WWTP UPGRADE: GREENHOUSE GAS CONSIDERATIONS

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On behalf of the Middlebury Energy Committee

Presentation for Middlebury Infrastructure Committee
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Overview

- Existing 20-year-old Wastewater Treatment Plant (WWTP) needs partial or complete replacement
- It is a major consumer of electricity for the town, consuming over $20,000 worth each month
- Replacing the current system for drying the sludge with an anaerobic digester could save a lot of money, and savings would pay for the construction and equipment cost in just a few years.
- Adding an anaerobic digester greatly increases the amount of greenhouse gas potentially released by the plant, mostly methane
- Methane is a very potent greenhouse gas if released unburned

Overview (continued)

- Existing plant also uses over 600 tons of quicklime per year, with major embedded carbon – not needed if anaerobic digester installed
- An engineering evaluation of four options for handling the methane indicated all four would pay for themselves in a few years

Overview (continued)

- Our evaluation of the four options from a greenhouse gas perspective shows issues of various kinds with all four
- The MEC would like to urge the town to investigate options for replacing the existing WWTP that do not have adverse GHG consequences.

The four anaerobic digester options

- None of the options require replacing the existing Sequencing Batch Reactors (SBRs) or changing the management of their fluid output
  - *Thus any GHG releases from the SBRs are the same for all options.*
- The anaerobic digester setup replaces a very energy-intensive system that uses lime and heat to dewater the sludge and prepare it for land application.
  - *It also takes as input trucked-in sludge from numerous onsite sewage disposal systems in and out of Middlebury (septic tanks).*
- We have chosen to assess the four options that the engineer assessed, plus three more for context

The four options assessed by the engineer

1. Use the methane to generate electricity, use the electricity to operate the WWTP and heat its buildings, and sell the remainder to GMP.

2. Clean up the methane and sell it to Vermont Gas Systems to distribute to other customers as ‘renewable natural gas’, without using it on-site

3. Use the methane to operate the plant, and flare off the excess

4. Combine 2 and 3 – use the methane to operate the plant, clean up the excess, and sell it to VGS.

The other three scenarios – thought experiments

- A. Current system.
- B. Release all the methane straight to the atmosphere without using it beneficially.
- C. Flare off (burn) all the methane without using it beneficially.

The seven scenarios – CO_2e and cost savings

Scenario	Tons of CO_2e released per year	Simple payback in years
A – current state	880	NA
B – release methane unused	7,858	NA
C – flare off methane unused	1020	NA
1 – electricity to the grid	924	3.8
2 – biogas to the VGS pipeline	187	4.2
3 – biogas for process and facility heat, flare excess	958	5.2
4 – combine 2 and 3 – use biogas to operate plant, sell excess to VGS	252	3.7

All the Town's operations together release about 600 tons of CO_2e per year, not counting the lime releases

Some comments about the four options

- Option 1 is less favorable because the electricity made at our WWTP would be replacing GMP electricity that is already very low-carbon.
- Options 2 and 4 look favorable because methane from the WWTP is replacing fossil natural gas, which is not low-carbon.
- Options 2 and 4 tie the town's WWTP to the fate of VGS, however, which in turn may for many years depend on distributing mostly fossil natural gas. We also assume risks of price volatility for natural gas.
- Option 3 has somewhat higher GHG emissions than the current state, because most of the gas is burned without replacing any fossil fuel.

Final Thoughts

- The Energy Committee urges the Infrastructure Committee, and Town staff, actively to explore options for drying and sterilizing sewage sludge that do not create new greenhouse gas emissions.
- We note that the cost considerations and GHG considerations do not necessarily point in the same direction. The Town will need to weigh these considerations against each other as it finalizes its design choices.

Questions?

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