UNITED NATIONS **E**

Economic and Social Council

Distr.
GENERAL

ENERGY/WP.3/GE.5/2004/4
10 October 2003

Original: ENGLISH

ECONOMIC COMMISSION FOR EUROPE

COMMITTEE ON SUSTAINABLE ENERGY

Working Party on Gas

Ad Hoc Group of Experts on the Supply and Use of Gas

Fifth session, 22 January 2004
Agenda item 6

GAS NETWORK BALANCING

(Draft questionnaire, prepared by the delegation of Hungary)

Note by the secretariat: This document is prepared in accordance with the decision of the fourth session of the Ad Hoc Group of Experts (ENERGY/WP.3/GE.5/2003/2, para 8), held in Geneva in January 2003.

You are kindly requested **to review** the draft questionnaire and send your **comments** to the General Rapporteur, **Mr. Sándor BOGOLY**, Head of Capacity Management, MOL Hungarian Oil and Gas Plc., Tanácsház u. 5, 8600 SIÓFOK – Hungary. Tel. +36 84 505 202 Fax. +36 84 505 218 and Email: sbogoly@mol.hu, with a copy to the secretariat,

by 1 December 2003.

GE.03-32381

1. Gas demand depends on seasons, outlet temperature and other factors. The demand in reality changes each moment, so the gas flow is changing constantly too. Gas demand and flows are often calculated on an hourly basis. The task of the transmission system operator is to match supply with demand in order to maintain the system integrity.

2. Pipeline systems are designed in such a way that they can balance daily and hourly peak demand. Pipeline system capacity is related to pressure and depends on many parameters supply and off takes the topography of pipeline system, pipeline diameters, location of delivery stations and supply points, inlet and outlet pressures, capacity of compressor stations, etc.

3. Transmission companies have to maintain and upgrade the pipeline system every year according to the strategy and the expected transmission demand, but the philosophy may be different from country to country. For example in Hungary supply resources and the transmission system have to be prepared for the expected demand at –8 C° daily average temperature, but households and commercial consumers have to be supplied in cases of lower temperatures.

4. The structure of natural gas consumers (households, commercials, power plants, industry) determines the temperature dependency. The bigger the share of households in the overall consumption pattern, the more difficult the forecast for the expected peak day/hour demand. Volume- wise flexibility of supply points has to meet demand, assuming that adequate transportation and distribution capacity is available to supply the end users.

5. What kind of software and information do the traders and system operators use in order to determine the demand and supply of the next day and week? Do the gas distribution companies and traders determine the demand for the system operators? What is the standard measurement to determine capacity overrun on supply point and delivery points?

6. Transparent flexibility services are needed for market players and especially for transmission system operators for the day-to-day operational management of their systems. For example, system operators mainly use line pack to ensure the integrity of the network. Access to flexibility services should be limited according to the available capacities.

7. Different network balancing policy is applied according to whether the market is monopolistic or liberalized. Peak management tools are flexible storage facilities, flexible import sources, flexible domestic production, interruptible customers, and temporary capacity restriction, and of course limiting each shipper/consumer to their contractual maximum capacity.

8. Below is reproduced a revised and elaborated version of a draft questionnaire which will be discussed at the next session of the Ad Hoc Group of Experts, in January 2004

