International Energy Agency
Bioenergy Task 37
UK Country Report
April 2011
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Task 37 (UK)
Anaerobic Digestion

- Rapidly expanding sector
- Renewable energy as well as waste diversion
- Renewable fertiliser with good nutrient characteristics
AD Situation in 2011

Commercial AD facilities as of January 2011

Green = Operational
Yellow = In commissioning
Red = In build
## Situazione in 2011

### AD facilities in UK

<table>
<thead>
<tr>
<th>Type of facility</th>
<th>Status</th>
<th>Number of plants</th>
<th>Capacity (tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial, associated with food / drink manufacturer</td>
<td>Operational</td>
<td>7</td>
<td>382,000</td>
</tr>
<tr>
<td></td>
<td>In-build or commissioning</td>
<td>5</td>
<td>2,596,500</td>
</tr>
<tr>
<td>Commercial, not associated with food / drink manufacturer</td>
<td>Operational</td>
<td>20</td>
<td>527,200</td>
</tr>
<tr>
<td></td>
<td>In-build or commissioning</td>
<td>22</td>
<td>1,049,500</td>
</tr>
<tr>
<td>On-farm</td>
<td>Operational</td>
<td>21</td>
<td>107,481</td>
</tr>
<tr>
<td></td>
<td>In-build or commissioning</td>
<td>9</td>
<td>124,000</td>
</tr>
</tbody>
</table>

Source: WRAP
Biogas upgrading Plants

- **2008** Gasrec 500 t/pa from landfill gas for vehicle fuel – pilot schemes with local authorities and surplus exported to Norway

- **2009** Adnam’s Brewery (Suffolk) biogas produced from brewery waste and restaurant food - approx. 100 m$^3$/hr for grid injection and electricity production

- **2010** (under development) Government Demonstration Project with United Utilities and National Grid, Davyhulme (Manchester 250 m$^3$/hr) for vehicle fuel and grid injection.

- **2010** British Gas and Centrica confirmed plans for 5 plants - first of which is Didcot - to upgrade sewage gas for grid injection

- **October 2010** Didcot STW - a joint venture between Thames Water, British Gas and Scotia Gas Networks supplies first bio-methane to the UK gas grid.
Energy Technology Transfer Programme

United Utilities / National Grid
Sewage gas injected direct to grid and used for vehicle fuel
Water authority & school project: 2-litre Volkswagen retrofit running on upgraded biomethane from sewage gas – the Bio-Bug
Energy produced under ROCs (including those transferred from the Non Fossil Fuel Obligation)

7.5 Electricity generated from renewable sources
   - Renewables Obligation basis

<table>
<thead>
<tr>
<th></th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landfill gas</td>
<td>4,290</td>
<td>4,424</td>
<td>4,677</td>
<td>4,757</td>
<td>4,952</td>
</tr>
<tr>
<td>Sewage sludge digestion</td>
<td>466r</td>
<td>447r</td>
<td>502r</td>
<td>547r</td>
<td>638</td>
</tr>
<tr>
<td>Animal Biomass</td>
<td>468</td>
<td>434</td>
<td>555</td>
<td>587</td>
<td>620</td>
</tr>
<tr>
<td>Plant Biomass</td>
<td>382</td>
<td>363</td>
<td>409</td>
<td>568</td>
<td>1,109</td>
</tr>
</tbody>
</table>

Note: Animal and Plant Biomass generation includes combustion and AD

Compiled from DECC Energy Statistics (2010)
Animal includes the use of farm waste digestion, poultry litter combustion and meat and bone combustion. Plant includes the use of straw and energy crops. AD is not separately accounted.
Coalition Agreement

The Coalition: our programme for government

• “We will establish a full system of feed-in tariffs in electricity – as well as the maintenance of banded Renewables Obligation Certificates”

• “We will introduce measures to promote a huge increase in energy from waste through anaerobic digestion”

