

PetroSA: Biogas-to-electricity plant reduces greenhouse-gas emissions

Greater energy efficiency through Beckhoff controller

→ The state-controlled Petroleum, Oil and Gas Corporation of South Africa, or PetroSA for short, has been operating the first biogas-to-electricity plant of its kind in South Africa at its gas-to-liquid refinery near Mossel Bay since October 2007. The environmentally friendly and sustainable generation of energy from excess biogas that was not used in the past is controlled with Beckhoff technology.

The biogas-to-electricity plant was developed and funded by MethCap, a WSP Group company, the Central Energy Fund, NRG, a group of empowerment investors, and CO₂ emission rights generated under the Clean Development Mechanism (CDM) of the Kyoto Protocol.

The 4.2 MW power plant is equipped with a smokestack that houses a flaring apparatus from which excess gas escapes. In conventional systems this gas is flared. Over the lifetime of the power plant a gross heat value of at least 1300 GWh would be wasted in this way. "Not in this plant," Charles Liebenberg, managing director of MethCap, said. "From the exhaust gases we generate electricity which PetroSA uses to reduce the amount of electricity it obtains from the grid. Over the lifetime of the power plant this reduces the carbon dioxide emissions of the public grid by more than 500,000 tons." "The construction of this biogas power plant shows that projects for promoting renewables are not just a government dream but are actually being implemented," said Minerals and Energy Minister Buyelwa Sonjica.

A blower in the chimney of the power plant compresses the gas to 8 kPa. The gas is then burnt in three gas engines, each driving a 1.4 MW generator. Fans protect the plant from excessive temperatures. A CX9000 Embedded PC from Beckhoff with Windows CE operating system and the TwinCAT PLC automation software control the blowers, the fans and the heat exchanger and monitor temperature, pressure and gas quality. The system

components are connected to the controller via Beckhoff Bus Terminals. "We chose Beckhoff technology due to its very good price/performance ratio and the straightforward connection system. For example, the Bus Terminals with Cage Clamp® mechanism can quickly be connected to the cable ends on site," said Charles Liebenberg. The CX platform is integrated in the PetroSA control system and the higher-level fire and gas leak detection systems. The Ethernet programming and monitoring port of the CX9000 enables high-speed logging of system variables via the Adroit monitoring system. In addition, Charles Liebenberg is convinced that TwinCAT is the optimal development and runtime environment: "In compliance with the IEC 61131-3 standard TwinCAT supports all main high-level languages. This makes it straightforward for us to create our functions with Structured Text. The utilization of function blocks from the comprehensive TwinCAT libraries has reduced our programming effort and simplified commissioning."

→ PetroSA www.petrosa.co.za

→ WSP Africa www.wspgroup.co.za

→ Beckhoff South Africa www.beckhoff.co.za