A. Questionnaire

	Country	
	Date of the survey, validity of data	
1.0	**Market participants:**	
1.1	Number of wholesalers	pieces
1.2	Number of gas traders	pieces
1.3	Number of transmission companies	pieces
1.4	Number of distribution companies	pieces
1.5	Number of direct customers who connect to the transmission system	pieces
1.6	Number of independent producers	pieces
1.7	Number of eligible consumers	pieces
1.8	Tasks of the System Operator	
1.9	Which company is responsible for supply of household consumers?	
1.10	Which company is responsible for transmission?	
1.11	Which company is responsible for storage?	
1.12	Who carries out the tasks of System Operator	
1.13	What kind of services are ensured by the main companies?	
1.14	Structure of consumers are in peak day	%
1.15	Structure of consumers in an average summer day	%
2.0	**Transmission system:**	
2.1	Gas supply system 1	Attachment 1
2.2	Length of transmission system	km
2.3	Average distance of transmission	km
2.4	Number of gas delivery stations	pieces
2.5	Number of compressor stations, and built in power	pieces, MW
2.6	What is the usual number of compressor units	pieces
2.7	Typical pressure range along the pipeline system	bars
2.8	Typical outlet pressure	bars
2.9	What are the main technological functions of the gas delivery station?	
2.10	Number of domestic production supply points	pieces
2.11	Number of storage supply points	pieces
2.12	Number of import supply points	pieces
2.13	Who is the operator of the flow measurement system between producer	

	and transporter?	
2.14	Who is the operator of the flow measurement system between storage and transporter?	
2.15	Who is the operator of the flow measurement system between distributor company and transporter?	
2.16	In the case of crossborder measuring stations are there measuring stations on both sides and are measurement data sent mutually between transmission companies?	
2.17	Who is responsible for gas quality parameters?	
2.18	Where can chromatographs be found in the system?	
2.19	What is the general odorization method in the transmission system? Central or individual odorization?	
2.20	Number of odorizing units?	pieces
2.21	What kind of SCADA software is used?	
2.22	Is it approved for the purpose of gas accounting, measuring data transmission through the SCADA system?	
2.23	Is a general database used which ensures the background for different applications (contract management module, nomination, accounting module)	
		Bcm billion cubic metre (15 C) reference temperature for example
		Mcm million cubic metre (reference temperature for example 15 C)
		Gas year
		Gas day
3.0	**Transmission tasks:**	
3.1	Gas consumption	Bcm/y
3.2	Domestic production	Bcm/y
3.3	Import	Bcm/y
3.4	Supplied from Underground storage (UGS)	Bcm/y
3.5	Number of UGS	pieces
3.6	Date and time of peak day	

3.7	Daily average temperature on peak day	
3.8	Peak consumption	Mcm/d
	Supply data	Used supply max.
3.9	Domestic production	Mcm/d
3.10	Import	Mcm/d
3.11	Local UGS	Mcm/d
3.12	UGS Service imported	Mcm/d
3.13	LNG	Mcm/d
3.12	Peak consumption	Mcm/h
	Supply data	Used supply max.
3.13	Domestic production	Mcm/h
3.14	Import	Mcm/h
3.15	Local UGS	Mcm/h
3.16	UGS Service imported	Mcm/h
3.17	LNG	Mcm/h
3.18	Transit	Bcm/y
3.19	Daily peak	Mcm/d
3.20	Hourly peak	Mcm/h
3.21	Profile of yearly transmission in 2003	Attachment 2
3.22	Peak day profile in 2003	Attachment 3
3.23	Average peak usage hours 2003 (peak day Q/ peak hour q)	
3.24	Average peak usage days 2003 (Q annual / peak day Q)	
3.27	Dependence on temperature 2003	Attachment 4
3.28	Heating limit temperature	
3.29	Effects of wrong temperature forecast	
3.30	What is the characteristic low heating value of gas?	MJ/cm
4.0	**Future transmission tasks**	
4.1	Supply obligation, target demand	
4.1	Who decides the target peak demand and when?	
4.2	What is the typical time period for demand and supply forecast?	years
4.3.	What is the typical forecast data?	

