Reducing barriers to biomethane injection projects to help NetZero

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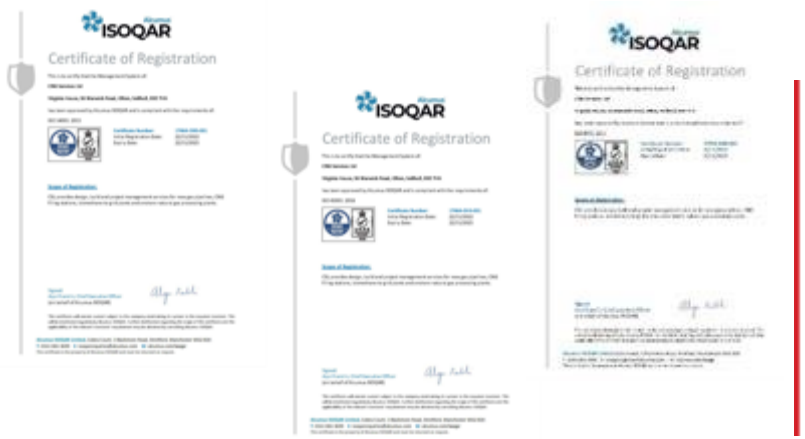
CNG Services Ltd

- CNG Services Limited (CSL) provides consultancy, design and build services to the biomethane industry, all focused on reducing Greenhouse Gas (GHG) emissions
- In the past 10 years our efforts have produced a material impact with an estimated 20 year project life reduction in CO2 emissions of 17,500,000 tonnes through:
  - Biomethane injection into the gas grid
  - Running trucks on Bio-CNG
  - Acting as developer and design and build contractor for the Highlands CNG Project
- Working on a number of Biomethane, H2 and CCUS innovation projects including:
  - Biomethane from manure with CCS
  - Biomethane direct into the NTS
  - Green H2 into the NTS and Hydrogen Business Model Projects
  - Reverse Compression to Create Capacity for Biomethane Injection
- CSL is an ISO 9001, 14001 and 45001 approved company and has also achieved Achilles certification. CSL is GIRS accredited for design and project management and has been certified as a competent design organisation for high pressure UK onshore natural gas works by DNVGL



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Summary

Looked at solutions to the current barriers to entry in terms of time and cost

- Category 1 – Summer 2024
- Category 2 – Immediate
- Category 3 – Reverse compression & blending

Category 1 - Review of Ofgem Injection Rules – Summer 2024?

2011 – EMIB Report

Joint Office of Gas Transporters

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Ofgem Review Group on Energy Market Issues for Biomethane Projects

The purpose of the group was to provide a forum for informed debate on the potential barriers to the commercial development of biomethane projects within the energy market and the appropriate means of addressing such barriers. Participation within the group required members who were committed to providing resource to develop the evidence base and analysis.

