

Biomethane Market Overview

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Biomethane Market Overview

1. CNG Services Ltd
2. Overview of the day
3. Review of key issues
4. Market potential
5. Conclusions

CNG SERVICES LTD

CNG Services Ltd

- Supports projects to inject biomethane into the gas grid
 - Didcot, Adnams, Poundbury, Vale Green, Stockport, Doncaster, Minworth
- Bio-CNG as a fuel for trucks
 - Own UK's largest CNG filling station
 - Sell Bio-CNG (20% biomethane)
 - Supporting Qatar's move to CNG by 2022!



We are independent from all makers of plant, vehicles, clean-up, compression....we help clients get the best solution for their projects

Our Biomethane Projects Team

- Biomethane Projects
 - Iain Ward, Lee Firth, Alison Cartwright, Terry Williamson, Robert McKeon, Jen Clayton, Greg Lee
- Pipelines and Compression Project
 - Ian Roughley, Bob Ingmire, Mick Beddows (LTS), Phil Winnard
- Commercial (RHI, NEA etc)
 - Peter Rayson
- Project Support
 - Angela Bagshaw, Chris Toase, Christine Venables, Lauren Hamer

We support Biomethane Projects for a living

OVERVIEW OF THE DAY

Overview of the Day

Biomethane Projects

- Poundbury
 - Owner/Developer (JVE)
 - Biogas to Biomethane (SGN)
 - First Commercial 3 Stage Membrane in EU
- Stockport
 - Food / local authority waste
- Doncaster
 - Zero CH₄ emission project, agricultural feedstock
- Minworth
 - High efficiency integration with existing CHP plant
 - High pressure grid, blending to avoid propane

Overview of the Day

Grid Owners Perspective

- National Grid
 - Stockport
 - Doncaster
 - Minworth
- Wales and West Utilities
 - Case study of Vale Green with technical detail

Overview of the Day

Green Gas Certificates

- REAL Green Gas Certificate Scheme
 - Not for profit scheme
 - Green Gas Certificates are key to helping sell biomethane
 - First sales have now taken place

Overview of the Day

Power to Gas

- High wind/nuclear generation post 2020
- Use electricity to make Hydrogen (70-80% efficient)
- React H_2 with CO_2 from AD to make CH_4 and inject into gas grid (80% efficient)
- So, store electricity by storing gas
 - Heat
 - Transport
 - Electricity generation
 - Industrial process

Overview of the Day

EU Projects Update

- Keep on Track
 - Ensure timely progress is made towards national Renewable Energy Targets
- Green Gas Grids Project
 - Sustainability, trade, standards, market growth
- Biomethane Regions
 - Actively supporting small scale AD plants through to construction
- Biomaster
 - Promoting biomethane injection and vehicle use

Overview of the Day

Norfolk County Council

- Key partner in the Biomaster project
- Set up an Energy Services Company called Norfolk Energy Futures, wholly owned by the council
- Aim to invest into renewable energy projects
- Has invested into Solar, Wind Energy and Biomass boilers
- Looking at the potential of investing into an Anaerobic Digester

REVIEW OF KEY ISSUES

Key issues (1)

Oxygen Specification for Grid Injection

- GS(M)R level is 0.2%
- Industry needs 1%
- We must have it by June to avoid flaring gas with 0.3% CO₂...
- Richard Pomroy will give update

Key issues (2)

RHI – Tariff Guarantees and Degression

- Joint REA/ADBA meeting with DECC on 21 May 2013
- DECC supportive of biomethane – why has market been slow?
 - Oxygen issue
 - Still relatively complex to complete an injection project
 - Uncertainty re Registration/Pre-Accreditation
- REA/ADBA action includes providing evidence to DECC that having a form of Pre Accreditation System for biomethane would help the market

Key issues (3)

60% GHG reduction compared to natural gas

- No issue for sewage derived biogas, food waste, agricultural waste
- Is a potential issue for crop based AD
- Need good husbandry
 - William Mezzullo of Future Biogas is the expert
 - Read his paper to GGG and talk to him!

