



THE STELLAR APARTMENTS

FIRST YEAR ENERGY LESSONS

Alison Kwok, Annie Chiang, Ryan Dirks
Eric Schmidt, Ashley Tuffo
University of Oregon

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San Francisco, California
September 12—13, 2014

AIA Learning Objectives

- Explain the objectives of a pilot project built to Passive House and Earth Advantage targets
- Describe methodology and equipment used to measure energy and environmental quality
- Compare energy use, specifically heating energy
- Compare energy end-use patterns and occupant preferences/behaviors

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The Stellar Apartments – Eugene, Oregon





Site Amenities



Design Team

Owner: St. Vincent dePaul Society of Lane County

Architect: Bergsund DeLaney Architecture/Planning

Contractor: Meili Construction

Lead CPHCs: Win Swafford, Jan Fillinger

Mechanical: SOLARC, Peter Reppe

Inspiration: from many



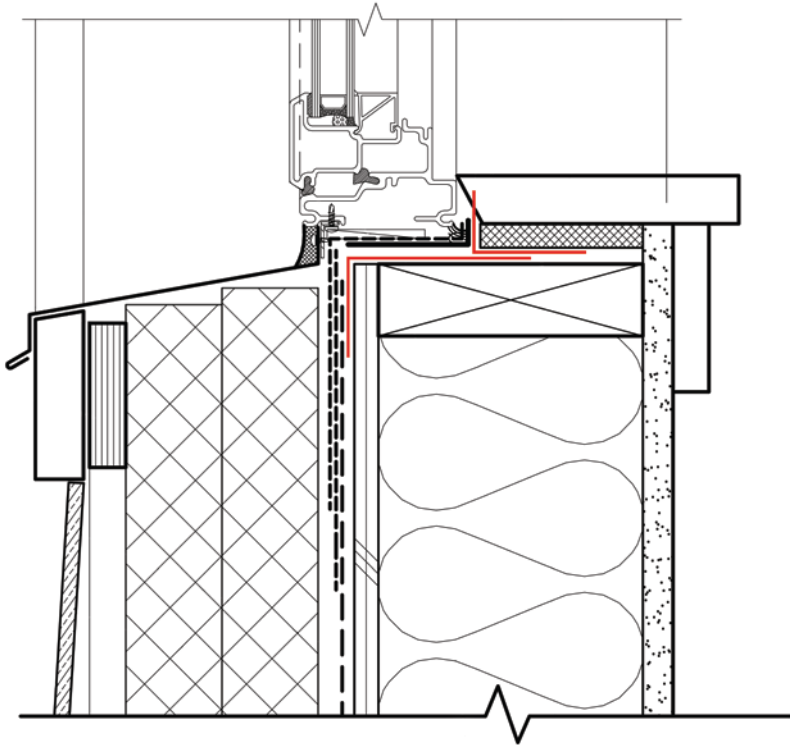
Pilot Study



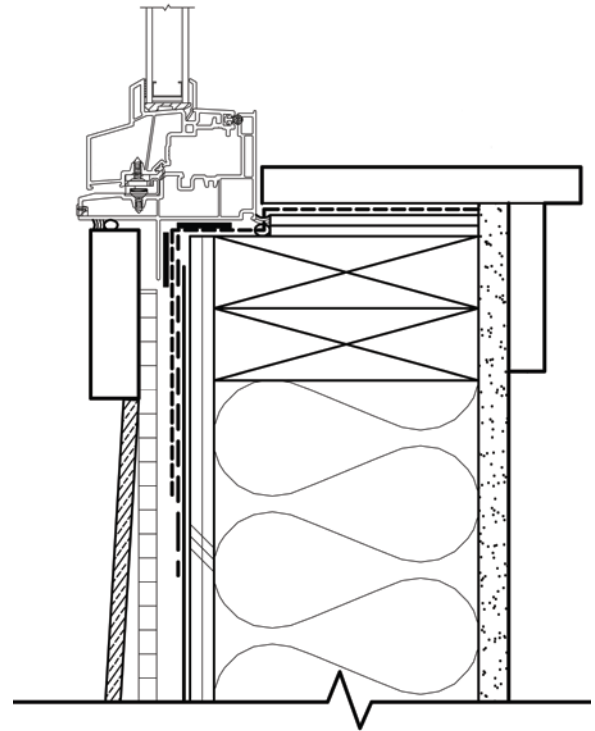


Wall Sections

Passive House



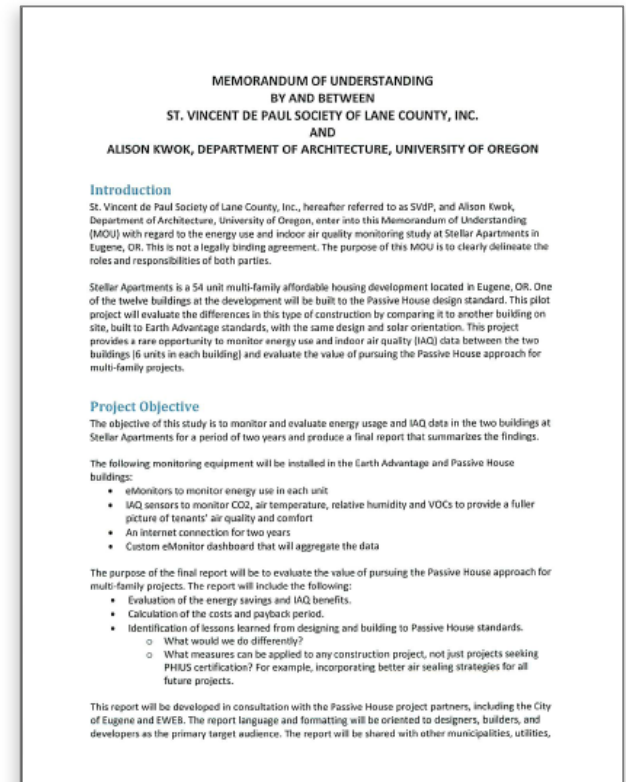
Earth Advantage





MOU: St. Vincent dePaul and University of Oregon

- Evaluate energy and IAQ
- Calculate costs and payback
- Identify lessons learned
- Produce final report

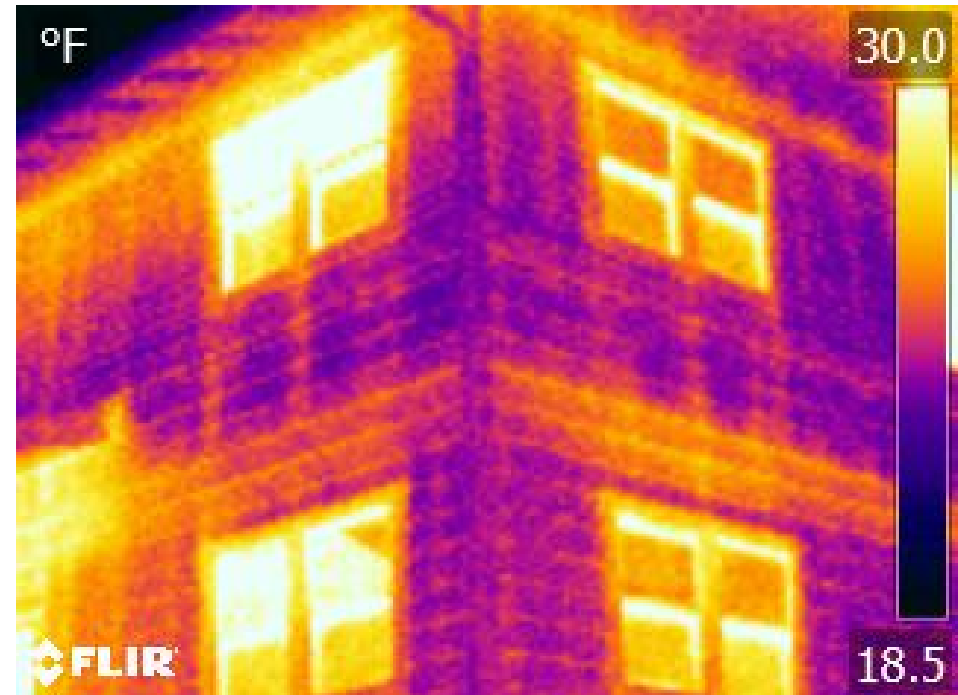


Envelope: check on thermal bridging?

