

Cadent

Your Gas Network

Biomethane gas to grid

Customer connection guide



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We are Cadent. Your gas network.

We own, operate and maintain the largest gas distribution network in the UK, providing our customers with the energy they need to stay safe, warm and connected.

Our networks

- 1** North West
- 2** West Midlands
- 3** East of England
- 4** North London



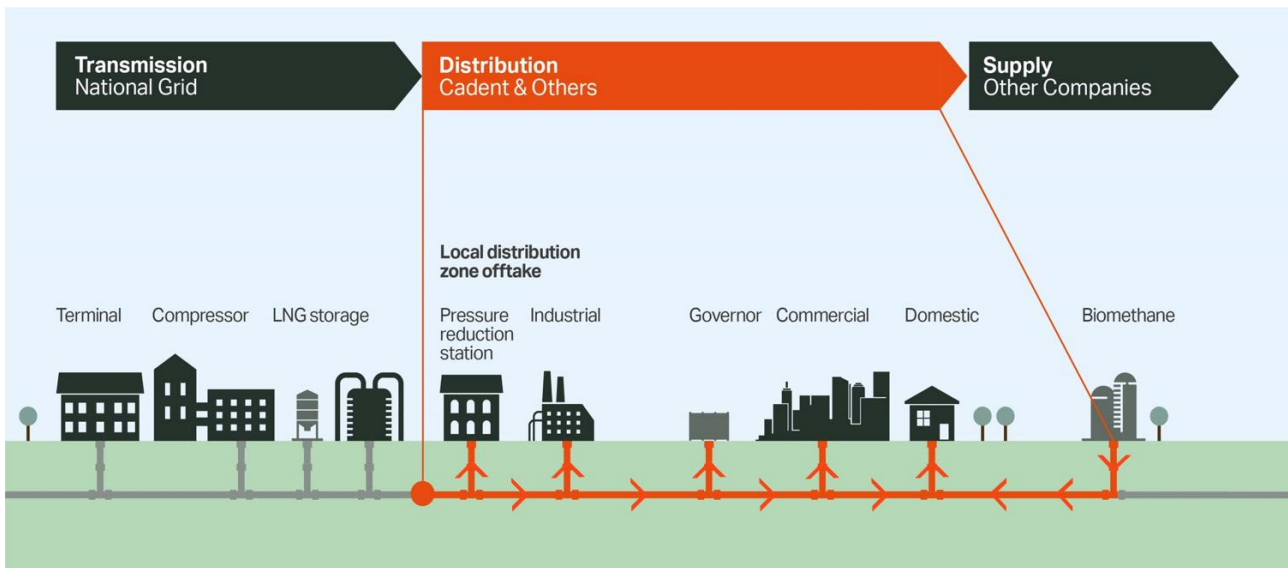
Facilitating biomethane connections

Our aim is to facilitate new entry connections to our gas distribution network that will enable biomethane producers to inject their renewable gas into our network.

The addition of biomethane into the gas grid will help the UK minimise its carbon footprint and use of unsustainable fossil fuels, whilst increasing the security and diversity of energy supplies.

How does the UK gas market work?

The diagram below provides a breakdown of how the UK gas network is structured to deliver gas to consumers, and where biomethane producers fit into this.



There are many different groups involved in the biomethane process. The commercial and contractual relationship model (see Page 5) shows the interaction between these parties.

Producers

Responsible for producing the gas. The gas produced must meet the quality requirements set out in the Gas Safety (Management) Regulations GS(M)R 1996. The producers must secure sales of their gas with a shipper before it can be injected into the grid.

Gas shippers

Convey gas in the pipeline network by contracting with the gas transporters, such as Cadent. Gas shippers must have a Gas Shipper Licence before taking part in any gas shipping actions.

Gas transporters – National Grid (transmission), Cadent & others (distribution)

Own and operate the gas transmission and distribution network, using the infrastructure to transport the gas from producer to end consumer. Transporters may take responsibility for quality testing and gas metering.

