

## COPELAND COLD CHAIN SOLUTIONS

# Innovative heat recovery solution revamps cooling efficiency for leading Chinese fast food chain

## Background

A leading fast food chain in China faced cooling system challenges that threatened food safety, energy efficiency, and operational costs. Leaving these problems unchecked for this market leader with thousands of branches in China could result in compromised food safety, higher energy consumption, and higher overall operating costs. Copeland was tasked to develop a custom solutions to ensure that the critical restaurant operations remain uncompromised.

## Challenge

The restaurants struggled with high kitchen temperature caused by the heat given off from the condensing unit. The use of additional air conditioning to manage this heat, alongside reliance on electric heaters for water heating, contributed to substantial energy consumption – a notable concern for the environment and business.

A typical restaurant has one medium-temperature cold room and one low-temperature cold room, with one condensing unit providing cooling capacity to one cold room. Over 90% of the application involves the condensing unit sitting on top of the walk-in cooler with short piping. Data is monitored via a big screen display installed on the cold room's front door for convenient checking. Refrigeration system data are collected as part of enterprise-level data management.

## Typical QSR application



## The company's kitchen operations faced several challenges:

- Condenser heat from condensing units is ejected into the top ceiling of the kitchen, resulting in higher ambient temperature.
- The ejected heat eventually had to be cooled by the building air conditioning system.
- The restaurant required 55°C hot water generated by an electric heater, for cleaning purposes.
- The electric consumption was very high, with 36,000 kWh annually for its refrigeration system and 1.4M<sup>3</sup> of water/day for its electric water heating system.

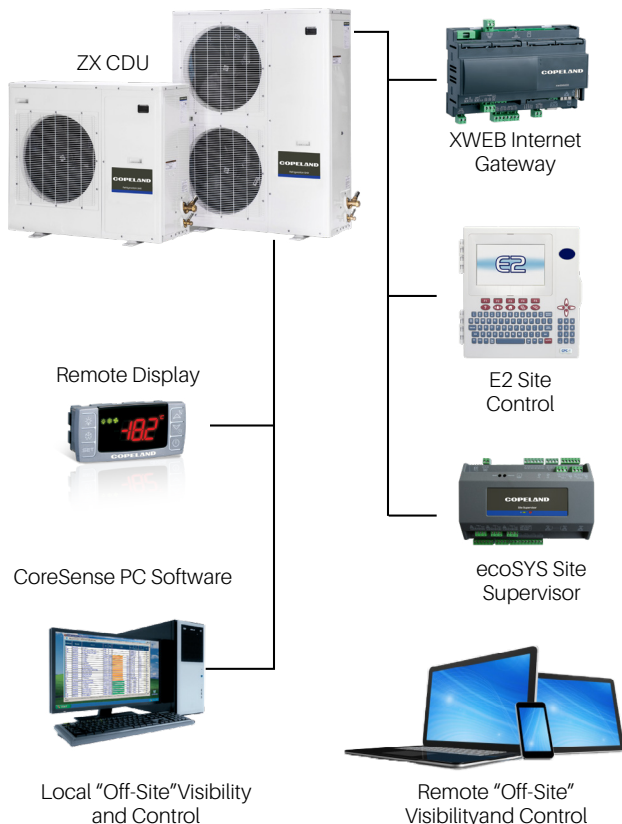
## Solution - Copeland ZX Condensing Unit

Copeland ZX condensing units stand out due to their efficient energy-saving feature and user-friendly electronics, including built-in diagnostic and easy installation capabilities ideal for the company's stringent cold chain requirements.

By leveraging Copeland's scroll compressor technology and combining it with fan speed controllers and optimized condenser coils, these units offer up to 20% annual energy cost savings compared to conventional hermetic reciprocating units.

Copeland ZX units combined with controls, monitoring, and enterprise management systems like XWeb, E2, and Site Supervisor enable better facility decisions to help lower operational cost.

These intelligent store solutions automate site management tasks such as providing visibility on equipment health, preventing equipment failure, and protecting food quality. They minimize maintenance costs and maximizes system reliability, which is needed in its fast-scaling food branches.

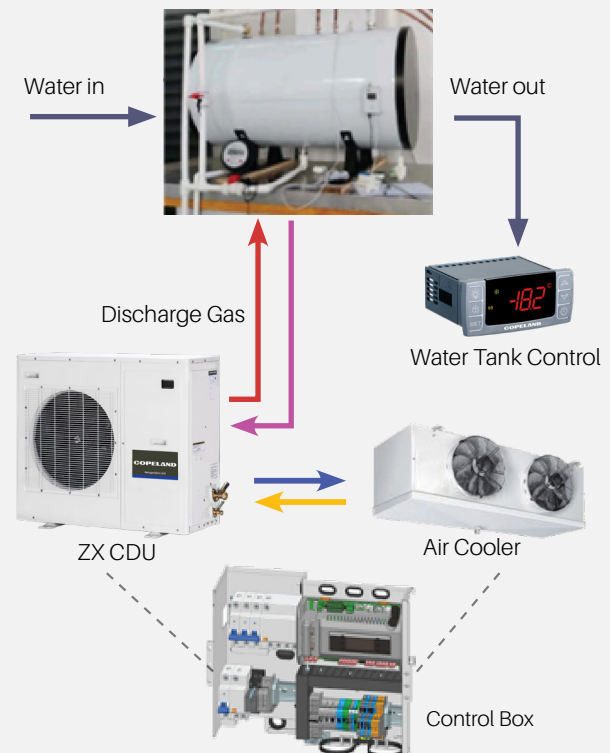


*Customized heat recovery loop system enables the fast food chain to increase cost savings by up to 30% and ensure food safety across thousands of branches in China.*

