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16. september 2011
FSK/SJH/TIL

Input to public consultation on gas quality

Being the Danish transmission system operator for gas, Energinet.dk would like to contribute to the development of a common methodological approach to setting gas quality standards and thus supports the development of a competitive European market for gas.

Energinet.dk is actively participating in the ENTSOG-driven gas quality standardisation process under the Interoperability Working Group and support this work.

The initiatives to approach the quality challenge based on economic efficiency criteria are welcomed. The Commission's role in defining such criteria could be an important instrument to avoid excessive costs and delimit adverse impact on the market functioning.

There is a need to define a common European approach to setting gas-quality standards nationally that is based on shared methodology and assumptions (cost indicators) in order to arrive at efficient quality standards. The approach should be a cost-benefit analysis, not limited to the transmission system operations or commercial actors in the gas sector, but including gas consumers and external, environmental effects.

Energinet.dk would like to draw the attention to a study on how to deal with changes in the gas quality in a cost-effective manner (a summary of the study is enclosed as Attachment 1). Being based on self-sufficient domestic production, the Danish gas sector has enjoyed stable gas quality with relatively high energy content. As production is in rapid decline, physical import is already required to balance supply and demand. Imported gas enters the system at the Danish-German border. The gas can differ from the Danish requirements. The question is if imported gas should be treated at the border, to obtain the same gas quality as domestic production, or if a wider wobbe index should be adopted

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so that imported gas can be mixed freely with domestic production, maintaining the safety record for natural gas users in Denmark.

Gas treatment necessitates significant investments by the TSO and this is levied on transportation. Accepting a wider wobbe index still within EN437 implies changes in efficiency and emissions at consumption places.

All investments in the publicly owned Danish transmission system are justified using cost benefit. Energinet.dk operates on a break-even basis with no commercial or profit-oriented interests. The methodology applied is based on common principles used by all public sectors and enterprises. The Danish Energy Agency has published the method guidelines and provides a wide set of economic indicators (assumptions), which allows for cross-sector comparisons of investments.

A key criterion in the Danish analysis that could also govern choices on pan-European gas quality studies is that the safety record must be maintained and the market functions should not be distorted by gas quality standards. Irregular interruptions of import or limitations of capacity create bottlenecks in the system and materialise in significant price spikes paid by consumers. The annual costs of bottlenecks easily exceed the lifetime costs of efficient gas treatment. If rigid standards are indeed applied, gas treatment facilities should be dimensioned to allow full utilisation of import capacities.

Cost of gas treatment should be levied on consumption and not internalised in capacity entry tariffs, which would distort competition between entry points and reduce cross-border competition. Most systems have arrived evolutionarily at specific standards and appliance adjustment. It is a misleading notion to impose costs of gas treatment on latest entrant or supply source.

Cost of gas treatment should be levied on national consumption and not be transferred to transit through to markets with different and/or wider quality standards.

Danish experience shows that externalities have an impact on the overall efficiency of either gas treatment or the wide wobbe index. Emissions can be priced and assessed over a longer time span. Gas quality has a direct impact on emissions, and some types of gas treatment (e.g. LPG addition) have a direct negative impact on emissions – and, in longer term, on the role of the gas in an emission conscious energy sector.

A major part of the future European gas consumption will be in combined heat and power plants -in the Danish case, the heat demand-determined gas consumption and related power production. Putting a value on the power production gave a measure of external benefits in the alternatives.

Efficiency of gas appliances as a function of gas quality can be assessed and quantified, e.g. in terms of gas required in two alternatives to produce the same amount of useful energy.

In conclusion, Energinet.dk supports a mutually accepted and common methodological approach to setting gas quality standards. Common standards should be defined as wide as possible maintaining the safe use of natural gas. The approach should be cost-benefit-based and based on national characteristics. It is unlikely that a common quality standard is equally efficient in every member state. Cost-sharing principles should be defined to prevent gas quality from becoming an obstacle to an integrated market.

The Danish case shows significant, and often ignored, effects of changing gas quality. Accepting a wider wobbe index in Denmark would result in improved environmental performance.

Adjustment costs at consumption places could be significant given the large number of consumers. In the Danish case, such costs are significantly limited by service agreements by which a majority of gas appliances are regularly serviced. Changing the regulation of Danish appliances can to a large extent be achieved through ordinary visits of a plumber at no additional cost to consumers and insignificant cost to society.

For further information, please contact Head of Section Tine Lindgren at til@energinet.dk.

Best regards

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Attachment 1: Short summary of "Cost benefit analysis of solutions for the new natural gas qualities arriving to Denmark".