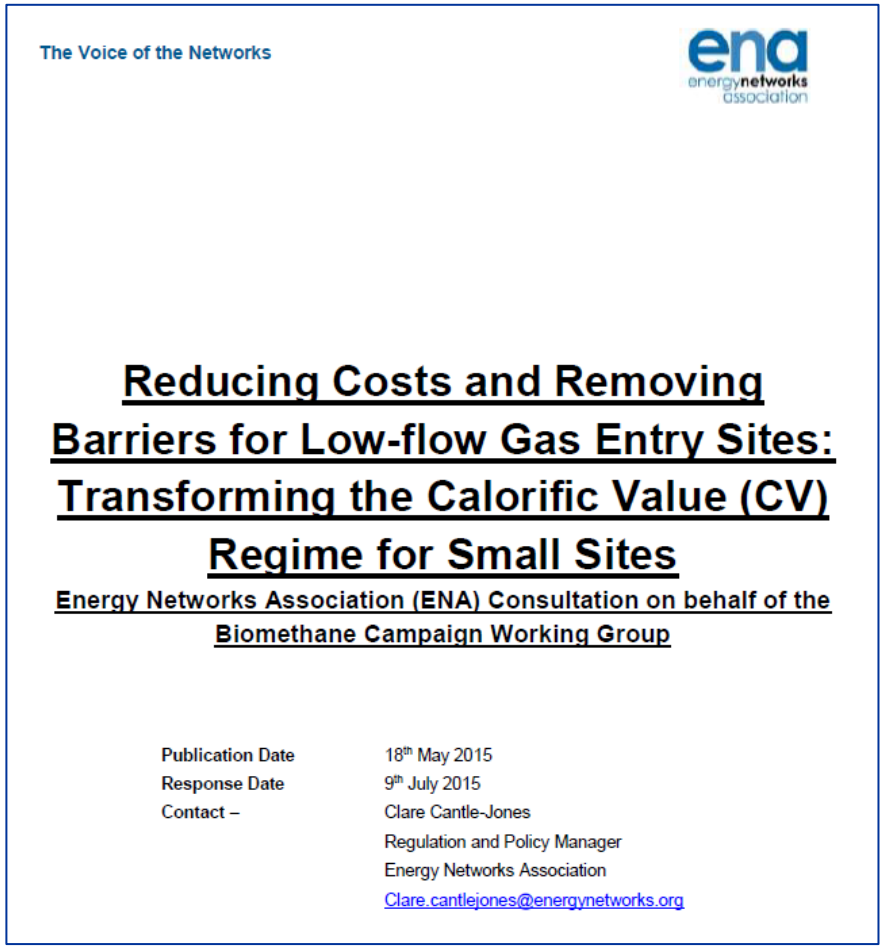
The EMIB review group was convened to support the UK Government's anaerobic digestion strategy and the related policy instruments, such as the Renewable Heat Incentive (RHI). DECC had indicated that the replacement of fossil natural gas with renewable natural gas from anaerobic digestion could contribute around 7 TWh/annum to the UK's renewable energy targets for 2020. Therefore the identification and removal of any unnecessary barriers (regulatory or otherwise) was an important enabling step. Ofgem was keen to facilitate debate on this important issue for gas market development, in support of Government and consistent with Ofgem's statutory duties in respect of promoting sustainable development and protecting consumers' interests. Ofgem's contribution, in addition to co-ordinating information and facilitating debate, was to provide advice to the group on how the current regulatory framework operated and what the effects of regulatory change might be.

2011 adopted existing rules that were not appropriate for low flows and lead to very high CAPEX and OPEX

- A biomethane injection point is treated the same as a main entry point into a GDN network
  - GDN network that may supply 1 million customers
  - The design philosophy is that the plant can never stop flow
- For biomethane there is already a robust system to ensure no H_2S/Wobbe issues
  - Bring CV measurement in as well

Review of Ofgem Injection Rules

2015 – Proposals to Reduce costs



The Voice of the Networks

ena energynetworks association

Reducing Costs and Removing Barriers for Low-flow Gas Entry Sites: Transforming the Calorific Value (CV) Regime for Small Sites

Energy Networks Association (ENA) Consultation on behalf of the Biomethane Campaign Working Group

Publication Date	18th May 2015
Response Date	9th July 2015
Contact –	Clare Cantle-Jones
	Regulation and Policy Manager
	Energy Networks Association
	Clare.cantlejones@energynetworks.org

- 2015 ENA consultation for low flow (<5,000m3/hr) sites
  - Option 1: No change to current regime
  - Option 2: Modified Letter of Direction
  - Option 3: Removal of the requirement to 'direct' low-flow sites
- Re-assess recommendation Option 3 – No letter of direction (no heated room!)
- Reduction in CAPEX by 50% and reduction in ongoing OPEX