Passive House



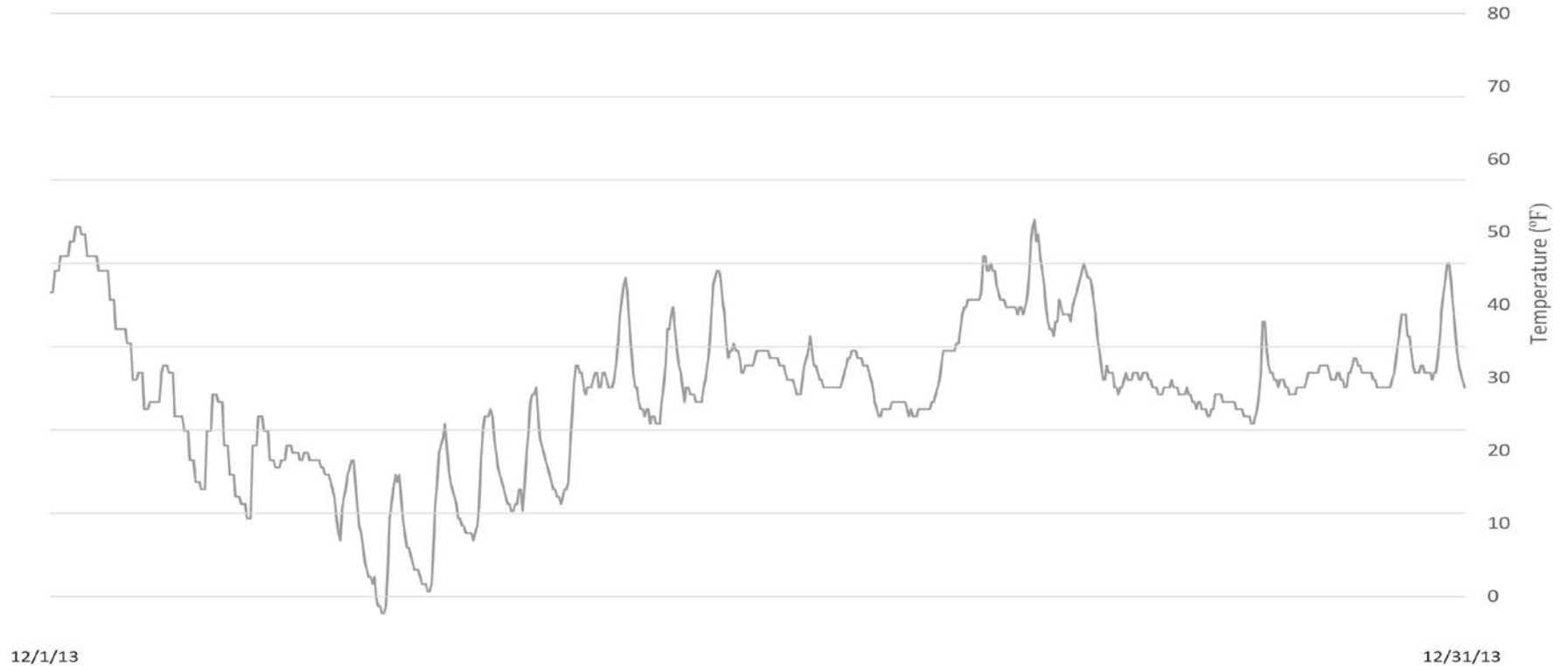
Earth Advantage



Outdoor Temperature: 11 F



Heating: December Outdoor Temp



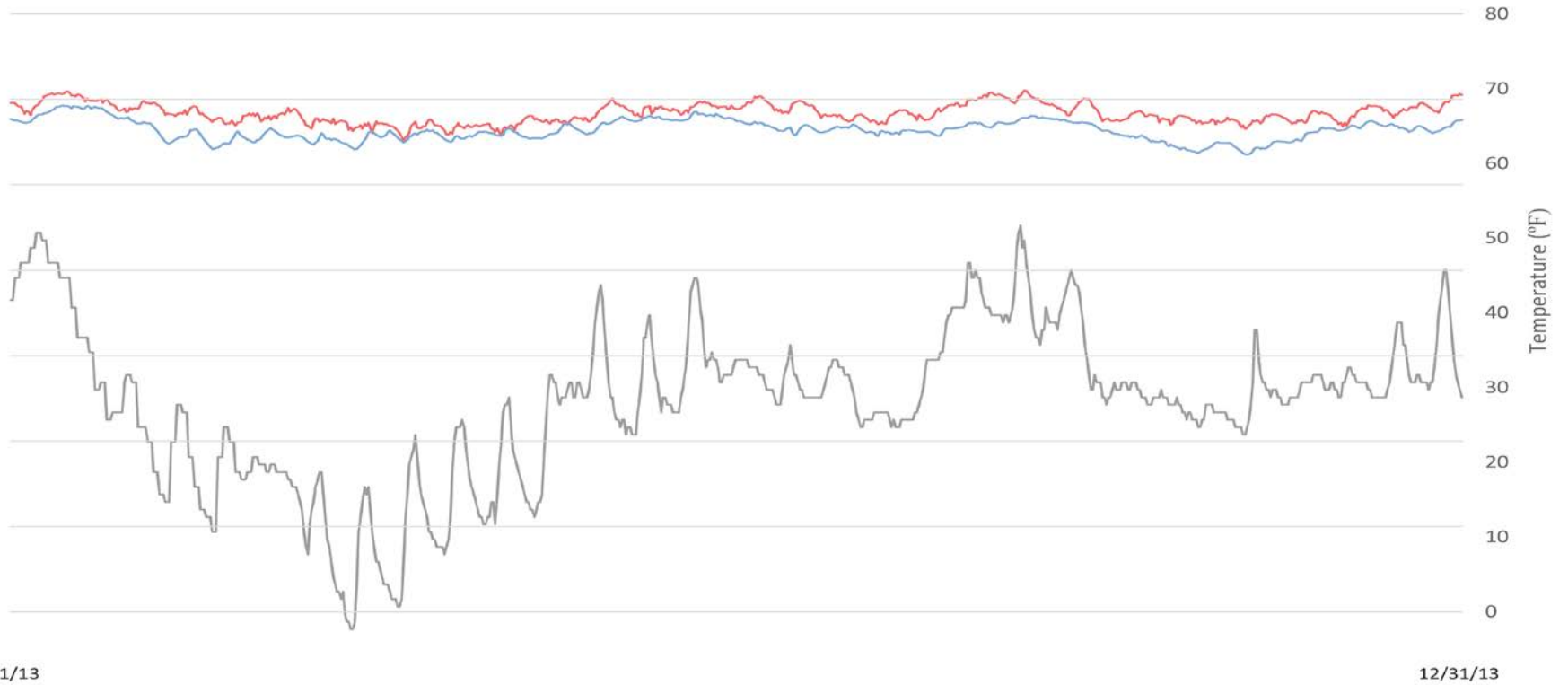
12/1/13

12/31/13

— Outdoor Temperature



