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The economic and environmental benefits of adopting natural gas in isolated systems of Amazonas state, Brazil

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ABSTRACT

The Amazonas state in Brazil faces unique challenges regarding energy planning for its 95 isolated systems, which are remote areas not connected to the national power grid and primarily rely on diesel to generate electricity. These challenges include dense forests, low population density, low overall energy demands, and restrictions on transporting oil derivatives via waterways. However, the discovery of onshore reserves of natural gas in the state and investments in infrastructure, such as the construction of gas pipelines, have provided an opportunity to replace diesel with this cleaner and more cost-effective energy source. This study aims to assess the feasibility of completely replacing diesel-powered generators with natural gas in 14 isolated systems located near the Urucu-Manaus gas pipeline, as well as the Azulão and Japiim production fields. The methodology employed in this study aims to provide a comprehensive assessment of the economic and environmental impact of transitioning from diesel to natural gas in isolated systems. This assessment focuses on two key topics: fuel costs and CO₂ emissions resulting from electricity generation. The analysis results indicate that transitioning from diesel to natural gas can bring significant economic and environmental benefits. The switch to natural gas would reduce fuel costs by more than 40% and decrease CO₂ emissions from combustion (in one case, 39.6% and in other cities, between 16.75% and 27.10%), promoting savings for additional investments in efficiency and sustainability. Implementing these changes makes it possible to achieve a better quality of life for citizens in isolated communities by providing access to a more reliable and sustainable energy source.