REQUIREMENTS FOR INTEGRATED BIOMETHANE NETWORK ENTRY FACILITY

FUNCTIONAL SPECIFICATION

COVER NOTE

This functional specification has been prepared on behalf of, and approved by the following Gas Distribution Networks: National Grid, Northern Gas Networks, Scotia Gas Networks and Wales & West Utilities. It will be maintained and edited as necessary by the distribution networks jointly, following consultation with interested parties.

The functional specification sets out the broad requirements that must be complied with by any party seeking to inject biomethane into a gas distribution system. The specific requirements at any particular entry point will be specified with the Network Entry Agreement for that entry point. While the functional specification provides guidance on the requirements which are expected to apply in the majority of cases and be included in the relevant NEA, the Gas Distribution Networks necessarily reserve the right to carry out a risk assessment in each specific case in order to ensure that gas entering their gas distribution system is compliant with legislative requirements in the particular circumstances of each entry point.

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1 INTRODUCTION

The UK Gas Industry wishes to facilitate the connection of renewable gas supplies into its gas distribution systems. The injection of biomethane into the gas grids in the UK is still in its early stages with just a small number of pilot projects underway. However the number of projects is expected to expand considerably now that the UK Renewable Heat Incentive has been announced, which provides a financial incentive to biogas producers to inject biomethane into gas grids.

Existing biogas projects have employed bespoke designs of systems to inject biomethane into the gas grids, often based on equipment more commonly found in much larger scale natural gas systems. In order to facilitate connection therefore, it is essential that minimum functional requirements are set out so as to provide reassurance to GTs that such systems are fit for purpose and suitable to allow their legal obligations to be discharged, and to biomethane producers that such systems are appropriate to their smaller scale of operation.

2 SCOPE

This document sets out the overarching principles and minimum functional requirements to permit safe, efficient and fit-for purpose grid injection of biomethane. Ownership and responsibility for operation and maintenance of such "Biomethane Network Entry Facilities" (BNEF) may rest with the GT, the biomethane producer or a combination of the two. Three models are envisaged and these are discussed in Section 6 in more detail.

3 REFERENCES

3.1 LEGISLATION

SI 1996 No. 551 - Gas Safety (Management) Regulations 1996

SI 1996 No. 439 - Gas (Calculation of Thermal Energy) Regulations 1996

SI 1997 No. 937 - Gas (Calculation of Thermal Energy) (Amendment) Regulations 1997

3.2 DESIGN STANDARDS

3.2.1 INSTITUTION OF GAS ENGINEERS AND MANAGERS

IGE/GL/5 - Management Procedure for Managing New Works, Modifications and Repairs

IGE/GM/8 - Non-domestic meter installations. Flow rate exceeding 6 $m^3 h^{-1}$ and inlet pressure not exceeding 38 bar

IGE/TD/13 - Pressure regulating Installations for transmission and distribution systems.

IGE/SR/16 - Odorant systems for gas transmission and distribution

IGE/SR/25 - Hazardous areas classification of natural gas installations.

3.2.2 JOINT OFFICE OF GAS TRANSPORTERS

T/PR/ME/2 - Work Procedure for Validation of Equipment Associated with Measurement Systems for the Calculation of Mass, Volume and Energy Flowrate of Gas

3.2.3 NATIONAL GRID

T/PM/G/17 - Management Procedure for the Management of New Works

T/PM/G/19 - Management Procedure for Application of Model Design Appraisals

T/PM/GQ/8 - Management Procedure for Assessing the Requirement for Gas Quality, Calorific Value and Flow Measurement Systems.

T/PM/PT/1 - Management Procedure for pressure testing of pipework, pipelines, small bore pipework and above ground austenitic stainless steel pipework.

3.2.4 NORTHERN GAS NETWORKS

NGN/PM/G/17 - Management Procedure for the Management of New Works

NGN/PM/G/19 - Management Procedure for Application of Model Design Appraisals

NGN/PM/GQ/8 - Management Procedure for Assessing the Requirement for Gas Quality, Calorific Value and Flow Measurement Systems.

NGN/PR/PT/1 - Work Procedure for pressure testing of pipework, pipelines, small bore pipework and above ground austenitic stainless steel pipework.

3.2.5 SCOTIA GAS NETWORKS

SGN/PM/G/17 - Management Procedure for the Management of New Works

SGN/PM/G/19 - Management Procedure for Application of Model Design Appraisals

SGN/PM/GQ/8 - Management Procedure for Assessing the Requirement for Gas Quality, Calorific Value and Flow Measurement Systems.

T/PM/PT/1 - Management Procedure for pressure testing of pipework, pipelines, small bore pipework and above ground austenitic stainless steel pipework.

3.2.6 WALES & WEST UTILITIES

T/PM/GL/5 - Management Procedure for Managing New Works, Modifications and Repairs

T/PM/G/19 - Management Procedure for Application of Model Design Appraisals

T/PM/GQ/8 - Management Procedure for Assessing the Requirement for Gas Quality, Calorific Value and Flow Measurement Systems.

T/PM/PT/1 - Management Procedure for pressure testing of pipework, pipelines, small bore pipework and above ground austenitic stainless steel pipework.

4 DEFINITIONS

The definitions applying to this specification are listed below.

Anaerobic digestion - Biological process in which microorganisms break down organic matter in the absence of oxygen into biogas and digestate.

Biogas - Gas produced by anaerobic digestion of organic matter.

Biomethane - Methane-rich gas produced by upgrading of biogas.

