Despite increased efforts to remove material from the waste stream via recycling and WTE, more than 60% of MSW is sent to landfills. Currently, 85% of NYC waste is shipped by truck to out-of-state landfills. Due to the size and cost of Landfill Gas to Energy (LFGTE) projects, the generated methane is usually flared rather than used as a fuel. Improving the cost and efficiency of LFGTE projects could increase their implementation throughout the country.

### Syngas Generation and Economic Feasibility

- The addition of H₂ to LFG improves the combustion due to its high laminar flame speed and flammability limit and its low ignition energy.
- In-situ autothermal reforming of methane offers the most economically feasible source of H₂.

**Experimental Set Up**

- Simulated LFG = 1:1, CH₄:CO₂
- Electrical load on the system 0.4 kW
- Syngas added as 5% by enthalpy of the reaction
- Syngas = 2:1, H₂:CO
- Tested in terms of emissions and engine efficiency
- The equivalence ratio held constant 0.5

### Results

- Initial experimental results were found to emulate the work of previous CCL members
- Simulated LFG created more emissions compared to methane

THC and CO emissions follow the same tendencies:

- significant increase in LFG compared to CH₄
- decrease with SG addition, by 66 and 7% respectively
- An increase of only 15% to the levelized cost of electricity for in-stream reforming is justified by its potential to decrease NOₓ

### Further Work

- Continue testing 5 and 10% synagas additions at different loads to get a complete picture of the effect on emission and efficiency
- Vary the H₂ and CO ratio in the synagas, ideally landing on an optimal composition that can be produced by autothermal reforming
- Reduce the amount of CH₄ in simulated LFG to determine minimum concentration

References

4. Calculation and images, CCL

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