

Energy Savings Report - Northeast US Utility Customer RTU-2 Jan 2025

To justify further investment in Motus innovative energy-saving motor solutions, our customer conducted a pilot study of replacing an existing rooftop unit (RTU) constant-speed supply fan motor with the Motus motor solution. The goal of this pilot was to prove the Motus solution’s energy saving and economic performance. As part of this process, motor nameplate data was collected, and motor energy usage was measured using NuOz Real-Time Energy Monitoring equipment, prior to and following the installation of the Motus motor solution. The collected motor data was reviewed and used to calculate energy savings and the resulting economics. The table below summarizes major project details.

Table 1. Project Details

Project Summary	
Project Name and Location	Northeast US Utility Customer - RTU-2 - Brockton, MA
Project Description	A rooftop unit (RTU) supply fan motor serving the building had a Motus motor solution installed on December 18 th , 2024. A NuOz Real-Time Energy Monitoring solution was installed prior to the Motus upgrade to study baseline energy usage compared to the Motus solution to estimate annual energy savings with the new Motus motor solution.
Current Equipment	One RTU supply fan motor: <ul style="list-style-type: none"> • RTU-2 had a 5.0 hp constant speed motor
Energy Calculation Parameters Used in the Energy / Economic Analysis	
Hours of Operation	24 hours a day, 365 days a year
Utility Rate Used	\$.10 per kilowatt hour (kWh)
Energy Savings Calculation Approach	<p>The total kilowatt hours (kWh) of energy usage and cost comparison from the baseline and post-installation are derived and calculated from revenue-grade energy sensors that collect minute-by-minute real-time energy usage data during the equipment operation, including real-time amps, active and apparent energy, voltage and power factor.</p> <p>This usage data was collected continuously while the motors were operating during each of the baseline and post installation periods. Annual energy savings in kWh are calculated by extrapolating the baseline period energy usage over the whole year and subtracting from it the measured energy usage in the post-install period for a full year. Power reduction is calculated as the difference between the baseline power and post-install power, divided by the baseline power.</p>
Monitoring Period Statistics	
Monitoring Period Dates	<p>Baseline: 12/12/2024 through 12/17/2024 -5 Days: 3 weekdays, 2 weekend</p> <p>Post-Install: 01/08/2025 through 01/13/2025 - 5 Days: 3 weekdays, 2 weekend</p>

The table below summarizes the energy and economic analysis using the assumptions outlined above.

Motor (hp)	5.0 hp
Baseline Avg Daily Energy Usage (kW & kWh)	Avg 4.20 kW & 99.8 kWh/day
Post-install Avg Daily Energy Usage (kW & kWh)	Avg 0.74 kW & 17.6 kWh/day
Daily Equipment Operation (Hours)	24 x7x365
Motus Solution Energy Usage Reduction (%)	82.4% Energy Reduction
Estimated Annual Energy Savings (kWh)	30,003 kWh Savings /Yr
Estimated Annual CO2 Reduction (.92lbs/kWh)	27,603 lbs CO2 Reduction /Yr
Estimated Energy Cost Savings (\$.10/kWh)	\$3,000 Savings /Yr
Motus Installed Cost	\$6,867.17
Rebate: National Grid Mass Save 2024	\$3,800.00
Simple ROI Payback	1 Year, 1 Month

Table 2. Energy and Economic Savings Summary

Motor Energy Usage Details

The Motus motor solution was installed on this 5 horsepower RTU-2 motor on December 18th, 2024. The prior motor power draw peaked at 4.44 kW during the baseline period with an average of 4.20 kW and an average daily kWh energy usage of 99.8 kWh. During the post-installation review of the Motus solution, the motor power peaked at 3.42 kW with an average of 0.74 kW and an average daily kWh energy usage of 17.6 kWh. **This resulted in an estimated annual energy reduction of 82.4% with the Motus solution.**

