

Final Performance Case Study: Dual Fuel RTU Monitoring

Background and goals

Center for Energy and Environment's (CEE) research team completed a nine-month study in Queens, New York monitoring the performance of two Daikin Rebel dual fuel heat pump rooftop units (RTUs). These units combine a heat pump as the primary heating source with a gas furnace as backup, making them well suited for cold climate regions. Daikin U.S. had an existing relationship with the building manager, and contracted CEE to conduct a pilot study which aimed to:

- Demonstrate the **energy efficiency and emission reduction** potential of dual fuel heat pump RTUs in mixed-use commercial buildings.
- Evaluate the **performance and heating capacity** of the RTUs during a full heating season.
- Provide data to **support adoption of dual fuel heat pump RTUs** as a low emission HVAC solution.

CEE and Daikin U.S. are both partners in the U.S. Department of Energy's (DOE) Commercial Building Heat Pump Accelerator challenge, which encourages the adoption of dual fuel heat pump RTUs for achieving energy savings and emission reductions.



Project overview

The report evaluates the performance of two 15-ton Daikin Rebel dual fuel heat pump RTUs (RTU2F and RTU3F) installed on the roof of a mixed-use commercial building including healthcare and financial services. The units served the back zones of the second and third stories. Performance was monitored from October 19, 2023, to July 31, 2024, using remote data loggers.



Performance and benefits

Energy and emissions savings

Compared to a standard RTU in the same application:

- RTU2F reduced site energy use by **72%** and source emissions by **58%**
- RTU3F reduced site energy use by **69%** and source emissions by **55%**

Emissions savings were calculated based on guidance from New York City Local Law 97 (NYC LL97), which requires buildings over 25,000 square feet to meet certain emission limits.

Performance and efficiency

During the heating season, this study found that less than 1% of the heating capacity delivered was from gas combustion.

- RTU2F delivered **100%** of its heating capacity via the heat pump
- RTU3F delivered **99%** of its heating capacity via the heat pump

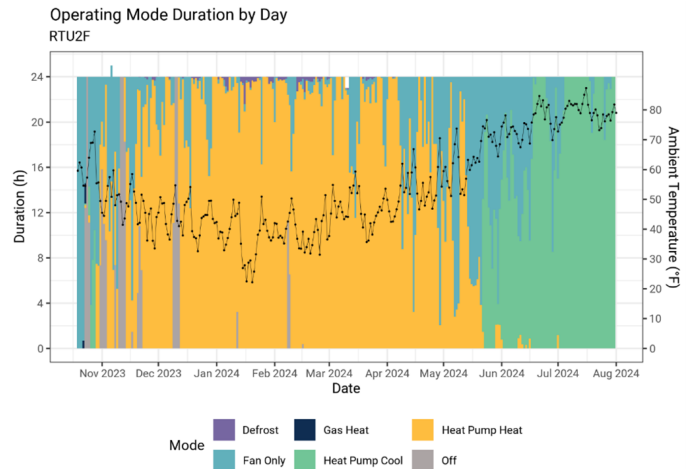
Average Seasonal Efficiency (COP)

- RTU2F: 2.59 (3.19 in heat pump mode)
- RTU3F: 2.53 (3.07 in heat pump mode)



Results and next steps

Performance was summarized in plots describing operating modes, efficiency, and delivered heating energy by energy source and ambient conditions. Find all the details in the [full report](#).



For more information on dual fuel heat pump RTUs including resources and tools for upgrading HVAC equipment, visit www.nextgentus.org.

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