Future Billing Methodology

SDRC 9.1b Report on 2nd Phase of Industry Engagement

28th March 2018

Report contents

1 Introduction

"Future Billing Methodology" or "FBM" is a £5.4m Project, approved under Ofgem's Network Innovation Competition (NIC) in November 2016. The project runs from April 2017 to March 2020 and explores three options to provide a "proof-of-concept" for attributing the energy content of gas (calorific value or CV) to volumes in GB's gas distribution networks in a more specific way for billing purposes.

The project has been live for one year and we are in final preparation to begin installation of equipment on our network for the field trial, so it's worth recapping on the issues and what we are trying to achieve through this project.

FBM – ultimate objective

To make the existing gas distribution networks in GB a part of the solution to decarbonising heat, rather than being the problem. Let's consider the main issues: –

- Heat accounts for over 40% of all carbon emissions and gas is the heat fuel of choice for around 85% of GB households – the lack of progress in decarbonising heat is the greatest threat to meeting the 2050 emissions target
- Heat demand in GB is extremely peaky, with peak-day demands sometimes exceeding eight times the daily average level, and with rapid demand swings within day and season - the existing gas network already has the capability to meet these demands and gas customers have invested in its development over many decades
- Replicating all of this heat delivery capability via other low carbon energy vectors would likely be extremely expensive, as it would require high levels of "retro-fit" infrastructure upgrades and extensive, prolonged and very costly disruption on a nationwide scale
- It therefore makes economic sense to use our existing gas infrastructure to deliver low carbon heat for the future, but in order to do that we need to overcome the existing need to enrich lower carbon renewable gases with fossil fuel, and we must also be able to bill customers in line with the energy they use

Phase 2 of Industry Engagement

As we are still in the final stages of preparation for our project field trial, we have no findings from that to share at this stage. We have therefore confined the second phase of our industry engagement to gathering initial thoughts from key delivery agencies on the potential impacts of implementing a future CV zone based billing framework. To that end, we have been engaging informally with Xoserve and National Grid's National Gas Transmission business, and this report sets out the initial views gathered to date.

Please note that the following commentary is set out in relatively simple terms, to describe concepts and issues for general consumption. It is intended as a basis for further industry discussion, and so will not reflect the full detail, or use the exact technical terminology that would be applied in an industry codes forum. As previously pointed out, detailed drafting of industry code modifications is outside the scope of GDN Innovation projects such as this.

2 Initial Findings – Xoserve

Gas transportation billing is undertaken at Supply Meter Point (SMP) level. Under the present process for attributing the energy content or CV to gas for billing purposes, each SMP is assigned to its Local Distribution Zone (LDZ), ultimately based on physical asset data. The energy content of the gas in each LDZ is calculated on a daily basis, using a Flow Weighted Average Calorific Value (FWACV), calculated in line with the governing regulations.[1]

