

UK Biomethane Day 2018

Market Review

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CNG Services Ltd

- Supports projects to inject biomethane into the gas grid
 - Only one new completed project in 2017
- Supports back-up gas generation projects
 - Connection to a 50 MW plant on 2 bar grid in 2017
- Part owner of CNG Fuels Ltd, a company set up to build national network of Bio-CNG stations on the high pressure grid
 - Leyland CNG Station
 - 84% saving in GHG compared to diesel



Innovation in Natural Gas

Agenda

1. Review of 2012 – 17
2. Market Summary
3. Demand for Biomethane
4. Conclusions

1. 2012 – 17 REVIEW

**JB CONCLUSIONS SLIDE FROM EACH
YEAR WITH NOTABLE POINTS
HIGHLIGHTED**

2012 Biomethane to Grid Conclusions

- It has taken 6 years but the regime looks good – 40 projects in next 2 – 3 years is possible, all technologies
- UK has an extensive gas grid and the full support of UK gas distribution network owners
- 3% of domestic customer gas supply by 2020 is a reasonable target
 - 7TWh out of around 300 TWh demand (around 150 projects of 600 M3/hr biogas) More likely to be 4 – 5 TWh by 2020
- Biomethane project economics are attractive
 - Lots of waste feedstock available in UK
- Green Gas Certificates
 - CNG for trucks and buses and CHP/District Heating for new housing
- Within grid compression can give UK market leadership
 - Still not one of these projects – 6 years later

The biomethane market is set to grow, delivering significant benefits and helping meet 2020 targets – come and join us!

2013 Biomethane to Grid Conclusions

- Over 20 projects in next 2 – 3 years is possible, all technologies
- Need to focus on reducing capital costs
 - Not made that much progress in this
- 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
 - This scheme now established and doing very well

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

2014 Biomethane to Grid Conclusions

- Over 50 projects in next 3 years is possible, all technologies
- Majority of biomethane from waste feedstock
- Around 2 TWh in 2015
 - UK total gas demand 800 TWh
- Focus on reducing capital costs
 - New processes being developed for high pressure connections
 - 7 active biomethane equipment providers in UK – competition
 - We now have established supply chains

UK biomethane market growing fast, delivering significant benefits and helping meet 2020 renewable energy targets

2015 Biomethane to Grid Conclusions

- Over 50 projects by end 2015, further 100 by end 2020 if tariffs OK
 - 46 projects completed in period 1 June 2014 to 31 Dec 2015
- Around 2 TWh by end 2015
 - 140,000 tonnes of LNG not imported
 - This is lovely
- Focus on reducing capital and operating costs
 - No Letter of Direction – no
 - Tariff fixed
 - Competition has established supply chains
 - Lower cost of finance?

UK biomethane market growing fast, delivering significant benefits and helping meet 2020 renewable energy targets

2016 Looking Forward

1. Project Performance
 - Key issue in 2016 is to increase production rate of projects
2. RHI Consultation
 - Waste good, crops bad
 - Capture of CO2 from biomethane plants – only possible for crops as waste is not acceptable in the CO2 utilization industry
 - Funding availability for 20 projects per annum each of 40 million kWh
3. Tariff stability
 - Tariff booking essential to move away from 3 monthly project cycle - nearly there
4. Green Gas Certificates
 - Developments re Vehicle Fuel?
5. Cost and complexity
 - How can we persuade the GDNs and Ofgem to *want* to do it Still working on this
 - Will 19 bar Hexel One be approved for further projects? Not yet
6. Low cost CNG compressors at biomethane plant
 - Farm tractors on compressed biomethane great for sustainability....nearly!

