

FOCUS ON EMERGING TECHNOLOGY



DUAL-FUEL ROOF TOP UNITS (RTU)

Technology Description

RTUs play a critical role in heating, ventilation, and air conditioning (HVAC) for commercial buildings, particularly in cold climates where heating efficiency is a primary concern. Standard gas-fired RTUs dominate the market, but emerging technologies such as dual-fuel RTUs reduce energy consumption while maintaining reliable performance in varying climate conditions.

A dual-fuel RTU is a packaged air-conditioning system providing space cooling and two heating pathways: (1) air-source heat pump heating via a reversible vapor-compression cycle and (2) combustion heat from an integrated gas furnace section. The controller selects the heat source dynamically, typically based on outdoor conditions. The objective is to capture the high seasonal efficiency of heat-pump heating during mild weather while preserving the capacity, fast warm-up, and cold climate performance of gas heat.

Typical commercial dual-fuel RTUs range from ~3 to ~30 tons, serve single-zone or light multi-zone systems, and include standard RTU features (economizer, filtration, supply fan control). Cooling performance is equivalent to a conventional direct expansion of RTU.

Benefits

- Pairing heat pump efficiency with the reliability of combustion heat ensures consistent operation during very low temperatures.
- By using the most efficient fuel source depending on outdoor conditions, dual-fuel RTUs help lower energy usage and utility costs.
- The ability to switch between electricity and gas allows building operators to manage costs more effectively as energy prices change.

Customer Type

Office, retail, education, municipal, healthcare clinics, industrial, and warehouse.

Market Sectors

Mid-size and large commercial.

Potential Energy Savings

Estimated to save between 9,000 and 12,000 BTUs per square foot, equivalent to saving \$0.01 to \$0.03 per square foot on energy costs.

Research Findings

- Dual-fuel RTUs offer meaningful energy reductions in cold climates, with growing momentum from manufacturers and national initiatives.
- Adoption is hindered by high upfront costs, limited product availability, long lead times, and entrenched one-for-one replacement practices.
- Coordinated action across utilities, manufacturers, contractors, and public agencies—supported by targeted education and streamlined program design—is needed to accelerate market uptake.
- Field demonstrations show strong cold-weather performance and efficiency benefits, reinforcing the technology's readiness.
- Wider adoption will depend on pairing simple incentives and supportive rate structures with hands-on training, decision tools, and improved product availability.

REDUCING ENERGY WASTE ACROSS WISCONSIN

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