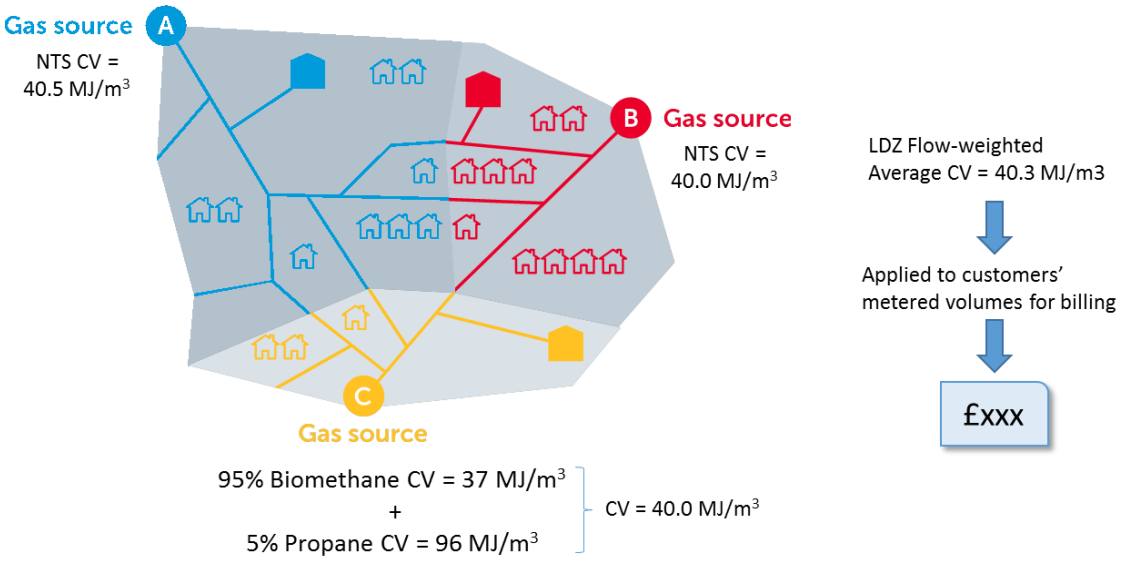
Energy attribution – Present regime

For Daily Metered SMPs, which tend to be the larger loads on the LDZ, the daily calculated FWACV value for the relevant LDZ is used directly in the transportation billing process. But for the majority of smaller loads which are Non-daily Metered, or "NDM", the actual daily LDZ FWACV only comes into play at two points in the process:

a) Reconciliation or "Settlement", in which allocated energy quantities and associated charges are adjusted, based on actual periodic meter readings

b) The Annual Quantity (AQ) Review for non-daily metered (NDM) Supply Meter Points, which allows for the AQ to be updated, based on metered consumption history and actual historical weather data

Fig. 1 – Simple illustration of the current LDZ FWA CV energy attribution



[1] Paragraph 4A of the Gas (Calculation of Thermal Energy) Regulations as amended 1997

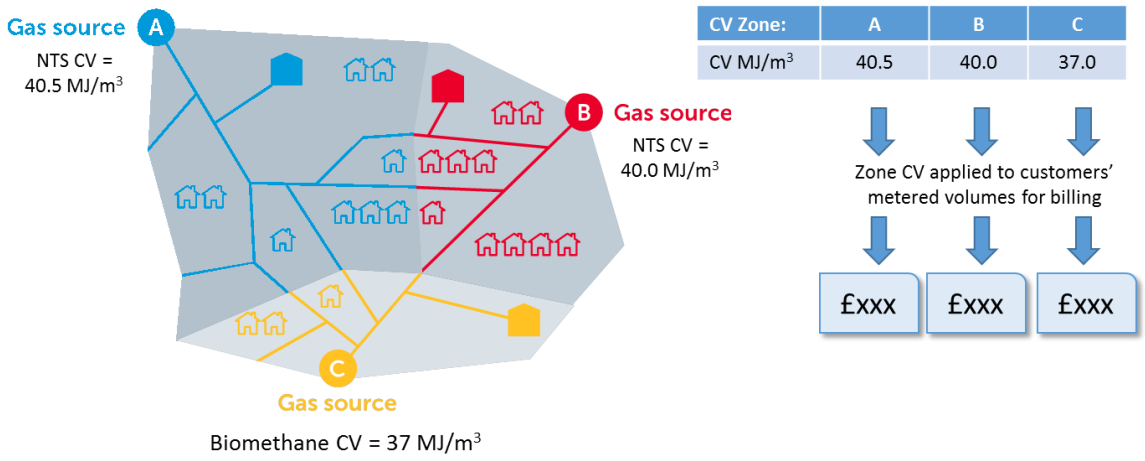
Energy attribution – Future regime

The Future Billing Methodology Project is looking to develop three potential options for a more specific attribution of CV to gas off-taken from the LDZ, as follows:

- **Pragmatic –** Creation of billing zones for specific LDZ-embedded input points, such as biomethane injection sites, using modelling techniques, but retaining LDZ FWACV outside these zones.
- **Composite –** Creation of billing zones for every input point to the LDZ, using modelling and within-network CV measurement. LDZ FWACV is superseded by CV zone based billing
- **Ideal –** Explores the use of smart meters in attributing CV measured at LDZ input points and at specific points within the gas distribution network for billing, as a precursor to direct gas energy metering in the future

The indications from our initial liaison with Xoserve are that CV zone based gas transportation billing could be implemented with little or no impact on the format of gas transportation invoices. This is because the zonal CV value used in this process would only impact directly on the background calculations to the SMP-specific Settlement Invoice, and in the AQ review calculations.

