Digi-RTU

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WHAT IS THE DIGI-RTU™

The Digi-RTU is a Heating, Ventilation, and Air Conditioning (HVAC) rooftop unit control kit that is both a demand management and energy usage device. It is designed to improve the energy efficiency and demand requirements of a rooftop unit as well as solve the humidity, common noise, and frequent on/off issues of a rooftop unit through modulating the capacity of a rooftop unit to match the cooling or heating space requirements.

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DIGI-RTU

PERFORMANCE RECOGNITION

American Public Power Association's 2011 DEED Energy Innovator Award.

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HOW THE DIGI-RTU WORKS

By intercepting heating and cooling calls, the Digi-RTU's patented technology manages the compressor and fan speeds to match the space requirements.

As a result space temperature and humidity are best managed.

DIGI-RTU KIT 4-5 HOUR INSTALL

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DIGI-RTU ROOFTOP ADVANCED CONTROLS

- Integrates air-side economizers
- Controls supply fan speed - VAF
- Controls Compressor capacity - VRF
- Manages Demand-Controlled Ventilation, CO_2
- Demand Response signal enabled (DR)
- Fault Detection & Diagnostics (FDD)

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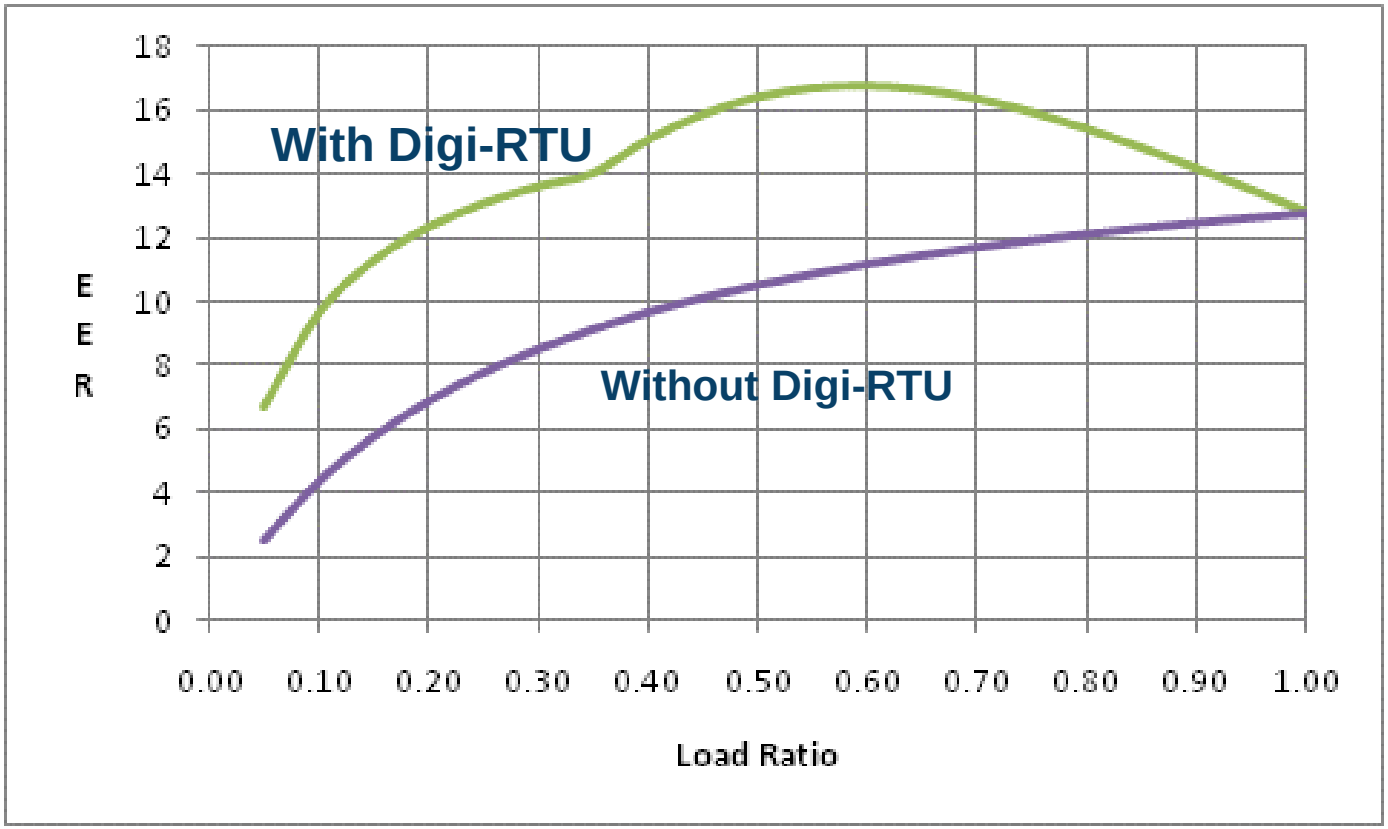
DIGI-RTU ENERGY PERFORMANCE: EER



