

MSW PROJECT OPPORTUNITY

SANTA ROSA LANDFILL

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CICLUS AMBIENTAL

OVERVIEW OF MSW PROJECT

The Santa Rosa Landfill began operations in 2011 and is owned and is operated by the consortium Ciclus Ambiental as a concessionaire of the Rio de Janeiro City Solid Waste Company (COMLURB). This Landfill is a sanitary landfill with a designed waste footprint of 169 hectares (ha), a total design capacity of 70 million tonnes, and is expected to close in 2031. Currently, there are 4 million tonnes of waste in place with an average waste depth of 25 meters.

PROJECT TYPE: Landfill gas (LFG) projections indicate that the Santa Rosa Landfill could have several LFG utilization project options. These options include electricity generation, direct use, and flaring only. Assuming start-up of a power plant in 2016, sufficient gas is assumed to be available to support a power plant of up to 20 MW from 2016 to 2018, a power plant of up to 40 MW can be supported for the following 9 years, and a power plant of up to 50 MW can be supported for the following 4 years. A direct use project is possible depending on the availability of potential end-users near the Landfill. An interesting direct LFG project worthy of further analysis at this site would be the conversion of the LFG of this landfill into vehicle fuel.

The feasibility of any of these projects would require additional information from the Landfill and surrounding area, such as exact locations of electricity distribution and transmission lines, natural gas distributors specifications, nearby industrial facilities' energy requirements and interest in pursuing a LFG energy project.

ESTIMATED PROJECT LIFETIME EMISSION REDUCTIONS: 14.3 MMTCO₂E

LANDFILL LOCATION AND ASSISTANCE REQUESTS



Ciclus Ambiental seeks specific cooperation to advance the development of this project:

- An investor to build, own, and operate a project.
- The project owner does have a contract to sell its carbon credits.

DISCLAIMER: The information and predictions contained within this poster are based on the data provided by the site owners and operators and site visits conducted by U.S. EPA. The Global Methane Initiative (GMI) cannot take responsibility for the accuracy of these data. It should be noted that conditions on landfills will vary with changes in waste input, management practices, engineering practices, and environmental conditions (particularly rainfall and temperature). GMI does not guarantee the quantity or quality of available landfill gas from the landfill site, which may vary from the values predicted in this report.

LANDFILL GAS AND ENERGY POTENTIAL

Under contract to the U.S. EPA, SCS Engineers estimated the amount of LFG generated by the Santa Rosa Landfill using the EPA model. Model input data for the preliminary assessment of the LFG capture and use project were obtained from COMLURB and collected during EPA site visits in October 2012.

