France Task 37 Country report

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<table>
<thead>
<tr>
<th>Plant type</th>
<th>Number of plants</th>
<th>Electricity production (GWh/year)</th>
<th>Heat production incl. injection (GWh/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sewage sludge</td>
<td>88</td>
<td>41</td>
<td>416</td>
</tr>
<tr>
<td>Biowaste from MSW</td>
<td>16</td>
<td>67</td>
<td>22</td>
</tr>
<tr>
<td>Industrial</td>
<td>80</td>
<td>7</td>
<td>350</td>
</tr>
<tr>
<td>On-farm and centralized plants</td>
<td>319</td>
<td>712</td>
<td>607</td>
</tr>
<tr>
<td>Landfills with biogas recovery</td>
<td>113</td>
<td>953</td>
<td>294</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>616</strong></td>
<td><strong>1780</strong></td>
<td><strong>1689</strong></td>
</tr>
</tbody>
</table>
Biogaz upgrading status

- Upgrading plants
  - 2 ww sludge
  - 3 municipal waste (biowaste or separated waste)
  - 21 agricultural and/or agrofood waste
Key figures (2016)

- 215 GWh renewable production, +162% in 2016
- 0.05% of natural gas consumption, +146% in 2016
- 410 GWh/an maximum capacity, +47% en 2016
- 26 biomethane injection sites, +53% en 2016

- 160 = 1 MWh of injected biomethane
- 18 suppliers registered on the GO register
- 24 sites registered out of 26 which injected as of 31/12/2016
- 80% of the GOs used as Bio-NGV since the creation of the register

Source: Overview of renewable gas in 2016 (English version in press)
FIRST AMBITIOUS OBJECTIVES FOR BIOMETHANE

The Decree governing the Multiannual Energy Programme (PPE) under the Energy Transition Law (Article 176) was published on 27 October 2016. Objectives are based on two roadmaps – the first of which lasts three years (2016-2018) and the second, five years (2019-2023). This is the first regulatory text providing the biomethane sector with developmental objectives. The developmental objectives for biomethane injection into the gas network in terms of overall production are: 1.7 TWh in 2018 and 8 TWh in 2023. Despite this, the current rate of projects is not meeting the government’s target of 8 TWh of biomethane injected in 2023, set by the EPP.
Biogas upgrading News

**Wagabox / Waga Energy (in operation Feb. 2017)**
- Breakthrough technology: membrane + cryogenic distillation
- Landfill gas epuration to biomethane
- 25 GWh for 500-800 Nm3/h biogas
- Injection into the distribution grid (150 Nm3/h)

[www.waga-energy.com](http://www.waga-energy.com)

**BioGNVal / Cryopur (in operation 2017)**
- Biogas from WWTP
- 3 cryogenic steps (“cascade”)
- Production of bio-LNG and bio-L-CO2

**Biomet / AROL Energy (in operation 2017)**
- Centralized AD (agriculture/biowaste 40,000 T/y)
- Amine cleaning
- Injection into the distribution grid (110 Nm3/h)
- Financed by Danone Group
On-farm and centralized AD plant development forecast by 2020

Number of built units and MWe installed, ADEME Jan. 17

2015: 80 new plants / y → not sufficient to reach the aims
Financial Support Systems for Biogas

Feed-in tariffs
- paid by the consumer of electricity/gas
  - Electricity (2016): 15 to 22.5 c€/kWhe (on 20 years)
  - Biomethane (2011): 4.5 to 13 c€/kWh HHV (on 15 years)

Investment grants: 25% subsidies by
- ADEME (15%)
- Regional councils and EU funds (10%)
Performance and Economic Data

Investment costs AD plant with CHP economics data from 80 plants for investment (2016),

- On-farm: 7,500€/kWe
- Centralized: 7,200 €/kWe
- Small scale: 11,000€/kWe

Investment costs for AD plant with upgrading

Average figures

- Around 40,000 €/Nm3/h
Biogas/biomethane seen by ADEME

Position paper (2016)
- AD incl. injection
- transmitted to TF37
- For AD profession and decision makers

R&D Roadmap (2016)
- built with a team of experts (univ., technical centres, public research, private groups, etc.)
- basis of a shared R&D program
- target → 2050:
  - which type of development for AD?
  - main R&D subjects to investigate?