Gas suppliers

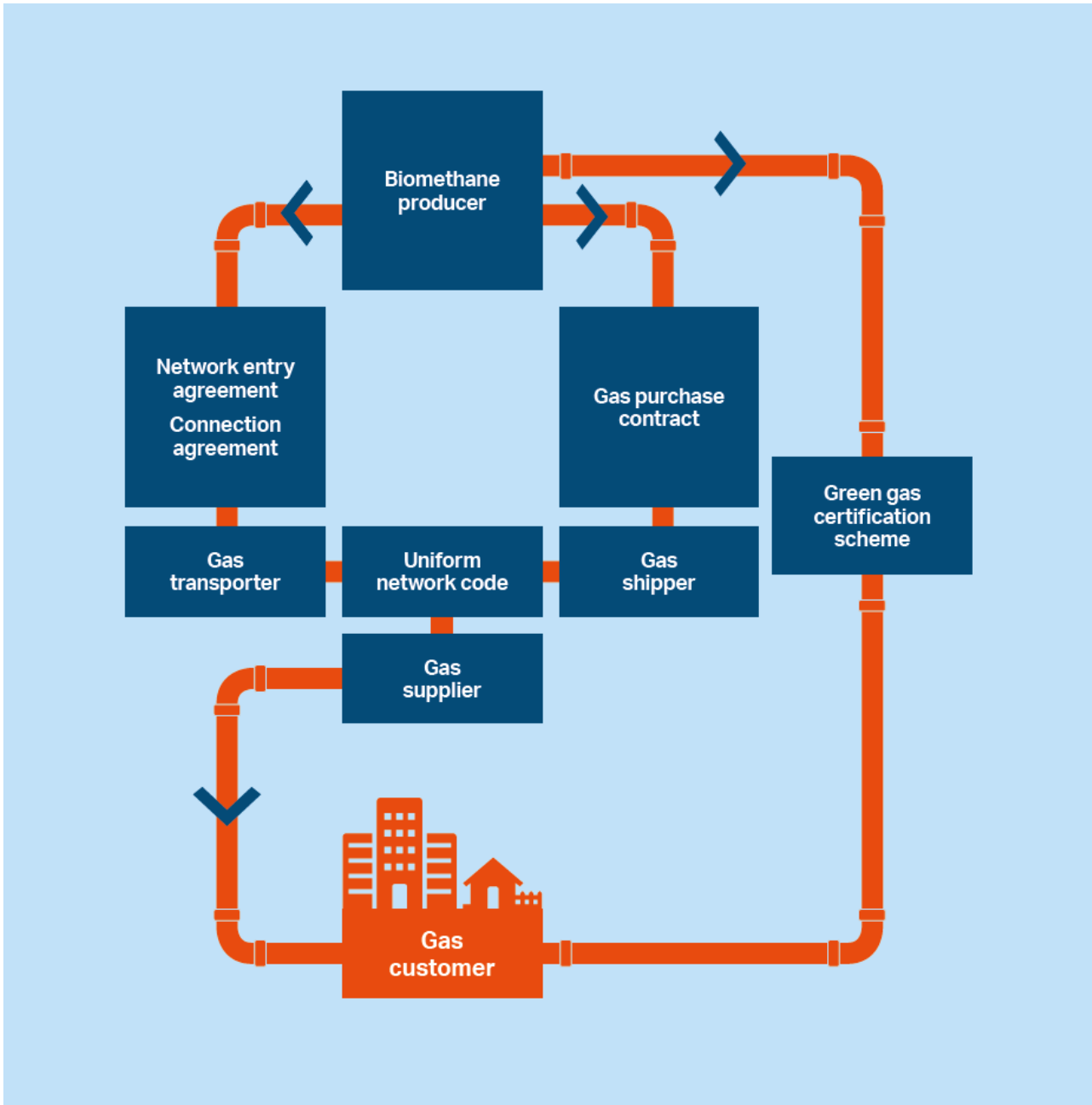
Responsible for customer interaction and providing an interface for consumers to purchase their gas. Suppliers must have a Gas Retailer Licence before engaging in any consumer contracts.

Customers

Purchase gas for residential, commercial or industrial use. They contract directly with gas suppliers to secure their gas.

Commercial and contractual relationships

The diagram below outlines the commercial and contractual relationships between the key stakeholders involved in transporting renewable biomethane through the gas network.



Why connect biomethane to the gas grid?

What are the economic benefits?

The Government is supporting the generation of renewable heat using the new Renewable Heat Incentive (RHI) tariffs. As a producer of biomethane, you will receive payments based on your heat output. The deadline for the Tariff Guarantee Scheme has now been extended until 31 January 2021, so there is now more time to benefit from the scheme.

