Animal Waste based Biogas Potential in Turkey

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Outline

I. Turkish-German Biogas Project
II. Biogas and agriculture
III. Market opportunities in Turkey
IV. Status quo of biogas plants
I. Turkish-German Biogas Project

a. Brief information

- International Climate Initiative (IKI) financed project

- 2010-2014

- Project partners:
  - TR Ministry of Environment and Urbanisation
  - Ministries of Agriculture, Energy, Industry
I. Turkish-German Biogas Project

b. Project goals

Overall goal: reduction of greenhouse gas emissions from agricultural residues (esp. Methane, Nitrous Oxides)

→ Climate friendly production of renewable energies
→ Supporting a modern and sustainable agriculture
  - Environmentally friendly storage and field application of manures and digestates
  - Improving the nutrient cycle through organic fertilizing
  - Improvement of soil quality
  - Supporting sustainable crop rotations
  - Strengthening biodiversity
  - Preventing erosion
I. Turkish-German Biogas Project

c. Project components

1) Pilot biogas plant: support of a biogas investment
   - Substrates (manure) logistics and fertilizer application
   - Technical assistance for biogas process optimization

2) Framework for biogas
   - Focusing on animal waste and fertilizer legislation
   - Supporting a national biogas strategy

3) Capacity development
   - National level: public administration, investors, finance
   - Local level: practical trainings at the pilot site
II. Biogas and agriculture  
a. Structural change in Turkish agriculture

- Micro and small enterprises still prevailing (average size: 6.1 ha), small parcels due to heritage customs
- Agriculture: 26.4% of total employment
- Around 3 million holdings (Germany: 370,500)
- Since 2010 government provides investment credits for farms of more than 50 cattle (zero interests rate, lent term 8 years) and opened many countries for livestock imports
  - Investments of large scale milk farms and feed lots
  - Enormous request of cattle from EU and overseas
II. Biogas and agriculture

b. Potential investors

- Trends to large scale milk farms and feed lots
  - Open to new manure management systems and potential biogas investors
- Modern and highly industrialized poultry sector sensitive to waste management obligations

→ Potential for biogas investments especially in modern and big scale farms in cooperation with food industry
### III. Biogas market opportunities

#### a. Technical biogas potential: summary of sectors

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<thead>
<tr>
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<tbody>
<tr>
<td>Agriculture - livestock</td>
<td>Cattle Manure</td>
<td>107.8</td>
<td>42.1</td>
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<tr>
<td></td>
<td>Poultry Manure</td>
<td>36.6</td>
<td>36.2</td>
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<tr>
<td>Agricultural Residues</td>
<td>Straw of Cereals</td>
<td>276.7</td>
<td>27.7</td>
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<td></td>
<td>Sugar beet leaf</td>
<td>17.5</td>
<td>4.4</td>
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<td></td>
<td>Tomato Waste</td>
<td>11.1</td>
<td>4.1</td>
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<td>Energy crops</td>
<td>Energy Crops on fallow land</td>
<td>325.1</td>
<td>81.3</td>
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<tr>
<td>Agro-Industrial Residues</td>
<td>Meat production residues</td>
<td>0.5</td>
<td>0.2</td>
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<tr>
<td></td>
<td>Cheese - waste water</td>
<td>2.7</td>
<td>2.4</td>
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<td></td>
<td>Sugar beet press cake</td>
<td>5.0</td>
<td>4.5</td>
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<tr>
<td></td>
<td>Molasses (sugar production)</td>
<td>3.3</td>
<td>2.9</td>
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<tr>
<td></td>
<td>Olive press cake</td>
<td>1.3</td>
<td>1.2</td>
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<tr>
<td></td>
<td>Olive mill waste water</td>
<td>1.3</td>
<td>1.2</td>
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<tr>
<td></td>
<td>Juice residues (Pomace)</td>
<td>1.8</td>
<td>1.6</td>
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<tr>
<td></td>
<td>Draff (Bioethanol-production)</td>
<td>0.9</td>
<td>0.8</td>
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<tr>
<td>Municipal Waste</td>
<td>Municipal Waste</td>
<td>22.0</td>
<td>11.0</td>
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<tr>
<td><strong>Total (with energy crops)</strong></td>
<td></td>
<td><strong>813.4</strong></td>
<td><strong>221.5</strong></td>
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<tr>
<td><strong>Total (without energy crops)</strong></td>
<td></td>
<td><strong>488.3</strong></td>
<td><strong>140.3</strong></td>
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<tr>
<td><strong>Total (without energy crops and straw)</strong></td>
<td></td>
<td><strong>211.6</strong></td>
<td><strong>112.6</strong></td>
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</tbody>
</table>
III. Biogas market opportunities

b. Cattle and poultry manure

Almost every province with > 50,000 animals units is located in the western part of Turkey

→ Huge energetic potential of animal residues currently unused
III. Biogas market opportunities

c. Residues from agro-industries: 2 examples

- **Meat production** concentrated in the western part
  - Residues from slaughterhouses

- **Sugar beet production** and sugar factories in the central part
  - Sugar beet presscake, molasse
III. Biogas market opportunities
d. Possible share of biogas in Turkey’s energy production

Technical biogas potential based von animal and bio waste:
- 112.6 PJ/year = 31.3 TWh/year
- Technical potential can cover 6% of current electricity production

→ 4.800 biogas plants (installed capacity per plant~ 350 kW_{el})

BUT: Straw and energy crops are not in the focus due to high commodity prices
IV. Status quo of biogas plants

Biogas facilities in figures

Capacity in operation [MW]

- Agriculture (animal waste, crops) 96.979
- Food Industry (wastewater, organic waste) 13.676
- Municipality (landfill gas, wastewater) 0.83

Plants in operation

- Agriculture (animal waste, crops) 17
- Food Industry (wastewater, organic waste) 17
- Municipality (landfill gas, wastewater) 3

Data base 12/2011

- Biogas from agriculture at its start…
  - 3 plants installed; many more in planning stage
Thank you for your attention!

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