

System 800xA

“A cool, greener life” for Singapore’s first multi-plant district cooling network



Marina Bay Sands Integrated Resort is just one of the sites that the district cooling network – powered, controlled and optimized by the ABB solution – provides with chilled water. The resort features a 2,560-room hotel, a 120,000 sq m convention-exhibition center, a shopping mall, museum, two theatres, six ‘celebrity chef’ restaurants, two floating pavilions and a casino with 500 tables.

Global energy consumption is on the rise. However, there are technological innovations crafted precisely to raise energy efficiency and reduce carbon emissions. In Singapore, a multi-plant district cooling system has been built, thereby allowing the country to benefit from economy of scale in energy production.

Singapore has the distinction of having the largest and most ambitious district cooling project ever undertaken.

Hailed as the ‘multi-billion dollar city within a city,’ Marina Bay is a 360-hectare extension to Singapore’s existing business district and downtown area. Built on reclaimed land at the southern tip of the island-state, Marina Bay and its distinctive signature skyline has already become the city’s new business, commercial and entertainment hub.

During the 1990s when the Marina Bay project was initiated, district cooling was quickly identified as the energy-efficient and cost-effective method to provide buildings in the area with an optimal indoor climate. Singapore has a hot and humid equatorial climate, in which daytime temperatures are rarely below 30 degrees Celsius.

To date, phases 1 and 2 of the district cooling system are in operation, providing 1.1 million sq m of accommodation with cool air via two chilled water production plants and a 5 km piping network.



Among the landmark buildings cooled by the network are the Marina Bay Integrated Resort (a vast commercial complex comprising a casino, hotel, conference center, museum and theaters), the Marina Bay Financial Center, One Raffles Quay (an iconic office building which headquarters five major banks), and the Asia Square office, hotel and retail scheme.

In time, the network will be expanded to five inter-connected plants with a total installed capacity of 900 megawatts (MW_r), capable of providing energy-efficient cooling to 8 million sq m of floor space.

ABB technologies play a key role in this vast district cooling project

ABB is playing a key role in this vast district cooling project by providing a complete electrical, control and instrumentation solution to Singapore District Cooling Pte Ltd (SDC). SDC owns and operates two chilled water production plants (total planned capacity 330MW_r), piping network, and intake stations which are the interface between the district cooling system and the buildings.

ABB goes beyond the reach of a tradition automation system, beyond mere controlling of the process. Through Industrial^{IT} Extended Automation System 800xA, ABB provides technical platform for productivity gains and efficiencies.

Integration

With a project this massive, SDC handles vast and diverse information from a multitude of systems – from process control, condition monitoring to energy metering, to name a few – including external data sources such as the real time electricity prices. With System 800xA, all this relevant information is delivered in a single platform and interface, in a context that is customized to the needs of the user. This enables SDC to make proactive monitoring and informed decisions around productivity, cost projections and consumption, including daily production reporting. This is the Power of Integration.

Operator Effectiveness

ABB's solution features the System 800xA, which monitors and controls the entire network of intake stations. It provides operators with real-time information on network and equipment performance. Armed with this information, the operator

Solutions that make better use of Singapore's water resources are a focus for the country's government.

is then able to fine-tune production in line with demand and energy prices. This capacity results in improved energy efficiency and lower operating costs. The control system for the district cooling plants and the distribution network includes some 45 controllers, approximately 6,000 I/Os, 10 operator workplaces, 3 engineering stations and 3 information management servers.

The solution is also comprised of medium-voltage switchgear, transformers, low-voltage motor control centers, low-voltage and medium-voltage drives, and instrumentation for pressure, flow, temperature and energy metering.

Asset Optimization

The primary task of plant asset management is to reduce costs by identifying performance problems, improving predictive maintenance, and optimizing asset lifecycles. The ABB 800xA system provides real-time asset monitoring and notification, of SDC's entire range of assets.

Proven reliability, historically...

Phase 1 was completed in 2005. Six years later, the plant continues to run efficiently and at optimum level. The ABB System 800xA is specially designed for the demanding 24/7 operating conditions of the district cooling system, delivering reliable and high-efficiency power and control.

... and Evolution for the Future

With its plans to build up to Phase 5, SDC can leverage its existing infrastructure and investment in ABB technologies to manage and fulfill its future requirements. ABB's System 800xA is the most scalable process control platform in the market today, with capacities for increased capacity and productivity – at shorter lead times and maximum uptime and consistency.

The network sets a new international energy efficiency benchmark for cooling commercial buildings

According to SDC's submission paper for the "Global Climate Award 2011", the district cooling system reduces CO₂ emissions by 23,000 tons a year at current level of demand compared to alternative solutions in Singapore.

ABB has a long and successful track record in the district heating and cooling market, having supplied numerous integrated electrical, control and instrumentation solutions for large and small networks in Europe, China, and Central and Southeast Asia.

Power of Integration!

ABB's solution makes better use of water at projects across the city-state.



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