Biomethane network entry facility (BNEF)	-	Facility to facilitate the injection of biomethane into gas distribution systems.
Delivery facility	-	The facility from which biomethane may be tendered for delivery at the LDZ System Entry Point.
Delivery Facility Operator (DFO)	-	The operator of the delivery facility.
Directed site	-	Site at which the GT has been directed by Ofgem to determine calorific value under Regulations 6(a) and 6(b) of the Gas (Calculation of Thermal Energy) (Amendment) Regulations 1997.
Gas Transporter (GT)	-	A body holding a licence under Section 7 of the Gas Act 1986 as amended by the Gas Act 1995 and by the Utilities Act 2000.
Liquefied Petroleum Gas (LPG)	-	Petroleum gas containing principally butane or propane stored and transported as a liquid under pressure.

5 PRINCIPLES

5.1 FUNDAMENTAL PRINCIPLES

1) The legal obligations upon the GT in respect of gas introduced into its gas systems by a third party, as set out in the GS(M)R and Gas(COTE)R, are such that criminal liability cannot delegated to a third party. The GT may therefore wish to retain control of key aspects of some or all parts of the BNEF including: ownership, design, operation and maintenance. The closure or the ROV shall be under the control of both the DFO and the GT. The opening of the ROV shall be under the sole control of the GT.

2) Gas not complying with the requirements of Part 1 of Schedule 3 of the GS(M)R shall not be injected into a gas grid unless an exemption has been granted by the Health and Safety Executive from a particular requirement. In such a situation the DFO and GT shall ensure that any requirements conditional to the granting of such an exemption are met.

3) Where the GT has been directed by Ofgem to determine calorific value, the facility and its operation shall be in accordance with the relevant Letter of Direction.

4) The costs associated with the capping of area calorific value in accordance with regulation 4A(1) of Gas (COTE) Regulations are disproportionate to the quantity of biomethane being injected. It is therefore essential that measures are taken to ensure that capping is avoided either by enrichment with LPG or, where technically and economically feasible, by blending with other gas being conveyed by the GT.

5.2 MEASUREMENT RISK ASSESSMENT

1) The DFO and GT shall participate in a measurement risk assessment in accordance with T/PM/GQ/8 to determine which parameters shall be monitored, the frequency of measurement and the speed of response of measurement system.

2) The recommended limit values shall be assessed by risk assessment.

3) The initial risk assessment shall set out those changes (e.g. change of feedstock to the Anaerobic Digester, equipment change, etc) that will require review of the risk assessment. In the event of one or more such changes, the risk assessment shall be reviewed. Where a particular parameter shows increased risk then a change in the monitoring scheme may be appropriate.

5.3 PROVISIONS OF THE DFO

1) The DFO shall provide biomethane to the BNEF that is compliant with the requirements of Part 1 of Schedule 3 of the GS(M)R, with the exception that it shall be unodorised.

2) Where the strategy for calorific value requires enrichment with LPG the DFO shall provide biomethane with a gross calorific value that equals or exceeds the target CV agreed with the GT on a daily basis.

3) Where the GT owns and operates the odorant injection equipment and the DFO owns and operates the metering equipment the DFO shall agree with the GT the interface between the metering and odorant injection equipment so as to permit control of odorant injection rate so as to achieve the required odorant concentration.

4) Where the DFO owns and operates the odorant injection equipment the DFO shall add odorant at the rate agreed with the GT. The GT may for operational reasons require injection at rates higher or lower than that generally required.

5) Where the DFO owns and operates the BNEF the DFO shall also provide to the GT's telemetry system signals from the BNEF of those parameters identified by risk assessment (see 5.2).

6) The DFO shall agree with the GT a local operating procedure for the management of non-compliant gas, including issue of TFA, advance notification of Remotely Operated Valve (ROV) shutdown and procedures for restoration of biomethane flow following ROV closure. This may or may not involve the installation of a diverter valve.

5.4 PROVISIONS OF THE GT

1) The GT shall provide full details of the format of data for the telemetry interface so as to enable the DFO to procure suitable equipment to achieve appropriate repeat signals.

2) Where the GT owns and operates the odorant injection equipment and the DFO owns and operates the metering equipment the GT shall agree with the DFO the interface between the metering and odorant injection equipment so as to permit control of odorant injection rate so as to achieve the required odorant concentration.

3) Where the GT owns and operates the odorant injection equipment the GT shall add odorant to meet its obligations under the GS(M)R.

4) The GT shall agree with the DFO a local operating procedure for the management of non-compliant gas, including issue of TFA, advance notification of Remotely Operated Valve (ROV) shutdown and procedures for restoration of biomethane flow following ROV closure. This may or may not involve the installation of a diverter valve.

6 ASSET OWNERSHIP AND OPERATING AND MAINTENANCE RESPONSIBILITY

6.1 ASSET OWNERSHIP MODELS

Assets associated with the BNEF are those that carry out the following functions:

a) Pressure reduction and control

b) Gas analysis for compliance monitoring

c) Metering

d) Odorant injection

e) FWACV functionality

f) Supervisory system

In addition, the following assets shall always be owned and operated by the GT:

g) The ROV

h) The telemetry unit

For the purposes of this functional specification, other functions required for production of biomethane are assumed to not be associated with the BNEF. Such functions include:

i) Biogas clean-up

j) Enrichment with LPG and control of calorific value

k) The biomethane diverter valve, if arrangements have not been made with the GT for disposal of non-compliant gas that may have entered the BNEF.

l) Compression, if biomethane is to be injected into distribution systems at pressures above 7 barg.