Industry will slow down in 2016 and it did

2017 Looking Forward

1. Election and new RHI
 - Focus on waste
 - Project delays due to the election – believed to have only been one new project completed in 2017 (check with Air Liquide)
2. Use of RTFC as alternative to RHI for projects >40 million kWh/annum
 - New Bio-CNG from waste trucks are great
3. Capacity issue to be sorted
 - Encourage Ofgem to incentivise GDNs to provide capacity
4. Continue to innovate to reduce costs and simplify processes and aim for 20 TWh/annum by 2030

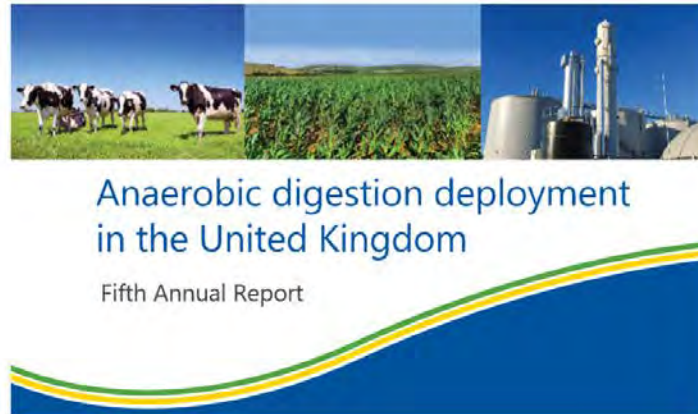
Biomethane will continue to grow at >20 projects a year if we find capacity

2. MARKET SUMMARY

NNFCC

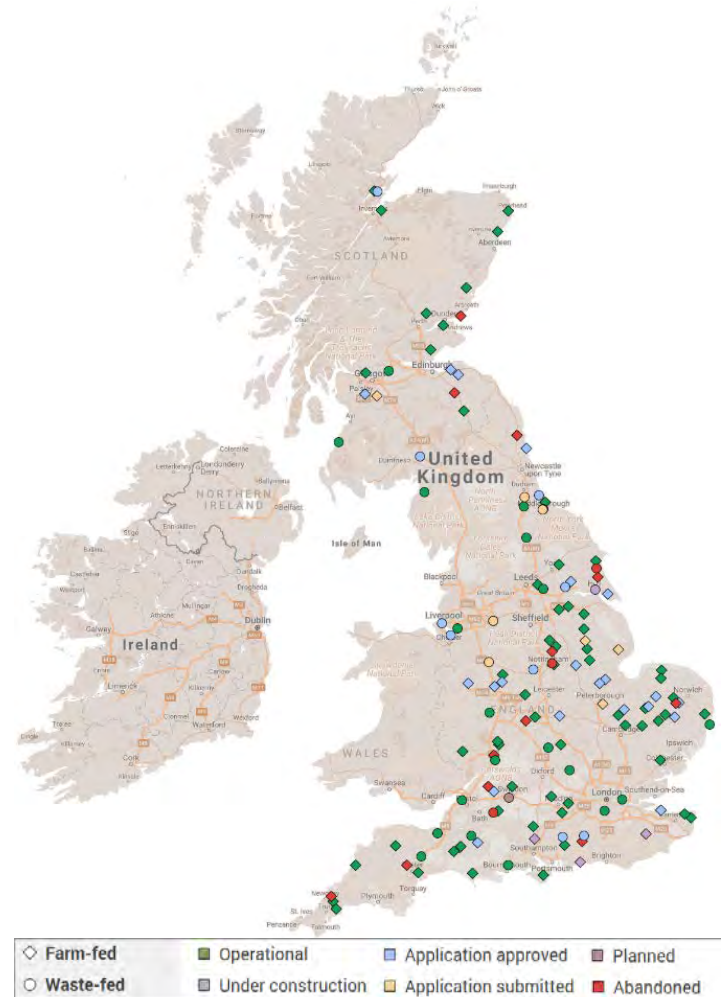
AD deployment

- NNFCC fifth annual AD deployment report published in April 2018 outlines current deployment in the UK AD industry
- Provides detailed information on installed capacity, feedstock requirements and estimated cropping area for AD plants outside of sewage treatment sector



Biomethane deployment

- 80 operational biomethane plants with a cumulative capacity of 48,000NM³/hr
 - 75% of plants using predominantly agricultural feedstocks
 - 25% using predominantly food/industrial wastes
- 47 biomethane projects in development with a cumulative capacity of 25,000NM³/hr