Improve RTU seasonal performance over 30%

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MAIN APPLICATIONS

- Package rooftop units, water and air source heat-pumps, split units
- HVAC rooftop units between 3 to 30-ton
- Up to four cooling stages
- Up to two heating stages
- Scroll compressors & reciprocating compressors
- All original equipment rooftop units
- Thermostat and BAS interfaces

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DIGI-RTU ADVANCED CONTROLS FUNCTION

Modulating mechanical HVAC equipment matches space operating requirements and is an accepted industry standard

Modulating fan and compressor is the energy efficiency strategy for rooftop units in all climate zones

Economizer Integration

- Integration and management of the existing economizer
- Extends existing economizer range by 30%

Fan Speed Control - VAF

- ON mode - average fan savings are greater than 85%
- AUTO mode - average fan savings are 70 – 80%

Demand Controlled Ventilation, CO2

- CO_2 sensor in the return-air duct integrated with the economizer meets ASHRAE 62.1 and CA Title 24 IAQ

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DIGI-RTU ADVANCED CONTROLS FUNCTION

Demand Response

- Digi-RTU responds to all space heating /cooling calls according to establish set-points
- Prior notice of a Demand Event, the Digi-RTU can “pre-cool” the space and then maintain established space temperature per set-points of the BMS
- A Load-Limit factor for the rooftop unit is sent through the BAS to the Digi-RTU, and can range from 50-100%, thereby limiting the speed of the rooftop unit.

kW Reductions Are Not Achieved by Adjusting Up Space Set-Points

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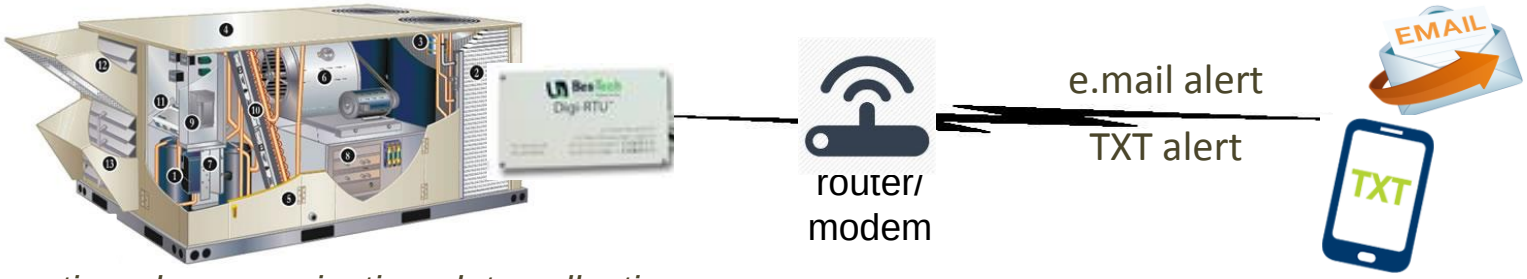
DIGI-RTU ADVANCED CONTROLS FUNCTION

FAULT DETECTION & DIAGNOSTICS (FDD)



continued communication, data collection, and visibility with existing building strategies

existing BMS & database server

existing IP T-stat & database server

Monitoring & Alerts

- **Insufficient evaporator air-flow**
- **Condenser coil fouling**
- **Low/high refrigerant charge**
- **Compressor valve leakage**
- **Liquid line restrictions**
- **Economizer damper failure**
- **Sensor failure/degradation**

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DIGI-RTU ADVANCED CONTROLS FUNCTION

Existing Building EE Strategies, Platform & Equipment

- Communicates with existing BAS platforms and existing installed thermostats; programmable, IP etc.
- Integrates with the original equipment HVAC controller
- Mounts inside the HVAC rooftop unit

