

Bergen K gas engine projects

Brønderslev, Denmark



Fact sheet

Project description

Brønderslev cogeneration plant was built in 1995, and is designed to provide heat for the local community, while the electricity is sold to the public grid. The fuel used is natural gas from the Danish sector of the North Sea.



The main contractor for building the cogeneration plant was Dansk Kraftvarme Konsortium, a co-operation between LR-Energi and PM-Energi.

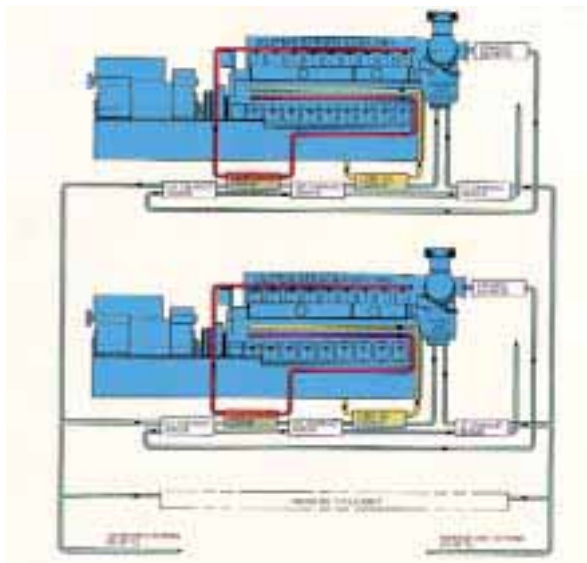
The engine

The seven engines are Bergen spark-ignited lean-burn gas engines, type KVGS-18G, running on natural gas. This engine is the result of several years of careful development. It is based on the highly success 'K' type diesel and heavy fuel oil engine, with which it shares most mechanical components. This has resulted in a particularly robust and well-proven engine, ensuring a high degree of reliability and long intervals between overhauls.

This engine is well suited for base load power generation under varying conditions. The lean-burn principle of engine operation is unique in its combination of high power and high efficiency with reduced exhaust emissions.

The heating system

Heat from the engine's exhaust gas, jacket cooling system, lubricating oil, and charge air is collected in a series of heat exchangers and stored in an accumulation water tank. The hot water from this tank is distributed to approximately 3000 consumers, with a temperature of 95-97°C. Maximum inlet cooling water (return water) temperature to the engine is 50°C. In the three exhaust gas coolers, the gas is cooled in three steps, from 420°C to 100°C, then to 70°C, and finally to 60°C.



Output and efficiency

Together with the similar Micron Technology cogeneration plant in Italy, this plant is among the largest gas engine power plants in Europe, producing 27MW of heat and 21MW of electricity. This corresponds to a total efficiency of almost 93 per cent.

Service and maintenance

Rolls-Royce has signed a Service and Maintenance Agreement with the owner, and a skilled service engineer is permanently stationed at the plant. The reason for this is to perform preventive care to the engines. The agreement guarantees an availability of 95 per cent, compared to the planned, attainable operational time.

Technical specification

Engine	7 x KVGS-18G
Shaft power	7 x 3155kW
Electrical power	7 x 3060kW
Gas consumption	7 x 747Nm ³ /h
Energy consumption	7 x 7520kW
Electrical efficiency	40.7%
Total efficiency	92.8%

Total heat dissipation

Lub oil cooler	7 x 395kW
Charge air cooler	7 x 450kW
Jacket water cooler	7 x 910kW
Exhaust boiler	7 x 2160kW
Heat output	7 x 3915kW
Heat efficiency	52.1%

Design criteria

Max return water temperature to charge air cooler	50°C
Process water temperature for district heating	95°C
Generator voltage	10kV
Exhaust gas flow	7 x 20,000kg/h
Exhaust temperature after exhaust turbine	420°C
Lower heating value of the fuel gas	36.0MJ/Nm ³



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