On a national scale, the use of biomethane injection allows the existing gas infrastructure to help meet the UK's decarbonisation targets.

Changes to existing household appliances are not required as a result of using biomethane, allowing customers to benefit from this renewable energy without the cost and disruption of replacing existing appliances.

By contrast, a move to complete dependence on electricity for heating would require very significant investment in flexible generation and network reinforcement.

What are the environmental benefits?

The UK Government has set a target to achieve Net Zero greenhouse gas emissions by 2050. Analysis has shown that biomethane is one of the most prominent routes to providing an economical, secure energy supply whilst reaching these targets.

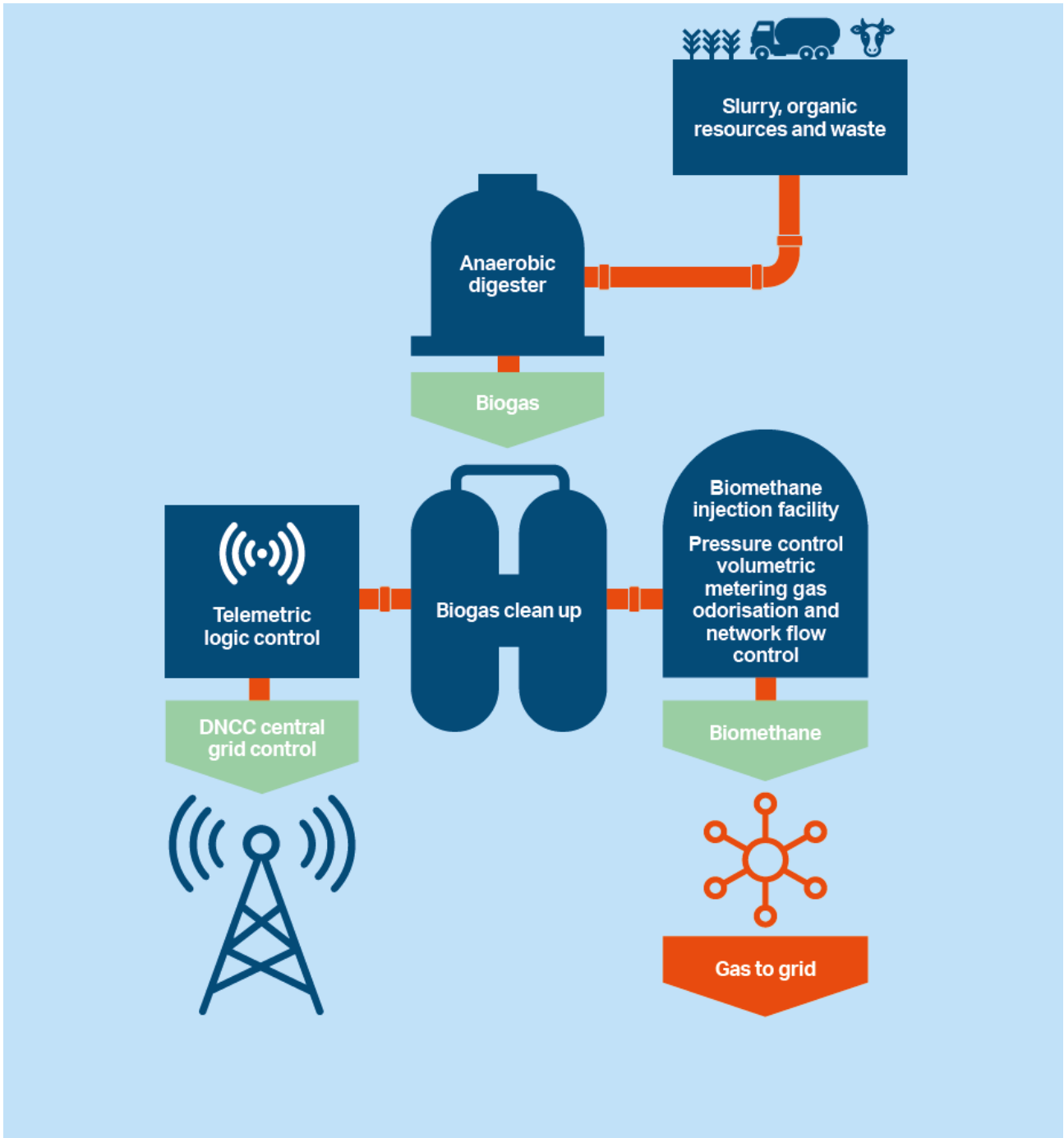
This is due to biomethane being considered a 'carbon neutral' energy source, as the carbon released originates from organic materials, which offset emissions during their lifetime.

