marcogaz
TECHNICAL ASSOCIATION
OF THE EUROPEAN NATURAL GAS INDUSTRY

Odorisation and interoperability

1. CONTEXT

The difference in odorisation practices between EU countries, considering that some countries are odorising gas on the transmission network while others are only odorising gas when it enters the distribution network, is considered as a hurdle for interoperability.

This report makes a review of the odorisation practices and identifies problems of interoperability that may arise from different odorisation practices.

2. EU ODORISATION PRACTICES

Marcogaz WG Odorisation made a detailed review of the odorisation practices in EU (see "Natural Gas odorisation practices in Europe" document GI-OD-09_04 Revised 02/10/12); it can be noted that the content of Sulphur in the odorant molecule can be quoted from 0% (sulphur free odorants) to 35-40% of the usual odorants (see Odorants Table in "Natural Gas odorisation practices in Europe" document).

Analyzing the data contained in the "Natural Gas odorisation practices in Europe" document the tables presented in the Annex were elaborated.

Taking into account the typical concentrations of the odorants in EU countries, the theoretical concentration of total sulphur and the mercaptan sulphur deriving from odorants in natural gas (see tables 1 and 2 of the Annex) can be calculated.

Not considering the sulphur free odorant, the values of total sulphur from odorants in the natural gas is less than 15 mg/m^3 (n), with typical values of less than 10 mg/m^3 (n), while the mercaptan sulphur is less than 4 mg/m^3 (n), with typical values less than 2-3 mg/m^3 (n).

3. RELEVANT CONSIDERATIONS

3.1 Centralized/decentralized odorisation

Odorisation can be centralized or decentralized (odorization can take place at the interface with regional transmission or distribution networks).

Large flows of gas between EU Countries are not odorized, except from:

- UK to Ireland;
- France to Switzerland/Italy and Spain;
- Spain to Portugal and France.

Note that some exchange of odorised gas may occur, due to local connections between networks. This is known to happen between France & Belgium, France and Switzerland, Hungary and Austria, for instance.

In some cases, in particular when considering transferring odorized gas, deodorization plants have been considered. UK, for instance, changed their odorisation practices when Interconnector came on line in 1998, allowing transfer of natural gas without added odorant at the Cross-Border points.

As far as regards transmission of gas between EU countries, decentralized odorisation could be preferred because it avoids the addition of sulphur from odorisation to transmitted natural gas. Besides, sulphur free odorants are not a source of sulphur, so in the case of centralized odorisation the adoption of this kind of odorant could be helpful to maintain low levels of sulphur in the gas transmitted between EU countries.

3.2 Masking effects

Usually no masking effects are reported from mixture of different sulphur odorants, even if it can be hypothesized some effects of enhancement of the odour in mixtures between sulphides and mercaptans (for example in mixtures containing TBM and MES) which make it difficult to predict the strength of smell of the mixture. In case of mixtures of sulphur odorants and sulphur free odorants, no public data are available yet and it could be necessary to perform olfactory tests to know the behavior of the mixture in terms of odour.

Odorisation of biomethane, because the upgrading process may leave some odoriferous trace components not known by the gas industry, may raise some issues.

3.3 Influence of Sulphur

Some national regulations, for example in matter of natural gas as vehicle fuel, can add more stringent requirements: DIN 51624 "Natural gas as vehicle fuel", e.g., requires a total sulfur content of maximum 10 mg/kg.

For storage operators (especially in the case of underground storages) a higher presence of sulphur may cause:

- Pore clogging due to sulphur related reactions and H2S production (depending on the sulphur-type molecules and properties of the reservoir);
- Increased complexity of underground storage operations: effects onto the glycol regeneration plant due to high rates of SO2 in flue gases when these are burnt and waste stream treatment.

A number of processes in which desulphurization of natural gas is needed was reported, mainly for industrial sites directly connected on the transmission grid using natural gas as feedstock.

It shall be noted that the same industrial groups are active with similar processes all over EU and thus it can be hypothesized that they have the technology to use odorised and not odorised gas; in this case, however, an added cost is given to the customer.

Generally speaking, besides, an increase of ulphur in natural gas determines an increase of SOx emissions. In the table 3 of the Annex it is presented a calculation of the increase of SO_2 due to odorant addition, when gas is burned: the values are less than 3 mg/m^3, and, as average, around 0,9 mg/m^3 (mass of SO_2 in the fumes).

4. CONCLUSIONS

This report and the associated document represent the state of the odorisation process in the Marcogaz countries and present the amount of sulphur which is added to natural gas during this process.

It shall be noted that some countries strongly adverse the possibility to receive odorised gas from abroad, even if the added amount of sulphur is comparable to the concentration admitted for natural sulphur.

On the other hand, some countries receive amounts of odorized gas, with, until now, no evidence of problem even if different odorant may be used in the neighboring countries.