Attachment 2: Comments on "Study on Interoperability – Gas Harmonisation – Cost Benefit Analysis"

Attachment 1

Cost-benefit analysis of solutions for the new natural gas qualities arriving to Denmark

This document is a summary of a cost-benefit study performed by Energinet.dk for the Danish Technical Safety Authority. Motivation of the study is that the Danish gas consumers in the future will experience a new gas quality regime with larger variations. The study compares the socio- economical cost of a gas treatment solution with the cost of all necessary actions that facilitates a broadening of the allowed wobbe index for the Danish market. Included in the study is the safe use of gas, correct operation of appliances, environmental consequences and efficiencies for all types of Danish gas installations.

The Danish and Swedish gas markets are based on a production from the North Sea gas fields. So long as the production exceeded domestic consumption, Denmark and Sweden have benefited from a stable, homogeneous gas quality from the same source of supply. Stable gas quality within a narrow band has allowed optimization of gas appliances within the Danish natural gas sector.

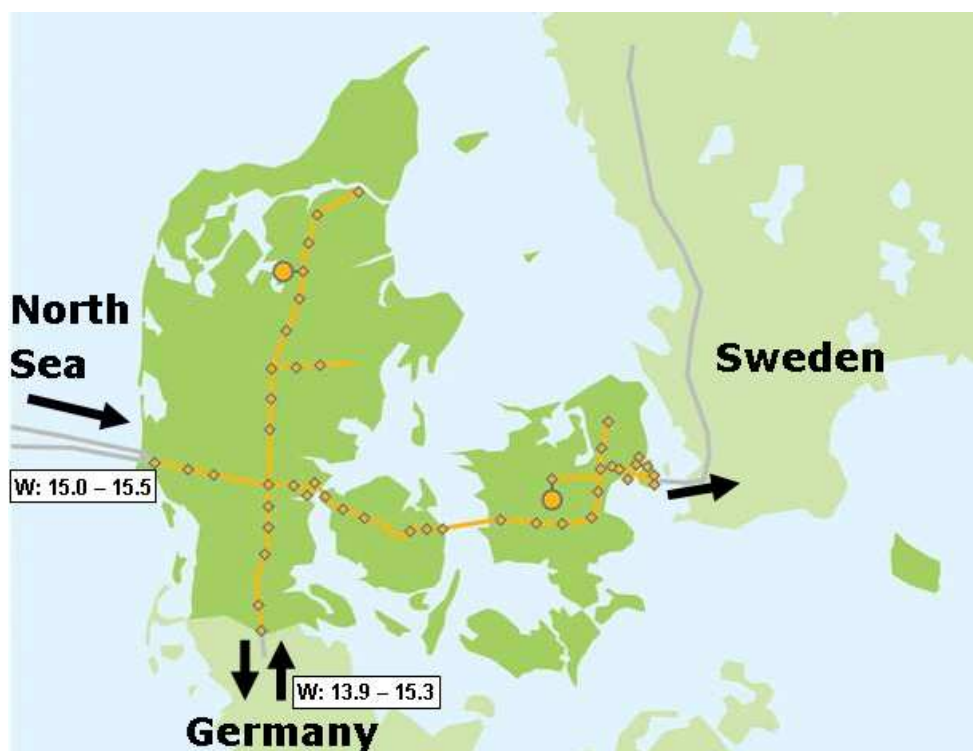


Figure 1 The Danish transmission system with import and exit points marked. Ranges of wobbe index at the import points are shown.

The expected decline in the Danish North Sea production means that gas imported through the German-Danish border point will constitute a necessary supplement and in the long term it is expected to become the predominant

source of supply for Danish and Swedish consumers of natural gas. The natural gas market is liberalised with free access to public pipe systems. The free market entails that there is no central control of the gas flows in the system and that gas is traded commercially and transported in financial flows alongside the physical flow.

Supply crises and disruption of free gas movement will have serious socio-economic consequences that Energinet.dk is obligated by law to meet in a timely and efficient manner through safe solutions.

Gas imported from Northern Germany is of a different and varying quality than Danish North Sea gas which reflects the many different sources of supply to the European gas market. Thus, gas cannot be imported freely and physically across the border point without either adjusting the Danish gas quality requirements or treating the gas at the central border point to ensure that imported gas meets the existing quality requirements. Changing the Wobbe index requirements and varying gas qualities can be a challenge for gas-consuming appliances and a solution should therefore include an analysis of impact and necessary adjustment of appliances.

Energinet.dk has been asked by the Danish Safety Technology Authority to perform the gas quality study to identify a socio-economically efficient solution which accommodates changes in the combination of supply sources and gas quality in a safe manner.