Three models of asset ownership are set out below. Note that the figures associated with the models are intended to show asset ownership and not the physical arrangement of equipment or devices associated with a particular functional block. In particular: the location of the ROV under Model 3; the location of compression; and the location of LPG enrichment with respect to the diverter valve may vary, depending on the requirements of individual GTs and arrangements agreed between the DFO and GT.

For the purposes of this functional specification it is assumed that the primary responsibility for operation and maintenance of any asset rests with the asset owner, although it is recognised that commercial arrangements may be put into place with third parties to delegate operation and maintenance.

6.2 MODEL 1 – THE "MINIMUM CONNECTION" MODEL

In this model the GT owns only the ROV and the telemetry unit. All other assets associated with the BNEF are owned by the DFO. Figure 1 shows the functional blocks and asset ownership for this model.

6.3 MODEL 2 – THE "MIXED CONNECTION" MODEL

In this model, the GT owns, in addition to the ROV and telemetry unit, the odorant injection asset. All other assets associated with the BNEF are owned by the DFO. Figure 2 shows the functional blocks and asset ownership for this model.

6.4 MODEL 3 – THE "MAXIMUM CONNECTION MODEL

In this model, the GT owns all of the assets associated with the BNEF. No asset associated with the BNEF is owned by the DFO. Figures 3 and 4 show the functional blocks and asset ownership for this model with the ROV located downstream of and upstream of the BNEF, respectively..

7 FUNCTIONAL REQUIREMENTS

7.1 PRESSURE REGULATION AND CONTROL

Pressure regulation and control is required to control pressure at the point of injection into the distribution system. As gas demand increases and pressure in the distribution system falls the pressure regulation and control system shall open the regulator to admit more biomethane. It is anticipated that demand will generally exceed biomethane flow and pressures in the distribution system will be so as to permit biomethane flow up to 100% of the agreed daily flowrate. The maximum flowrate of biomethane shall be controlled by assets upstream of the BNEF and not by the BNEF pressure regulation and control system. Demand in excess of biomethane flow will be satisfied by supplies of gas elsewhere in the distribution system. If demand should fall below the biomethane flow then the pressure regulation and control system shall close to reduce the biomethane flowing into the distribution system.

Pressure regulation and control shall be to IGE/TD/13.

7.2 GAS SAMPLING AND ANALYSIS

Gas sampling and analysis shall continuously or continually monitor biomethane being injected and provide confirmation that it is compliant with the requirements of Part 1 of Schedule 3 of the GS(M)R and that calorific value meets the minimum requirements agreed with the GT. A schedule of parameters that shall be monitored is given in Table 1.

Calorific value shall be determined using an instrument approved by Ofgem for determination of calorific values for the purposes of determining the number of kilowatt hours, under Section 12 of the Gas Act 1986. The instrument shall comply with the requirements listed in an appropriate Letter of Approval from Ofgem.

The gas sample point for monitoring of parameters in Table 1 shall be located upstream of the BNEF and upstream of the diverter valve, if installed by the DFO.

A facility shall be provided to permit representative spot samples of biomethane for laboratory analysis to be safely taken.

7.3 REMOTELY OPERATED VALVE

An ROV valve shall be supplied, which shall be capable of manual remote or automatic closure in the event of variation in biomethane outside of the agreed conditions given in Table 1, failure of odorisation, or inability to provide sufficient blending where this is practiced (see 8.1). A more detailed description of trip and reset philosophy is given in the Gas Quality and Supervisory system functional block. The means of actuation of the ROV shall be the choice of the GT.

7.4 METERING

Metering systems shall be designed in according to the principles of IGE/GM/8 – Part 1. The metering system shall meet the accuracy requirements of Table 2 and shall be based on any principle of operation that is acknowledged as suitable for this application.

Volume conversion devices for conversion of metered volume to volume at reference conditions shall take account of pressure, temperature and compression factor. Systems employing a flow computer are preferred, but alternative systems may be acceptable provided that the overall accuracy requirements of Table 2 are met. Whatever solution is chosen, instantaneous flow and integrated daily volume shall be available for acquisition by the FWACV functionality system (see Section 7.6) and instantaneous flow shall be available to the Odorant Injection system to enable delivery of odorant at the required rate.

7.5 ODORANT INJECTION

The odorant injection system shall be designed in accordance with the principles of IGE/SR/16, with appropriate allowance for the small-scale of operation of BNEFs.

The odorant injection system shall inject odorant in order to achieve - under normal circumstances - an odorant concentration of 6 mg/m^3 in the biomethane exiting the BNEF. In some circumstances variation from this concentration may be required in order to achieve satisfactory odour intensity and so the system shall be designed to achieve odorant concentrations over the range 2-16 mg/m^3.

Three options for odorant are available depending upon the required concentration and daily volume of biomethane injected:

a) Odorant NB - 80 wt% (± 2 wt%) TBM, 20 wt% (±2 wt%) DMS

b) Diluted odorant - Odorant NB 34 wt% (±2 wt%), hexane 66 wt% (±2wt%)

c) Diluted odorant - Odorant NB 8 wt% (±2 wt%), hexane 92 wt% (±2wt%)

The odorant injection system shall employ a suitable liquid pump; evaporative or wick odorisers shall not be used.

The odorant pump controller shall accept a signal from the metering system corresponding to the instantaneous flowrate of biomethane at reference condition and compute and control the required odorant injection rate to achieve the required odorant concentration.

The odorant tank at site shall be suitable for containing liquid odorant and be capable of being transported to facilitate re-filling by the appropriate service provider. Unodorised biomethane cannot be injected, so the design shall consider how the replacement tank is put into operation. The odorant supply shall be designed for around 6 months continuous site use at an odorant concentration of 6 mg/m^3 at maximum design flowrate.

