



# **Biomethane Connection Guide**





This guide has been prepared to assist owners and/or developers of a Biomethane production facility to connect to the Kinecx Energy gas distribution network.





# About Kinecx Energy

- ⌘ Kinecx Energy was established in March 2005 when it was awarded a licence to develop the natural gas distribution network in ten key towns and cities across Northern Ireland.
- ⌘ Our network now extends to 35 cities, towns and villages across Northern Ireland. We have already invested over £200 million in developing our network, which now comprises over 2,200 km of pipeline. This network currently serves 75,000 customers.
- ⌘ Kinecx Energy is committed to a net zero carbon future and our ambitions are underpinned by the development of biomethane production in Northern Ireland.





# Biomethane Production and Injection into the Distribution Network

## Production

- ⌘ Biomethane is created from the upgrading of biogas which has been produced using the anaerobic digestion process.
- ⌘ The input or 'feedstock' can be any organic material such as food waste, farm and livestock waste.
- ⌘ Following cleaning and upgrading of the biogas the resultant biomethane may need to be enriched (with propane or bio propane) to increase the energy content to a suitable level, as measured by the calorific value (CV).
- ⌘ The Biomethane Producer is responsible for ensuring that the gas meets the appropriate gas quality requirements, as set out in the Network Connection Agreement (NCA) and Network Entry Agreement (NEA).
- ⌘ See Appendix 1 for further details regarding gas entry conditions.
- ⌘ Biomethane is now ready to be injected to the grid.

## Injection

- ⌘ The biomethane is then injected into the Kinecx Energy network via a Biomethane Entry Facility (BNEF).
- ⌘ The BNEF is where the gas will be metered, quality monitored and injected with odorant to give the characteristic 'gas' smell.

## Delivery

- ⌘ Once this is complete the gas can be injected into the distribution network for transportation along the delivery pipeline.
- ⌘ In order for a producer to inject gas into the gas network they will require a contract with a gas supplier.
- ⌘ The gas supplier must have a licence to supply gas within the Kinecx Energy network area, have acceded to the distribution to the distribution network code and completed the appropriate market assurance processes.



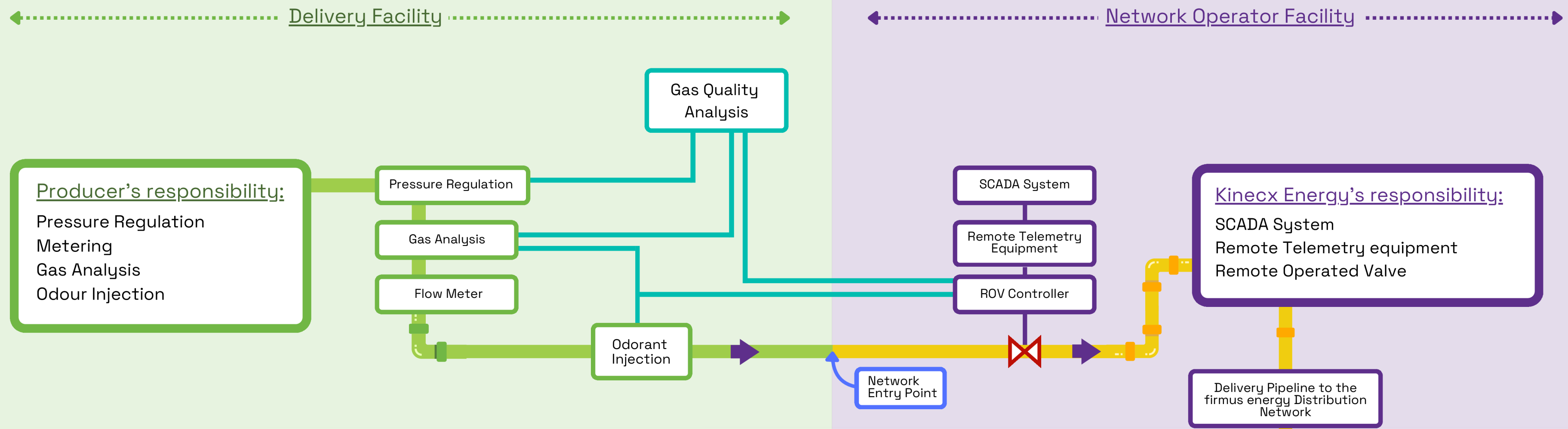
# Biomethane Network Entry Facilities (BNEFs)