Fig. 2 – Simple illustration of energy attribution under an FBM "Composite" regime



However, there are two key dependencies around this; one upstream and one downstream of the gas transportation billing process, as follows:

a) Creating and maintaining CV zones

In order to create and maintain CV zones for billing purposes, both existing and new Supply Meter Points would need to be assigned to a specific CV zone within an existing LDZ. This assignment would need to be based on physical asset data, but there would also need to be the following:

i. Default mechanism – for the minority of new SMPs for which asset data might not initially be available, which might use a FWACV value
ii. Correction mechanism – to establish the final physical link to a CV zone and correct for any initial CV error

If the FBM field trials prove that it is practicable to create a robust "zone of influence" around a given LDZ input point and link this to physical system attributes, then it is thought that it should be possible to link this to SMP data.

Xoserve already provide data on new SMPs to the GDNs to support their demand derivation systems which in turn support the GDNs' network planning models. It is thought that a cross-reference file could be generated, using the GDNs' demand derivation systems[2], which will link SMPs to their CV zone via their physical "parent" gas main or system "node". This data could then be transferred to Xoserve on a daily basis. The most efficient approach would likely be an initial upload with a daily exceptions report containing new SMPs and CV zone corrections for initial defaults.

In this way, the CV zone would become an additional standing data item against the SMP, to which zonal CV data from the FBM process would be linked. It is thought that the existing LDZ FWACV process could remain in operation in the background at LDZ level and so, where initial assignment of a new SMP to its CV zone remained in "default" status, the daily CV zone value could be set equal to the daily LDZ FWA CV value.

Transition to the new regime has yet to be considered in any detail, but it should be possible to set an implementation point in SMP history, from which the zonal CV is used for Settlement and AQ review. In this way, the new energy attribution regime could be assimilated into the existing billing processes with least disruption. However, it would be essential to carry out some testing at scale in the background to assess the potential impact of a regime switch on SMP AQ and annual billing.

[2] Not all GDNs use the same demand derivation system, but it is thought that the cross-reference file creation could work with all versions in current use.

b) Alignment with downstream billing

The prospect of being able to implement an FBM framework for gas energy attribution with little or no impact on gas transportation invoicing structures is encouraging. However, this still leaves the question as to how CV zone based energy attribution would be accounted for in onward billing from gas Shippers / Suppliers to their customers. The answer to this lies in the following:

i. The future existence of the CV Zone data item against each SMP in the Shipper / Supplier's SMP portfolio;
ii. The provision of daily LDZ FWACV / zonal CV data (LDZ FWA CV is presently published by National Grid), and
iii. How these data items can be brought together most efficiently and applied consistently in wholesale / retail billing systems in line with the governing regulations.

The above question also links back to Ofgem's letter to Shippers / Suppliers of 5th August 2014, entitled "Calculation of average calorific value in accordance with the Gas (Calculation of Thermal Energy) Regulations 1996", which sets out to clarify the process in line with the governing regulations for the application of LDZ FWACV in wholesale and retail billing. Further, how that process could be developed for FBM purposes and implemented in Shipper / Supplier billing systems. However, this area clearly lies outside the GDNs' remit.

We would welcome input from Shippers / Suppliers on this area, and would be happy to support any discussion, if invited, as indicative costs and development / implementation timescales will be essential inputs to the final project CBA. It would be appropriate to engage in these discussions, once the measurement field trial has begun to generate positive indicative results.

3 Initial Findings – National Grid NTS

Cadent recognises that the implementation of a CV zone based energy attribution mechanism would require changes to the Offtake Arrangements Document (OAD) which supports the main contract for gas transportation[3] in defining the charging areas to which the governing regulations[4] apply. This is because the present OAD defines these charging areas for gas distribution as each of the 13 LDZs which comprise the GB gas distribution networks. If an FBM framework were implemented, this document would need to recognise each CV zone as a charging area.

Further, we recognise that an FBM implementation would have significant implications for the Energy Balancing Team which administers daily CV data across the system on behalf of gas transporters. This function is undertaken by National Grid's gas transmission business, and Cadent has engaged with this team to gain initial views on potential implementation impacts.

Cadent explained the aims and objectives of the FBM Project and the possibility that the three options being explored (see page 4) could represent evolutionary steps towards full gas energy metering and billing at the customer's meter. Whilst the team did not feel qualified to judge the appropriateness of the staged strategy between options at this point, their initial comments focused on the Pragmatic scenario, as follows:

a) TSO Risks

- No major objection to the methodology was expressed, but there was a concern that the proposal could inadvertently result in additional CV Shrinkage.

