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Working Party on Gas and Gas Centre

Workshop on the Current State and Prospects for
Rehabilitation of the Local Natural Gas
Infrastructure in the city of Tbilisi
Tbilisi (Georgia), 18-19 May 2005

REPORT

Introduction

1. At the request of the delegation of Georgia, the UNECE Working Party on Gas at its fifteenth session, held in January 2005 in Geneva, decided to organise in Tbilisi, Georgia, a workshop on the Current State and Prospects for the Rehabilitation of the Local Natural Gas Infrastructure. The workshop was organized jointly by the UNECE Working Party on Gas, the UNECE Gas Centre and the Tbilisi City Assembly.

2. The purpose of the Workshop was to exchange data and information on the present condition of the Tbilisi natural gas distribution system, including its connections with consumers and its supply connections. Because of the urgent problems brought forward during the fifteenth session of the Working Party on Gas by Mr. Ivan Zazashvili, Chairman of the Georgian Union "Ecology and Underground Metal-Communications ("Ecoengineering"), issues related to immediate assistance as well as structural help were also discussed during the workshop.

I. Participants

3. The workshop was attended by over fifty participants from Bulgaria, Estonia, Georgia, Russian Federation and Ukraine. The majority of participants were local gas experts, as well as representatives from local authorities, governmental bodies and scientific institutions of Georgia. A representative of the Organization for Security and Cooperation in Europe (OSCE) was also in attendance.

II. Chairman

4. Mr. Zurab Zhvania, Secretary of the Tbilisi City Council, chaired the workshop.

III. Agenda

5. The agenda was adopted.

6. Technical visits were organized to a gas distribution station, other technical installations and a residential area near Tbilisi, followed by a visit to the headquarters of TBILGASI and a Round Table discussion. The workshop ended with an overview on the topics that were discussed, including conclusions and a list of follow-up activities and alternatives.

IV. Opening of the workshop

7. The Workshop was opened by Mr. Zurab Zhvania, Secretary of the Tbilisi City Council and Chairman of the meeting who welcomed participants and wished them a fruitful discussion and a pleasant stay in the capital of Georgia.

8. Mr. Teimuraz Kurkhuli, the Premier of Tbilisi City, expressed his appreciation that so many gas experts and representatives of companies and organisations, as well as officials and scientists were prepared to discuss the difficult situation with regard to the Tbilisi gas distribution system and possible solutions to urgent problems. He wished the Workshop participants all the success and hoped its results would contribute to the improvement of the situation in the Tbilisi gas infrastructure.

9. Mr. Alexandre Chachine, secretary of the UNECE Working Party on Gas, recalled that the idea of organizing such a Workshop had been launched by Mr. I. Zazashvili, Chairman of "Ecoengineering", and the UNECE, which has been directly involved in international cooperation in the field of natural gas for the last fifty years.

10. Mr. Tans van Kleef, Manager of the UNECE Gas Centre in Geneva, introduced the Gas Centre and its activities. Some 25 major gas companies in the European countries of the UNECE region and in North Africa are members of the Gas Centre and they fully fund its activities (see: www.gascentre.unece.org).

V. Presentations by Experts

11. Mr. Giorgi Kajaia, Chairman of the TBILGASI Supervisory Board, informed the workshop on the history of natural gas in Georgia and especially in Tbilisi, where in 1958 TBILGASI was established. At the end of the 1980s it had a business of about 1.8 bcm/year. Unfortunately during the last 10 to 15 years of political instability, including civil war, gas supply and distribution came more or less to an end. Today, although gas supply and distribution are still quite unstable, there are grounds to believe that it will become safe and secure again. It is assumed, that full rehabilitation of the infrastructure will take 6 to 7 years. Proper metering has to be developed and introduced and staff have to be trained in new technologies.

12. According to Mr. Kajaia, the City of Tbilisi transferred to TBILGASI some 57 million Lari in the period 2000-2004 to improve the gas infrastructure (US$ 1 = approx. 1.8 Lari). Based on the results of a recent study by Austrian experts, an additional US$ 75 million (25 million for metering and 50 million for rehabilitation) would be necessary to create a reliable infrastructure.