The BNEF or Grid entry unit is the interface between the producer's site and firmus energy's distribution network. The specification for the BNEF is set out in the BIO/2 document available on request from firmus energy.



The responsibility for operation & maintenance of the facility by the producer/site owner & firmus energy is demarked by separate compartments within the unit. the producer will be responsible for building the BNEF to the required specification (bio/2). firmus energy will then adopt (transfer ownership from the producer to firmus energy) the Network Operator Facility (as set out in the diagram below).

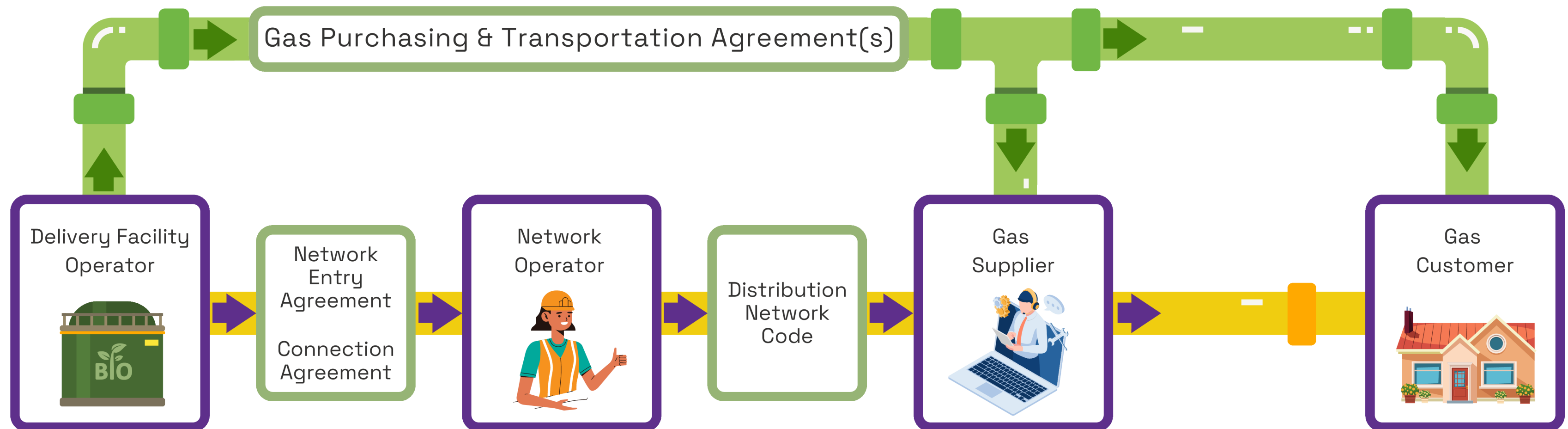
The producer must ensure that the site and the BNEF can be accessed by firmus energy and our contractor on a 24/7/365 basis.