Key issues (4)

Capital costs

- We need Ofgem to implement the EMIB recommendations to take further £50 - 100k out of cost of Entry Facilities
- We need more projects from all technologies to reduce costs of CO₂ removal plants
- We would like GDNs to review their processes once they have done some projects to see if they can help take costs out
- We would also like GDNs to reduce time and costs associated with connection to the >7 bar grid (NG looking at this)

Key issues (5)

Propane costs

- No short term alternative to addition of propane for most projects
- REA has provided the ENA Biomethane Sub-Group with a paper setting out detailed proposal to allow blending to reduce the amount of propane enrichment
- We estimate that around 30% of projects will have blending potential
 - Injection into IP and LTS systems

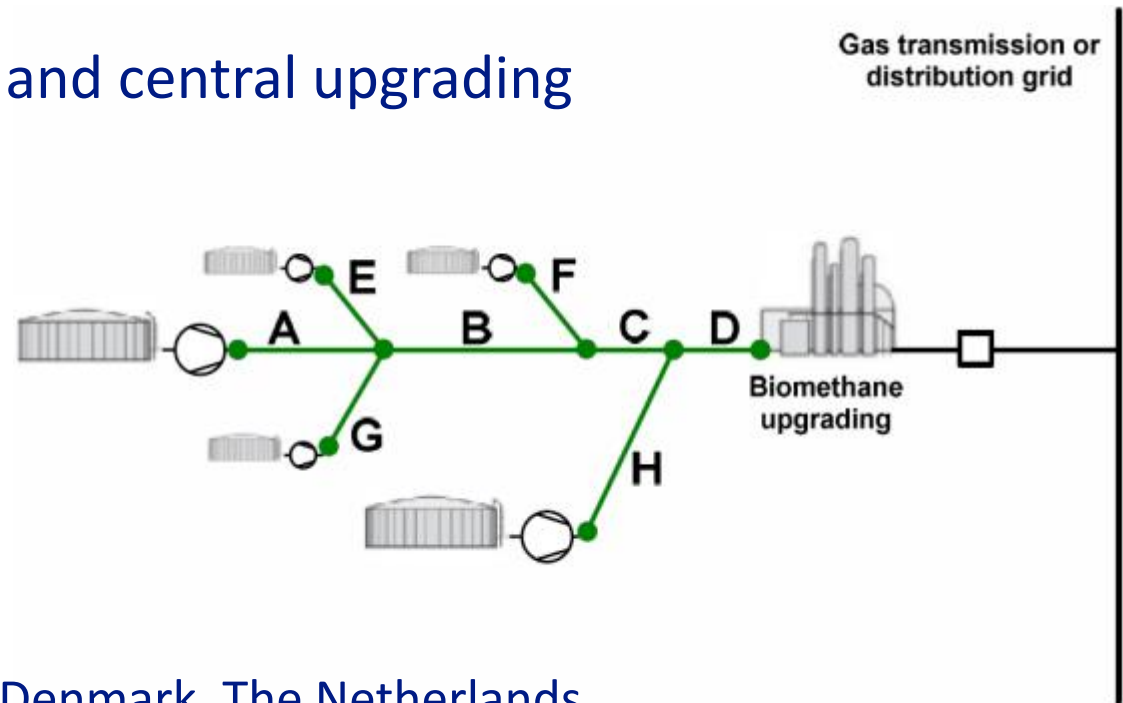
Key issues (6)

Grid Capacity

- NGN/NG have demonstrated that use of “within grid compressors” can create capacity
- We need some actual projects now to show this for real
- Useful for around 40% of projects
- NG progressing

Key issues (7) Innovation

- Biogas pipelines and central upgrading



- Examples in Sweden, Denmark, The Netherlands
 - Above case is 29km long
- Biomethane to Grid has inherent Economies of Scale
- Provides better use of energy in biogas – no waste heat
- Project in Crewe with NNFC – WRAP Funded feasibility underway