By injecting your biomethane into the gas grid, you are greatly increasing the efficiency of the energy source by at least 90%, whereas using the gas directly for electrical applications harnesses only 30-35% of the available energy.

Furthermore, by diverting the waste from landfill, we can prevent methane, a large contributor to greenhouse gases, being released into the atmosphere.

The biomethane production process

As the graphic below demonstrates, there are several key steps involved in producing biomethane.



What's involved?

The production of biogas is performed by the producer, using either the anaerobic digestion or gasification processes. The biogas is then upgraded to a higher quality of biomethane for gas injection.

Propane may be required to be added by the producer to raise the energy content of the gas.

The biomethane must then be sold to a shipper before it is injected into the grid. Ofgem can provide a list of licenced shippers.

Once the biogas has been upgraded to biomethane, it will be transferred to Cadent's network entry facility. From here, the gas will be metered and the quality monitored. An odorant called Mercaptan will be injected to give the characteristic 'gas' smell.

Once these stages have been completed, the gas can be injected into the distribution network for transportation.

What about the legal factors?

As part of Cadent's obligations as a gas transporter, we must offer conditions for gas entry points under section D12 of the Gas Transporter Licence.

Biomethane is considered a safe source of energy, providing it meets all the Gas Safety (Management) Regulations 1996 – GS(M)R, which stipulate the quality of the gas that is acceptable.

The regulations also state biomethane must be enriched with propane so that target calorific values are met where appropriate. This will be site-specific, based on the feedstock and equipment being used. As with natural gas, the supply must be odourised so that leakage can be detected.

There are a number of governmental bodies who have responsibilities in the gas sector:

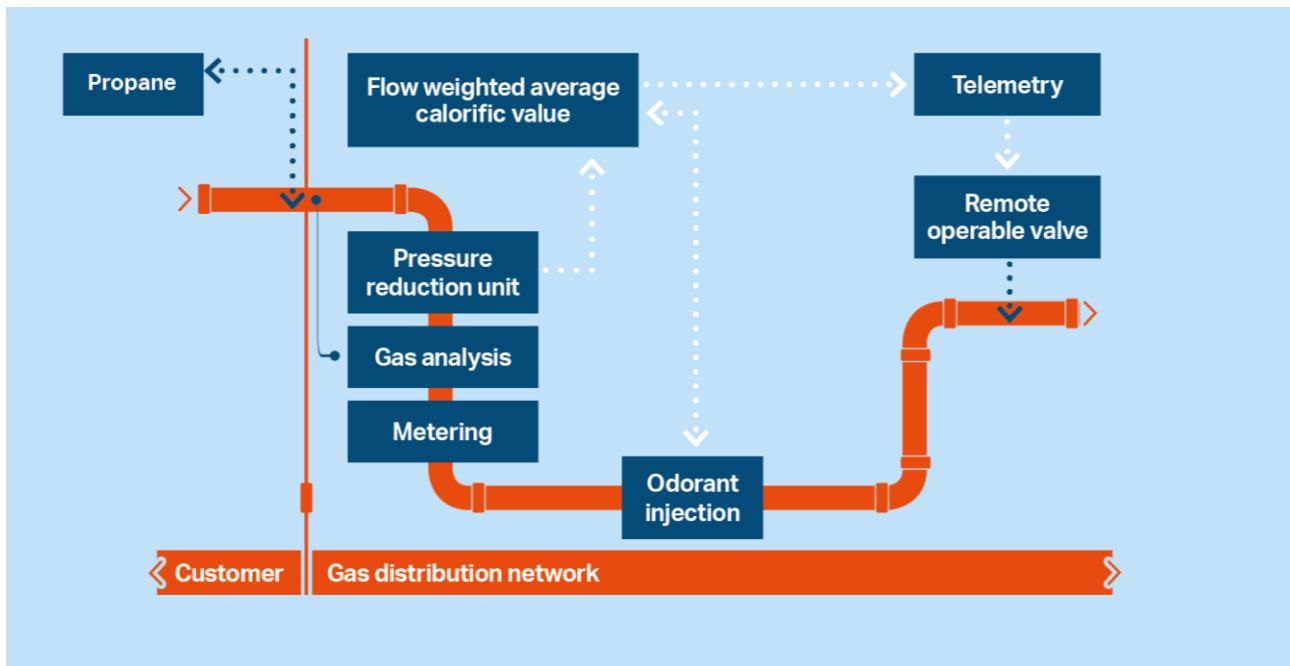
- **The Department for Business, Energy & Industrial Strategy (BEIS):** accountable for primary legislation of gas, such as the 1986 and 1995 Gas Act, the Competition Act 1998, the Gas Calculations of Thermal Energy Regulations 1996 and the GS(M)R 1996 mentioned above.
- **The Office of Gas and Electricity Markets (Ofgem):** responsible for economic regulation of the gas market.
- **The Health and Safety Executive (HSE):** responsible for the health and safety of the gas sector.
- **The Uniform Network Code (UNC):** a set of guidelines for all gas industry members that allows for market competitiveness. The UNC states that the biomethane producer must enter into a network entry agreement before gas may be injected into the grid.

