

IEA Bioenergy Task 37

# Anaerobic Digestion Report

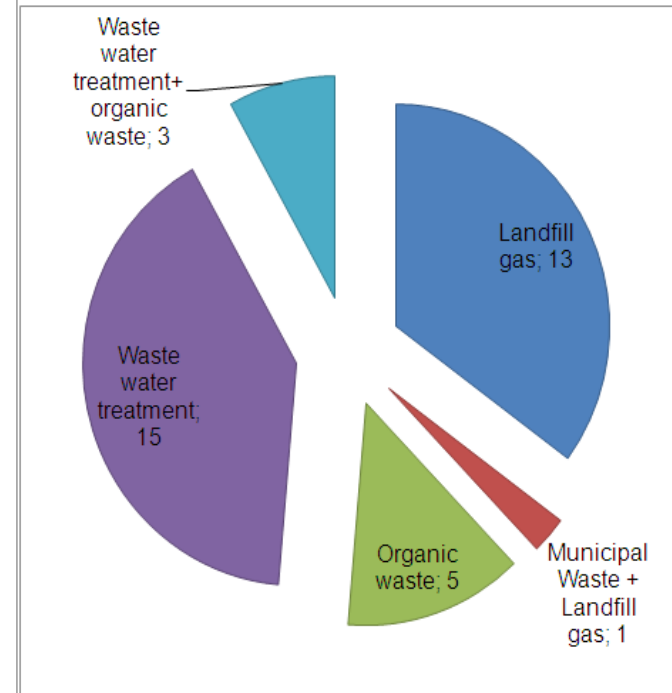
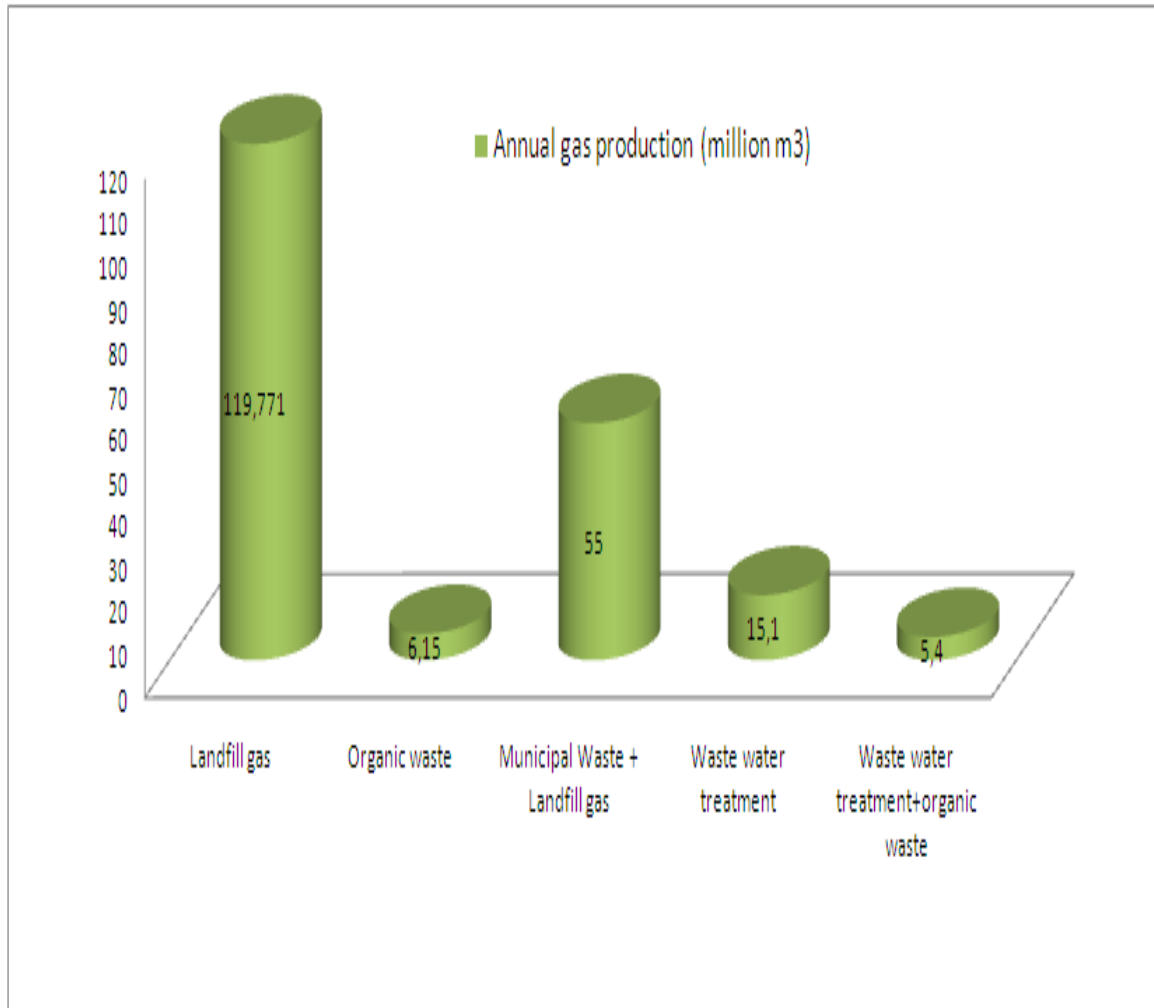
***Turkey's Situation in Biogas***

# Biogas Plant Inventory

Summary of AD Plants: 37 plants

- Agriculture: None in Turkey
- Industrial: 23 plants
- Sewage sludge: None in Turkey
- Municipal (biowaste): 1 plant
- Landfill: 13 plants

# Biogas Plant Inventory



# Biogas Plant Inventory

Summary of Up-grading Plants:

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 37 plants (ten at the construction phase)

Turkey has 2.000 plant potential only with animal manure.

# Biogas Plant Inventory

## Summary of Gas Production Data:

- Raw biogas production  
201 million m<sup>3</sup> annually
- Electricity production  
91 MW installed capacity annually
- Amount of heat recovered  
91 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 (2 MW plant for € 3 mil.)

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



# Biogas Feed-in-tariff Legislation

Economic Support Data:

- Potential Feed-in tariff in Turkey

**Renewable Energy Law (Nr. 5346)** (announced in Dec. 2010)

<b>Scale of RES Feed-in tariff Guaranteed Purchase Prices</b>	
<b>RES Plant type</b>	<b>For a decade (\$ cent/kWh)</b>
<b>Hydroelectric</b>	<b>7.3</b>
<b>Wind</b>	<b>7.3</b>
<b>Geothermal</b>	<b>10.5</b>
<b>Solar</b>	<b>13.3</b>
<b>Plant running on biomass (including landfill gas)</b>	<b>13.3</b>

In case of using locally made mechanic and electro-mechanic components, an additional \$0.4-2.4 cent for 5 years will be added to the guaranteed price.

# 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

According to the law: Tariffs are applied for plants established between 18th May 2005 & 31st December 2015.

From 31st December 2015 on, the prices will be revised (not exceeding figures)

# Biogas Plant Inventory

Challenges:

- **AD plant permitting**

Licensing steps including ([www.epdk.org.tr](http://www.epdk.org.tr))

Application, examination and Evaluation, Approval, Granted a license  
(150-180 days)

- **Environmental licenses**

Environmental impact assessment is required

- **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.
- Some additive nutrients are being tried