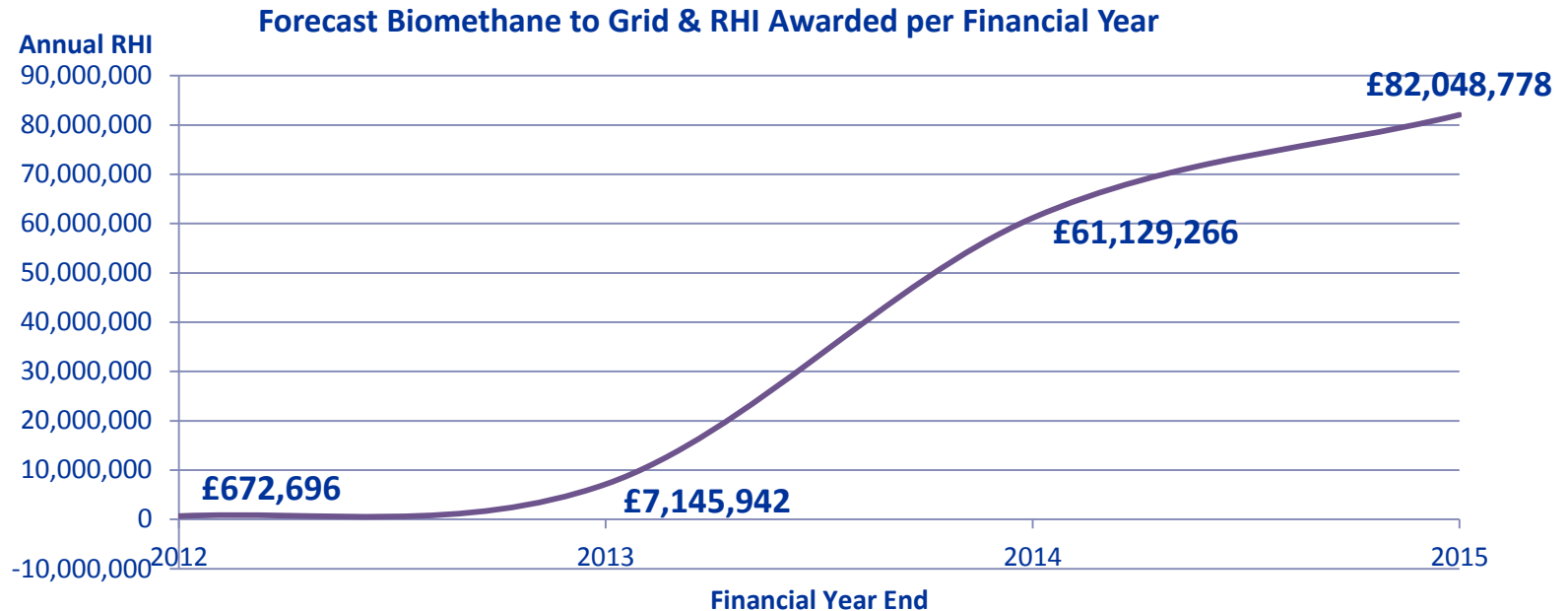
MARKET FORECAST AND CONCLUSIONS

Feedstock Categories

Projects were also categorised according to sectors determined by the EU Green Gas Grids Project:

1. Sewage Sludge
2. Agricultural
 - a. Animal manure (slurry)
 - b. Agricultural by-products and residues
 - c. Crops for Energy
 - d. Agricultural biomass is modelled as one sub-group as projects will often contain elements of all 3 streams
3. Industrial Food Processing waste
4. Food Waste (commercial, domestic, local authority)
5. Biodegradable waste (e.g. from an MBT plant or garden waste collected by local authority)

