



Emergency power for the Oil & Gas industry

ROLLS-ROYCE SAFEGUARDS CONTINUOUS EMERGENCY OPERATION AT KÅRSTØ NATURAL GAS PROCESSING PLANT

Who Statoil, Norway's biggest LPG and natural gas producer, on behalf of operator Gassco
What Five MTU Type 16V 4000 G63 low-noise, emergency power gensets with all the necessary system components
Where Tysvær, Norway

The Norwegian natural gas processing plant at Kårstø has been equipped with a new emergency power system as part of a long-term expansion project. During any future power outages, five Rolls-Royce gensets powered by 16V 4000 G63 engines will be in place to supply the energy for essential production processes – and, thanks to special acoustic technology, they will do their job more quietly than ever.



Most of Europe's gas reserves are located in Norwegian territory and the country is one of the world's largest gas producers. In continental Europe, 15% of the total natural gas consumption are distributed through the Norwegian operator Gassco. Owned by a joint venture between oil and gas companies on the Norwegian continental shelf, Gassco operates the third largest natural gas processing plant in the world, Kårstø.

The onshore complex Kårstø plays a key role in the transport and processing of gas and condensate pumped ashore from the most important areas of the Norwegian Continental Shelf. Located in Tysvær near Stavanger, the processing plant is fed by pipelines from 28 fields, including major natural gas reserves such as Åsgard, Mikkel, Sleipner and Kristin. Every year, Kårstø processes 28 million cubic meters of gas to produce 8.5 million tons of liquefied gas.

Kårstø has grown significantly since it first went into operation in the early 1980s. During the course of several expansion projects, the facility has developed until it now occupies an area five times as large as its original site – and it is set for further growth over the coming years. All technical service is provided by Statoil, the state-owned mineral oil and natural gas company and the country's most important producer. "In the context of the upgrade programs which accompany growth, our main aim is to make Kårstø both safe and efficient for many years to come," said Asbjørn Søndena, Discipline Lead Electro Commissioning at Statoil, "That means protecting people and the environment as well as safeguarding trouble-free operation at the production facilities." In particular, a number of electrical and mechanical systems will be upgraded in order to modernize and improve safety and control systems as well as utility systems.

Moving forward safely

One of the key extensions is the new Rolls-Royce-brand MTU emergency power system which will supply essential power for the entire onshore gas processing plant in case of any future outage. As the installed capacity of the previous emergency gensets was no longer adequate, Statoil replaced the elderly generator sets with new MTU units. After successful test runs, they went into operation in summer 2011. "Our experience of working with Rolls-Royce had already proved very positive on an earlier project. The fair price-performance ratio coupled with high product quality and Rolls-Royce's extensive experience with emergency generation systems tipped our decision in favor of these gensets," explained Asbjørn Søndena. "In addition, Rolls-Royce was the only provider capable of meeting our low-noise requirements."



All MTU emergency gensets are housed in their own generator building on the Kårstø site. Rolls-Royce also supplied five horizontal core radiators with extremely low noise levels which were installed on the roof of the generator building. (Photo: Øyvind Hagen/Statoil)



Interior view of the generator building with MTU gensets Type 16V 4000 G63. (Photos: Øyvind Hagen/Statoil)

The crucial factor in the decision, however, was reliability. And that is why today five robust MTU gensets are in place to keep all of the major emergency consumers supplied with the power they need in the event of any future outages. These consumers include fire extinguishing systems, emergency lighting, battery-charging alternators for uninterruptible power supplies and HVAC plants which maintain the pressure inside buildings within areas exposed to the risk of explosion. In addition, during any emergency situation, power supplies also have to be maintained to auxiliary units such as lubrication pumps, compressor cooling plants and motorized valves.

Noise levels below 104 decibels

A further demand on the emergency gensets was that they had to comply with Statoil's occupational safety regulations by achieving the lowest noise levels possible. That meant that inside the generator building, at a distance of one meter from the generator, the sound pressure level should not exceed the 104 decibel (dB(A)) limit. That is around the same noise level that a person on the ground would experience with a jet passing overhead at 300 meters.

Because acoustic enclosures, for example, could not be used to cut down engine noise without incurring significant cost increases or without reducing access to the engine for maintenance, Rolls-Royce's engineers developed an alternative solution. Special additional acoustic mufflers were used on the engines to damp air-intake noise from the turbochargers and a special acoustically damped housing was fitted to reduce air intake and outlet noise at the generator. The additional measures reduced engine noise levels, and those of the plant overall, to below the specified limit: at a distance of one meter, the sound pressure levels measured were between 100.7 and 102.6 dB(A).

Components of the emergency power system

The new emergency power system is housed in an equally new generator house built by Statoil according to Rolls-Royce's specifications. The emergency power system consists of five gensets powered by MTU Type 16V 4000 G63 engines. In case of a grid failure, four of these units deliver enough power for the entire Kårstø site in emergency mode, thus enabling a safe shut down of critical systems. The fifth unit is in place as a reserve. At 50Hz and 690V, each of the units has a power rating of 2,338 kVA and generates 1,870 kWel. In total, the four gensets produce around 8 MW – enough power to meet the energy demands of a small European town.

Overall planning for the plant took place jointly with the English contractor MW Kellogg who was responsible for technical planning, procurement and implementation at the Kårstø expansion. Rolls-Royce supplied the gensets complete with base rafts and resilient mounting systems as well as all the system components required such as switchgear, fuel tanks and ventilation plants. Rolls-Royce also supplied five horizontal core radiators with extremely low noise levels which were installed on the roof of the generator building. Special exhaust silencers from Rolls-Royce also ensure that as little noise as possible is transmitted to the outside via the exhaust lines – guaranteeing particularly low noise levels even outside the building.

Reliable power supply during emergencies

Fuel for the plant is stored in two special-purpose tanks that were also included in Rolls-Royce's scope of supply. In case of a power outage, the tanks can keep four gensets running at full power for up to 17 hours. Rolls-Royce also supplied switchgear for monitoring the emergency power systems and power feed-in. In the event of a power outage, the switchgear initiates the start command for the emergency generators. One of Statoil's particular specifications was that the gensets had to reach operating status within 15 to 20 seconds. The units are therefore designed so that load imposition is possible after 10 seconds and full power is reached after a further ten seconds. To ensure that the emergency gensets will function reliably when it comes to the crunch, they are regularly tested for functional capability. "All gensets are tested once a month for several hours," explained Asbjørn Søndena. In addition, the modules are inspected once a year for compliance with the requirements of Safety Integrity Level 2. If any additional support is needed, on-site customer service is available from the Norwegian importer and distributor of MTU engines, Bertel O. Steen Teknisk AS.

