Gas Transmission Europe

GTE Interoperability Report

20 June 2001

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Executive Summary

The present section covers the subject of interoperability. It has been drafted between February and June 2001 by the GTE's Interoperability Working Group on the basis of contributions by professionals working in gas undertakings across Europe.

The chapter deals with interoperability from a "pipeline operator" perspective, meaning that priority was given to examining the facilitation of natural gas flows between interconnected pipeline networks operated by different companies. The issue of LNG interoperability, meaning the feasibility of discharging the same LNG cargo in several different LNG re-gasification plants, is deemed as complex as pipeline interoperability and therefore, due to the limited amount of time available for the finalisation of the present report, is not treated therein.

The term "interoperability" is normally used to mean the technical possibility to ensure safe flow of natural gas from one pipeline network to another, possibly built with different technical specifications, in a different country, by a different operator. In this respect, interoperability is already a reality in Europe, because a large percentage of gas trade in Europe involves cross-border transactions and therefore gas undertakings have developed local interoperability arrangements over the years. However, these interoperability arrangements have one distinctive feature making them unsuitable as a model for future interoperability arrangements: they are embedded in long term gas transportation agreements between companies that are at the same time owners of the gas (shippers) and operators of the respective networks (carriers).

The percentage of third party gas (meaning gas that is not the property of network operators) on European networks is steadily increasing. As the European gas market becomes more fluid over time, the number of shippers and the frequency of transactions is also expected to increase, and this process is not going to be limited to national networks but will involve cross-border transit.

As a consequence, Transmission System Operators will be required to amend the interoperability arrangements presently embedded in long term gas transportation agreements with more appropriate interoperability tools, that are required to provide standard, flexible, easy-to-manage arrangements for the non-discriminatory treatment of shippers.

This assumption has set the approach to this assignment. GTE felt that, historically, the issue of interoperability has been addressed from a strictly technical point of view. However, GTE also recognised the ever increasing importance, in the new framework of the European gas industry established by the Gas Directive, of removing barriers of technical/operational nature to the free movement of gas across the EU countries. This approach could facilitate the separation of the commercial regime and the physical operation as a means of encouraging the liberalisation of the gas market. Concerns about the completion of the EU's internal gas market and the development of cross-border trade have been recently expressed by the European Commission and the Gas Regulatory Forum. In order to effectively address these issues, GTE resolved to take a pragmatic approach to interoperability, giving due attention to the user's perspective.
Therefore, the following general guidelines have been adopted while drafting the present section:

a) First, to review and update all activities carried out with regard to interoperability by other groups of industry experts (i.e. CEN, MARCOGAS,GERG), some of whom are also present in this Working Group on issues such as gas quality, cross-border operational procedures, metering of gas quantity and quality, network specifications;

b) Second, to propose practical measures to facilitate smooth interoperability of interconnected systems, with a view to introducing a Common Interoperability Protocol.

Interoperability issues have been grouped and addressed as follows:

Gas quality

This section outlines general views on the subject of gas quality and may not represent the specific situation of a particular country. This section provides also an overview of the prevailing gas quality specifications in EU Member States. The difficulties in developing a unique EU gas quality specification are described. Examples of operating gas quality agreements are collected and the complexity of the problem is analysed. Players and roles are defined underlining that there isn't a unique solution. Gas quality being an evolving matter, every possible solution must be considered in long term scenarios, taking into account changes in gas industry country by country.

Communication protocol

The section stresses the importance of standardisation for communications between TSOs and between shippers and TSOs. Edig@s is identified as the most appropriate communication protocol and its implementation at European level is recommended. In collaboration with the Edig@s group of companies, a presentation of the work carried out so far is provided, and areas of further investigation are described.

Harmonisation

This section makes proposals on the harmonisation of key parameters such as gas day, gas year, measurement units, nomination timing and publication of maintenance information. It is assumed that implementation would initially be at the national border although in the longer-term the proposals could be adopted within the member states.

Interconnections

This section describes the typical contents of an Operating Agreement between TSOs and shippers upstream and downstream of an interconnection point. Several important issues are covered, such as the respective roles and responsibilities of the involved parties and the procedures for the administration of gas flows at interconnections. The section also covers Operational Balancing Agreements (OBAs), as an increasingly developed tool adopted by Transmission System Operators to match nominations and allocation procedures on both sides of an interconnection.

European Gas Industry Standards Board (EGISB)

In this section the establishment of a European Gas Industry Standards Board (EGISB) is considered. EGISB would be a voluntary, organisation with representation from all organisations involved in the European gas industry, with the objective to define and maintain a Common Interoperability Protocol. EGISB should be an independent organisation where not only TSOs but all market players would be represented.

Future developments

GTE identifies the provision of timely information concerning transportation at interconnection points as a key element to facilitate cross-border gas flow. GTE recommends the creation of a specific Internet site providing shipper-oriented interoperability related information, such as:

- A glossary of interoperability terms
- Gas supply system structure and capacity availability
- An interoperability "checklist", or process map of activities that a prospective shipper would be required to carry out before the gas actually flows.
- A summary of Transmission Code or Conditions in EU Member States and/or links to companies' websites
- Standard templates for Operational Balancing Agreements
- A list of contact points for each GTE company.

The subject of interoperability bears a close relationship with capacity management and balancing regimes. Attention was given, during the drafting of this chapter, to ensuring co-ordination with the other GTE Working Groups responsible for the Capacity and Balancing sections of the report, and the reader is referred to those chapters for a more detailed treatment of capacity and balancing. These are only mentioned in this section to the extent that they can create operational difficulties for a shipper, in which case the Interoperability Working Group has attempted to indicate practical solutions, providing examples taken from actual operation.

Section 1. Gas Quality

1. Introduction

The European gas market is being supplied by a series of different gas sources, each with its own specific wellhead composition and quality treatment equipment and consequently with its own specific contractual gas quality specification.

These different gases are classified into two main gas categories, being the low calorific (Slochteren) and the high calorific gas categories or, more formally, the group L and the group H of the second family of gases which are described under the European Standard 437. This standard, however, is limited to the specification of a set of test gases for appliances. These two main gas categories are not interchangeable and are transported and distributed in separate pipeline systems to ensure safe and efficient operation of gas appliances and burner systems. High calorific gas can be transformed into low calorific gas by blending with nitrogen and/or air. It is however generally speaking not economically feasible to transform low calorific gas into high calorific gas.

Within each main gas category, and particularly within the high calorific gas category, the differences between the gas quality specifications are such that there can be a lack of interchangeability where, for various reasons, limitations and/or restrictions on gas quality specifications are necessary and established. Schedule I sets out a list of gas quality parameters used for group H gases at the connection points between EU member states and gives an indication of the range of the differences, and hence a possible origin of limitations and restrictions, in the specifications for these quality parameters.

Such limitations and restrictions might either be related to technical issues such as CO2 levels with respect to storage characteristics or to contractual obligations such as redelivery specifications or even administrative billing rules in the pipeline system as well as in the downstream area. As a consequence, shippers are at times confronted with the situation that, at some border crossings, the redelivery gas quality specification ranges out of the upstream system are wider than those for delivery into the downstream system. Although agreement between upstream and downstream specifications can be reached in some of these situations, in most situations some differences would remain.

These limitations and restrictions may be considered as impediments to trade, which, to some extent, have been reported to the European Commission and to the European Forum of Gas Regulators or have been commented on at gas industry conferences.

The possible policy choices for elimination of the above mentioned impediments to trade are limited : either sufficient flexibility is available at the burner tip and gas quality specifications can be reasonably widened, or flexibility at the burner tip is limited and gas quality specifications will need to be narrowed down. It is obvious that the choice for flexible burners and, where needed, local gas quality monitoring and/or control systems moves the investment costs downstream towards the end users. The choice for narrow range burners however, moves the costs further upstream towards the transporters (blending) or towards the producers (gas treatment).

The U.S. have chosen for a standard gas quality specification and have imposed narrow ranges for gas quality parameters on the producers. As a result, all gas sources are interchangeable between transmission pipelines and downstream investments are limited.

The choice for a standard gas quality specification seems to be a logical one and possibly the most cost effective overall. However, the present situation in Europe would not allow for such a choice to be made easily. As gas is a natural product a narrow standard specification could considerably reduce the overall availability in the market which is even more important if the market is strongly import depended as is the case in Continental Europe. Nevertheless, it is clear that some of the contractual gas quality specification parameter ranges are resulting from historical reasons and may, given the evolution of technology, be adapted without increased risk to the producers. For obvious commercial reasons, this does not happen. Conversely, also downstream operators and/or distributors stick to certain gas quality parameters that are arguably no longer required given the evolution of the requirements for appliances imposed by European standards.

Differences in gas specifications should also be analysed against the respective historical background. Thus different countries made different choices to cope with gas specification issues: : some countries have invested in flexible burners (e.g. Belgium, France) whereas others have opted for blending at the transporters level (e.g. Holland, Germany). This lack of coherence has obviously a high potential for causing incompatibility problems at border crossings where new pipeline systems create new transversal link between traditional supply routes. This is particularly the case with the Interconnector related routes.

The European gas transporters try to solve any incompatibility problems at the interconnection points between their individual systems but it is clear that gas quality issues can only to a very limited extent be solved by the transporters alone. The removal of the gas quality related difficulties is not an easy task and will require the co-operation of all parties involved including the various players in the gas industry such as producers, shippers, gas merchants, transporters, public distribution companies, appliance manufacturers and regulators.

With the aim to clarify the matter further, the European Commission has launched a study on European Gas Quality specifications; a preliminary study report is expected to become available this summer. The study report will need to be evaluated by the working group and then used as a starting point for the development of an action plan identifying the various issues at hand.

2. Gas quality parameters

Gas quality parameters fall in one of five categories with regard to : energy content, energy load, combustion characteristics and acceptable levels of impurities and inert gases, with the understanding that the first and the last named have significant impact on the determination of the values in the second and the third category.

Energy content is obviously important for energy billing purposes which is generally based on the gross calorific value (GCV) of the gas. The determination of GCV is carried out according to well defined industry standards by measurement of the heat release due to combustion of a specified quantity of gas at a given temperature under the condition that the products of combustion are brought back to the same temperature. Unfortunately, the use of different reference conditions in the different European member states sometimes is a source of confusion at connection points between pipeline systems. Nevertheless, conversion factors are available and are readily used to manage the energy exchanges at these connection points.

The energy load to a burner is a major factor in relation to combustion control. The Wobbe Index is the parameter used throughout the industry as a measure of the energy load available at the burner tip at one unit of pressure differential. The Wobbe Index is derived from fluid mechanics and is equal to the GCV divided by the square root of the density relative to air.

The parameters in the category of "combustion characteristics" describe the reaction kinetics during combustion. Continental wholesale gas specifications do not include specifications for combustion characteristics, since limitations on Wobbe Index and inert gases are judged to be sufficient. UK specifications, on the contrary, include parameters such as Soot Index (SI) and Incomplete Combustion Factor (ICF). The Soot Index is an indication for the risk of soot formation whereas the Incomplete Combustion Factor is an indication for the risk of carbon monoxide formation during the process of combustion. Combustion characteristics specifications used to be quite necessary with respect to manufactured city gas, although they have lost part of their importance for natural gas. As soon as all gas appliances used in the different networks comply with European Standard 437 (the standard defines the composition of various test gases specifically chosen for the verification of a number of combustion characteristics, including soot and carbon monoxide formation) the problem would be considerably reduced.

There is a range of limiting concentrations for impurities generally used throughout the gas industry, such as maximum values for O_2, S and H_2S contents and maximum values for dew points of H_2O and hydrocarbons. A limited number of countries have introduced specifications for maximum H_2 contents.

These impurity specifications are necessary for protection of pipeline systems and/or customer facilities from corrosion and mechanical or other damage. Often, gas quality specifications also include a general “impurity clause” aimed at proscribing (trace) components which are not monitored for but that could, if present in the gas, cause operational and/or other problems to the gas user.

Finally, the maximum content of inert gas, more specifically carbon dioxide, is commonly specified throughout Europe. A limited number of countries have introduced specifications for maximum N_2 contents.

3. Specific examples of interoperability problems.

Historically, the continental natural gas market developed from coke-oven gas and small scale local production towards an integrated E.U.-wide system that conveys natural gas from large production areas through high integrity long distance transportation systems such as pipelines (Groningen, North Sea, Russia) or a fleet of LNG tankers (Algeria). Historically, continental gas merchants gathered forces by forming buyer consortia with the aim to enhance economies of scale for large supply investments and to increase their negotiating power while facing oligopolistic producers. Continental network operators therefore have always naturally co-operated towards solving transmission pipeline compatibility problems since they had common interests. Also, the fact that pipelines were built to serve long term contacts with long lead times between contract signature and first gas flow allowed for gradual evolution which made it possible to anticipate the necessary investments related to changes in gas quality. The tradition of shared sources of natural gas has ensured that continental European gas transmission pipeline systems have naturally been harmonised, at least along the major transmission routes, in terms of compatibility in general and in terms of gas quality in particular. A similar gradual evolution from coke-oven gas supply with their associated local distribution grid to a nationwide natural gas transmission system supplied by offshore producers took place in the UK with one major difference : there has simply been no need for co-operation and harmonisation between network operators since insular Britain has been blessed, throughout its growth towards a mature gas market, with the exclusivity of one single operator .

The start-up of the Interconnector has dramatically changed the situation in terms of transmission system compatibility within Europe. The Interconnector pipeline does not link production fields to markets but rather constitutes a grid to grid connection. Moreover, the pipeline system downstream of Interconnector establishes transverse links between several continental national markets that had not directly been interconnected before. As a consequence, the varying quality requirements at non-traditional interfaces gave rise to a number of extremely frustrating situations for shippers trying to take advantage of the new trading opportunities created by the Interconnector and the transit system in Belgium.

