



## **Field testing the new MAN six-cylinder naturally aspirated engine for Cogeneration systems**

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**Exceptional degree of efficiency due to efficient engines and combined heat and power generation**

**MAN Engines is testing the completely new E2676 E302 six-cylinder inline engine for cogeneration or block-type thermal power plants, which feed 60 Hertz into the North American power grids. Built on the basic architecture of the D2676 diesel engine variant, which is already in use in different on- and off-road applications, and on the water worldwide, the new naturally aspirated engines will progressively replace the E2876 model engines. The E2676 is already available for applications with 50 Hertz but requires field testing at 60 Hertz prior to commercial release. In cooperation with the CHP packager Co-Energy America, a field test for applications with 60 Hertz was started in June 2016. MAN Engines & Components, a subsidiary of MAN Truck & Bus AG, is working closely with the business partner. The engine is the prime mover of a 150kW cogeneration system at a Holiday Inn hotel. The system is located on Cape Cod in Hyannis, Massachusetts.**

“The higher grid frequency of the US power grid requires the unit to have a higher speed. Therefore the engine is exposed to different loads, and these will be tested under real-life conditions during the field test,” says Hubert Goßner, the manager of the Power segment at MAN Engines. At the same time as the project at the Holiday Inn hotel, pre-series engines in several 50 Hertz applications are successfully in use in Germany already. The ongoing projects are laying the foundation for a successful series delivery to customers worldwide. Due to the extensive field tests under different general conditions, MAN Engines ensures that thoroughly tested products are brought to the market, as early as the sign-off for series production.

MAN Truck & Bus is one of Europe's leading manufacturers of commercial vehicles and supplier of transport solutions, with revenues of approximately €9 billion a year (2015). The product portfolio includes trucks, buses and diesel engines, as well as services related to passenger and cargo transport. A subsidiary of Volkswagen Truck & Bus GmbH, MAN Truck & Bus employs more than 35,500 people worldwide.



### **Engines suitable for all markets**

With 160 kW mechanical power at 1,800 rpm for the US market, and 140 kW at 1,500 rpm for the rest of the world, the E2676 E302 provides an efficient basis for modern block-type thermal power plant applications. These systems can reach an overall efficiency of up to 90%, thanks to the simultaneous generation of heat and power. If electricity and heat are produced separately by a coal power plant and an oil-powered boiler, however, the losses can be more than four times higher. The new gas engines are also more economical than their predecessors, and the complete system is therefore even more efficient.

The Holiday Inn hotel in Massachusetts has high heat and energy requirements. The cogeneration plant, equipped with the new field test engine, ensures that hot water is always available for domestic uses and heating, and it avoids purchasing electricity from the power grid. According to Co-Energy America, the CHP system will have paid for itself after three years, thanks to the system's high degree of efficiency.

### **Co-Energy America is monitoring the field tests**

Co-Energy America is operating and overseeing the project, in close cooperation with MAN Engines & Components. "We have been working together with Co-Energy America for over ten years so our customers profit from a well-oiled team," says Goßner. With systems located at over 50 sites in Boston and New England the business partners can already look back on many cooperative projects. Co-Energy America designs, manufactures, installs and services cogeneration units. They remotely monitor the complete systems and carry out the scheduled MAN maintenance due every 1,000 hours.

In total, the test engine will run for 8,000 operating hours. The engine will then be completely disassembled by MAN for series production approval. In doing so, extensive component appraisals and material analyses of the pistons, piston rings, valve gear, bearings, cylinder liners, and other individual parts will be carried out. At the same time, a new engine will ensure a seamless transition for the system in Massachusetts.



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The block-type thermal power plant with the E2676 E302 engine is located in a soundproof container.



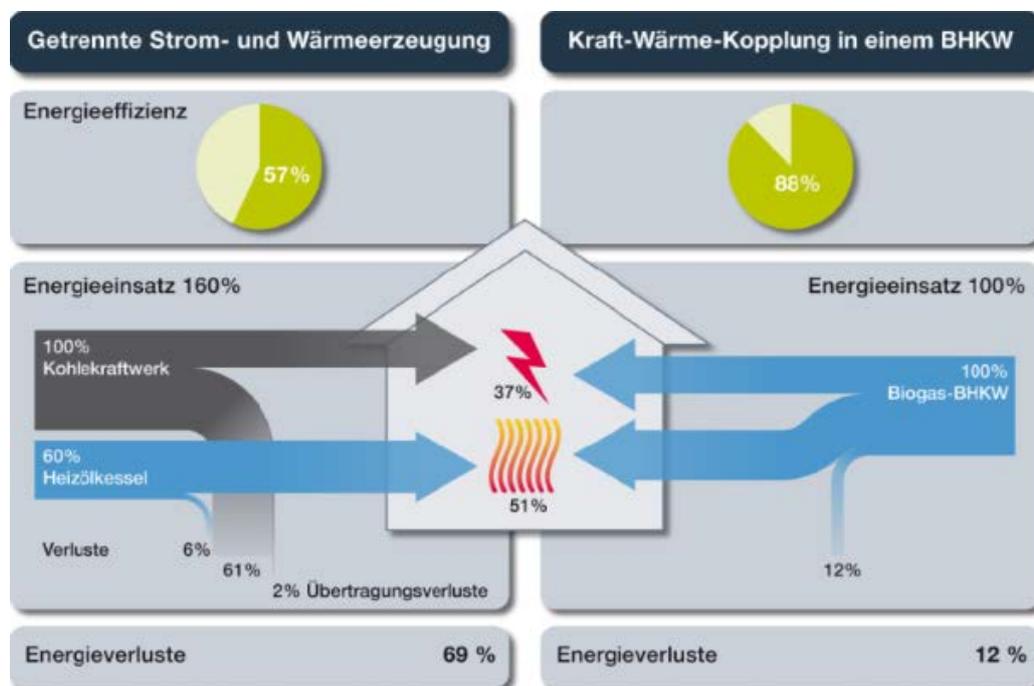
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The compact E2676 E302 in the container can be accessed from all sides by the maintenance personnel, and is therefore easy to service.



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The E2676 is a state-of-the-art gas engine for energy production that is mainly used in block-type thermal power plants, and attains exceptional degrees of efficiency thanks to cogeneration.



Data source: ASUE e.V.,

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High degrees of efficiency speak favorably for the implementation of cogeneration.



Engine data table:

E2676 E302 Performance data		
<b>Mains frequency</b>	50 Hz	60 Hz
<b>ISO-standard performance at 100% load</b>	140 kW	160 kW
<b>Engine speed</b>	1500 rpm	1800 rpm
<b>Air ratio</b>	1.00 λ	1.00 λ
<b>Bore</b>	126 mm	126 mm
<b>Stroke</b>	166 mm	166 mm
<b>Displacement</b>	12.42 l	12.42 l
<b>Maximum torque</b>	900 Nm	850 Nm
<b>Compression ratio</b>	12 :1	12 :1
<b>Total degree of efficiency at 100% load<sup>1</sup></b>	93.5 %	93.4 %

<sup>1</sup> Subject to technical change due to further development.

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