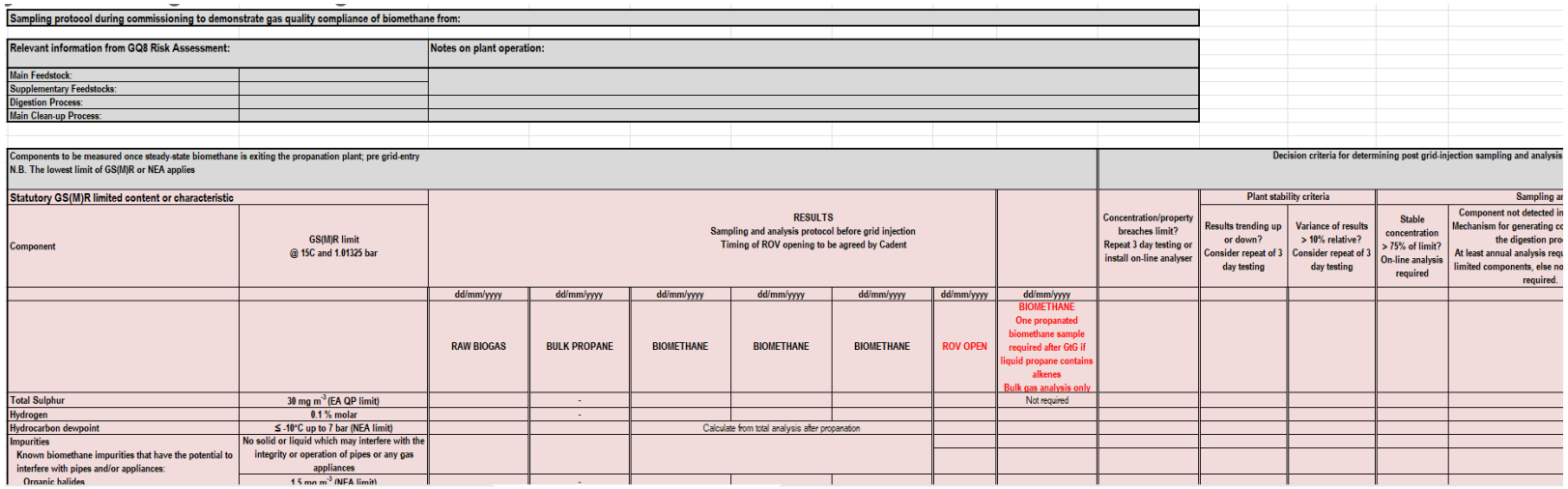
Category 2 – Discretionary items that can be done immediately

- Remove need to adopt RTU
  - Is RTU needed?
- Does the ROV need to be adopted?
  - Is ROV required?
  - Diverter valve is key asset

- Risk based and generic design assurance for plants which are substantially the same
  - 140 projects that are producing biomethane with no known out of spec gas injected into the grid in the last 7 years
  - Simpler if no adopted RTU and no ROV (as NGT)

Category 2 – Discretionary items that can be done immediately

- Simplify GQ/8 process for each new plant and reduce lengthy testing regime
  - Has any sample ever failed a test?
- Publication of gas quality data to build confidence
- Introduce flexibility in relation to temperature blips



Sampling protocol during commissioning to demonstrate gas quality compliance of biomethane from:

Relevant information from GQ8 Risk Assessment:		Notes on plant operation:
Main Feedstock:		
Supplementary Feedstocks:		
Digestion Process:		
Main Clean-up Process:		

Components to be measured once steady-state biomethane is exiting the propanation plant; pre grid-entry N.B. The lowest limit of GS(M)R or NEA applies		RESULTS Sampling and analysis protocol before grid injection Timing of ROV opening to be agreed by Cadent							Decision criteria for determining post grid-injection sampling and analysis				
Statutory GS(M)R limited content or characteristic										Plant stability criteria			Sampling ar
Component	GS(M)R limit @ 15C and 1.01325 bar	dd/mm/yyyy	dd/mm/yyyy	dd/mm/yyyy	dd/mm/yyyy	dd/mm/yyyy	dd/mm/yyyy	dd/mm/yyyy	Concentration/property breaches limit? Repeat 3 day testing or install on-line analyser	Results trending up or down? Consider repeat of 3 day testing	Variance of results > 10% relative? Consider repeat of 3 day testing	Stable concentration > 75% of limit? On-line analysis required	Component not detected in Mechanism for generating co the digestion pro At least annual analysis req limited components, else no required.
		RAW BIOGAS	BULK PROPANE	BIOMETHANE	BIOMETHANE	BIOMETHANE	ROV OPEN	BIOMETHANE One propanated biomethane sample required after GtG if liquid propane contains alkenes Bulk gas analysis only					
Total Sulphur	30 mg m^{-3} (EA QP limit)		-					Not required					
Hydrogen	0.1 % molar		-										
Hydrocarbon dewpoint	≤ -10°C up to 7 bar (NEA limit)			Calculate from total analysis after propanation									
Impurities Known biomethane impurities that have the potential to interfere with pipes and/or appliances: Organic halides	No solid or liquid which may interfere with the integrity or operation of pipes or any gas appliances 1.5 mg m^{-3} (NEA limit)		-										

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Date Reported ... 28/01/2022

SAMPLE DESCRIPTIONS
[redacted]

