

Costa Group

Agricultural Facility

The Challenge

First First established in 1928 as a small fruit shop, Costa Group has become one of Australia's leading horticultural firms, providing premium fruit and vegetable production from glasshouses to major and independent retailers. In 2018, when the company began developing expansion plans for a new glasshouse and propagation nursery at their Tomato Exchange Facility, it became clear that their energy demands would soon exceed the grid's capacity. Additionally, their commitment to reducing environmental impact meant they were seeking an energy-efficient solution that would be both highly reliable and aligned with their sustainability goals. With a Capstone C800 system engineered by Optimal Group, Capstone's Australian dealer, they achieved all that and more.

The Solution

Deployed in one of Australia's largest and most advanced tomato glasshouse facilities located in the city of Guyra, the microturbine-based system is configured as a Quad-Gen application (combined power, heat, cooling and CO2 fertigation). In addition to the microturbines, the design includes a specialized heat recovery module (HRM), two co-fired burners, and a cooling system custom-designed by Optimal. The microturbines, which provide 800kW of power, are housed in a five-bay enclosure to accommodate future

Power Profile

Customer

Costa Group

Location

Guyra, New South Wales, Australia

Commissioned

2021

Fuel

Pipeline Natural Gas

Technologies

- (1) C800S Microturbine

Capstone Green Energy Partner

Optimal Group



Costa Group's state-of-the-art glasshouse technology and growth program puts them at the forefront of innovation in sustainable farming practices and sets them apart in the fruit and vegetable industry."

— Kane Ravenscroft, Sales Director
Optimal Group

An aerial photograph of the Costa Group glasshouse facility in Guyra, Australia. The image shows several large, rectangular glasshouse structures arranged in a grid-like pattern, surrounded by greenery and roads. The image is overlaid with a semi-transparent green filter.

**Smarter Energy
for a Cleaner Future**



The Capstone C800S microturbine system at Costa Group's facility provides 800kW of reliable power while operating as a highly efficient CHP (combined heat and power) and CO2 fertigation solution.

expansion. This modular architecture will allow Costa Group to increase capacity by up to 1 megawatt (MW).

Here is how the system works: the microturbine supplies hot water to the glasshouse via a custom two-stage HRM (heat recovery module). The first stage delivers high-temperature hot water (85C/185F) to the glasshouse heating system. The exhaust, now cooled, is then sent to two hot water boilers as combustion air. The two boilers, which are each fitted with advanced SAACKE burners, use the turbine exhaust to fire the burner. The hot water from the boilers is added to the HRM hot water to meet the glasshouse heating needs, while boiler exhaust, further enriched from the turbine exhaust, is used for plant CO2 fertigation to increase yields. To improve the flue distribution, a water-cooling system was included to improve the performance of the flue gas condensers.

"Capstone's microturbine technology is an excellent fit for CHP and CO2 fertigation in a greenhouse," said Kane Ravenscroft, Sales Director for Optimal. "Greenhouses usually provide the CO2 to enhance plant growth by using the exhaust from a natural gas boiler. In these applications, the clean exhaust from the microturbine delivers additional value, providing a richer stream of CO2 to the plants while maintaining very low CO, NOx and hydrocarbons."

Power availability is also a critical need for Costa. Because the turbine's design is both modular and can run at low loads (including being able to turn all the way down to 0%), Capstone microturbines are ideal for this environment. On top of being able to easily load follow, there is a much larger range of conditions in which the turbine is available to provide power, which is an important factor should the site want to integrate renewable generation technology, such as solar PV, where the output is variable.

The Results

Costa Group has a long history of commitment to the local community and economy, which is further supported by the company's environmental mission. The energy system at the Guyra facility is an important part of the company's carbon reduction efforts thanks to the fact that microturbines form the basis of a highly efficient combined heat and power solution. The energy savings from this system – which can be up to 95% total efficiency when operating in quad-generation configuration – allow the facility to use less fuel and produce lower overall carbon emissions. In addition, the system takes advantage of Capstone's exceptionally low NOx and CO emissions levels to maximize CO2 recovery into the glasshouse.

Capstone C800S Microturbine



A C800S Microturbine provides 800 kW of reliable electrical power in one small, ultra-low emission, and highly efficient package.