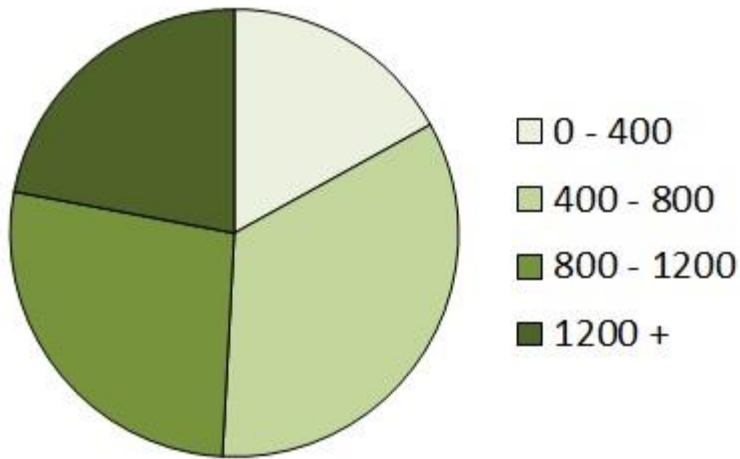
Annual Biomethane to Grid and RHI for 2012-2015



Financial Year (end)	2011	2012	2013	2014	2015
Total Therms to Grid per annum	0	324,974	3,452,146	29,531,046	39,637,091
Total TW per annum	0	0.01	0.10	0.87	1.16
RHI per annum	0	£672,696	£7,145,942	£61,129,266	£82,048,778
Cumulative	0	£672,696	£7,818,638	£68,947,904	£150,996,682

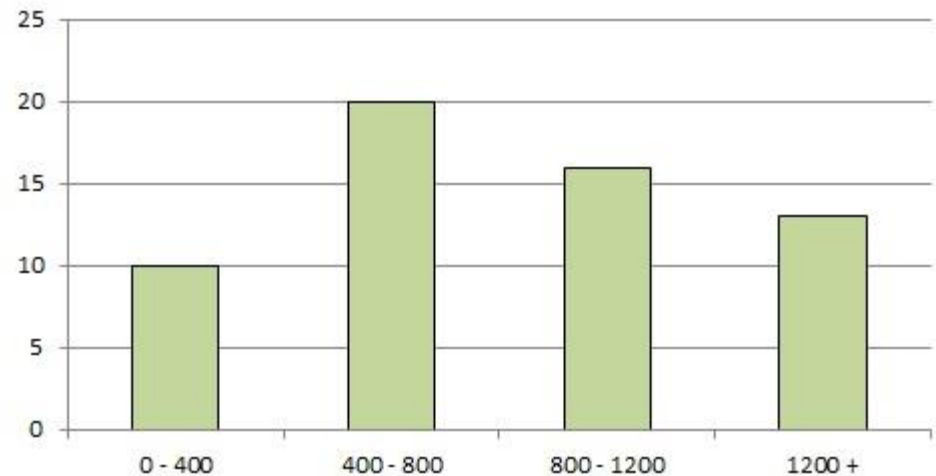
Projects by biogas flow-rate

% Projects by Biogas Flow Rate



scmh Biogas	Number of Projects	%
0 - 400	10	17%
400 - 800	20	34%
800 - 1200	16	27%
1200 +	13	22%

