

The background is a solid blue color with several translucent, glowing blue bubbles of various sizes scattered across the surface. The bubbles have highlights and shadows, giving them a three-dimensional appearance.

Anaerobic Digestion: The Field-Good-Factor

AllEnergy 2009

CoRE North West

Agenda

1. CoRE NW
2. Anaerobic Digestion
3. Silloth: The Findings
4. Biogas Hochreiter
5. Contact

1

Community Renewables

Community Renewables (CoRE) North West is a regional cooperative project in the Northwest of England for the implementation of renewable energy generation, currently focusing on anaerobic digesters.

The project is inspired by CoRE North East and involves over half a dozen stakeholders representing organisations, authorities, farmers and companies.



1

CoRE Activities

CoRE North West works in partnership with (farming and other) communities to develop a sustainable industry that stimulates the market development of indigenous agricultural practices, supply chain opportunities and encourages farmers to move up the value chain by becoming part-owners.

CoRE NW takes a stake in the developments and any profits are used to invest in further community renewable projects.



1 CAD

CoRE NW focuses on CAD, which stands for Cooperative AD or Community AD, otherwise known as Centralised AD. This exactly pinpoints the attitude towards for community projects.

CoRE NW currently works with over half a dozen community groups, dealing with ca. 200k tpa of agri waste per year and a combined installed capacity of >5MW. We are regarded as the largest CAD developer in UK.

2

Process Overview

Anaerobic digestion (AD) is a natural biological process whereby various types of bacteria break down ('digest') the carbon of organic materials in an oxygen free ('anaerobic') environment.

The process is best compared to the digestion in a cow's rumen, however the controlled (temperature, ph-value, retention time, C:N ratio, OLR, etc.) and enhanced environment of an AD plant maximises the outputs.



2

Primary Products

Biogas consists of ca 60% methane (CH_4), ca 40% carbon dioxide (CO_2) and traces of hydrogen sulphide (H_2S), moisture and ammonia. It is similar to sewage gas or syngas.

The **digestate** has a neutral pH-value and no caustic action when applied to plants. Nitrogen can be assimilated directly by the plant as it is mainly in the form of ammonia (NH_4) and not organically bound. The odour of digested slurry is significantly reduced compared to the original material (ca 80%).



2 Secondary Products

The digestate can be separated into liquids and solids, which have different chemical (NPK) and commercial values.

Further cleaning and compression enables the export to the gas grid or the use as fuel (CNG).

Otherwise, the methane is combusted in an CHP engine, thereby creating heat. CO₂ can be used in soda manufacturing or agriculture.



2

Global Markets

- Several millions of 'village' ADs in China, India
- AD is the third largest energy source in China
- Several 1000s of high tech ADs in Germany, Denmark, Austria, Switzerland
- Installed capacity typically 15kW (India) to 2MW (EU)
- Biogas market estimate in 2007: €3 billion *
- Biogas market estimate in 2020: €25 billion *

(Source: Helmut Kaiser Consultancy, Switzerland)

2

UK Market Potential

- Industry voices: 1,000 or 2,000 AD plants by 2020
- Typical sizes: micro, small, medium-large, very large
- Different visions for the future of the AD industry by:
 - Agriculture
 - Food waste lobby
 - Sewage industry
- Material selection:
 - Agricultural feedstock
 - Co-generation: agricultural and commercial waste
 - Industrial: commercial and industrial waste only

2

AD Drivers

- NVZ regs: ‘dead investments’ in slurry tank extension
- Slurry nuisance: odour, inefficient fertiliser
- Landfill diversion and landfill tax for ABP, food waste
- Rising energy costs (heat, electricity)

- Double ROCs for electricity from AD
- Greenhouse gas emissions reduction
- Long term income and stability for farmers
- New image of ‘Energy Farmer’ (food, feed & fuel)

2

Agricultural Benefits

- Farms cover their own electrical & heat demand
- Manure management, odour control
- Digestate-fertiliser reduces chemical fertiliser costs
- Reduces GHG, pathogens, weed seeds, pollution
- Integrates food, feed and fuel
- Long term income and stability
- Integrates lifestyle with modern technology
- Rural economic development