Compressor Optimization - VRF

- Conforms to original equipment manufacturer recommendations for speed reduction down to 45Hz
- Programmed logic provides soft start & stop of the compressor
- Compressor modulation savings are double fan power savings for a significant portions of the climate zones
- Peak Demand savings of 4 – 5kW for an average 10-ton rooftop

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BENEFITS OF USING A DIGI-RTU

- Sustainable reduction in electricity and therm consumption
- Reduces peak demand and associated peak demand charges
- Integrates with existing space temperature management devices
- Better maintains space humidity and temperature decreasing comfort complaints
- Reduces compressor cycling up to 75%, reducing maintenance costs
- Reduces HVAC equipment noise in occupied space
- Applicable kW, kWh, Demand Response, Fault Detection and VFD utility incentive programs
- Available financing options; equipment loan/lease or performance contract

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OMAHA, NE

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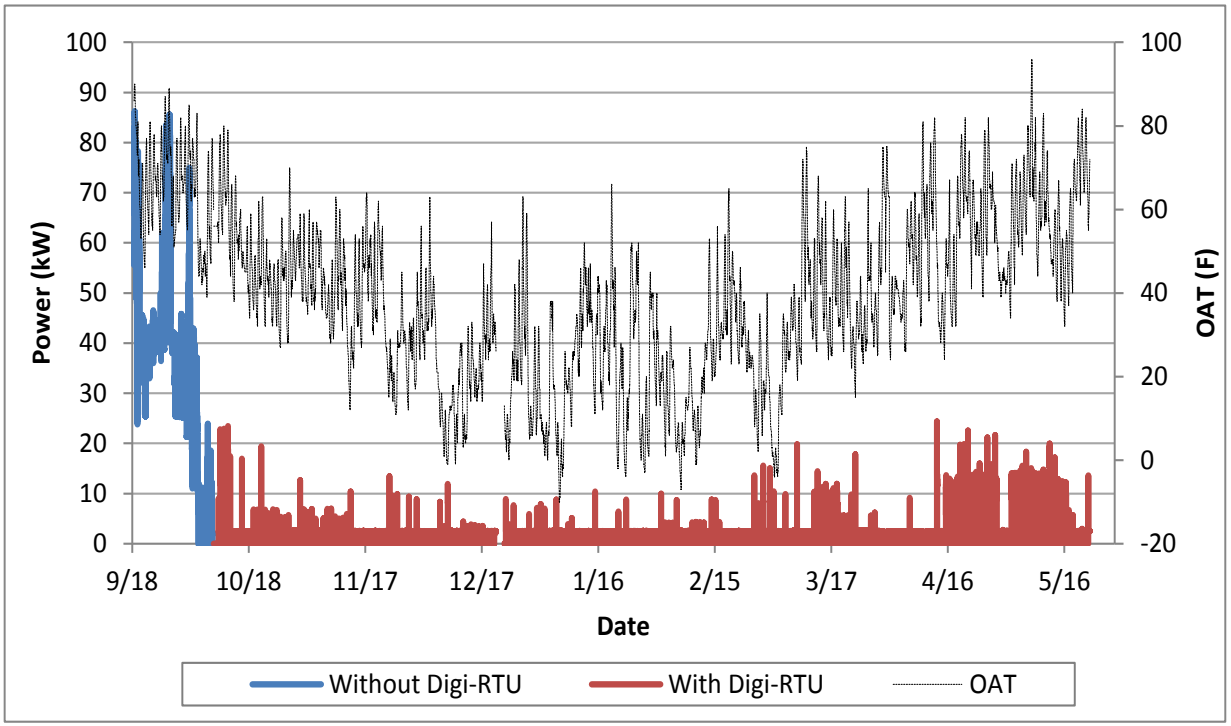
DIGI-RTU CASE STUDY – PHARMACEUTICAL DISTRIBUTION CENTER



