



Trent projects in
power generation

Avedøre 2, Denmark

energy



Fact sheet

Project description

The Avedøre 2 power station on the outskirts of Copenhagen, is a multi-fuel system based around an ultra supercritical steam cycle fitted with separate coal and biomass fired boilers. The plant has been jointly developed between Energi E2 of Denmark (An amalgamation of SK Power and Copenhagen Energy) and Vattenfall AB of Sweden. When



completed in 2001 it will be one of the world's most efficient CHP plants. The cycle will have two (with an option for a third unit later) Rolls-Royce gas turbines, which will be integrated with the plant to supply electrical power and heat for pre-heating the feedwater to the main steam turbine plant.

The multi-fuel concept has been devised to ensure fuel flexibility, high through life efficiency, modular construction and low capital costs. The central philosophy of the concept is that each fuel type is burnt in its own separate boiler. By burning the coal and biomass fuels in separate boilers, the ash from each process remains entirely separate and can easily be extracted for industrial purposes. In Denmark the fly ash from the coal is used by the cement industry and the ash from biomass is used as a fertiliser.

For the Avedøre 2 project, the client has selected the Rolls-Royce industrial Trent, the world's most powerful aero derived gas turbine, producing over 50MW of electrical power. By integrating each Trent into the Avedøre 2 cycle, an additional 70-75MW of electrical power will be produced. The specific cost of this additional power is less than that of a similarly sized gas turbine in combined cycle. This is because the cost of

the heat recovery system and equipment for its integration into the steam cycle is much lower than that of a steam bottoming cycle.

The most cost effective gas turbine for the multi-fuel concept is the turbine with the highest shaft efficiency. High efficiency allows a maximum amount of gas turbine capacity to be integrated into the cycle. This is because high efficiency leaves less heat in the flue gas so that the heat/power ratio is relatively low compared with other lower efficiency gas turbines. As the Rolls-Royce Trent is the highest efficiency gas turbine on the current market, with an open cycle efficiency of nearly 42 per cent, it therefore has the highest potential for adding additional power to the Avedøre 2 steam cycle.

When completed, Avedøre 2 will be one of the most energy efficient CHP plants in the world, and will help in achieving the Danish Energy Policy goal of reducing emissions to the benefit of both the national and global environment.

Technical information

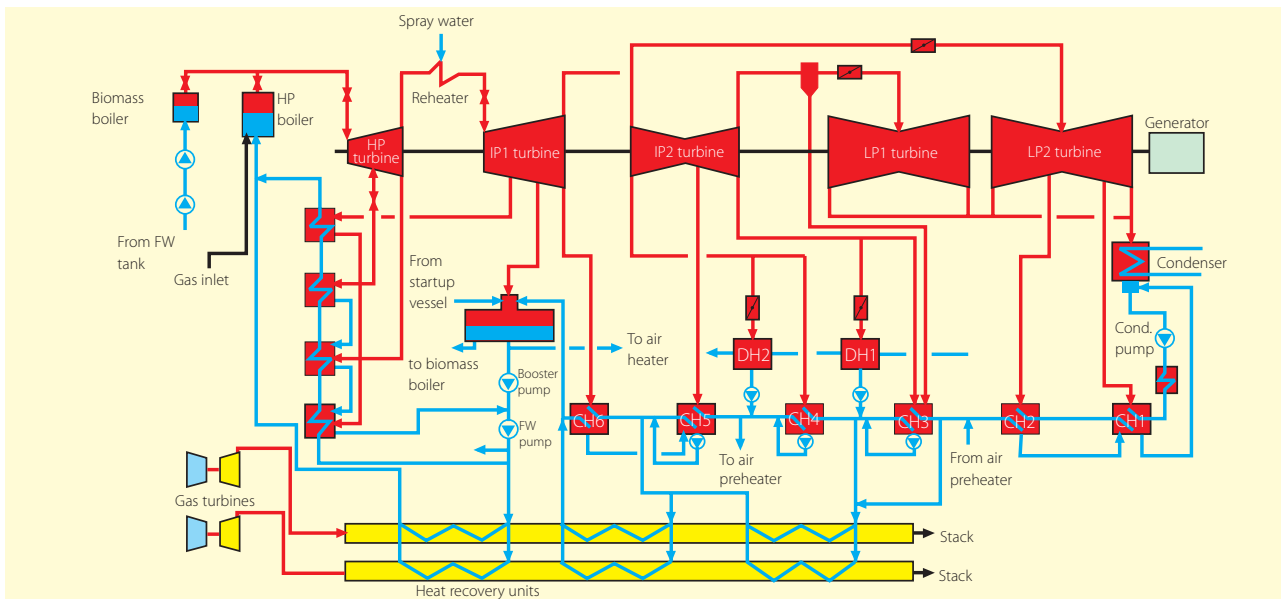
Plant performance

Trent Genset ISO

Net electrical output	51,190 kW
Net heat rate	8,660kJ/kWh
Efficiency	41.6%

Avedøre 2 (Total plant with two gas turbines)

Net electrical output	535 MWe
Net heat capacity at full load	545 MJ/s
Net efficiency	50.6%



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