



C-CHANGE

Consortium for Cultivating Human
And Naturally reGenerative Enterprises

Linking farms and cities through biodigestion

FALL 2021



C•CHANGE is bringing Iowa State University agricultural and engineering science and extension to help bridge the rural-urban divide to solve sustainability challenges, including financial, energy, air and water quality, and climate challenges.

In this project, we analyzed the feasibility and cost-effectiveness for municipalities across Iowa to expand their digester facilities to incorporate grassy material – cover crops and perennial crops – from surrounding farmland. Digesters are a common component of municipal waste treatment plants. Expanding the capacity of municipal digesters to include grassy feedstocks could help cities meet their water quality and climate change goals.

Cover crops and perennial crops can protect and build soil for farms, and keep valuable nutrients from leaking out of the agricultural environment. While their impacts are desirable, incorporating cover crops and perennial crops is often not cost-effective for farmers in the short term without additional streams of revenue. Municipalities could provide new revenue streams for farmers by purchasing harvested grassy material for biodigestion.

www.agchange.org

From farms to cities, anaerobic digestion offers a smart solution for meeting 21st century sustainability goals.

Anaerobic digestion (AD) is the natural biological process by which microorganisms break down organic substances in the absence of oxygen. AD is a form of biodigestion. The resulting products are biogas and digestate.

Renewable natural gas (RNG) is biogas that has been purified for energy and industrial uses. It is chemically the same as fossil natural gas, but can provide a more sustainable substitute anywhere fossil natural gas is currently used.

A **digester** is a sealed vessel built to anaerobically digest materials or feedstock.

Digestate is the liquid and solid left overs from anaerobic digestion once the biogas is removed. It is commonly used as a fertilizer and soil amendment.

The US Environmental Protection Agency's AgSTAR program provides basic and detailed educational information and planning tools on anaerobic digestion. Visit the AgSTAR website:

<https://www.epa.gov/agstar>

Project Goals

1. Improve information dissemination and coordination among municipal and agricultural communities regarding biodigestion as a way to mutually achieve sustainability goals.
2. Develop a platform to evaluate alternative pathways to achieving these goals.



Key Findings

- Municipal digesters are capable of accepting food waste. The proposed addition of grassy feedstocks is viewed as an expansion on what they already do.
- Feasibility experiments suggest grassy feedstocks cannot be directly added to digesters using existing processes. Additional infrastructure is needed to store and pretreat the grassy material.
- Municipalities plan for infrastructure upgrades on 5, 15, and even 30-year horizons. Long-term partnerships are needed for plan adjustments to come to fruition.
- Municipalities are also engaged in long-term planning to meet sustainability goals. Many are planning for changes starting in 2030, with full implementation in 2050. Sustainability goals – including water quality, energy, and climate change goals – will impact infrastructure upgrades.
- Accessing renewable natural gas markets and markets for environmental credits (e.g., carbon, nutrient) could make the value chain proposition and infrastructure upgrades cost-effective.

Next Steps

- Continued information dissemination and coordination among agricultural, municipal, and sustainability communities.
- Additional research, pilots, and development on the pretreatment of grassy feedstocks for use in anaerobic digestion.
- Full assessment of lifecycle, other environmental benefits, and costs associated with grassy feedstock production, pre-processing, conversion, and product utilization to support accessing renewable natural gas and environmental markets.
- Demonstration of the proposed value chain with fully transparent communication of project financials.



Engage with C·CHANGE

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