Measured Power Consumption and Ambient Temperature

71% kW decrease

Measured RTU Power

Pre - blue

Post - red

Ambient temperature

5-minute intervals

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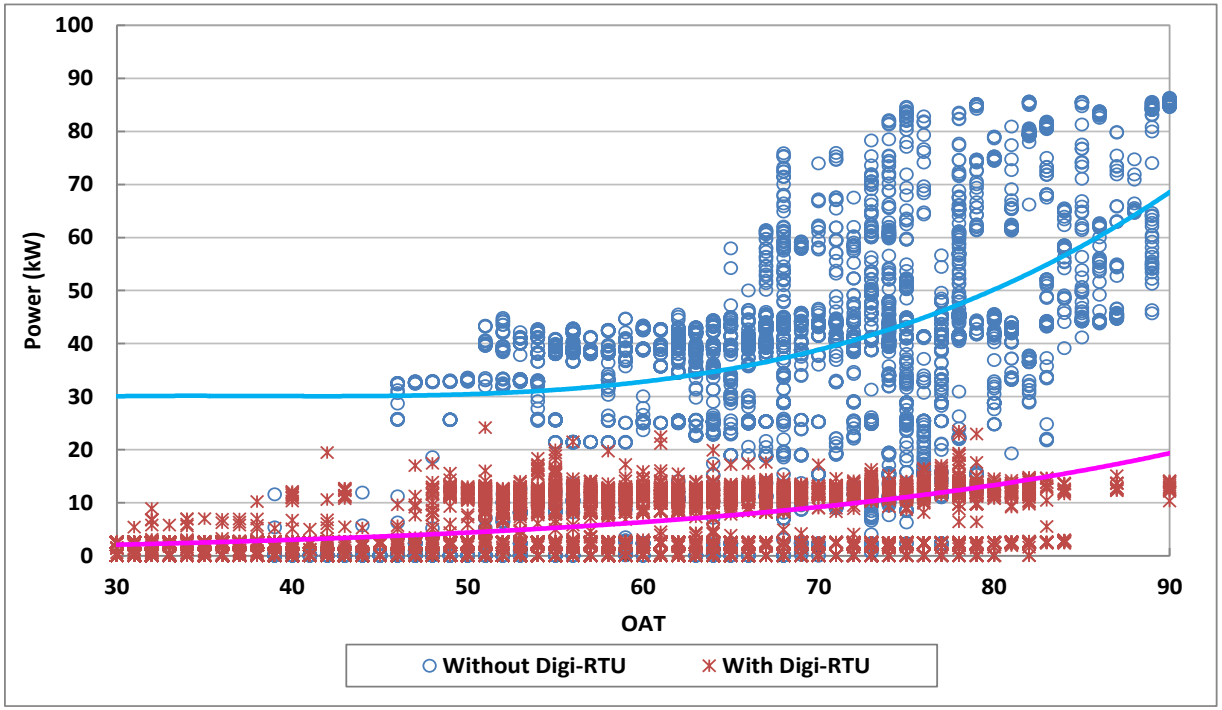

Comparison of Measured Power Consumption with and without Digi-RTU

85% kWh decrease

Measured RTU Power

Pre blue

Post red

5-minute intervals

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SAN DIEGO

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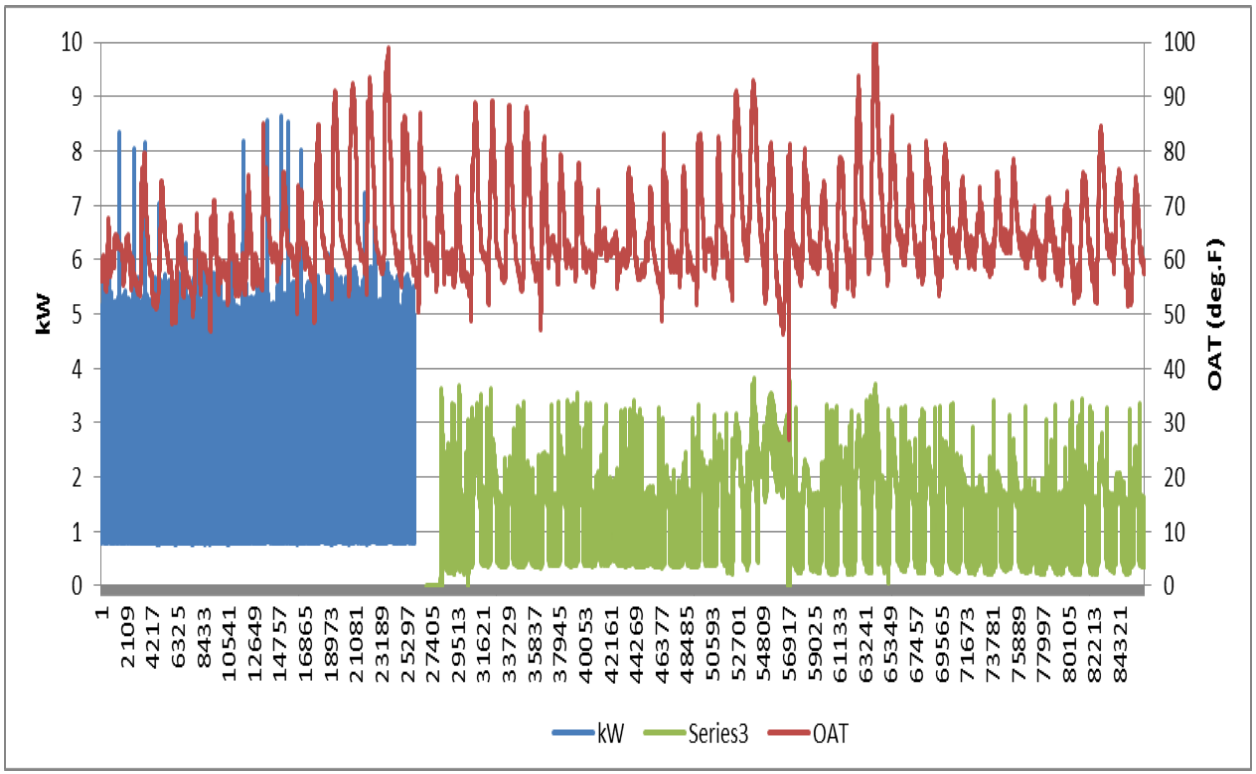
DIGI-RTU CASE STUDY – OFFICE SPACE