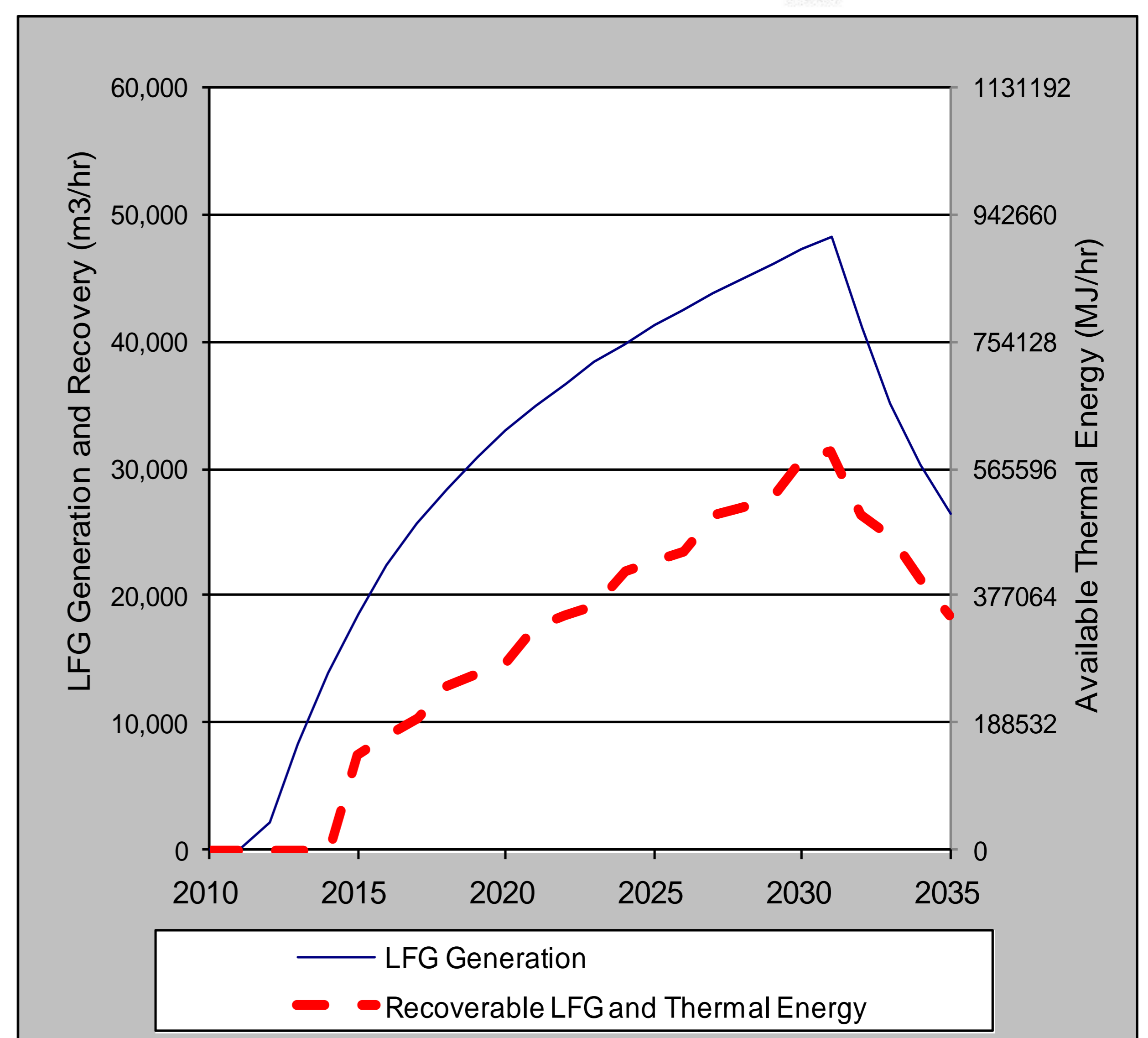
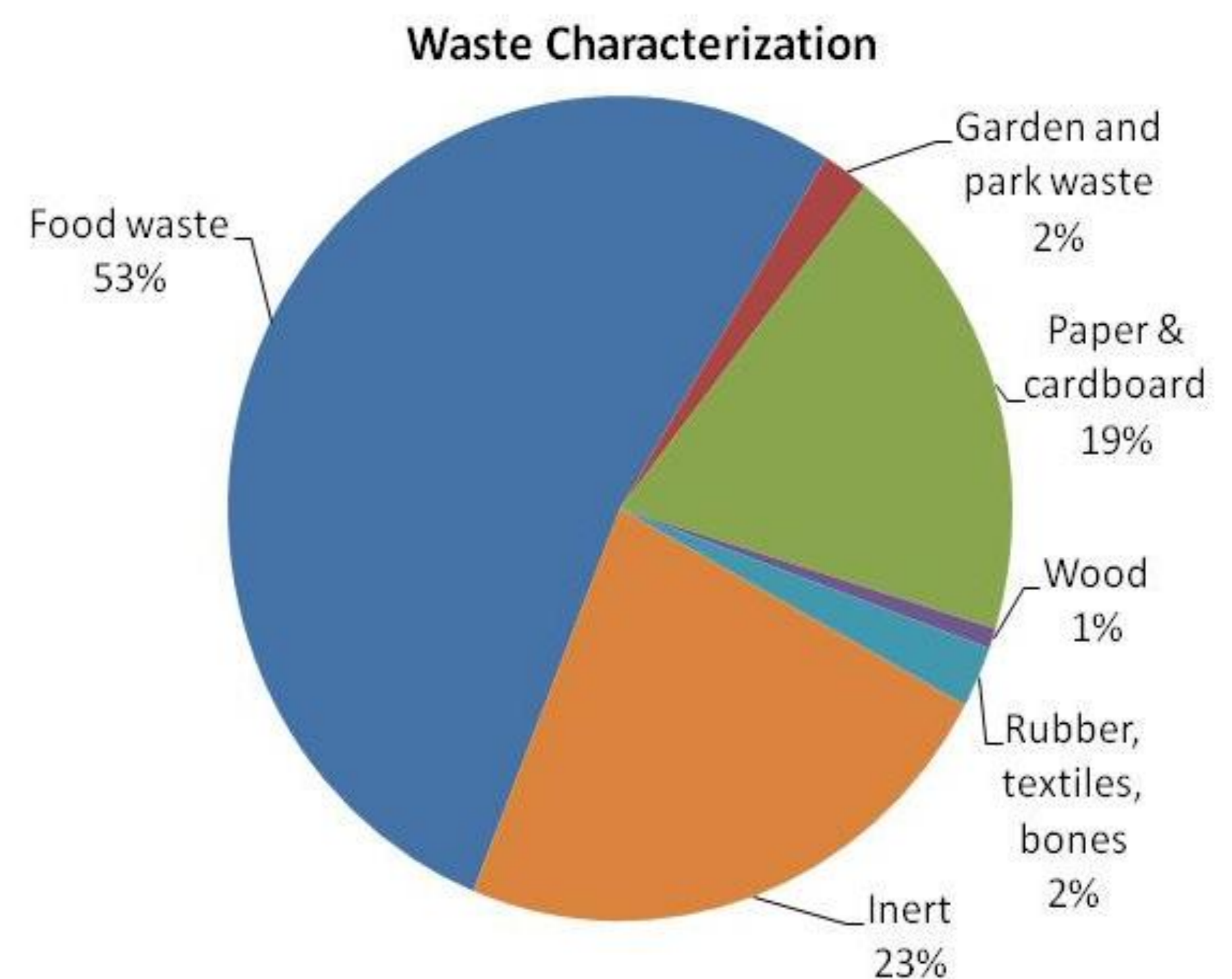
Other Landfill Physical/Operational Data

