Decision Support Tool for Preliminary Techno-Economic Assessment of Biomethane Production Projects

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NOVELTY

• Integrated technical, logistical and economic assessment within a single decision-support platform.

• Automatic optimization of substrate mixtures based on technical constraints.

• Rapid screening of alternative biomethane production scenarios.

• User-friendly interface enabling fast and reproducible project assessment.

INTRODUCTION

Biomethane production from organic waste plays an important role in the transition towards a circular and low-carbon economy. During the early stages of project development, multiple technical, logistical and economic factors must be evaluated simultaneously. However, these analyses are often performed using independent tools and datasets, making preliminary decision-making time-consuming and inconsistent. To address this challenge, a decision support tool was developed to perform an integrated preliminary assessment of biomethane production scenarios.

OBJETIVE

Develop a decision support tool capable of performing a rapid preliminary assessment of biomethane production projects by integrating:

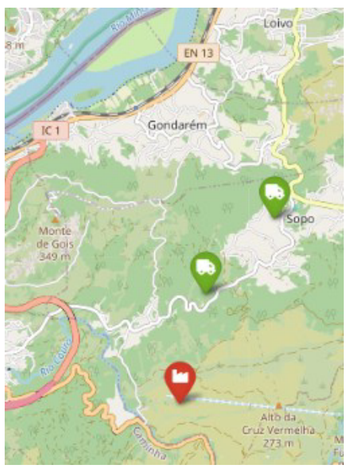
- Technical evaluation of substrate mixtures
- Automatic mixture optimization
- Co-digestion recommendations
- Logistics assessment
- Digestate estimation
- Techno-economic evaluation.

METHODOLOGY

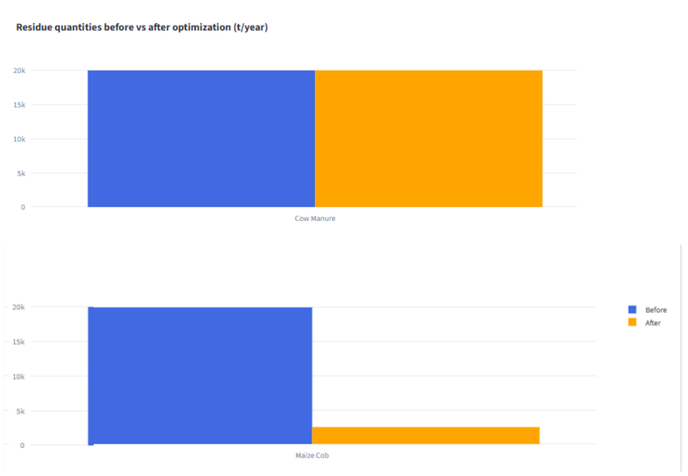
The proposed decision support tool follows a modular workflow designed to support the preliminary assessment of biomethane production projects.

The methodology integrates substrate characterization, mixture suitability assessment, optimization algorithms and techno-economic evaluation into a single framework.

Starting from user-defined scenarios, the tool sequentially evaluates technical, logistical and economic aspects, allowing rapid comparison of alternative configurations while maintaining a computationally efficient screening-level approach.

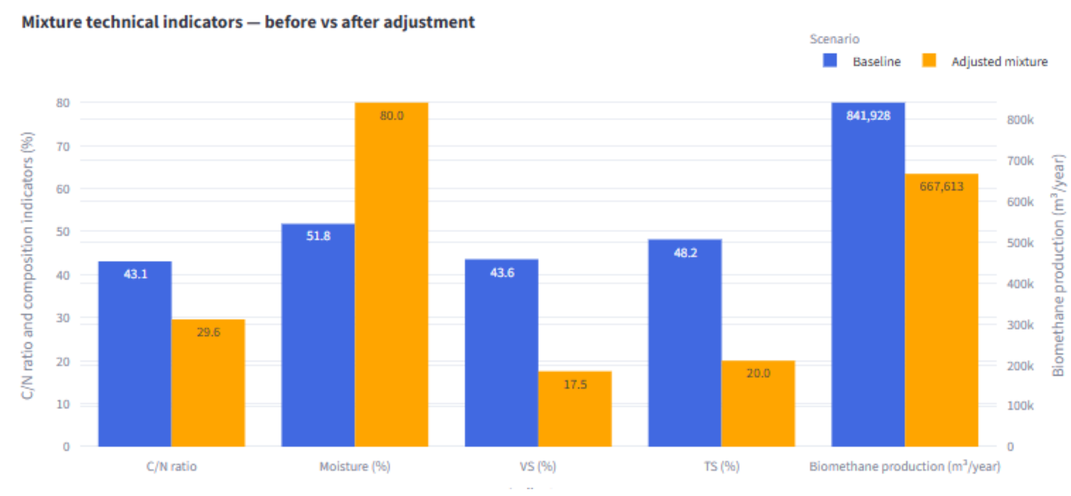


Step 1:
Feedstock Sources

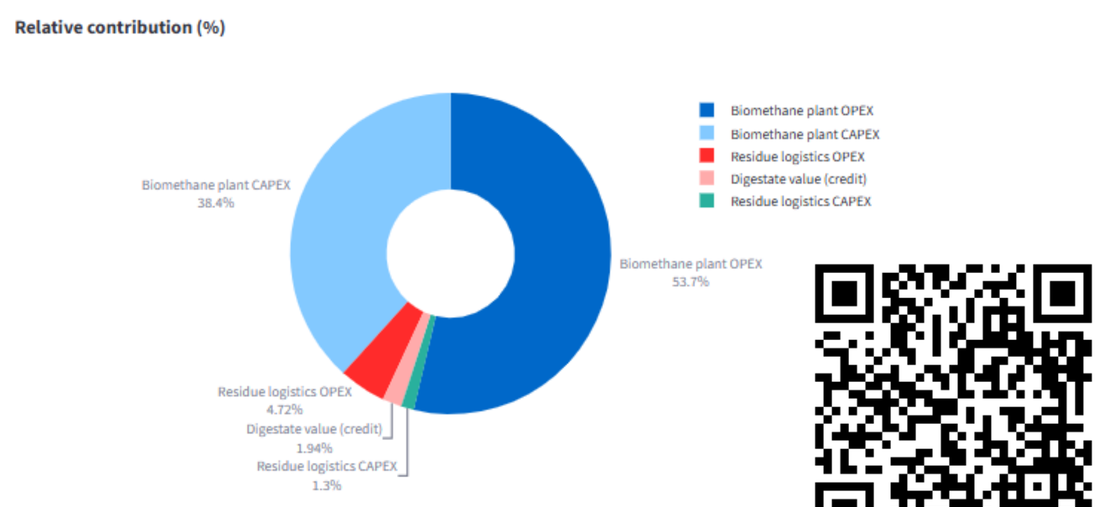


Step 2: Mixture Assessment & Optimization

Step 3: Techno-Economic Assessment



Step 4: Operational Performance Assessment



Step 5: Global Economic Performance

https://www.inegi.pt/pt/gasesrenovaveis/

CONCLUSION

The proposed decision support tool integrates technical, logistical and techno-economic analyses into a single platform, enabling rapid screening of biomethane production scenarios and supporting early-stage project decision-making.

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