TEST	UNITS	BIOGAS
Date Sampled		17/01/2022
Time Sampled		11:45
Hydrogen Sulphide	ppm	320
Carbon Dioxide	%mol	42.25
Oxygen	%mol	0.34
Nitrogen	%mol	1.20
Hydrogen	%mol	<0.01
Methane	%mol	56.21
Ethane	ppm	<1
Ethene	ppm	<1
Propane	ppm	<1
Butanes	ppm	<1
Pentanes	ppm	<1
C6	ppm	<1
C7	ppm	<1
C8	ppm	<1

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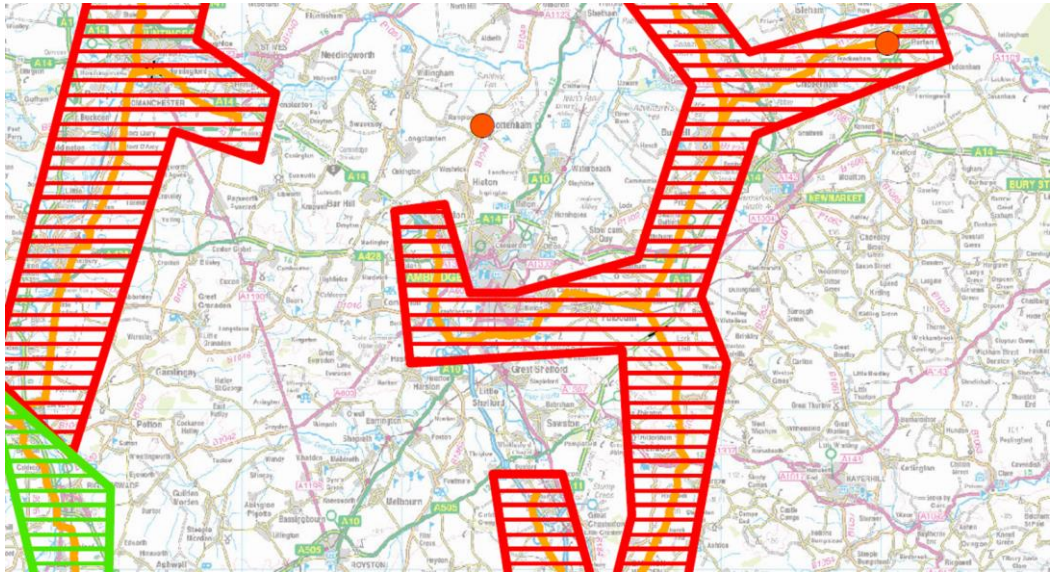
Category 3 – Support Reverse Compression

- Unlocks capacity for at least 20 projects
- Simple solution for minimum running hours
- Most AD projects lead time c. 18 months
- Low cost off shelf option to reduce O&M costs
- GDN adoption of RC assets feasible if GDNs could accept Bio-CNG Industry specification
- First commercial RC underway at High Bickington in WWU area, 10 months from start to finish, <£1.5 million for 2 compressors



Category 3 - Support Blending to Reduce Propane kWh

- Current restrictions mean only a few sites available for blending with 4 x the injection flow going past the connection point
- Aim to use AI to decide if blending for CV is possible without the need to install instrumentation
- Software modification will help (see Thyson presentation)
- Link to Hydrogen Blending Consultation currently underway
  - Hydrogen into NTS will reduce the FWACV in an LDZ which will reduce the amount of propane required
  - The biomethane industry must respond to this Consultation


GOV.UK

Home > Environment > Energy infrastructure > Low carbon technologies

Open consultation

Hydrogen blending into GB gas distribution networks

From: Department for Energy Security and Net Zero

Published 15 September 2023

Innovation

- How about a mini-innovation competition to reduce CAPEX and OPEX associated with biomethane?
- Replacement of present GEU (more like Netherlands) with reduced asset adoption
- Work with industry to innovate in areas such as:
  - Propane contamination
  - Reduce GEU to <£200k for low flows (300m3/hr)
  - LTS exit connection for <£50k
  - E-Methane integration

Conclusions

- Funding to support biomethane will be limited so we must reduce cost where we can
- Discretionary Category 2 and 3 items can be done now if the GDNs want to show enhanced support for biomethane
  - Reverse compression is very important
- The Category 1 change is important and valuable, the first stage is to have a look and see what can be done based on 8 years' experience since the last review