13. Mr. Teimuraz Godritashvili, professor in Planning and Development, explained the gas market in Tbilisi and especially losses and theft (amongst others because of the collapse of the district heating systems) of natural gas. His general conclusions were as follows:

- Fundamental improvement of gas metering is badly needed;
- Part of the increased income should be used for improvement of the gas infrastructure;
- Immediate introduction of a cathodic protection is needed;
- Lower operational gas pressure should be applied;
- Cycle supply/distribution further developed.

14. He also underlined that the present tariff system should be reviewed and adapted in order to improve the financial position of the gas industry and to provide for financing improvements. He believed that a lower purchase price should partly contribute to this. He was also in favour of ending monopoly positions. He suggested that since natural gas was a relatively cheap source of energy, compared to electricity for example, a considerable market growth up to some 3 bcm in the year 2020 would be possible.

15. Mr. Alain Tournebise, Database Manager of the UNECE Gas Centre, announced that following a request from Mr. Zazashvili, and in view of enormous problems with the gas grids in Tbilisi, Gaz de France had decided to donate a used but well-maintained gas leakage detection vehicle in order to accelerate tackling the problem in Tbilisi.

16. Mr. Gia Shashvilashvili, Deputy Director of TBILGASI, presented some additional information on the history and current status of the Georgian/Tbilisi gas market. For example, around the year 1990 the gas market in Georgia represented 2 bcm per year (300,000 small consumers and industries, some 800 commercials). For the last ten years, Georgia, and in particular Tbilisi, had experienced very serious problems on a technical level. No maintenance or replacements had been carried out until now – some modest rehabilitation has just started again on a very low level. Some 65 accidents a year are observed in the city of Tbilisi, causing CO_2, gas leakages and explosions. On top of that, theft, non-payment of gas consumed and the installation of amateurish equipment also have direct consequences on safety. He estimated that some US$ 75-90 million would be needed to improve the metering system alone.

17. Mr. Manfred Koeckenbauer, Facilities Management Officer of the OSCE Representative Office in Tbilisi, informed the meeting that at the end of 2004 he had discussed the serious gas losses with the General-Director of TBILGASI, Mr. David Morcheladze, and the Deputy Director-General Mrs. Purtseladze. He asked the Vienna Gas Company if it could assist TBILGASI and the population of Georgia, through expertise and technology transfer.

18. After a series of negotiations involving the Austrian Ambassador, the Austrian Minister President, the Austrian Foreign Minister and the Georgian Foreign Minister, it was agreed that Austrian specialists would be sent to Tbilisi for a first evaluation, and that funds of the Austrian Ministry of Foreign Affairs would be appropriated to cover the main part of the expenses for the first evaluation of the TBILGASI network. Two leading engineers from Wienenergie were

subsidized. In April 2005 they started to evaluate the pipeline system, the gas metering system and the troubleshooting system. Subsequently a delegation of seven Georgian experts travelled to Vienna to see how Vienna Gas was solving the problems and to learn about possible solutions.

19. The results of the expertise by the Austrian experts may be summarized as follows:

A. Gas Pipes

(a) General Situation

The general situation of the gas pipe system in Tbilisi, as well as the distribution system, the counting and gas meter system, and the complete regulator and observation system are in a very poor and dangerous condition. This is mainly caused by the fact that maintenance of the system has been neglected for almost 50 years.

The estimated losses of 150 million m^3 of gas a year is not just a serious loss of funds, but is also causing a highly dangerous situation for the Georgian population. In the last three years more people have been killed in Georgia by gas accidents than in Vienna over the last 50 years.

Tbilisi feeds into the system about 750 million m^3 of gas per year. Gas loss, approximately 150 million m^3, is mainly caused by leakages and damages. Another high and unknown additional amount of losses is caused by stolen or unpaid gas. An obsolete system of gas meters enables customers to defraud the system. Apart from the danger, a lot of gas disappears without being paid for and this causes high commercial losses.