Measured RTU Power for One Minute Interval

February - March 2014

43% kW decrease

Pre blue line
Post green line
Ambient temperature red line

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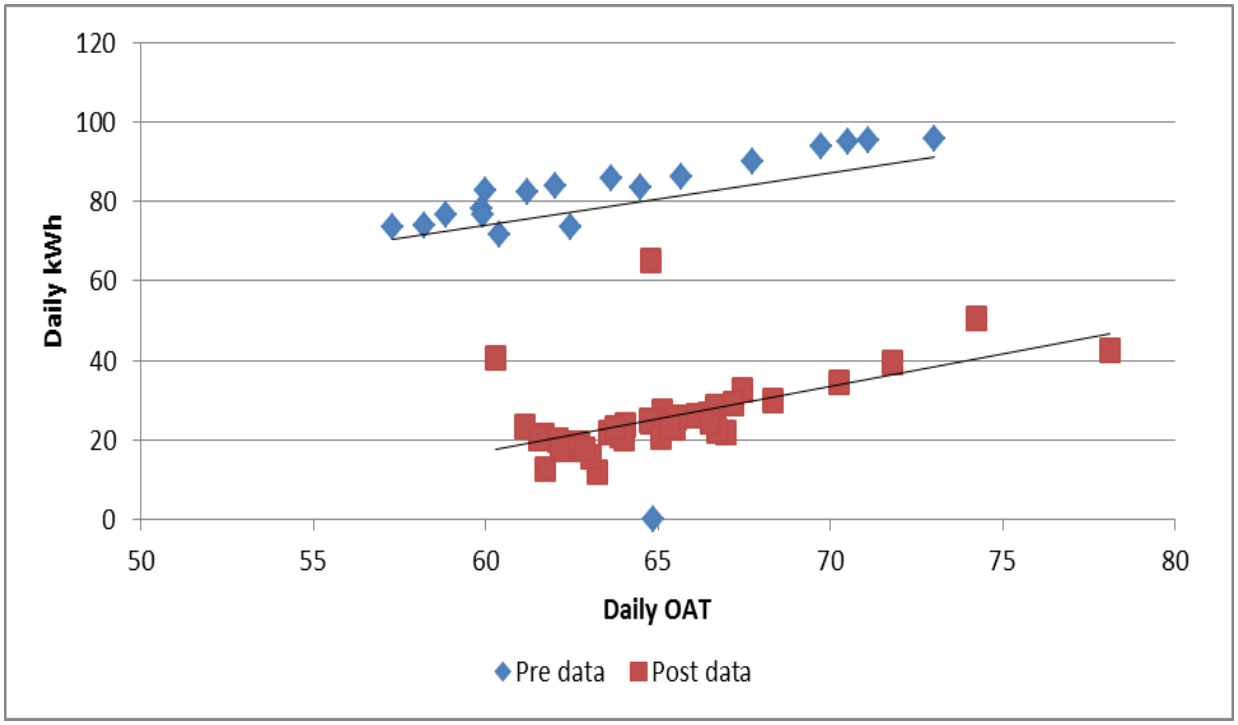
DIGI-RTU CASE STUDY – OFFICE SPACE



