


EIC Biomethane Project – Briefing for REA

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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 CO_2 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
- Part owner of CNG Fuels Ltd, a company set up to build a national network of Bio-CNG stations on the high pressure grid
  - National network of CNG Stations
  - 84% saving in GHG compared to diesel
- Part owner of Barrow Shipping Ltd, GB's leading shipper of biomethane and a company that only buys and sells biomethane, no fossil gas
- 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
- Working on a number of H_2 and CCUS innovation projects

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Introduction

This three stage research study is being carried out by CNG Services (CSL) due to the following two reasons:

1. The uncertainty in the support of biomethane following March 2022 due to the end of the Renewable Heat Incentive (RHI).

2. The cost of getting biomethane into the market due to the MP/IP grid capacity being consumed in many areas due to the 110 biomethane projects that have been completed to date.

There are three separate stages as part of this overall research project:

1. Adapting and reviewing the CSL central injection hub model and associated economics to be applicable for the GB regime.

2. Adapting and reviewing CSL work on sewage biogas conversion of utilisation from electricity generation to biomethane injection.

3. Report on the mandatory requirements:
    - Including biogas to electricity plants.
    - Identifying areas with highest potential for new AD.
    - Identifying commercial barriers and opportunities.

Stage 1
Review Central Injection Hub Model and Associated Economics

Stage 1

- Stage 1 shall assess the current connection types to find optimal solutions for the GB regime.
- The study shall examine the technical feasibility, the financial cost and the environmental benefits when compared to each injection type.
- The four primary biomethane connection types to be considered are:
  - Scheme 1 – 2 & 7 barg grid connection
  - Scheme 2 – LTS or NTS grid connection
  - Scheme 3 – Virtual pipeline
  - Scheme 4 – Reverse Flow

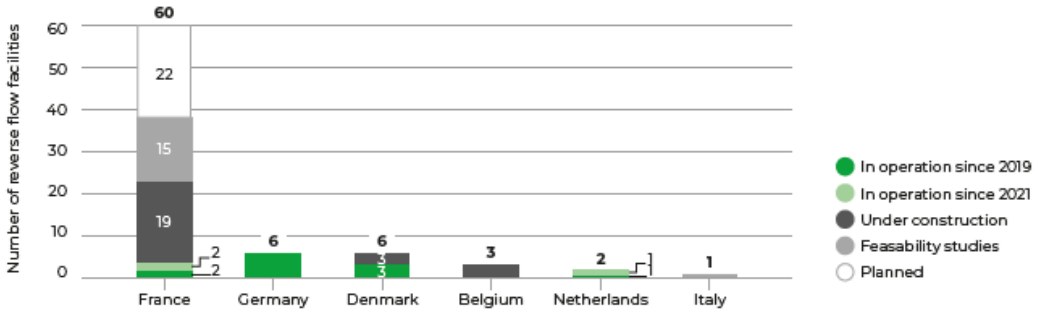
CSL have previously completed a Feasibility Study which reviewed these options:

1. Direct into 4 bar grid
2. Direct into 75 bar grid
3. Central CBM Decanting Hub (as Portsdown Hill)
4. Reverse Flow (as Cadent Doncaster and EU gas companies)

The conclusions were that:

- Direct into 2/7 bar is lowest cost option
- Next best is direct into 75 bar (especially if no propane is required)
- Next best was Reverse Flow (especially attractive for low running hours)
- Least attractive was the Central CBM Decanting Hub

Figure 7
Number of reverse flow facilities in selected European countries (TSO interviews, ENTSOG)[31, 32, 33]



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Stage 2 - Review sewage biogas conversion of utilisation from electricity generation to biomethane injection

CSL has supported 2 biomethane projects completed by Northumbrian Water Ltd injecting biomethane into NGN Grid at Howdon and Bran Sands. In each case NWL has converted Biogas CHP engines to natural gas CHP. The cost of each engine conversion was around £200k and there are technical challenges. The purpose of this report is to remove barriers to this conversion taking place by other water companies, with Report giving Deliverables as follows:

