

MSW PROJECT OPPORTUNITY

GERICINÓ LANDFILL

RIO DE JANEIRO, RJ, BRAZIL

COMLURB

OVERVIEW OF MSW PROJECT

The Gericinó Landfill began operations in 1987. It is owned by the Municipality of Rio de Janeiro and is operated by the Rio de Janeiro City Solid Waste Company (COMLURB). This Landfill is a sanitary landfill with a designed waste footprint of 35 hectares (ha), a total design capacity of 10.9 million tonnes, and is expected to close in 2028. Currently, there are 7.1 million tonnes of waste in place with an average waste depth of 55 meters.

PROJECT TYPE: Landfill gas (LFG) projections indicate that the Gericinó 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 5 MW from 2016 to 2023. A power plant of up to 7 MW can be supported for the following 10 years. A direct use project is possible depending on the availability of potential end-users near the Landfill. This landfill is located adjacent to a state prison and a major natural gas pipeline; both of which are potential direct end-users. The utilization of the LFG of this landfill, either directly at the nearby prison or by injection into the nearby natural gas pipeline as purified LFG, are two of the promising direct use landfill gas project opportunities offered at this site.

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: 2.7 MMTCO₂E

LANDFILL LOCATION AND ASSISTANCE REQUESTS



The Municipality of Rio de Janeiro seeks specific cooperation to advance the development of this project:

- An investor to build, own, and operate a project.
- The project owner does not have a contract to sell its carbon credits.

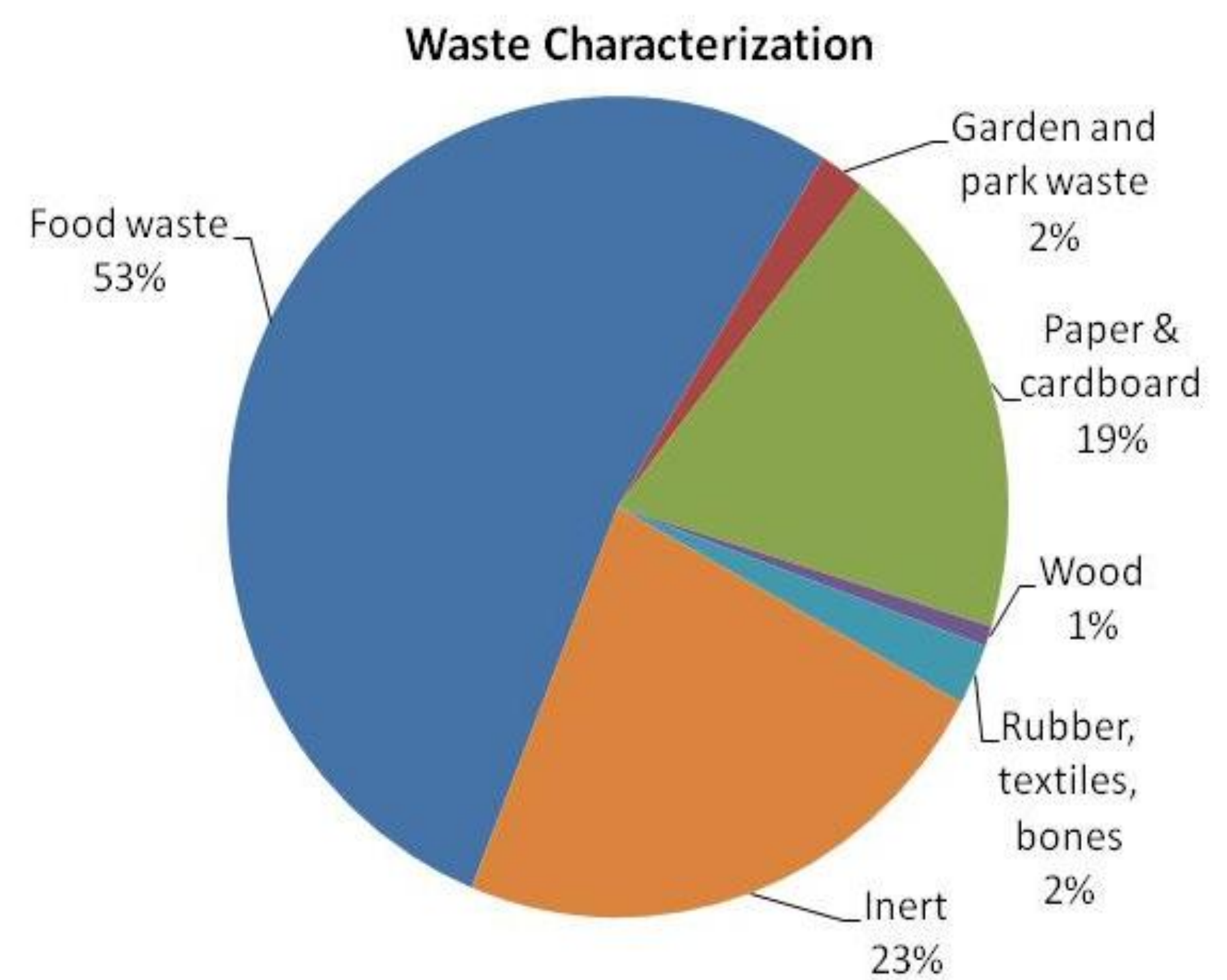
DISCLAIMER: The information and predictions contained within this poster are based on the data provided by the site owners and operators and site visits conducted by U.S. EPA. The Global Methane Initiative (GMI) cannot take responsibility for the accuracy of these data. It should be noted that conditions 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 Gericinó 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 March 2012.