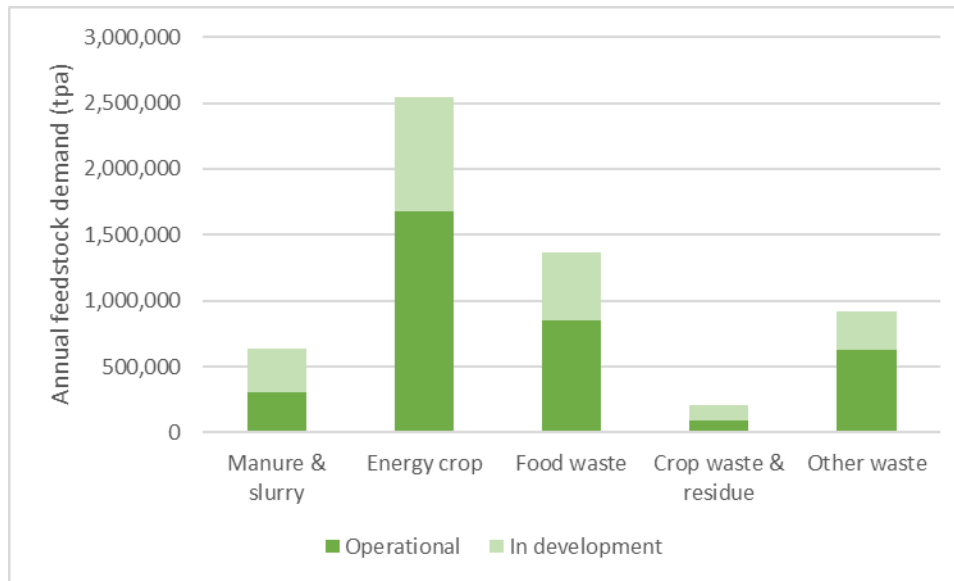


The Bioeconomy Consultants



Biomethane deployment

- Crop feedstock remains most dominant feedstock
- New RHI feedstock regulations anticipated to encourage pipeline projects towards greater use of waste



3. DEMAND FOR BIOMETHANE

1. Gas Central Heating

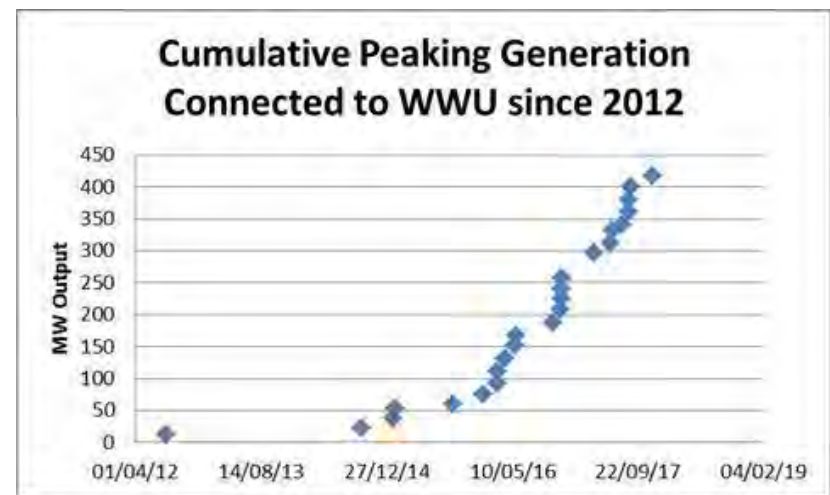
1. RHI designed to support heating and it has been successful – around 4 TWh/annum
2. Typical house uses 12,000 kWh/annum so that's 120,000 houses
3. But there a lot of alternatives for domestic heating:
 - Insulation to reduce demand
 - Ground, water and air source heat pumps
 - Electric storage heating
 - CHP/District heating



There is a risk that too much focus on heating reduces investment in other options

2. Back-up Power Generation

1. Growth in low load factor gas engine power stations, typically 20MW
 - Designed to run only when wind/solar etc needs back-up
2. 200 – 1,500 hours a year
 - No staff, scheduled remotely
3. Biomethane that has been stored and is delivered via the gas grid is a good option to fuel these plants as there is no other fuel apart from natural gas
 - Diesel not allowed as does not meet air quality standards



Developers of back-up generation are interested in Biomethane

3. CHP in London

1. Most new London offices have a basement gas engine plant which produces heating, cooling, electricity
 - Gas pipeline in every street in London
2. The fuel for the gas engine can only be natural gas in London and so could use biomethane
 - Some buildings buy Green Gas Certs
3. Option in London of using the Thames and Water Source Heat Pumps with District Heating

Home » Policy & Regulation » CHP helps Bloomberg to achieve 'world's most sustainable building'

CHP helps Bloomberg to achieve 'world's most sustainable building'

02/10/2017

By Diarmaid Williams
International Digital Editor

Combined heat and power (CHP)

technology is playing its part in helping Bloomberg achieve the status of world's most sustainable office building for its European headquarters.

