Translation from Bulgarian

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ENVIRONMENT IMPACT STATEMENT ON PROJECT

"GASIFICATION OF THE TOWN OF VELIKO TARNOVO"

HEAD OF TEAM:
/ Kr. Petrov, Asst. Prof., DSc (Eng)/

GENERAL MANAGER:
/ St. Doncheva, MSc. (Eng) /

January 1999

Sworn translator: Andrey Manolov

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ENVIRONMENT IMPACT ASSESSMENT OF THE GASIFICATION OF THE TOWN OF VELIKO TARNOVO PROJECT

NON-TECHNICAL SUMMARY

The objective of the statement on the gasification of the town of Veliko Tarnovo, incl. industrial enterprise zone (IEZ), public and administrative sector (PAS) and the residential sector (RS) is to offer an alternative to the existing energy carriers.

This project has been necessitated by the lack of heating infrastructure in Veliko Tarnovo and the potential threat for the ecosystem and the living environment caused by the use of conventional fuels.

This project is focused on the technological process of supplying natural gas to consumers. All related operations are automated and will not lead to any environmentally hazardous emissions.

While gas appliances and equipment are not part of the consumer gas-supplying network, they are treated as output. They are used in the technological process of gas combustion with waste emissions, which interact with the environmental components.

The project covers:

- Distribution Gas Pipeline (DGP – 12 bar) from the Automatic Gas Distribution Station (AGDS) to Gas Regulation Points - Town (GRP1-T) in the central town part and gas pipeline connection to consumers in the industrial zone: Arbanasi and Dalga Laka;
- Town Distribution Network (4 bar) and gas pipeline connection to consumers in the Town Section, incl. 7 GRP-TS;
- Town Section distribution network (100 mbar) and gas pipeline connection to consumers in the Residential Sector (RS) of the town of Veliko Tarnovo.

The project objective directly interferes with the state of the atmospheric air and indirectly to the ecosystem and the living environment in Veliko Tarnovo. Forecasts for the expected changes of the state of the atmospheric air as a result from the substitution of conventional fuels for natural gas are made. Two hypotheses have been examined:

Ist hypothesis – the existing situation (using conventional fuels), with no implementation of the project objective - zero hypothesis;

IInd hypothesis – complete gasification of the IZ, PAS and RS – implementation of the project objective.

The results of the research made in connection to the EIS on the Gasification of the town of Veliko Tarnovo are the following:

1. The activities under this project aimed at achieving sustainable development and environmental reproduction. They envisage the substitution of carbohydrate and liquid fuels in IZ, PAS and RS in Veliko Tarnovo for natural gas, which has the lowest emissions generating capabilities.

2. According to the analysis the replacement of carbohydrate and oil fuels in IZ, PAS and RS in Veliko Tarnovo will reduce the released emission by 7.6 times. The release of sulphur oxides, dust and ashes from organized sources will be reduced almost 100%. The quantity of nitrogen oxides will increase by 1.08 times, however, the performed dissipation simulation indicates that it is unlikely to exceed the maximum concentration limits. In line with the allowable contents standards the quantity of CO is insignificant due to the extensive combustion in the gas-fired heat and energy equipment. This shows the advantages of using natural gas instead of conventional fuels and proves the relevance of the project to the improvement of the ecosystem in Veliko Tarnovo.

3. The project location and the activities related thereto do not contradict with any laws and regulations on environment protection and the health and hygienic standards in the Republic of Bulgaria.

4. The construction works and the operations under the project will not impose any threat to the environmental components: air, surface and ground waters, soils, flora, fauna and humans.

The implementation of this project will improve the ecosystem and the living environment in the town of Veliko Tarnovo.

In conclusion, the team of independent experts of CONTROL P EOOD suggests that the EEC of the District Institute of the Environment and Waters (DIEW) shall accept this EIS as final, in accordance with Art. 9 (2) of Ordinance No. 4/7.07.1998, and shall permit the implementation of this project in conjunction with Art. 20(2), pt. 2 and Art 20 (3), pt. 1

Team Leader: **Manager of CONTROL P EOOD:**
(Asst. Prof. Dipl. Eng. K. Petrov) **(St. Doncheva)**

AUTHORS OF THE ENVIRONMENT IMPACT STATEMENT (EIS)

The Environmental Impact Statement on the "Gasification of Gorna Oryahovitsa" project has been developed by a team of experts of "CONTROL P EOOD" company, Sofia 1421, 2 Dragan Tsankov Blvd., University of Architecture, Construction and Geodesy, general manager Svetla Doncheva, tel.: 658 175.

