Flexible power through rain or shine with a Wärtsilä 31SG plant

REFERENCE CASE – BENNDALE, MS, USA

Cooperative Energy in the US was looking to upgrade one of its plants in order to help it supply affordable, flexible and reliable power in a hurricane-prone region. Wärtsilä's comprehensive solution comprises a plant powered by two gas-fired Wärtsilä 31SG engine generating sets and covered by a 10-year service agreement.

Intermittent renewable energy generation in the United States has seen a staggering 700% increase between 2008 and 2019, with solar and wind generation accounting for around 350 million MWh of power generation in 2019. The subsequent increase in variable generation means that flexibility is increasingly important in the energy system because if the wind dies or clouds obscure the sun, there's a need to rapidly and efficiently switch to other methods of generation. This was an important consideration for utility Cooperative Energy when they chose to upgrade one of their older plants.

Cooperative Energy is a not-for-profit electricity cooperative covering 432,000 homes and businesses in the US state of Mississippi. In 2005, coal produced more than half of its energy, but today cleaner natural gas makes up about two-thirds of the mix. The company also operates six solar sites, showing the increasing importance of Mississippi's sunshine in providing power.

"I wanted to be satisfied with the technology and the people behind it, so we visited Wärtsilä's factory and testing facilities and met the engineers. This is not just about a product, but the people. I needed to be comfortable with everyone involved in design, installation and maintenance. I was very impressed.

There is a lot of variable generation in our market and we need to match that with more flexible capacity that can rapidly start up when needed. Wärtsilä's generation units meet this need. The Wärtsilä 31SG engines are top-of-the-line."

Jim Compton
President Emeritus of Cooperative Energy

FAST, FLEXIBLE AND RELIABLE SUPPORT FOR RENEWABLES

Wärtsilä has delivered a 22.7 MW engine power plant to Cooperative Energy under a full engineering, procurement and construction (EPC) contract. The plant, located in Benndale in the south of Mississippi, will be powered by two Wärtsilä 31SG gas engine generating sets and maintained by Wärtsilä under a 10-year service agreement.

The gas-fired Wärtsilä 31SG engine generating set can provide simple-cycle efficiency of about 50%, which is roughly 10% higher than any modern gas turbine can provide in simple-cycle configuration. It is also able to respond rapidly to continuously changing load patterns found in systems with solar and wind energy.

The engine generating sets at the Benndale plant will operate as peaking units with frequent cycling. Their ability to act as fast, flexible and reliable support for renewables is one of the primary reasons they were chosen for this project.

BUILT FOR HURRICANE-PRONE AREAS

Another major consideration behind the choice of engine was the plant's location close to the hurricane-prone Gulf Coast. Benndale was used to restore critical loads in the area after hurricanes Frederic (1979) and Katrina (2005). After Katrina, the plant provided power to two local hospitals and other emergency services for several days before the supply was restored. In these conditions the ability to black start, or start with no power to the grid, is essential.

COMPREHENSIVE, OPTIMISED MAINTENANCE FOR PEACE OF MIND

Wärtsilä is overseeing the entire project through the EPC agreement. A 12-month optimisation period will be used to further fine-tune the engines and aim for a two-minute start-up time. Wärtsilä and Cooperative Energy also signed a 10-year Wärtsilä Optimised maintenance agreement covering spare parts for all scheduled maintenance, technical advisors, technical labour for the engines and auxiliary equipment maintenance including workshop services and Wärtsilä Asset diagnostics.

These agreements will enable Cooperative Energy to focus on serving its members while Wärtsilä takes care of optimising the performance and efficiency of the plant over its whole lifecycle.

KEY DATA

END CUSTOMER
Cooperative Energy

SOLUTION
Wärtsilä 31SG gas power plant

OPERATING MODE
Peaking units with frequent cycling

GENSETS
2 x Wärtsilä 20V31SG

TOTAL OUTPUT
22.7 MW

FUEL
Natural gas

DELIVERY
March 2020

LIFECYCLE SOLUTIONS
A 10-year Optimised maintenance agreement

THE CHALLENGE

- Efficient power generation in a market with increasing levels of renewables
- Mitigate financial and timing risks in construction
- Resilient and reliable generation in a hurricane-prone region
- Maintain the plant and its performance over the lifecycle

WÄRTSILÄ'S SOLUTION

- A flexible Wärtsilä 31SG gas power plant with the ability to respond rapidly to continuously changing load patterns of systems with renewables
- Full EPC delivery
- Wärtsilä plant integrated with customer's system
- 10-year Wärtsilä Optimised maintenance service agreement

BENEFITS

- Efficient and flexible power supply with a reduced environmental footprint
- One EPC supplier with full responsibility for both timelines and costs
- Fast starting; ability to supply power to key facilities such as hospitals during a natural disaster
- Ensure optimised plant performance and efficiency over the lifecycle

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