SUSTAINABLE BIOMASS SUBSTRATES:
POTENTIALS AND PERSPECTIVES IN EUROPE

THE POTENTIAL OF ANIMAL MANURE, STRAW AND GRASS
FOR EUROPEAN BIOGAS PRODUCTION IN 2030

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EU28 - Primary Biogas Production

Eurostat, 2015.
Potential Pathways of the European Biogas Production towards 2030

- 14% annual increase
- 12% annual increase
- 10% annual increase
- Production in 2014

Resource base? Sustainability?
European biogas production in 2030?
What is the potential from straw, animal manure and unexploited grass?
Manure from cattle, pigs and poultry

Registrations of animals (Eurostat, 2015)

Forecasts for the agricultural production of meat, milk and dairy in Europe and Central Asia (Bruinsma, 2012).

Manure production (American Society of Agricultural Engineers, 2005)
## Unutilised grass from rotational and permanent grasslands

**Rotational grassland** *(Eurostat, 2015)*
Forecast based on expected increase in livestock production *(Bruinsma, 2012)*

<table>
<thead>
<tr>
<th>Scenario</th>
<th>t DM/ha</th>
<th>Share allocated for energy production</th>
</tr>
</thead>
<tbody>
<tr>
<td>High availability</td>
<td>14</td>
<td>20%</td>
</tr>
<tr>
<td>Moderate availability</td>
<td>12</td>
<td>10%</td>
</tr>
<tr>
<td>Low availability</td>
<td>10</td>
<td>5%</td>
</tr>
</tbody>
</table>

**Permanent grassland** *(Eurostat, 2015)*

<table>
<thead>
<tr>
<th>Scenario</th>
<th>t DM/ha</th>
<th>Share of unutilized grassland and meadow allocated for energy production</th>
<th>Share of utilized grassland and meadow allocated for energy production</th>
</tr>
</thead>
<tbody>
<tr>
<td>High availability</td>
<td>4</td>
<td>100%</td>
<td>50%</td>
</tr>
<tr>
<td>Moderate availability</td>
<td>3</td>
<td>100%</td>
<td>30%</td>
</tr>
<tr>
<td>Low availability</td>
<td>2</td>
<td>100%</td>
<td>20%</td>
</tr>
</tbody>
</table>
Straw from cereal production

Cereal production (Eurostat 2015)
Straw-Grain ratios matter (Höhn et al., 2014; Weiser et al., 2014; Edwards et al., 2006)
Forecasts for the agricultural production of cereal in Europe and Central Asia (Bruinsma, 2012).

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Grain – straw ratio</th>
<th>Share utilized for other purposes</th>
</tr>
</thead>
<tbody>
<tr>
<td>High availability</td>
<td>0.62</td>
<td>10%</td>
</tr>
<tr>
<td>Moderate availability</td>
<td>0.52</td>
<td>20%</td>
</tr>
<tr>
<td>Low availability</td>
<td>0.42</td>
<td>30%</td>
</tr>
</tbody>
</table>
Potential Pathways of the European Biogas Production towards 2030

- 14% annual increase
- 12% annual increase
- 10% annual increase
- Production in 2014
- High availability
- Moderate availability
- Low availability
The potential contribution to EU28

39-68 Mtoe from manure, straw and excess grass

8.4-14.3% of the total supply of renewables targeted for 2030

Adding the current production (2014 level):

11.3-17.2% of the total supply of renewables targeted for 2030

≈9-16% of the current total consumption of natural gas.
Conclusions

The investigated residuals represents a significant potential for the future European biogas production, but utilization requires:

• Changing the management practices
  • Supply chains
  • Partnerships

• Technologies enhancing the CH$_4$ yields
  • Pretreatment of lignocellulose

• Stable framework conditions
  • Subsidies
Large Scale Bioenergy Lab 2
2016-2019

Innovation
Thank you for your attention

References


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