# The Biomethane Injection Process – Who is involved - Overview

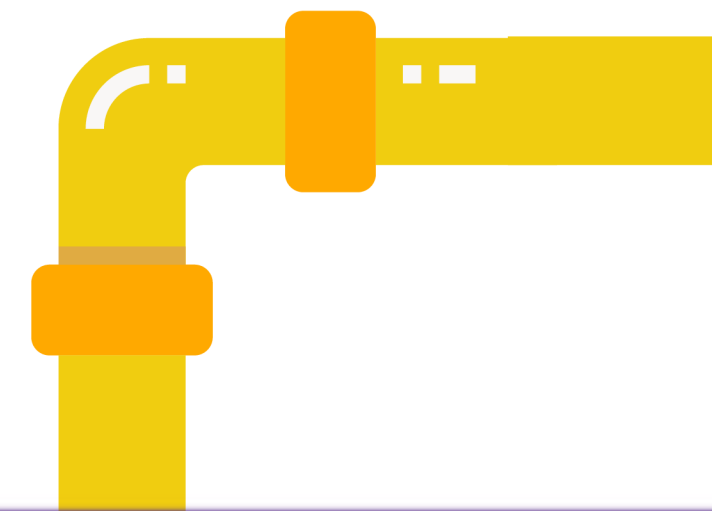
- ⌘ The Biomethane Producer must have a contract with a gas supplier before biomethane is injected into the gas network. Biomethane is injected into firmus energy's network via a Biomethane Network Entry Facility (BNEF).
- ⌘ Once these stages have been completed, the gas can be injected into the distribution network for transportation along the Delivery Pipeline.





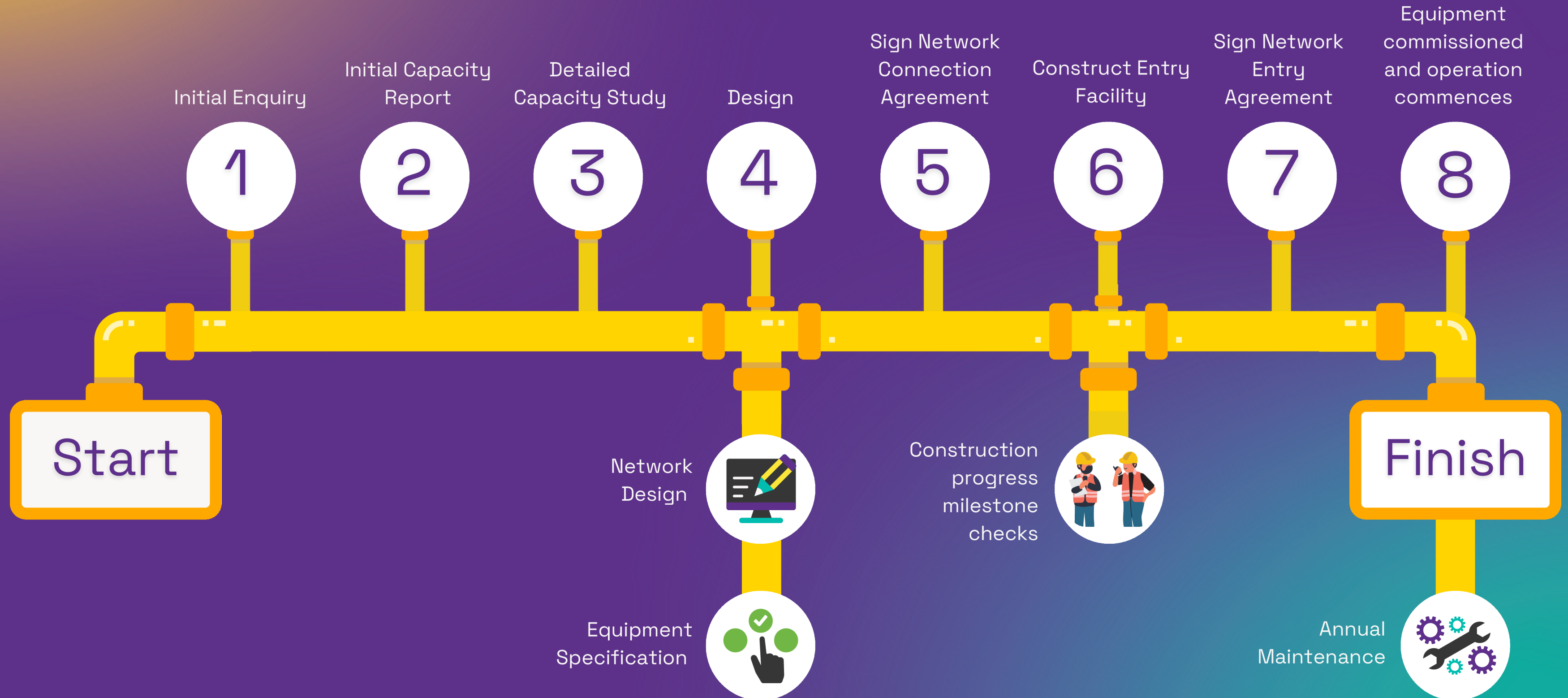
# The Biomethane Injection Process – Who is involved