The analysis is challenged by a long analysis period from year 2014 to 2042. This significant time span, among other things the distribution between decreasing North Sea production and import, but also in the combination of the imported gas, where in particular Russian natural gas through the new Nordstream connection can constitute a large share, physically and commercially. The subject of the analysis has therefore been a wide range of scenarios for flow distribution, the share of Russian gas and a number of solution models. A total of 60 possible scenarios have been tested for the entire period.

Results are expressed in socio-economic present values that are immediately comparable for the different solution models, but which individually express marginal considerations in relation to a joint reference. The study is therefore limited by an actual value assessment of the natural gas consumption and by maintaining and supporting the market functionality in the transition phase.

The study shows that the gas quality challenges can be solved most efficiently through acceptance of a wider Wobbe index and adjustment of appliances at the consumers maintaining safe operation with natural gas. Derived effects, particularly in relation to the environment, mainly contribute to limiting socio-economic costs. A reduced environmental impact from using natural gas could be a long-term benefit for the gas industry in addition to reduced emissions as the survival of gas as a fuel in the Danish energy sector is directly linked to its eco-impact in an energy system with increased focus on climate effects.

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Attachment 2

Comments to "Study on Interoperability – Gas Quality Harmonisation – Cost Benefit Analysis"

General comments:

It could be of value for the additional work to obtain and evaluate information about experiences in Denmark may be applicable at European level. As a consequence of declining gas production in the North Sea Denmark experiences delivery of gas qualities outside the typically delivered range in 2010. This together with a cost benefit study to evaluate the future gas quality specification has given Denmark an edge considering possible gas quality ranges.

The study should consider adjustment of appliances as a means to handle larger gas quality variations, and not only replacement of appliances. Adjustment of appliances to G20 is essential for a wide working range for appliances.

Table 3.4

Numbers are not correct for Denmark regarding the following parameters:

- CO₂: max 2.5 %
- RD: 0.555 – 0.700

Chapter 6.3.2:

We believe that the recommended EASEEgas specification is within the EN437. It should be clarified on which matter the specification is considered to be outside EN437.

Chapter 7:

The comments from Jacob Klimstra Consultancy are not correctly reflecting the historical experience and current situation in Denmark. Also the wobbe range has not been widened by the TSO. Energinet.dk as the Danish TSO would like to contribute with a more correct description of the situation in Denmark.

Current text:

- Danish customers were traditionally supplied with gas in the Wobbe range from 15.2 to 15.3 kWh/m³, although the contract range was between 14.1 kWh/m³ and 15.5 kWh/m³. As in many places in Europe, the actual quality delivered was much more constant than allowed in the contract. Because of recent imports from Germany, the TSO has now widened the contract range to 13.9 – 15.5 kWh/m³. This is still narrower than the 13.6 – 15.8 kWh/m³ range as proposed by EASEE-gas. The higher end of the range creates problems for reciprocating engines. The Danish gas research institute and the users foresee many problems if the wide range will be common practice, especially since as has been observed that changes in quality can be very abrupt (plug flow).

Source: Jacob Klimstra Consultancy

Description of the historical experience by Energinet.dk and Danish Gas Technology Centre (DGC)

- Danish customers have traditionally been supplied with gas with Wobbe index from 15.2 to 15.3 kWh/m³, although the contractual range was from 14.4 to 15.5 kWh/m³. From Dec. 2007 this range has been widened to 14.1 to 15.5 kWh/m³ after discussion with appliance manufacturers and acceptance from the National Safety Authority. The TSO has now applied to the Danish National Safety Authority for future acceptance down to 13.9 kWh/m³. The discussion of this with authorities and appliance suppliers/manufacturers is on-going. Recent gas imports from Germany have delivered Low-Wobbe gas into the Danish natural gas system. Parts of Denmark have been supplied with unmixed import gas and for periods have had gas with Wobbe index down to 14.1 kWh/m³. No **safety related incidents or issues** have been reported during these periods although all appliances have been operating with and been adjusted to the usual High-Wobbe Danish North Sea gas. The majority of the engines have had no operational problems (shut downs or similar incidents) despite little preventive measures were taken at the time. Few plants experienced problems with reduced power or extra time for synchronisation. At some plants the engine or control settings have now been changed. Examples are valve feedback positions or gas meter readings where gas flow (m³/h) extended the former upper limit due to lower calorific value of the gas. Gas companies have also made corrections that slightly increase consumer gas pressure, improved information systems (SMS when gas is imported, quality track systems available at the Internet etc.). During periods with import gas it has been noticed that little mixing takes place in the gas pipes (plug flow like). A change in the gas quality can therefore be quite abrupt.