

The Volkswagen combined Heat and Power Unit - Automotive Know-How for Intelligent Energy Production

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Abstract

As the climate change can be especially traced back to CO₂-emissions, it is a worldwide aim to reduce those CO₂-emissions. Therefore, it is necessary to make use of regenerative energy sources and highly efficient technologies. Besides the reduction of emissions within automotive mobility significant attention is paid to heat- and electricity generation in Germany. The reason for this is that more than half of the consumed energy in Germany is used for heat generation. Besides, large parts of the heating plants are not state-of-the-art. This shows that there is a considerable savings potential in this field.

In 2007, German government decided that the percentage of combined heat and power (CHP) in electricity generation is supposed to be increased to 25 % until the year 2020. In order to reach this goal, an annual additional construction of CHP-units with a power output of 700 MW becomes necessary.

A contribution to this aim can be achieved by small CHP-units, so-called combined heat and power plants. A combined heat and power plant is a unit in which a combustion engine generates electricity by means of a generator in a highly efficient manner. At the same time, the developing waste heat of the engine is used for heat generation. The joint electricity- and heat generation leads to an overall efficiency which is considerably superior to any conventional heat- and electricity generation. In direct comparison, the primary energy input is up to 40% lower. Compared to a coal-fired power plant the CO₂-emissions are even 60% lower in a CHP powered with natural gas.

Efficient energy conversion and intelligent control technology are only exemplary requirements, which are important issues in the CHP as well as in the automotive industry and which are mastered by Volkswagen. The Volkswagen combined heat and power unit "EcoBlue 2.0" stands out for a modular and compact design, and shows many similarities to the front part of a vehicle. Power unit, generator, engine control, heat exchanger and exhaust system are only a few examples for those similarities. Additional measures, such as modified valve springs, an optimised camshaft as well as a supplementary oil tank enable a long life-time in stationary operation and generate a product which stands out in competition.

Sales as well as the subsequent control of the equipment are effected by the LichtBlick AG. For this purpose, the LichtBlick AG has developed the so-called fluctuating power concept, which implies a control center which can turn the combined heat and power plants on and off at the customer by remote control. The aim is the network connection of thousands of CHPs to a virtual power plant, which is able to close the gap between power requirement and -capacity within a short time and thus is a major advantage compared to the inert large power stations.

The combination of the Volkswagen "EcoBlue 2.0" and the innovative fluctuating power concept of the LichtBlick AG is a totally new business model, which enables the introduction of high quantities on the energy market and thus strongly contributes to the reduction of CO₂-emissions.

Keywords:

Combined Heat and Power; Decentralized Energy Generation