Other Landfill Physical/Operational Data

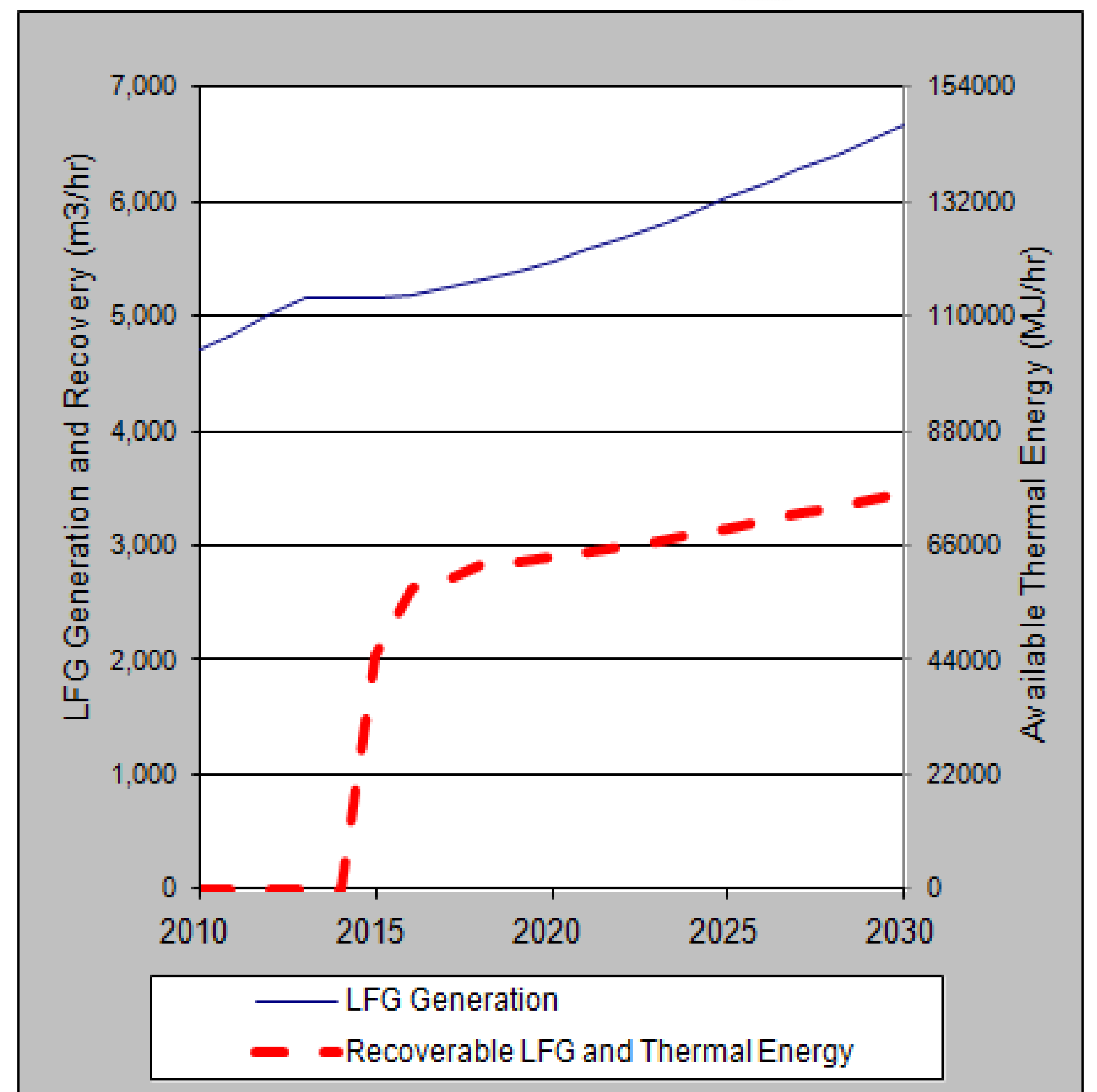
- Estimated annual MSW acceptance rates for 1987 to 2029: ranges from 63,000 to 500,000 tonnes/yr
- Landfill is lined with clay and a HDPE membrane
- Waste compaction is performed with a bulldozer
- Leachate management: accumulating in standing pools
- LFG collection and control system: passive venting wells installed.



Landfill Gas Modeling Inputs:

- CH₄ generation potential (Lo):
70 m³/Mg for very fast-decay organic waste
176 m³/Mg for moderate decay organic waste
145 m³/Mg for slow-decay organic waste
- CH₄ generation rate constant (k):
0.30 for fast-decay organic waste (e.g., food)
0.060 for medium-decay organic waste (e.g., paper)
0.015 for slow-decay organic waste (e.g., rubber)
- Percent methane: 50%

Values for these modeling variables have been developed based on the waste composition data and average annual precipitation at Gericinó 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 67% Gas Collection Efficiency = 60%

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 14.7 million cubic meters of methane annually over the next 13 years. This is equivalent to emission reductions of more than 2.7 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 | 132,289 | 181,255 | 190,044 | 202,361 | 206,474 | 210,807 | 215,320 | 219,985 | 224,781 | 229,692 | 234,711 | 239,830 | 245,046 |

FOR MORE INFORMATION

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