## A tailored heat recovery loop system

Copeland partnered with the main contractor, **Shanghai Kangshuai Industry Development Co., Ltd** to come up with an innovative customized design to solve the company's challenges. This system consisted of Copeland ZX condensing units and controller that discharge gas to heat the water in heat recovery tank, a controller to manage water and air temperature, an integrated control box project design, and the contractor's water tank and air cooler. Copeland's compressor electronics also enabled the unit's communication connectivity and diagnostic protection capabilities.

Field tests show that the condensing unit runs stable, the inlet water from municipal is heated by the discharged gas so the electrical heater running time is significantly reduced. The cold room temperature is well maintained to secure food quality.

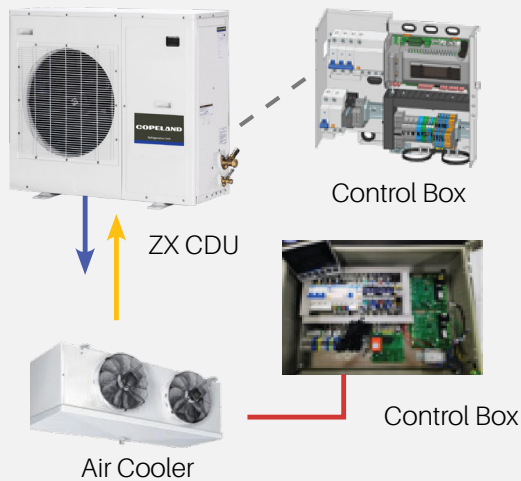


## Copeland ZX Heat Recovery Loop System

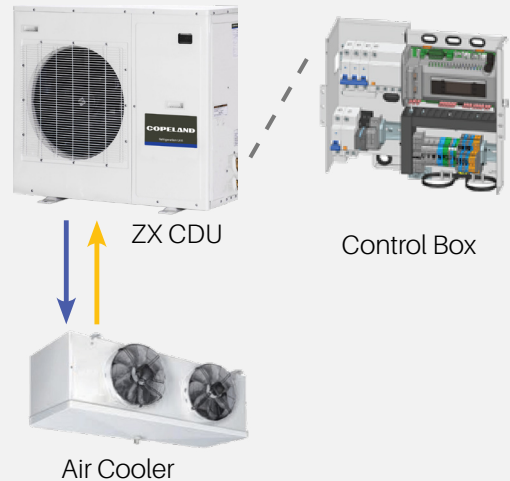
*This solution enables the reuse of discharge gas of compressor for water heating.*



## Before



## After



### Control Integration Solutions

Removing the air cooler control box and integrating air control into the CDU control box, provides optimization of the total applied cost resulting in USD 130 cost reduction for contractors.

### Ease of installation and system protection

For ease of contractor's installation, the control box for the air cooler is removed, resulting in less wiring work. Removing the control box for air cooler also means reduced cost, helping contractors improve solution competitiveness.

With the advance diagnostics and communication capabilities built-in, the system provides preventive

maintenance alerts and system optimizations, enhancing system reliability, and reducing service calls for contractor.

### Reliability of solution

Field test confirmed the system's reliability and effectiveness, with the heat recovery units experiencing reduced service call in practice.



## Key benefits

There are many benefits from this tailored Copeland ZX heat recovery loop system, which is currently being adopted across the company's chain of restaurants



### **Cost-efficient operations**

- Up to 30% reduction in operating costs
- Annual energy savings documented at roughly 14,000 kWh, based on field test
- Substantial cost savings over traditional pure electric heater systems, given the same daily water usage of 1.4 M<sup>3</sup>
- Less electric heater run times, thereby saving energy
- Indirect contribution to energy saving by lowering the condensing unit temperature
- Additional energy saving for the air conditioning system



### **Simplified Installation for lower applied costs**

- Elimination of the air cooler control box reduces complexity and associated costs.

## Outcome

The refrigeration system configuration delivers a solid solution, helping the fast food chain navigate through this significant challenge.

### **Scalability of Solution**

While this heat recovery loop system configuration is tailored for this fast food leader in China, it can be scaled to fast food chains of similar sizes and formats, leading to consistent food safety, lower energy consumption, and cost savings of up to 30%. This ensures that the bottom line of the business is protected.



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