- Under OAD F4.1 National Grid NTS (Energy Balancing Team) determine the FWACV for each charging area on behalf of each GDN. The proposals, particularly the Pragmatic option, would create additional operational and system costs, requiring a review of NTS funding.

- Further concern was expressed that NTS and its paying customers could end up subsidising GDNs, due to increasing complexity/cost for NTS to deliver FWACV and other CV services, which suggests a review would be needed to determine appropriate roles and responsibilities between gas transporters to administer CV data going forward.

- Any project implementation plan should also provide a transitional arrangement for any transfer of responsibilities.

[3] The Uniform Network Code sets out the common terms of agreement between gas transporters and all users of the GB gas transportation network.

[4] The Gas (Calculation of Thermal Energy) Regulations as amended 1997

- "Loss of CV record" events for any new charging zone could impact the CV Shrinkage calculation. A UNC modification may be required to address this.

- Further on CV shrinkage management, there is a question over how stable the CV zones would be under varying network configurations. Imperfect or unstable CV zone boundaries would result in CV Shrinkage errors and could also risk a misalignment of the NTS Shrinkage mechanism against operational reality. Licence changes could be required to mitigate any NTS exposure.

b) Potential wider issues outside EB Team remit

- GEMINI – The Energy Balancing Team questioned whether this system has the capacity to accommodate a proliferation of charging areas. The present NTS (EB Team) is not resourced to manage such a growth in meter set ups.

- If CV zones have flexible boundaries, then a meter point may swap zones between billing periods. It is not clear how billing and SMP administration systems could accommodate this flexibility.

Cadent recognises the concerns raised by National Grid's NTS Energy Balancing team, in particular those concerns around potential impacts on CV shrinkage. This will be a major area of focus in the analytical phase of the field trial, as one of the key goals under FBM is to minimise CV shrinkage.

We also agree that the scale of proliferation of CV zones could exceed the capacity of existing systems used for CV management. Under a *Pragmatic* option, the number of CV zones or charging areas would be equal to the 13 LDZs, plus a CV zone for each embedded system entry point, which would total in the hundreds. This would increase correspondingly under a Composite scenario, as the LDZs would be superseded for billing purposes by a CV zone for every input point on each LDZ from the NTS. Under all FBM options, there would need to be a defined arrangement for handling the addition of new entry points on the LDZ.

Given the above, we also agree that the implementation of an FBM regime could trigger a review of ownership, resourcing, and funding of the energy attribution processes and have implications for the administration of energy balancing.

With regard to concerns over the stability of CV zones, one of the key aims of the FBM Project is to develop a practicable means of defining a stable CV zone for billing purposes. We recognise that within-billing-period changes would be impractical and, as above, we will seek to understand the potential impact of maintaining zone stability over time on CV shrinkage.

4 Next steps

As we have said, Cadent is working with project partners DNV GL to finalise preparations for the field trial installations that will progress through the spring and summer of 2018, in readiness for the measurement phase in Gas Year 2018-19. We are hopeful that once measurements begin, we will begin to see a correlation between our empirical observations and modelled results from our network planning model.

Once we have achieved an appropriate level of confidence in our observations, we will begin to share our findings. We believe that this would be an appropriate point to recommit industry resources to looking further into potential implementation impacts and to begin estimating implementation costs at high level to help complete our final Project Cost Benefit Analysis. This will in turn inform our final recommendations to the industry.

5 Glossary of terms

Term	Meaning
AQ	Annual Quantity
CBA	Cost-Benefit Analysis
CV	Calorific Value – expressed in mega Joules per cubic metre of gas (mJ/m^3) at standard temperature and pressure
DNV GL	Project partner of Cadent
FBM	Future Billing Methodology
FWACV	Flow Weighted Average Calorific Value
GB	Great Britain
GDN	Gas Distribution Network
LDZ	Local Distribution Zone (gas distribution networks in GB comprise 13 LDZs)
NDM	Non-Daily Metered
NIC	Network Innovation Competition
NTS	National (Gas) Transmission System
OAD	Offtake Arrangements Document
RIIO	Ofgem regulatory framework: Revenue = Incentives + Innovation + Outputs
SDRC	Successful Delivery Reward Criteria
SMP	Supply Meter Point
UNC	Uniform Network Code

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