



# RoofPak™ Energy Recovery Solutions from McQuay



## Controlling Energy Costs and ASHRAE Standard 62.1 Compliance

The energy cost to condition ventilation air is a major part of total building energy costs. Ventilation air can account for 30% of the total cooling load and 50% of the total heating load for a school building. Because proper ventilation is a necessity – not an option – a method of conserving energy, while simultaneously meeting the current requirements of ASHRAE Standard 62.1 is essential.

The solution is a factory-installed and tested energy recovery system available only in McQuay RoofPak™ applied rooftop systems and rooftop air handlers.

## McQuay Energy Recovery Systems

Our energy recovery device transfers both heat and moisture energy between the exhaust and ventilation air. In doing so, it conditions the incoming ventilation air. This total energy device offers a cost-effective and efficient method for containing energy costs while meeting the ventilation requirements of ASHRAE Standard 62.1.

## Factory-Installed and Tested Package

McQuay energy recovery systems (with an ARI certified wheel, exhaust fan, optional bypass dampers and controls) are provided as a one-piece, factory-installed and tested package. This eliminates field coordination and leakage problems associated with field installation.

The outdoor and exhaust air flows are arranged in counter-flow for better efficiency, and to reduce field cleaning requirements. Exhaust contaminants cannot enter the ventilation air because the exhaust air static pressure is always less than the ventilation air static pressure. Frost protection and purge options are also available.

Factory-installed and tested controls provide proper operation for:

**Integrated cooling, heating and recovery control** – Mechanical heating and cooling are supplied as necessary to supplement the wheel and maintain space conditions.

**Free cooling** – Units with economizers include bypass dampers that are opened when “free cooling” is available. The wheel is simultaneously turned off.

**Proper exhaust** – Exhaust fan speed is controlled using a factory-installed Variable Frequency Drive (VFD) and space building pressure sensor for proper exhaust.

## Features

- Recovers both heat and moisture energy
- Factory-installed and tested prior to shipment
- Available in 100% outdoor air (OA) or economizer configurations, both with exhaust fans
- ARI-certified and UL-recognized wheel

## Benefits

- Recovers approximately 75% of the energy from exhaust air stream
- Allows mechanical refrigeration, heating, and humidifying capacities to be reduced, offsetting the initial cost of the energy recovery wheel
- Cuts winter humidification energy costs by up to 60%
- Provides 100% more summer energy recovery than sensible-only energy recovery devices
- Helps provide a comfortable and affordable indoor environment
- Satisfies ASHRAE Standard 90.1 requirements for energy recovery on applications involving more than 70% minimum outdoor air and 5000 total cfm.

## Advantages of Enthalpy Wheel Design

Not only is our energy recovery wheel ARI-certified and UL-recognized, its unique composition also provides significant advantages. Composed of synthetic fiber, our wheel allows moisture-absorbing desiccant to be uniformly and permanently dispersed throughout the wheel, maximizing its life expectancy.

The desiccant forms a 4-Angstrom molecular sieve that attracts water and minimizes contamination. Unlike other energy recovery wheels that can separate or be spread apart by air flow and risk contamination of ventilation air from the exhaust air, the honeycombed design and small aperture sizes of our wheel provides even air flow and minimizes internal wheel bypass.

## Efficient Winter Humidification

Low space humidity is a common problem in the winter and can cause both discomfort and health problems for tenants. It also leads to increased static electricity, which can be damaging to computer equipment. However, mechanical humidification requires 1,100 Btu per pound of humidity. Our energy recovery system provides the added benefit of

significantly raising the humidity level of outdoor air in the winter. Not only can this have a dramatic impact on the first cost and operating cost of an HVAC system, it can also dramatically improve indoor air quality and level of comfort for building occupants.

## Winter Performance: Beating “Jack Frost”

Frost build up can occur whenever the exhaust air stream is near 100% relative humidity (RH) and the wheel surface temperature is below 32°F. Optional factory-installed and tested controls help prevent frost by measuring the exhaust air temperature and humidity, slowing down the rotation of the wheel as required.

## Summer Performance: It's Not Just the Heat, It's the Humidity

Enthalpy wheels provide twice as much summer energy recovery as sensible devices because summer ventilation air involves as much latent load as sensible load. In fact, our wheel normally cools outdoor air down to 67°F wet bulb as normally required by dedicated outdoor air systems (DOAS). Therefore, terminal unit systems like fan coils and heat pumps can be used in combination with our energy recovery rooftop units to provide excellent dehumidification on the most demanding applications.

## First Cost and Operating Cost Reductions

The charts below illustrate typical energy cost savings from the McQuay RoofPak Energy Recovery System.

First cost savings result because the system is factory-installed and tested, eliminating the need for field design, installation and coordination. Because less mechanical cooling is needed, the cooling system can be downsized for additional first cost savings. This also can reduce the unit's electrical requirement, further reducing installed costs.

Typical Annual Energy Savings per 10,000 CFM of Ventilation Air with McQuay Energy Recovery Wheel

	Minneapolis	Phoenix	Miami	Dallas	N.Y.C.	Atlanta	Chicago
With Winter Humidification	\$6,609.00	\$4,605.00	\$8,048.00	\$5,545.00	\$5,374.00	\$4,738.00	\$6,010.00
Without Winter Humidification	\$5,359.00	\$4,579.00	\$8,048.00	\$5,381.00	\$4,625.00	\$4,363.00	\$5,041.00

Typical Payback (In Years) with McQuay Energy Recovery Wheel

	Minneapolis	Phoenix	Miami	Dallas	N.Y.C.	Atlanta	Chicago
With Winter Humidification	1.2-2.6	2.6-7.4	0.7-2.7	1.8-5.2	2.0-6.1	2.6-7.1	1.5-4.1
Without Winter Humidification	1.9-4.9	2.6-7.4	0.7-2.7	1.9-5.4	2.6-7.1	2.9-7.3	2.1-6.0

