

IEA Bioenergy Task 37

# Anaerobic Digestion Report

***Turkey's Situation in Biogas***

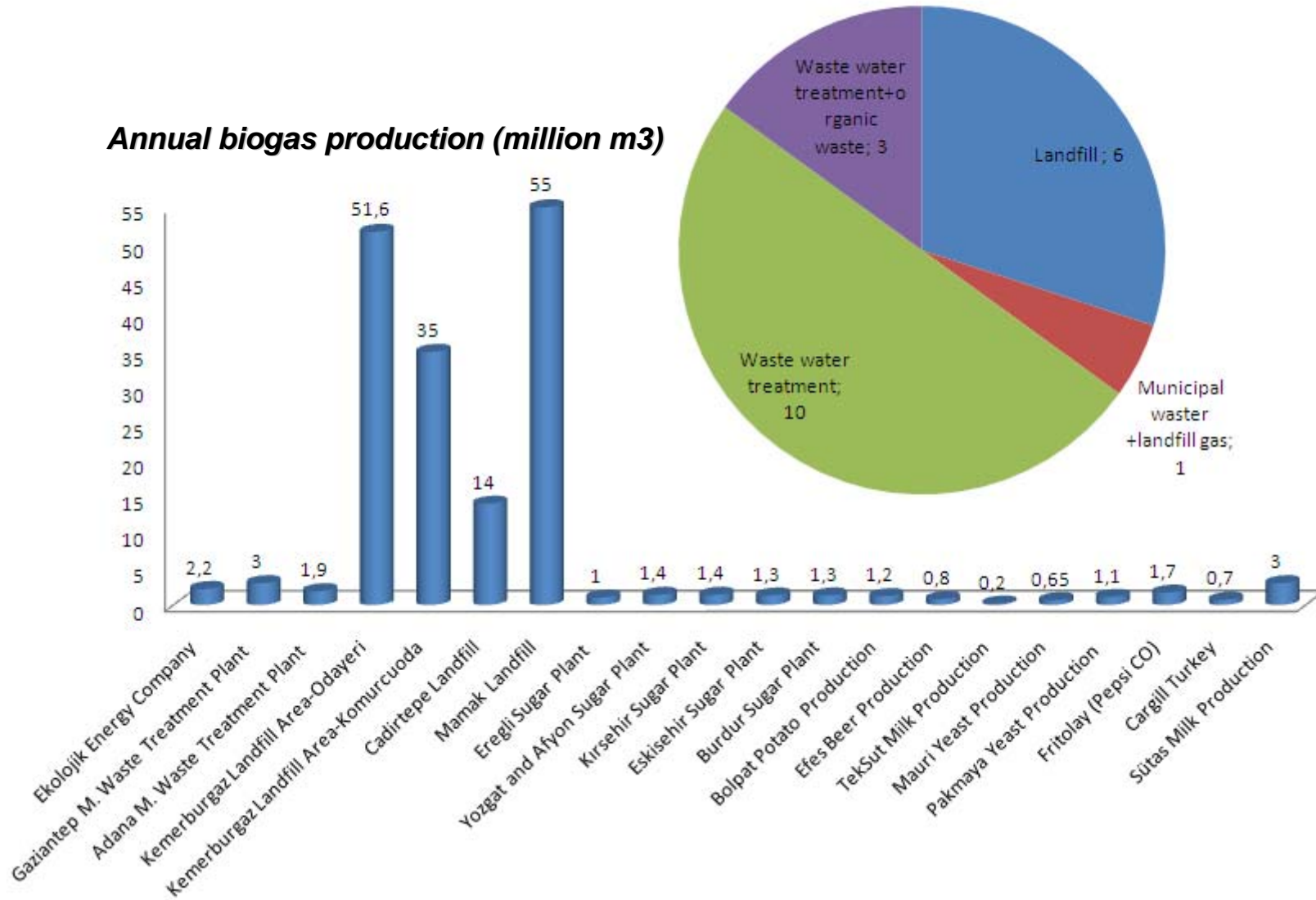
# Biogas Plant Inventory

## Summary of AD Plants:

- Agriculture: None in Turkey
- Industrial: 13 plants
- Sewage sludge: None in Turkey
- Municipal (biowaste): 1 plant
- Landfill: 6 plants

# Biogas Plant Inventory

**Annual biogas production (million m3)**



# Biogas Plant Inventory

Summary of Up-grading Plants:

Unfortunately, there is no biogas upgrading plant in Turkey. The produced biogas is only separated from condensate and hydrogen sulphide to be utilised in gas engines.

# Biogas Plant Inventory

Trends in numbers of AD Plants:

Continuously running 20 plants and there are almost five more at the construction phase.

Turkey has 2.000 plant potential only with animal manure.

It is obvious that market players are waiting for the new legislation.

# Biogas Plant Inventory

## Summary of Gas Production Data:

- Raw biogas production  
180 million m<sup>3</sup> annually
- Electricity production  
60 MW installed capacity annually
- Amount of heat recovered  
60 MW installed capacity annually

# Biogas Plant Inventory

Performance Data:

- electrical efficiency

The electricity efficiency ratio is between %30-38

- total energy efficiency

Overall efficiency 80-85%

- emissions

Not in the agenda yet

# Biogas Plant Inventory

Economic Data:

- Investment costs
  - AD plant

Landfill plants cost are around €33 million/17 off 1.4 MW plant

Waste water treatment+organic waste plant investment cost  
€2,7 million 600 kW engine and operating cost €40.000 annually.



# Biogas Plant Inventory

Economic Support Data:

- Potential Feed-in tariff in Turkey (in progress)

Scale of RES Feed-in tariff		
RES Plant type	First 10 years in operation	Second 10 years in operation
	(Euro cent/kWh)	(Euro cent/kWh)
a. Hydroelectric power plant	7	-
b. On land wind turbine plant	8	-
c. Offshore wind power plant	12	
d. Geothermal power plant	9	-
e. Photovoltaic solar panel plant	25	20
f. Solar power plant	20	18
<b>g. Plant running on biomass (including landfill gas)</b>	<b>14</b>	<b>8</b>
h. Tide and wave energy power plant	16	

# Biogas Plant Inventory

National Strategy/Support for Exploitation of Biogas:

- e.g. renewable energy programmes – specific support for biogas

The new potential RES legislation also includes biogas production

# Biogas Plant Inventory

Challenges:

- AD plant permitting

There is no direct permission for plant

- Environmental licenses

Not really big issue as the market still under development phase

- Grid connections (electricity, heat, gas pipeline)

Some applications exist but still not clear

- Digestate utilisation

No legislation on digestate characteristics and utilisation

# Biogas Plant Inventory

## Research Activities:

- Main national and international projects
- Ongoing national biogas plant project capacity of 350 kWel.
- Ege University will establish 1-5 m<sup>3</sup> 60 plants around Izmir.
- Akdeniz University has also its own laboratory 5 m<sup>3</sup> plant.
- Suleyman Demirel has started lab. scale trials as well.
- Some other universities also study on lab. scale