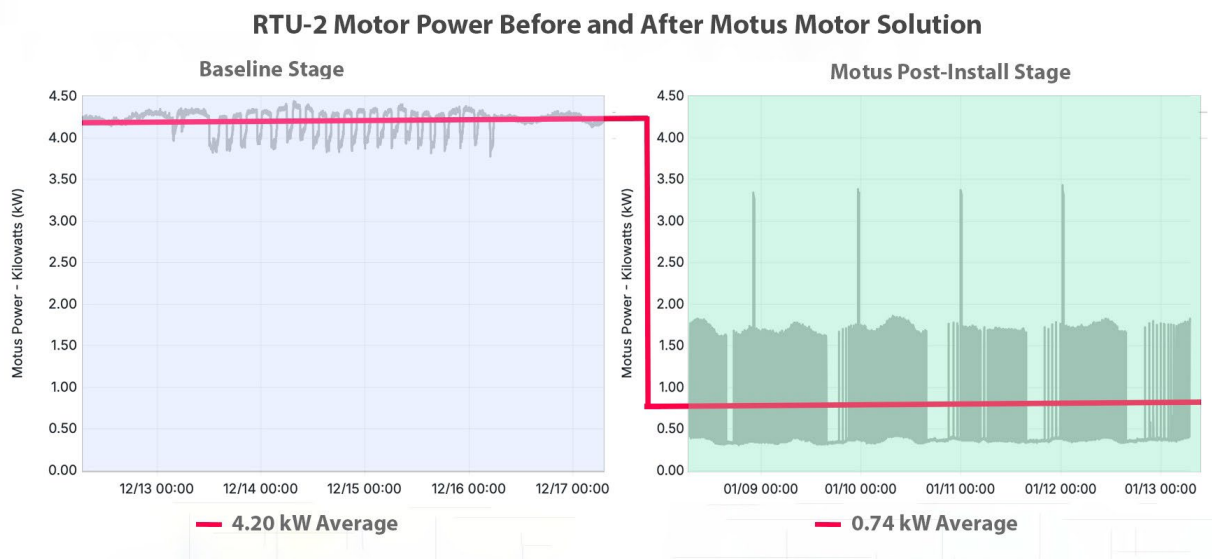


Figure 1. RTU-2 Motor Power Analysis in Baseline and Post-Install Monitoring Periods

NuOz Motor Energy Data Collection

The detailed data collected showed the motors ran nearly constantly in both the baseline and post-installation and measured in similar conditions with the average daily outside temperatures ranging between 10 and 55 degrees Fahrenheit during the monitoring periods.

The NuOz revenue-grade energy monitoring solution included minute-by-minute measurements of real-time voltage, power factor, and amperage on each phase of the 3-phase power configuration in the baseline and post-install monitoring periods. The detailed data is available upon request and below is a sample of the data collected:

Date/Time EST	Avg Current Phase A	Avg Current Phase B	Avg Current Phase C	Total Avg Current Phase ABC	Avg Voltage Phase to Neutral ABC	Avg Power Factor ABC	Total Estimated Average kW	Total Estimated kWh / 15m	Outdoor Ambient Temp in F
12/06/24 12:00	4.72	5.64	4.82	15.13	278.30	0.77	3.25	.81	27.8
12/06/24 12:15	4.74	5.63	4.79	15.29	278.20	0.77	3.25	.81	27.8
12/06/24 12:30	4.7768	5.68	4.78	15.12	278.80	0.77	3.27	.82	27.9
12/06/24 12:45	4.72	5.58	4.76	15.04	277.70	0.77	3.23	.81	27.9