In particular, deviations in gas quality specification and related responsibilities in the sensitive area of hydrocarbon dew point have caused disruptions of gas flows from the UK towards the Continent. More importantly, differences in basic gas quality parameter specifications such as calorific value and Wobbe Index, prevent certain gas sources from entering the newly formed trade routes altogether.

3.1. Gross Calorific Value

The German legislation governing natural gas billing practices includes regulations that limit the maximum value of the gross calorific value that shippers are allowed to use in billing energy deliveries to local distribution companies to the lower GCV value of the natural gas delivered to the area. Logically, those shippers that would suffer in case the gross calorific value of gas delivered exceeds the level that can be charged for to their customers, have imposed limitations for the gross calorific value to their UK suppliers and in the redelivery specifications related to the UK-gas transit agreements through Belgium.

As a result, blending of richer gases into the transit stream of the leaner UK-originated gas is made impossible at times or is very limited at best. This of course limits the trading opportunities for these richer gases into Germany and, due to the configuration of the Belgian transit system, also into the Netherlands.

The obvious solution seems to be to alter the relevant German legislation in such a way as to remove the capping of gross calorific value in the billing process and to invest as appropiate in gas quality tracking software and/or in individual energy measurement systems in order whilst ensuring fair treatment of both shippers and end users.

3.2. Wobbe Index

The Wobbe Index specification at the connection point with the Interconnector, and to some extent at the Dutch side of one of the Belgian border connection points with the Netherlands, is significantly lower than these specifications at the other Belgian border connection points. As a result, trading opportunities for gases with wider Wobbe Index ranges into the UK and into the Netherlands are limited.

The (lesser) problem in the Netherlands is related to the limiting redelivery specification in the systems operated by Gasunie downstream of the newly connected supply line.

The situation in the UK is more serious. Notwithstanding the adoption of an European Directive imposing E.U.-wide standards and regulations for natural gas fired appliances in 1990 and its subsequent mandatory enforcement in 1996, the relevant standard Wobbe Index range is not acceptable in the UK.

The fact of the matter is that although newly sold appliances should indeed comply with the EU regulations, many homes still are equipped with older appliances that preclude the use of natural gas at the higher end of the Wobbe Index range. This problem applies particularly to the UK.

It would require a major and lengthy effort to ensure that, over time, all British appliances would either be adapted or gradually replaced by appliances fully compatible with the European standards.

In the meantime, blending of the gas supply streams or other appropriate actions may be necessary.

3.3. Hydrocarbon Dewpoint

The hydrocarbon dew point problem is by far the most commented-on gas quality issue related to the Interconnector trade routes.

It all starts with a contractual mismatch at the Bacton end where IUK shippers have to deliver gas with a dew point of maximum - 2°C, whereas their NTS counterparts have no contractual means of enforcing that Bacton beach gas meets this specification at all times.

To make matters worse, there is no generally accepted measurement method for the determination of the hydrocarbon dew point. The existing methods are either not in accordance with established ISO standards, or in case they are, they are not very suitable for continuous and automated monitoring. Therefore, the only sensible and practical approach, most commonly followed in the natural gas industry, is to ensure that the hydrocarbon dew point is controlled to a value sufficiently below the specified maximum temperature by using adequate process equipment. Unfortunately, upstream contractual specifications at Bacton are well above - 2°C during large parts of the year and as a result, the Interconnector and downstream hydrocarbon dew point specifications have not always been met. This in turn has led to reduction and even interruption of the Interconnector flows, causing confusion and frustration to shippers acerbated in the early days after the Interconnector start-up by the fact that the three connected transporters used different measurement methods. Indeed, Transco used the traditional manual cold mirror type instrument, Interconnector relied on on-line chromatographic analysis and subsequent calculation of the dew point by means of an equation of state and Distrigas used automated weighing equipment to determine the amount of dew formed per unit of gas at the contractually specified temperature.

In order to try and solve the controversial measurement issue, the three operators commissioned a testing program with the aim to evaluate jointly the various available measurement methods. The testing program has resulted in a fair evaluation of the differences between the various techniques and has also led to the "discovery" of an automated version of the cold mirror type instrument, now in place at both the Bacton and the Zeebrugge end of Interconnector.

After close to a year of frequent disruptions caused by gas quality deficient deliveries at Zeebrugge, the UK gas community, and more particularly the parties involved at the Bacton end, responded with effective voluntary action and as a result hydrocarbon dew point deficient gas deliveries have stopped. However, as of today, close to 2 years since the Interconnector flow has been interrupted because of hydrocarbon dew point deficiency for the first time in April 1999, the UK-gas community is still working on the establishment of an appropriate contractual arrangement that will put the hydrocarbon dew point issue to bed.

3.4. Oxygen contents

More often than not, the limiting concentration for maximum O_2 contents generally equals 1000 ppm(vol), both on the continent and in the UK. However, there are some remarkable exceptions that have a high potential to cause impediments to trade. Indeed, at one of the border crossings between the Netherlands and Belgium, the maximum (emergency) concentration limit equals 5000 ppm(vol) whereas the limiting concentration for gas delivered out of Interconnector is set at 10 ppm(vol).

4. Conclusion.

Although the European Community has established a European Standard for gas quality specifications as far as burner characteristics of appliances are concerned, it is clear that this standard is far from being acceptable all over the EU. Moreover, the existing standard is not aimed at giving guidelines for international border connection points since it does not include guidelines for gas quality parameters other than the Wobbe-index. Although the ideal solution would be the establishment of a common gas quality specification, it is not clear at this stage that, given the required investment, this would be the best way forward. More and detailed information needs to be gathered in order to complete the total European gas quality picture whereas issues such as upstream or downstream investment costs must be evaluated before a recommendation can be made. In the meantime, some of the gas quality related problems may be solved by operator to operator agreements (O.B.A.'s).

See Annex A: Gas quality parameters at border crossings in Europe

Section 2. Communication Protocol

1. Why do we need a communication standard

Whereas initially a relatively small number of companies were engaged in natural gas business, the last years have shown a growing number of companies taking their share of the market. As a result, the volume of information to be transmitted between the operational dispatching centers of the different gas companies and between traders and operational dispatching centers has grown continuously.
But not only the amount of players has grown, also the number of contracts for each player has increased. Furthermore, these contracts are concluded on short notice and the duration can also be shorter.

This all implies that communication between players is getting more important.
The following characteristics apply :

- An increasing amount of messages
- Reliability of message exchange
- Availability of message exchange
- Security
- Confidentiality

In order to ensure communication with above characteristics, a group of 6 European gas companies, the EDIG@S group[1], decided to set up communication standards.

Standards were agreed in the following areas :

- Message scenarios and message contents;
- Message protocol;
- Message carrier.

2. Message scenarios and message contents

All communication between players is defined in some 19 messages, the contents of each of these messages is agreed. It is also decided when to send which message (according to so-called message scenarios). For instance : when ordering gas, a "request" message is sent to the gas producer who will respond with a "response" message. When ordering transportation, a "nomination" message is sent to the gas transportation company which may be followed by a "confirmation". Also scenarios are defined in which exceptions are covered. Of course only those messages that will be used need to be implemented.

3. Message protocol

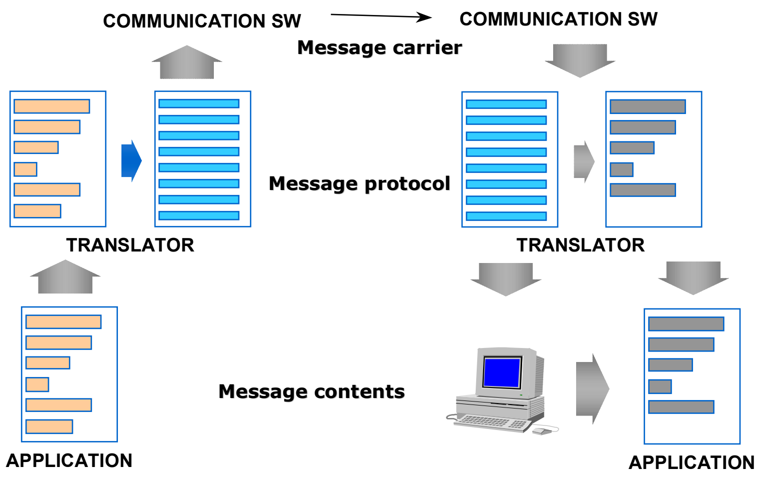
The EDIG@S group decided to use the EDIFACT message protocol in order to give each single item in a message a unique code. By using the international standard of EDIFACT, commercial translation software is available to assist in translating EDIFACT messages to messages in a user format (and back).

4. Message carrier

The message carrier that was first chosen was the international X.25 standard. This is an international data network operated by telecommunication companies. It offers secure and reliable network services combined with a high degree of availability and confidentiality. However, it is not suitable to facilitate internet-like

[1] The EDIG@S group was founded by Distrigas, Ruhrgas, Gaz de France, SNAM, Statoil and Gasunie. Early 2001, Gazprom and Centrica joined the group.

applications.
Remark : currently also ISDN/FTP as message carrier is being used in the gas market.



The picture above gives in a schematic way the mechanism of automated message exchange between two gas companies.

The lowest levels depicts the existing computer software in two gas companies.
On the left side, a message is generated by the software and sent to the translator program. This program translates the message to an EDIFACT message, which just contains the codes (tags) of each piece of information combined with the value of it. The message does not contain a layout of the message and is unreadable.
The EDIFACT message is by the communication software prepared for transmission by wrapping it up and sent via a data line to the gas company on the right hand side of the picture.
The communication software unwraps the message and translates it back from EDIFACT format to the format, defined by computer software. The software recognises the tags and reads the associated values. The message is presented to the user according to a layout that may be completely different from that of the company on the left hand side.

This means that automatic communication between two companies having completely different computer software can be established using above mentioned standards.

The standardization work executed so far has resulted in :

1. Scenarios for transport and trading messages and the contents of 19 messages.
   Some more details on scenarios and contents have yet to be settled. This work will be carried on by the EDIG@S group of companies.

2. The message protocol has been chosen. All companies of the EDIG@S group are currently converting their existing messages to EDIG@S messages and are implementing new messages in the EDIG@S format. Next to the companies of the EDIG@S group, also some 40 shippers are using EDIG@S messages for their transport contracts with transmission companies. Experience shows that the effort required for implementing EDIG@S translation software and connecting it to existing in house computer software should not be underestimated. Software packages are available to get started.

3. The message carrier that was initially chosen (X.25) is indeed being used by the founders of the EDIG@S group. But new users of EDIG@S have adopted a different carrier (ISDN/FTP) which is less costly but on the other hand offers less on the field of security and confidentiality. Two different message carriers implies that double communication software has to be implemented with double cost. Better standardization in this area is required. The EDIG@S group is currently reconsidering the message carrier standard. A standard network should be a network with the following characteristics :

   - high reliability
   - high availability
   - support confidentiality
   - high degree of security
   - low entrance fee so a low threshold for new users
   - easy access

Particularly the option of a Virtual Private Network is investigated. This is a network which already possesses above mentioned characteristics or where they can be implemented. A VPN can also be used to exchange real-time data which can be accessed with standard tools like an internet browser. The currently used X.25 network does not permit the use of standard internet tools.

see Annex B – The EDIG@S standard

Section 3. Harmonisation

1. Introduction

This document has been prepared at the request of the GTE Interoperability Group. The remit was to prepare the draft section on harmonisation detailing current arrangements and making recommendations on the standardisation of gas day/year, measurement units, nomination / re-nomination times and the provision of maintenance information. It was initially intended to harmonise at the national border in order to better facilitate the flow of gas between European states. However, it is anticipated that the time the recommendations would be adopted within the member countries.

Information was received from a total of nine European gas companies. These included Bord Gais, Gasunie, Gaz De France, VNG, OMV, Enagas, Dong, Snam, Distrigas and Transco.

In preparing the recommendation a consensus view has been taken where possible. If a clear consensus was not available the basis for the recommendation has been noted.

Following comment from the members of the GTE Interoperability Group the intention is that the document will be finalised and incorporated in the full report from the Group for presentation to the GTE Plenary session.

2. Summary of current arrangements

2.1 Gas Day
Seven of the nine organisations included in the survey confirmed that the gas day ran from 06:00 to 06:00. With the exception of Transco all organisations use local time. One organisation, Enagas, has a gas day running from 00:00 to 00:00. Another organisation DONG has a gas day running from 08:00 to 08:00.

2.2 Gas Year
With the exception of Gasunie and Enagas (which operates a calendar gas year) all organisations have adopted a gas year running from 1st October to 1st October.

2.3 Measurement Units
The following measurement units are used by the organisations responding to the survey.

Item	Unit	Number	Unit	Number
Energy [1]	kWh	7	MJ	3
Volume [2]	M^3	9	n/a	n/a
Pressure [3]	Bar	9	n/a	n/a
Calorific Values	MJ/m^3	4	KWh/m^3	2
Capacity	Is offered in both volume and energy units			

[1] one organisation uses both m^3 and MJ

[2] 5 organisations measure volume under Normal conditions (1.01325 bar & 0ºC)
3 organisations measure volume under Standard conditions (1.01325 bar & 15ºC)

[3] 5 organisations measure CV under Normal conditions (1.01325 bar & 0ºC)
3 organisations measure CV under Standard conditions (1.01325 bar & 15ºC)
2 organisations measure CV at 1.01325 bar and 25ºC
VNG measure volume 1.01325 & 20ºC
Algeria supplies SNAM with gas at 1 bar & 15ºC

2.4 Nomination Timing

There are wide variations between the different nomination/re-nomination arrangements with no clear common position. Further information is available from the GTE Balancing & Storage Group.

2.5 Publication of Maintenance Information

A total of six organisations responded to the item on the publication of maintenance information. Transco provides detailed maintenance information including anticipated system entry point capacities as part of its Network Code obligations. This information is made available to all Shippers. The remaining five organisations provide limited information to specific interested parties.