Daily Electrical Energy Consumption; Pre (blue) and Post (red) vs. Ambient Temperature

February - March 2014

71% kWh decrease

Pre blue line
Post red line

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SAN ANTONIO TX

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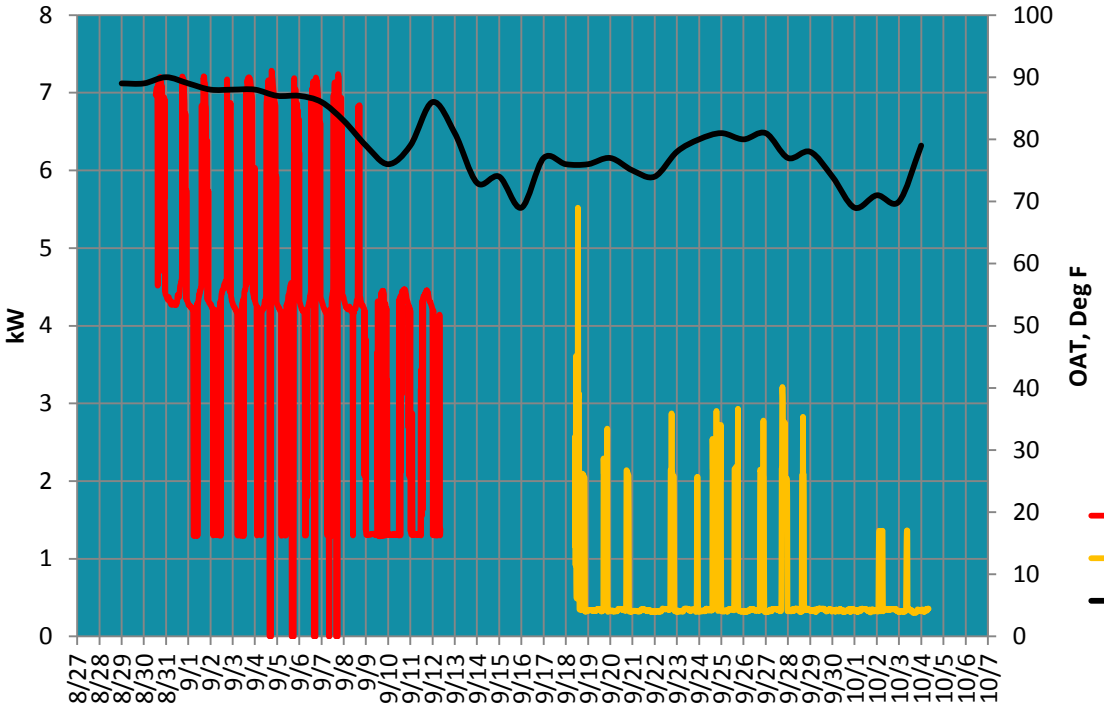
SEPTEMBER – OCTOBER 2012