(b) Necessary steps

1. Renovation work on the piping system should begin at the centre. The priorities which should be taken into consideration are:
   - The amount of losses in the area
   - Population density
   - The frequency of reported damage

2. The evaluation of the piping system should be completed with efficient and state-of-the-art equipment. The equipment currently used is not efficient enough to guarantee proper evaluation and planning.

3. After a preliminary assessment, renovation work should begin before the next winter/heating season starts.

4. Gas meters must be changed and replaced. In areas where there losses are high, a prepayment system could drastically reduce the amount of stolen gas.

5. The distributing and regulating stations should be changed as soon as possible.

6. The emergency concept has to be reorganized from the beginning.

7. The contractual, subscribing and cost allocation system should be reorganized.

(c) Detailed actions and steps: Evaluation and technical survey

The evaluation and technical survey should be started in several steps.

(i) Testing with equipment operated with high-flammable gas, which now provides better and more efficient results than sophisticated laser systems.
(ii) Testing by digging the ground and evaluating the pipes by direct check up.
(iii) Testing by pressure tests and robot cams.
(iv) Testing with "intelligent pigs" to evaluate the pipe condition and remaining thickness.

(d) Renovation of pipes / repair of pipes

Renovation of the pipes can be done, in several different ways, as was demonstrated during the visit to Vienna:

(i) Renewal and replacement of pipes in areas where the traffic situation allows.
(ii) Renovation and repair of pipe systems using different inline methods. The Austrian Gas companies use various systems, using textile pipes prepared with epoxy components or in-liners which accommodate their form to the inside diameter of the existing system.
(iii) An active Cathode protection should be installed or rehabilitated, to prevent the corrosion of steel pipes. State-of-the-art systems allow checking of the condition of the cathodes on a monthly basis. Special check-up points are therefore installed.

B. Replacement of distribution stations

The existing distribution stations are not in accordance with any standards, either Russian, US or ISO. The survey of the Austrian experts discovered a very bad overall situation, which will be documented in the final report. It is not necessary to come close to the existing station to recognize the intensive smell of gas. Different systems should be checked out to afford the most efficient system.

C. Changing of gas meter system

The gas meters used currently conform either little or not at all to any actual standards. Apart from the fact that these meters can easily be manipulated with a high risk to those doing the manipulating, the loss for TBILGASI is extraordinary high, and probably cannot be compared with other city of same size. In most countries, such as Russia, United States and EC countries, the gas supply is disconnected the moment somebody starts to manipulate the gas meters, by opening a screw for example. Only the gas company service team can repair these failures and reconnect the gas.
In addition, the gas meters currently used should be calibrated at least every sixth year. At the moment it is possible, according to the engineers responsible, to calibrate 10 units per hour, which means a total of 100 units during a 10-hour working day. Assuming 250

working days per year, a total of approximately 25,000 units could thus be calibrated each year. Taking into account the current number of households, it would take almost 12 years to check all devices.

D. Changing of emergency concept

Past experience has shown that several factors are blocking an efficient search for failures and immediate reaction.

- Insufficient equipment.
- Unacceptable plan and layout situation (as Vienna Gas engineers were informed, the emergency unit does not even have access to the weak layout plan system after 18:00 Local Time. In addition, no actual plans exist of many districts in Tbilisi).
- The unbelievable situation, as Vienna Gas engineers were informed - and witnessed during an operation of the rescue team – that restrictions in working hours during the night are causing dangerous situations. A rescue team digging in the sidewalk/road could not find a strong smelling leakage. At the end of the day the building pit was closed, the team postponed the repair and went away without performing the necessary repair work.

E. Contractual, subscribing and cost allocation system

The existing system has to be changed. Automation will guarantee a higher and better result. The more people involved in running a manual system, the higher the error rates, caused by mistakes or even on purpose.
The current payment system should be changed to a monthly prepayment system. The basic calculation in this system can take into consideration apartment size, people per apartment, and number and kinds of connected items.
Clients who do not pay their bills or manipulate the gas meters could and should be supplied with intelligent card meters, which only operate when prepaid smart cards are used.