I. LIST OF LICENSED EXPERTS WORKING THE EIS

No.	Expert	Participation	Signature
1	Krasimir Velkov Petrov, Asst.Prof., DSc. (Eng), License No.271/18.10.1996: waters, geological base, terrain, soils	General editing, it.1, it.2, it.3.1, it.3.2, it.3.3, it.3.4, it.3.6, it3.7, it.3.9, it.4, it.5, it.6, it.7, it. 8, it.9, it.10	
2	Petar Georgiev Petrov, M.Sc. (Eng), License No.218/25.09.1996: atmospheric air, noise, vibrations, harmful radiation	it.3.1, it.3.5, it.4, it.9, it.10	
3	Ilia Petrov Angelov, M.Sc. (Eng), License No.40/1996: vegetable kingdom	it.3.8, it.10	
4	Dr. Ilia Ivanov Ivanov, License No.528/1997: health protection zones and health hazards	it.4	

II. CONSULTANTS

1. Svetla Marinova-Garvanska, Prof., PhD (Agr.), License No.310/1996: soils, wastes

HEAD OF TEAM: GENERAL MANAGER:
/ Kr. Petrov, Asst. Prof., DSc (Eng)/ / St. Doncheva, MSc. (Eng) /

DECLARATION

1. I, the undersigned Krasimir Velkov Petrov, Asst.Prof., DSc. (Eng), holding License No.271/18.10.1996, issued by the Ministry of Environment and Water of Bulgaria(MEW)
2. I, the undersigned Petar Georgiev Petrov, M.Sc. (Eng), holding License No.218/25.09.1996, issued by the Ministry of Environment and Water of Bulgaria.
3. I, the undersigned Ilia Petrov Angelov, M.Sc. (Eng), holding License No.40/1996, issued by the Ministry of Environment and Water of Bulgaria
4. I, the undersigned Dr. Ilia Ivanov Ivanov, holding License No.528/1997, issued by the Ministry of Environment and Water of Bulgaria

DECLARE:

1. I possess the necessary professional qualifications and competence for working on the Environment Impact Statement (EIS)
2. I have not participated in the preliminary study and the development of the project “Gasification of the town of Gorna Oryahovitsa”
3. I am not associated with the employer and am not benefited from the implementation of the project.
4. I am familiar with the Environment Protection Law (EPL), Ordinance No.1 for EIA, the legislation related to the environment protection, as well as the requirements of Art.21, para. 2 of EPL.

I am aware that I am liable to criminal amenability for false data statements according to Art. 313 of the Criminal Code and for unobserved requirements of Art. 20, par.3, item 3 of EPL and incorrect EIA conclusions according to Art. 33 of EPL, if I am not liable to a heavier punishment for which I sign below

Sofia, October 1998

Signed:

1. ……..
2. ……..
3. ……..
4. ……..

1. GENERAL INFORMATION

1.1.Project title, address of the investor, contact person

- Project title: Gasification of the town of Veliko Tarnovo
- Investor: Overgas Inc. AD, Sofia, 36 Dragan Tsankov Blvd.
- Project Designer: Overgas Inc. AD, Sofia, 36 Dragan Tsankov Blvd.
- Contact person – Dipl. Eng. Vanya Spassova, Overgas Inc.; tel. 02/971 21 59;
  Dipl. Eng. Dimitar Dimitrov – Rahovets Gas OOD, Veliko Tarnovo; tel: 0618/ 3 10

1.2. Indication of the individuals and the legal persons, which may be affected by the project

According to the data from the Investor (Annex 1, 2, 3) the implementation of the project will affect the following individuals:

- Vitan Andreev Kefirov – lot 85006 on the land of the village of Ledenika, cornfield - 7th category of soil;
- Stoyan Nikolov Stoyanov - lot 14001 on the land of the town of Veliko Tarnovo, abandoned cornfield -6th category of soil;
- Ilia Obretenov Pechkov - lot 14002 on the land of the town of Veliko Tarnovo, abandoned cornfield -6th category of soil;

