



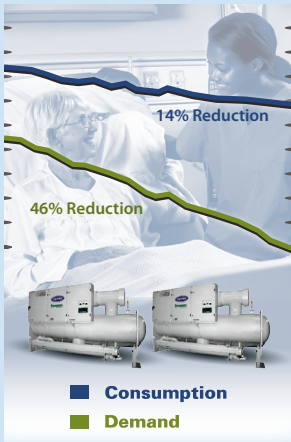
# CASE STUDY



## Mater Hospital, Queensland

### EVERGREEN® 23XRV CHILLERS IN SERIES COUNTERFLOW ARRANGEMENT PROVIDE CRITICAL EFFICIENCY IMPROVEMENTS AT MATER HOSPITAL

**CARRIER CHILLERS REDUCE POWER CONSUMPTION AND DEMAND WHILE PROVIDING ENERGY COST SAVINGS**



*Two Evergreen® 23XRV chillers installed in series counterflow arrangement reduced cooling-related energy consumption at Mater Hospital by 14% (as measured in kWh) as well as cooling-related power demand by 46% (kVa), providing significant savings in energy costs.*

## Project Objectives

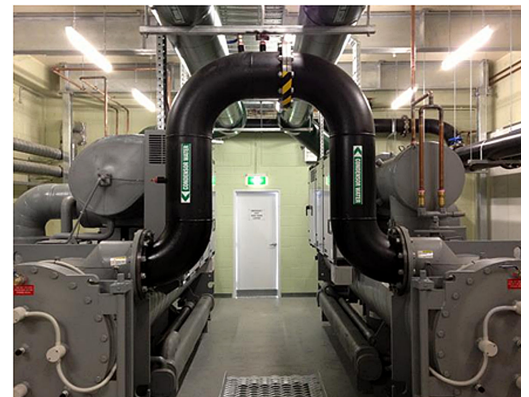
Mater Health Services North Queensland provides hospital care and outpatient medical services to the city of Townsville and surrounding areas of North Queensland, Australia. The region has a population of approximately 200,000 people, and a tropical climate. Mater Hospital, an acute care facility, required a chiller solution that would provide reliable comfort to patients and staff while also delivering superior efficiency, as measured both in energy consumption and power demand. While these two measurements are closely related, consumption represents the total amount of electricity used, whereas demand indicates the immediate rate of use, an important factor in areas such as North Queensland, where peak usage rates represent a significant increase in cost. With this in mind, Mater Hospital decided to upgrade its chiller plant, and tasked design consultants McClintock Engineering to find the most efficient chiller solution.

**"The Evergreen® 23XRV chillers in series counterflow arrangement were the best outcome for reduced energy consumption and electrical demand. The hospital has recorded an energy consumption savings of approximately 14 percent (kWh) and a reduced demand of 46 percent (kVa)."**

– Paul Robinson,  
Senior Sales Engineer,  
AHI Carrier (Australia)

## Project Solution

McClintock Engineering selected two Carrier Evergreen® 23XRV water-cooled screw chillers because of that unit's superior efficiency performance and low operating costs. After modeling several possible chiller configurations, McClintock Engineering and Carrier selected the series counterflow arrangement as the most efficient option. Early data on the installed system suggests an energy consumption savings of approximately 14% (kWh), with demand reduced by 46% (kVa). The new chiller plant also provides N+1 redundancy, the highest standard for healthcare applications, and leaves room for the hospital to expand.



## Synopsis

Mater Health Services North Queensland provides hospital care and outpatient medical services to the city of Townsville and surrounding area in North Queensland, Australia. Mater Hospital, with more than 150 patient beds, is an acute-care facility that provides specialized services such as cardiology, sleep disorder treatment, a post traumatic stress disorder unit, orthopedic and neurological unit, operating room suite and surgical unit.

With a regional population of approximately 200,000 and a tropical climate, Mater Hospital required a chiller solution that would provide reliable comfort to patients and hospital staff while also delivering superior efficiency, as measured in energy consumption and power demand. While these two measurements are closely related, consumption represents the total amount of electricity used, whereas demand indicates the immediate rate of use, an important factor in areas such as North Queensland, where peak usage rates represent a significant increase in cost. With this in mind, Mater Hospital tasked design consultants McClintock Engineering to find the most efficient chiller solution.

McClintock Engineering selected two Carrier Evergreen® 23XRV water-cooled screw chillers because of that unit's superior efficiency performance and low operating costs. The high efficiency of the Evergreen 23XRV is due in part to the use of Variable Speed Drives, which enable the unit to run efficiently at the partial loads that characterize the majority of the load on a chiller system.

After modeling several possible chiller configurations, McClintock Engineering and Carrier selected the series counterflow arrangement as the most efficient option. In this configuration, the chillers are not plumbed in parallel as in the typical older installation, but occur in sequence in the same loop so that the secondary chiller benefits from lower-temperature intake water generated by the primary chiller.

Paul Robinson, Senior Sales Engineer, AHI Carrier (Australia), said, "The Evergreen 23XRV chillers in series counterflow arrangement were the best outcome for reduced energy consumption and electrical demand, as the subsequent data have demonstrated. The hospital has recorded an energy consumption savings of approximately 14% (kWh) and a reduced demand of 46% (kVa)."

These reductions translate to considerable cost savings for Mater Hospital—an anticipated \$13.9M Australian dollars over the 25-year projected life cycle of the chillers. The hospital also anticipates a 28% reduction in maintenance costs due to the high reliability and ease of servicing the Evergreen 23XRV chiller.

Furthermore, the dual-chiller system has provided Mater Hospital with N+1 redundancy—the highest standard for healthcare applications—a design parameter that provides for back-up in case of catastrophic chiller failure. With two chillers now in use, either of which is capable of carrying the average load of the facility, Mater Hospital patients will never be without cooling service.

And finally, because McClintock Engineering and Carrier sized the Evergreen 23XRV chiller system with the future in mind, the hospital can carry out planned expansions of more than 5,000 additional square meters without the need for added cooling capacity.

In closure, Paul Robinson said, "This was the first series counterflow installation in North Queensland. This pioneering strategy has rewarded Mater Hospital with superior cost-savings, forwarding their mission of service to the community."

## Project Summary

**LOCATION:** Townsville, North Queensland, Australia

**PROJECT TYPE:** Chiller plant upgrade

**BUILDING SIZE:** 19,400 m<sup>2</sup> (208,819.9 ft<sup>2</sup>)

**BUILDING USAGE:** Acute-care medical services

**OBJECTIVES:** Replace outdated cooling plant with high-efficiency system to reduce energy consumption and demand; add N+1 redundancy.

**EQUIPMENT:** Two Evergreen® 23XRV chillers in series counterflow arrangement.

**MAJOR DECISION DRIVERS:** Performance and reliability data on Evergreen 23XRV model; projected savings from series counterflow arrangement.

**UNIQUE FEATURES:** First series counterflow installation in North Queensland; pioneering strategy rewarded with excellent efficiency and cost savings.

**INSTALLATION DATE:** 2012

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