20. Other experts and authorities involved in operation of Tbilisi gas market underlined the urgent need to combat problems related to safety, rehabilitation, metering, maintenance and rehabilitation of the system. They also stressed the necessity of funding to improve the situation. New technologies must be introduced in which young people have to be trained.

21. The Head of the National Movement Faction in the Tbilisi City Council stated that any privatisation of the gas industry is not an option from a political point of view.

22. Mr. David Morchiladze, General Director of TBILGASI, presented some basic information on the technical and financial position of the company. There were not enough funds available out of the commercial margins to (fully) improve the gas distribution system in Tbilisi. The system is obsolete and the TBILGASI company is greatly in debt (to the gas supplier) although gas supply prices are at a reasonable level. In order to obtain the new investments needed for the improvement of the gas system, the current system should become profitable. Apparently, this is not the case at the moment. An optimal organisation of the gas industry should be targeted. International cooperation is very important.

23. Mr. Alan Sepp, Chairman of the Estonian Gas Association, presented the history of his association which now has 33 members. They are active internationally through the International Gas Union (IGU). It is his experience that to reorganize and rationalize a gas market, new legislation is essential. As far as he could judge, the present situation in Georgia is comparable to Estonia some 15 years ago. New legislation has to be developed and implemented in Georgia. New technical equipment has to be applied, especially gas meters (Dutch meters, more expensive but better quality) and heating equipment (NEVA, St-Petersburg, very good price/quality balance). In everything, safety is key. Mr. Sepp offered his services to the Georgian/Tbilisi officials and to the gas industry to assist them with developing new energy legislation.

24. Mr. Alexey Zorya, Deputy General Director of PROMGAZ, Russian Federation, presented the way that Gazprom/Promgaz organizes and builds gas distribution systems, including maximum safety and quality control. He explained details of their system/ infrastructure, including rehabilitation. He stressed that cathodic protection is an integral part of their systems. He demonstrated some of Gazprom's distribution projects, showing their successful operation. The experience of Promgaz/Gazprom could be very helpful for Georgia/Tbilisi.

25. Mr. Alain Tournebise, UNECE Gas Centre, presented the opportunities that Georgia may have under the Kyoto Protocol to finance projects reducing greenhouse effects gas emissions like methane. He explained the Clean Development Mechanism (CDM). In the case of Tbilisi, based on discontinuing losses of 200 million m^3 a year and a credit period of 10 years, he estimated that a potential amount of US$ 160 million could become available for financing the network rehabilitation. He explained the whole CDM process and referred to various carbon finance initiatives with the World Bank. They could be of help for Georgia.

26. Mrs. Nadezhda Shmeleva, Head of Planning Division of Overgas Engineering, Bulgaria, presented her company which is a joint venture between Bulgaria and the Netherlands (Gastec). The company is very experienced in large distribution projects as well as specific specialised projects (per house or building). They are involved in Kyoto-related projects. She suggested that all projects have three major features in common: quality control, environmental protection, and sustainability. Training of personnel and new technologies are an important part of their projects. Mrs. Shmeleva was convinced that her company's experience and know-how could be of great value in solving problems in Tbilisi.

27. At the end of the Workshop programme Mr. Alexandre Chachine, UNECE Working Party on Gas, thanked all participants for their contributions to the interesting Workshop. He thanked especially the Mayor and the Council of the City of Tbilisi for hosting and organising it. He thanked Mr. Zurab Zhvania for chairing the Workshop in a very efficient way and for his warm and extensive hospitality. On behalf of the UNECE he presented Mr. Z. Zhvania with a memorial book on the Palais des Nations (UN Headquarters) in Geneva. Mr. Zurab Zhvania also thanked all participants for their interesting presentations and contributions in the discussions and he invited them to take part in the Technical visits.

