The European Association of Internal
Combustion Engine Manufacturers

EUROMOT

EUROMOT POSITION

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Actual H-gas Wobbe Index ranges in five member states compared with the EASEE gas proposal

In order to compare practical experiences with existing Wobbe Index ranges as proposed by EASEEgas and CEN TC 234 WG 11 the European Commission asked for input to an overview of the current range of gases supplied in the EU.

Actual quality data about delivered gases are not easily available. However, the composition of indigenous and imported gases is generally known. Those compositions have been used in the next diagrams. Also use has been made of the deliverable report for the EC (see: “INGAS_DR_EON RUHR GDF SUEZ_DB01_20110314.doc” [1]).

Figure 1 compares the actual Wobbe Index ranges present in the five countries with the EASEEgas and NGC+ rules. It appears that the actual Wobbe Index range per country is much narrower than the EASEEgas proposal. The variations at specific locations in each country are even narrower than the ranges given per country, since a typical gas quality is generally distributed within a certain area. For example, a large area in Germany receives only natural gas from Russia with a Wobbe Index of 50.4 MJ/m3. In some countries, separate networks exist for gases in the higher Wobbe Index range (H-gas) and for gases in the lower WI range (L-gas)

The fact that the actual gas quality range in a certain area is quite narrow originates from the times that gas suppliers were still integrated companies with responsibility for proper performance of the connected gas appliances. Those companies had laboratories that checked the effect of gas composition on gas applications and sufficient expertise was present about negative effects of a wide Wobbe Index range [2]. Source statement /2/:

"Overcoming the technical difficulties of extending the operating range by means of a 10% swing in Wobbe Index, as proposed by EASEE-gas, is unlikely to be feasible. Such a move would affect the countries that receive gas of variable quality such as the UK, where treatment of imported LNG will have to continue".

The only gas that has been excluded from Figure 1 is Libyan LNG. **There is no proof that customers received pure Libyan gas**.

The statement can be made that no experience exists with the wide WI range as proposed by EASEEgas/CEN. On the contrary, experts warn that problems will arise with respect to safety, emissions and fuel efficiency.