5.0	**Nomination for the gas day**	
5.0	Rules of outlet (demand) and intake (supply) nomination	
5.1	Confirmation message	
5.2	Renomination	
5.3	Source predicted average daily temperature of the next gas day	
5.4	Software forecast demand	
5.5	Software for the nomination	
5.6	Nomination in WEB	
5.7	Usage of Hydraulic simulation	
6.0	**Balancing measures:**	
6.1	Balancing period	
6.2	Capacity binding	
6.3	Domestic production flexibility	Mcm/h/h
6.4	Import flexibility according to daily nomination	%
6.5	Storage flexibility	Mcm/h/h
6.6	Interruptible consumers (power stations, industrial customers)	Mcm/d
6.7	Distribution Companies total storage capacity	Mcm/d
6.8	Distribution Companies total interruptible consumers	Mcm/d
6.8	Capacity/flow restriction	
6.9	Temporary capacity restriction	
6.10	Normal linepack	Mcm
6.11	Linepack flexibility	Mcm
6.11	Flexibility service	
7.0	**What happens if customers do not use the transmission network according to the contracts?**	
7.1	Monitoring capacity overrun	
7.2	Capacity overrun penalty	
7.3	Imbalance charge 1	
7.4	Imbalance charge 2	
7.5	Imbalance charge 3	

B. Explanatory Notes to the Questionnaire

	Questions		**Explanations**
	Country		Name of the country
	Date of the survey, validity of data		Please indicate the date of the data. Example: 31.12.2002. If this date differs for any data, please indicate.
1.0	**Market participants:**		These questions refer to the number of market participants.
1.1	Number of wholesalers	pieces	Number of public suppliers
1.2	Number of gastraders	pieces	Number of traders supplying the eligible consumers
1.3	Number of transmission co.	pieces	Please distinguish between domestic and transit transmission, if the transportation is accomplished via a different system.
1.4	Number of distribution company	pieces	
1.5	Number of direct customers who connect to the transmission system	pieces	Industrial, powerplant consumers, or eligible consumers.
1.6	Number of independent producers	pieces	
1.7	Number of eligible consumers	pieces	Number of consumers who have the right to choose their gas trader according to market opening.
1.8	Task of the System Operator		Who is responsible for the process of nomination, control of transmission and gas accounting?
1.9	Which company responsible for supply of household consumers ?		
1.10	Which company responsible for transmission?		
1.11	Which company responsible for storage?		
1.12	Who carries out the tasks of the System Operator		
1.13	What kind of services are ensured by the main companies?		Example: Integrated service (Wholesale + transmission + storage) or single service only (trading, or transmission, or storage.)

1.14	Structure of consumers in a peak day	%	Indicate the daily consumption rate in a peak day. example: households:50 %, commercial:20 %,industrial:10 %, electricity & heating:20 %.
1.15	Structure of consumers in an average summer day	%	Indicate the daily consumption rate in an average summer day. example: households: 20 %, commercial:20 %,industrial:10 %, electricity & heating:20 %, storage 30%.
2.0	**Transmission system:**		These questions refer to the gas supply, gas transmission system.
2.1	Gas supply system 1	Attach-ment 1	Map of the gas supply system, showing the transmission system, underground storage and main intake points.
2.2	Length of transmission system	km	
2.3	Average distance of transmission	km	Estimated average distance of consumers from the intake points Example: about 250km
2.4	Number of gas delivery stations	pieces	Number of gas delivery station, which supply the medium or low pressure distribution systems
2.5	Number of compressor stations, and built in power	pieces, MW	Example 5 compressor stations, 110 MW
2.6	What is the usual number of compressor units	pieces	Example 3 (2 operating and 1 standby)
2.7	Typical pressure range along the pipeline system	bars	Example: 40-63 bars
2.8	Typical outlet pressure	bars	Typical outlet pressure of the gas delivery station Example: 6, 8 or 20 bars and in some cases pipeline pressure 20.50 bars
2.9	What are the main technological functions of gas delivery station?		Example: filtration, gas heating, pressure control or flow control, flow measurement for clearing or gas accounting, odorization. If flow control or upper flow limit control is characteristic please indicate.
2.10	Number of domestic production supply points	pieces	
2.11	Number of storage supply points	Pieces	
2.12	Number of import supply points	Pieces	