An odour assessment test point suitable for use by trained rhinologists shall be installed downstream of the odorant injection point at a location agreed with the GT.

7.6 FWACV FUNCTIONALITY

The system shall deliver the functionality required for the FWACV regime, namely requirements set out in the Gas (COTE) Regulations and the conditions specified by both the Ofgem Letter of Direction for the BNEF and the Letter of Approval for the chosen CV determination device. Conditions currently specified include the following:

1) Acquisition and storage of gross CV from the approved CV determination device, together with a flag indicating its quality/suitability for use. For non-continual CV determination devices,

the System - CV determination device interface shall be such that only one value of each CV determination is acquired.

2) Acquisition and storage of instantaneous volumetric flowrate at the time of acquisition of gross CV.

3) Initiation of daily calibration of CV determination device.

4) Automated tests of apparatus and equipment at periods not exceeding 35 days in accordance with Regulation 6(e) of the Gas (COTE) Regulations. The facility to manually initiate tests of apparatus and equipment either by, or at the request of, the Gas Examiner. Provision of a report of results of automated or manual tests in accordance with Regulation 6(e) of the Gas (COTE) Regulations.

5) Calculation of the daily average CV at the end of each Gas Day in the manner specified by the Letter of Direction. This will require confirmation of the quality of individual records (records are Good if the CV determination device is operating within agreed limits) and averaging of only those records that are Good and for which gas is flowing past the sample point. In addition a flag shall be stored indicating whether the resulting daily average CV is Valid (i.e. the maximum time between Good records is less than 8 hours). Gross CV values during calibration or tests of apparatus and equipment shall not be included for averaging.

6) Acquisition and storage of integrated daily volume at the end of the Gas Day.

7) In addition to local storage of individual data acquired, appropriate means of secure transfer of data to the High Pressure Metering Information System (HPMIS) owned and operated by the GT. HPMIS currently accepts data as CSV files with appropriate check sum to ensure corrupted data is identifiable and not accepted. A list of files and file structure is provided in Appendix A.

FWACV functionality may vary if alternatives to the CV determination devices currently approved by Ofgem become available.

Any software and hardware solutions are acceptable provided they deliver the required FWACV functionality, but the GT will require demonstration that the required functionality has been delivered. In addition Ofgem may require testing and approval of some parts of or all of such software and hardware by their service provider.

7.7 GAS QUALITY AND SUPERVISORY SYSTEM

The Gas Quality and Supervisory system shall monitor biomethane quality signals from the BNEF instrumentation, the remote monitoring unit instrumentation and the delivery facility instrumentation. Monitoring shall be continuous or continual and provide confirmation that the biomethane injected into the grid is compliant with the requirements of Table 1 or any other parameters agreed by risk assessment (see 5.2). If blending is practiced (see 8.1) monitoring shall also provide confirmation that the biomethane-gas blend is compliant with the requirements of Table 1 for oxygen content and/or CV, as appropriate.

In the event of an excursion in any of the parameters in Table 1 or any other parameters agreed by risk assessment (see 5.2) the trip system shall initiate closure of the ROV and prevent further grid injection of biomethane.

The limit values in the parameters of Table 1 are indicative and site-specific values shall be agreed during design approval and may be subject to review if risk assessment confirms such a requirement (see 5.2). All alarms and trips shall therefore be configurable.

If closure of the ROV has been initiated because of non-compliance with the parameters in Table 1 or any other parameters agreed by risk assessment (see 5.2), then its subsequent opening shall be under the sole control of the GT.

8 VARIATIONS

8.1 REMOTE MONITORING UNIT

Monitoring of gas quality at a location remote from the BNEF may be required if comingling of biomethane with gas in the distribution system is practised. Two scenarios are envisaged where comingling may be carried out:

a) Where monitoring of oxygen content of the comingled mixture is a specific requirement of any exemption from the requirements of Part 1 of Schedule 3 of the GS(M)R granted by the Health and Safety Executive (see 8.1));

b) Where the requirement to enrich biomethane with LPG may be reduced or eliminated by determination of the calorific value of the comingled mixture.

The remote monitoring unit shall therefore contain a remote oxygen monitoring meter and/or a CV determination device approved by Ofgem as in Section 7.2, together with telemetry to send the measured values of oxygen content and/or CV of the comingled gas back to the main BNEF or the GT's telemetry unit as appropriate.

9 DESIGN APPROVAL

9.1 ASSETS OWNED BY THE GT

Design approval for all assets owned by the GT shall be managed in accordance with IGE/GL/5 and T/PM/GL/5 (for Wales & West Utilities) or the Management Procedure G/17 pertaining to the relevant GT (for other GTs). Note that if a valid model design appraisal for the BNEF is available then site specific design approval within Management Procedure G/17 by application of Management Procedure G/19 pertaining to the relevant GT is acceptable.

9.2 ASSETS OWNED BY THE DFO

For those assets owned by the DFO the GT shall be afforded the opportunity to review the design of interfaces to assets owned by the GT.

10 TESTING

10.1 ASSETS OWNED BY THE GT

Pressure testing of all pressure containing components and systems shall be carried out in accordance with Management/Work Procedure PT/1 pertaining to the relevant GT. Testing of electrical and instrument systems and equipment shall be carried out in accordance with BS 7671 and BS EN 60079-14.