3. Recommendations

3.1 Gas Day

It is recommended that the 06:00 to 06:00 gas day is adopted across Europe and based on European Local time (to take into account Winter/Summer time changes) as this is a majority position.

3.2 Gas Year

It is recommended that the 1st October to 1st October gas year is adopted across Europe as this is a majority position.

3.3 Measurement Units

It is recommended that the following key measurement units are adopted:

Energy	kWh
Volume	m^3
Pressure	Bar
Calorific Value	kWh/m^3
Capacity	kWh or m^3

Units should be measured under Normal Conditions (1.01325 bar & 0ºC)

3.4 Nomination Timing

It is recommended that initial nominations are received by 13:00 D-1 to enable system operators to schedule transportation capacity.

It is recommended that re-nominations are permitted between 16:00 D-1 and the end of the gas day to provide Shippers with the necessary flexibility to manage their customer portfolios. The period between 13:00 and 16:00 D-1 would be used for the initial scheduling of gas flows for the following day. There may need to be some limitations placed on the number and size of re-nominations to take into account the physical characteristics of the specific gas transportation systems. Although nominations could be received at any time during the period between 16:00 D-1 and the end of the gas day. It may be necessary to place additional limitations on re-nomination from 00:00D to the end of the gas day as the associated rate changes can present operational difficulties. They would be batched and actioned at specific times, for example on each hour.
These recommendations should be considered in conjunction with the proposals of other GTE groups such as Balancing & Storage.

3.5 Publication of Maintenance Information

It is recommended that the following information relating to system maintenance is provided:

- Description of the gas transportation system;
- Details of maintenance/development activity with the potential for restricting capacity;
- Details of capacity availability at system boundaries.

It is recommended that the information is provided to the relevant Shippers in September for the October to April (Winter Operations) period and in March for the April to October (Summer Operations) period.

The provision of this information, via the Internet for easy access, would enable the Shippers to effectively manage their longer term supply/demand balance.

3.6 Implementation

In order to implement the recommendations on harmonisation it would be necessary for most organisations to amend existing systems and processes. Clearly there would be both resource and cost implications associated with the necessary changes. In addition, existing contractual arrangements, industry structures and/or national legislation could delay implementation within member states. It is therefore recommended that the proposals are initially implemented at national borders.

If the recommendations are supported it would be appropriate for the GTE Interoperability Group, or its successor, to undertake a more detailed investigation of the issues and to develop a programme for implementation. The programme would be incorporated in the broader arrangements for the liberalisation of the gas market.

See Annex C - DATA COLLECTION TABLE

Section 4. Interconnections

1. Current situation

Infrastructure owners have a number of obligations in order to fulfil the commercial and technical requirements. High demands of Seller, Buyer and Shipper have to be met at interconnection points for the fulfilment of purchase, transport and storage contracts as well as gas pipeline systems have to be kept in balance for reliability and safety reasons. Transmission system operators therefore monitor their network continuously so as to stay within certain tolerance levels around the balanced conditions. Gas companies have concluded operational agreements, where appropriate provisions such as ~~dispatching~~ nomination procedure, quantity measurement, quality control, allocation procedure, reporting and documentation are laid down.

2. Carrier to Carrier Agreement on Operations

In view of the implementation of the Gas Directive into national legislation it is becoming urgent to establish agreements on operations within the changed framework. In the future Transmission system operators have to amend existing arrangements as carrier to carrier agreements 'C2C agreements' and in addition operational balancing agreements 'OBA' to maintain the present flexibility, providing sufficient information and to ensure safety at the interconnection points and the relevant gas pipeline system. The carrier to carrier agreement shall consist of the following subjects:

- Equipment and operation
- Dispatching procedure
- Quantity measurement
- Quality determination
- Provisions for In- and Off-taking
- Allocation and documentation
- Tele-metering

2.1 Equipment and operation

For the construction and renewal as well as modifications of the metering station at the interconnection point the equipment and installation shall be defined in the form of basic design data, which shall consist of a general description, simplified flow diagram, instrument specifications, piping drawing and certification of instruments. The minimum technical requirements shall be standardized.

Transmission system operators shall appoint representatives who shall act in the name and on behalf of his company and one or more deputies, who in his absence, shall act in the name and on behalf of their company, for the fulfilment of the regulations. Responsibilities, rights and obligations of the representatives of the Transmission system operators have to be defined.

2.2 Dispatching procedure

Transmission system operators shall provide each other all information necessary for the fulfilment of their respective obligations. Any information, document and instruction concerning the performance of the gas pipeline system shall be exchanged directly between Transmission system operator and the relevant Shipper. The communications between the parties shall be carried out by an agreed tele-transmission system, for example Edig@s.

Weekly forecasts, daily programs and changes of the program shall be communicated promptly. The Transmission system operator shall perform matching procedures in order to check whether the requests on both gas pipeline systems are equal. As soon as requests are matched the relevant confirmation shall be given to the shipper.

2.3 Quantity measurement

For the determination of the quantity of gas and the quantity of energy the metering station at the interconnection point shall be equipped with an automatic measurement equipment, securing a state of the art quantity measurement. The metering equipment shall also includes any control and data transmission equipment and shall comply with the applicable technical standard EN ISO 1776.

The measurement system for the determination of the quantity of gas shall be effected with approved measuring equipment verified by the Transmission system operators. For the determination of the quantity of energy the Gross Calorific Value shall be calculated from the gas composition determined by gas chromatograph.

All interventions on the quantity measurement instruments must be previously communicated between the Transmission system operators, who shall timely answer whether they intend to be present at the intervention.

2.4 Quality determination

The Transmission system operator shall carry out gas quality control and the results shall be made available to the parties concerned. The following characteristics shall be defined as a minimum:

- The chemical composition relating from Methan to Hexane and heavier, Nitrogen and Carbon Dioxide;
- Sulphur content and sulphur compounds relating to Hydrogen sulphide, Mercaptan sulphurs and total sulphur;
- Dew point for water and hydrocarbons or equivalent;
- Pressure and temperature;

All interventions on the quality control instruments must be previously communicated between the Transmission operators, who shall timely answer whether they intend to be present at the intervention.

2.5 Provisions for In- and Off-taking

The gas quality parameters have to be specified for each interconnection point. In addition a certain operational procedure for quality deficiency have to be defined.

2.6 Allocation and documentation

The most convenient allocation procedures for Shipper are defined quantities per declarations. As long as no operational balancing agreement is in force, Transmission system operator is forced to determine the extend of the transport services used by the Shipper by means of metering equipment and by means of calculation methods approved by Shipper.

All data concerning quantity of gas, quantity of energy and gas quality shall be compiled by the Transmission system operator in form of daily and monthly reports and shall be made available to Shipper.

2.7 Telemetering

In order to guarantee the operational reliability of the gas pipeline systems, the interconnection points and the exchange of data the Transmission system operators shall establish a telecommunication system between their dispatching centres, which shall be attended by dispatchers day by day round the clock.

3. Administration tools: Operational Balancing Agreement (OBA)

3.1 Introduction

An Operational Balancing Agreement (OBA) is an agreement between two transporters at an Interconnection Point. The purpose of an OBA is to facilitate efficient and reliable operations at the interconnection point and to determine the conditions for allocation of gas quantities delivered and/or off-taken at the interconnection point. A typical OBA will consist of procedures with respect to allocation and validation of shippers' nominations along with general terms and conditions. The key provisions of the agreement define the imbalance arrangements and the obligations of the transporters with respect to the management of the imbalance at the interconnection point. The document sets out to describe the contents of an OBA and to provide a comparison between an interconnection point operated with an OBA and one without.

3.2 Contents of an OBA

3.2.1 Nominations and Confirmations

Prior to each gas day the Shippers on both pipelines nominate to each Transporter the quantities they intend to deliver or receive at the interconnection point. The Transporters reconcile/confirm nominations received from their respective Shippers, i.e. the Shippers for whom the Transporters will deliver or receive gas at the interconnection point. The global quantity determined through this reconciliation and confirmation process is described as the 'Scheduled Quantity'. The Scheduled Quantity is subsequently profiled and scheduled to flow at the interconnection point. In the event of a difference between the quantities nominated by Shippers on both pipelines a 'lower of' default will be applied, i.e. the lower nomination will be confirmed as the Scheduled Quantity.

Shippers are allowed to re-nominate such that the Scheduled Quantity can be changed. The two transporters at the interconnection point will in turn reconcile the new nominations and confirm the new quantity to flow as the new 'Scheduled Quantity'. Shipper re-nominations must be in accordance with the relevant Transmission Codes or Conditions.
Allocations are based on Scheduled Quantities

The parties to the agreement intend that the quantities actually delivered and received each day at the interconnection point(s) will equal the Scheduled Quantity. The physical flow at the Interconnection Point will be determined and communicated by the Transporter controlling the meter to the 2nd Transporter as soon as possible during the day following the gas day. The absolute difference between the metered quantity and the Scheduled Quantity is the 'Operational Imbalance'. The Operational Imbalance is the responsibility of both Transporters. The accumulated value of operational imbalances is called the 'Imbalance Quantity'.

3.2.2 Operational Imbalances

Correction in Flow Rates during the Day

Ideally both Transporters would co-ordinate such that the Imbalance Quantity is reduced to zero, i.e. a small shortfall on one day would be followed by an over supply on the following day. Physical Flow adjustments will be made to attempt to maintain or achieve an Operational Imbalance of zero at the interconnection point. The Transporters will be able to request adjustments to actual deliveries or receipts at any time during the production day by co-ordination between the Transporters control facilities, i.e. dispatching centres.

Each Transporter will use reasonable efforts to deliver or receive the 'Imbalance Quantity' when the operating conditions on each Transporters systems permits, taking into consideration the nominations made by firm Shippers on each Transporters system. In the event that the Interconnection Point is unable to achieve the scheduled flow rate, i.e. a capacity constraint, the Transporters will take corrective action.

Corrections of Imbalances

There are a number of options with respect to reconciling the 'Imbalance Quantity'.

An example would be where the Transporters agree 'In Kind' balancing between the pipelines. When the daily imbalance at the meter is within a percentage of the daily Scheduled Quantity the imbalance is treated

'In Kind' between the two Transporters. Any 'In Kind' imbalance carried over from the prior period, day, will become part of the current 'Scheduled Quantity'. When the daily imbalance is greater, or less, than x%, or an absolute value, of the Scheduled Quantity the entire amount is allocated on a pro rata basis to the Shippers who have nominated at the interconnection point. As an alternative, to avoid the shipper to be part of the metering, there can be a reduction of capacity according to § 5.3.2.

An other example would be where the Transporters agree that the aggregate monthly imbalance is cashed out in accordance with the appropriate market index or applicable balancing gas contract cost at the end of the month. The following month will start with an 'Imbalance Quantity' of zero, regardless of the previous aggregate monthly imbalance. Transporters would be encouraged to facilitate OBA's if they are kept whole with respect to the cost of 'Imbalances' at the end of each Month.

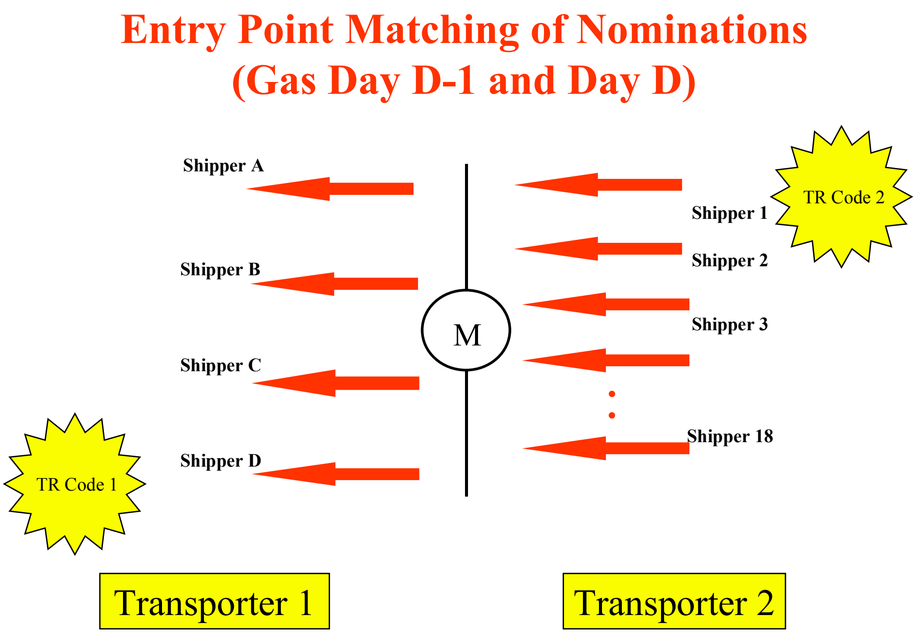
3.2.3 Measurement of Operational Imbalance
This section typically states the measurement standards applied, i.e. ISO5167/5168.

3.2.4 Capacity Constraints
Provisions are normally included in an OBA on how to deal with capacity constraints on one of the transmission systems at the interconnecting point. In the event that a capacity constraint occurs on either transmission system which results in a curtailment of quantities at the interconnection points, the Transporter on whose system the constraint occurs shall determine the capacities available to its relevant Shippers. The shippers should then renominate and the process as described in §5.3.2.1 and §5.3.2.2 is followed as normal.

3.2.5 Miscellaneous Provisions
Like other agreements an OBA normally includes provisions regarding the applicable governing law, the term of the agreement, notices, termination rights, warranties, liabilities, governing bodies, waivers, confidentiality, billing and payment along with a reference to the applicable Transmission Code or Conditions. In the event of a conflict or difference in interpretation between the Transmission Code or Conditions and an OBA the interpretation of the respective Transmission Code or Conditions shall apply.