| Role  | Description   | Role  | Description  |
|---|---|---|--|
| <b>Producers/ Delivery Facility Operator (DFO)</b>                                    | Responsible for producing the biomethane gas. The gas produced must meet the quality requirements set out in the Gas Safety (Management) Regulations (Northern Ireland) - GS(M)R (NI) 1997. These standards are specified in the network entry and connection agreements. The biomethane producer must secure the conveyance of their biomethane with a Gas Supplier before it can be injected into the network.  | <b>Utility Regulator for Northern Ireland</b> | Responsible for approving the charges for use of the gas network in Northern Ireland. They issue network operator and supplier licences to the relevant market actors as well as ensuring customer interests are protected through license obligation adherence and by approving regulated policies. |
| <b>Gas distribution network operator (Kinecx Energy, Phoenix Energy &amp; Evolve)</b> | Owns and operates the distribution pipeline network, using the infrastructure to transport the transmission network and gas from biomethane producers to end consumer.  | <b>Customers</b>                              | Purchase gas for residential, commercial or industrial use. The customer contracts directly with Gas Suppliers to secure their gas.  |
| <b>Gas transmission network operators (GNI UK &amp; Mutual Energy)</b>                | Owns and operates the high-pressure transmission system in Northern Ireland, taking gas from entry points such as interconnectors or producers and transporting it to system offtakes, including the distribution network areas in Northern Ireland.  |   |  |
| <b>Gas Network Operator (GMO NI)</b>  | Operates the gas transmission market for Northern Ireland, managing the commercial rules and all trading and transactional aspects of the gas transmission market in Northern Ireland on behalf of the Transmission System Operators.   |   |  |
| <b>Gas Suppliers</b>  | Responsible for the conveyance of gas through the distribution networks in Northern Ireland. They are also responsible for customer interaction and providing an interface for consumers to purchase their gas. Suppliers must have a Licence for the Supply of Gas In Northern Ireland, granted by the Utility Regulator before engaging in any consumer contracts. A list of licensed gas suppliers is available on the Utility Regulator Northern Ireland website: <a href="https://www.uregni.gov.uk/gas-licences">https://www.uregni.gov.uk/gas-licences</a> |   |  |





# The Connection Process - Overview





# The Connection Process - Steps 1-4

1

## INITIAL ENQUIRY

To begin the process the biomethane producer should register their interest and complete a biomethane entry enquiry form. This document will contain details such as:

- Contact details
- Site location
- AD Plant feedstock
- Expected gas volumes
- Estimated gas on date

3

## CAPACITY STUDY

Following instruction from the producer to progress the enquiry, a more detailed analysis will be completed. This will provide the producer with an in depth network analysis detailing any constraints that might apply alongside more detailed costings.

The capacity study is chargeable.

The cost is typically £2500 however the final cost will be confirmed prior to commencing any work.

4

## DESIGN

Our engineers will work up a detailed design for the delivery pipeline, outlining the route this will take and highlighting requirements to lay through private land or known difficult crossing obstacles such as rivers & bridges. The design phase will also consider the location of the BNEF.

This design will provide equipment specifications and detailed costings.

It will be the responsibility of the producer to secure any easements required for the pipeline.

