NIVELCO CASE STUDIES

Instrumentation of a biogas plant (Hungary)

Efficient manure disposal from livestock farms

Existing environmental regulations in Hungary require livestock farms to dispose of the manure produced in dedicated underground tanks. Since that is not a really efficient method, biogas plants are used throughout the European Union as the optimal solution for this task.

So Jászapáti Termelőszövetkezet made the decision to establish a biogas plant, and they won financial support from the European Union to realise this project.

The biogas plant produces methane from the livestock manure which is burnt to power a gas-motor to generate electric energy.

The finished biogas production plant uses the neighbouring livestock litter and liquid manure, as well as corn-silage and other types of organic waste. Along with the generated electric energy the other useful by-product is the bio-manure, which can be used in the fields as compost, after phase-segmentation and treatment.

The actual biogas production is done in 3 fermentors, where anaerobic (in the absence of oxygen) digestion takes place. This controlled biological breakdown of the input materials into components is performed by bacteria. During this process primarily methane (CH4) and carbon dioxide (CO2) are released. Biogas fermentation technology requires many measurement tasks which should be controlled continuously.

Biogas technology is instrumented by the following NIVELCO instruments:

- The input livestock manure is stored in a pre-silo, where it is turned into liquid manure by adding water. The level in this silo is measured by an EasyTREK SPA-360-4 integrated ultrasonic transmitter. The instrument is IP68 protected to protect it from accidental submersion.
- This liquidised manure is transferred into the fermentors, and the flow measurement is made by an ISOMAG MS 2500 magnetic induction flow-meter flanged to DN150. The measurement data is processed on the separate ML-110 control unit with an LCD display.
- Temperature measurement of the digestion process is monitored by THERMOCONT TTJ-521-6 Ex type intrinsically safe temperature transmitters, which incorporate a Pt100 sensor. Process pressure is measured by a NIVOPRESS DTF-501-6 Ex hydrostatic pressure transmitter.

- Solving the high level fail-safe alarm indication of the fermentors created a quite rare application for our capacitive level transmitter. Our experts offered a NIVOCAP CTR-206-6 Ex mounted unusually in the horizontal position. With this special solution programmed properly for this application – eliminating the relative dielectric constant of the air in the tank – foam detection was successful in the fermentors.
- After the fermentation process the remaining sludge is dewatered in a screw press, and the water is let into the drain after degassing. Level measurement of this degassing tank is done by a standard vertically mounted NIVOCAP CTR-206-6 Ex capacitive level transmitter.

The completed biogas plant demonstrated its economical and efficient operation during the first trials.

The biogas plant is able to generate 3.2 MWh of electric energy from the manure produced in only one day at the farm. In this way the farm can cover the running costs of the plant, while the amount of dry sludge generated is less than one cubic meter.

After this successful project, NIVELCO looks forward to the future possibilities of cooperation on similar investments for complete biogas instrumentation, particularly for efficient renewable energy production.

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