10.2 ASSETS OWNED BY THE DFO

All pressure containing components and systems shall be shall be pressure tested and declared safe to commission by the DFO. Testing of electrical and instrument systems and equipment shall be carried out in accordance with BS 7671 and BS EN 60079-14.

11 COMMISSIONING AND INITIAL VALIDATION

11.1 GENERAL REQUIREMENTS

All personnel carrying out commissioning and initial validation shall be competent and adequately trained to do so.

A written commissioning procedure shall be agreed and shall take into account relevant Permit to Work procedures.

Initial validation shall be carried out in order to demonstrate the accuracy of the measurement system complies with the requirements of Table 2. Suitable systems, software or procedures shall be provided or agreed to ensure that compliance can be demonstrated.

11.2 ASSETS OWNED BY THE GT

Following satisfactory commissioning, validation of the flow and gas quality measurement system shall be carried out in accordance with the relevant parts of T/PR/ME/2 or an alternative documented procedure if appropriate.

11.3 ASSETS OWNED BY THE DFO

Following satisfactory commissioning, validation of the flow and gas quality measurement system shall be carried out in accordance with a documented procedure agreed with the GT.

Table 1: Parameters to be monitored and indicative limits to be applied

Parameter	Units	low limit	high limit
Delivery temperature	^{o}C	(see note 1)	(see note 1)
Delivery pressure	barg	(see note 1)	(see note 1)
Wobbe index	MJ/m^3	47.2	51.41
Incomplete combustion factor	-	not applicable	0.48
Sooting index	-	not applicable	0.60
Gross calorific value	MJ/m^3	(see note 2)	(see note 2)
Carbon dioxide	mol%	not applicable	2.5
H_2S	mg/m^3	not applicable	5
Water dew temperature (see note 3)	^{o}C	not applicable	-10
Odorant injection rate	mg/m^3	(see note 4)	(see note 4)
Odorant injection pump operation (see note 5)	-	not applicable	not applicable
Odorant tank level	-	(see note 6)	not applicable

Notes:

1. Limits for delivery temperature and pressure to be agreed during design review.

2. Targets for calorific value will be agreed during design review.

3. Water dew temperature to be calculated using the LRS equation of state at a pressure of 7 barg (for injection into below 7 barg systems) or at the highest anticipated pressure (for injection into above 7 barg systems).

4. Odorant injection rate (typically 6 mg/m^3) and high/low limits to be agreed during design review.

5. Confirmation is required that the odorant pump is operating.

6. Low level on odorant tank shall trigger alarm and at extra low level shall initiate closure of the process shut down valve.

Table 2: Accuracy requirements for metering system

Design daily volume	MPB (Note 1)		MPE (Note 2)	
	Daily volume	Daily energy	Daily volume	Daily energy
Less than 250,000 m^3	0.90%	1.0%	2.9%	3.0%
Greater than 250,000 m^3	0.09%	0.10%	1.0%	1.1%
Note 1: Compliance with MPB shall be deemed if |mean error| ≤MPB Note 2: Compliance with MPE shall be deemed if |mean error| + U(mean error) ≤MPE Note 3: Subject to agreement with Ofgem that the above accuracy requirements are "requisite to the calculation of daily calorific value" (see regulation 3.(3) (b) of the Gas (COTE) Regulations)				

Figure 1: Asset ownership under Model 1 ("Minimum Connection")