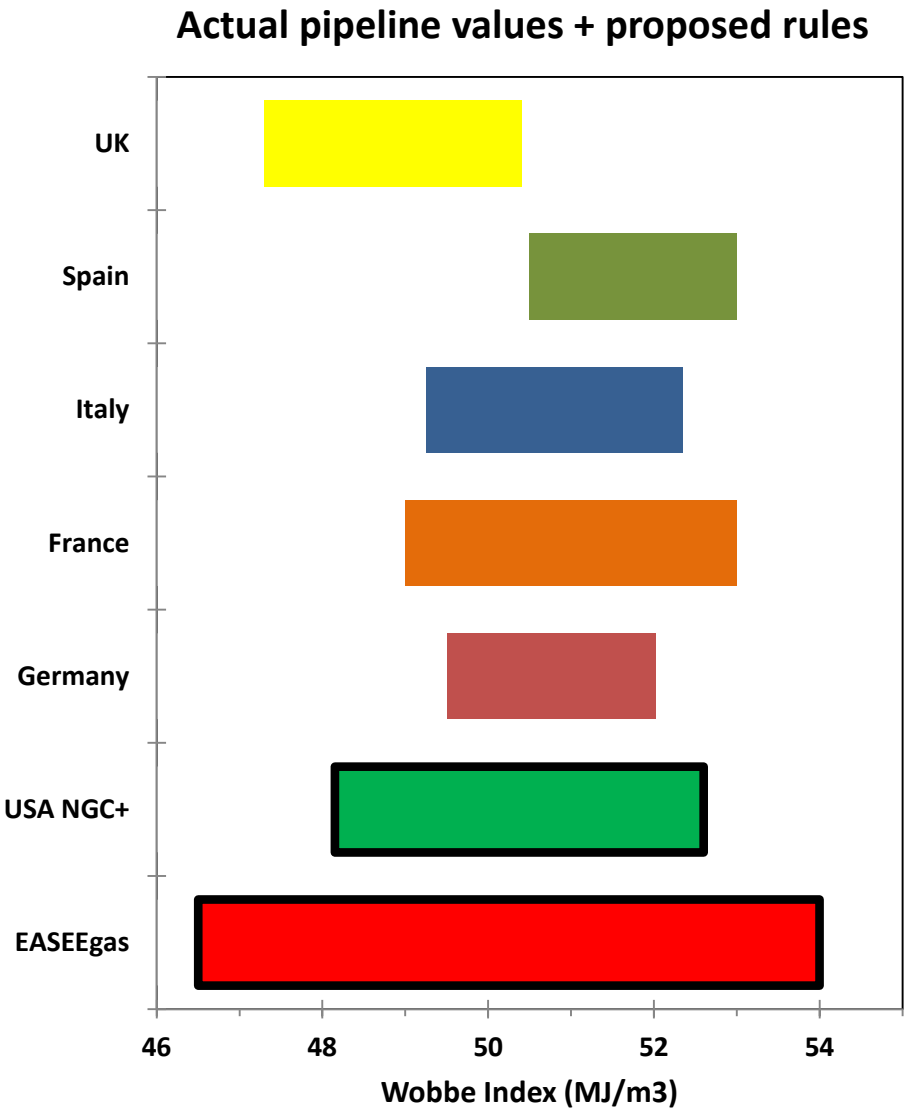

Figure 1: The Wobbe Index of the range of gases imported/transported in a number of EU countries (at 15° C / 15° C). The actual national range is apparently much narrower than in the EASEE-gas proposal.

Just limiting the Wobbe Index to a relatively narrow range, as has always been common practice, is however no guarantee that the knock resistance of natural gas is guaranteed. Historically, the engine suppliers asked the gas suppliers about the common local composition of the gas and optimised the engines for their customers accordingly.

Figure 2 gives the relationship between WI and Methane Number for a number of common natural gases, including LNG. The gases used for Figure 2 have not been subjected to nitrogen ballasting or hydrogen/propane admixing. Although a WI higher than 53 MJ/m^3 definitively means that the Methane Number is lower than 70, relatively low MN values can also occur for gases with a lower WI in case of the presence of higher than average concentrations of higher hydrocarbons. This happens especially

when nitrogen ballasting is used to lower the WI instead of removing part of the higher hydrocarbons. Nitrogen ballasting is used in the UK, where nitrogen is added to rich LNG to reach a relatively low WI range. Moreover, adding propane to restore the calorific value of pipeline gas in the case of hydrogen injection will also result in low MN values. It is therefore **crucial that the specifications for trans-border exchange of gases contain a minimum value for the MN**.

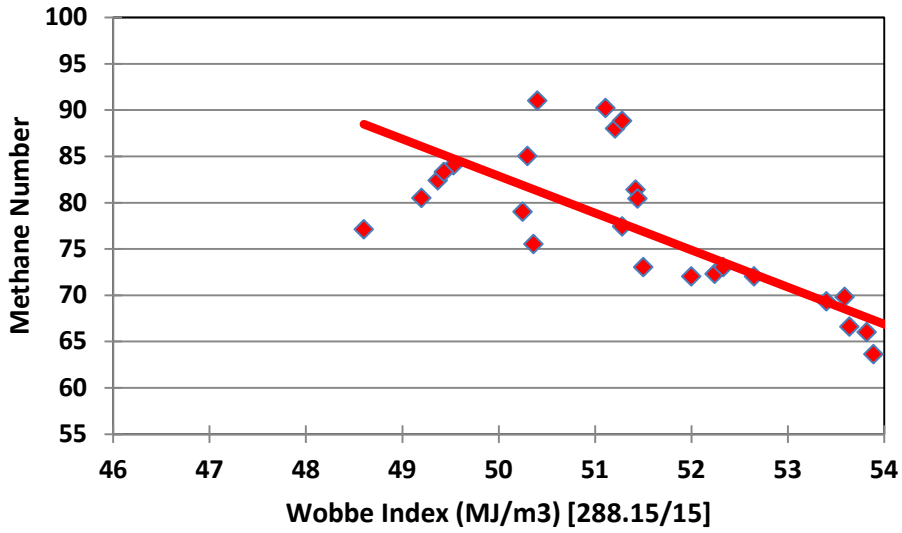

Figure 2: An imperfect correlation between the MN and the WI caused by the presence of deviating concentrations of higher hydrocarbons in natural gas. For a WI > 53 MJ/m^3, the MN is always lower than 70.