• “We will create a green investment bank”
Support- Renewables Obligation

- The Renewables Obligation (RO) for large-scale (generally >5MW) renewable electricity projects
- RO Certificates (ROCs) issued to accredited generators for renewable electricity
- Introduced in April 2002
- Banded from April 2009
- Double ROCs for Anaerobic Digestion
  - ROC value c. £44 – 50 per MWh
- Banding Review due 2013
- Consultation on the grandfathering policy of support [for AD] under the RO
  - *Grandfathering of support at current levels for AD and EfW generators*
Feed in tariffs – Payment rates

- Feed-in Tariffs (FITs) provide a guaranteed price for a fixed period to small-scale (< 5MW) electricity producers;
  
  - **Generation Tariff** – the generator is paid for every kWh of electricity generated.
    - 11.5 p/kWh if 500kW or less
    - 9 p/kWh if > 500kW
  
  - **Export tariff** – for electricity exported onto the National Electricity Grid. [Generators can opt in or on an annual basis, deciding whether to claim this or the market value for the electricity]
    - 3.0 p/kWh
## Feed-In-Tariffs – Payment rates

<table>
<thead>
<tr>
<th>Technology</th>
<th>Scale</th>
<th>Tariff level for new installations (p/kWh) *</th>
<th>Tariff Lifetime (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaerobic Digestion</td>
<td>≤ 500 kW</td>
<td>11.5</td>
<td>20</td>
</tr>
<tr>
<td>Anaerobic Digestion</td>
<td>&gt; 500 kW</td>
<td>9.0</td>
<td>20</td>
</tr>
<tr>
<td>PV</td>
<td>&gt; 4 – 10 kW</td>
<td>36.1</td>
<td>25</td>
</tr>
<tr>
<td>PV</td>
<td>&gt;10 – 100 kW</td>
<td>31.4</td>
<td>25</td>
</tr>
<tr>
<td>PV</td>
<td>&gt;100kW – 5MW</td>
<td>29.3</td>
<td>25</td>
</tr>
<tr>
<td>Wind</td>
<td>&gt;15 – 100 kW</td>
<td>24.1</td>
<td>20</td>
</tr>
<tr>
<td>Wind</td>
<td>&gt;100 – 500 kW</td>
<td>18.8</td>
<td>20</td>
</tr>
<tr>
<td>Wind</td>
<td>&gt;500kW – 1.5MW</td>
<td>9.4</td>
<td>20</td>
</tr>
<tr>
<td>Wind</td>
<td>&gt; 1.5 – 5MW</td>
<td>4.5</td>
<td>20</td>
</tr>
</tbody>
</table>

*NB Tariffs will be inflated annually (RPI linked)*

- **Fast-track review** of small-scale AD [and PV] tariffs proposes new rates from 01.08.11
  - < 250kWe = 14p/kWh
  - 250 – 500kWe = 13p/kWh
# Renewable Heat Incentive - Tariffs

<table>
<thead>
<tr>
<th>Technology</th>
<th>Size (kWth)</th>
<th>Tariff (p/kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Small Biomass</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solid Biomass; Municipal Solid Waste (incl. CHP)</td>
<td>&lt; 200</td>
<td>Tier 1: 7.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tier 2: 1.9</td>
</tr>
<tr>
<td><strong>Medium Biomass</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>200 – 1,000</td>
<td>Tier 1: 4.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tier 2: 1.9</td>
</tr>
<tr>
<td><strong>Large Biomass</strong></td>
<td>≥ 1,000</td>
<td>2.6</td>
</tr>
<tr>
<td><strong>Biomethane</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biogas injection and biogas combustion (excl. landfill)</td>
<td>Injection all scales; combustion &lt; 200</td>
<td>6.5</td>
</tr>
<tr>
<td><strong>Small ground source</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ground-source heat pumps; water-source heat pumps</td>
<td>&lt; 100</td>
<td>4.3</td>
</tr>
<tr>
<td><strong>Large ground source</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ground-source heat pumps; deep geothermal</td>
<td>≥ 100</td>
<td>3.0</td>
</tr>
</tbody>
</table>

*NB Tariffs will be inflated annually (RPI linked)*
Digestate acceptability

WRAP’s agriculture working group

- Quality assurance and others
  - AFS, HGCA, MAGB, NABIM, SWA, NFU, NFU Cymru, NFUS, NBA, EBLEX, WLBP Ltd, Dairy UK, Meat Promotion Wales, QMS, SQC, SFQC, CFA, HDC, Soil Association, BRC, FDF, CLA, LEAF, FUW, AICC

