

Technical Appendix

Knox County Advancing Renewable Energy Project

Introduction:

Knox County Landfill desires to address GHG emissions three-fold: collecting and mitigating existing landfill gas, reusing the landfill gas for energy, and installing solar panels. The extension of 3-phase power is a necessary first step to achieve these goals with currently available technology. In order to efficiently phase the projects, the GHG reduction measures proposed to be included for the grant request include extending 3-phase power and the construction of the gas control and collection system. The solar panels and landfill gas to energy projects would follow, outside of the grant funding, with outside partnerships.

References and Sources:

- LandGEM Version 3.03 was run with site-specific data in February 2024. Emission modeling for the years 2025-2050 was included in the GHG calculation.
- The 2022 Tier II Report was submitted to the Illinois EPA in 3-8-2023. Sampling of Landfill #3 was completed in November 2022 which verified that Landfill #3 contains methane ranging from 55 to 80% at depths of 5 to 10 feet below ground surface.
- EPA's LMOP website and documents were referenced.

Methodology:

To calculate the GHG reduction for the measures proposed to be included in the grant request, the following methodology was used:

- Model the landfill emissions with the EPA's LandGEM Version 3.03 modeling tool
- Calculate the emissions for methane and carbon dioxide from 2025-2030 and 2025-2050.
- Use the EPA's Interactive Conversion Tool to calculate MMTCO₂E.
- Assume 80% of the emissions can be reduced based on typical reported rates for capped landfills.
- Though the solar panels and the landfill gas to energy have significant potential for GHG reduction in terms of avoided fossil fuel generated energy, and because these projects are proposed to be funded outside of the grant application, the GHG reduction has not been calculated.

Calculation:

The calculation is shown on the attached table. The LandGEM model is not included due to size considerations but is summarized on the table.