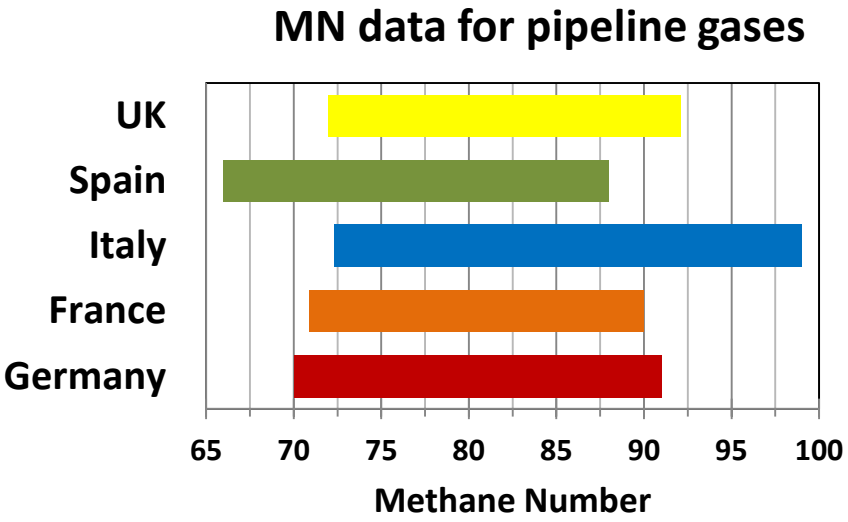

Figure 3: The practical range in MN in five EU countries. This does not mean that customers by definition experience such a wide range, since locally the gas composition can be close to constant

CONCLUSIONS

1. The wide WI range as proposed by EASEEgas and now included in the CEN TC 234 WG 11 draft standard has never been experienced in European countries. This supports the worries expressed by consumers and appliance manufacturers about safety, emissions and efficiency in case the wide WI range will be applied.

2. Ballasting of rich natural gases (LNG) with nitrogen to lower the WI as well as admixing of hydrogen/propane create the risk of low MN values.

3. The WI should never exceed 53 MJ/m3 since a higher value means that the MN is lower than 70, with negative effects on stationary and mobile gas engines.

4. It is imperative that a lower limit is maintained for the MN in the gas specifications since a maximum WI of 53 MJ/m3 does not guarantee that the MN is higher than 70.

5. Also regarding a number of other gas parameters such as total Sulphur, etc. The EASEE gas and CEN TC 234 WG 11 proposals differ considerably from ranges of gas qualities distributed in many countries and might result in increased corrosion and emissions. See Euromot Position papers /3/, /4/, /5/ where also remedies to these problems are proposed.

REFERENCES

1. Report on gas composition range in Europe, Deliverable report INGAS_DR_EON RUHR GDF SUEZ_DB01_20110314.doc

2. B. Kavalov, H. Petric, A. Georgakaki, 'Liquefied natural Gas for Europe – Some Important Issues for Consideration' JRC Reference report 200907 for the EC, 2009.

3. http://www.euromot.org/download/30e10106-5cca-4349-a337-91d1a9b804cf/GAS%20QUALITY_sulphur%20levels%20in%20natural%20gas%202012-04-04.pdf

4. http://www.euromot.org/download/d606ce6a-3b67-4c6e-8ed9-92db4aa964f8/GAS%20QUALITY_sulphur%202012-08-30.pdf

5. http://www.euromot.org/download/bfa1d894-73d0-4b01-a3a0-90735b608fe2/GAS%20QUALITY%20euromot%20position%202011_05.pdf

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