The Application of Anaerobic Digestion In Agriculture

Greg Hilton

25 November 2010

BIDWELLS

bidwells.co.uk

Bidwells Agribusiness

- Leading provider of consultancy and management services to the farming, food, energy and agri-investment sectors
- c.50,000 hectares of land under management
- Clients include:
  - Landowners
  - Food processors
  - Food manufacturers
  - Supermarkets
  - Life science companies
  - Farmers
  - Project developers
  - Utilities
  - Technology companies
- Founder members of the AD and Biogas Association

www.bidwells/agribusiness

BIDWELLS

History of AD in Agriculture in the UK

- Emphasis on digestion of animal manures and slurries
- Small scale – typically less than 200 kWe
- Driven by slurry storage / management and control of ammonia emissions

Photo: Farm AD plant in Scotland by Greenfinch

BIDWELLS

Meanwhile elsewhere in Europe….

- Germany, Spain and other countries introduced feed in tariffs which supported the development of on-farm AD projects:
  - Over 4,000 AD plants in Germany
  - Over 2,000 AD plants in Spain
  - Rapid growth in Italy, Denmark, Sweden and other countries
- An emphasis on renewable energy and income generation rather than manure/nutrient management

BIDWELLS

Policy for on-farm AD in the UK

- **Defra AD implementation plan** (March '10):
  - "We want to encourage on-farm anaerobic digestion of manures and slurries ... a significant increase in the take-up of **on-farm AD** ... aim of 20% of manures being used in such plants."
- **Coalition agreement** (May):
  - "Measures to promote a huge increase in **energy from waste** through anaerobic digestion."
- **Committee on Climate Change** (June):
  - "Our new analysis of the agriculture sector suggests that there is significant scope for emissions reduction through ... anaerobic digestion..."

BIDWELLS

ROCs, FITs and RHI

- ROCs – market value
- FITs – fixed for 20 years + RPI:
  - 11.5p/kWh (< 500kW plant)
  - 9.5p/kWh (>500kW plant)
  - Security for lending
  - Generation and export tariffs
  - Displacement of energy costs
- RHI
  - Use of heat on-farm?
    - Pasteurisation / cooling / cheese-making
    - Vegetable stores, Glasshouses, Grain drying
  - Or off-farm: district heating?

BIDWELLS

Benefits of on-farm AD

- Diversification opportunity
- Internal market for crops
- Better manure / waste management (inc in NVZs)
- Digestate and improved nutrient management, incl fertiliser savings
- GHG emissions reduced, incl in milk and meat products
- Electricity and / or heat, biogas to grid or transport
- ROCs or FITs and likely RHI

BIDWELLS

Project considerations:

- Resources:
  - Feedstock
  - Site
  - Land for crops
  - Land for digestate
  - Funding: debt/equity
  - Energy demand

- Grid connection and costs
  - Electricity
  - Gas

BIDWELLS

Biogas output

Input	No / ha and yield tonnes	DM %	Biogas yield M3 per tonne
Dairy cow slurry	20 – 40 cows for 1 tonne per day	8.5 - 12%	20
Pig slurry (sows)	250 – 300 sows 1 tonne per day	6 - 9%	25
Laying hen litter	8000 – 9000 for 1 tonne per day	30%	100-150
Broiler manure	10,000 – 15,000 1 tonne per day	50 – 60%%	50 - 100
Maize silage	35-50 tonnes / ha	28 - 32%	170 - 190

BIDWELLS

The economics

Key drivers of economic return:

- Choice and source of feedstock
- Energy export or on-site use
- Scale
- Grid connection cost

BIDWELLS

Case Study: UK

- Biogen Greenfinch: Twinwoods AD plant, Bedford
- 12,000 tonnes pig slurry
- 30,000 tonnes food waste:
  - Municipal and commercial
- 1.1 MWe capacity

BIDWELLS

Case study: Germany
UTS Biogas Plant Söhnergy, Schwaigern

Söhnergy founded to supply sustainable heat and energy to the neighbouring industrial site (manufacturer of electromechanical assemblies). 18,000 tonnes maize silage from local farmers Biogas converted to electricity on site (Deutz CHP, 1020 kWe), heat piped 950 m to the industrial plant. 630kW abs. chiller to cool the tools and production facilities.

Co-operation / holistic approach to energy use / efficient operation

BIDWELLS

Ways to increase Internal Rate of Return

- Source high gate fee waste, e.g. animal by-products
- Obtain grant funding for capital costs
- Locate AD plant next to a big heat user, e.g.
  - Glasshouse
  - Property development
  - Hotel / leisure centre
  - Cold store
  - Data centre
- Locate AD plant next to a big electricity user, e.g.
  - Packhouse / factory
  - Property development
  - Data centre
- Market the biofertiliser

BIDWELLS

The Future of AD in Agriculture?

- Scale?
- Feedstocks?
- Location?
- Competition for land resource?

BIDWELLS

Bidwells Services

- Assessment of feasibility
- Technology appraisal
- Investment appraisal
- Project development
- Grant availability
- Feedstock sourcing
- Identification of energy partners / technology providers
- Permitting
- Planning
- Project management

BIDWELLS

Contact

Greg Hilton

Tel 01223 559466

greg.hilton@bidwells.co.uk

www.bidwells.co.uk

BIDWELLS