3.3 Contribution of a Matching Agent
As outlined above an OBA is an agreement between two Transporters at an Interconnection Point. The agreement is negotiated between the two Pipeline companies and Shippers are removed from the details of the agreement although they must sign-on to the arrangements agreed between the Transporters. An OBA is primarily concerned with gas flow, allocations and the determination of ownership after the day. A Matching Agent is an agreement between all Shippers delivering gas, and/or receiving gas, at the interconnection point between two pipeline systems. A Matching Agent is primarily concerned with the matching of individual Shipper nominations both before, and within, the gas day. This is highlighted in Figures 1 Matching of Nominations (Matching Agent).

Figure 1: Matching of Nominations (Matching Agent)



A Matching Agent may be necessary when Transporters at the Interconnection Point cannot guarantee confidentiality of information, (i.e. when Transporters are also Traders at that Point) or when one of the Transporters at the interconnection point does not agree to an OBA due to technical or commercial reasons.

The Matching Agent performs matching of individual Shipper upstream and downstream nominations. If there is a mismatch between the individual nominations on the Upstream and the Downstream pipeline systems an individual default nomination, related specifically to the contract between the two Shippers, is applied. The default nomination applied to the Shippers mismatch is based on the registration details of the nominating Shippers, i.e. Upstream party, Downstream party, lower of, etc. In the example provided in Figure 1 Shipper 'C' can be supplied by, and match, with any of Shippers one to eighteen.

In the absence of an OBA the Agent can also perform allocation of the metered quantity pro-rata to the matched nominations, or any other set of pre-determined allocation rules, at the interconnection point. The Transporters can in turn receive the allocated quantities from the Agent, and subsequently, each individual Shippers imbalance is calculated on their own respective pipelines. As such, there is no imbalance at the interconnection point, as it is the metered amount, which is allocated amongst Shippers.

With an OBA in place an individual Shippers risk of imbalances at the interconnect is reduced significantly as the Shippers at the interconnection point are allocated equal to their individual nominations. The Shippers total imbalance on the pipeline is equivalent to the offtake at the exit point versus the nomination to the pipeline at the Entry Point. The OBA allocation method is outlined in Figure 2.

However, in the case where an Agent performs the allocation a Shipper is allocated at the interconnection point on a predetermined method, usually pro-rata to nominations to the metered quantity. Therefore, the Shippers imbalance position on the pipeline is the Agents allocation at the interconnect versus the allocation at the Shippers off-take point. This is illustrated in Figure 2 'Shipper Pipeline Imbalance'. The Shipper pipeline imbalance would be dealt with under the relevant Transmission Code or Conditions. It can be clearly illustrated from the example provided that Shipper Imbalances are reduced through the implementation of an OBA.

Figure 2: Shipper Pipeline Imbalance

	OBA In Place	Without OBA
Nomination	100	100
Scheduled Quantity	100	100
Interconnect Metered Quantity	102	102
Shipper Allocated	100	102
Shipper Interconnect Imbalance	0	2
Shipper Exit Point Metered	99	99
Shipper Pipeline Imbalance	+1	+3
Transporters Imbalance	+2 'In Kind'	0

In addition to the above, with an OBA in place a Shipper does not normally need to be concerned with the legal and operational complexities involved with the operation of an interconnection point on a day to day basis (metering, steering differences....). The set up and administration of Agents will require, once off, Shipper resources with respect to legal drafting, meetings and workshops. There is also an additional cost associated with the administration of the Agent, i.e. matching has to be performed on a day to day basis. These administration costs are borne by the Shippers operating at the interconnection point usually on a 'per-throughput' basis.

Under an OBA if there is a system disturbance and the gas delivered, or received, at an interconnection point is out by x%, but within the permitted tolerance, no action would be taken on Shippers quantities. Shippers are removed from these kind of risks when trading at the Interconnection Point. However, with an OBA in place matching should still be performed between the Shipper nominations on both pipelines, this will reduce the risk for any Shipper not showing up on a day and the consumer continuing to offtake gas at the exit point. Set up costs and ongoing administration costs will also be incurred with the implementation of an OBA, but these should be kept to a minimum.

3.4 Summary and Conclusion

It is clear that OBA's are very useful tools to facilitate gas transfer between Shippers who are operating at the interconnection point between two pipeline systems. OBAs have advantages in that they result in a reduction of risk of imbalances, offer reduced complexity to Shippers and may be implemented at a lower cost to Shippers. The costs of an OBA will need to be considered in terms of gas availability, systems and administration. Agents can be used where greater transparency, and confidentiality, is required when there are multiple Shippers operating at an Interconnection Point. Agents can also be used where one of the Transporters at the Interconnection Point may not agree to an OBA with the costs of Agents being considered with respect to set up, systems and administration. The particular tool which is applied at an interconnection point will need to be agreed between the parties operating at that interconnection point, i.e. Shippers and Transporters.

However, the tool which is applied at the Interconnection Point must result in a reduction of risk and encourage the movement of gas at that point by as many parties as possible in order to create competition and facilitate customer choice. The ideal situation is to perform matching of individual Shipper nominations before, and during the gas day via Transporters or a Matching Agent, if required. After the day quantities would then be allocated according to the last confirmed Shipper nominated quantity and any resultant Imbalance would be catered for by both Transporters. With an OBA there are a number of options with regard to the handling of tolerances, the Operator Imbalance and the Imbalance Quantity. Therefore, the specific details of the OBA, or managing gas at an interconnection point, may need to be agreed between the two Transporters at each individual interconnect point. In addition, the physical characteristics of the interconnection point itself may determine the commercial arrangements which are required to be put in place.

Section 5. European Gas Industry Standard Board

1. What is GISB?

GISB, the Gas Industry Standards Board (GISB) is a voluntary, independent U.S. organisation consisting of, and supported by, all segments of the U.S. natural gas industry. It is a non-profit, autonomous organisation consisting of a board of directors, an executive committee, several working subcommittees and the general membership. It has three main goals: First, the GISB develops and maintains voluntary standards governing electronic communications for the business transaction within the natural gas industry. It develops these standards with input from all segments of the industry. Second, the GISB serves as a forum for reaching market-responsive solutions. Third, the GISB enhances the reliability of gas service through easy access to the information standards needed for critical business transactions.

Some GTE representatives of the Interoperability WG met GISB representatives in Houston on the 29th May in order to consider the US experience and to explore how establish an European GISB.

2. Why an European GISB (EGISB)?

The European Gas Industry needs standards. In the following "standards" means mainly "common practices, common way of information exchange". With standards supporting transactions, doing business with different companies look much the same to the customer, reducing costs and improving the quality of the information. Standards reduce the ambiguity of the information passing between companies. Standards support more and faster transactions, allowing the firms that use them to compete more effectively. Standards expedite and simplify business transactions, reduce confusion and administrative burdens, and enhance the reliability of service.
As specific terms and conditions apply for gas business in Europe, U.S. Standards could not apply. The task of standardization in Europe had already begun with the work of the GTE Task Force on Interoperability but it is going to be a long process which should be performed by a permanent organisation taking into account the wishes of market participants and the evolution of market conditions asked for by the European regulatory bodies.

To avoid any confusion between the US and the European organisation other names may be chosen:

- EGOS for European Gas Organisation for Standards
- GISE for Gas Industry Standards Europe

3. Who will runs the EGISB, and How decisions will be made?

As for GISB, we suggest that all segments of companies involved in the European gas industry participate in the elaboration of the standard : producers, transport operators, services (marketer, storage operators and software providers), local distribution companies, and end-users. As all market segment participation is needed, we suggest this work be developed by an independent organisation.
In order to guaranty efficiency, we suggests to work with a Steering Committee consisting of 15 people (3 people from each of the five industry segments). Beyond this level, working committees will be constituted as needed.
As member of EGISB, each company will participate in the election for the members of the Steering Committee for its own segment.

4. What kind of Standards are we talking about?

To continue the extensive work already performed by the EDIG@S Group, the EGISB will work on electronic communications and to avoid to have many separate organisations, it could be proposed to EDIG@S to join EGISB. In addition, EGISB will maintain the standards for completing gas business transactions such as nominations, balancing, but also invoicing, reporting (hourly/daily/monthly consumption). It will also establish

the business scenarios for gas transportation and trading trying to take into account all situations that can happen in a gas day.
EGISB will propose standards on time schedule (gas day, nomination, matching), contracts (OBAs, Trading contracts), gas quality, measurements units, codification (delivery points, interconnection points), words used in the industry.

5. How will the EGISB make Standardization happen across the natural gas industry in Europe?

Use of the standards produced by the EGISB will be strictly voluntary. But we believe the benefits of clear communications, faster transactions and reduced paperwork will be very attractive to everyone concerned. Besides, because we will solicit help and ideas from virtually every company and individual who is in any way associated with natural gas, these standards will be the result of all our efforts. We hope everyone who will work to establish these standards will want to use them. As it already is the case for EDIG@S, we propose that all companies will have free access through a Web site to any details of the standards.

6. How will Standards help natural gas compete more effectively?

We believe standards will make gas more competitive. With standards, a huge set of business problems disappears, and we and our customers can concentrate on the real issues of competition: service, supply and price.

SECTION 6. CONCLUSIONS AND RECOMMENDATIONS

- In this report, the issue of interoperability has been addressed from a "pipeline to pipeline" perspective, meaning that priority was given to examining the "ease of flow" of natural gas between interconnected pipeline networks operated by different companies (LNG interoperability will be addressed soon in a subsequent report).

- The term "interoperability" is normally used to mean the technical possibility to ensure safe flow of natural gas from a pipeline network to another, possibly built with different technical specifications, in a different country, by a different operator. In this "basic" respect, interoperability is already a reality in Europe, because a large percentage of gas trade in Europe involves cross-border transactions and therefore gas undertakings have developed interoperability arrangements over the years.

- These existing interoperability arrangements are most often embedded in long term gas transportation agreements between companies that are at the same time owners of the gas (shippers) and operators of the respective networks (carriers).

- As the European gas market becomes more fluid, the percentage of third party gas, the number of shippers and the frequency of transactions on European networks are expected to increase, and this process will involve cross-border transit. As a consequence, TSOs will be required to amend existing arrangements with new interoperability tools, providing standard, flexible, easy-to-manage arrangements for the non-discriminatory treatment of shippers.

- From an interoperability perspective, concerns about the completion of the EU's internal gas market and the development of cross-border trade translate into the question "Are there barriers of technical/operational nature to the free movement of gas across the EU?".

- Preliminary conclusions and recommendations from GTE's analysis of this subject may be summarised as follows:

- Interoperability issues may be broadly grouped in two classes, depending on whether or not investment is needed to overcome possible problems. Typically, gas quality issues tend to require major investment while harmonisation and standardisation of communication protocols, units of measurements, administration of gas flows at interconnections could be achieved without major expenses.

- Interoperability is a complex and evolving matter: a complete investigation and solution of the main interoperability problems may take up to 2 years (for issues not requiring major investments); it may take longer for issues requiring major investments. Cross checks and collaboration with European Working Groups like GERG, CEN or others is requested to avoid overlaps in developing interoperability procedures.

- An on-going co-operation between TSOs, system users, national and European Authorities is required over the next few years for an overall improvement of European pipeline interoperability to be achieved. GTE suggests the establishment in 2002 of an organisation responsible for the definition of technical / operational standards for the European gas industry (EGISB) as in the US. Such an organisation would be permanent, voluntary, independent and non-profit; it would include not only representatives of Transmission System Operators but also all the market players, in order to ensure the maximum acceptance of its standards.

- GTE believes that interoperability does not stand in the way of a liberalised internal gas market in the European Union, for a series of reasons:

➢ interoperability does not mean "ensuring 100% free physical movement of gas" across Europe. Such an objective would not be achievable in the medium term, due to the significant investments it would require and the absence of a clear framework for the recovery of these investments. However, it does not take "100% free physical movement of gas" to achieve "free movement of gas" across Europe.

➢ A large percentage of gas trade in Europe involves cross-border transactions: this – in itself - proves that such gas is already "able" to flow from network to network and from country to country. The same will continue to apply to additional gas quantities coming from the same sources.

➢ Much can be done to facilitate cross-system gas flows in the European Union through the standardisation of communication protocols and message carriers (via the adoption of the EDIG@S standard), the harmonisation of definitions and units of measurement, the introduction of Operating Balancing Agreements or similar arrangements at interconnections.

