ENERGY 350

Advanced RTU Controls

Opening up a New Retrofit Market

About Energy 350

- 26 person firm based in Portland
- EE Program Deployment & Support
- Building Tuning/RCx/SEM
- Energy Studies
- Research
- Evaluation
- LEED/Green Building Assistance

Traditional Small Commercial

- On-site consultations would recommend the usual:

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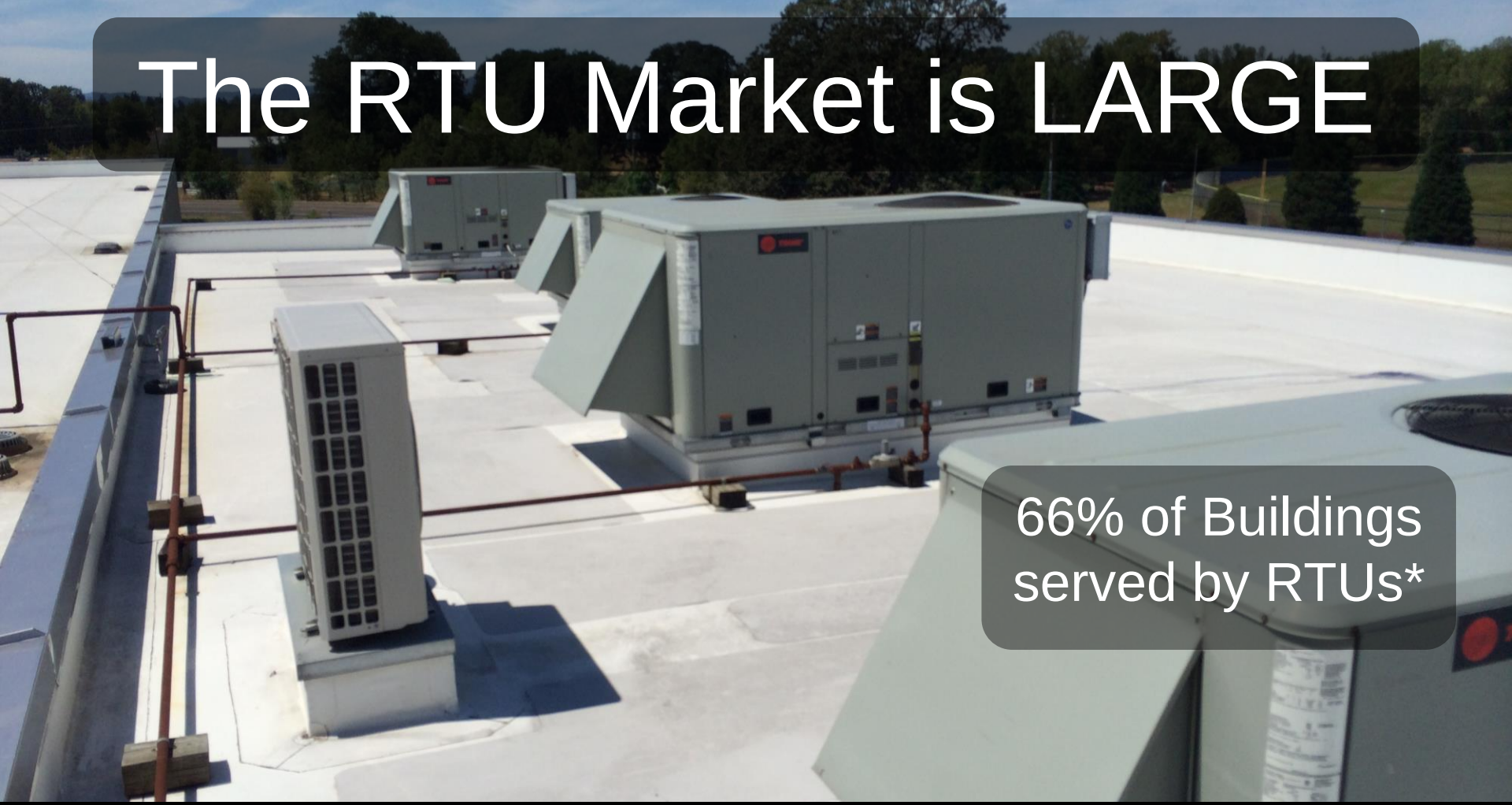
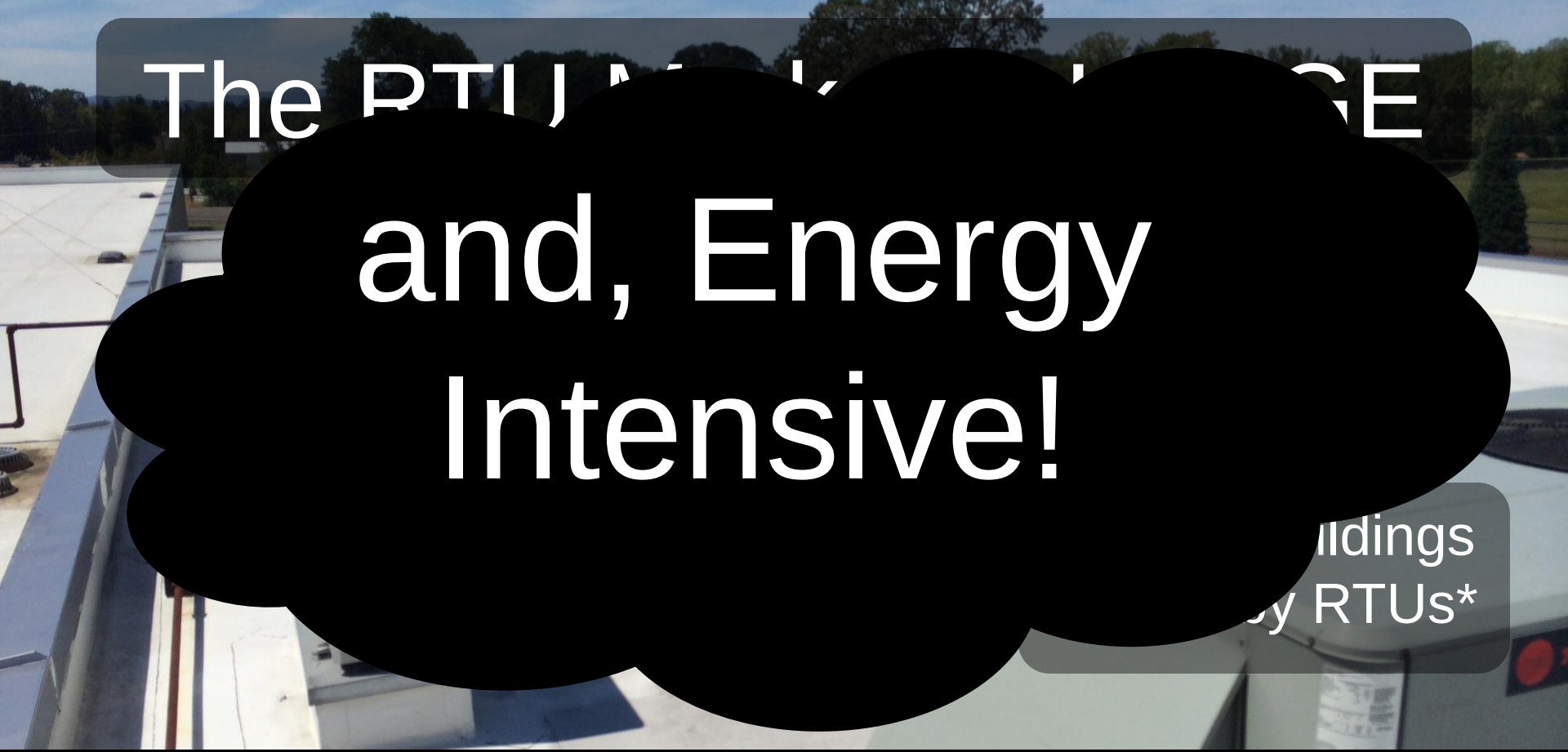
The RTU Market is LARGE