Table 3. Data Power Analysis Detail

Baseline Energy Usage Chart 12/12 thru 12/17/2024

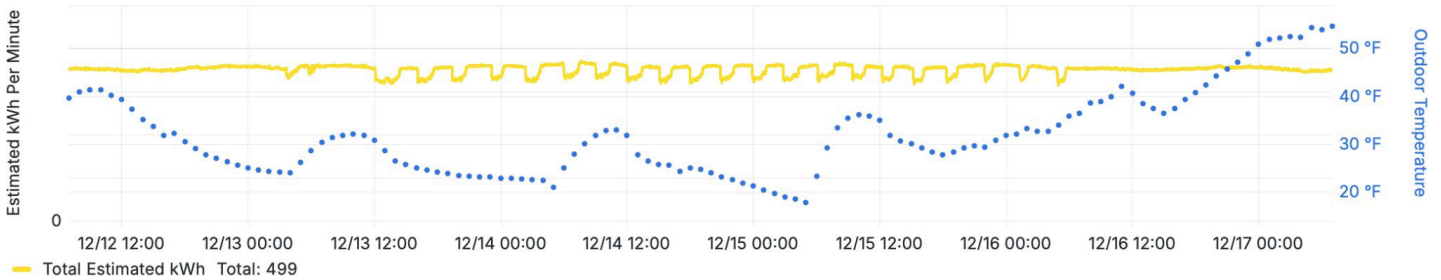


Figure 2. Baseline Energy Usage Total kWh and Outdoor Temperature

Post-Install Energy Usage Chart 01/08 thru 01/13/2025

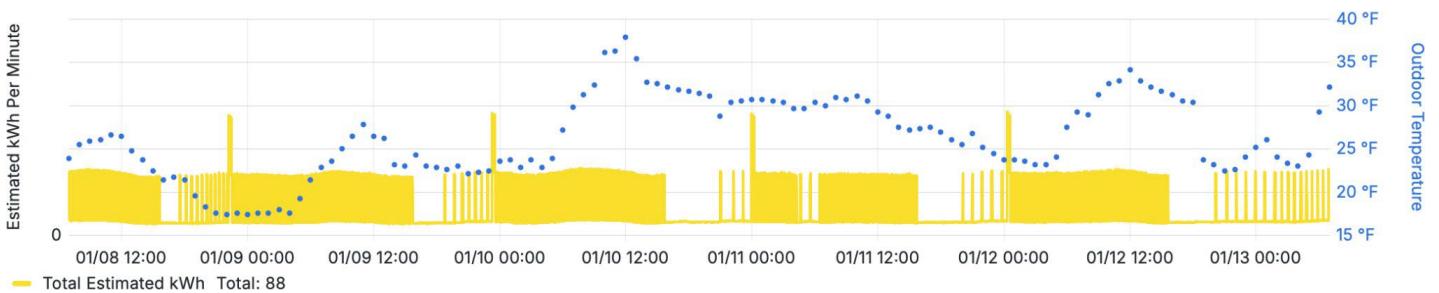


Figure 3. Post-Install Motus Solution Energy Usage Total kWh and Outdoor Temperature

Example Energy Savings in Higher Utility Rate Locations

Comparison Locations Utility Rates	Estimated Annual Energy Savings (5hp)	Estimated Annual Energy Cost Savings	Simple Estimated Paybacks Comparable Rebates
Tennessee \$.12/kWh	30,003 kWh	\$3,600	10 Months
Nevada \$.16/kWh	30,003 kWh	\$4,800	8 Months
New York \$.23/kWh	30,003 kWh	\$6,900	23 Weeks
Connecticut \$.26/kWh	30,003 kWh	\$7,800	20 Weeks

Table 4. Example Energy and Economic Savings in Higher Utility Rate Locations

NuOz Real-Time Energy Monitoring & Qualifications

NuOz Corporation was contracted to deliver a revenue-grade energy monitoring solution at the RTU-2 pilot site. Their responsibilities included collecting and reviewing operational data from the pilot study, calculating energy savings, and developing a concise report summarizing the findings.

NuOz is a full-service managed services provider and industrial sensor solution provider with wide ranging installations of industrial sensors and revenue-grade real-time energy monitoring that combines deep industry expertise. These integrated solutions help building owners and operators enhance building performance, improve operations, and address the challenges of maintaining energy savings over time.

NuOz has experience successfully performing all these services for a variety of client types and in a variety of building types. Special focus on assessing overall energy usage, lighting, HVAC, building controls, and water-related saving opportunities, as well as renewable energy applications. NuOz and its founders have been in operation since 1990 and is headquartered in Bellevue, WA USA.

Final Review Performed by _____ Date/Time _____

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