energy neutrality with co-digestion

use SUEZ’s advanced anaerobic digestion to free up volume for organic wastes

introduction

Wastewater treatment is necessary to protect water sources, and ensure long term stability of the environment. Conventional wastewater treatment processes require significant energy inputs in order to produce a resultant effluent that can be discharged into the environment. In fact, over 3% of all electricity used in the United States, and almost 1% in Europe goes to wastewater treatment.

Not all aspects of wastewater treatment are energy intensive. Wastewater plants equipped with Anaerobic Digestion (AD) have the capability to produce energy. AD biologically breaks down organic material, in this case sludge. This process converts the sludge into biogas which is rich in methane, and leaves a resultant biosolid. This produced biogas can be converted to thermal energy, as well as electricity when combined heat and power (CHP) units are employed.

In conventional AD plants, the amount of biogas produced solely from the wastewater sludge is not sufficient to produce enough electricity and heat to cover the plant load. SUEZ’s Advanced Anaerobic Digestion (AAD) technology has the ability to shift this balance to energy neutrality. Using SUEZ’s AAD biological hydrolysis before digestion, plants can reduce the amount of retention time for sludge in digestion, maintaining biogas yields. With reduced retention time required for sludge, digester volume can be dedicated to the treatment of additional organic wastes and co-digested with sludge in the existing infrastructure. This will significantly increase the overall biogas production.

critical to quality

- Reduce digester hydraulic retention time (HRT) for sludge
- Increase existing biogas production from current sludge loading
- Dedicate freed up digester volume from reduced HRT to digest other organic streams
- Ability to receive and process organic wastes
- Add-on solution to existing Anaerobic Digestion (AD) plants
- Co-digest or co-located digestion practice
- Enable higher solids digestion (when coupled with SGM mixing)
- Produce high quality digestate

Figure 1: SUEZ’s AAD
achieving energy neutrality with co-digestion

**Figure 2: SUEZ’s Co-digestion process flow**

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**co-digestion system process**

- Organic Waste Receiving
- Pre-Digestion Biological Hydrolysis
- Optional Re:Sep* Mechanical Separation
- Optional Monsal* 70 Pasteurization
- Anaerobic Digestion

**optional biosolids dewatering reduces digester hrt for sludge**

SUEZ’s AAD biological hydrolysis pre-conditions sludge and separates the hydrolysis and acid forming phases, leaving the digester for producing biogas. This results in shorter HRT requirements of 12-20 days. With a reduced HRT for sludge, existing digester volume can digest external organic wastes.

**increase existing biogas production from current sludge loading**

Reduced HRT does not sacrifice biogas productivity. Employing Biological hydrolysis, sludge is treated in multiple serial flow reactors, being hydrolyzed and acidified prior to AD, so digester volume can be optimized for methanogenesis, forming biogas. Freed up digester volume from reduced HRT can be dedicated to digest other organic streams.

These can be a variety of sources, including food waste, FOG (Fats, oils and greases), and other food processing wastes. Biogas produced from these feeds is substantial and when combined with biogas from sludge, enables WWTP energy neutrality.

**receive and process organic wastes**

SUEZ can offer a variety of technologies as part of any plants’ codigestion solution to receive organic wastes, and where needed pre-process to make ready for digestion. SUEZ offers receiving stations for liquid type waste, SUEZ’s Re:Sep technology for solid/packaged food wastes, to create a feed slurry for digestion.
add-on solution to existing AD plants

SUEZ’s codigestion solution can be added to any existing digestion plant with minimal integration costs or extensive retrofits. It is designed to be introduced at the front of any AD, with all controls defined. The system can even be commissioned in place without taking a downstream digestion out of service.

co-digest or co-located digestion practice

SUEZ’s codigestion solution can be adapted to suit plant infrastructure and needs. Sludge and other organic wastes are co-digested in the same digester tank or where there is a desire to keep waste streams separate, co-located digestion is applied, where discrete tanks are dedicated for sludge and other organic wastes.

enable higher solids digestion when coupled with SGM mixing

Operation of AD at high solids content can be limited by existing digester mixing systems. SUEZ has extensive experience with mixing high solids digesters through sequential gas mixing [SGM]. Where applications of co-digestion result in high digester solids content, SUEZ can propose a simple SGM digester retrofit, to remove any solids content limitations. SGM retrofits enable higher solids digester operation and digester mixing energy will also be reduced. SGM mixing energy typically is 1.5 W/m³.

produce high quality digestate

No matter what organic feeds are co-digested, the solution provided ensures a high quality digestate. In cases where sludge and organic waste is co-digested in the same tank, digestate is considered biosolids, and treatment levels are applied to all wastes. In the US, this can extend to treating co-digested feeds to be compliant with 40 CFR Part 503 on pathogen reduction for Class A. Where digestates have separate uses post digestion, the application of co-located digestion is utilized.

summary

SUEZ’s AD upgrading technology for co-digestion enables customers to maximize their existing assets, and efficiently produce maximum biogas outputs. This philosophy shifts wastewater treatment plants from energy importers to self-sufficiency. This shift towards energy neutrality direction promotes a long term operational certainty and environmental conservancy.

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
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<tbody>
<tr>
<td>Digester HRT</td>
<td>12-20 Days</td>
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<tr>
<td>Process Steps</td>
<td>Multi-stage (Biological Hydrolysis, Organic waste processing, AD)</td>
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<td>Digester Feed Solids Concentrations</td>
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<tr>
<td>Sludge Biogas Yields</td>
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<tr>
<td>Achievable Biosolids Quality</td>
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<tr>
<td>SGM Digester Mixing Energy</td>
<td>1.5 W/m³</td>
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