BOX RETAIL



Two weeks with and two weeks without

29.5% kW decrease

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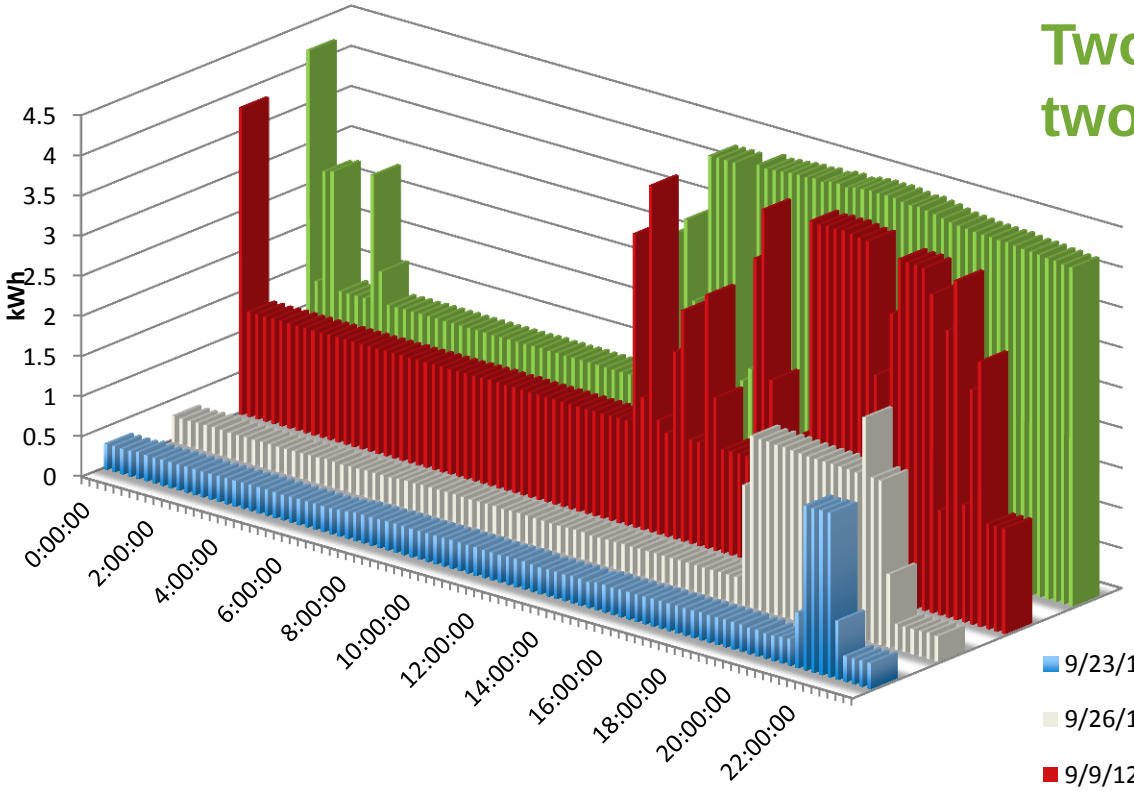
DIGI-RTU INSTALL ASHRAE #2

BIG BOX RETAIL



Two days with and two days without

74% kWh reduction

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VERMONT

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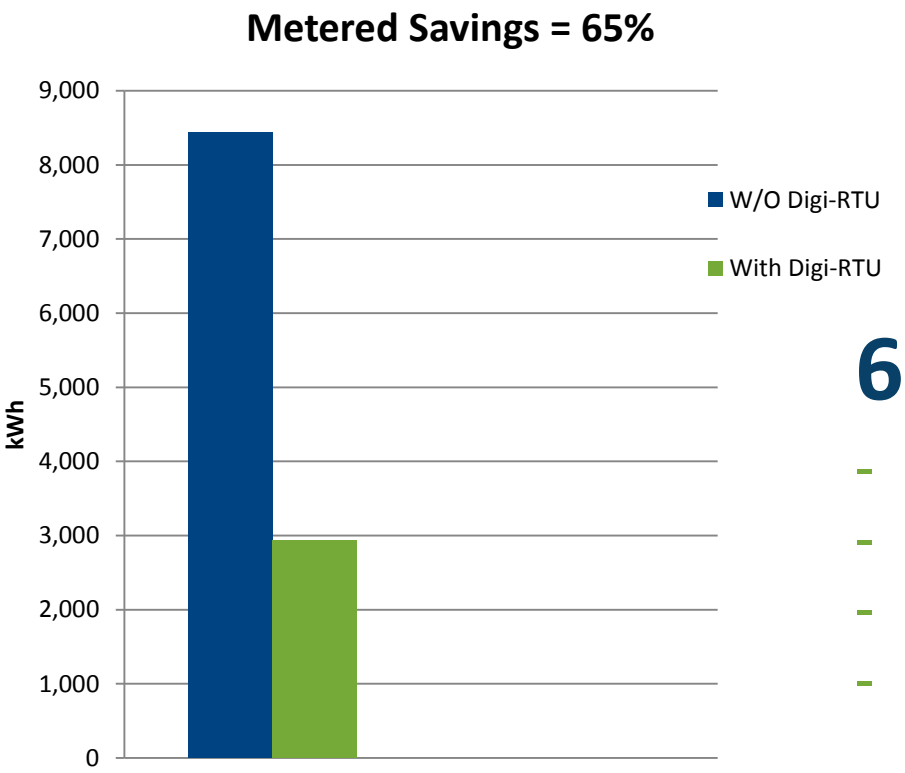
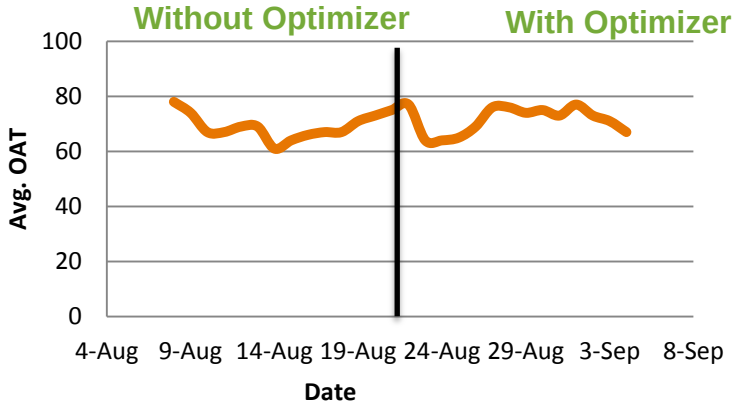
BURLINGTON ELECTRIC – STUDY