Heating: December Outdoor Temp + Indoor



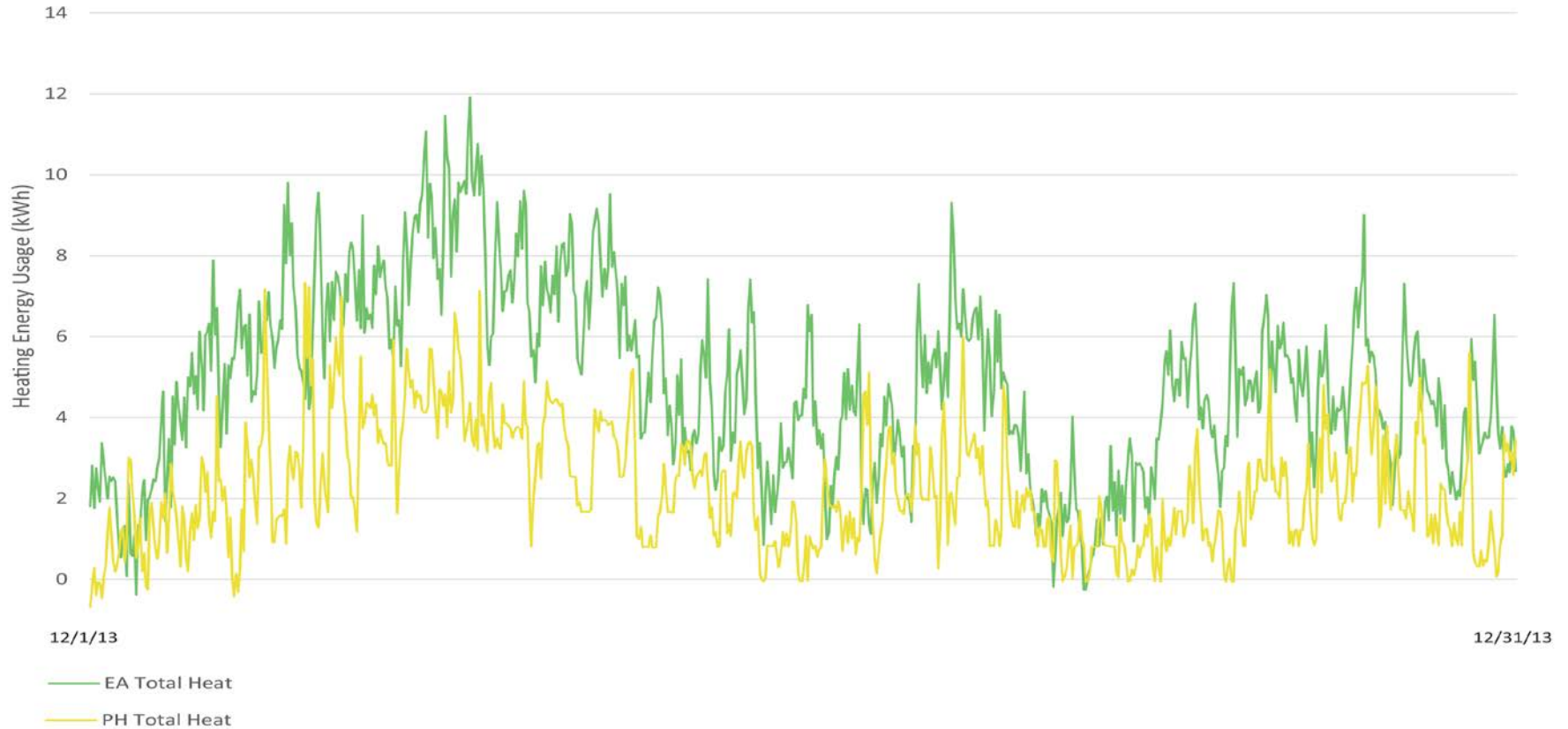
12/1/13

12/31/13

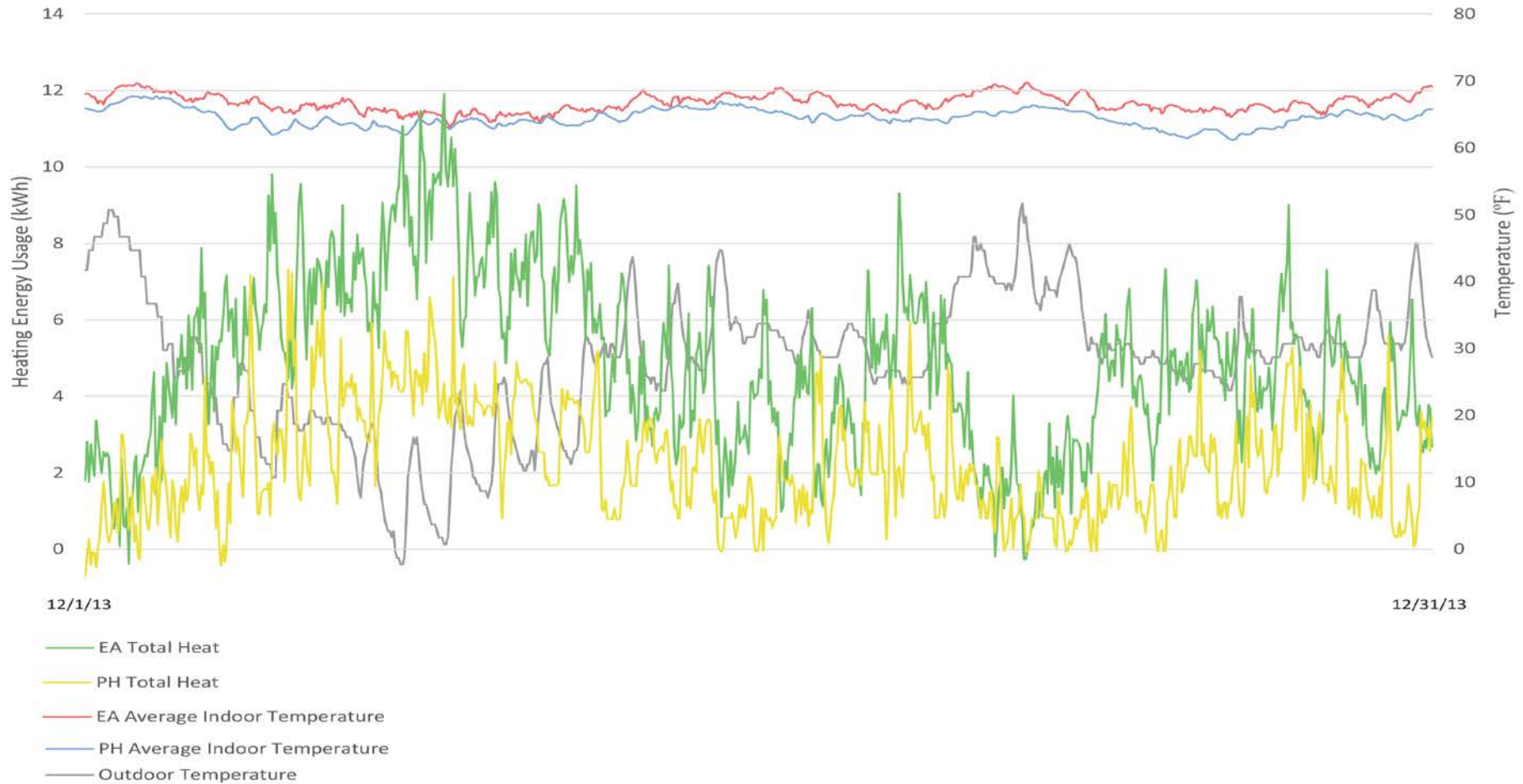
- EA Average Indoor Temperature
- PH Average Indoor Temperature
- Outdoor Temperature



