BIOMETHANE IN THE DISTRIBUTION GRID – THE CASE OF CEGÁS

Biogas Research Center Conference – Linköping University

International Outlook

June 4, 2020
AGENDA

- CEGÁS and the Biogas Production
- Renewable Natural Gas Distribution
- Natural Gas Consumption
- Policy Drivers and Barriers to Growth
- Proposals for Development
CEGÁS is the local concessionary for gas distribution in the State of Ceará, Brazil

SHAREHOLDERS

SELECTED INDICATORS – 2019

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Sales (US$ Million)*</td>
<td>176</td>
</tr>
<tr>
<td>Nº of Direct Employees</td>
<td>161</td>
</tr>
<tr>
<td>Nº of users</td>
<td>20,329</td>
</tr>
<tr>
<td>Ex-Thermal volume (m³/day)</td>
<td>549,829</td>
</tr>
<tr>
<td>Grid extension (km)</td>
<td>520</td>
</tr>
</tbody>
</table>

* Using average exchange rate 2019, US$ 1.00 = R$ 3.9451 (IPEADATA)

Source: CEGÁS
Cegas became, in 2018, the first gas company in Brazil to acquire and inject renewable natural gas in its grid.

CEGÁS and the Production of Biogas

Fortaleza Metropolitan Region Unit (CE) – Remarks

- **75,000 m³/day** of Renewable Natural Gas (RNG or biomethane)
- **Reduction** of emissions equivalent to 610,000 tons of CO₂ per year
- **Issuance of 90 thousand CBIOs** (Brazilian credits of carbon) expected for 2020

- **23 km** polyamide pipeline
- **US$ 6.9 million** investment* – CEGÁS
- **US$ 31.3 million** investment* – GNR Fortaleza
- **Integration** to the existing gas distribution grid

* Using average exchange rate 2017, US$ 1.00 = R$ 3.1920 (IPEADATA)

**Source:** CEGÁS; Ecometano; https://diariodonordeste.verdesmares.com.br/editorias/negocios/usina-do-ce-deve-captar-r-3-6-mi-em-credito-de-descarbonizacao-1.2192306
Currently, Cegás has one of the highest percentages of renewable natural gas distributed in the world.

### Distribution of Renewable Natural Gas (RNG)

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Till Apr 2018</th>
<th>Till Apr 2019</th>
<th>Till Apr 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vol. RNG (daily average) – m³/day</td>
<td>25,817</td>
<td>70,251</td>
<td>73,620</td>
</tr>
<tr>
<td>Total Volume Distributed (Ex-thermal) – m³/day</td>
<td>508,646</td>
<td>554,648</td>
<td>455,468</td>
</tr>
<tr>
<td>% RNG (Ex-thermal)</td>
<td>5%</td>
<td>13%</td>
<td>16%</td>
</tr>
<tr>
<td>Max. % RNG</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mensal Daily</td>
<td>9%</td>
<td>13%</td>
<td>28%</td>
</tr>
<tr>
<td>Daily</td>
<td>18%</td>
<td>21%</td>
<td>53%</td>
</tr>
<tr>
<td>Min. % RNG</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monthly Daily</td>
<td>2%</td>
<td>12%</td>
<td>13%</td>
</tr>
<tr>
<td>Daily</td>
<td>0%</td>
<td>0%</td>
<td>10%</td>
</tr>
<tr>
<td>Non-operational hours (%)</td>
<td>35%</td>
<td>7%</td>
<td>1%</td>
</tr>
<tr>
<td>Availability (% Contracted Daily Quantity)</td>
<td>48%</td>
<td>94%</td>
<td>98%</td>
</tr>
</tbody>
</table>

Source: CEGÁS
The renewable natural gas, mixed with conventional gas, reaches several segments of the market, adding value to the final consumers.

**Consumption of Natural Gas – 2019**

**VEHICULAR**
- 59 gas stations
- 223.1 thousand m³/day
- 54,145 light vehicles on NG

**COMMERCIAL**
- 459 users
- 9.2 thousand m³/day

**INDUSTRIAL**
- 124 plants
- 313.2 thousand m³/day

**RESIDENTIAL**
- 20,325 households
- 4.3 thousand m³/day

**Share of ex-thermal volume (%)**
- VEHICULAR: 40.5%
- COMMERCIAL: 1.7%
- INDUSTRIAL: 57.0%
- RESIDENTIAL: 0.8%

Source: CEGÁS
Despite recent events, some barriers still hamper the spread of production and use of biogas in Brazil

**Policy Drivers and Barriers**

<table>
<thead>
<tr>
<th>DRIVERS</th>
<th>BARRIERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>New national carbon credit law (Renovabio 2018)</td>
<td>Low dissemination and access to existing technological solutions</td>
</tr>
<tr>
<td>Offer of tax breaks by some state governments (e.g. Ceará)</td>
<td>High costs of imported technologies and limited local know-how</td>
</tr>
<tr>
<td>Offer of credit lines by government-owned banks</td>
<td>Low awareness of the biogas potential among producers, investors and users</td>
</tr>
<tr>
<td>Evolving regulatory environment (nation and state-wide)</td>
<td>Very strict norms of biomethane production for grid injection</td>
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<td></td>
<td>Inadequate collection and disposal of solid waste (mostly in open dumping grounds, 27% of cities in the country, 63% in Ceará*)</td>
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<td></td>
<td>Low coverage of sewage treatment (46% of volume in Brazil, 39% in Ceará**)</td>
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<td></td>
<td>Governance and scale of projects</td>
</tr>
<tr>
<td></td>
<td>Small fleet of heavy vehicles running on NG (some trucks, no busses)</td>
</tr>
</tbody>
</table>

** SNIS (2018)

Source: CEGÁS; ABIÓGÁS (2015); PROBIOGÁS (2016); SEBRAE RS (2018)
Some actions along the biogas chain are required to spur growth in Brazil

Proposals for the Development of the Sector in Brazil

- Incentive to R&D on biogas
- Development of local suppliers of equipment and specialized services
- Mapping of the biogas production potential and use
- Promotion of the market potential to investors
- Development of feasible governance options for new projects by source
- Reduction of bureaucracy in the licencing of production projects
- Acceleration of the registration of new equipment running on NG (for instance, heavy vehicles)
- Stimulus to the development of distributed power generation
- Continued expansion of the gas distribution grid

Source: CEGÁS; EPE (2017); Mariani (2018)
Thank you!

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