2.13	Who is the operator of flow measurement system between producer and transporter?		Example: transmission company
2.14	Who is the operator of flow measurement system between storage and transporter?		Example: transmission company
2.15	Who is the operator of flow measurement system between distributor co and transporter?		Example: transmission company
2.16	In case of crossborder measuring station are there measuring station in both side and data of measurement are sent mutual between transmission companies?		Example: in a typical crossborder point, there are measuring systems on both sides, but one is appointed for accounting measurement. Data are exchanged mutually.
2.17	Who is responsible for gas quality parameters?		Example: producers or trading companies
2.18	Where can be found chromatographs in the system?		Example: intake points, special nodes, some special outlet points
2.19	What is the general odorization method in transmission system? Central or individual odorization?		Example: Central odorization is mainly used, but the transit pipelines are not odorized.
2.20	Number of odorizing units?	pieces	
2.21	What kind of SCADA softwares are used?		Example: Special software which is developed for the transmission company or a general SCADA software programme package.
2.22	Is it approved for purpose of gas accounting, measuring data transmission through SCADA system?		Data is used through SCADA system for pre-invoicing, but the end-invoice is based on local reading of flow computer.
2.23	Is it used a general database which ensures the background for different applications (contract management module, nomination, accounting module)		Example: we apply Oracle database and Internet Explorer (xml) viewer, with different modules:nomination and contract management module from one supplier.
		Bcm	Billion cubicmetre (reference temperature for example 15 C)
		Mcm	Million cubicmetre (reference temperature for example 15 C)
		Gas year	Begins: 01 January, Ends: 31 December

		Gas day	Begins: 06:00 hours, Ends: next day 06:00
3.0	**Transmission task:**		These questions refer to the gas supply, gas transmission data.
			Last year (fact) data
3.1	Gas consumption	Bcm/y	
3.2	Domestic production	Bcm/y	
3.3	Import	Bcm/y	
3.4	Supplied from Underground storage (UGS)	Bcm/y	
3.5	Number of UGS	pieces	
3.6	Date and time of peak day		Example: 13.01.2003 9:00
3.7	Daily average temperature on peak day		Example: T daily average = -9,8 C
3.8	Peak consumption	Mcm/d	Consumption on the peak day
	Supply data		Forecast/Target supply max.
3.9	Domestic production	Mcm/d	
3.10	Import	Mcm/d	
3.11	Local UGS	Mcm/d	
3.12	UGS Service imported	Mcm/d	
3.13	LNG	Mcm/d	
3.12	Peak consumption	Mcm/h	
	Supply data		Forecast/Target supply max.
3.13	Domestic production	Mcm/h	
3.14	Import	Mcm/h	
3.15	Local UGS	Mcm/h	
3.16	UGS Service imported	Mcm/h	
3.17	LNG	Mcm/h	
3.18	Transit	Bcm/y	
3.19	Daily peak	Mcm/d	
3.20	Hourly peak	Mcm/h	
3.21	Profile of yearly transmission in 2003	Attach-ment 2	Showing the seasonal characteristic of aggregate consumption.
3.22	Peak day profile in 2003	Attach-ment 3	Showing the daily characteristic of aggregate (all kind of consumers) consumption in peak day.

3.23	Average peak usage hours 2003 (peak day Q/ peak hour q)		Index number showing the relation between the daily and hourly data in peak day.
3.24	Average peak usage days 2003 (Q annual / peak day Q)		Index number showing the relation between the yearly and peak day data.
3.27	Dependence from temperature 2003	Attach-ment 4	Diagram showing the daily consumption temperature dependence.
3.28	Heating limit temperature		Daily average temperature above which consumption will be independent from temperature. Example: 16C
3.29	Effects of wrong temperature forecast		The meteorology forecast the next day average temperature max. +/- 4 C mistake, this resulted max. +/- 8,0 Mcm/d supply surplus or shortage.
3.30	What is the characteristic low heating value of gas?	MJ/cm	Example: 34 MJ/cm
4.0	**Future transmission task**		
4.1	Supply obligation, target demand		Maximum consumption that trading and transmission companies have to ensure without restriction Example: Demand at -8 C or estimated demand in the coldest winter in the past 20 years.
4.1	Who decides the target peak demand and when?		Distribution company + Wholesaler + Transmission company jointly, 3 months before the next gas year.
4.2	What is the typical time period for demand and supply forecast?	years	Every gas year market participants have to forecast the demand and supply data in a certain future period. Example: for the following years next year (n), n+1, n+2, n+3, n+4, n+9, n+14 for every intake and outlet points.
4.3.	What is the typical forecasted data?		Yearly, peak day, peak hour consumption, Summer average peak day, minimum consumption, outlet pressure demand.
5.0	**Nomination for the gas day**		

