Measurement Error Report

Air Liquide Biogas Solutions Europe

MER/CAD/220/22 Biodynamic BNEF

Document Reference: NK3244C-001
Client Reference: PO 20220418

Document Author: Kenneth Wright

Contact: Kenneth.Wright@kelton.co.uk

Kelton Engineering Ltd
The Mackenzie Building, 168 Skene Street
Aberdeen, AB10 1PE, Scotland, UK
t: +44 (0) 1224 630000 | f: +44 (0) 1224 630004
e: info@kelton.co.uk | w: www.kelton.co.uk

Contents

1 Revision Control

Rev	Issue date	Description	Prep.	App.
1	27/10/2022	Issued for comment	KW	CJ
2	28/10/2022	Updated	KW	CJ

2 Executive Summary

Site Name	Biodynamic BNEF
DNO	Cadent Gas Limited
LDZ	East Midlands
Error Start Date	3rd July 2022
(Or) Last Good Date	
Error Corrected Date	4th July 2022
Size of Error (over or under read)	1556.22 Sm^3 over registration (0.02 GWh)
Error Description	Erroneous readings on Fiscal meter
Methodology	Comparison of Inlet meter and Fiscal meter flow readings
Meter Type	Ultrasonic meter
MER Unique Reference Number	EM014
Cadent Internal Reference	MER/CAD/220/22

3 Error Description

Biodynamic BNEF has a single 2" Sick FlowSic500 ultrasonic meter stream for measurement of gas exiting the grid entry unit (GEU) and entering the distribution network (referred to as Fiscal USM). A second 2" Sick FlowSic500 ultrasonic meter is located on the inlet to the GEU for process control (referred to in this report as Inlet USM). Propane injection is used to control the gas properties (e.g. calorific value, Wobbe number, etc.) to meet the requirements of the Gas Safety (Management) Regulations (GS(M)R). Gas that is not within specification is rejected by a diverter valve.

During normal operation the Fiscal USM will read slightly higher (~36 Sm^3/h) than the Inlet USM due to the addition of propane.

During the following dates, process upsets were noted:

- 04/07/22 00:30 – 15:00

4 Methodology

The offset between the Inlet USM and the Fiscal USM during normal operation was calculated from the periods of normal operation before 4th July (2nd July – 3rd July) and after 4th July (5th July – 6th July). The Fiscal USM volume flowrate was corrected by using the Inlet USM volume flowrate plus the average offset for that period when the fiscal meter should have been measuring continuously and also by setting fiscal meter flowrates equal to zero when the system was in recirculation mode and should not have been measuring.
Two sets of volume totals were calculated, one using the measured Fiscal USM flow and another using the corrected Fiscal USM flow, the error being the difference between the two. The volume flowrates for the Fiscal USM, the Inlet USM and the corrected Fiscal USM were plotted for the period between the 2nd July 2022 and the 6th July 2022 in Figure 1.

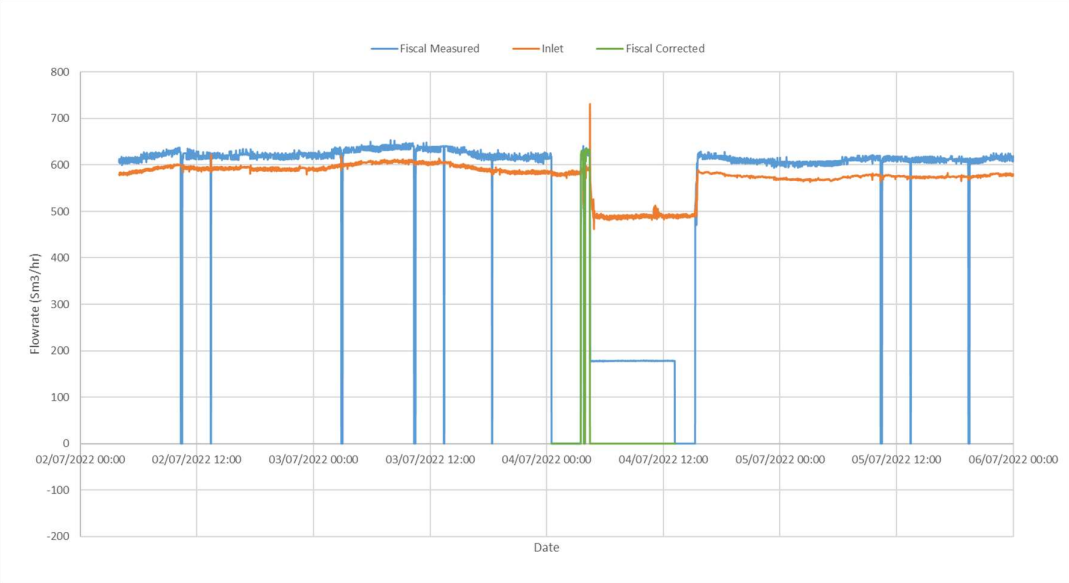

Figure 1 Volume flowrates for Fiscal USM, Inlet USM and corrected Fiscal USM

5 Error Quantification

The error is estimated to be an overall over registration of 1556.22 Sm^3. The errors for each day between the period of 3rd and 4th July 2022 are detailed in Table 1.

Gas Date	Total Error (Sm^3)
03/07/2022	98.04
04/07/2022	1458.18
Total	1556.22

Table 1 Total error during the period of mismeasurement

6 Learning

Contamination on the Fiscal ultrasonic meter transducers has caused the meter to read erroneously. The pipework and meter was cleaned to prevent the issue from reoccurring. It is recommended considering additional liquid filtration on the propane injection line. Consideration should also be given to continuously monitoring and recording the diverter valve position in order to ascertain if the system was recirculating or flowing to the distribution network. This would result in easier analysis if mismeasurements were to occur again.

7 References

BioD July 2022 MER – Analysed (Rev2).xls

8 Appendix A – Daily Correction Factors

The error should be corrected using the Daily Correction Factors applied to the Gemini Daily Volumes as detailed below.

Gas Day	Gemini Daily Volume	Daily Correction Factor
03-Jul-22	0.01222	0.99227
04-Jul-22	0.01022	0.85114