Markus Brautsch, J Fundam Renewable Energy Appl 2017, 7:4(Suppl)
DOI: 10.4172/2090-4541-C1-029

Duel fuel technology in biomass CHP-systems

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As a part of the research project "Comparison of CO_2 mitigation costs of biomass CHP systems" a MAN common rail Diesel CHP system with 240 kW electrical and 230 kW thermal power was investigated in liquid fuel operation. Based on these initial measurements a dual fuel operation system with liquid and gaseous biogenous fuels was developed. First, step the electrical efficiency, the thermal efficiency, the power coefficient and the emissions with different liquid biogenous fuels (rapeseed oil, soybean oil, biodiesel and palm oil) were investigated from part load to full load at compression rates of 19:1 and 16:1. The CHP system was driven under 100% liquid fuel operation. Second, biomethane was mixed with the combustion air to reduce the amount of liquid fuels to a minimum as "pilot fuel". Beginning with 0% (liquid fuel operation) the gas ratio was increased to its individual maximum. Investigations of the combustion behaviour by a cylinder pressure indicator system on each single cylinder attested a crucial influence of the point of the pilot fuel injection and the amount of pilot fuel. Hence, the biomethane ratio could be raised to its highest degree adapted to each different liquid biofuel. As a result, different combinations of biomethane and biogenous liquid fuels were optimized in a highly efficient common rail Diesel CHP system. Compared to Gas-Otto CHP units, the dual fuel technology shows better electrical and thermal efficiencies as well as CO_2 advantages.

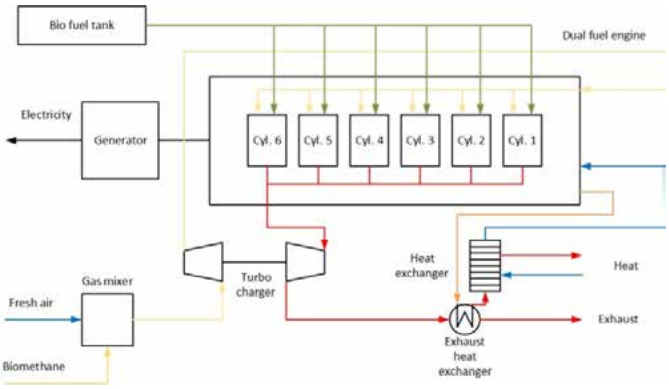

Figure 1: The installation of the test bed CHP-system for the experimental procedure – modified picture from (1)

Biography

Markus Brautsch is a Full Professor for Thermodynamics, Energy Technology and Renewable Energies at the Technical University of Applied Sciences Amberg-Weiden since 1998. He is the Founder of the Institute of Energy Technology and the Bavarian Center of Excellence for Combined Heat and Power Generation. In 2014, he was appointed as a Guest Professor at the Jiangsu University of Science and Technology in China. He is Guest Lecturer at the Renewable Energy Center in Mithradam (India) and the University of Santa Caterina (Brazil).

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