For more information, please see the Further information page at the back of this booklet.

Our connection models

We have two different connection models, enabling our customers to choose their level of ownership and responsibility:

Maximum connection model



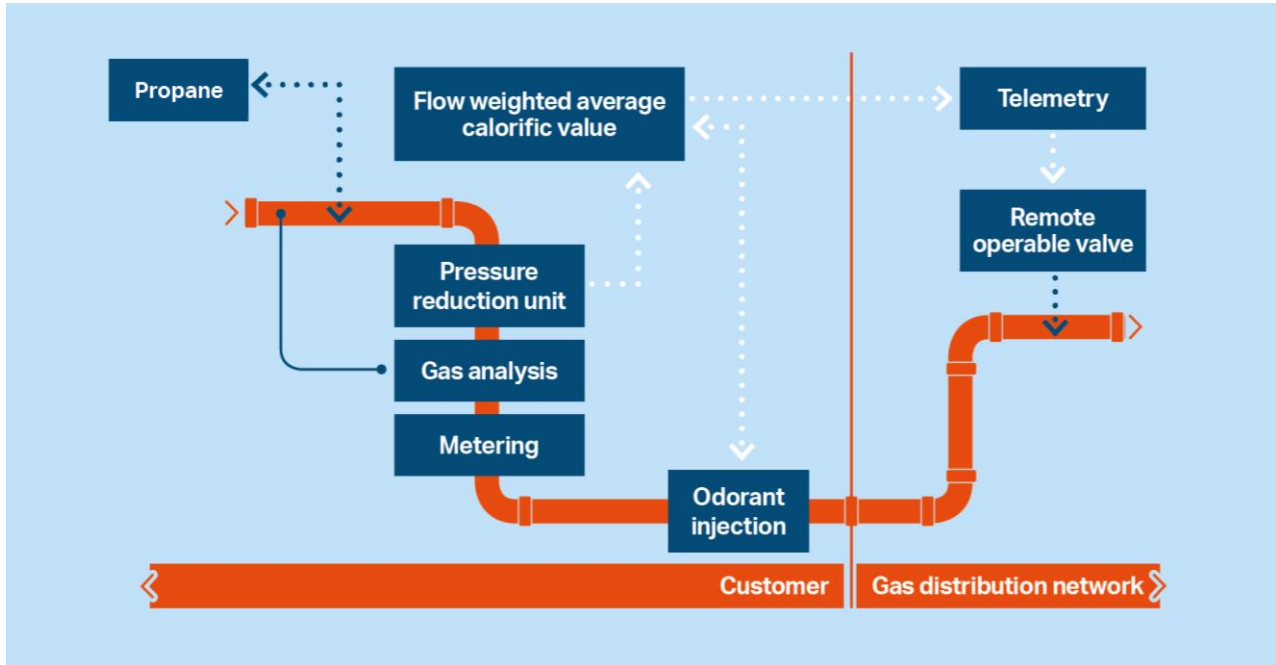
Under the maximum connection model, Cadent will have ownership and responsibility for all equipment contained within the injection facility. This does not include the activities upstream of the facility such as:

- The anaerobic digester
- The biogas clean-up plant
- Any enhancements to the calorific value (CV)

For delivery of the project:

We will procure and install the injection facility, as well as constructing and connecting the pipeline to our gas distribution network.