VI. Technical visits

28. Technical visits were organized to a gas pressure regulating station, a delivery station (including odorization) and some apartment buildings (including one with newly installed gas meters) and street locations. They were a clear illustration of what was presented earlier in the Workshop and the main observations could be summarised as follows:

A. Pressure regulating station

(a) Very primitive technical lay-out
(b) In working condition but not properly maintained
(c) Housing of the station (iron case) is not locked or properly covered
(d) All piping is above the ground, no passive protection applied.

B. Delivery station

(a) A lot of trees/bushes growing between pipelines, sometimes directly against pipes (outside the station)
(b) Station is well fenced and protected
(c) Clear smell of odorant
(d) Station is maintained.

C. Apartment buildings

(a) Normally no proper metering. One new metering project well initiated
(b) Not always adequate ventilation/exhaust piping
(c) Apparently hardly any modern heating installations

D. Street locations

(a) All distribution lines and secure pipes are above street level, often without passive protection
(b) In places where leakage is detected, works are conducted to replace the damaged part of pipeline
(c) No systematic leakage surveys.

E. Conclusions

(a) General lack of maintenance of the gas distribution system
(b) No cathodic protection
(c) Vulnerable lay-out of pipelines
(d) No systematic leakage control and repair
(e) Hardly any gas metering (new metering projects on a small scale being developed and introduced).

VII. Conclusions and Recommendations

29. The participants in the Workshop supported the following recommendations for rehabilitation of the natural gas distribution system in Tbilisi:

A. The development of an integral plan for the rehabilitation of the natural gas grid is necessary with an assessment of the total cost and the setting of priorities;
B. Obsolete parts have to be replaced or rehabilitated, or a more fundamental solution should be implemented, which could mean complete renewal of parts;
C. (Cathodic) protection should be introduced when necessary as well as systemic maintenance of pipelines and installations;
D. Proper metering should be stimulated;
E. Modern heating installations with proper ventilation/exhaustive piping should be introduced;
F. Adequate legislation (general laws as well as more detailed technical regulations) has to be developed further and introduced.

30. Fortunately, in principle there is an organized gas industry available, whose employees will have to be trained further in order to introduce and work with state-of-the-art technologies (some programmes are being implemented at the moment). Foreign companies present at this Workshop and others are able to provide the necessary technologies, training, etc. in a commercial way.

31. Mr. Alan Sepp of the Estonian Gas Association is fully prepared to organise and host a follow-up Workshop on Energy Legislation in Estonia. This will be a good training exercise for Georgian experts. He will make available as soon as possible, in Russian and English, all relevant Estonian Energy/Gas Legislation.

32. For TBILGASI, rehabilitation will be a huge challenge, not only technically. The company has to repay its present debts and develop a rehabilitation programme on the one hand and train its employees in new technologies on the other hand. The gas leakage detection vehicle will be of great help.

33. Together with the local authorities as well as with the national government a situation has to be created for proper funding for the programme/investment and training. It is of course up to all parties directly involved to make the necessary decisions, preferably as soon as possible.

34. It is recommended that Vienna Gas, owned by the municipality of the city of Vienna, together with financial support from the Austrian Ministry for Foreign Affairs, complete the second part of their evaluation activities as soon as possible and that the urgently needed repair work and further rehabilitation of the gas distribution system in Tbilisi be implemented. It should be noted that TBILGASI is a 100% municipal-owned enterprise, which might be of essential importance for attracting outside funding, including investments from international financial institutions

VIII. Overall conclusions

35. The Workshop provided a good opportunity to investigate and discuss the current conditions of the Tbilisi gas distribution grid, the present market conditions and the main elements that need to be developed and implemented in order to secure a safe gas distribution system. The environment has to be protected as well as the safety of customers and industry employees. A proper working distribution system should provide for a healthy economic gas distribution business. In order to implement this a huge financial and technical effort has to be made by the gas industries and the local and national officials. Foreign companies, experts and organisations can be of important help.

36. Participants of the Workshop were offered an extremely warm hospitality. For many of them it was a first experience to enjoy this heartily welcome of Georgian people and to enjoy the nature and beauties of Tbilisi.