- In conclusion, GTE is convinced that:

➢ awareness of interoperability issues is both necessary and useful to facilitate the free movement of natural gas across the European Union;

➢ the provision of timely, complete, easy-to-consult information on terms and conditions for access to European gas grids represents interoperability in its wider sense,

and is willing to play an active role in the diffusion of knowledge on these matters across the European gas community.

gte Gas Transmission Europe

ANNEX A

Gas quality parameters at border crossings in Europe
Differences in specification ranges for high calorific gas (Family 2 Group H)

original

Temperature reference conditions °C		EN 437	Distrigas	Distrigas	Bord Gais	Bord Gais	VNG	VNG	Enagas	Enagas	Gasunie	Gasunie	Snam	Snam
volume		15	0	0	15	15	0	0	0	0	15	15	15	15
GCV		15	25	25	15	15	0	0	0	0	15	15	15	15
Parameter	**unit**	**EN 437 Fam 2 Gr H**	**Lowest contractual value**	**Highest contractual value**	**Lowest contractual value**	**Highest contractual value**	**Lowest contractual value**	**Highest contractual value**	**Lowest contractual value**	**Highest contractual value**	**Lowest contractual value**	**Highest contractual value**	**Lowest contractual value**	**Highest contractual value**
Minimum GCV	MJ/m³	-	38,9	40,343	36,50	36,50	30,20	30,20	36,93	36,93	36,5	39,62	36,2	39
Maximum GCV	MJ/m³	-	44,38	46	47,20	47,20	47,20	47,20	47,74	47,74	42,07	43,61	39,2	43,6
Minimum Wobbe	MJ/m³	45,7	49,2	53,21	45,70	45,70	46,10	46,10	48,25	48,25	45,5	48,35	47,1	48,3
Maximum Wobbe	MJ/m³	54,7	54	56	54,70	54,70	56,50	56,50	47,81	47,81	52,23	54,03	52,32	52,5
Relative density	-	-			0,55	0,7	0,55	0,75						
Soot Index			nls	nls	nls	nls	nls	nls	nls	nls	nls	nls	nls	nls
Uncomplete Combustion Factor			nls	nls	nls	nls	nls	nls	nls	nls	nls	nls	nls	nls
H2S	mg/m³	-	5	5	5	5	5	10	2	2	5	5	2	
Total S	mg/m³	-	22,4	150	50	50	30	150	150	150	22,5	150	50	
Mercaptans (as S)	mg/m³	-			nls	nls	6	16	15	15	6	16	5,6	
O2	ppm(vol)	-	10	5000	5000	5000	nls	nls	nls	nls	10	5000		5000
H2	ppm(vol)	-	nls	nls	nls	nls	nls	nls	nls	nls	nls	nls	nls	nls
Aromatic compounds	ppm(vol)	-	nls	nls	nls	nls	nls	nls	nls	nls	nls	nls	nls	nls
CO2	%(vol)	-	2	3	4	4	0,5	3	3	3	2	3,5	0	3
N2	%(vol)	-	nls	nls	6	6	nls	nls	7,5	7,5	nls	nls	0	10
H2O dew point	°C @ 69 bar	-	-8	-12	nls	nls	ground temp	ground temp			-8	-8	-12	-3
H2O	mg/m³	-	nls	nls	112	112	nls	nls	80	80	nls	nls	nls	nls
HC dew point	°C total pressure range	-	-2	-4	nls	nls	ground temp	ground temp	nls	nls	-4	0	-5	0
HC dew point	°C@72 bar								-12	-12				
mist,dust,liquid	-	-			techn free	techn free	techn free	techn free						
Impurity clause	-	-	yes	yes	no	no	no	no						
Odorant THT	mg/m³								10	30				
			notes:	1) reference conditions pressure : 1013,25mbar ; temperature : as indicated on data sheet										
				2) nls stands for "no limit specified"										

Gas Transmission Europe

Schedule I

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Gas quality parameters at border crossings in Europe
Differences in specification ranges for high calorific gas (Family 2 Group H)
notes: 1) reference conditions pressure : 1013,25mbar ; temperature :0°C
2) nls stands for "no limit specified"

		EN 437	Distrigas	Distrigas	Bord Gais	Bord Gais	VNG	VNG	Enagas	Enagas	Gasunie	Gasunie	Snam	Snam		
Parameter	**unit**	**EN 437 Fam 2 Gr H**	**Lowest contractual value**	**Highest contractual value**	**Lowest contractual value**	**Highest contractual value**	**Lowest contractual value**	**Highest contractual value**	**Lowest contractual value**	**Highest contractual value**	**Lowest contractual value**	**Highest contractual value**	**Lowest contractual value**	**Highest contractual value**	**Lowest contractual value**	**Highest contractual value**
Minimum GCV	MJ/m³	-	39,00	40,45	38,57	38,57	30,20	30,20	36,93	36,93	38,57	41,86	38,25	41,21	30,20	41,86
Maximum GCV	MJ/m³	-	44,50	46,12	49,87	49,87	47,20	47,20	47,74	47,74	44,45	46,08	41,42	46,07	41,42	49,87
Minimum Wobbe	MJ/m³	48,29	49,33	53,35	48,29	48,29	46,10	46,10	48,25	48,25	48,08	51,09	49,77	51,03	46,10	53,35
Maximum Wobbe	MJ/m³	57,80	54,14	56,15	57,80	57,80	56,50	56,50	47,81	47,81	55,19	57,09	55,28	55,47	47,81	57,80
Relative density	-	-			0,55	0,7	0,55	0,75								
Soot Index			nls	nls	nls	nls	nls	nls	nls	nls	nls	nls	nls	nls		
Uncomplete Combustion Factor			nls	nls	nls	nls	nls	nls	nls	nls	nls	nls	nls	nls		
H2S	mg/m³	-	5,00	5,00	5,27	5,27	5,00	10,00	2,00	2,00	5,27	5,27	2,11			
Total S	mg/m³	-	22,40	150,00	52,75	52,75	30,00	150,00	150,00	150,00	23,74	158,24	52,75			
Mercaptans (as S)	mg/m³	-			nls	nls	6,00	16,00	15,00	15,00	6,33	16,88	5,91			
O2	ppm(vol)	-	10	5000	5000	5000	nls	nls	nls	nls	10	5000		5000		
H2	ppm(vol)	-	nls	nls	nls	nls	nls	nls	nls	nls	nls	nls	nls	nls		
Aromatic compounds	ppm(vol)	-	nls	nls	nls	nls	nls	nls	nls	nls	nls	nls	nls	nls		
CO2	%(vol)	-	2	3	4	4	0,5	3	3	3	2	3,5	0	3		
N2	%(vol)	-	nls	nls	6	6	nls	nls	7,5	7,5	nls	nls	0	10		
H2O dew point	°C @ 69 bar	-	-8	-12	nls	nls	ground temp	ground temp			-8	-8	-12	-3		
H2O	mg/m³	-	nls	nls	118,1505	118,1505	nls	nls	80,00	80,00	nls	nls	nls	nls		
HC dew point	°C total pressure ran	-	-2	-4	nls	nls	ground temp	ground temp	nls	nls	-4	0	-5	0		
HC dew point	°C@72 bar								-12	-12						
mist,dust,liquid	-	-			techn free	techn free	techn free	techn free								
Impurity clause	-	-	yes	yes	no	no	no	no								
Odorant THT	mg/m³								10	30						

gte Gas Transmission Europe

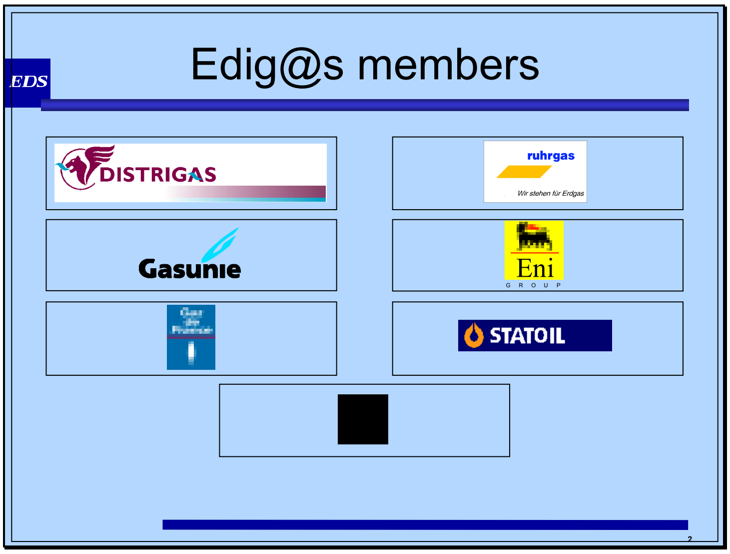
15-15

Schedule I

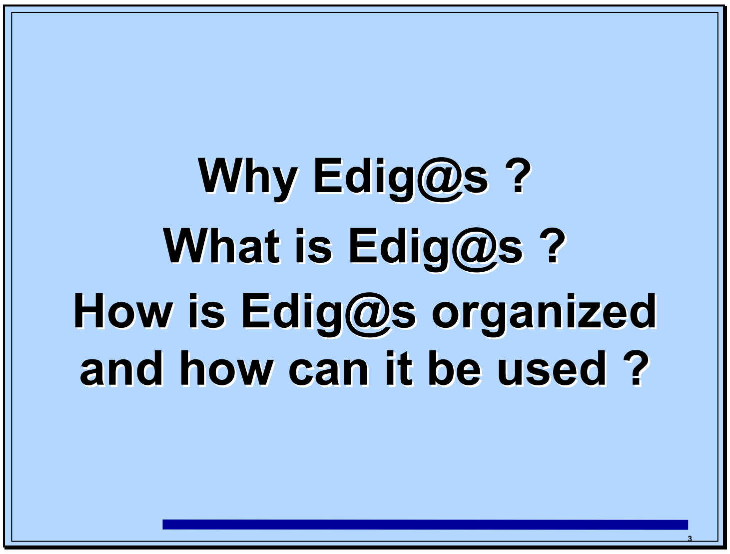
Gas quality parameters at border crossings in Europe
Differences in specification ranges for high calorific gas (Family 2 Group H)
notes: 1) reference conditions pressure : 1013,25mbar ; temperature : 15°C
2) nls stands for "no limit specified"

		EN 437	Distrigas	Distrigas	Bord Gais	Bord Gais	VNG	VNG	Enagas	Enagas	Gasunie	Gasunie	Snam	Snam		
Parameter	**unit**	**EN 437 Fam 2 Gr H**	**Lowest contractual value**	**Highest contractual value**	**Lowest contractual value**	**Highest contractual value**	**Lowest contractual value**	**Highest contractual value**	**Lowest contractual value**	**Highest contractual value**	**Lowest contractual value**	**Highest contractual value**	**Lowest contractual value**	**Highest contractual value**	**Lowest contractual value**	**Highest contractual value**
Minimum GCV	MJ/m³	-	36,91	38,28	36,50	36,50	28,58	28,58	34,95	34,95	36,50	39,62	36,20	39,00	28,58	39,62
Maximum GCV	MJ/m³	-	42,11	43,65	47,20	47,20	44,67	44,67	45,18	45,18	42,07	43,61	39,20	43,60	39,20	47,20
Minimum Wobbe	MJ/m³	45,70	46,69	50,49	45,70	45,70	43,63	43,63	45,67	45,67	45,50	48,35	47,10	48,30	43,63	50,49
Maximum Wobbe	MJ/m³	54,70	51,24	53,14	54,70	54,70	53,47	53,47	45,25	45,25	52,23	54,03	52,32	52,50	45,25	54,70
Relative density	-	-			0,55	0,7	0,55	0,75								
Soot Index			nls	nls	nls	nls	nls	nls	nls	nls	nls	nls	nls	nls		
Uncomplete Combustion Factor			nls	nls	nls	nls	nls	nls	nls	nls	nls	nls	nls	nls		
H2S	mg/m³	-	4,74	4,74	5,00	5,00	4,74	9,48	1,90	1,90	5,00	5,00	2,00			
Total S	mg/m³	-	21,23	142,19	50,00	50,00	28,44	142,19	142,19	142,19	22,50	150,00	50,00			
Mercaptans (as S)	mg/m³	-			nls	nls	5,69	15,17	14,22	14,22	6,00	16,00	5,60			
O2	ppm(vol)	-	10	5000	5000	5000	nls	nls	nls	nls	10	5000		5000		
H2	ppm(vol)	-	nls	nls	nls	nls	nls	nls	nls	nls	nls	nls	nls	nls		
Aromatic compounds	ppm(vol)	-	nls	nls	nls	nls	nls	nls	nls	nls	nls	nls	nls	nls		
CO2	%(vol)	-	2	3	4	4	0,5	3	3	3	2	3,5	0	3		
N2	%(vol)	-	nls	nls	6	6	nls	nls	7,5	7,5	nls	nls	0	10		
H2O dew point	°C @ 69 bar	-	-8	-12	nls	nls	ground temp	ground temp			-8	-8	-12	-3		
H2O	mg/m³	-	nls	nls	112	112	nls	nls	75,84	75,84	nls	nls	nls	nls		
HC dew point	°C total pressure range	-	-2	-4	nls	nls	ground temp	ground temp	nls	nls	-4	0	-5	0		
HC dew point	°C@72 bar								-12	-12						
mist,dust,liquid	-	-			techn free	techn free	techn free	techn free								
Impurity clause	-	-	yes	yes	no	no	no	no								
Odorant THT	mg/m³								9,48	28,44						

ANNEX B



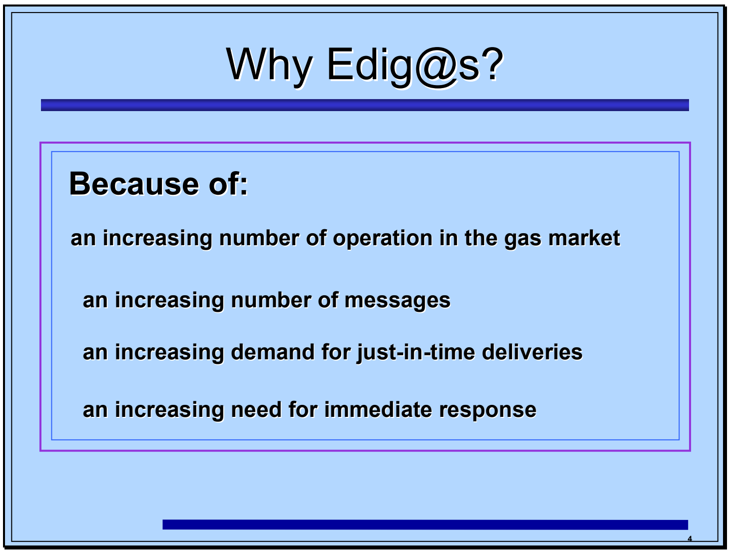
The companies participating in the Edig@s project are: Distrigas in Belgium, Gasunie in the Netherlands, Gaz de France in France; Ruhrgas in Germany, Statoil in Norway and SNAM in Italy. Gaz de France also currently assumes the chairmanship of the Steering Committee. EDS assumes the EDI consultancy support and interacts with the International EDIFACT Workgroup.



