Association (CHBA)
- Carlisle Companies
- CASE - RPI
- California Institute of Environmental Design and Management (CIEDM)
- City of Vancouver
- Clallam County
- Construction Services Group of Educational Service District 112
- Coolearth Architecture Inc.
- County of San Diego
- CSRA
- Dimensions-Energétiques
- Eden Housing
- Efficiency Maine Trust
- Enbridge Gas Distribution
- Energy Futures Group Inc.

Call Attendees: Non-Members (2 of 3)

- Energy Management Services
- Energy Solutions
- Environmental Design / Build
- Florida Solar Energy Center
- Franklin Energy
- Frontier Energy, Inc.
- Greater Minnesota Housing Fund
- Green Compass Consulting
- Greenbanc
- Greenergy Realty
- HILCO Electric Cooperative Inc.
- Homecrete Homes
- Honeywell
- ID3A, LLC
- Intelligent Technology Services
- Local Government Commission
- Low Energy Edge Node Analytic Laboratories
- Lutron Electronics
- Madison Gas & Electric Company
- Madison Lakeview LLC
- Massachusetts Department of Energy Resources

Call Attendees: Non-Members (3 of 3)

- NANA Regional Corporation, Inc.
- Nexant
- U.S. National Park Service
- Natural Resources Canada
- National Renewable Energy Laboratory
- Office of Energy Resources (Rhode Island)
- Oregon Institute of Technology
- People's Self Help Housing
- Philip Neumann Energy Design
- Power Integrations, Inc.
- PV Blue
- RE/MAX Alliance
- San Francisco Department of the Environment
- Sierra Business Council
- Sim2
- Simkus Development LLC
- Solar Habitats, LLC
- Sustainable Buildings Canada
- The Energy Experts
- Transition Living
- University of Kansas
- University of Minnesota

Opening Poll #1

- Which of the following best describes your organization's experience with zero energy ready homes?
  - Some experience/familiarity – ***59%***
  - Limited experience/familiarity – ***24%***
  - Very experienced/familiar – ***11%***
  - No experience/familiarity – ***3%***
  - Not applicable – ***3%***

Closing Poll

- After today's call, what will you do?
  - Seek out additional information on one or more of the ideas – ***66%***
  - Consider implementing one or more of the ideas discussed – ***26%***
  - Make no changes to your current approach – ***8%***
  - Other (please explain) – ***0%***