GBEP Webinar: Green jobs in biogas

Biogas for entrepreneurship and livelihood diversification in Latin America

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Transforming organic waste into energy and fertilizer...and green jobs

What is a biogas digester?

Waste management
No odors, pathogens control, minimize pollution

Biogas chamber
Bacterias and archaea + organic matter = biogas and fertilizer

Digestion chamber

Impacts:
Social
Economic
Environmental

Biogas = renewable energy
CH$_4$ 55-75%
CO$_2$ 25-35%
H$_2$S 1%
Reduce GHG emissions

Fertilizer
N-P-K and other minerals
Small scale biogas digester models used in Latin America

Concrete biogas digester models. Fixed dome (China) and floating dome (India) (Bruun et al., 2014).

Garfí et al. (2016). Household anaerobic digesters for biogas production in Latin America: A review

Flexible tubular small scale biogas digester used in Latin America
Biogas for entrepreneurship
Diffusion of biogas technology: opportunities for entrepreneurs?

**Diffusion of innovations model (Rogers, 1983)**

- **Knowledge**
  - Decision maker characteristics:
    - Socioeconomics
    - Personality
    - Communication behavior
  - Perceived characteristics of the innovation:
    - Relative advantage
    - Compatibility
    - Complexity
    - Proof capacity
    - Observability

- **Persuasion**
  - Communication channels

- **Decision**
  - Adoption
  - Rejection

- **Implementation**
  - Continue adoption
  - Late adopter
  - Abandon
  - Continue rejection

- **Confirmation**
  - Continue adoption

**Technical, socioeconomic and cultural**

**Previous conditions:**
- Previous practice
- Problem/necessity
- Innovation
- Social norms

Financial, socioeconomic and cultural

Institutional, NGO’s, private companies, entrepreneurs
biogas technology and green jobs

- Supply chain
- Financial access
- Manufacturing
- Installation
- Maintenance
- Training
- Marketing

- Supply chain
- Fertilizer savings
- Crop production
- Environmental benefits
- Gender equality
- Innovations

- Research and development
- Innovation
- Training
- Networking

- ¡Promote technological autonomy!
- Financial and technical support
- Stakeholders training
- Women participation

- Green credits
- Advice to Start-ups
- Local technology provider
- Professional services
- Knowledge economy

- Valorizing waste
- Improving crops yield and family income
- Minimize pollution

- Academia
- Public sector
- Private sector
- Start-ups

- Specialized services
- Career projection
- Knowledge economy

- Advice to Start-ups
- Projects proposals

- Farmers: Women role

- Public sector: Biogas as public policy

- Private sector: Biogas as public policy

- Advice to Start-ups
- Projects proposals

- Public sector: Biogas as public policy

- Academia
- Public sector
- Private sector
- Start-ups

- Specialized services
- Career projection
- Knowledge economy
Biogas for livelihood diversification in Latin America
Latin America and the Caribbean Biogas Network (RedBioLAC) promoting biogas technology

<table>
<thead>
<tr>
<th>Work groups</th>
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<tbody>
<tr>
<td>Small scale digesters</td>
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<tr>
<td>Large scale digesters</td>
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<td>Digestate</td>
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<tr>
<td>Urban organic waste</td>
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<td>Laboratory in anaerobic digestion</td>
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<td>Public policy</td>
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<td>Student exchange and internships</td>
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<td>Communication</td>
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<td>Redbiolac Journal</td>
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<td>Wikibiogas</td>
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![Map of Latin America and the Caribbean](image-url)
Biogas potential of the Mezcal industry in México...

- **Environmental pollution:**
  - 10-12 L vinasses/L mezcal are produced
  - High organic matter content waste
  - 90 millions liters of vinasses are produced per year (Robles-González et al. 2012)
  - 80% is discarded with no treatment not valorization into soil and water streams (Rodríguez & De La Cerna, 2017)
Digestate used as fertilizer

Digestate application to agave plantation in Tlacolula, Oaxaca, México.

Evaluation of digestate as fertilizer in agave plant nursery.
### Costs and savings for every 1000 L of fertigation of agave plantation when using raw waste and digestate

<table>
<thead>
<tr>
<th>Fertilizante</th>
<th>Total Cost (MXN $)</th>
<th>Savings (%)</th>
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</thead>
<tbody>
<tr>
<td>Steiner comercial</td>
<td>120.2</td>
<td>0</td>
</tr>
<tr>
<td>Vinaza</td>
<td>81.1</td>
<td>33</td>
</tr>
<tr>
<td>Digestato</td>
<td>24.3</td>
<td>80</td>
</tr>
</tbody>
</table>

**Legend:**
- **Total Cost**
- **Savings (%)**
Mezcal elaboration

Cultivo

Molienda o triturado

Fermentación

Destilación

- Biogas
- Fertilizer
- Reduce pollution
- Savings ($)

Cosecha

Cocción de la piña

Cocina

Sobrevenida

Torre de la iglesia
Thanks for your attention!

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