Minimum connection model



Under the minimum connection model, you take ownership and responsibility of the injection facility which includes:

- The metering equipment
- The gas quality monitoring
- The energy content measurement

For delivery of the project, you can ask that either:

- 1) WE procure and install the Remote Operable Valve (ROV) and Remote Telemetry Unit (RTU).
- 2) We construct and connect the pipeline to our gas distribution network.

Or

- 1) YOU procure and install the ROV and RTU.
- 2) You construct and connect the pipeline to our gas distribution network.

This latter delivery model supports both Utility Infrastructure Providers (UIP) and third-party connections providers, as long as these companies hold either the appropriate Gas Industry Registration Scheme (GIRS) accreditation or are suitably qualified and competent to carry out construction and connection to our higher-pressure pipelines.

In all cases, after commissioning Cadent will own and operate the:

- ***Remote Operable Valve***
- ***Remote Telemetry Unit***
- ***The pipeline from the ROV to the Cadent network***

This is subject to approval of the required specifications/designs and final adoption.

Our two connection models allow you to choose your level of ownership and responsibility for the equipment involved.

How do I get connected?

Step 1 – Initial enquiry

Complete our initial enquiry form, providing the following key information:

- Site location
- Postcode
- Estimated flow rate – standard cubic metres per hour (scm/h) of biomethane for injection into the pipeline grid network

We perform a high-level network analysis and mapping to assess whether a connection is possible. **There is no charge to you for this activity.**

Our initial enquiry form can be found at cadentgas.com/biomethane

In some instances, e.g. where there are no engineering difficulties, it may be possible for you to proceed directly to connection offer stage. Once we have completed your initial enquiry, we can advise you on the next steps.

TIMESCALE: 15 working days

Step 2 – Detailed Analysis Study (DAS)

Complete our DAS request form and read our terms and conditions. These can be found at cadentgas.com/capacity-enquiry

Following receipt of your signed form, you will be invoiced. Once we have received payment, the study will be completed and issued within 30 working days. There are two types of study:

1) Capacity Only study

This study will provide you with:

- Network entry connection options
- Network capacity flows and constraints

2) Standard study

This study includes the points outlined above, as well as:

- Indication of costs for Cadent to carry out the pipeline construction and connection
- Indication of costs for Cadent to procure and install the injection facility
- Plant and equipment required to be provided by the customer
- Details of proposed site and pipeline route

Once you have reviewed the study we can discuss next steps, or you can proceed to connection agreement when you are ready.

TIMESCALE: 30 working days to issue study following receipt of payment. 30-day payment terms for invoice

Step 3 – Customer application to connect

If you want to proceed to connection, simply complete and submit an application to connect.

You can find the application form on our website:

cadentgas.com/capacity-enquiry

Please submit your application form to:

box.nonstandardconne@cadentgas.com

Our Strategic Connections Team will make sure you are kept fully informed at every step of the process. We will validate and acknowledge receipt of your application form within two working days.

TIMESCALE: 2 working days

Step 4 – Contractual agreements

Connection Offer – Delivery Facility

We will aim to provide a connection offer within 15 days of receiving your application.

For the maximum connection model and in more complex scenarios, we may need to do additional work before issuing a connection offer.

For all entry connections, we will issue a connection offer that sets out both parties' obligations for the on-site works associated with the installation of the injection facility and the physical entry connection onto our gas network.

The costs outlined are an estimate and will be reconciled both during the project and following commissioning.

Connection Offer for the design and construction of pipelines to the LTS network (above 7barg) by third party

If you are connecting to our LTS pipeline, our 'Connection Offer – Delivery Facility' will cover the activities associated with installation of the injection facility, gas quality and hazardous operations, etc. Once you have accepted this connection offer, we will issue a Self Lay Contract to you for the construction and connection of the LTS pipeline, for works which will be undertaken by the self lay company you have selected to undertake the works.

Easements

You will be responsible for obtaining all easements associated with the pipeline route to facilitate the entry connection on the gas grid network, and if required, any associated leases required for the project.

