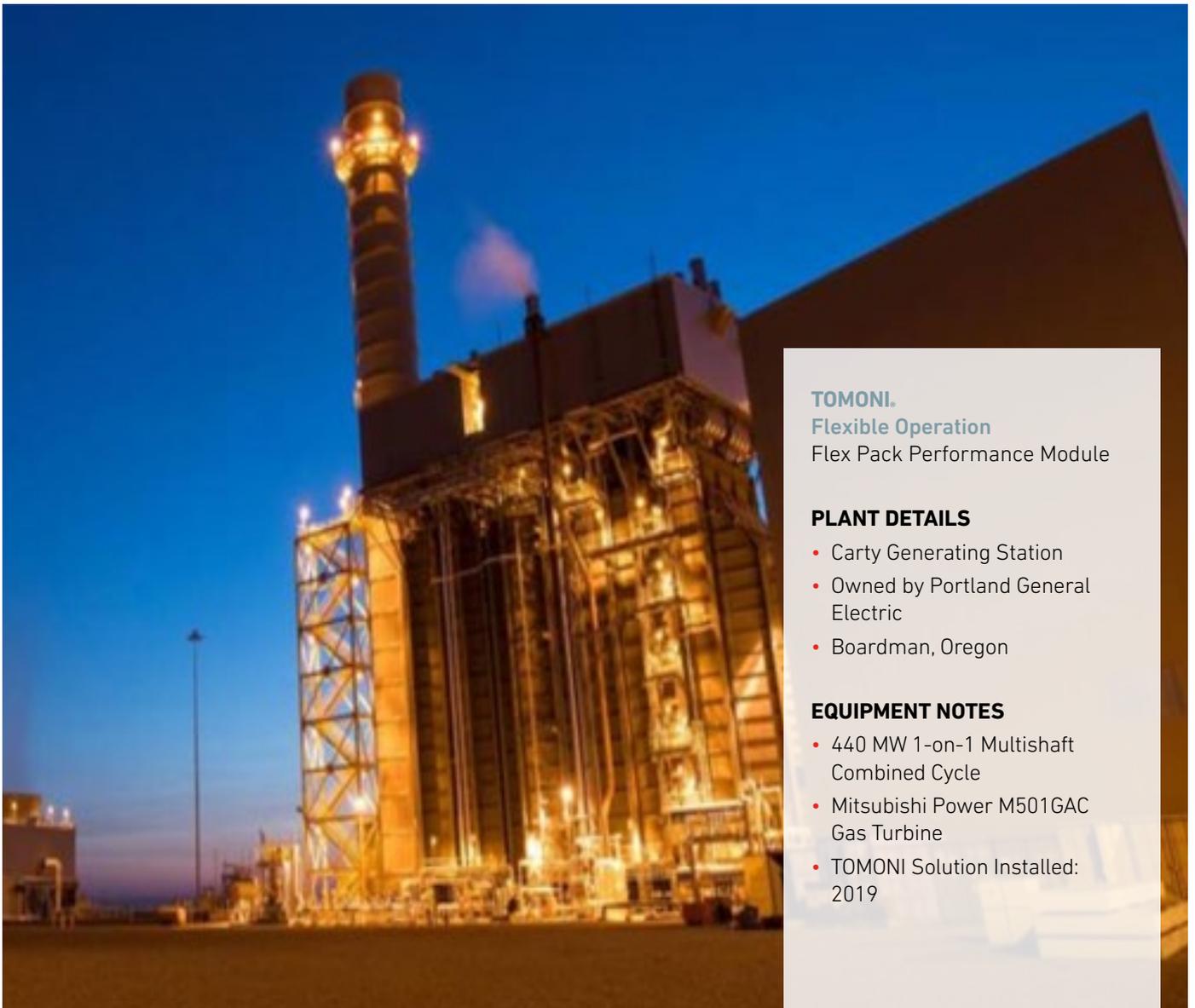


CASE STUDY:

INTELLIGENT SOLUTIONS POSITION OREGON PLANT FOR ADDITIONAL CAPACITY AND REVENUE.

**TOMONI.****Flexible Operation**

Flex Pack Performance Module

PLANT DETAILS

- Carty Generating Station
- Owned by Portland General Electric
- Boardman, Oregon

EQUIPMENT NOTES

- 440 MW 1-on-1 Multishaft Combined Cycle
- Mitsubishi Power M501GAC Gas Turbine
- TOMONI Solution Installed: 2019

CHALLENGE

Portland General Electric (PGE) expects the demand for electricity to increase by about 20 percent during the next 20 years. This led them to build the Carty Generating Station in 2016 to serve customer demand, meet additional growth and maintain a reliable supply of power. Carty is operated much of the time at base load, often with duct firing, testifying to the value of maximizing output at its critical location in the grid. PGE was looking for additional output at this location during times of high market demand and to provide additional contingency for constraints from California.

SOLUTION



PGE worked with Mitsubishi Power to find a solution that provided increased output and operational flexibility in this critical plant. In 2019, they installed the TOMONI Flex Pack Performance Module. The Performance Module provides the flexibility to increase output or reduce heat rate to optimize plant economics, providing additional opportunities for energy and capacity sales. Each implementation of the Flex Pack is tailored to the gas turbine and plant, as well as local grid and market requirements.

For applications of the Flex Pack Performance Module, Mitsubishi Power engineers study current operating settings, ambient temperature and cooling usage to develop the plant-specific parameters of three modes of operation:

- Maximum Efficiency Mode is set for the most efficient operation of the gas turbine through reduced flow and optimized compressor operating points at nominal base-load firing. It has no impact on parts life and is capable of tracking near maximum load at improved heat rate for reserve.
- Maximum Output Mode is set for maximum output with no impact on parts life. It increases the compressor air flow and gas turbine output at nominal base-load firing.
- Peak Fire Mode goes beyond output achievable with the Maximum Output Mode by increasing the firing temperature above the rated firing temperature. This mode is used during high demand or grid emergencies and includes a maintenance factor when utilized.

Each mode can be selected while the gas turbine is online and offers the optimized power and heat rate setting for specific situations.

RESULT

The Flex Pack improved cost per MW, increased flexibility and provided opportunities to take advantage of market conditions through peak fire. PGE estimates they will use the Flex Pack for around 1,500 hours per year. At Carty, performance testing validated increased output of over 5 MW. This increased output during periods of high demand is valued at \$0.5–1 M per year, even in this hydro-rich area of relatively low wholesale power costs. An additional benefit is the ability to reduce GTCC heat rate at higher loads by 0.3% during periods when the Maximum Output Mode and Peak Firing Mode are not needed.

The TOMONI Flex Pack is one of many intelligent solutions that provide O&M Optimization, Performance Improvement and Flexible Operation of important thermal power plants.

“The overall impact of the TOMONI Flex Pack has been positive, and testing of the modes shows improvement in the cost per MW. The cost was reasonable, and the use of new operational modes has been beneficial to our operations. It provides us flexibility to take advantage of market conditions.”

Lee Archer

Director of Thermal Plants East

TOMONI[®] is a suite of intelligent solutions that accelerates decarbonization with power plant design, O&M and system knowledge, together with strong customer and partner collaborations. TOMONI leverages advanced controls, artificial intelligence and machine learning with multi-layered cybersecurity to make energy systems smarter, more profitable and ultimately more autonomous on the road to a sustainable future.



- Data Foundation & Enablers
- O&M Optimization
- Performance Improvement
- Flexible Operations