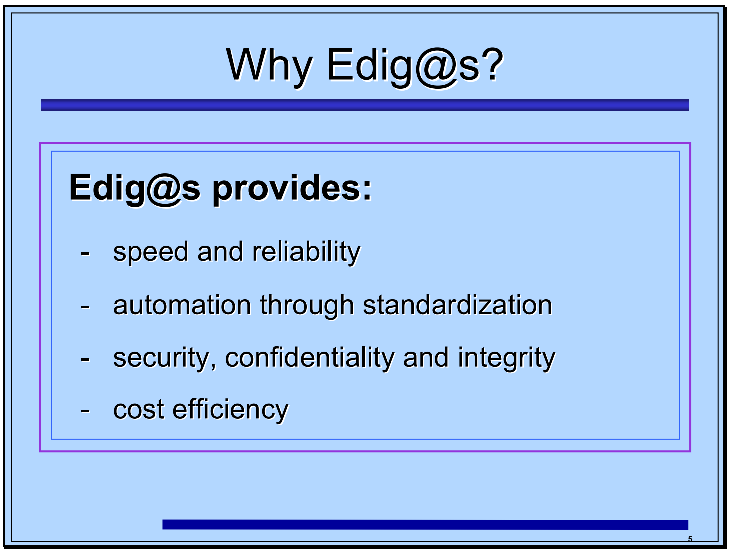
This presentation covers the following items:
Why did those European Gas Companies launch the Edig@s project?

What is the Edig@s project, what are the goals, what are the means used and what are the achievements?

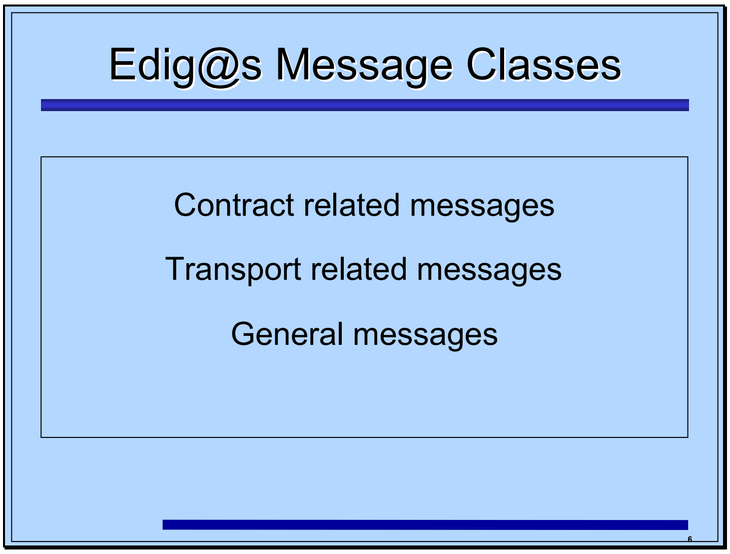
Finally, what is the structure of the project and how can the results of this work be used by other companies that are not involved in the project?

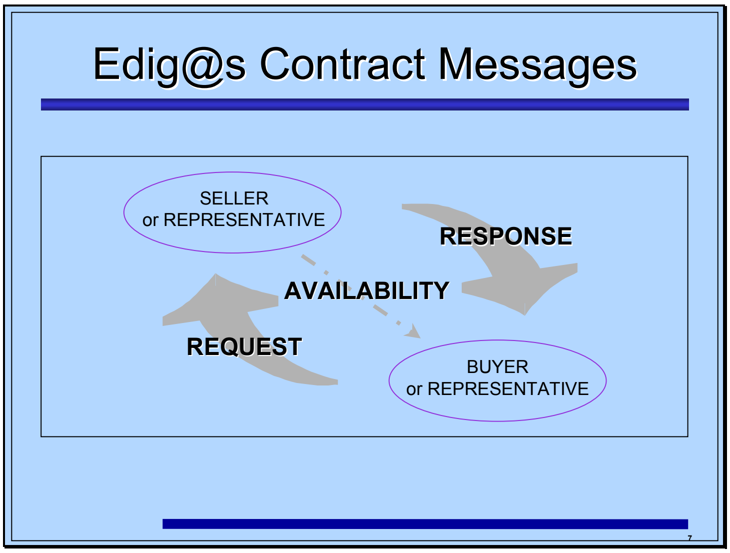


The decision to start the Edig@s project was based on a changing perception of the market environment. In the early eighties the above mentionned companies had already put on operation a standard «the GASNET Protocole» to exchange opérational data between their dispatching centers. This telex based standard was not adapted to handle a big number of messages. During the nineties, the volume of information transmitted between the operational dispatching centers of the different companies has continuously grown. Companies now also request their energy supply to be delivered just-in-time. The gas spot market has emerged and all these factors result in an increased complexity of the information and also stresse the need to be able to respond almost immediately to changing requirements. The traditional communication means based, on telex or fax, are no longer an efficient way to cope with this information volume and its complexity. Since they require human intervention they are neither fast enough nor reliable enough.

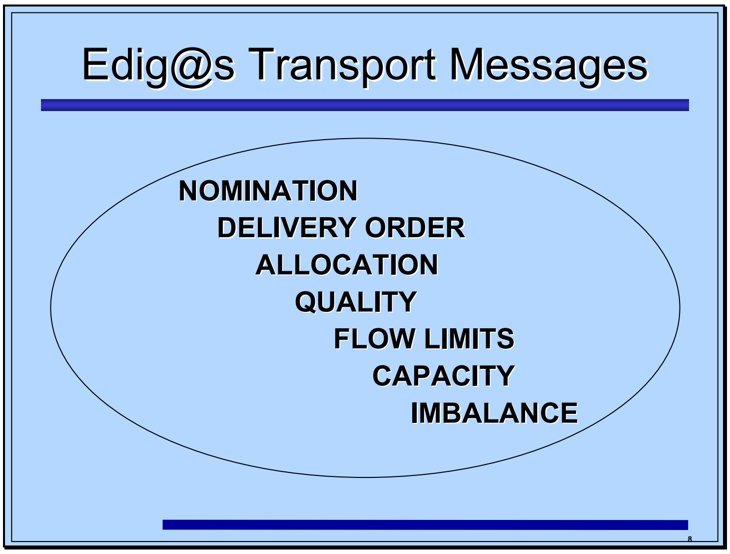


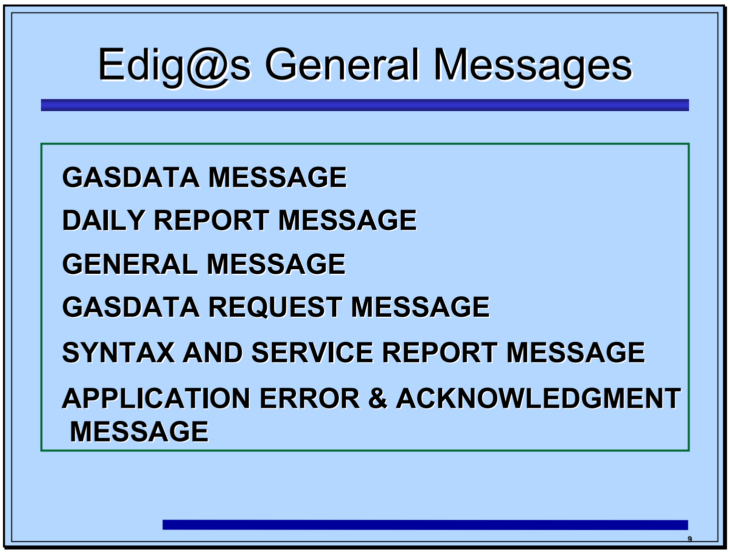
The alternative proposed in the Edig@s solution uses EDI or Electronic Data Interchange instead of fax and telex. By doing so, speed is guaranteed both because the transmission time is short and because the data can be integrated immediately into the application without requiring a human intervention. Because EDI messages can be tracked all the way from the sender to the receiver an increased reliability is offered for those messages. EDI is also about standardization and the use of standard messages which will allow the automation of business processes. Automated integration of the data eliminates interruptions in the information flow thereby increasing the speed of data interpretation and reducing considerably the time required to react to changed requirements. Conventional EDI is basically secure and it can be further secured through the implementation of additional provisions if this would be required. Whenever confidentiality is an issue encryption may be used. The integritry of the data is guaranteed by the fact that the data is going directly from the sender's application into the receiver's application without being humanly manipulated which avoids misinterpretations and transcription errors. The reduction of manual intervention through automated processing, the elimination of error recovery through direct integration of the data, those are only a few elements that illustrate that this is indeed a cost efficient solution.



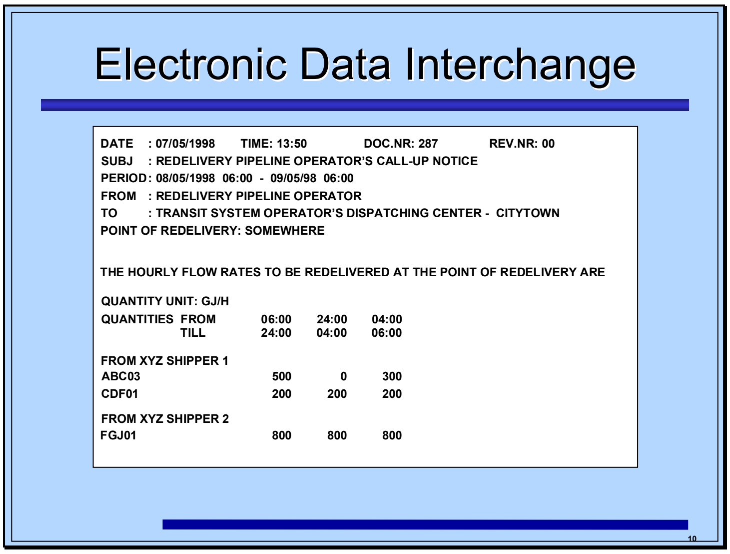


The contract related messages cover the requirements related to the information of availability or change of availability of gas.
It allows the transmission from buyers to sellers of monthly, weekly and/or daily requests and handles also the corresponding response by sellers either confirming the requested volumes or advising alternative volumes.

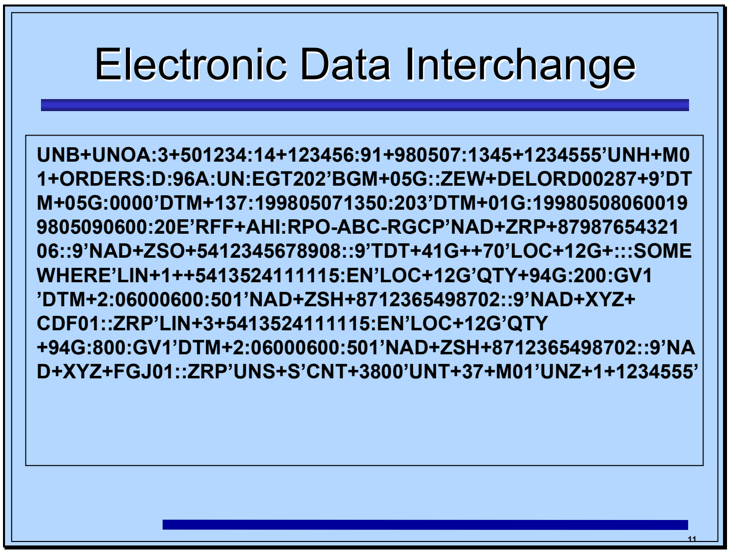




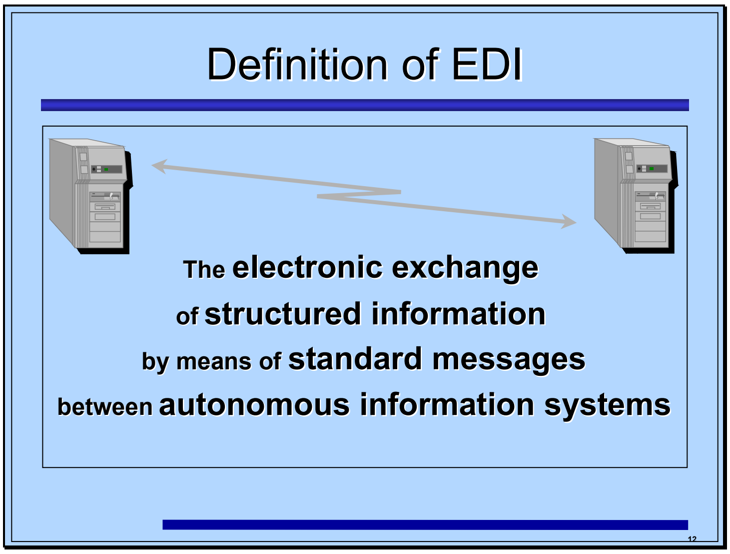
The general messages have been designed to support and complement the functionalities of the two preceding classes of messages. The Gasdata message as well as the Daily Report message provide tools for reporting activities on any requested frequency.
The General message allows the transmission of textual information which has been kept out of the operational messages because it may interrupt the automatic processing of data.
The Gasdata Request message is a tool to request information which has not been previously scheduled.
Finally the Syntax and Service Report or Control message and the Application Error and Acknowledgment messages are used to provide receipt acknowledgment at different levels and at different stages.
The detailed description of all those messages, their use within the gas industry and the code lists to be used are to be found in the Message Implementation Guidelines issued by the Edig@s Group.



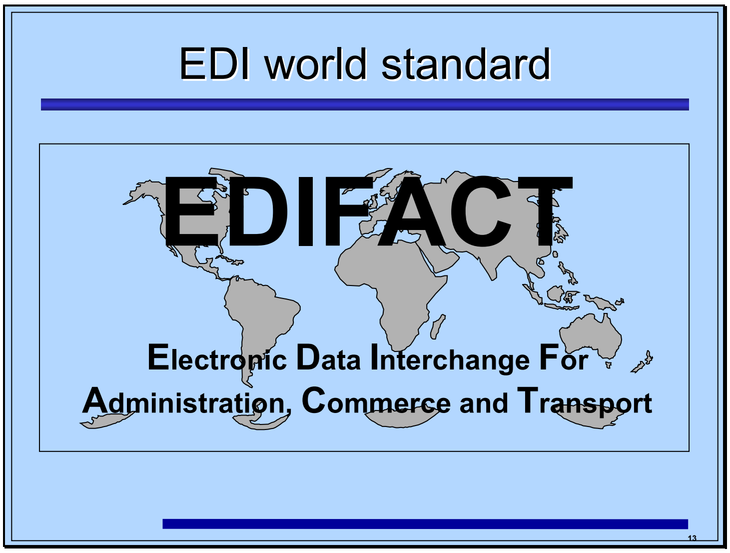
This formatted telex containing a Redelivery Pipeline Operator's Call-up Notice shows how dispatching centers were using the Gasnet Protocol to exchange information. It is primarily meant to be readable for an operator although its standardized format allows some automated input. This format however can be read by a computer but with certain difficulties.
For example, if you type one figure in the wrong place, information will not be read. The messages were not standardized, implementation costs were high.



