International outlook with short reports from India, Italy, South Africa, Cuba, Brazil

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Talk outline

✓ EU and Italian scenario: New momentum for the circular bioeconomy, Push towards green finance, Environmentally Harmful Subsidies

✓ Social and policy context: non-technological barriers

✓ Case study: a focus on RES-T

✓ Policy implications
Talk outline

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EU and Italian scenario

European bioeconomy turnover in millions of euros - per country and per production sector
EU and Italian scenario

1. Bioeconomy in Italy in 2017
   - Food and beverages: 328,036 million euro
   - Agribusiness: 9,642 million euro
   - Bio-based industries: 12,120 million euro
   - Bio-based textiles: 12,482 million euro
   - Bio-based pharmaceutical: 12,444 million euro
   - Bio-based materials: 22,779 million euro
   - Total turnover: 52,781 million euro
   - Employment: 2,013 people

2. Biorefinery: industrial plants and flagships

3. Biobased R&D centres, pilot plants, demo plants, and experimental fields

Source: European Commission, "Bioeconomy in Southern Europe", March 2018
Changes on the production side
- Production of biobased products
- Cascading use
- Utilisation of organic waste streams
- Resource-efficient value chains

Changes on the consumption side
- Responsible consumption models
- Sharing practices
- Post consumerism

EU and Italian scenario

Transition towards a circular bioeconomy

From a linear to a circular bioeconomy

Linear economy
Natural resources

Circular economy
Natural resources

Use

Renewable resource
Non-renewable resources

Landfill and incinerate

Changes on the consumption side

Changes on the production side

New momentum for the circular economy
EU and Italian scenario

Policy sources of pressure (some examples):

✓ Push towards green finance
✓ Environmentally Harmful Subsidies
EU and Italian scenario: new momentum for the circular bioeconomy, push towards green finance, Environmentally Harmful Subsidies

Social and policy context: non-technological barriers

Case study: a focus on RES-T

Policy implications
Social and policy context: non-technological barriers

Factors that limit social acceptance:

• Food vs. Energy crops debate
• Direct and indirect land use change
• Biodiversity
• End-of-waste legislation
Factors that most worry the local population:

- Bad smell coming from the plants or from poorly managed fertilizers
- Possible consequences to human health
- Heavier traffic in the areas where the plants in question are present
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Case study: a focus on RES-T

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RES-T trajectories and an integrated SWOT-AHP analysis for biomethane. Policy implications to support a green revolution in European transport

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Case study: a focus on RES-T

Fig. 3. RES share in 2016 (Eurostat, 2016).

Fig. 1. Top five countries in terms of biogas-biomethane production in 2016 (European Biogas Association, 2017).
Case study: a focus on RES-T

RES-diagram allows distributing MS in four quadrants:

- **I** Quadrant includes MSs that had reached both 2020 targets.
- **II** Quadrant includes MSs that had achieved only the 2020 RES target.
- **III** Quadrant includes MSs that had reached only the 2020 RES-T target.
- **IV** Quadrant includes MSs that had not met either 2020 target.
Case study: methodology

Analytic Hierarchy Process

We produced a list of priorities through pairwise comparisons, based on expert judgements.

We conducted a survey among 20 experts from 18 MSs through Skype video calls, over the period September - December 2018.

Each interview took, on average, 1 h.

Experts were recruited from the European Biogas Association (EBA)
Case study: methodology

Selection of SWOT factors.

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1 Number of actors involved</td>
<td>Ammenberg et al. (2016)</td>
</tr>
<tr>
<td>S2 Utilisation of available resources</td>
<td>Brudermann et al. (2015)</td>
</tr>
<tr>
<td>S3 Technical requirements well-known</td>
<td>Clancy et al. (2018)</td>
</tr>
<tr>
<td>S4 Recovery/selling of additional products</td>
<td>Hao et al. (2018)</td>
</tr>
<tr>
<td>S5 Additional source of income</td>
<td>Brudermann et al. (2015)</td>
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<tr>
<th>Weaknesses</th>
<th>Source</th>
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<tbody>
<tr>
<td>W1 Quality of technical parameters</td>
<td>Brudermann et al. (2015)</td>
</tr>
<tr>
<td>W2 Low financial strength of small plants</td>
<td>Brudermann et al. (2015)</td>
</tr>
<tr>
<td>W3 Lack of awareness</td>
<td>Herbes et al. (2018)</td>
</tr>
<tr>
<td>W4 Uncertainty of subsidies</td>
<td>Chan Gutiérrez et al. (2018)</td>
</tr>
<tr>
<td>W5 Inadequate raw material</td>
<td>Ardolino et al. (2018)</td>
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<tr>
<th>Opportunities</th>
<th>Source</th>
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<tbody>
<tr>
<td>O1 Can be blended with natural gas</td>
<td>Scarlat et al. (2018b)</td>
</tr>
<tr>
<td>O2 Reduced dependency on energy imports</td>
<td>Brudermann et al. (2015)</td>
</tr>
<tr>
<td>O3 Targets/constraints to reach</td>
<td>Veum and Bauknecht (2019)</td>
</tr>
<tr>
<td>O4 Climate change</td>
<td>Brudermann et al. (2015)</td>
</tr>
<tr>
<td>O5 Multi-functionality of biomethane</td>
<td>Brudermann et al. (2015)</td>
</tr>
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<tr>
<th>Threats</th>
<th>Source</th>
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<tr>
<td>T1 Potential dilemma with other RES</td>
<td>Daniel-Grunke et al. (2018)</td>
</tr>
<tr>
<td>T2 Low social acceptance</td>
<td>Brudermann et al. (2015)</td>
</tr>
<tr>
<td>T3 Schemes time-limited</td>
<td>Horschig et al. (2019)</td>
</tr>
<tr>
<td>T4 Food vs. fuel dilemma</td>
<td>Brudermann et al. (2015)</td>
</tr>
<tr>
<td>T5 Feed-in-tariff depends on policy</td>
<td>Brudermann et al. (2015)</td>
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Case study: results

Six interviewees from “green” countries in the transport sector (e.g. Sweden, Austria, Finland and France) assigned approximately half of the relevance (48.7%) to opportunities. In addition, they gave opportunities and strengths a combined value of 80%.

Fourteen interviewees from “not green” countries in the transport sector assigned the highest weight (45.5%) to threats. They gave threats and weaknesses a combined value of 78%.

Fig. 8. Group priority.
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The value of subsidies should be calculated considering two main variables:

i) Biomethane production cost
ii) Market price of natural gas

The duration of the subsidies should be associated with the lifetime of a plant, and should be carefully defined to reduce the probability of distortions.
Policy implications 2 - Satisfying sustainability criteria

• Food vs. fuel and the associated (direct and indirect) land use change issues were perceived as extremely relevant and should thus be taken into consideration in any new incentive scheme.

• Need to focus on local development through the promotion of a short supply chain based on the development of (many new) small plants.
Thank You