66% of Buildings served by RTUs*

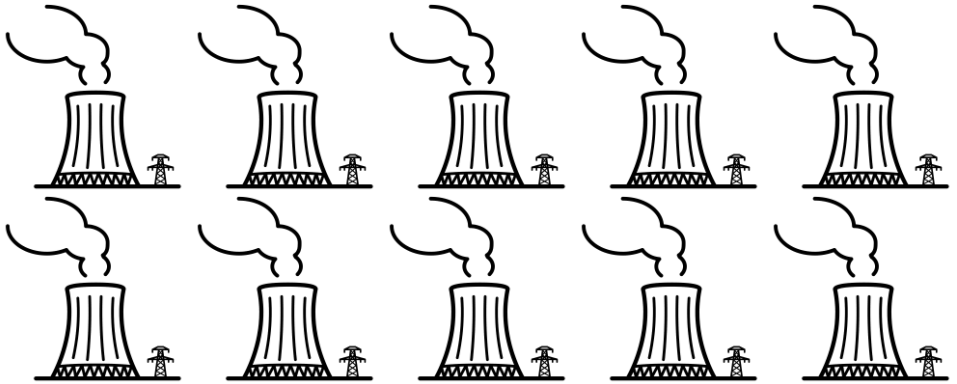
*2012 CBECS Inventory



HVAC represented 44% of end use BTUs in CBECS 2012 data

Just how big is this market?

PNNL estimated that if half of the existing RTU stock were retrofit, 10,000 aMW would be conserved.



What is an ARC?

- Converts from constant volume to variable volume air supply (supply fan VFD)
- Optimizes free cooling/economizer control
- Optimizes Scheduling
- Demand Controlled Ventilation (DCV)

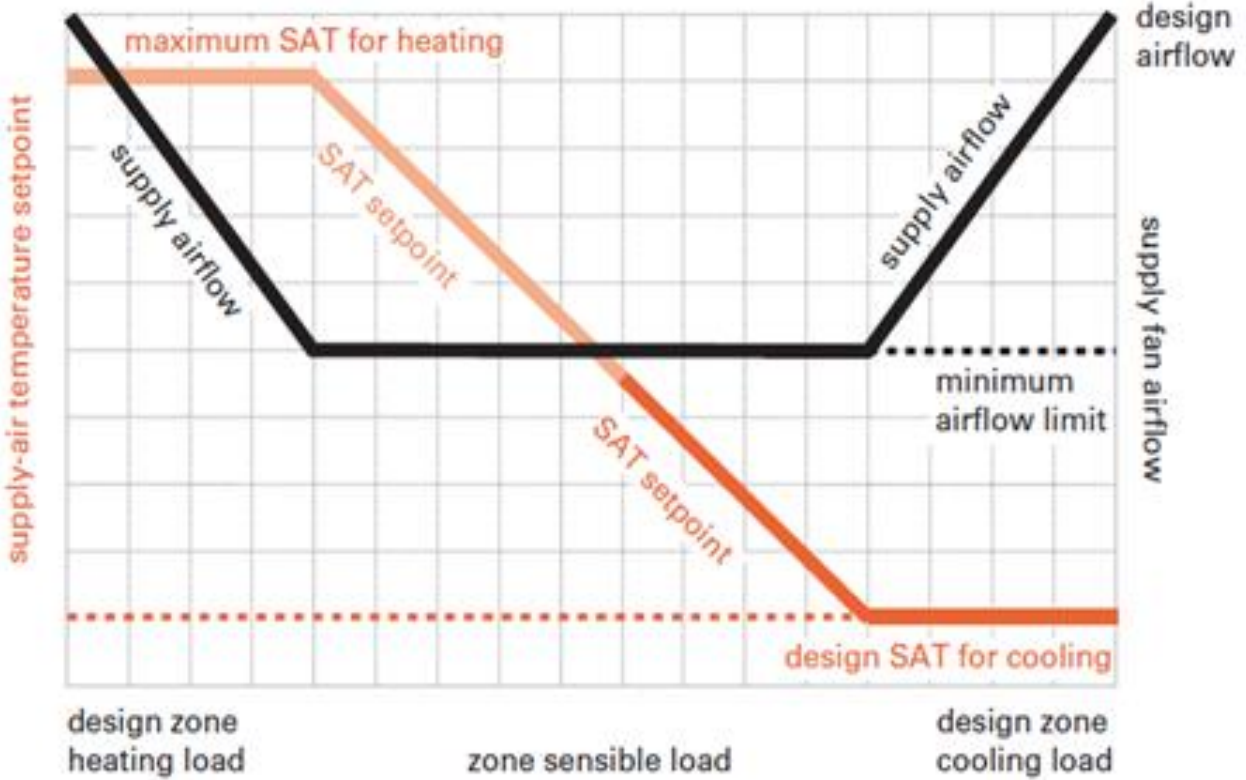
ARC Optional Add-Ons

- Web accessible controls
- Fault detection analytics
- Automated Demand Response

