Use of commingling of biomethane with grid gas to avoid or mitigate the need to add propane at biomethane entry points

A note by National Grid

1. Background

In 2010, the UNC 251 Review Group agreed that it was appropriate and necessary for the Calorific Value of biomethane to be enriched, using propane, to the local Flow Weighted Average CV (or to be blended if possible). Therefore the requirement to add propane to biomethane has been factored into both the designs of biomethane production plant and the economics of biomethane projects. However, in certain circumstances it was recognised that it may be possible to avoid the additional complexity and cost associated with propane addition by blending (or, more accurately, commingling) with local grid gas.

National Grid proposes to adopt this approach in respect of the Adnams Bioenergy plant in Suffolk, and has discussed with Ofgem the application of the Gas (Calculation of Thermal Energy) Regulations 1996 (as Amended) to the particular situation at Adnams. Ofgem has indicated in discussions with National Grid that if National Grid puts proposals for draft Directions which are consistent with the arrangements outlined in those discussions it would be minded to agree the Directions. In view of the potential wider application of commingling to minimise the use of propane, NG is setting out in this note the basis of the discussions with Ofgem on this issue.

2. Alternative method for determining CV

An alternative method for calculating daily calorific values is set out in the 1997 Amendment to the Gas (Calculation of Thermal Energy) Regulations. In summary, the amendment provides for the application of the FWACV "cap" to be based on the measured CV **of the commingled gas downstream of an input point** rather than that of the CV of the input gas itself (so long as no consumers are supplied by the gas before it is commingled).

The CV (and volume) of the input gas is also required to feed into the calculation of the Flow Weighted Average CV itself (the "area calorific value"), but input of biomethane with a CV that is >1MJ/m3 less than the FWACV **will not automatically trigger the FWACV "cap"** (of course the input gas must still comply with GS(M)R in respect of Wobbe Number/CV).

Further details of the application of this alternative method for determining CV in the case of the Adnams plant are set out below.

3. The 1997 Amendments to the Regulations

Regulation 4A(1) states that where the calculation of the daily calorific values for a take-off point is undertaken on the basis of the alternative method:

"The daily calorific value of gas conveyed to any take-off point situated in a charging area in respect of a gas day shall be the lower of:-

(a) the area calorific value; and

(b) the calorific value obtained by adding one megajoule per cubic metre to the lowest of:-

(i) any of the average calorific values determined on the gas day by the gas transporter pursuant to directions give under regulation 6(a) and (b) below on the basis of samples of gas which is a commingling of gas flowing past an input point for the take- off points in the charging area and other gas, where the gas flowing past the input point is not conveyed to any take-off point in the charging area without being commingled with the other gas; and

(ii) any of the average calorific values applicable on the gas day to any input point for the take-off points in the charging area, where sub-paragraph (i) above does not apply."

National Grid Gas' interpretation of the above is that the daily calorific value for a take-off point situated in a charging area where the alternative method is used will be the lowest of a range of possible figures:

(i) the area calorific value; and

(ii) any of the average calorific values determined on the gas day by the transporter in the relevant charging area in accordance with Ofgem directions **using samples of commingled gas** plus one megajoule per cubic metre; and

(iii) where (ii) does not apply, any of the average calorific values applicable on the gas day to any input point for the take-off points in the charging area plus one megajoule per cubic metre.

4. National Grid's proposals in respect of the Adnams biogas site

The proposals are represented in the attached diagram. The key elements from the perspective of compliance with the Regulations are as follows:

- There is a point on the existing network where biomethane will be injected and we refer to this as the "input" for the purpose of the Regulations and this description.
- At the input point our proposal is to measure the calorific value and the volume and use these values to calculate the input energy. The energy at this input would feed

into the calculation of "area calorific value" along with calculations from other inputs.

- All of the injected biomethane flows to a point where it commingles with other gas (gas from other inputs to the charging area where the energy at those inputs has been measured). We refer to this as the commingling point.

- Close to the commingling point (downstream) we propose to take gas from a sampling point and measure its calorific value. The gas at this sampling point will be a commingling of all the gas flowing past the input at Adnams and gas from the other inputs into the charging area. The calorific value measured at this sampling point plus one megajoule per metre cubed will be the daily calorific value used for charging if it is the lowest value calculated under Regulation 4A. National Grid Gas proposes to design the control system in such a way that this condition would only occur in failure mode and the normal charging basis would be the area calorific value.

- There are no take-off points between the input at the Adnam's site and the commingling point.

- We propose to install measurement equipment at the input and commingling points in accordance with directions made by Ofgem.

- We propose to notify Ofgem and take reasonable steps to notify relevant licence holders in advance of executing our proposal.

Note: at Adnams, the use of commingling also enables biomethane with an oxygen concentration >0.2% to be allowed to flow into the National Grid network.

