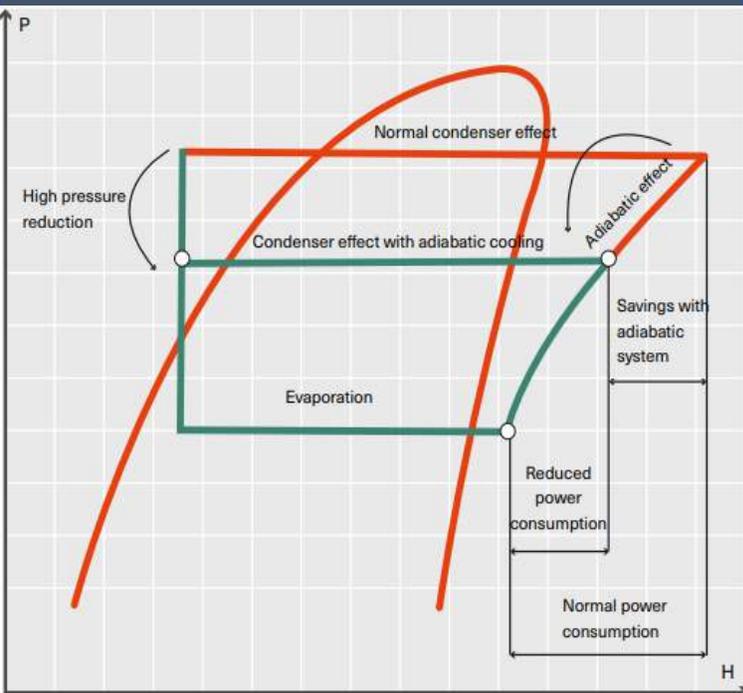
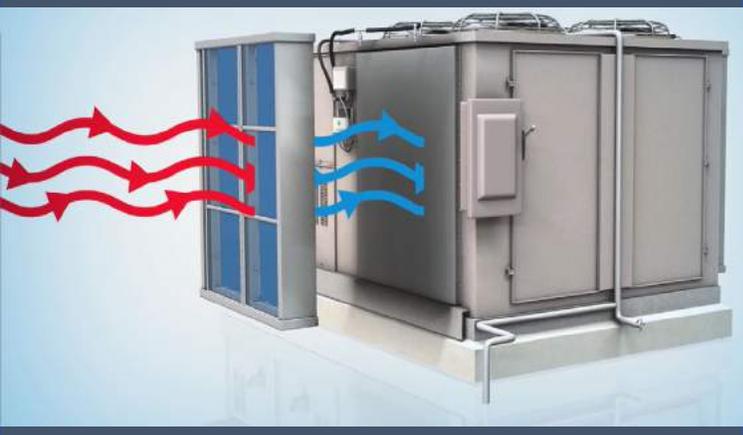
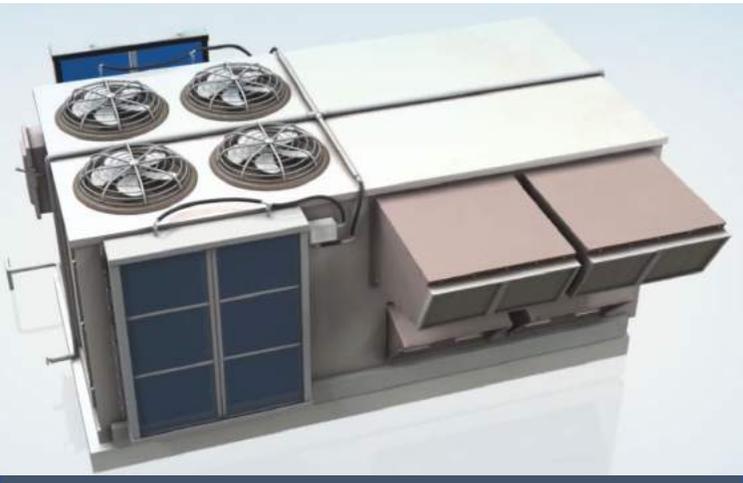


INSIGHTS FOR A COMPLETE GAME PLAN



INSIGHT #1 // ADIABATIC PRE-COOLING – PACKAGED ROOFTOP UNITS

For the purpose of this article, we will separate a packaged rooftop unit into two major systems: the **Evaporator System** and the **Refrigerant System**. The **Evaporator System** is made up of the supply fan assembly. The **Refrigerant System** is made up the compressor, condenser fans and associated controls.

According to a study by the National Renewable Energy Laboratory (NREL), the distribution of energy usage in a packaged rooftop unit is about 23% by the evaporator fan and 77% by the refrigerant system.

The higher baseline consumption of the refrigerant system makes it an attractive system to optimize. However, typical retrofit solutions are invasive requiring things like soldering and specialty valves. In **Adiabatic Pre-cooling**, water is sprayed freely or on non-metallic mesh panels upstream of the condenser coils. As the water evaporates, the dry bulb temperature of incoming air to the condenser coils is lowered. The cooler air flowing through the condenser coils reduces gas pressure, providing energy savings on mechanical cooling of up to 30%. This reduces the work and peak demand of the refrigerant system. Additional benefits from the mesh panels are condenser coil protection from debris and solar rays, lower equipment runtime, and lower stress in the refrigerant system.

Additional complexities of water consumption, controls, hydronic specialties, water treatment, and maintenance need to be considered for retrofits. Utility companies provide rebates to make the adoption of **Adiabatic Pre-Cooling** more attractive

SOURCES: NREL, PEAKPLUS, TRANE

MARKET SUMMARY// WEEKLY ENERGY OUTLOOK.

Power prices in the mid Atlantic and the Great Lakes Region were up one to three percent from the prior week. Real-Time prices in ERCOT averaged \$23.23 per Mwh.

| Week Ending | 1/7/2022 | RTC Day-Ahead Index Prices | | | RTC Forward Calendar Strip Prices ¹ | | | |
|----------------------|----------|----------------------------|----------|----------|--|---------|---------|---------|
| | | (\$/MWh) | | | (\$/MWh) | | | |
| Electric Hub | ISO | Min | Max | Avg | 2023 | 2024 | 2025 | 2026 |
| Indiana Hub | MISO | \$29.76 | \$110.39 | \$52.52 | \$43.95 | \$43.84 | \$44.36 | \$43.86 |
| Michigan Hub | MISO | \$26.82 | \$99.37 | \$46.50 | \$43.21 | \$43.24 | \$43.91 | \$43.61 |
| PJM West Hub | PJM | \$28.77 | \$119.33 | \$54.38 | \$43.47 | \$41.88 | \$41.35 | \$40.85 |
| AEP-Dayton Hub | PJM | \$29.26 | \$90.82 | \$46.47 | \$42.18 | \$40.60 | \$40.03 | \$39.48 |
| N. Illinois Hub | PJM | \$10.04 | \$87.92 | \$38.21 | \$37.25 | \$35.76 | \$35.37 | \$34.97 |
| Mass Hub | ISO-NE | \$33.90 | \$208.41 | \$110.63 | \$65.23 | \$52.45 | \$51.86 | \$51.46 |
| NYZ J | NYISO | \$33.75 | \$211.40 | \$92.83 | \$52.71 | \$53.00 | \$54.56 | \$55.29 |
| ERCOT N ² | ERCOT | (\$0.05) | \$363.93 | \$31.84 | \$37.58 | \$33.29 | \$31.93 | \$30.59 |
| SP15 | CAISO | \$5.79 | \$121.80 | \$57.08 | \$54.44 | \$50.96 | \$48.48 | \$46.16 |