Opening later this month in the City of London, the building achieved an 'Outstanding' rating against the BREEAM sustainability assessment method, with a 98.5 per cent score. This is the highest design-stage score ever achieved by any major office development.

The CHP generation centre on-site supplies heat and power in a single, efficient system with reduced carbon emissions. Waste heat generated from this process is recycled for cooling and heating and, in use, is expected to save 500-750 metric tonnes of CO₂ each year.

Bloomberg has been a zero-landfill operation in London since 2010; instead *waste* is recycled, composted or converted to energy. This commitment will continue at the new site, with better waste streaming to enable a greater proportion of waste products to be reused and recycled. Globally, Bloomberg currently diverts 75 per cent of its total waste away from landfills and is targeting 90 per cent diversion by 2020.



Gas CHP and Biomethane is an easy option – would it be better to encourage water source heat pumps?

4. London Buses

1. Not one Biomethane bus in London
 - 75 EVs and 8 H2
 - 8,500 diesel
 - Nottingham and Bristol have joined Reading with biomethane buses
2. London has a great gas grid and could have biomethane buses using biomethane from the new Saria plant in Dagenham

Laura Sharman 19 May 2017

Nottingham unveils world's largest biogas bus fleet

A new fleet of buses that run on biomethane have been unveiled by Nottingham City Transport (NCT).

The £17m double-decker bus fleet will be powered by a biogas produced by sewage and waste.

NCT engineering director, Gary Mason, said: 'We are hugely proud of our new biogas buses. This is the largest order for gas double decks in the world and is the culmination of our extensive research into alternative fuels.'

'When [biomethane] is used, emissions are 84% lower than their diesel counterparts, thereby making them - from 'well to wheel' - the greenest buses on the road'



Biomethane buses meet air quality and GHG targets and encourage recycling of food waste – much more honest paint job possible
They can also save money which is important – use savings to insulate houses

5. Trucks

APRIL 30, 2018

Demand for biomethane triples at UK CNG refuelling station

CNG Fuels is reporting that demand for '100% renewable biomethane' from its refuelling station in Leyland, UK has more than tripled in the last year.

The facility was first unveiled in March 2016, with CNG Fuels stating at the time it was the facility of its kind in the UK.

Capable of refuelling more than 500 heavy-duty vehicles per days, the facility also supplies 100% renewable biomethane (bio-CNG) made from waste at anaerobic digestion plants and delivered to the station through the national grid pipeline system. The facility is backed by gas network Cadent.

With an increasing number of retail and logistics firms, such as Waitrose and DHL, using the site, the latest data have revealed that the volume of gas dispensed at the site in March 2018 was 170% higher than in March 2017.

Iveco has supplied seven Stralis NP 4x2 tractor units to Preston-based firm H Parkinson Haulage, to run on compressed biomethane.



Running on high mileage contracts and with each vehicle expected to cover in excess of 230,000 miles per year, H Parkinson Haulage trialed a number of demonstrators before selecting the Stralis to add to its 95-strong fleet. The firm is located close to CNG Fuel's compressed biomethane filling station in Leyland, and research by Cadent Gas in 2017 found an 84 percent drop in CO2 emissions from HGVs using the first gas filling station connected to a high-pressure pipeline in the UK.



Seema Kennedy, MP of South Ribble and David Jones, transport strategy manager, Cadent

Bio-CNG Booming

4. CONCLUSIONS

2018 Looking Forward

1. Win the Champions League Semi-Final tonight
2. Visit to Ukranian Gas Industry in Kiev on 26th May
3. New RHI

Key gas pipelines in Ukraine



Source: East European Gas Analysis, National Gas Union of Ukraine

Its a Golden Age for Mo Salah