

## **CONSULTATION QUESTIONS AND ANSWERS**

### **Do you agree with the high-level conclusions of this report?**

The globalization of the NG market and the competition for lower prices of acquisition, will inevitably lead to the adoption of broader gas quality specifications.

Even if the interconnection between neighbour networks did not exist, are not used, or is not strengthened, the growing market of LNG would force countries to adopt wider specifications, in order to gain procurement/trade flexibility.

LNG tends to have a wider variation, from shipment to shipment, when compared to NG received by pipeline.

Portugal is receiving NG and LNG with very close specifications, in a narrow range close to the upper limit of the Portuguese specification (NG  $\approx$  53.3 and LNG  $\approx$  55.4 MJ/m<sup>3</sup>). In fact after 8 years of LNG imports from various sources and the NG (from Algeria) through Spain, we have experience no utilization problems.

Also there is, since 2003, an EC directive establishing the obligation of the member states to grant access of biogas to NG grids. In between several other characteristics, that are not compatible with NG, biogas tends to have, depending on the source, low to very low Wobbe indexes.

The Portuguese specification is very close – actually it is a little broader – to that of EASEE, but the sudden utilization of the full scale of variation could be disruptive.

We believe that the eventual adoption of such a specification should be done in a stepwise fashion, over a large period of time, given the market the time to adapt.

This opinion is aligned with high-level conclusions of the report.

### **As a manufacturer do you maintain an inventory of installed appliances?**

We are not manufacturers of appliances.  
Even as retailers or DSO, no inventory is consistently maintained.

### **Are there any specific gas quality related issues not recognised within this report?**

No reference is made to the utilization of NG in vehicles.  
The NGV market is important in several countries.  
Are these engines prepared for such specification? Can the conclusions drawn to the large industrial reciprocating motors be extended to the small vehicle motors?

### **Do you manufacturer appliances that can operate over the full EASEE-gas specification without loss of efficiency or increased of emissions?**

We are not manufacturers of appliances.

### **Do you have evidence of damage or failures caused by appliance operating on gas that is not compliant with the local gas quality specification?**

No. The gas received in Portugal is of homogeneous specification.

**Would you support the adoption of the proposed EUROMOT gas quality specification, (Appendix B)?**

The EUROMOT specification is concerned with parameters that are not mentioned in the Portuguese or EASEE specification.

We are not capable of anticipating what the impact, if any, would there be in the quality of the gas.

**Are there any specific circumstances that should be assessed in detail?**

No comment.

**Do you consider that the data used to undertake this analysis is sufficient to support the conclusions presented in this report?**

No comment

**Should significant effort be made to improve the data used in the analysis presented in this report?**

We believe the conclusions drawn from the existing set of data will remain valid.

**Do you have access to further data that could (if it were made available) improve the quality of the data used in the analysis presented in this report?**

No

**Can you provide typical detailed gas composition at cross border points? If so, can this data be made available (respecting confidentiality, as required)?**

According to the TSO information, the typical NG received from the Magreb pipeline, thru Spain, has the following specification:

| Components                                     | mol %                 |                        |
|--|-----------------------|------------------------|
| Methane  | 87.885                |                        |
| Ethane   | 8.056                 |                        |
| Propane  | 1.378                 |                        |
| i-Butane                                       | 0.108                 |                        |
| n-Butane                                       | 0.158                 |                        |
| i-Pentane                                      | 0.022                 |                        |
| n-Pentane                                      | 0.018                 |                        |
| n-Hexane                                       | 0.020                 |                        |
| Nitrogen                                       | 1.088                 |                        |
| CO <sub>2</sub>                                | 1.266                 |                        |
| Molecular Weight (km/kmol)                     | 18.192                |                        |
| Density (kg/m <sup>3</sup> (n))                | 0.8141                |                        |
| Specific Gravity (relative density)            | 0.6297                |                        |
|  | MJ/m <sup>3</sup> (n) | kWh/m <sup>3</sup> (n) |
| Superior Caloric Value [ 25°C;(0°;1,01325 bar] | 42.47                 | 11.80                  |
| Inferior Caloric Value [ 25°C;(0°;1,01325 bar] | 38.39                 | 10.66                  |
| Wobbe Index (on Hs)                            | 53.52                 | 14.87                  |

The typical LNG received, has the following specification:

| Components                                     | mol %  |                        |
|--|--------|------------------------|
| Methane  | 91.197 |                        |
| Ethane   | 6.251  |                        |
| Propane  | 2.056  |                        |
| i-Butane                                       | 0.276  |                        |
| n-Butane                                       | 0.202  |                        |
| i-Pentane                                      | 0.000  |                        |
| n-Pentane                                      | 0.000  |                        |
| n-Hexane                                       | 0.000  |                        |
| Nitrogen                                       | 0.017  |                        |
| CO <sub>2</sub>                                | 0.000  |                        |
| Molecular Weight (km/kmol)                     |        |                        |
| Density (kg/m <sup>3</sup> (n))                | 0.792  |                        |
| Specific Gravity (relative density)            |        |                        |
|  | MJ/Kg  | kWh/m <sup>3</sup> (n) |
| Superior Caloric Value [ 25°C;(0°;1,01325 bar] | 54.754 | 12.046                 |
| Inferior Caloric Value [ 25°C;(0°;1,01325 bar] | 49.488 | 10.887                 |
| Wobbe Index (on Hs)                            | 69.956 | 15.390                 |

### How should data be collected for such a study?

We believe the conclusions drawn from the existing set of data will remain valid; therefore no more data is required