2

## INITIAL CAPACITY REVIEW

Following an initial enquiry we will discuss the project and determine whether the connection is possible. If the initial enquiry appears to be feasible the next step will be to carry out a detailed capacity study. The initial capacity report will include:

- The location and pressure of the main in relation to the site
- The suitability of the main to accept the volume of distributed gas.
- A high level estimation of costs (indicative capital and operational costs)



# The Connection Process - Steps 5-8

5

## NETWORK CONNECTION AGREEMENT

The signing of the connection agreement by the producer and Kinecx Energy initiates the formal start date of capacity reservation, enabling the producer to commence the construction stage. This document sets out the obligations for the producer and Kinecx Energy for the installation, validation and commissioning of the BNEF before biomethane can be injected into the gas distribution network. This agreement will reserve capacity for 24 months, subject to progress milestones being achieved.

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## NETWORK ENTRY AGREEMENT

The network entry agreement must be signed a minimum of 30 days prior to the commencement of biomethane being injected to the grid. This contract will detail the conditions, limitations and rules regarding biomethane injection.

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## CONSTRUCT ENTRY FACILITY

Once the Network Connection agreement has been signed the producer should commence construction work on the BNEF. Kinecx Energy will agree a number of milestones along this journey which will need to be achieved to ensure the facility is completed within the 24 month capacity reservation period. If milestones are not met in a timely fashion the connection agreement may be forfeit. To prevent this arising Kinecx Energy will engage regularly with the producer to monitor and support progress toward the milestones.

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## EQUIPMENT COMMISSIONED AND OPERATIONS COMMENCED

Following completion of all construction and final inspections injection of biomethane into the Kinecx Energy network can commence.

# Overview of Approximate Costs

Once a submission is received an initial capacity review will give an outline of indicative costs with these further refined once the capacity study has been completed.



Pipeline to  
Connect to  
Main

Variable

SCADA &  
Connection  
Charges

c. £125,000

Upgrading  
& Propane

Variable  
depending on feedstock

Biomethane  
Network Entry  
Facility

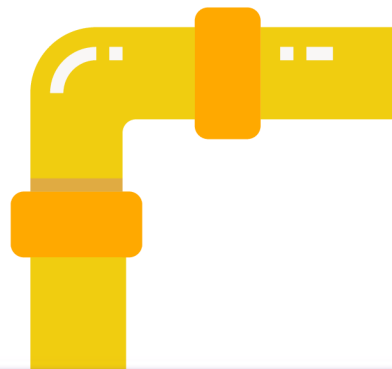
£800,000  
up to 200m

# Overview of Costs to Connect to the Network

Once a submission is received an initial capacity review will give an outline of indicative costs with these further refined once the capacity study has been completed.



| Type  | Category                                      | What does this include?   |
|-------|---|---|
| Capex | Detailed Capacity study                       | Assessment of the proposed biomethane injection on current network loads, pressures, network parameters and relevant flows from other known or imminent biomethane injection sites.   |
| Capex | Delivery pipeline                             | Site specific design and construction of the connection pipeline  |
| Capex | Network Connection Charge                     | <p>This one-off charge covers:</p> <p>Ongoing support services supporting:</p> <ul style="list-style-type: none"> <li>·Network related requirements regarding the design, development and installation of the BNEF associated workshops (Gas quality / HAZOP)</li> <li>·Factory and Site Acceptance Tests</li> <li>·work execution / project management (e.g. weekly co-ordination meetings).</li> <li>·Procurement of site telemetry / communications equipment and installation of SCADA into the Gas Control Centre.</li> <li>·Fully commissioning the BNEF's connection to the distribution network.</li> </ul> |
| Opex  | Operational, Maintenance and Emergency Charge | <p>This annual charge covers:</p> <ul style="list-style-type: none"> <li>·24-7/365 management and monitoring of SCADA.</li> <li>·Daily reporting, including any associated alarm activation (flow, out of specification gas / pressure control / high or low Calorific Value).</li> <li>·24-7/365 emergency response to the Network Operator Facility (containing the Remotely Operated Valve and associated telemetry).</li> <li>·Annual maintenance of the Remotely Operated Valve.</li> </ul>  |
| Repex | Replacement of Site Monitoring Equipment      | This charge covers the replacement of the site's monitoring equipment every 7-10 years.   |