Network Entry Agreement

You will be issued a draft Network Entry Agreement prior to site commissioning.

TIMESCALE: 15 working days for connection offer. Validity period 45 calendar days. 30 calendar days invoice payment terms

Step 5 – Technical assessment and design

Following receipt of your signed connection agreement and payment, we will contact you to arrange an initial meeting for relevant parties, where roles and responsibilities will be agreed.

Our technical team will support a joint meeting to discuss:

- Technical project risk assessment of gas quality
- Hazardous on-site operations.
- Initial Design Meeting
- Gas Quality Risk Assessment
- Hazards and Operability Study (HAZOP)
- Discussion of commissioning and hazardous on-site operations

We facilitate your design requirements dependent upon your preferred connection model to facilitate your Gas to Grid (G2G) date.

A brief timeline of deliverables is given below. These can change depending on the specifics of your connection. The deliverable timeline is calculated back from the G2G date (the date when you first flow biomethane into our network).

Document deliverable timeline

- 1) **Prior to construction:** all G17/GL5 documents to be submitted to Cadent for review and user acceptance.
- 2) **No later than 16 weeks prior to G2G:** G17/GL5 Part B Designs to be submitted to Cadent for review.
- 3) **No later than 12 weeks prior to G2G:** G17 Part C User Acceptance to be provided by Cadent.
- 4) **No later than 8 weeks prior to G2G:** G17/GL5 Part D documentation to be provided by installer.

TIMESCALE: Steps 5-7 are dependent upon the complexity of the project, and will be discussed as a part of the joint meeting detailed above

Step 6 – Build and installation

In the case of a minimum connection model where you are carrying out full installation of the injection facility and pipeline, you will need to submit the appropriate assurance documents to demonstrate that the equipment we will adopt has been built to our specifications and is fit for purpose.

We will review these documents and undertake design assurance as necessary, before civil works and on-site installation of the injection facility begin.

Document deliverable timeline

- 1) **No later than 8 weeks prior to G2G:** Quality Assurance (QA) packs to be submitted to Cadent for review and approval
- 2) **No later than 8 weeks prior to G2G:** Electrical Installation Certificates to be submitted to Cadent for review and approval
- 3) **No later than 4 weeks prior to G2G:** ME2, 10723, SAT test reports submitted for Cadent review and approval
- 4) **3 weeks prior to G2G:** End to End testing undertaken

Step 7 – Testing and commission

As part of the assurance process, you will provide us the results of on-site testing of the injection facility and associated equipment, to demonstrate that it has been installed correctly and it is fit for purpose.

We will approve the on-site test results and once completed, undertake joint testing to check that the signals from site to our Distribution Network Control Centre (DNCC) are fully operational.

You will need to carry out gas sampling on your raw biogas and biomethane in line with the sampling protocol and output of the Gas Quality Risk Assessment (GQ8) meeting. The results of these will be approved by Cadent and will demonstrate that your gas meets the quality specified in GS(M)R 1996.

We will issue a final Network Entry Agreement as early as possible before commissioning, which we will both need to sign before the G2G date. This sets out the technical and operational conditions for the plant on an enduring basis. This is a requirement of the Uniform Network Code and will cover responsibilities for the maintenance and operation of the connection and injection facility.

The injection facility will be ready to inject gas into our network once we have:

- Final sign-off for the pipeline and connection
- Approval from all Cadent departments that testing and assurance activities have been completed
- A dual signed Network Entry Agreement

Step 8 – Project close out and business as usual

We will carry out project financial reconciliation and provide feedback to you.

You (or your contractor) will need to provide any appropriate project document records to allow completion of the G/17 Part F. We will then hold a project close out meeting.

We welcome your feedback, and will carry out a review of the project with you to capture successes and areas for improvement.

As part of your enduring obligations under the Network Entry Agreement, amongst other things, you will need to provide:

- daily calibration files
- your planned maintenance schedule
- gas sampling test results to the timescales outlined in your sampling protocol
- test results associated with the measurement equipment, which should be carried out to the timescales outlined in the Network Entry Agreement
- details of any unplanned outages
- responses to any Ofgem inspections associated with the injection facility

It is also very important to keep both in hours and out of hours contact details up to date in case we need to contact the site.