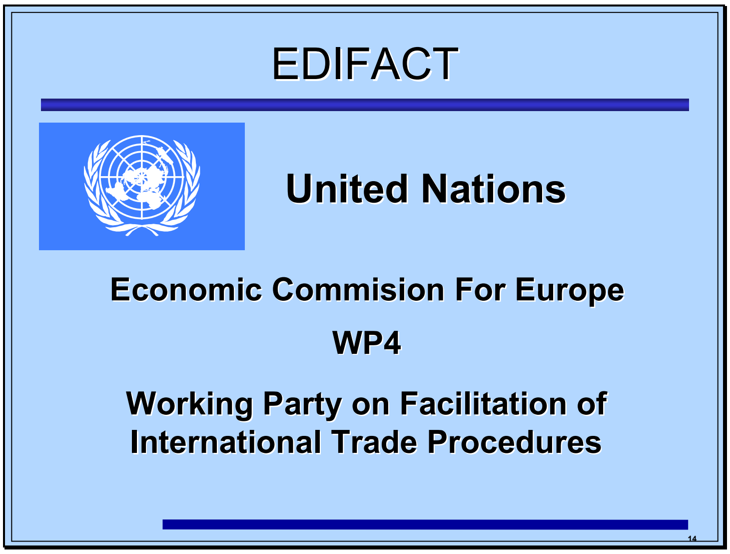
This is the same information but in EDI message format. The string of characters represents the information that is being exchanged between two dispatching applications. It is a succession of codes and separators that is hardly readable by an operator but it is very reliable for computer operation. The main difference between both communication ways is that the EDI message, since it is not to be read by an operator, can be reduced to contain only dynamic information. All other "supporting" information, mainly meant to allow the reading of the message, can be eliminated.



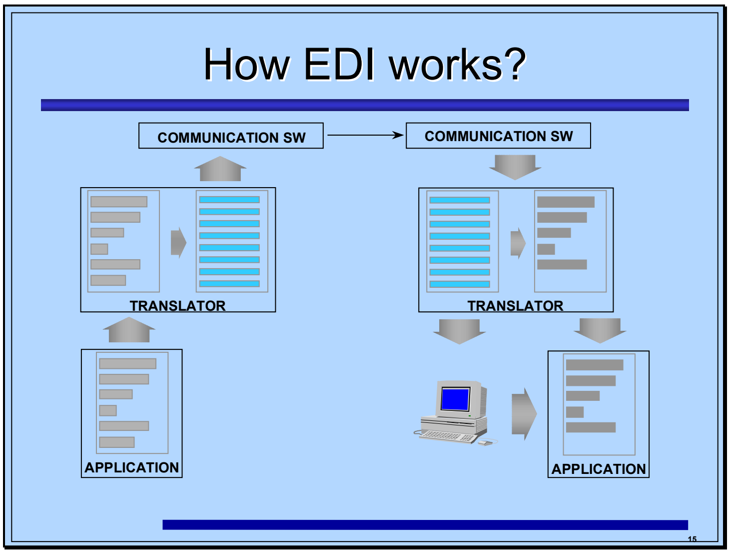
Without going into any detail, it is in order to provide a definition of Electronic Data Interchange or EDI. It is:
the electronic exchange - with the exclusion of any other means
of structured information - free text information should be transmitted via e-mail
by means of standard messages - the lack of standardisation makes EDI unmanageable through the number of conversions that would be required to accommodate in house formats
between autonomous information systems.



As stated Electronic Data Interchange is primarily based on standardization. In the course of the years many different standards have been developed ranging from proprietary standards to sectoral standards to national standards. ODETTE and ANSI.X12 are some examples of still widely spread EDI standards. Since the early 90's EDIFACT has gradually emerged as the truly worldwide EDI standard. The acronym stands for Electronic Data Interchange for Administration, Commerce and Transport.



This standard was developed under control of the United Nations' Economic Commission for Europe, and more specifically within the Working Party on facilitation of the International Trade Procedures. It is a multinational and multi-sectoral standard which is independent from hard- and software, from any national or sectoral limitation and from any cultural or linguistic limitation. Today EDIFACT is applied for all industrial and commercial activities throughout the world. It is in a growing number of cases the only EDI standard allowed when dealing with authorities with examples such as the European Union, the Customs Authorities, the Ministry of Defense in the US and many other countries.

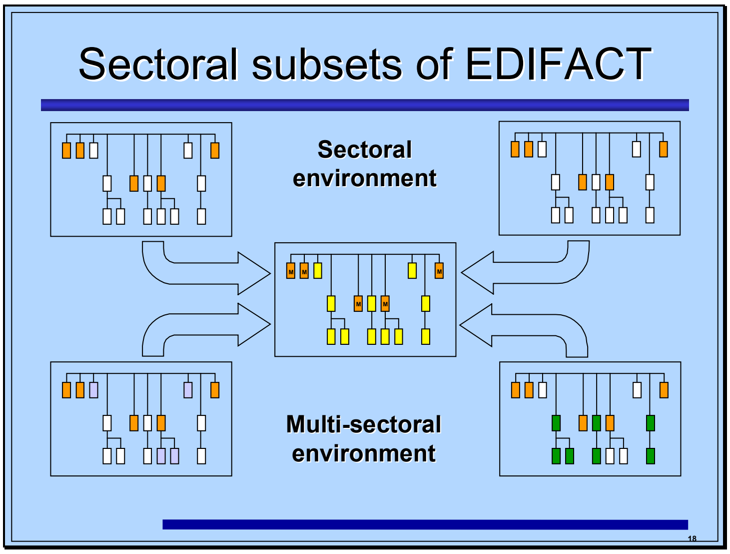


This slide illustrates on a simplified schematic basis how EDI works. The sender's application will provide an output which is structured in an in-house format. This output is then routed to a translation software that will transform the in-house format into the appropriate EDIFACT standard message format.
Once the message is ready it is routed via a communication software and transmitted to the communication software of the receiver. This can be done in a direct connection via an X.25 or ISDN line, it can be done via a Value-Added-Network, it can be done via X.400 and it can even be done via Internet using the public Internet or a in-house Intranet. Upon receipt of the interchange, which may contain just one message or a number of messages, the translation software of the receiver will transform the standard EDIFACT format into the in-house format of the receiver. During this conversion a syntax validation may be done to check that all mandatory fields have been included and that all elements have been transmitted in the proper format.
After this conversion the data can either be integrated into the receiver's application or can be viewed by an operator for interpretation and manual validation prior to its integration into the application.

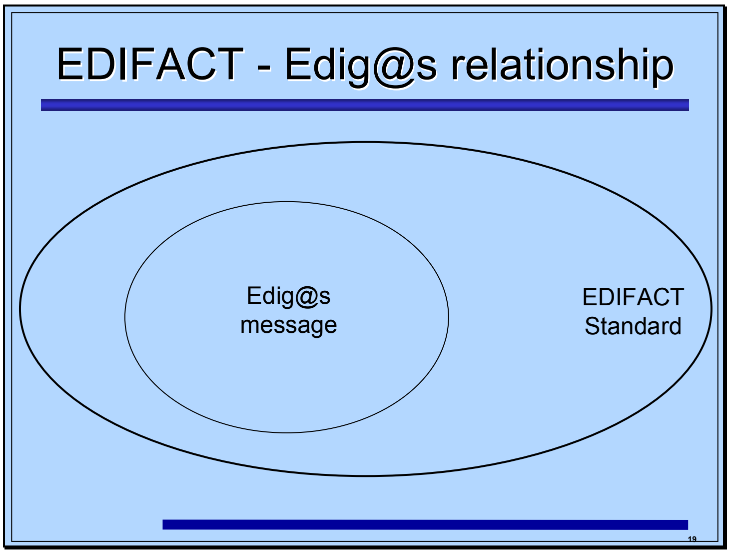
Edig@s Project Implementation

The information will be handled by the computer	Re-engineering of workflows	The message is NOT humanly readable
Automated integration possible.	***IMPACT***	Re-engineering of IT architecture.
Adaptation of existing procedures	Reduction of manual handling	Interface required with application

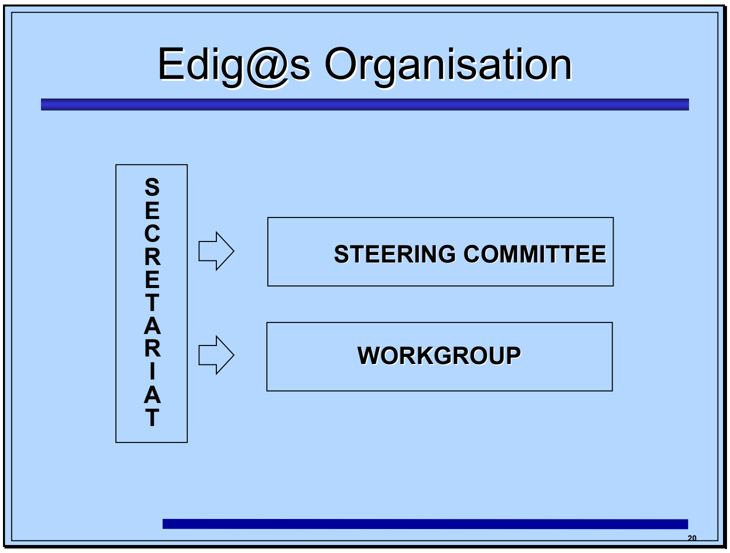
The implementation of EDI capabilities will have implications. Some of those are unavoidable and will require an adaptation in the workflow and the way companies used to treat information. Other implications are the result of management decisions taken in line with a long-range vision to expand the EDI capabilities to full-flesh electronic commerce.
Implementing EDI requires an interface with the application hence the integration of data is not possible.
The information received will be handled by the computer and whenever possible it should be checked and validated automatically.
The automatic handling of the information requires a revision of existing procedures mostly still based on human validation of paper-based information.
The incoming information will no longer be humanly readable, but after its conversion into the in-house format it can be provided to any operator in any format thus allowing a presentation that is best suited to allow the operator to perform his task in the most efficient way;
Manual handling of paper documents will be avoided, thus eliminating time-consuming and non value-added activities;
Depending on the sensitivity of the information and on the degree that this information can be validated via pre-set parameters, the integration in the application can be done automatically rather than after visual validation by an operator;
Depending on the degree that EDI is integrated, the workflow can then be reviewed and re-engineered to eliminate gradually all non value-added activities thus achieving a more efficient workflow;
Finally the complete IT-architecture of the company can be re-evaluated in view of its long term vision on electronic commerce.
Recognising those implications and tackling them in the appropriate manner will in the end secure the full benefits that can be achieved.

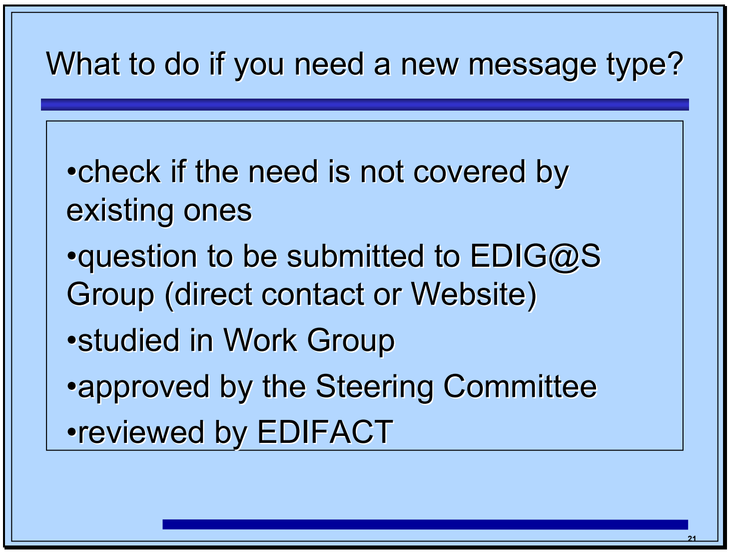


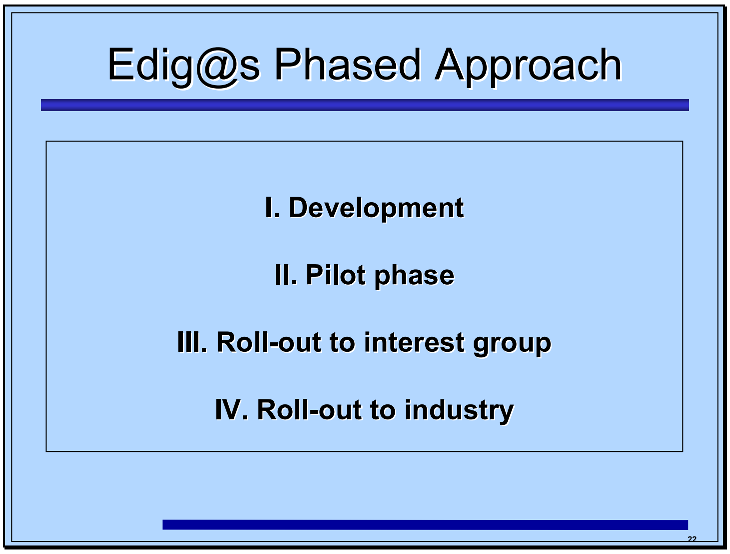
As already stated EDIFACT, as an EDI standard, covers the requirements of all business activities throughout the world. This means that the standard messages cater for more possibilities than those required for a specific sector. That is why sectoral organisations have taken up the task to define subsets of the standard messages.
Whenever companies operate solely within a sectoral environment the use of subsets will cover exactly their needs.
A company operating in a multi-sectoral environment will implement the standard message and will then be able to handle the different sectoral subsets used by its trading partners.