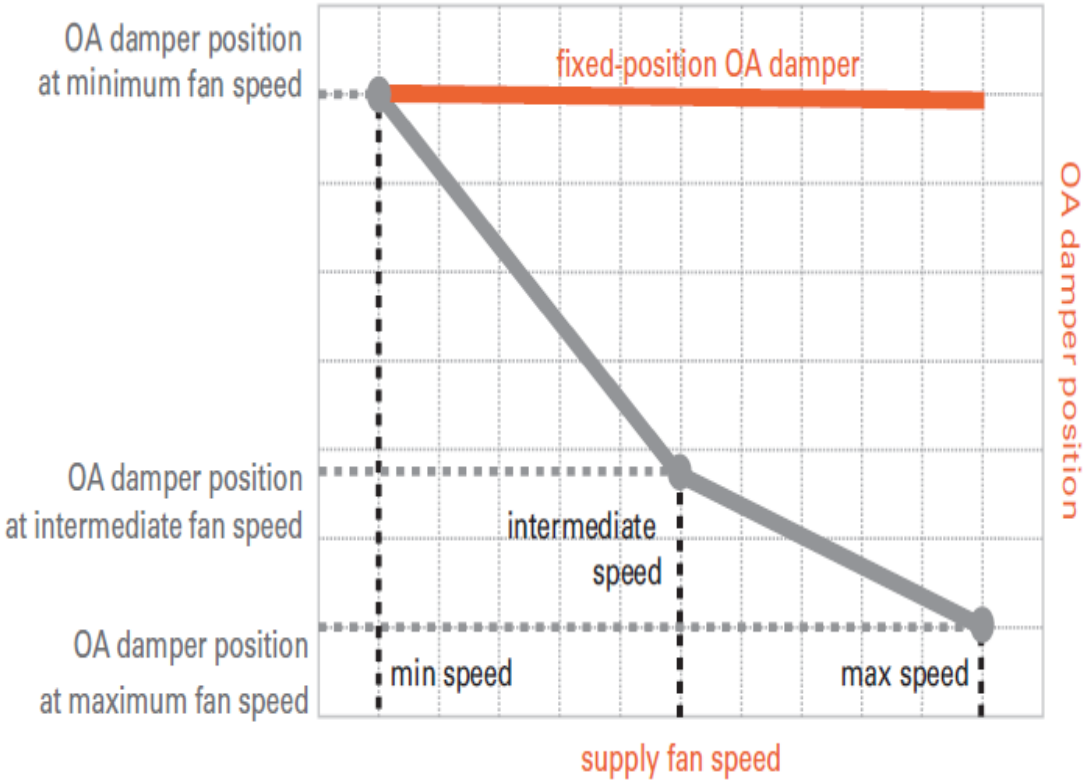
Advanced Rooftop Controls

- Where have ARCs taken off?
  - Retail, Manufacturing, Restaurants
- What are the barriers to implementation?
  - Out of sight, lack of awareness of the technology
  - Split incentive
- Where should we never install an ARC?
  - Systems with a high thermal load-capacity ratio

