



# IEA Bioenergy Task 37

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## The French Report

*French Environment and Energy Management Agency*

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# Biogas Plant Inventory

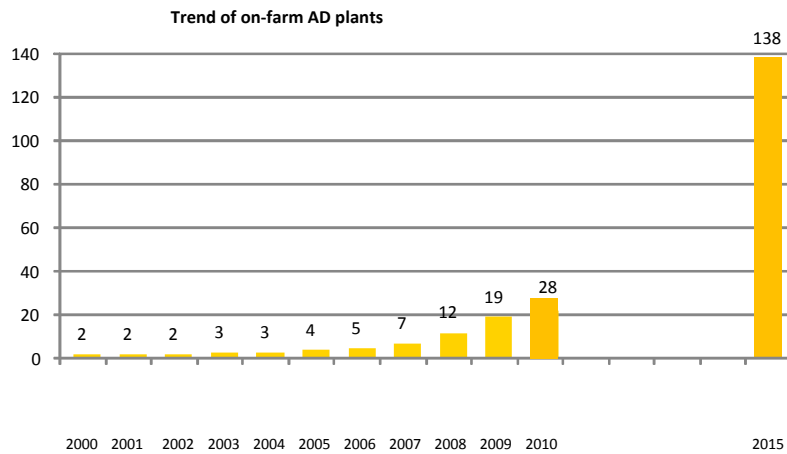
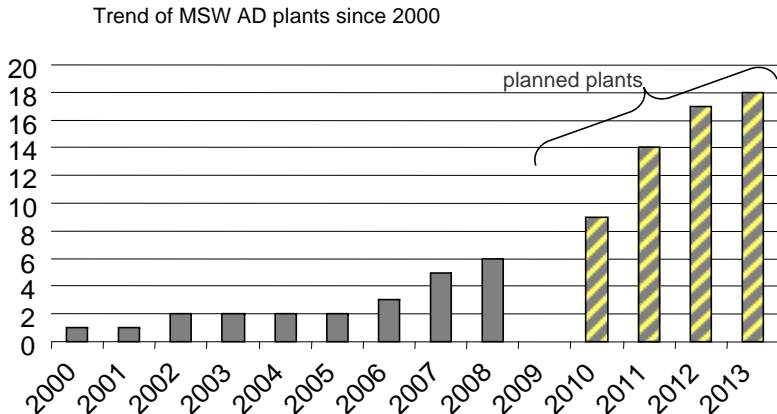
## AD plants in operation (E&Young study for ADEME, 2010) :

- On-farm : arr. 20
- Centralised : 2
- Industrial : 88
- Sewage sludge : 74
- Municipal : 6 (3 biowaste & 3 grey waste)
- Landfill : 301 inc. 65 with energy valorisation

## Up-grading plants in operation :

- 1 landfill : 200 m<sup>3</sup>/h (R&D - PSA and membranes)
- 1 biowaste (Lille) : 1.200 m<sup>3</sup>/h (water scrubber)
- 1 municipal sludge (Lille-Marquette) : 100 m<sup>3</sup>/h (water scrubber)

## Trends of AD plants (E&Young study for ADEME, 2010) :



Trends in numbers of others AD plants in 2020 :  
 -+ 60 industrial (88 to 150)  
 -+ 60 municipal sludge (74 to 134)

Trends in numbers of up-grading plants : arr. 20  
 (landfill & on-farm)

### Gas production 2008 (French Ministry for Environment and Energy, 2009) :

- Raw biogas production : 3.300 GWh
- Energy production : 1.290 GWh
- Electricity production : 660 GWh inc. 77 GWh CHP
- Amount of heat recovered : 630 GWh inc. 70 GWh CHP
- Up-graded to biomethane
  - amount injected to natural gas pipeline : 0
  - amount used as vehicle fuel : arr. 0

**Performance data** (French Ministry for Environment and Energy, 2009) :

- electrical efficiency : 15,0 %
- total energy efficiency : 39,1 %
- emissions : nd

## Economic Data (if available) :

- *Investment costs*
- AD plant
  - on-farm AD : 5.000 to 8.500 €/kWe dep. of P
  - biowaste AD : 80 €/treated ton
- *Up-grading*
- *Operating Costs*

## Economic Support Data :

- Feed-in tariffs (act. 2010)

feed-in tariff (in c€/kWh)	$P \leq 150 \text{ kW}$	$150 \text{ kW} < P \leq 2 \text{ MW}$	$P > 2 \text{ MW}$
	9,451	Linear interpolation	7,875
AD bonus	2,100	2,100	2,100
Energy efficiency (V)	$V \leq 40 \%$	$40 < V < 75 \%$	$V \geq 75 \%$
EE bonus	0	Linear interpolation	3,150
<b>Min.</b>	11,551	Linear interpolation	9,975
<b>Max.</b>	14,701	Linear interpolation	13,125

$V = (\text{total heat and electricity sell or consumed by process}) / \text{raw energy from biogas} * 0.97$

- Investment grants

- Environment agency : until 30 % of the investment limited to 10 M€, namely 3 M€
- Agricultural ministry : until 375 k€/project on-farm AD
- European funds

### National Strategy/Support for Exploitation of Biogas :

- **Renewable Heat Fund** managed by ADEME to promote the use of heat, biogas transport and grid injection

#### 5 projects in 2009 :

- 3 large AD (organic waste and sludge)
- 1 transport of raw biogas from landfill to a furnace
- 1 landfill biogas valorisation (in operation)

- **Waste fund** managed by ADEME to promote new technologies, and the use of digestate

#### 3 projects in 2009 :

AD animal by-products and organic waste

- **national WG** on up-grading and grid injection : definition of technical specifications to inject biomethane into the grid and feed-in tariff

## Challenges :

- *AD plant permitting*
- *Environmental licenses*
- *Grid connections (electricity, heat, gas pipeline)*
- *Digestate utilisation*

## Research Activities :

- Biogasmax with Lille City
- Up-grading by PSA and membranes : test for low and high capacities (landfill, on-farm), different kinds of membranes
- Technologies to remove siloxanes from landfill gas