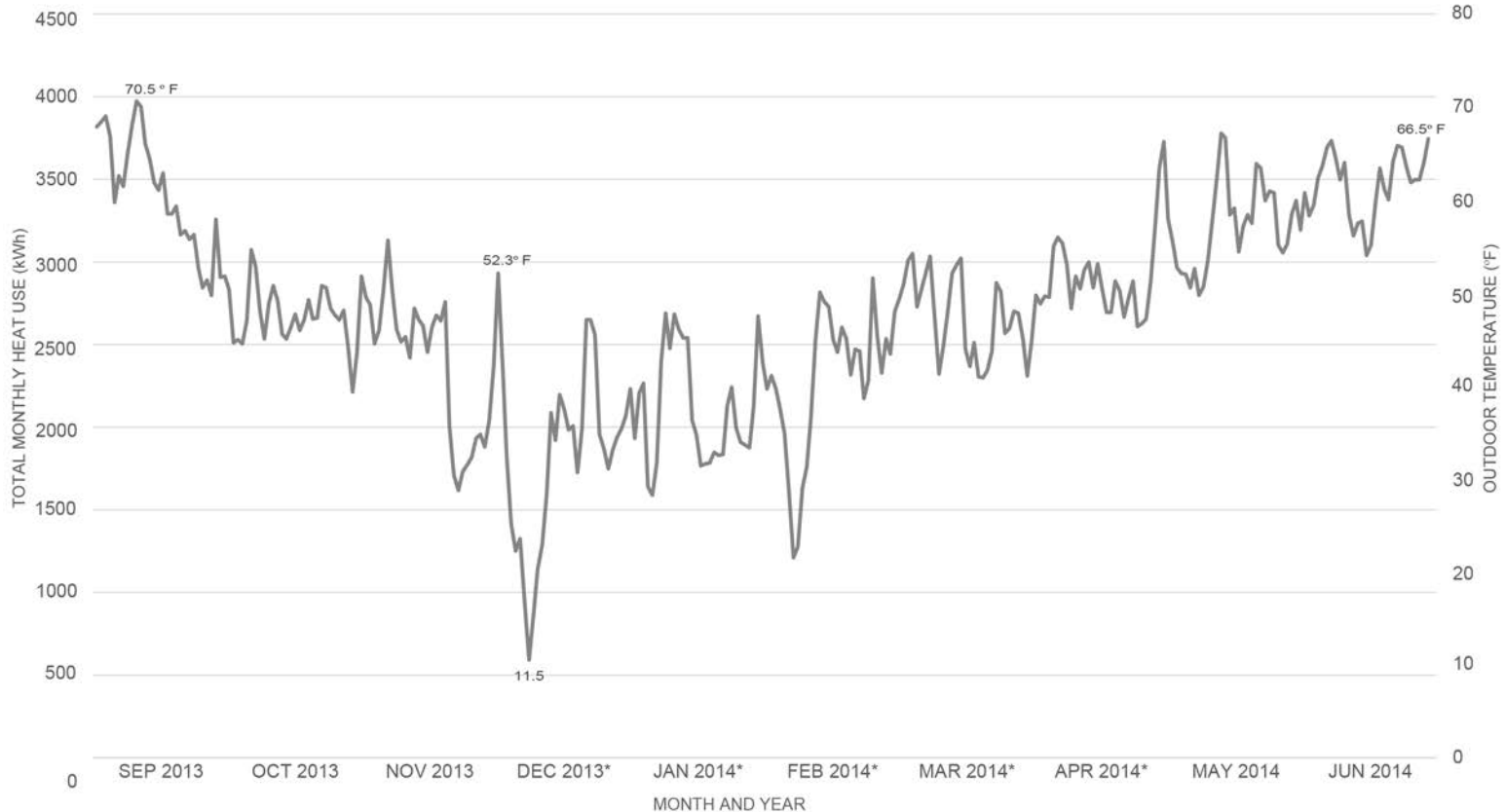
Heating: December PH and EA heating use



Heating: December PH and EA heating use + temps



Heating Reduction: **Passive House** vs. **Earth advantage**



— Outdoor Temperature

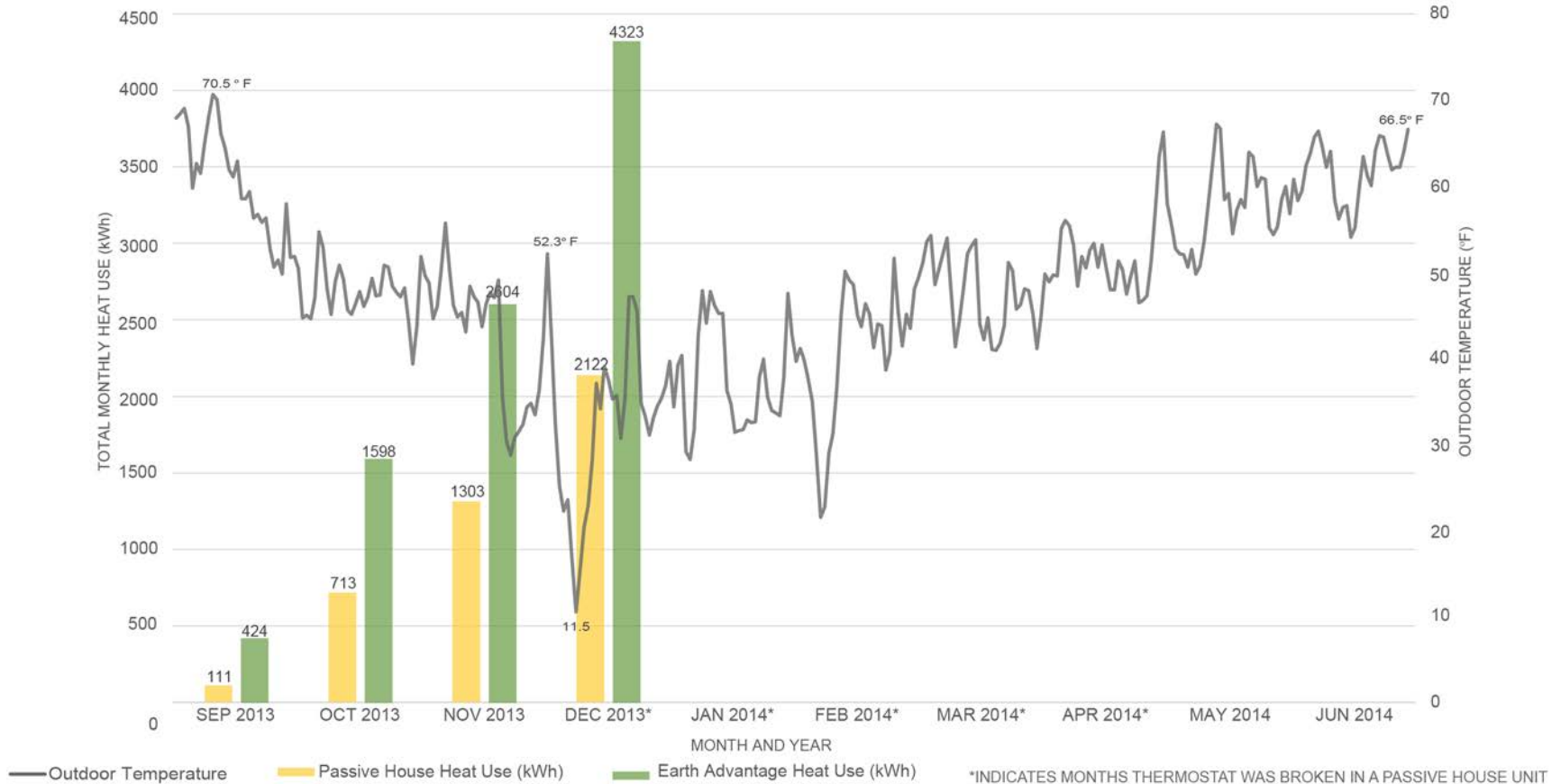
*INDICATES MONTHS THERMOSTAT WAS BROKEN IN A PASSIVE HOUSE UNIT

Adjusted for Broken Thermostat



Heating Reduction: **Passive House** vs. **Earth advantage**

SEP 74% OCT 55% NOV 50% DEC 51%

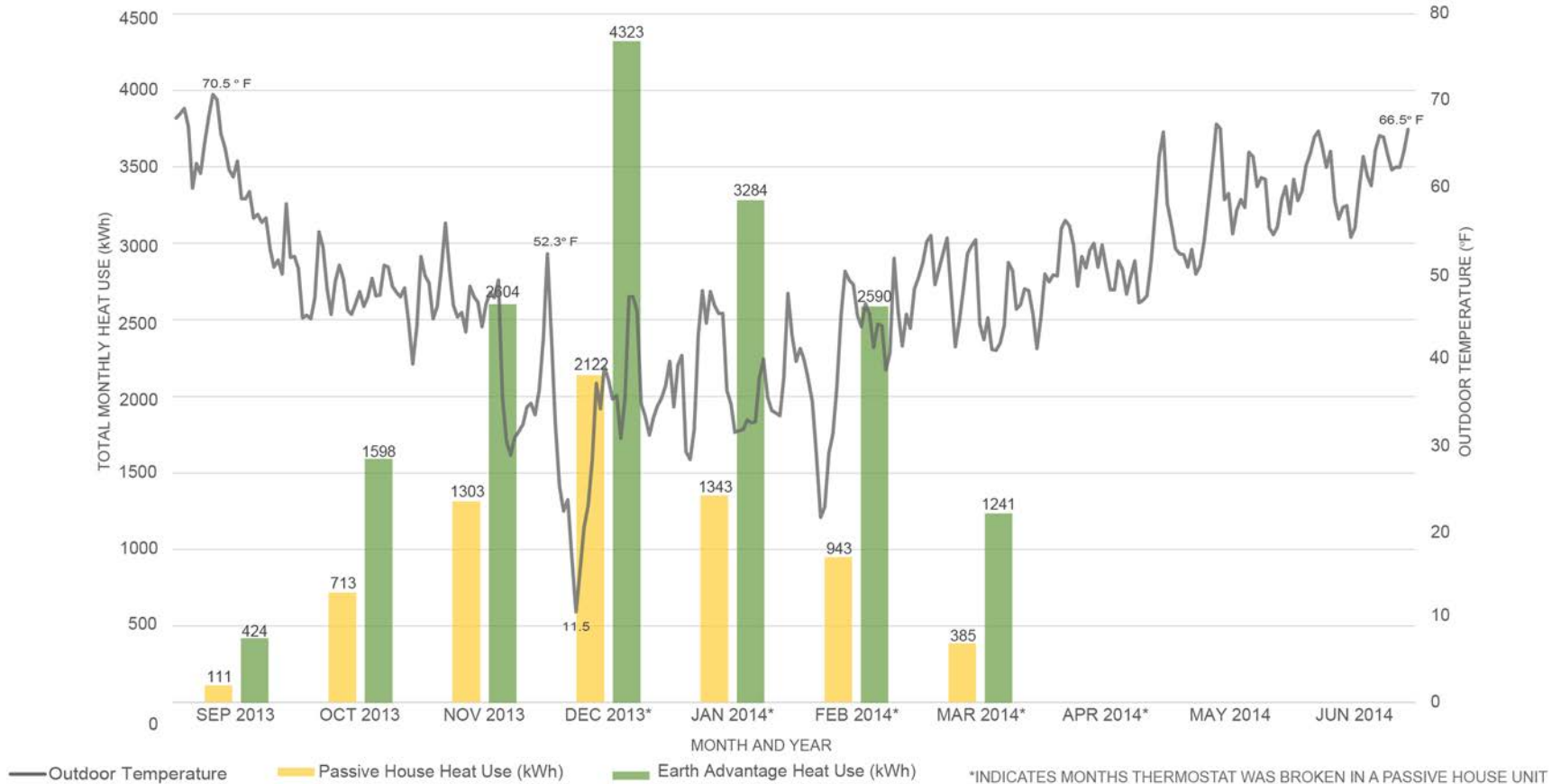


Adjusted for Broken Thermostat



Heating Reduction: **Passive House** vs. **Earth advantage**