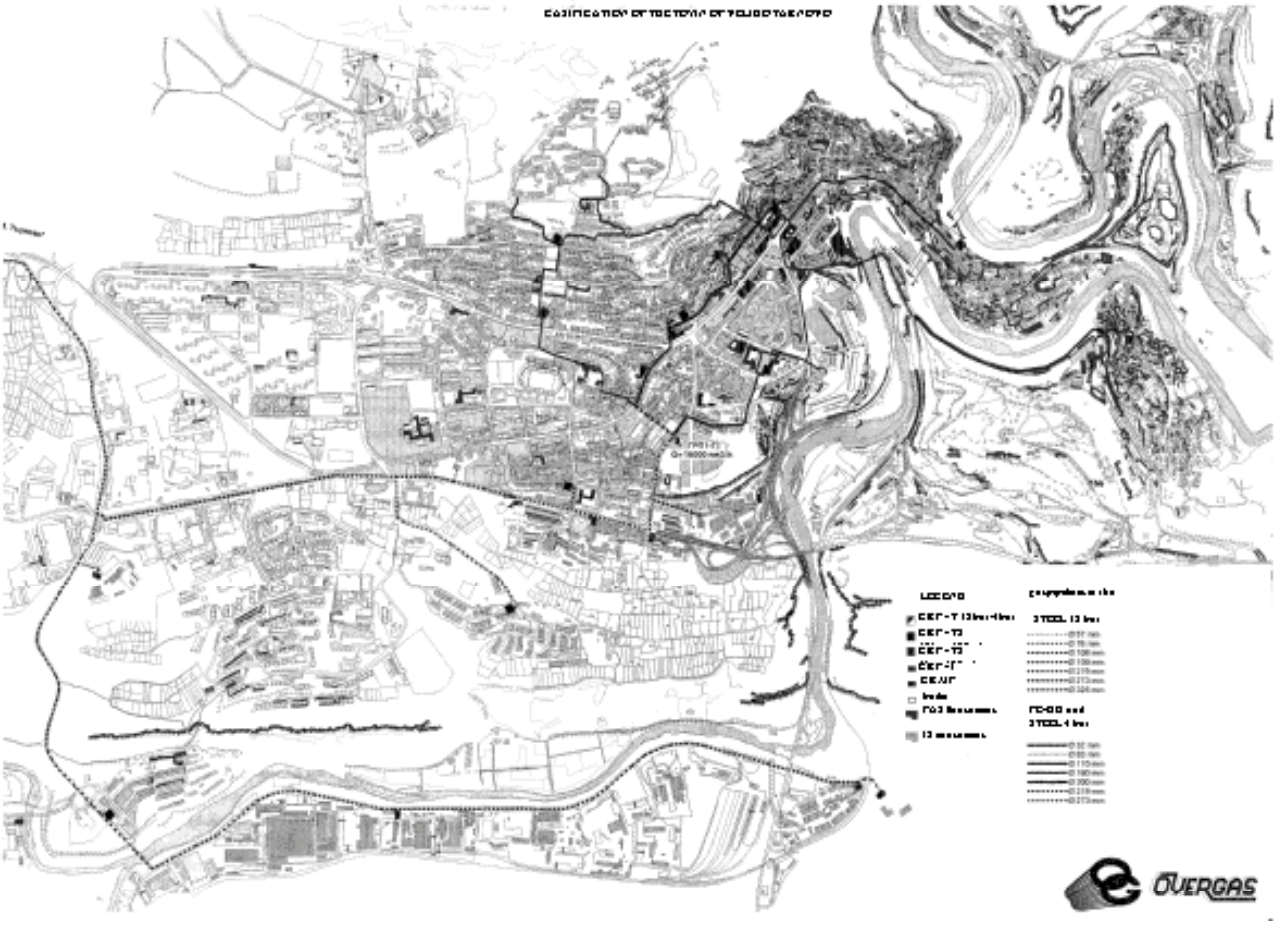
and legal persons:

- the village of Ledenika – Veliko Tarnovo Municipality
- the village of Beliakovets - Veliko Tarnovo Municipality
- Veliko Tarnovo Municipality

The track of the main pipeline connection from the Republican Gas Transportation Network (Northern Semi-ring) for the area of Gabrovo and Veliko Tarnovo, as well as the site of the AGRS (Automated Gas Regulation Section) – Veliko Tarnovo Platform are covered by another project called Gas Main Pipeline for the V. Tarnovo and Gabrovo Regions. A Plan for the EIS has been developed, the Area Environmental Control and Water Department in V. Tarnovo No. 139/1996 has issued a decision, the validity of which has been extended by letter No. 924/22.01.1998. A Committee has selected the site of AGRS – Veliko Tarnovo on the land of the village of Ledenika, evidenced by Protocol dated 19.05.1995 pursuant to Order No. 373/15.05.1995 issued by the Mayer of Veliko Tarnovo.

1.3. Location – map or scheme and description of the area

The project covers the whole area of the town of Veliko Tarnovo, located in the valley of the Yantra River in the Central Northern Bulgaria. The town of Veliko Tarnovo is very important cultural, historical and administrative center. The relief is undulating-flat, 210 meters above-sea level. The gas supply system of Veliko Tarnovo is supplied from the Northern Semi-Ring of the Republican Gas Transportation Network via gas connection and AGRS, being about 3.0 km west from the town on the land of the village of Ledenika. The track of the Distribution Gas Pipeline from AGRS to the regulated area of Veliko Tarnovo is located on municipal and private farmland and forests agricultural lands of the villages of Ledenika and Beliakovetz and the town of Veliko Tarnovo (pt. 1.2). The remaining part of the Distribution Gas Pipeline to GRP-T and the adjacent equipment, the Town and Town Section distribution network and the adjacent equipment are fitted underground along the street network of Veliko Tanovo covering any potential consumers.