1. Identify existing quantum – total installed capacity and operational capacity across the sector (main focus is sewage biogas as they earn 1 X ROC, food waste ADs earn 2 x ROCS or FIT and harder for them to switch)
2. Review and benchmark current performance
3. Ascertain current operational profiles and drivers – whether the projects are fuel availability lead, mechanical availability influenced or operated to match site demands
4. Compare the electrical generation pattern to heat recovery and use – hence the effectiveness and efficiency of the schemes as CHP's
5. Identify the engine population and distribution by manufacturer
6. Based on the manufacturer distribution, determine the most likely alterations required to achieve conversion to run on natural gas
7. Consider equipment efficiency, and whether upgrades and refurbishment can also be used to improve the electrical efficiency of the installation, and similarly whether the change in fuel creates an uplift
8. Determine the most likely operational pattern and the range of operational scenarios which may be required – identify the key issues which may arise as a result of the run pattern. Consider hybrid operation at some locations where baseload and peaking are combined
9. Estimate the cost ranges for the various works, and any differences in cost which may occur as a result of varying operational practices
10. Undertake high level Cost Benefit Analysis of ROCs v RHI/GGSS/RTFC
11. Consider the carbon benefits of redirecting the Biogas for alternative use
12. Summary of barriers and opportunities

Stage 3 – Deliverable 4.2
Part 1 – Assess GB AD Biogas Sites

1. Locations, capacities, reach to gas network
2. Identify areas of network with clustering of AD sites
3. Infographic of opportunity by GWh/TWh energy wasted by GDN

This work is led by NNFCC using the NNFCC AD data base with CSL Support and input from the GDNs in relation to location of gas grid

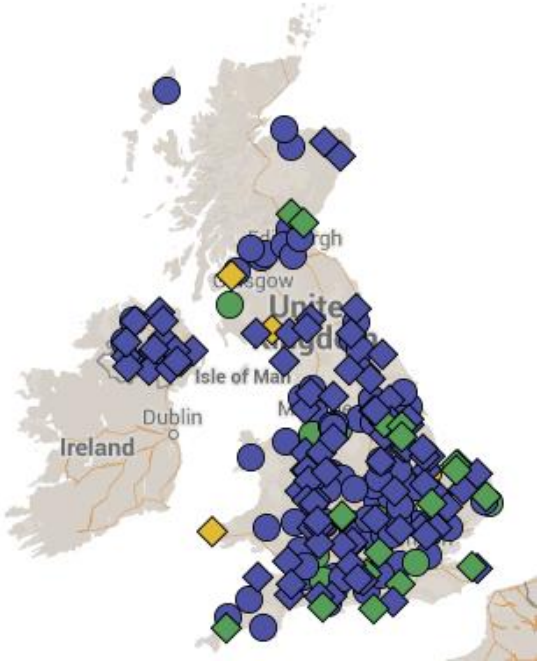
[Biogas Map | Anaerobic Digestion (biogas-info.co.uk)]

Plants can be filtered by the following categories:

- **Agricultural** – plants that use predominantly agricultural feedstock such as manures, slurries, crops and crop residues.
- **Waste** - plants that use predominantly municipal, commercial and industrial waste streams as feedstock.

Each is then further categorised by the end-use of the biogas:

- **Heat and/or Power (CHP)** – an anaerobic digester generating biogas which is burned on-site to generate heat, power or both
- **Biomethane to Grid (BtG)** – an anaerobic digester generating and upgrading biogas, to derive biomethane for injection into the national gas grid



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Stage 3 – Deliverable 4.2
Part 2 – Complete Cost Assessment

- Cost to convert large AD to (within reach) gas grid
- Cost of strategic injection hubs (one option per GDN as use cases
- Cost estimates to use learning from other projects (P50/P90 costs
- Identify funding mechanisms /tariffs required to unlock opportunity

This work is led by NNFCC using the NNFCC AD data base with CSL Support in relation to cost of strategic injection hubs and economics of CHP v Biomethane

NNFCC and CSL will work together on the tariffs/funding mechanisms needed to unlock the opportunity

Results shared with BEIS to feed into GGSS review