SEP 74% OCT 55% NOV 50% DEC 51% JAN 59% FEB 64% MAR 69%



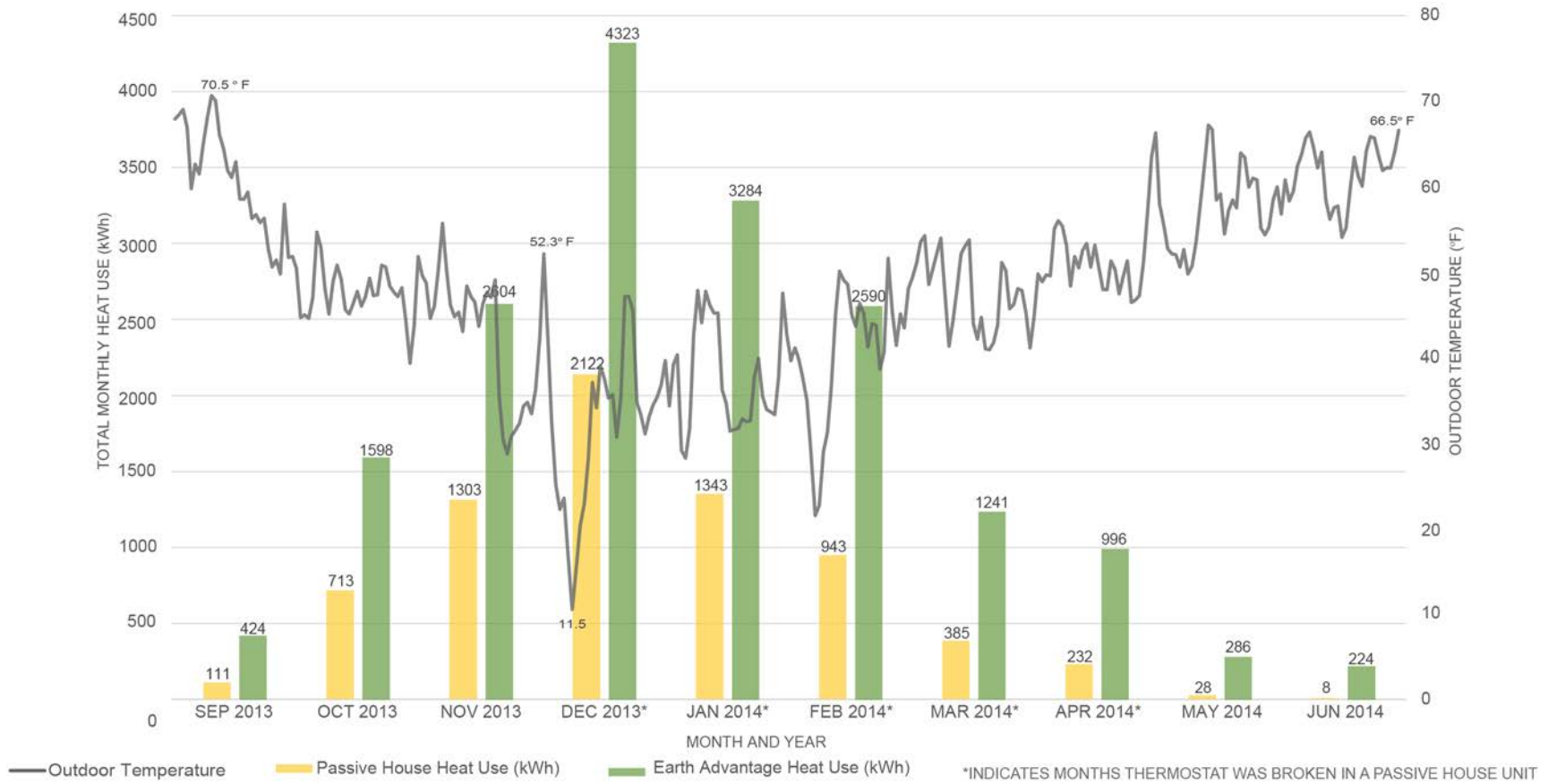
*INDICATES MONTHS THERMOSTAT WAS BROKEN IN A PASSIVE HOUSE UNIT

Adjusted for Broken Thermostat



Heating Reduction: **Passive House** vs. **Earth advantage**

SEP 74% OCT 55% NOV 50% DEC 51% JAN 59% FEB 64% MAR 69% APR 77% MAY 90% JUN 97%



*INDICATES MONTHS THERMOSTAT WAS BROKEN IN A PASSIVE HOUSE UNIT

Adjusted for Broken Thermostat



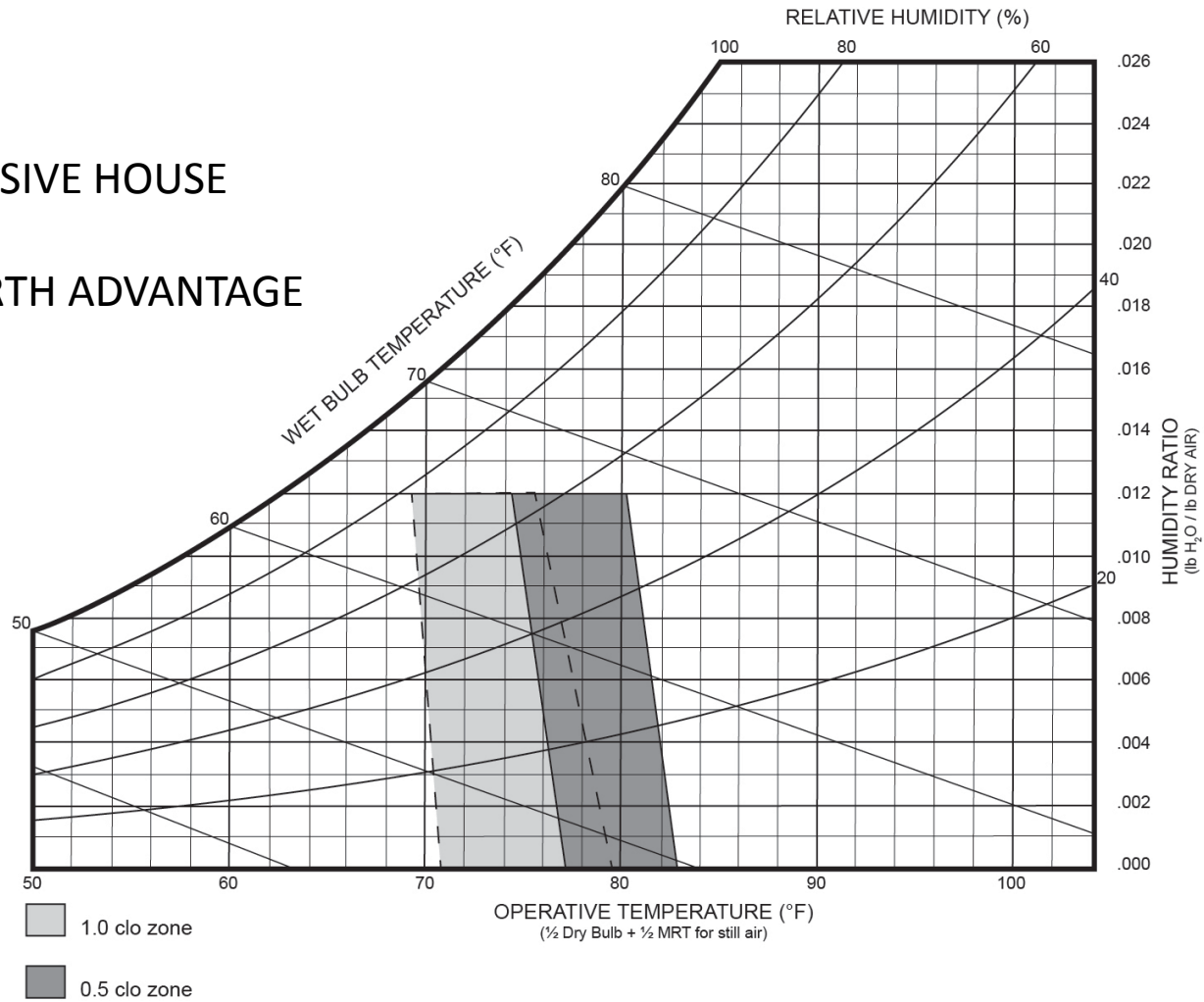
Thermal Comfort



PASSIVE HOUSE



EARTH ADVANTAGE



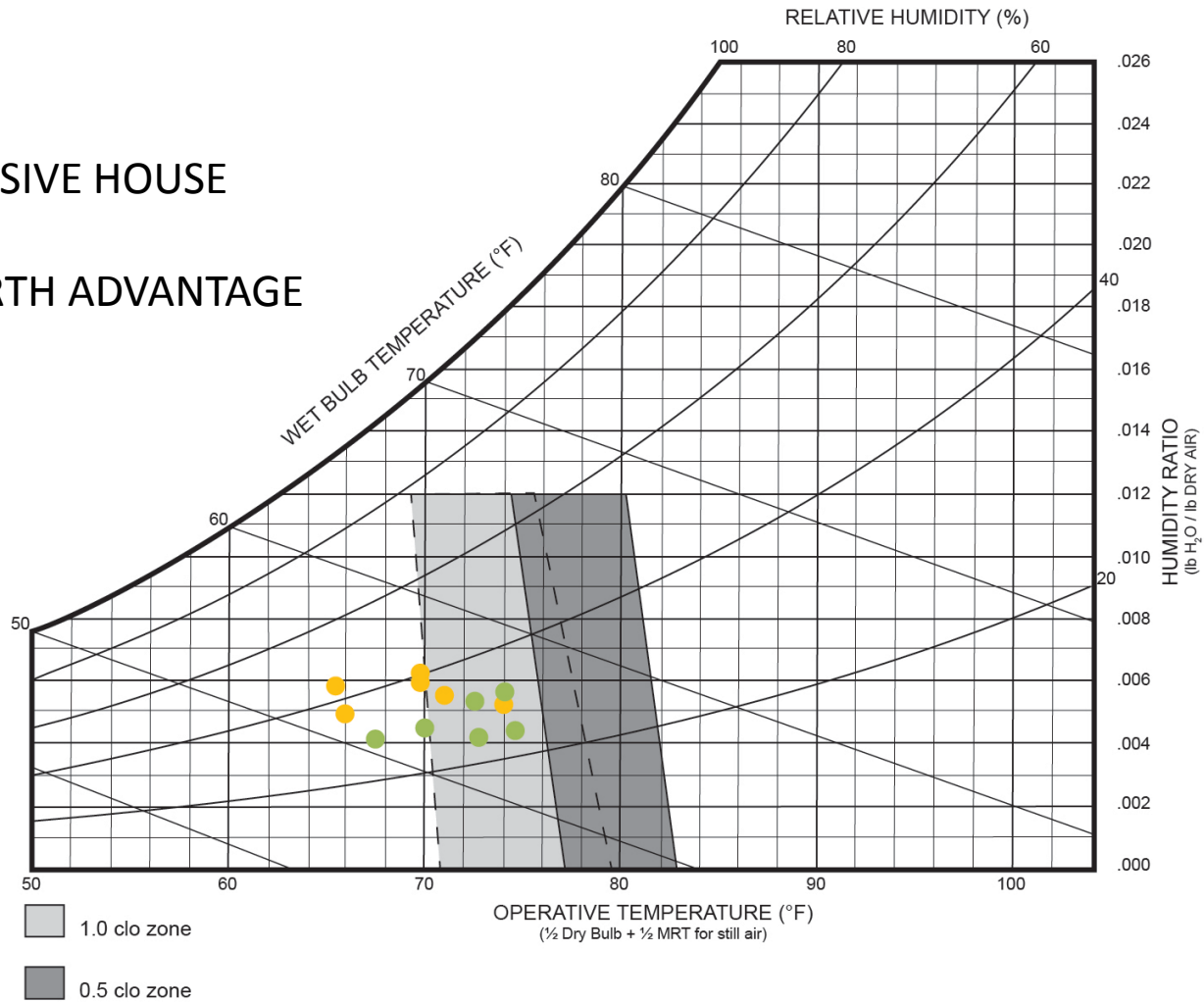
Thermal Comfort - December



PASSIVE HOUSE