- Estimated annual MSW acceptance rates for 2011 to 2031: ranges from 1 million to 3.9 million tonnes/yr
- Landfill is lined with clay and a HDPE membrane
- Waste compaction is performed with a bulldozer
- Leachate management: accumulating in standing pools
- LFG collection and control system: passive venting wells installed.

Landfill Gas Modeling Inputs:

- CH₄ generation potential (Lo):
70 m³/Mg for very fast-decay organic waste
103 m³/Mg for moderately-fast decay organic waste
169 m³/Mg for moderately-slow decay organic waste
200 m³/Mg for slow-decay organic waste
- CH₄ generation rate constant (k):
0.26 for fast-decay organic waste
0.12 for medium-fast decay organic waste
0.048 for medium-slow decay organic waste
0.024 for slow-decay organic waste
- Percent methane: 50%

Values for these modeling variables have been developed based on the waste composition data and average annual precipitation at Santa Rosa Landfill. It is not feasible to collect all the gas generated at the site for flaring or energy recovery, given site conditions and collection system limitations. Therefore, the amount of recoverable LFG was estimated by applying a gas availability factor to the results of the LFG generation model.



Recoverable LFG = 90% Landfill Area Available for Gas Collection x 78% Gas Collection Efficiency = 70%

ENVIRONMENTAL BENEFITS

Assuming that an active gas collection and flaring system is installed in 2015, this LFG capture project has the opportunity to collect and destroy an average of 73.2 million cubic meters of methane annually over the next 13 years. This is equivalent to emission reductions of more than 14.3 million tonnes of CO₂eq over the project lifetime.

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Tonnes CO ₂ eq from Flaring Activities	487,469	589,402	675,735	843,567	916,111	980,114	1,152,609	1,210,212	1,263,018	1,443,156	1,493,545	1,541,118	1,730,588

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