Office Building





65% kWh reduction

- Equipment sub-metered
- Two weeks pre
- Two weeks post
- IPMVP

*Efficiency Vermont press release

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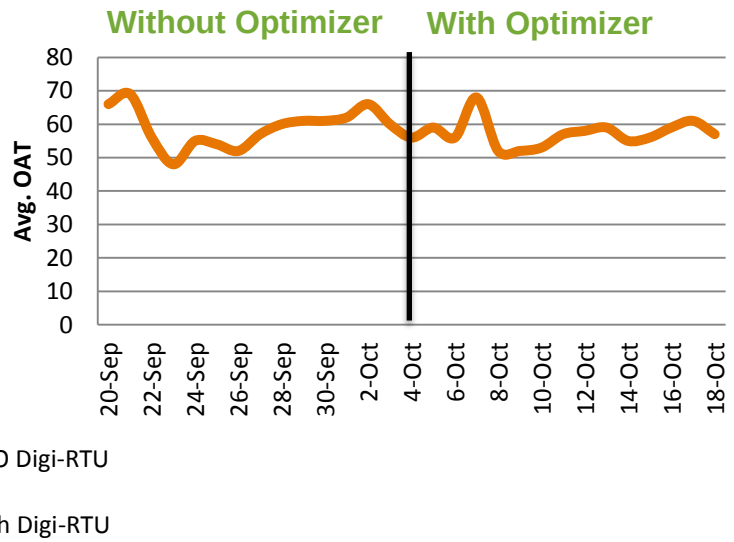
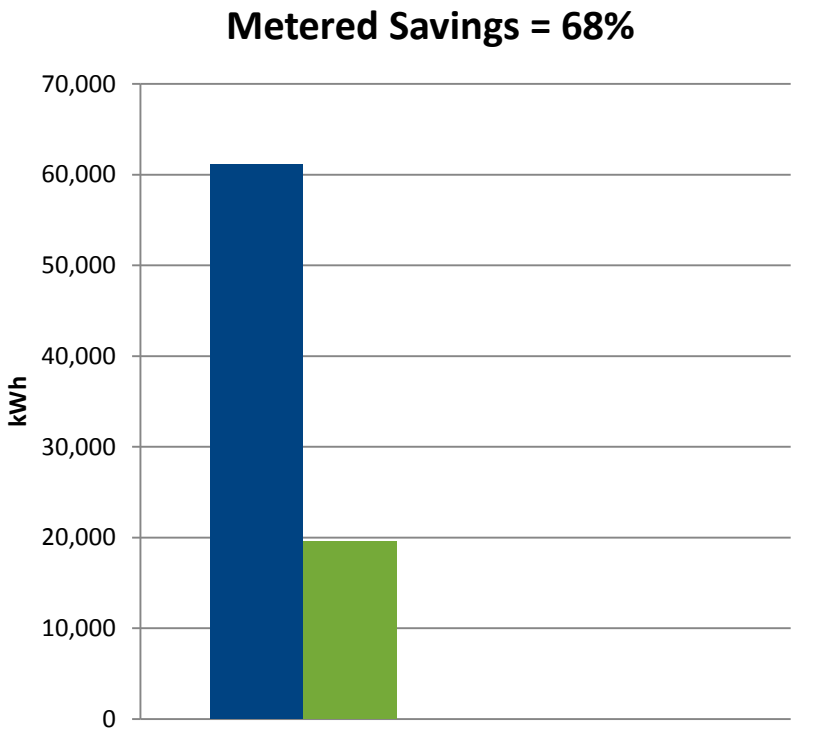
EFFICIENCY VERMONT - STUDY

Distribution Center





68% kWh reduction

- Equipment sub-metered
- Two weeks pre
- Two weeks post
- IPMVP

*Efficiency Vermont press release

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