# What is Included? - Opex and Repex

Once a submission is received an initial capacity review will give an outline of indicative costs with these further refined once the capacity study has been completed.

| Type  | Category                                      | What does this include?   |
|-------|---|---|
| Opex  | Operational, Maintenance and Emergency Charge | <p>This annual charge covers:</p> <ul style="list-style-type: none"><li>·24-7/365 management and monitoring of SCADA.</li><li>·Daily reporting, including any associated alarm activation (flow, out of specification gas / pressure control / high or low Calorific Value).</li><li>·24-7/365 emergency response to the Network Operator Facility (containing the Remotely Operated Valve and associated telemetry).</li><li>·Annual maintenance of the Remotely Operated Valve.</li></ul> |
| Repex | Replacement of Site Monitoring Equipment      | <p>This charge covers the replacement of the site's monitoring equipment every 7-10 years.</p>  |





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# Appendix 1 – Gas Entry Conditions (extract from Network Entry Agreement)

## 1 GAS ENTRY CONDITIONS

- 1.1 The Gas Safety (Management) Regulations (Northern Ireland) 1997, specifically Schedule 3 shall apply to these Gas Entry Conditions in relation to the System Entry Point.
- 1.2 The gas will comply with the System's statutory safety requirements, failing which the Network Operator shall be entitled to isolate the System Entry Point from the System.
- 1.3 Gas delivered to the System at the System Entry Point shall not contain any solid, liquid or gaseous material which would interfere with the integrity or operation of the System or any pipeline connected to such System or any appliance which a consumer might reasonably be expected to have connected to the System. In addition, all gas delivered to the System at the System Entry Points shall be in accordance with the following values:-

- |     |   |  |
|-----|---|--|
| (a) | <b>Hydrogen Sulphide</b>                  | less than or equal to 5 mg/CM.   |
| (b) | <b>Total Sulphur</b>                      | less than or equal to 50 mg/CM.  |
| (c) | <b>Hydrogen Content</b>                   | less than or equal to 0.1% (molar).  |
| (d) | <b>Oxygen Content</b>                     | less than or equal to 1% (molar) (subject always to HSENI consent), this may be modified by individual project exemption as agreed with HSENI  |
| (e) | <b>Hydrocarbon Dewpoint</b>               | not more than minus two degrees Celsius (-2°C) at any pressure up to the delivery pressure provided in paragraph (o).  |
| (f) | <b>Water Content</b>                      | The Water Dewpoint to be no more than minus ten degrees Celsius (-10°C) at [insert pressure]   |
| (g) | <b>Wobbe Number</b>                       | shall be between 47.20 MJ/CM, and 51.41 MJ/CM.   |
| (h) | <b>Incomplete Combustion Factor (ICF)</b> | less than or equal to 0.48 (currently subject to an exemption granted by HSENI)  |
| (i) | <b>Soot Index (SI)</b>                    | less than or equal to 0.60 (currently subject to an exemption granted by HSENI)  |
| (j) | <b>Odour</b>                              | gas delivered to the System shall be odorised with odorant NB (80% tertiarybutyl mercaptan, 20% dimethyl sulphide), and the odorant injection rate will be 7 mg/scm and may be varied at the Network Operator's written request between 4 mg/scm and 8mg/scm |
| (k) | <b>Carbon Dioxide</b>                     | less than or equal to 2.5% (molar).  |



