

# Johnson Controls Helps Sunway Pyramid Mall Cut 30 percent in Annual Energy Costs

## Chiller Plant Retrofit Project One of Malaysia's Largest for Mega Complex



### Summary

Driven by concerns over aging facilities and equipment, rising utilities costs as well as sustainability, Sunway Pyramid, one of the largest shopping malls in Malaysia, decided to overhaul its inefficient cooling infrastructure in 2012. Johnson Controls was selected from a six-party tender exercise because of its market leadership reputation, strong track record and good after sales service. The proposed integrated solution included the *Metasys*® software and YORK® YK centrifugal chillers. Sunway Pyramid mall drastically reduced its overall energy consumption by some 30 percent within a year of project completion. Seven years on, the Johnson Controls cooling system is still delivering on its energy efficiency targets.

### The Story

Located in Selangor, Malaysia, the five-level Sunway Pyramid shopping mall houses more than 1,000 outlets with a total retail floor area of nearly 4 million square feet. Since its opening in 1997, millions of shoppers have been drawn to the giant complex with its wide variety of dining, fashion and specialty offerings, in addition to a 12-screen cineplex, in-door ice-skating rink and a bowling alley.

Aging facilities and equipment, rising utilities costs as well as sustainability were key drivers for the mall management to overhaul the existing cooling system. The new solution has to cut the energy consumption by 30 percent, and be free of the HCFC refrigerant gas (to be phased out come 2020 under the Montreal Protocol). It was equally important that inconvenience to tenants and shoppers be minimized during the retrofitting.

Incentives from the Sustainable Energy Development Authority (SEDA) Malaysia further bolstered the management's decision to phase out the inefficient chillers. Under the SAVE Program, Sunway Pyramid received a rebate of about US\$430,000 to offset the purchase of eight new energy-efficient chillers, each able to achieve 0.54 kW/TR or less. This enabled the management to reduce the project payback period to 4.3 years, instead of 4.8 years.



## Case Summary

### Customer Challenges:

- Reduce energy wastage and risk of disrupted cooling caused by aging, inefficient central cooling system
- Improve plant room efficiency to 0.75 kW/TR or less
- Ensure business runs as usual with no downtime for retailers and shoppers during retrofit

### Our Solutions:

- Seven YORK® chillers of 1,200 TR capacity and 1 YORK chiller of 550 TR capacity, each able to achieve 0.54 kW/TR or less, integrated with Metasys® Central Plant Optimization software

### Customer Benefits:

- Reduction of energy consumption by 30 percent annually
- Sufficient redundancy to ensure uninterrupted cooling and provide extra cooling capacity during peak periods
- Higher productivity using automation features and analytics provided by more powerful software
- Reduction of CO<sub>2</sub> emission estimated at 6,400 tonne CO<sub>2</sub> equivalent per year

## Optimizing the Built Environment

The energy wastage was a result of aging installation and system design that was no longer efficient. The original cooling design – consisting of a central chilled water plant with eight units of water-cooled chiller – had insufficient buffer and over-taxed the pumps. Aging cooling towers and chillers further exacerbated the situation.

Furthermore, internal energy audits highlighted the inefficiencies of the then 15-year-old system. The overall plant room efficiency only registered in the 1.10 – 1.20 kW/TR range, and the chillers were unable to chill water to the intended temperature efficiently.

In 2012, a tender exercise was called which attracted bids from six companies. “Sunway Pyramid mall is one of the largest shopping centers in the region. Given the size of the retrofit project, we have to pick a partner with a solid track record and good after sales service to support us. Johnson Controls has a strong reputation within the country – and even after seven years, is still regarded as one of the top providers of energy-efficient chillers in the market,” said Mr. Jason Chin, General Manager of Operations, Sunway Malls.

Johnson Controls designed an integrated solution that optimizes and manages the performance of the chillers. The Metasys® Central Plant Optimization software is a scalable application that uses real-time information to reduce energy use and operation cost without sacrificing reliability. The eight YK centrifugal water chillers – designed for optimum performance and easy operation – take advantage of off-design conditions to save energy for comfort cooling applications with variable loads.

Replacing all of the eight old chillers required meticulous planning and tight collaboration between the Sunway team and Johnson Controls. Replacement of the chillers could only be carried out after operating hours and the mall remained open for business throughout the six-month retrofitting project.



## Exceeding Energy Efficiency Targets

Fast forward to 2019, the Johnson Controls cooling solution continues to meet its energy efficiency targets. The solution delivers plant room efficiency of 0.75 kW/TR or less, and cuts energy consumption by 30 percent within a year of project completion. The CO<sub>2</sub> reduction is estimated to reach 6,400 tonne CO<sub>2</sub> equivalent per year.

Chin commented: "The Johnson Controls chillers have exceeded our expectations in terms of performance and energy savings. These improvements have, and will continue to, significantly reduce our energy costs by about US\$900,000 per year."

With more efficient technology in place, only six out of the eight chillers are required to be kept running on a daily basis – and yet achieve an optimum performance with better indoor cooling temperatures. The extra buffer allows the service team to practice chiller rotation to minimize equipment stress, in addition to having extra cooling capacity during festive peak periods with heavier footfall.

The Metasys system allows the service team to easily monitor chiller performance for optimized efficiency. Initially though, the team was skeptical about the effectiveness of the touch-screen user interface; but was soon won over by the intuitive design and powerful analytics.

New upgrades for mall are in the pipeline. These include further enhancement of the user interfaces to include more functionalities. The use of web-based technology for remote monitoring of the chillers is also being considered.

The partnership with the Sunway Group is further cemented with new projects in the horizon. Johnson Controls has been selected to provide energy efficient cooling solutions for several of the conglomerate's properties such as Sunway University, Sunway Velocity Hotel and Sunway Medical Center.



## Customer Quote:

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*General Manager of Operations*  
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*Sunway Malls*

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