

**Industry: Power generation / biogas cogeneration unit**  
**Products Used: FX3U compact controller**

# Power and Heat from the Fields



From farmer to energy producer: More and more farmers are now growing maize for their biogas systems rather than as fodder for their cows. Legally guaranteed returns for electricity fed back into the power grid are making biogas-fired heat and power cogeneration plants economically viable. The company Dieng Schaltanlagen in Leutkirch, Germany, has planned and automated around eighty such biogas plants in the last three years alone. Modern controller technology from Mitsubishi Electric ensures that the power stations deliver reliable performance.

Agricultural biogas plants fired with renewable fuels like biogas made from specially-cultivated grades of maize are getting larger and more powerful. As their capabilities grow, these autonomous power plants also need more capable automation systems. Dieng, one of the leading producers of switchgear systems for biogas plants in the state of Baden-Württemberg, thus decided to switch to the latest and most powerful generation of compact controllers from Mitsubishi Electric for the automation of their new plant. The PLCs of the new MELSEC FX3U series are fully compatible with the FX2N series used in the earlier biogas plants.

The new plant that recently went into operation in Bad Buchau has two heat and power cogeneration units with an output capacity of 200kW each. The electricity generators are driven by combustion motors fuelled with biogas produced in a fermenter from maize and other plants including grain and grass, which functions as a "co-substrate". A variable-speed worm conveyor powered by a frequency inverter automatically feeds the fuel plants mix into the fermenter

from a mixing container with a capacity of up to seven tons. All the farmer has to do is top up the container once a day.

The system is controlled by a MELSEC FX3U controller. This unit features plenty of memory (64K program steps), fast program execution (cycle period 0.065µs) and is a proficient communicator. It exchanges data via serial ports with the weighing system that controls the substrate feed, the plant's control terminal and the frequency inverters that drive the worm conveyor and the agitator in the fermenter.

The controller's large memory and the fact that it uses the same standard programming interface as all the other compact and modular controllers in the Mitsubishi Electric range enabled Dieng's engineers to build on existing programs instead of having to develop new ones from scratch. Developing the con-



troller programs is quick and easy thanks to the user-friendly GX IEC Developer programming software package, which is based on the IEC 61131-3 standard and uses graphical function blocks.

Remote maintenance functions via a modem were also easy to implement. This enables programmers and technicians to check the plant status at any time online, and they can also upload new programs and provide fast assistance in the event of malfunctions. It's an impressive system concept, made possible to no small degree by the reliable and powerful compact controller.

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