5.0	Rules of outlet (demand) and intake (supply) nomination		Daily nomination for every intake and outlet points before the gas day up to 11:00.
5.1	Confirmation message		Before the gas day up to 16:00
5.2	Renomination		Possible before gas day.
5.3	Source of the next gas day predicted average daily temperature		Example: National Meteorology Institute.
5.4	Software forecast demand		Which market participants use forecast software? (estimate the next day consumption with the help of data on the expected temperature and historical consumption)
5.5	Software for the nomination		Kind of software used for receiving and confirmation of nominations
5.6	Nomination in WEB		Possibility of nomination through WEB pages
5.7	Usage of Hydraulic simulation		Example: Before confirmation of nominations we do transient hydraulic simulation of 24 hours of the next gas day with the help of historic daily profile.
6.0	**Balancing measures:**		Kind of balancing measures to be taken harmonizing demand and supply
6.1	Balancing period		Daily: Consumption and supply must be equal in a gas day.
6.2	Capacity binding		Peak day capacity has to be bought from the transmission company for inlet and outlet points before the gas year. This is the firm capacity, which is not interruptible.
6.3	Domestic production flexibility	Mcm/h/h	Maximum changing rate of domestic production Example: 0,1Mcm/h increase or decrease hourly.
6.4	Import flexibility according to daily nomination	%	Maximum flexibility in the case of import? Example: +/- 5% compared to the nominated quantity.
6.5	Storage flexibility	Mcm/h/h	Maximum changing rate in the case of main storage facility Example:0,3Mcm/h increase or decrease hourly.
6.6	Interruptible consumers (power stations, industrial customers)	Mcm/d	Aggregate direct interruptible consumption connected to the transportation system Example: 6 MMcm/d.

6.7	Distribution Companies total storage capacity	Mcm/d	If any.
6.8	Distribution Companies total interruptible consumers	Mcm/d	Aggregate interruptible consumption connected to the distribution system Example: 1,0 MMcm/d.
6.8	Capacity/flow restriction		Only in the case of a few gas delivery stations, which are equipped with a flow control system.
6.9	Temporary capacity restriction		The wholesaler in agreement with the transmission system operator should order temporary capacity restrictions on consumers in case of supply shortage. The schedule is approved by the Energy Office before the gas year.
6.10	Normal linepack	Mcm	Linepack of transmission system in normal operating conditions. Example: 48Mcm.
6.11	Linepack flexibility	Mcm	Deviation +/- from normal conditions. Example: +/- 3 Mcm.
6.11	Flexibility service		Example: Included in the transmission tariff up to +/- 3% of daily capacity demand.
6.12	What is the maximum allowable difference between aggregate consumption and the aggregate supply source?	%	Example: Limited time period consumption should be 8-10% higher than the supply source, but within a gas day the demand and supply must be equal.
7.0	**What happens if the customers use the transmission network not according to the contracts?**		
7.1	Monitoring capacity overrun		Yes, through the SCADA system. Carried out by transmission system operator. Measured by flow computer. Stored by flow computer in a limited time period. Archiving by SCADA.
7.2	Capacity overrun penalty		Yes, depends on the volume of overrun and the actual daily average temperature.
7.3	Imbalance charge 1		Example: Below 3% overrun there is no charge.
7.4	Imbalance charge 2		Example: Between 3-10% overrun XXL charge.
7.5	Imbalance charge 3		Example: Over 10% overrun XXXL charge.