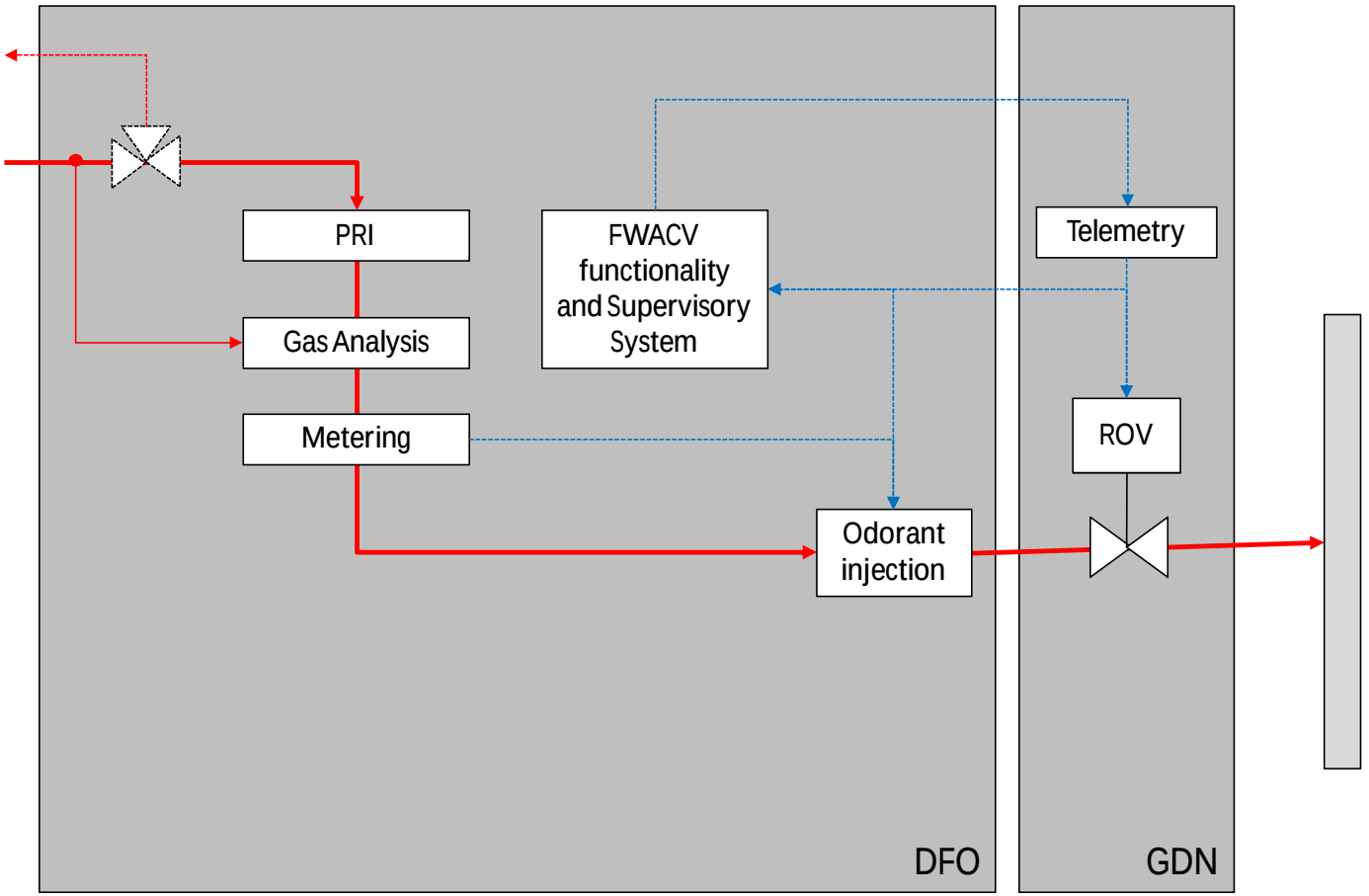


Figure 2: Asset ownership under Model 2 ("Mixed Connection")

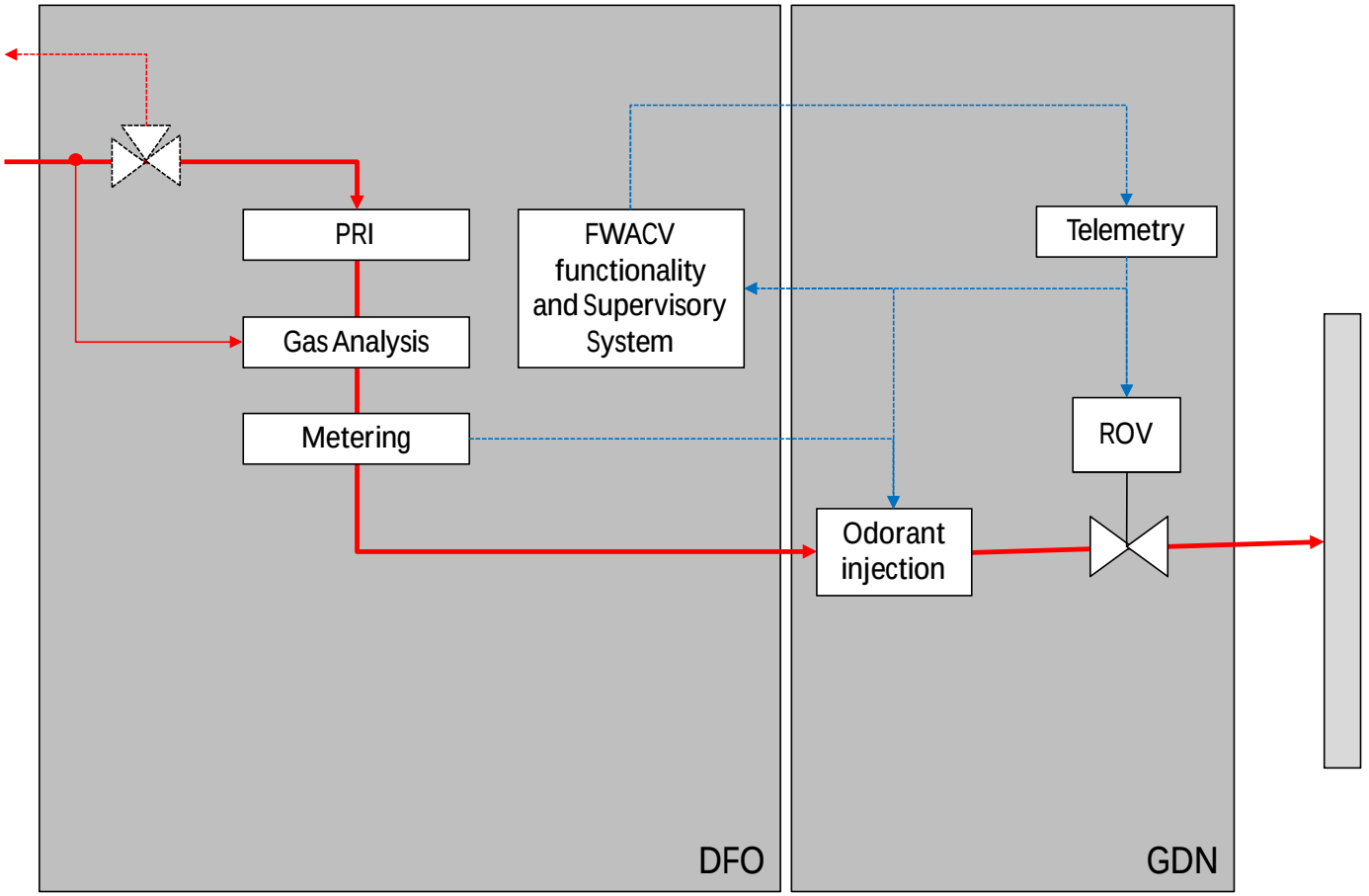


Figure 3: Asset ownership under Model 3A ("Maximum Connection – ROV downstream")

