Externality, local values and competitiveness of
the French biomethane sector

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Several works in progress to identify, evaluate and promote all externalities and non-energy services in the methanisation sector

1. Map, describe and suggest a first assessment of non-energy services and positive externalities

2. Identify and evaluate competitiveness levers for biomethane production

- A first public paper to be downloaded on our website
- A study co-executed with ASTRADE and with the involvement of a large number of actors in the sector
- Continued work with stakeholders in the sector to suggest a framework for evaluating and monetizing all services provided
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The different biomethane production sectors

5 biogas production sectors

offering a full environmental service (reduction of the environmental footprint of organic waste) beyond energy production

- Biogas valorisation of water treatment plants
- Biogas valorisation of non-hazardous waste landfill site
- Industrial
- Collective and autonomous agricultural methanisation
- Local methanisation

The territorial and agricultural units offer a multitude of services and values for the territories and the current energy system
Map, describe and propose a first assessment of non-energy services and positive externalities

- Environmental services
- Agricultural and agro-ecological services
- Power generation etc...
- Other energy services for the territory: mobility, bio-GNL, etc.

Methanisation = Biomethane = €/MWh?

Evaluable? Quantifiable? Monetisable?
The cost of producing biomethane must be weighed up the additional benefits brought by the sector.

**Externalities related to “energy and wastes” issues**
- Reduction of greenhouse gas emissions
- Production of non-variable and storable energy
- Energy independence through local green gas production and improvement of the trade balance
- Valorisation of the existing gas network asset through the development of methanisation
- Participation to a dynamic energy transition and circular economy within the territories
- Way of treatment and valorisation of bio-waste of the food industry and local authorities

**Externalities related to "agricultural practices" issues**
- Decrease in the use of mineral fertilizers due to the use of digestate and/or the cultivation of intermediate crops for energy purposes (CIVE)
- Limitation of water pollution related to the use of digestate and/or the cultivation of CIVE
- Positive impact of CIVE crops on main crops
- Preservation of biodiversity in relation to the culture of CIVE
- Reduction of smells due to spreading manure and slurry in the field
- Development of an energy and ecological transition approach within the agricultural world

**Externalities related to “economic activities” issues**
- Creation of French added value expressed in terms of French share of income and jobs created
- Local job creation
- Diversification of income for the agricultural world (from investment in a methanisation project and/or from the cultivation of CIVE for a methanisation project)
Focus on the externalities related to "agricultural practices" issues

<table>
<thead>
<tr>
<th>Externalities</th>
<th>Type of beneficiaries</th>
<th>Beneficiaries</th>
<th>Valeur</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decrease in the use of mineral fertilizers</td>
<td>Economy: costs reduction</td>
<td>Farmers</td>
<td>AA, AT : 3,0 €/MWh</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>IT : 4,3 €/MWh</td>
</tr>
<tr>
<td>Limitation of water pollution</td>
<td>Environment: soils and waters quality</td>
<td>General interest</td>
<td>AA : 6,3 €/MWh</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>AT : 6,4 €/MWh</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>IT : 5 €/MWh</td>
</tr>
<tr>
<td>Positive impact of CIVE crops on main crops</td>
<td>Economy: income rise</td>
<td>Farmers</td>
<td>Evaluable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Quantifiable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Non-monetized</td>
</tr>
<tr>
<td>Preservation of biodiversity</td>
<td>Environment: biodiversity</td>
<td>General interest</td>
<td>Evaluable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Quantifiable</td>
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<td>Reduction of smells due to spreading manure and slurry in the field</td>
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<td>General interest</td>
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<tr>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Non-monetized</td>
</tr>
<tr>
<td>Development of an energy and ecological transition approach within the agricultural world</td>
<td>Environment: Climate</td>
<td>General interest</td>
<td>Evaluable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Non-quantifiable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Non-monetized</td>
</tr>
</tbody>
</table>
**Between 55 and 85 € of non-energy value for each MWh produced**

<table>
<thead>
<tr>
<th>Stakeholders</th>
<th>Externalities</th>
<th>Estimation of the benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>State</strong></td>
<td>GHG emissions avoided*</td>
<td>33 to 35 €/MWh</td>
</tr>
<tr>
<td><strong>Energy consumers (industrial, individual)</strong></td>
<td>Avoided pollution of slicks</td>
<td></td>
</tr>
<tr>
<td><strong>Biowaste producers (agro-industry, collectivities)</strong></td>
<td>Job creation</td>
<td></td>
</tr>
<tr>
<td><strong>Farmers</strong></td>
<td>Additional benefits not monetized:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- 30% import of natural gas (independence and trade balance)</td>
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<tr>
<td></td>
<td>- Energy transition dynamic within the territories and the agricultural world</td>
<td></td>
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<tr>
<td></td>
<td>- Job creation in rural areas</td>
<td></td>
</tr>
<tr>
<td><strong>Energy consumers (industrial, individual)</strong></td>
<td>Production of non-variable and storable energy (reduced network adaptation cost)</td>
<td>20 €/MWh</td>
</tr>
<tr>
<td><strong>Biowaste producers (agro-industry, collectivities)</strong></td>
<td>Valorisation of gas networks (limitation of the increase in distribution and transmission costs)</td>
<td></td>
</tr>
<tr>
<td><strong>Farmers</strong></td>
<td>Reduction of bio-waste treatment costs</td>
<td>0 to 24 €/MWh</td>
</tr>
<tr>
<td><strong>Decrease in the use of nitrogenous mineral fertilizers</strong></td>
<td>Additional benefits not monetized</td>
<td></td>
</tr>
<tr>
<td>- Decrease in the use of mineral inputs (phosphorus, potassium, etc.)</td>
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<tr>
<td>- Positive impact of CIVEs on the main culture</td>
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<tr>
<td>- Biodiversity conservation (pollinator)</td>
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<tr>
<td>- Diversification of revenue sources</td>
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<tr>
<td><strong>3 to 4 €/MWh</strong></td>
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</table>
Other values and services for agricultural methanisation

The BioGNL? Another energy service offered by agricultural biomethane

- An estimated potential between 4 and 5 TWh
- Contribution to the decarbonisation of transport uses in the territories
- Create local physical loops on bio-GNL mobility to complement bio-GNC uses
- Propose another way of valorisation of the agricultural sector

Externalities related to “energy and wastes” issues

Externalities related to "agricultural practices" issues

Externalities related to “economic activities” issues
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An increase in complexity is not equal to a reduction in CAPEX

Language elements:

$LCOE = \text{Levelized Cost Of Energy} = \text{Full cost including all costs (project development, capital cost, debt cost, etc.)}$
10 competitiveness levers were analysed in detail for their impact on the competitiveness of biomethane production.
The recognition of all methanisation services... & .... the massification (number) of project development...

40 – 80 €/MWh  
Non-energy services and positive externalities

67 - 82 €/MWh  
Competitiveness levers for biomethane production by 2030

... make the sector competitive by following a cost/benefit reasoning for the community
Questions / Answers

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Strategy consulting to accelerate clean, accessible and affordable energy

<table>
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<tr>
<th>City</th>
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<tbody>
<tr>
<td>Paris</td>
<td>89 rue Réaumur 75002 Paris, France</td>
</tr>
<tr>
<td>Hong-Kong</td>
<td>Suite D, 6th floor, Ho Lee commercial building 38-44 d'Aguilar Street, Central, Hong Kong</td>
</tr>
<tr>
<td>Melbourne</td>
<td>Level 12, 360 Elizabeth Street Melbourne VIC 3000, Australia</td>
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