EARTH ADVANTAGE



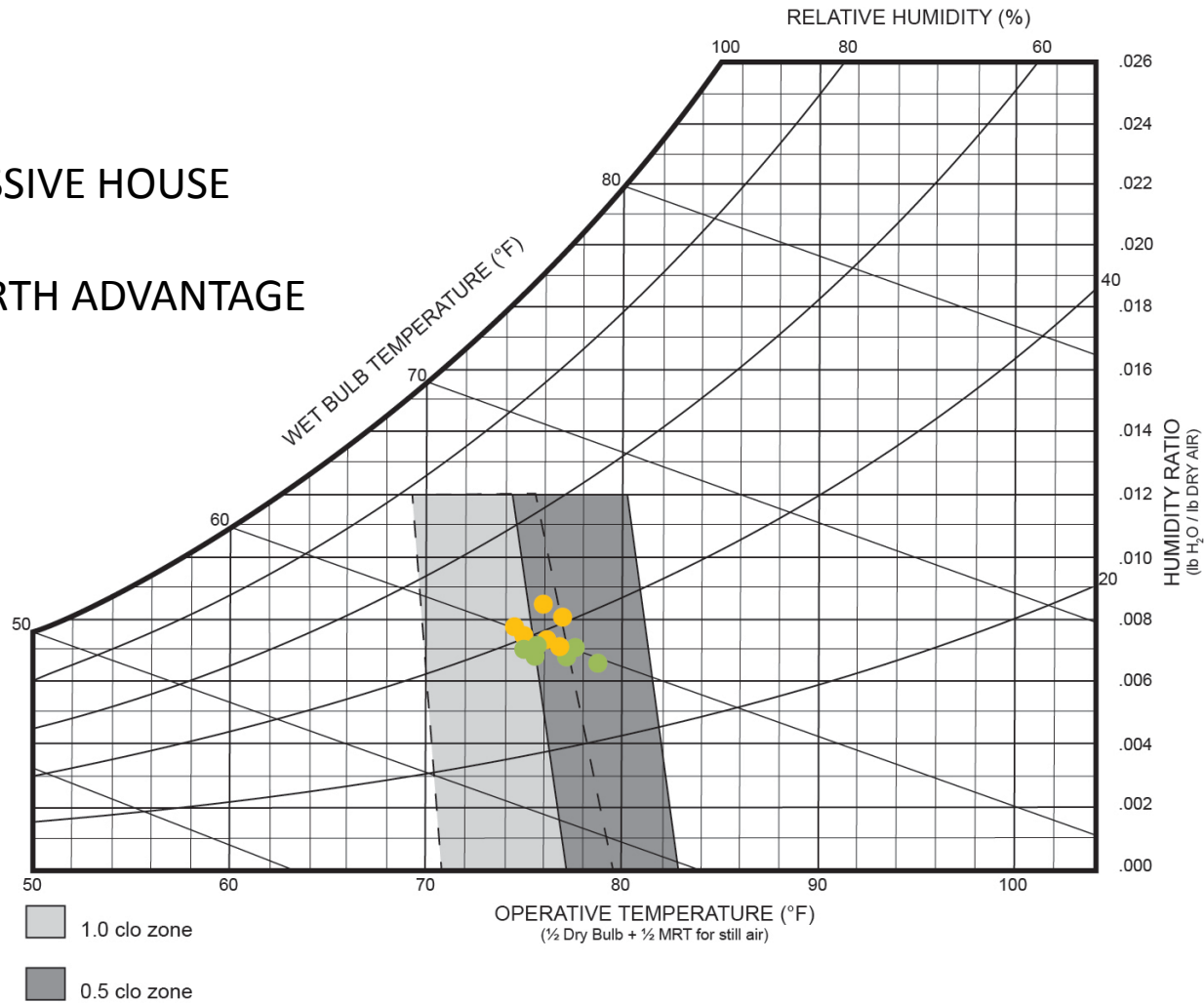
Thermal Comfort - June



PASSIVE HOUSE



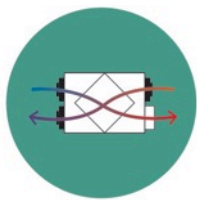
EARTH ADVANTAGE



Energy End Use: Monitored Circuits



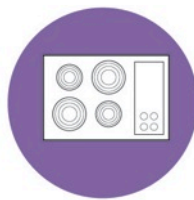
HEAT



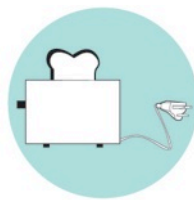
ERV
(Passive House Only)



WATER
HEATER



RANGE



KITCHEN
OUTLETS



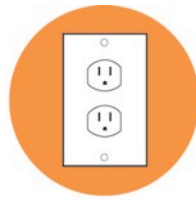
KITCHEN
FRIDGE



WASHER



DRYER
(Earth Advantage Only)

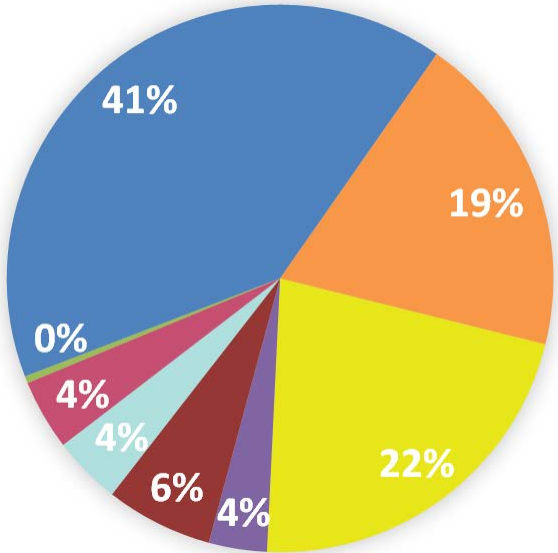


OTHER PLUG
LOADS



Energy End Use: Energy Pie

Earth Advantage



HEAT

ERV
(Passive House Only)