TIMESCALE: We aim to carry out project closure within 6-8 weeks of commissioning

Case study: Future Biogas, Doncaster

Green gas made from locally grown farming break-crops including maize, grass and other biomass will fuel thousands of homes and businesses across Yorkshire with the region's very first commercial gas to grid project at Lindholme, near Doncaster, commenced in 2014

The state of the art facility was the first biomethane plant to be built and operated by Future Biogas, and processes 35,000 tonnes of feedstock, sourced from local farmers each year.

The farm break crops are fermented in an anaerobic digester to produce biogas, which consists of 60% methane. Volume and energy value of the biomethane is then measured to ensure it meets the requirements of the gas network before being injected.

The plant can produce up to 12,000 cubic meters of biogas per day – enough to heat 2,500 homes during peak demand in winter.





As a by-product, the process also produces a valuable organic fertiliser that will be used by the local farming community.

We are now working with Future Biogas to enable the site to inject more biomethane into our network.



Our successes

The biomethane landscape has been constantly changing over the last few years. We pride ourselves on listening to our customers and adapting our processes and procedures where possible to meet their changing requirements.

2010	<ul style="list-style-type: none"> • Introduction of IFI IFI mechanism introduced by Ofgem to encourage gas distribution networks to invest in R&D activities
2013	<ul style="list-style-type: none"> • FIRST Commercial 3rd Party Owned and Operated project connected – Energy Breakcrop 
2014	<ul style="list-style-type: none"> • FIRST Commercial Single Integrated kiosk using 90,000 tonnes of supermarket & domestic council waste • FIRST Commercial project connected to our >7 barg (LTS) network – Sewage waste • FIRST Commercial 3rd Party lay project connected to >7 barg (LTS) Network 
2015	<ul style="list-style-type: none"> • FIRST Commercial 3rd Party lay project connected to >7 barg (LTS) Network – operating at 42 barg using SLO framework  • FIRST Commercial LTS project trialing > 7 barg PE pipe (Hexel One) • FIRST < 7 barg project with 2 connection points on IP and MP • FIRST Commercial Arrangement for CNG filling station at Leyland on M6 
2016	<ul style="list-style-type: none"> • FIRST to connect 4 sites in a single day to allow customers to flow to beat RHI depression • Facilitate low flow commissioning and variable capacity commercial agreements
2018	<ul style="list-style-type: none"> • FIRST 'Additional Flow' project supporting expansion of existing network connection
2019	<ul style="list-style-type: none"> • SEVENTH Severn Trent Green Power connection – demonstrating Severn Trent's commitment to their sustainable agenda • 70 barg pipeline connection under SLO framework and investigation into removing pressure limit on biomethane oxygen exemption • G/23 TRIAL of Tee Blender kicked off to investigate novel technology for facilitating OPEX by reducing/removing requirement for propane injection
2020	<ul style="list-style-type: none"> • STRATEGY for blending under development to provide framework for blending following completion of G/23 Tee Blender trial

Further information

Useful references

Gas to Grid entry connection initial enquiries – renewables	renewablegas.ukd@cadentgas.com
Detailed Analysis Study and Connection Offer applications – non-standard connections	box.nonstandardconne@cadentgas.com

Government bodies

Department for Business, Energy & Industrial Strategy (BEIS)	gov.uk/government/organisations/department-for-business-energy-and-industrial-strategy
Ofgem	ofgem.gov.uk
Health and Safety Executive	hse.gov.uk
Department for Environment, Food and Rural Affairs	defra.gov.uk
Ofgem fact sheet	ofgem.gov.uk/ofgem-publications/64019/biomethanearenewablegas-sourcefs-pdf
Gas Law legislation	legislation.gov.uk/ukpga
Lloyds Register Gas Industry Registration Scheme	lr.org/en/energy/utilities-and-building-assurance-schemes/gas-industry-registration-scheme

Other

AD portal (NNFCC)

www.biogas-info.co.uk

If you would like any further information about the Biomethane Gas to Grid process or have any questions, please feel free to contact one of our team below.

- **Commercial/contractual customer care queries and support**
Rebecca Pratt, Design Senior Analyst – Sustainable Connections: 07866 117292
- **Technical customer care queries and support**
Tina Hawke, Design Manager – Entry Connections: 07825 676694

For more information, visit cadentgas.com/biomethane