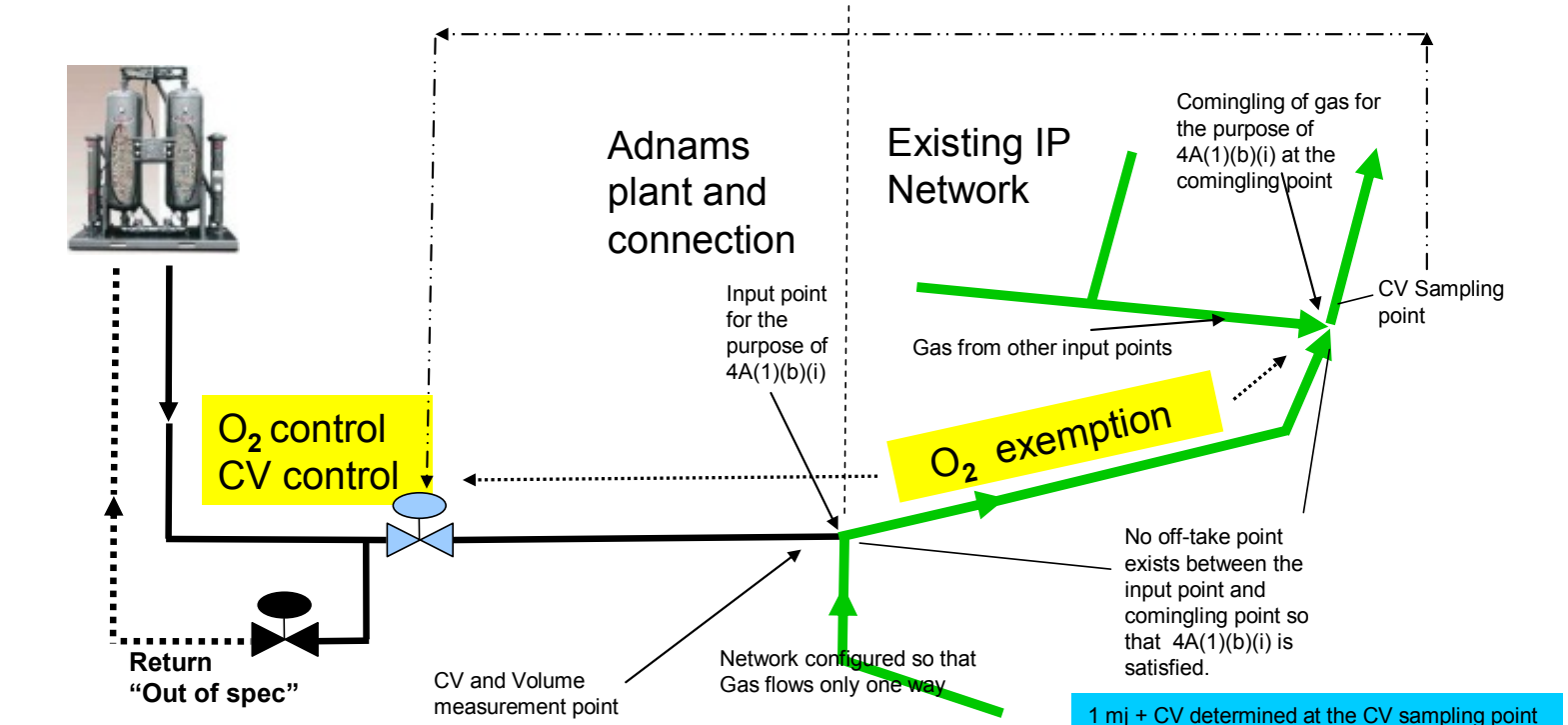
5. Conclusions

Whilst it may not be possible to apply the alternative method in the case of every biomethane input point, its application (including the use of remote CV monitoring by the GDN) should in some cases avoid the need for propane addition altogether, and in other cases could limit the period for which propane addition is required (and/or the volume of propane that needs to be added) to periods of low network flows, with resultant savings in operating costs for biomethane producers.

In other words, in some cases biomethane producers would still need to install a propane system, but would only need to inject propane in summer when there is no commingling opportunity. In winter, reduced amounts of propane (or none at all) would be required.

National Grid believes that this outcome would be advantageous in both financial terms to the biomethane producer, and also in environmental terms in relation to the need for reduced propane addition. Given this, there appears to be a good case for incentivising GDNs to identify and implement such commingling opportunities.

Application of CV regs at Adnams Bio Energy



There are no relevant energy outputs so for the purpose of 4A(1)(b)(i) the area calorific value is given by E/V where (as per 4A(3)(b

E is given by aggregating the energy input (CV x Volume) at all input points including Adnams.

V is given by aggregating the volumes at all the relevant input points including Adnams.

Daily CV is lowest of these

1 mj + CV determined at the CV sampling point as described in 4A(1)(b)(i). No requirement to measure volume here

1 mj + CV determined at any other input point (not using co-mingled sampling).

Actual CV at Adnams goes into FWACV calculation

cap triggered on co-mingled CV