WATER HEATER

RANGE

KITCHEN OUTLETS

KITCHEN FRIDGE

WASHER

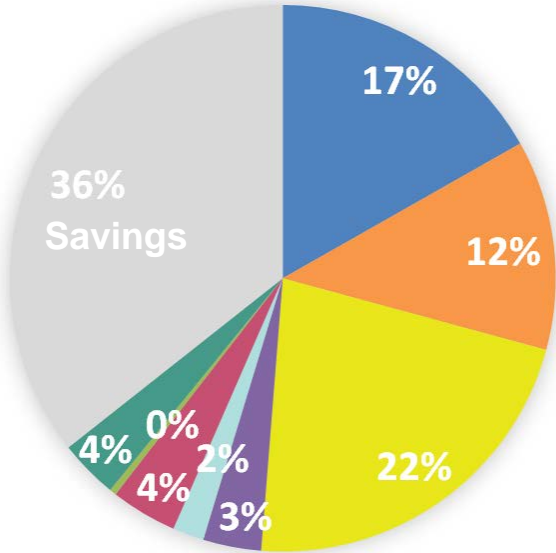
DRYER
(Earth Advantage Only)

OTHER PLUG LOADS

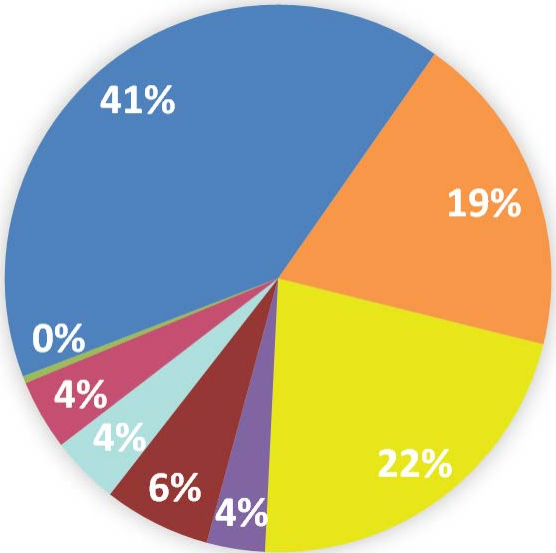


Energy End Use: Energy Pie

Passive House



Earth Advantage

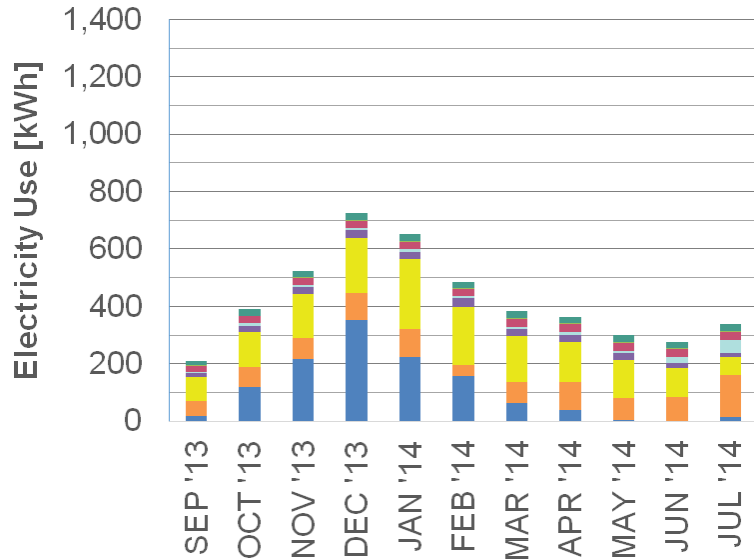


- HEAT
- ERV (Passive House Only)
- WATER HEATER
- RANGE
- KITCHEN OUTLETS
- KITCHEN FRIDGE
- WASHER
- DRYER (Earth Advantage Only)
- OTHER PLUG LOADS

