Optimization of an Anaerobic Digestion Reactor

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Sector: Renewables

Why chose **ORTO** for this application?

There are many challenges to using traditional real-time optimization technologies on an anaerobic digestion unit:

- The available savings are low relative to the implementation and maintenance costs
- Process dynamics can be highly non-linear and hard to model

ORTO schemes are easy to design and implement, significantly reducing the time, cost and expertise needed. They also handle non-linearity implicitly, significantly reducing maintenance needs.

Business Objective

Anaerobic digestion is used to treat biodegradable waste and sewage sludge and as a source of renewable energy. The process produces a biogas consisting of mainly methane and carbon dioxide. This biogas can be used directly as fuel, in combined heat and power gas engines or upgraded to natural gas-quality biomethane. The nutrient-rich digestated sludge also produced can be used as fertilizer.

Typical Optimization Objective Function

Maximize biogas produced, per unit organic waste stream feed.

By manipulating, within a permitted range:

- Reactor heat input
- Organic waste stream flow

Subject to the following constraints:

- Digested sludge total organic carbon (TOC) content
- Heat input limits

Solution

On simple reactor designs, two ORTO agents should be sufficient.

Benefits

Typically, a 3-5% increase in biogas.