## Appendix 2 – Gas Entry Conditions (extract from Network Entry Agreement)

- (m) Gross Calorific Value** shall:-  
be within the Acceptable CV Tolerance;  
For the purpose of this paragraph (m) the Acceptable CV Tolerance shall be:  
(i) a default value of plus or minus (0.5) MJ/CM around the Target CV;  
(ii) where necessary revised and notified to the DFO by the Operator [no later than D-1]; and  
(iii) in any event, no lower than 36.9MJ/CM nor higher than 42.4 MJ/CM.  
For the purposes of this paragraph (m), the Target CV shall mean the calorific value of gas (the calculation of which shall be determined by the Network Operator) which the Network Operator reasonably estimates it will be accepting for delivery into the Network from the System Entry Point on the relevant Day; as from time to time notified by the Network Operator to the DFO as set out below, it being acknowledged that the Network Operator shall not have any liability whatsoever to the DFO, the Delivery Facility owners or any other person should its estimates above prove to be incorrect.  
The Network Operator shall inform the DFO not later than the last Business Day of each calendar month of the Target CV that the DFO must achieve during each Gas Day in the following month unless otherwise requested at shorter notice by the Network Operator in accordance with the remainder of this paragraph (m).  
In the event that the Network Operator does not inform the DFO of a Target CV on the last Working Day of the prevailing calendar month then the Target CV for that prevailing month shall be deemed to apply to the subsequent calendar month.  
If the Network Operator or the DFO wishes to change the Target CV in respect of the Gas Day D between 18:00 on D-1 Gas Day and 04:00 hours on Gas Day D then it shall be by agreement by both Parties. If the DFO believes that it cannot meet the Target CV (whether before or during the Gas Day) it shall inform the Network Operator immediately.
- (n) Delivery Temperature** shall be between zero and twenty degrees Celsius (0°C and 20°C).
- (o) Pressure** shall be that required to deliver gas into the System taking account of the back pressure as the same shall vary from time to time. The delivery pressure shall be not less than [insert pressure and value references].  
Incomplete combustion factor (ICF) and Soot Index (SI) have meanings as defined in Part 1 of schedule 3 of the Gas Safety (Management) Regulations (Northern Ireland) 1997.



## Appendix 3 – Gas Entry Conditions (extract from Network Entry Agreement)

1.4 In order to meet the calibration ranges for typical analysis equipment, unless agreed otherwise by the Parties (such agreement not to be unreasonably withheld or delayed), the concentration ranges of the following components in the gas delivered shall be as follows:-

| Component        | % (molar) |        |
|------------------|-----------|--------|
|                  | Low       | High   |
| Nitrogen         | 0.00      | 10.00  |
| Carbon Dioxide   | 0.00      | 2.50   |
| Methane          | 78.00     | 100.00 |
| Ethane           | 0.00      | 18.00  |
| Propane          | 0.00      | 7.00   |
| i-Butane         | 0.00      | 1.00   |
| n-Butane         | 0.00      | 1.00   |
| Neo-Pentane      | 0.00      | 0.35   |
| i-Pentane        | 0.00      | 0.35   |
| n-Pentane        | 0.00      | 0.35   |
| 2 Methyl-Pentane | 0.35      | 0.35   |
| N-Hexane         | 0.00      | 0.35   |

1.5 The Parties acknowledge that the Network Operator will require the approval of the Health and Safety Executive for Northern Ireland (HSENI) prior to being able to agree to any change to the concentration ranges referred to above, and the Network Operator will act reasonably in seeking approval from HSENI in an expedient manner, but the Network Operator confirms that it will not otherwise unreasonably withhold or delay its agreement to any such change.



## Appendix 4 – Gas Entry Conditions (extract from Network Entry Agreement)

1.6 Biogas contains compounds not found in Gas. In addition, biogas has a higher level of Oxygen than the limit prescribed by the Gas Safety (Management) Regulations (Northern Ireland) 1997 (GSMR) which requires an exemption from the HSENI in order to be injected into the System (see paragraph 1.3 (d) above). The limits for these additional compounds are contained in the table below:

- |                                       |                                  |
|---------------------------------------|----------------------------------|
| <b>(a) Siloxanes</b>                  | less than or equal to 0.5 mg/CM. |
| <b>(b) Volatile Organic Compounds</b> | less than or equal to 30 mg/CM.  |