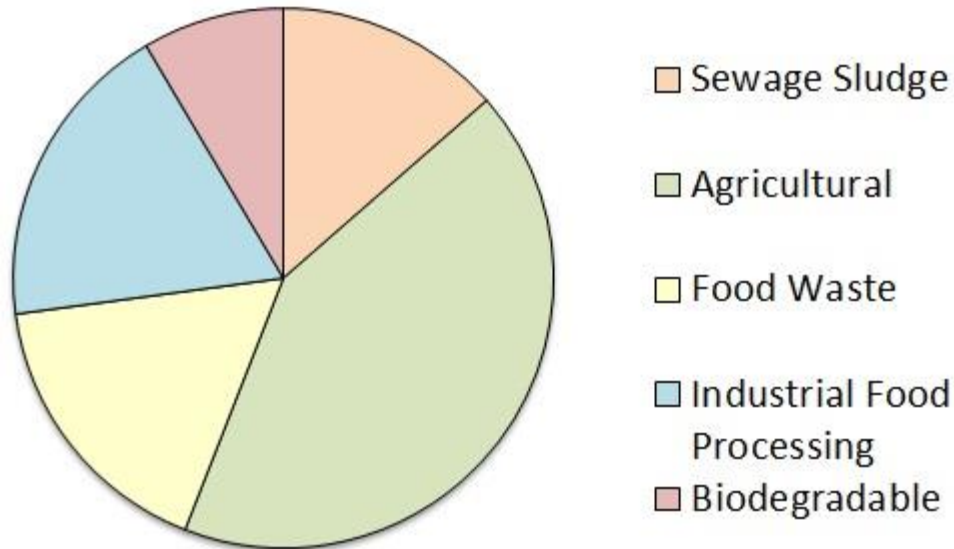
Number of Projects by Biogas Flow Rate



Proportion of Projects in Each Feedstock Category

GGG Feedstock Category	Number projects in Category	%
Sewage Sludge	8	14%
Agricultural	25	42%
Food Waste	10	17%
Industrial Food Processing	11	19%
Biodegradable	5	8%
Unknown	0	0%

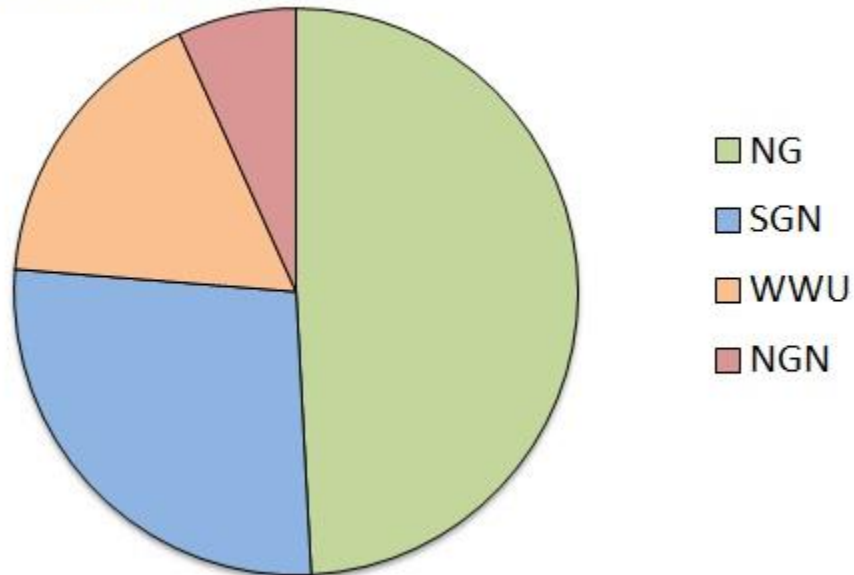
Proportion of Projects in each Feedstock Category



Proportion of Projects for Each Gas Distribution Network (GDN)

LDZ	Total Number of Projects	%
East of England	19	32%
Wales and West	10	17%
Southern	9	15%
North England	4	7%
West Midlands	3	5%
North West	7	12%
Scotland	7	12%
North London	0	0%

Number of Projects by GDN



Biomethane to Grid Conclusions

- It has taken 6 years but the regime looks good:
 - Over 20 projects in next 2 – 3 years is possible, all technologies
- Majority of biomethane from waste feedstock
- Need to focus on reducing capital costs
- Green Gas Certificates
 - CNG for trucks and buses and CHP/District Heating for new housing
 - REAL not for profit scheme is helping to facilitate biomethane projects

The biomethane market is set to grow, delivering significant benefits and helping meet 2020 renewable energy targets