2

Slurry – the Issues

- Restriction on application of slurry
- Spreads disease and weed
- Interrupts grazing
- Loss of nitrogen
- Pollution and release of greenhouse gases
- Odour
- Storage, spillage
- Run off

2

The Value of Digestate

- More liquid and more easily absorbed
- 3-7x available N, 2-4x potassium, little phosphates
- 80% or more of fertiliser needs covered by digestate
- Different commercial values for liquids and solids
- Low odour - about 80% less
- Up to 96% pathogens and weeds killed (thermophilic!)
- No increased storage
- Greatly reduced environmental problems
- 'Nitrate immune' in NVZ regulations

2 Comparison: Wind

AD

- Proven technology in UK
- Installations typ. >10MW
- 30-40% efficiency factor
- Investor owned
- Longer planning cycle
- Solid legislative framework
- Split onshore vs offshore
- Resource beyond control, no interface with landowner
- One output & income stream

- Proven technology in Europe
- Installations typ. <1MW
- 70-99% efficiency factor
- Farmer/operator owned
- Shorter planning cycle
- Changing legislation
- Split agricultural vs CAT3
- Multiple resources, require ongoing management
- Several outputs & income streams



Farm-based AD

3

So far after six Months

- Pilot project in Silloth, Cumbria
- 15 farmers involved, numbers changing
- Researched economic and sustainable impact
- Set up agricultural supply chain
- Set up sustainable business model
- Set up legal structures (supply coop, IPS)
- Preparing planning application



3

Site Details

- 1MW installed capacity
- Ca 8.4mio kWh elec pa, similar for kWh thermal
- Electricity partly used on-site, excess to grid
- Heat usage on site and neighbourhood
- Fertiliser usage sorted
- Manure, slurry, grass silage, chicken litter

3

Development Barriers

- Lack of expertise in operating AD plants
- Confusion between AD and incineration
- Clash of culture (farm vs food waste)
- Long-term supply commitment ('spot market')
- Loss of the cooperative spirit
- Farmers not convinced of value of digestate
- Over complexity of grid connection



3

Overcoming Barriers

- Close cooperation with Biogas Hochreiter
- Local political and organisational support
- Farmers are comfortable with AD feedstocks
- Security of supply through share in profit
- Increased profitability and diversity of income
- Social enterprise loan (COOP), green investors
- Slurry (odour, run-offs) and weed issues solved

3

Environmental Benefits

- Provide a manageable alternative to slurry
- Reduces CO₂ and methane from run-offs
- Reduces need for energy-intensive ind. fertiliser
- Reduces odour nuisance of slurry
- Pathogen and weed seed kill
- Similar transport activities
- Farm buildings can afford maintenance



3

Socio-economic Benefits

- Average income from supplier is 20k pa
- Reduction in fertiliser costs
- Job opportunities for several farmers in the area: operation, supply, maintenance, administration
- Some farmers sons will return to farming
- Balance between environmental benefits and profitability
- For investing farmers break even of total project costs is within 5 years



4

Biogas Hochreiter

- Leading technology provider with 800+ installations
- 25 years of AD-experience (food waste and FYM)
- Design, manufacturing, sales and maintenance of AD equipment (biogas-CHP generators, stirrers, etc.)
- Plant range from 35kW - 2MW of installed capacity



4 AD Example



Construction of a 1.8MW agricultural biogas plant with basement 2m below ground

4 AD Example



150kW biogas plant (digester and secondary digester)
entirely below ground, mitigating visual impact

Contact Details



CoRE North West:

The Hub, c/o Office 1, The Oval Centre, Salterbeck Drive, Workington, Cumbria, CA14 5HA

Rob Skinner

T: 07775 764263, E: robskinner@btconnect.com

Gunter Woltron

T: 07739 456547, E: biogas@anaerobic-digestion.net

www.corecoop.net · www.biogas-hochreiter.de