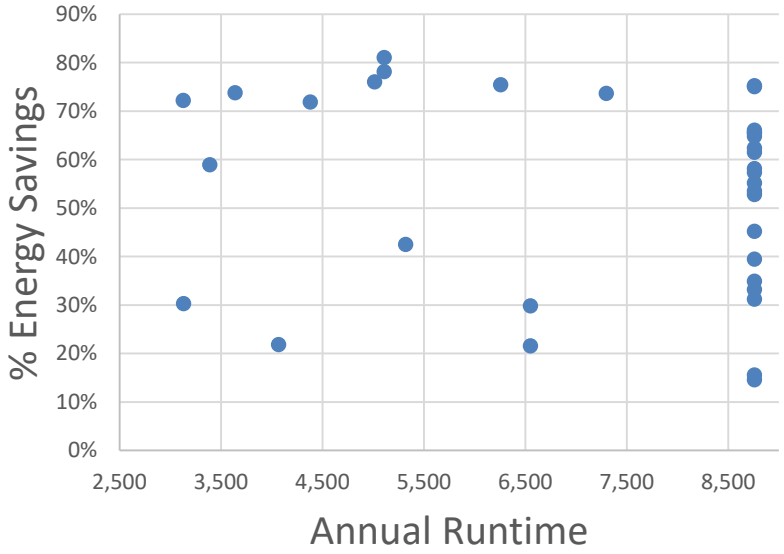
Control Details



Ventilation

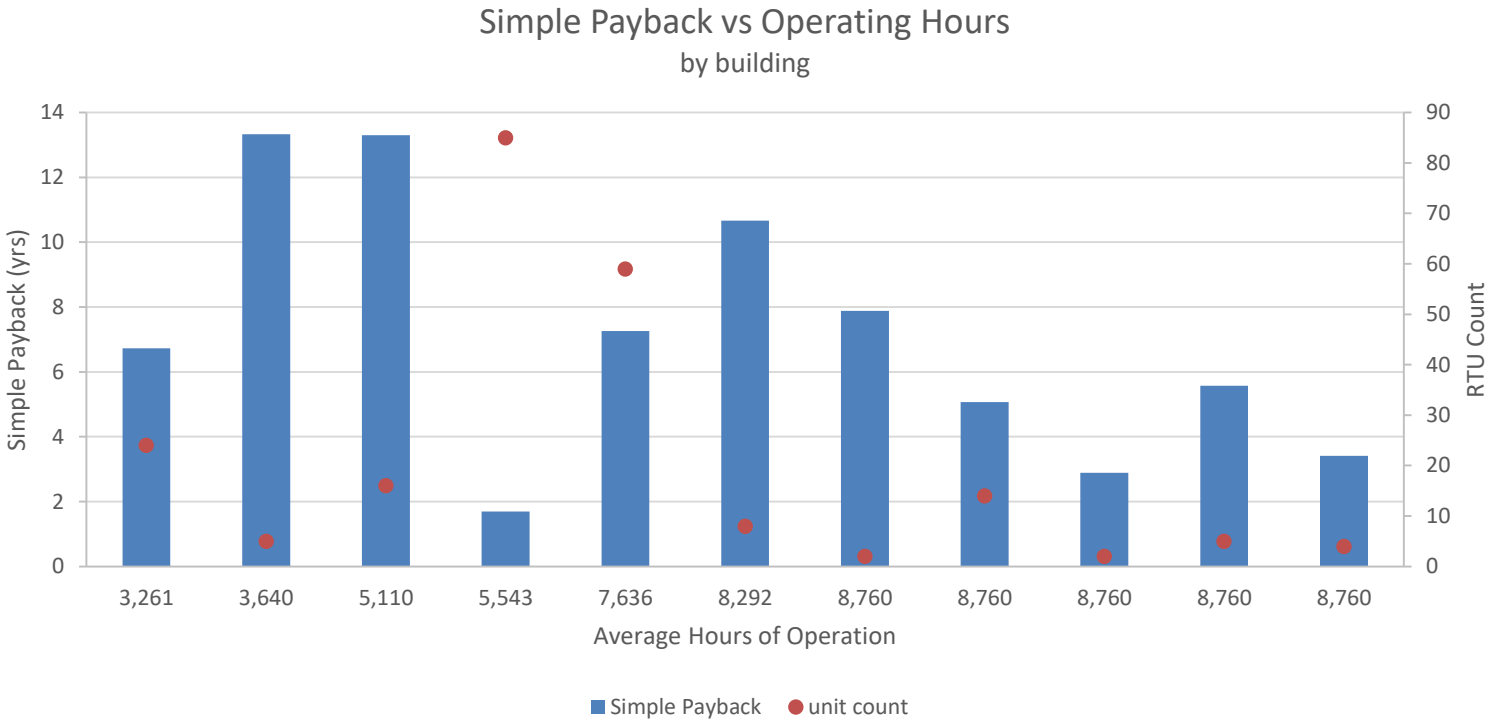


The results…a BIG deal

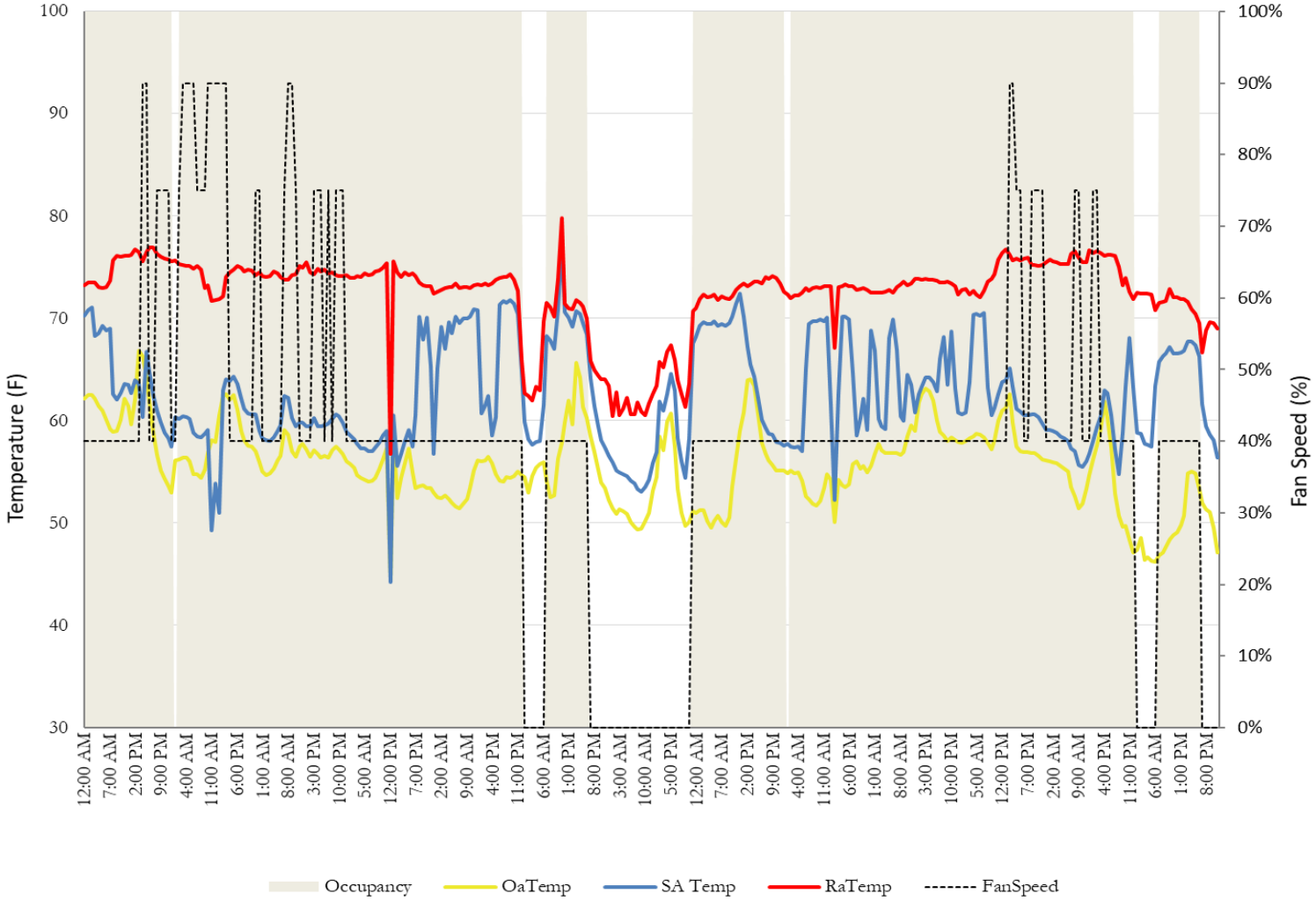


Median savings 57%

The Economics



Before incentives @ $0.072/kWh, only electric (kWh) savings included


Temperature (F)
Fan Speed (%)
100
90
80
70
60
50
40
30
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
12:00 AM
7:00 AM
2:00 PM
9:00 PM
4:00 AM
11:00 AM
6:00 PM
1:00 AM
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7:00 PM
2:00 AM
9:00 AM
4:00 PM
11:00 PM
6:00 AM
1:00 PM
8:00 PM
Occupancy
OaTemp
SA Temp
RaTemp
FanSpeed

Non-Energy Benefits

"…these controls took us from a reactive to a **proactive mode**. Before, we typically didn't know there was a problem with a unit until we received employee complaints. Now, facilities personnel often **identify issues** and resolve them before occupants arrive…"

Scott Bacon, Leatherman Tool Group, Portland

The Challenges Ahead

- These retrofits are not going to happen on their own
- ARC upgrades can’t be observed in the space (it’s not lighting or appliances
- We must actively seek allies in the market to develop traction