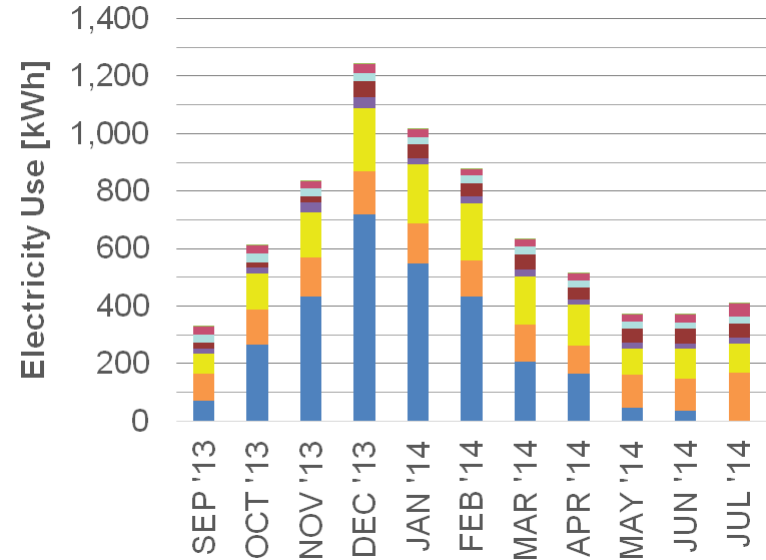


Energy End Use: Average Energy Use per unit

Passive House

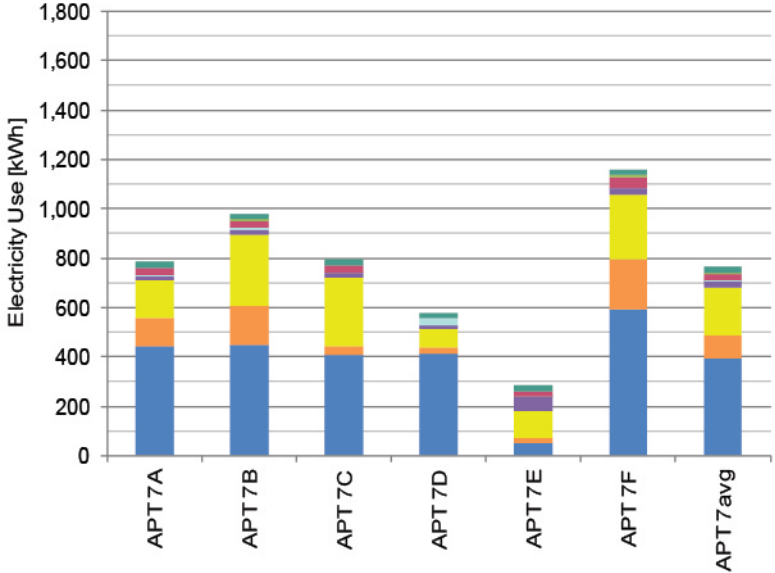


Earth Advantage

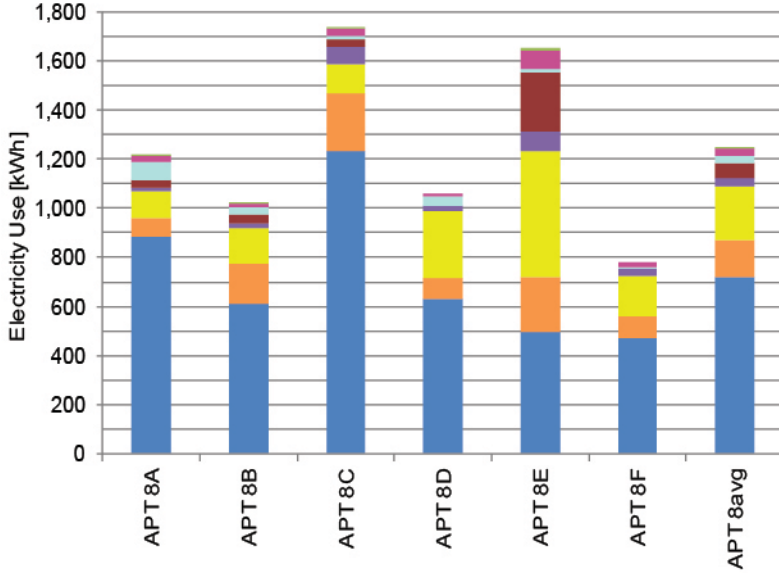


Energy End-Use: December 2013

Passive House



Earth Advantage

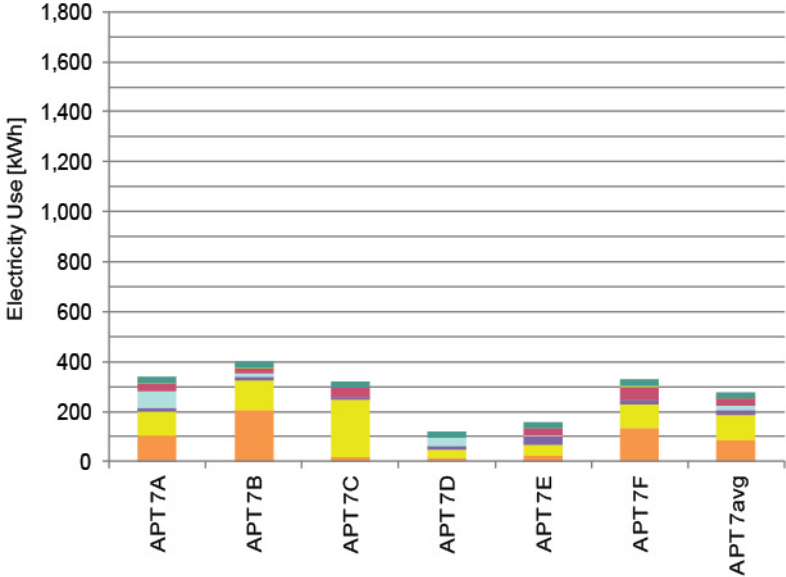


- HEAT** (Blue circle with red arrows)
- ERV (Passive House Only)** (Green circle with blue arrows)
- WATER HEATER** (Yellow circle with white tank icon)
- RANGE** (Purple circle with white stove icon)
- KITCHEN OUTLETS** (Light blue circle with white toaster icon)
- KITCHEN FRIDGE** (Pink circle with white refrigerator icon)
- WASHER** (Light green circle with white washer icon)
- DRYER (Earth Advantage Only)** (Dark red circle with white dryer icon)
- OTHER PLUG LOADS** (Orange circle with white outlet icon)

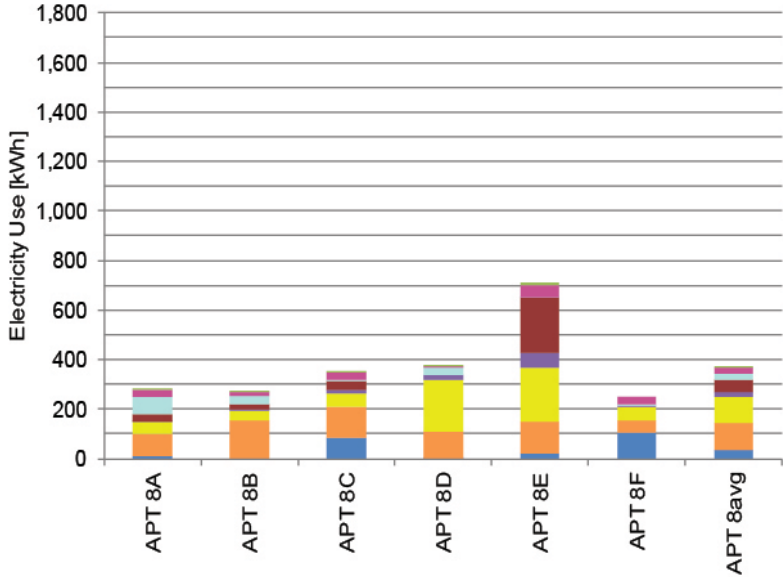


Energy End-Use: June 2014

Passive House



Earth Advantage



HEAT

ERV
(Passive House Only)

WATER HEATER

RANGE

KITCHEN OUTLETS

KITCHEN FRIDGE

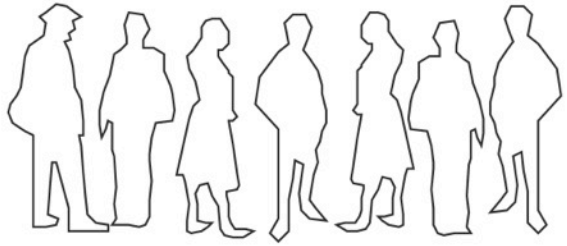
WASHER

DRYER
(Earth Advantage Only)

OTHER PLUG LOADS



PASSIVE HOUSE



7 adults (31-71 y.o.)



1 teenager (14 y.o.)
1 toddler (3 y.o.)



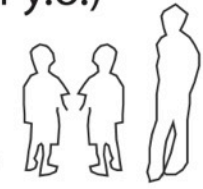
+/- pets

Occupancy: 9

EARTH ADVANTAGE



6 adults (21- 64 y.o.)



1 child (10 y.o.)
2 toddlers (1 & 3 y.o.)

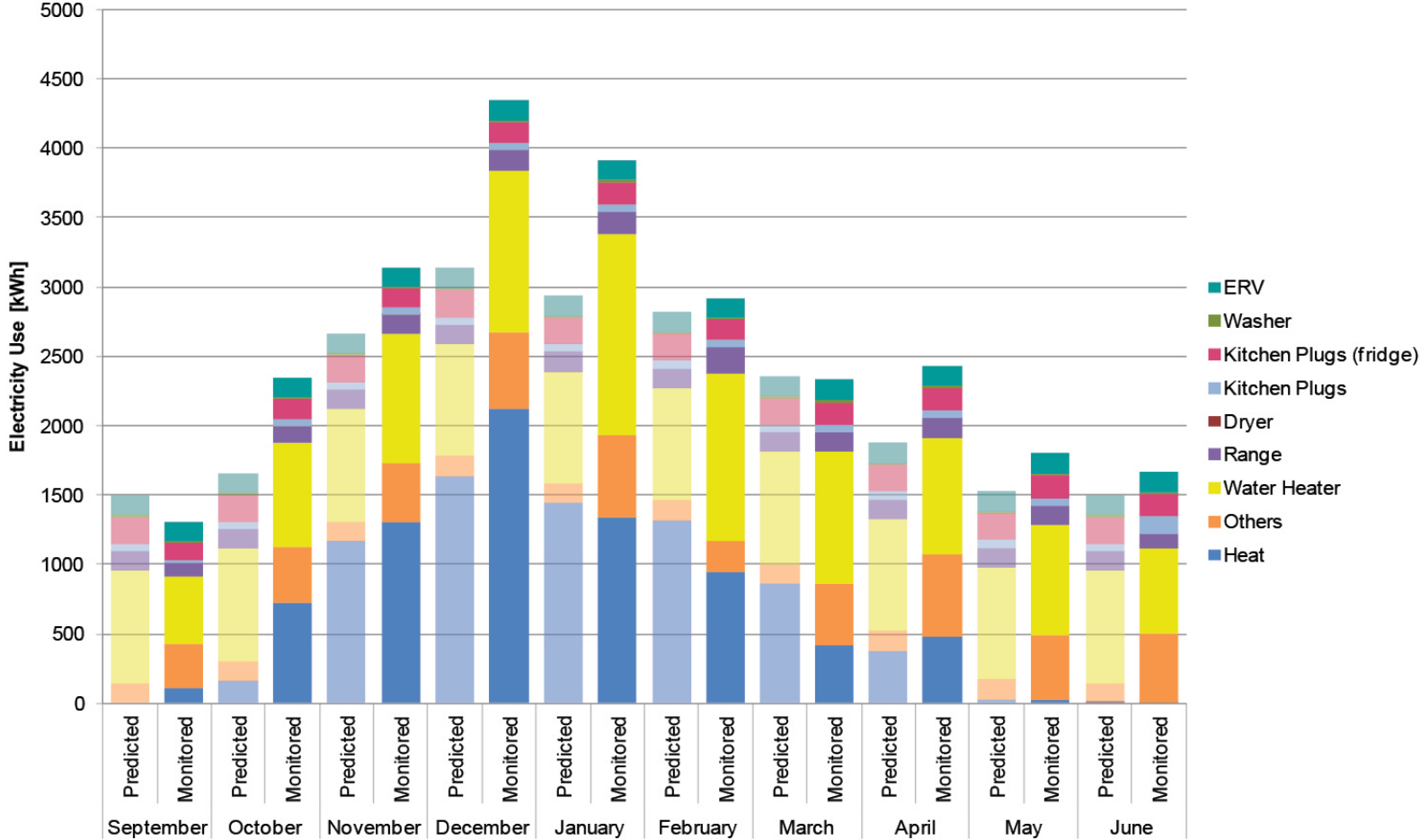


+/- pets

Occupancy: 9



PH Performance: Predicted vs. Monitored



Lessons Learned

- Energy use: behavior matters
- Tenant knowledge: cannot make assumptions
- Equipment: sometimes fails
- Comparisons: comparing against **EA** vs. code
- Weather: colder winter & hotter summer



Next Steps . . .

- Continue monthly monitoring analysis
- Complete first year report
- Establish baseline/code energy performance
- Potential tenant survey



Acknowledgements

- St. Vincent de Paul Society of Lane County
- Bergsund DeLaney Architecture and Planning
- Meili Construction
- CPHCs: Win Swafford, Jan Fillinger
- SOLARC/Peter Reppe
- City of Eugene, EWEB
- UO NetZed Case Study Lab team: Annie Chiang, Ryan Dirks, Ashley Tuffo, Eric Schmidt



Questions?