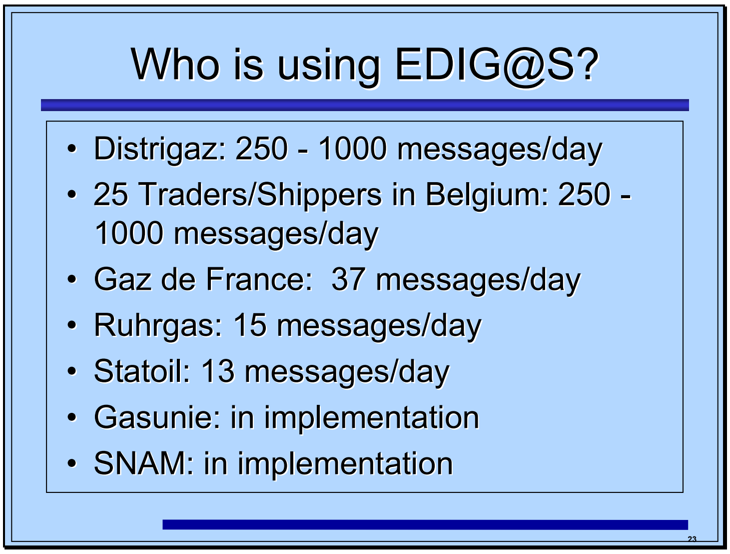
Having opted for EDIFACT as an EDI standard, the Edig@s Workgroup then defined its own subsets tailored to meet the specific requirements of the gas industry.

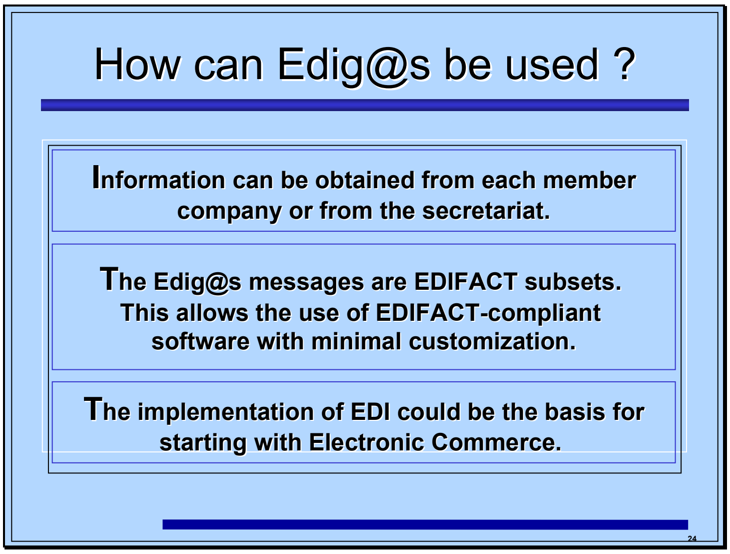

Edig@s Organisation
SECRETARIAT
STEERING COMMITTEE
WORKGROUP


What to do if you need a new message type?
•check if the need is not covered by existing ones
•question to be submitted to EDIG@S Group (direct contact or Website)
•studied in Work Group
•approved by the Steering Committee
•reviewed by EDIFACT



The Edig@s project has followed a phased approach. In a first stage time has been invested in the detailed study of the exact information requirements for the Gas Dispatching Centers. The Edig@s messages have been based on the findings of this analysis. In the pilot phase, the first operational messages have been tried out between a restricted number of companies. After this pilot phase, the roll-out to all the members of the interest group is now in a final stage. Meanwhile, other companies that are not members of the Edig@s group, have either implemented or are preparing to implement the Edig@s messages.

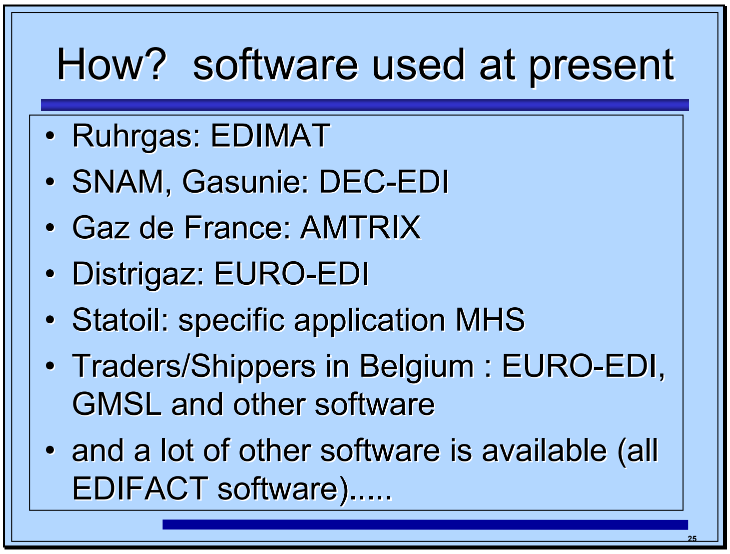


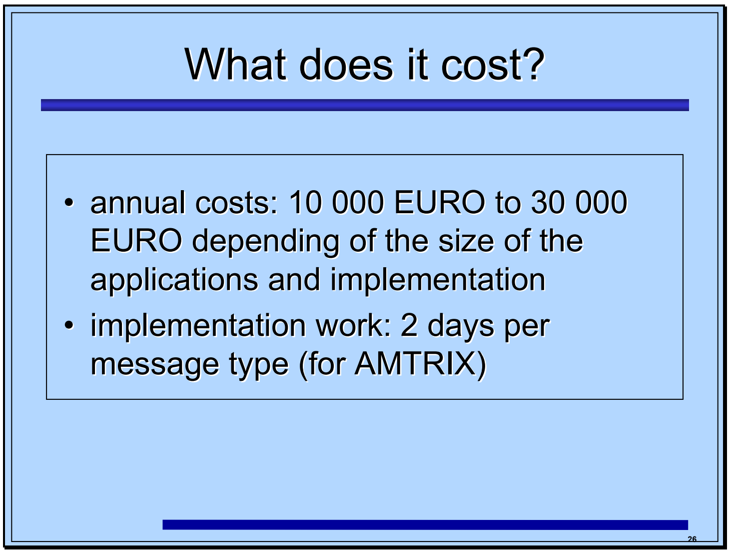


Information on the standard can be obtained from each member and from the secretariat.

The Edig@s messages are EDIFACT subsets which means that the use of EDIFACT-compliant software with a minimum of customization should be possible.

Finally the implementation of an EDI solution, required to use the Edig@s message, could evolve into a full scale electronic commerce solution for the company.





The Edig@s standard is not a proprietary standard, meaning that it is available to all companies who are willing to implement this new way of communicating. It is a fact that the real benefit of its implementation will grow with each new user. This is why the members of the Edig@s Workgroup are inviting gas companies to investigate the benefits that the use Edig@s messages may bring to them.

More information on the Edig@s project can be found on its website at the following address:
www.edigas.org

Annex C

Company	Gas Day	Gas Year	Units	Nominations	Renominations		Publishing Maintenance
					Increase	Decrease	
Gaz de France	06:00 to 06:00	None, usually begin the 1st of the month	Energy: KWh Volume: m^3 at 0°C and an absolute pressure of 1.01325	13:00 d-1	20:00 d-1, 12:00 d, 18:00 d	No restriction	Publication of maintenance: on internet accessible only to concerned shipper (Entry/Exit points affected and % of total capacity affected).
Verbundnetz Gas Ag	06:00 to 06:00	1st October to 30th September	Natural gas quantities: MJ, kWh and rarely m^3 (20^{o}C) Calorific value: MJ/m^3, kWh/m^3 Pressure: bar Capacity: m^3/h	weekly nomination until Friday 12.00	daily renomination is possible until the day before 12.00 am		Publication of maintenance information: Currently there is no need for regular public information. (Affected customers are informed in advance every year, quarterly and monthly)

Company	Gas Day	Gas Year	Units	Nominations	Renominations	Publishing Maintenance
Distrigaz	06:00 to 06:00	1st October to 30th September	Pressure: bar temperature: °C oxigen,S,H2S:ppm vol CO2: mole % volume : normal m^3 at 0°C and 1013.25mbara energy : J and multiples, GCV determined on 1 normal m^3 (0°C, 1013.25 mbara) which is brought to 25°C before combustion then flue gases cooled to 25°C	1) Transit (border to border) :shipper to nominate before 13:00 on D-1 except for one (older) transit pipeline where it is before 16:00 D-1. Renoms are possible at any time with min 2 hour lead time. 2) Zeebrugge hub: customer to nominate before 14:00 on D-1; no renoms until 20:00 on D-1 except in case of mismatch(notified to customer); from 20:00 on D-1 renoms are possible with min 2 hour lead time 3) TPA : shipper to nominate before 13:00 on D-1; scheduling charges applied to difference(over 3% tolerance at entry, 6% tolerance at offtake) between these noms and allocations; no renoms until 20:00 D-1; from 20:00 D-1 renoms are possible with min 2 hrs lead time.		Not generally published; case by case end users/shippers are contacted and maintenance is scheduled taking into account customers convenience.
Bord Gais	06:00 to 06:00	06:00 on the 1st of October to the end of the gas day 30th of September	Volume: m^3 at 15°C and an absolute pressure of 1.01325 Calorific value: MJ/ m^3 Pressure: bar Energy: kWh	Shippers on the BGE Transmission system are required to nominate by 10:00 on Gas Day D-1.	Renominations are allowed between 18:00 on D-1 to 01:45 on Day D. Specific arrangements are in place at the Moffat Entry Point and include; BGE shippers are required to nominate by 10:00 on Gas Day D-1. Transco shippers are required to nominate by 11:00 on Gas Day D-1. Renominations are allowed between 18:00 on D-1 to 01:45 on Day D.	

Company	Gas Day	Gas Year	Units	Nominations	Renominations	Publishing Maintenance
Transco	06:00 to 06:00	06:00 on the 1st of October to the end of the gas day 30th of September	Calorific value: MJ/ m^3 Pressure: bar Capacity: kWh Energy: kWh Volume: m^3 at 15°C and an absolute pressure of 1.01325	Nominations received before the day by: Daily metered output 13:00, Non daily metered Output 14:00, All Input 16:00, Scheduling Start 16:00, Finalisation 17:00.	Renomination's start from 18:00 d-1 to 04:00 on d.	On Lotus Notes Shipper Information System open to limited parties and on the Internet open to anyone wishing to view.
Gasunie The information on nominations are proposals to be confirmed when the Network Code is approved	06:00 uct to 06:00 uct	1 January UTC 06:00 to 1 January UTC 06:00.	Energy: KWh Volume: m^3 at 0°C and an absolute pressure of 1.01325	* to receive nominations from shippers at latest at UTC 13:00, * exchange call-up message between Downstream TSO and upstream TSO at latest at UTC 15:00, * exchange response on call-up message (after matching) between Downstream TSO and upstream TSO at latest at UTC 18:00, * send confirmation to shippers at latest at UTC 20:00.	Not Defined	Not Defined
DONG	08:00 to 08:00	08:00 on the 1st of October to 08:00 on the 1st of October	Energy: kWh. Volume: m^3 at 0°C and an absolute pressure of 1.01325 CV: Is kWh/ m^3	By noon (12:00) each Day, with effect from eight (8.00) a.m. on the following Day	By four (4.00) p.m. each Day, with effect from eight (8.00) p.m. on the same Day	By 1 April in each calendar year, DONG shall announce the dates scheduled for repair and maintenance works during the subsequent twelve (12) month period.

Company	Gas Day	Gas Year	Units	Nominations	Renominations	Publishing Maintenance
Snam The information on nominations are proposals to be confirmed when the Network Code is approved	6:00/6:00 CET or Local Time to be defined	October 1st - September 30th	Capacity (Scm/day) - Balancing (Energy Unit MJoule or GJoule to be defined) Volume: SNAM Fifteen degrees Celsius (15°C) and an absolute pressure of one decimal zero one tree two five (1.01325) Bar. For Gas coming from ALGERIA Fifteen degrees Celsius (15°C) and an absolute pressure of one (1) Bar.	Timing of nomination: 11.00 (D-1) (at the design stage)	Timing renomination: 16.00 (D-1);10.00 (D) only in particular cases (at the design stage)	To be defined
Enagas (SPAIN)	00:00 CET to 00:00 CET	1 st January CET 00:00 to 1st January CET 00:00.	**ENERGY**:KWh **VOLUME**: m3(n) normal cubic meters (defined at 273.15 ºK and 1013.25 kPa) **CALORIFIC VALUES:** kWh/m3(n) Hs[273.15ºK;V(273.15 ºK,1013.25 kPa)] **CAPACITY:** Energy and volume.	**DAY BEFORE (D-1):** **Nominations** to the Gas Day (D) from 10:00 h to 14:00 h of (D-1). Confirmation: limit 17:00 h (D-1).	**DAY BEFORE (D-1):** **Renomination to the Gas Day** from 18:00 h to 19:00 h (D-1). Confirmation limit 19:00 h (D-1). **GAS DAY (D):** **Renominations** to the Gas Day from 10:00 h to 12:00 h (D). Confirmation limit 12:00 h (D).	At the moment, maintenance is scheduled in our internal maintenance planning and software. Shippers are informed of capacity reductions. It's going to be in our LOGISTICS SYSTEM (now under specifications) and SHIPPERS, with limited electronic access, could consult maintenance periods by INTERNET.