



Bio-Fuel Co-gen and Tri-gen Plants in Italy

Latest MAN Diesel Projects Feature “Renewable In – Renewable Out” Application

18th July 2008. Following the introduction of a system of “green certificate” incentives promoting carbon dioxide (CO₂) neutral, renewable fuels, bio-fuel power generation and cogeneration capacity based on medium speed engines is now building up rapidly in Italy. Accordingly, Italy has become a major market for the Power Plant business unit at MAN Diesel SE in Augsburg, Germany.

With their broad insensitivity to fuel quality, large medium speed diesel engines designed for heavy fuel oils (HFO) cope readily with fuels like treated and untreated plant oils, animal fats, waste oils and various blends thereof – fuels which cause considerable problems in high speed engines with their more sensitive injection systems. Thus, large medium speed engines burning bio-fuels are, and will continue to be, part of the global warming solution.

Together with specialist partner for power generation and cogeneration applications, Termointerindustrial SpA, based in Alba, MAN is involved in a number of major cogeneration plants with a combined electrical output of some 40 MW. The fuel used is, initially, palm oil but this can be replaced with only minor modifications by blends of jatropha oils as supplies become available. Rapeseed oil is used for engine start-up and shutdown.

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Cereal Docks

Already on line is a 5.2 MW tri-generation plant at Camisano Vicentino in Northern Italy, roughly midway between Padua and Vicenza. The plant is operated by the Cereal Docks animal feed company and based on two generator-sets powered by MAN Diesel's nine cylinder inline type 9L 27/38 engines, each rated 2.6 MW electrical for palm oil operation.

The plant operates in grid parallel baseload mode and also produces around 5.2 MW of recovered for heat industrial processes. In a "tri-generation" arrangement, the recovered heat is used both as process heat and feeds absorption chillers for processes requiring refrigeration.

Renewable in, Renewable Out

Like a number of recent MAN Diesel bio-fuel engine projects, including the waste oil cogeneration plant in Fritzens, Austria, the Cereal Docks plant uses part of the heat recovered from the engine to produce a further CO₂ neutral renewable fuel. In this case, steam at 12 bar produced from the exhaust gases of the 9L 27/38 engines is used in the production of bio-diesel at an adjacent factory run by a sister company of Cereal Docks.

Further industrial cogeneration facilities based on MAN Diesel's plant oil engines plants are due to come on line in mid 2008. These include an installation at the works of the IGI company at Palomonte near Naples which processes vegetable oils into feedstock for the European food industry. It will operate a single baseload, grid parallel

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generator-set based on the 18 cylinder vee configuration version of MAN Diesel's well proven type 32/40 engine. The 18V 32/40 generator set is rated 8.3 MW electrical and will produce a roughly equivalent amount of thermal energy for processes at the foodstuffs plant.

Organic Rankine Cycle

At the Oxon chemical plant near Pavia a pair of 8.3 MWe rated, 18V 32/40 powered generator-sets will likewise operate in grid parallel, baseload mode. Recovered heat will be used in an organic Rankine cycle (ORC) to produce energy for various chemical processes.

Urea-based SCR and Oxicat

All the bio-fuel power and cogeneration plants supplied by MAN Diesel and partner Termointerindustriali include selective catalytic reduction (SCR) to control emissions of oxides of nitrogen (NOx). The SCR systems use urea as the reducing agent and incorporate a downstream oxidation catalyst to eliminate ammonia slip.



The Cereal Docks tri-generation plant is based on two 2.6 MW generator sets driven by nine cylinder inline MAN Diesel type 9L 27/38 bio-fuel engines. The MAN Diesel fuel specification covers a wide range of renewable fuels including treated and untreated plant oils, animal fats, waste oils and various blends.

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Power house at the Cereal Docks works in Camisano Vicentino in Northern Italy. In a “renewable in, renewable out” arrangement, heat recovered from MAN Diesel type 27/38 bio-fuel engines is used as process heat in an adjacent bio-diesel plant belonging to a sister company of Cereal Docks.



Delivery of the 18V 32/40 bio-fuel gen-set to the IG.I. company’s food processing plant at Palomonte near Naples.

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All the bio-fuel plants supplied by MAN Diesel and partner Termodiesel include selective catalytic reduction to control NOx. The SCR systems use urea with a downstream oxidation catalyst to handle ammonia slip.

Outputs:	5.2 MW electrical 4.7 MW thermal
Overall Efficiency:	80%
Gensets:	2 x 2.6 MWe
<i>based on MAN Diesel four-stroke type 9L27/38 diesel engines</i>	
Intended fuel:	Palm oil or Jatropha oil
Recovered heat utilization:	Process heat for bio-diesel production

Details of the Cereal Docks cogeneration plant.

About MAN Diesel

MAN Diesel is the world's leading provider of large-bore diesel engines for marine and power plant applications. The company develops two-stroke and four-stroke engines, auxiliary engines, turbochargers and propulsion packages that are manufactured both by the MAN Diesel Group and its licensees and deliver between 450 kW and 97.3 MW of power. MAN Diesel employs over 6,400 staff, primarily in Germany, Denmark, France, the UK, the Czech Republic and China. The global after-sales organisation, MAN Diesel PrimeServ, comprises a network of the company's own service centres and authorised partners. MAN Diesel is a company of MAN AG, which is listed on the DAX share index of the 30 leading companies in Germany.

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