- Government

- ADBA, REA, AfOR

- AD infrastructure and other service providers
Interlinked technical projects

- Major technical project:
  - Assess key stakeholder concerns
  - Develop Biofertiliser Matrix
  - Develop sector-specific guidance

- ‘Satellite’ projects:
  - Allergens
  - Herbicides
  - *Clostridium botulinum*
  - Odour control
  - Flavour taints

Source WRAP
Field experiments

- Joint WRAP / Defra initiative
  - Soil quality
  - Agronomic benefits
  - Crop quality / yield
  - Crop safety
  - GHG impacts
- Budget > £1.5million
- Until 2014
- Knowledge exchange
  - Training the next generation
The UK Model

Key drivers

Renewable energy
WASTE MITIGATION

Energy crops are a possible feedstock
Simplified regulation
Arable rotation – good break crop
Grass – multiple cut, multiple use

But do they require land which is a more limited resource
The UK Implementation Plan

Preparation has drawn together Government departments, Regulators and Industry through the following work streams:

- Knowledge and understanding
- Building skills
- Building safe and secure rules for digesters
- Raising awareness
- Building markets for biomethane
- AD in the rural economy
- Finance
- Regulations
- Communications
- Research
Improving understanding: national projects

• The AD Development Centre
  (www.uk-cpi.com/3_pages/focus/susproc/) small scale research plant for hire)

• 15 reports including

  • Project AC0409 Implementation of anaerobic digestion in England and Wales balancing optimal outputs with minimal environmental impacts
    - Potential for farm scale AD
    - Review of AD technology

• European experience with small scale AD

  Project WR1119 to summarize experiences and lessons from the use of small scale (0.15MW to 0.40 MW) and on-farm AD systems.
Improving understanding: national projects

• Building markets through programme to deliver confidence in digestate – working with retailers and farmers (WRAP)
• RELU Project – Energy production on farms through Anaerobic Digestion [www.ad4rd.soton.ac.uk/](http://www.ad4rd.soton.ac.uk/) completed
• Wales Centre of Excellence for AD [www.walesadcentre.org.uk/](http://www.walesadcentre.org.uk/) (Glamorgan University)
• John Walsh from Bangor University: PHD thesis laboratory and field scale testing of digestate on crops.
• Other work at Imperial college by Professor David D Stuckey [http://www3.imperial.ac.uk/people/d.stuckey](http://www3.imperial.ac.uk/people/d.stuckey)
BARRIERS TO UPTAKE

Technical
- Small-scale technology options
- Waste segregation
- Biogas Upgrading
- Biomethane for Transport

Economic
- Availability of finance
- Perceived technology issues
- Cost of energy crops
- Security of incentives

Social
- Food waste collections
- Markets for digestate
- Skills & training
- Food vs. Fuel conflict

Regulatory
- Planning
- Permitting
- Health & Safety
- Gas Quality Standards
Official AD Information Portal:

www.biogas-info.co.uk
Sharing global experience

- Methane to Markets Partnership - 30 countries members including Russia, China, USA and India
- IEA Bioenergy Task 37
- UK-China Sustainable Agriculture Innovation Network

- (NB all Defra funded work is under review)
Organisations supporting the UK membership of IEA Task 37

Sponsors:
Agri-food and Biosciences Institute (Northern Ireland), Biogen (UK) Ltd,
Biogas Nord UK Ltd, BiogenGreenfinch Ltd, Bioplex Technologies Ltd,
Chesterfield Biogas Ltd, CNG Services Ltd, Country Land and Business Association,
GWE Biogas, Hardstaff Group, J.H. Walter Sustainable Resource Management, Masstock
Smart Farming, Methanogen UK Ltd, National Grid, Natural England, NETZSCH Pumps
Ltd, Netsch Pumps, Omex Environmental Services Ltd, Peter Jones OBE,
Organic Power Ltd, Royal Institution of Chartered Surveyors, Renewables East,
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and

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