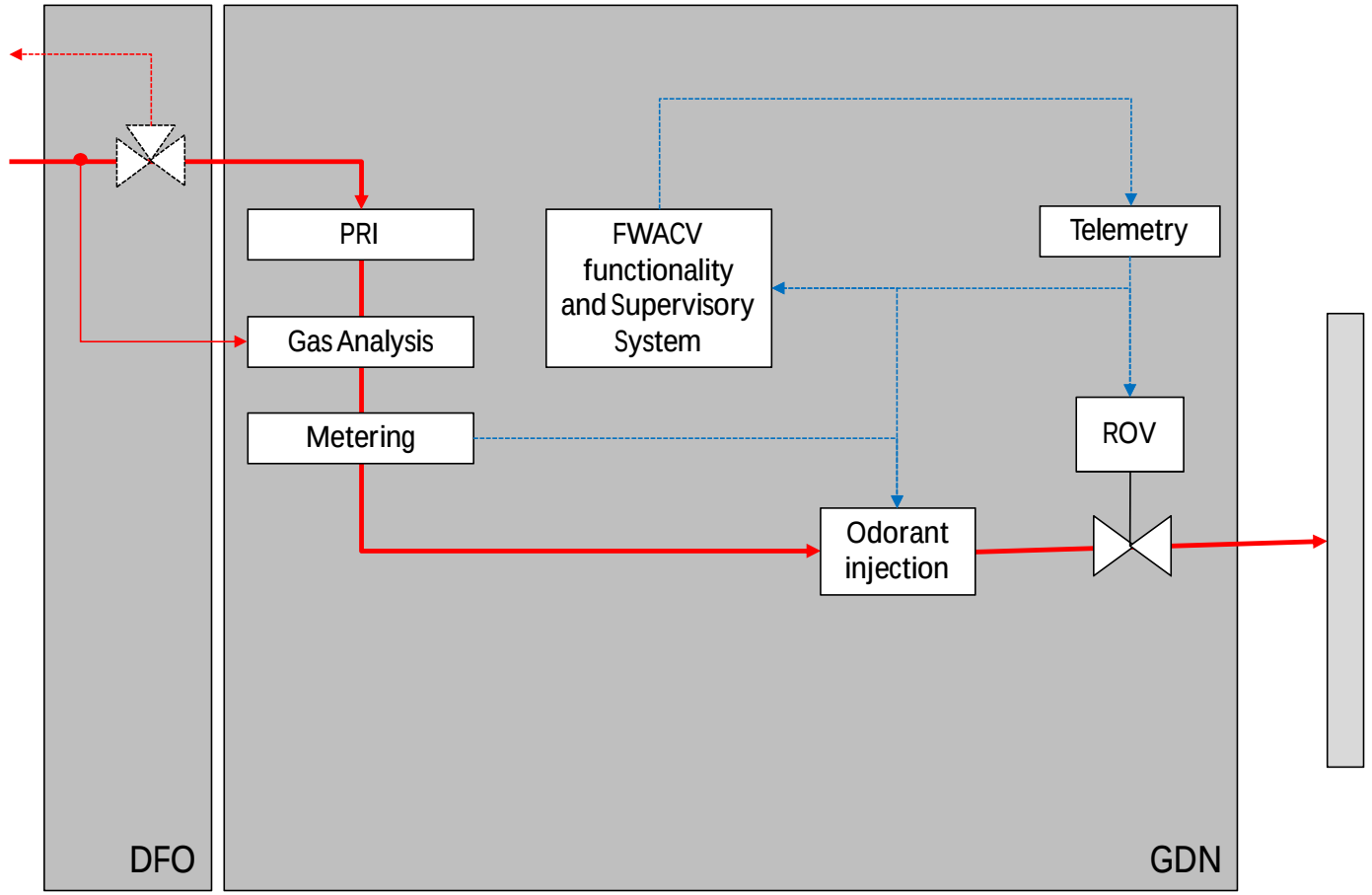
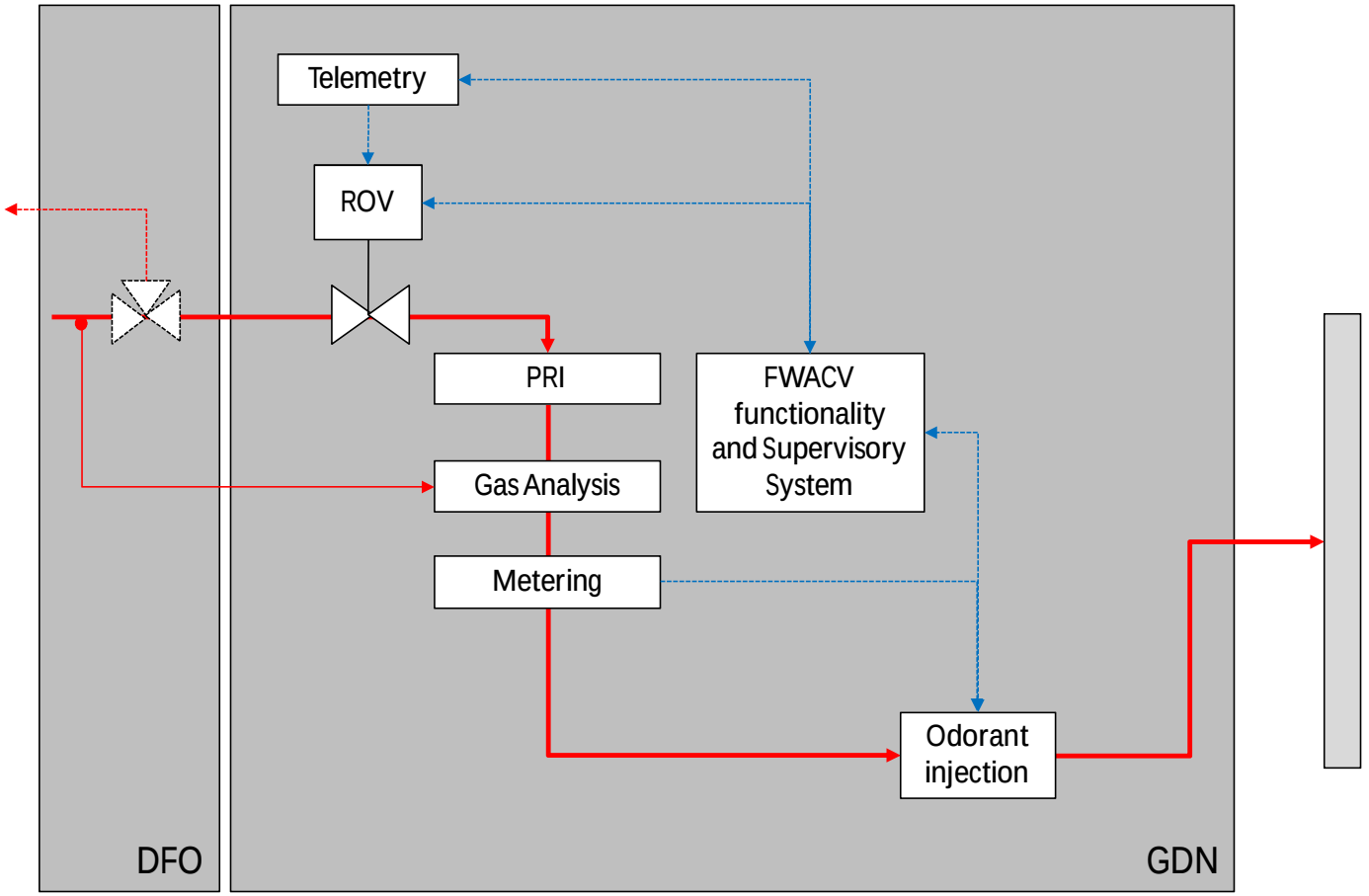


Figure 4: Asset ownership under Model 3B ("Maximum Connection – ROV upstream")



APPENDIX A

DATA FILES AND FILE STRUCTURE

INTRODUCTION

HPMIS is an Oracle database located at a central server and forms the basis by which many of the Gas Transporter obligations under the Gas (Calculation of Thermal Energy) Regulations can be managed. Data is imported as CSV files with a fixed data structure that must be adhered to if data is to be located correctly into the database.

The following Table lists the file naming and format for the daily average CV file to be returned from the BNEF.

The existing approved instruments are multi-stream and have between 3 and 5 gas streams: Stream 1 (calibration gas); Stream 2 (Gas Examiners' test gas) and Streams 3-5 (gas for analysis). For single-stream instruments that have neither calibration nor GE test gases, the extension ".ST3" is recommended for consistency.

HPMIS file name: Hsite.AByymmdd.Y0n.		
This file contains the results of the end of day averaging process and is generated at the end of the Gas Day (currently 06:00, although it is recommended that this is configurable). The stream number is indicated by "n".		
Line	Structure	Example
1:	Header comprising the Instrument number and location description followed by the name and version number of the software generating the data. (Under current arrangements the software that performs the averaging process is approved by Ofgem, so software name and version number must be included.)	"Instrument1234 at location: EODAVE v3.7"
2:	Time and date of the last record used in the file that contains individual CV data.	"06:02-20/01/2012"
3:	Stream number	3
4:	Blank (intentional)	-
5:	Indication if the average CV is valid (Y,N, or X)	Y
6:	Number of records used in the averaging process.	98
7:	Average CV (rounded to 1 dp using the normal rules of rounding).	38.5
8:	Blank? (Average RD)	0.6324
9:	Blank? (Number of records used in tracker averaging)	-

HPMIS file name: Hsite.AByymmdd.Y0n.		
This file contains the results of the end of day averaging process and is generated at the end of the Gas Day (currently 06:00, although it is recommended that this is configurable). The stream number is indicated by "n".		
Line	Structure	Example
10:	Blank? (Tracker CV)	-
11:	Blank? (Tracker RD)	-
12:	Blank? (attribution flag)	-
13:	Blank (intentional)	-
14:	Blank? (Total number of non-zero flow records in the file containing data for averaging)	-
15:	Blank? (24hr integrated flow)	-
16:	Blank? (24 hr integrated energy)	-
17:	Blank? (Sample gas minimum pressure and temperature)	-
18:	Blank? (Calibration gas pressure at end and temperature at calibration)	-
19:	Blank? (test gas end pressure and minimum temperature)	-
20:	Blank? (the two carrier gas cylinder pressures at end)	-
21:	Name of file containing the data that was averaged.	C:\DATA\DATA0101.ST3
22:	Configuration parameters for the for the averaging software: end of day time, loss of record time (hrs), stream sequence, FWACV flag, streams with a flow computer and the no flow time (hrs)	"06:00",8,"3","Y","3",0
23:	File terminator: @ plus 6 character checksum.	@XXXXXX