OVERGAS

1.4. Legal and institutional framework

The EIS has been developed at the request of the Investor in full compliance with the requirements under Art. 2 (1), pt. 4 of Ordinance No. 4 of the EIA (7.07.1998).

The Design relates to a project covered by Section 3. Energy Sector, item 3.3 – pipeline transportation of gas and fluids and technical maintenance of oil and gas pipelines with length above 1 km as per Appendices 1 and 2 to Art. 20, para. 1, pt. 1 of the Law on Environment and Waters (LEW) (published in State Gazette, No.86, amendment in No. 90 of 1991; amendment and addenda in No. 100 of 1992, No. 31 and No. 63 of 1995, amendments in No. 13 and No. 85 of 1997).

A Preliminary EIS has been developed in accordance with the provisions of Art. 9(1), pt. 1 of Ordinance No. 4 on the EIA (7.07.1998).

1.5. Information supply

1.Gasification of the town of Veliko Tarnovo project, Feasibility Study Phase, Overgas OOD, June 1998.

2.Climatic References for the PR of Bulgaria, vol. 1,2, 3 and 4, publication of BAN-NIMH, 1983-1990.

3.Geomorphology of Bulgaria, D. Kanev, 1989, "Kliment Ohridski" publishers.

4.Chronological Atlas of Medicamentous Plants in Bulgaria, Prof. M. Drinov Publishers, 1995.

5.Hydrological Reference Book of Rivers in Bulgaria, v. II-V; NIMH-BAN, 1981-1984.

6.Annual Book about the Environmental Conditions of the Republic of Bulgaria (Green Book), Sofia, 1992.

7.The State of Environment in the Republic of Bulgaria, Annual Bulletin 1996. NCOSUR, Sofia, 1997.

8.Quarterly bulletins about the state and the environment, NCOSUR, Sofia, 1996-1998.

9.Penkov, M., Land Reclamation Soil Science, Tehnika, Sofia, 1986.

10.Georgiev G. National Parks and Reserves in Bulgaria, Prosveta, 1993.

11.Petkov, P., Alichkov, D, Gas Supply, UASG Base Publishers, 1997.

12.Reference Book on existing methods for the evaluation and prognostication of environmental effects. MEW, 1997

13.Information on the situation of the atmospheric air in Veliko Tarnovo 1997-1998, provided by DIEW – Veliko Tarnovo

14.References for registered diseases by classes, for 1997, by the Veliko Tarnovo Health Center.

15.Information from the Municipality of Veliko Tarnovo

16.Minutes for the selection of tracks and sites for the equipment – No. 1 17. Preliminary EIS on the Gas Main Pipeline for the Veliko Tarnovo and Gabrovo Regions Project, Stroycomplekt-PEK Veliko Tarnovo, 1996.

17.Own Archives of the CONTROL P EOOD Company.

2. PROJECT ANNOTATION

This project has been developed by OVERGAS OOD, Sofia, on the grounds of the technical assignment provided by the Investor - OVERGAS INC. AD of 1998, and includes:

- Distribution Gas Pipeline (DGL– 12 bar) from AGRS to GRP-T in the Central Town Part and user gasification in the Industrial Zones, incl. Arbanasi and Dalga Luka, incl. DGP6-TS (Trudov Front Town Section), DGP10-TS (Buzludzha Town Section – Zone C) and DGP11-K (Tcholakovtsi);
- Town Distribution Network (4 bar) and user gasification in the Town Section, incl. 7 GRP-TS;

- Town Section Distribution Network (100 bar) and user gasification in the RS (residential) part of the town of Veliko Tarnovo.

The project design is in full compliance with the requirements of: Ordinance No. 2 for Fire and Civil Engineering-and-Technical Standards, Ordinance No. 21/1990 for the construction and safe operation of gas equipment and installations, Ordinance No. 3/20.02.1995 (State Gazette No. 24/1995) on designing gas supply systems for residential areas and gas installations in buildings using natural gas and the legal acts stipulating the requirements for gas supply systems and installations - for all issues unsettled by the norms covered by item 1 of Ordinance No. 3

2.1. Characteristics of the technological processes

General technological flow chart of the gas supply systems

Every gas supply system represents a complex set of gas pipelines and equipment with the following basic elements:

- Source of natural gas – gas main pipeline;
- Gas transportation connections along the gas main pipelines, the gas regulation and gas metering stations supplying gas to the whole gas supply system;
- Industrial, town and town section gas distribution networks of high, medium and low pressure and their appurtenant pieces of equipment;
- Gas regulation and gas metering terminal points supplying gas to the gas distribution networks;
- Internal gas pipeline installations and combustion equipment;
- Technological communication connections.

General Technological Processes in the Gas Supply Systems

The technological processes in the gas supply systems - industrial and for the urban area, are the following:

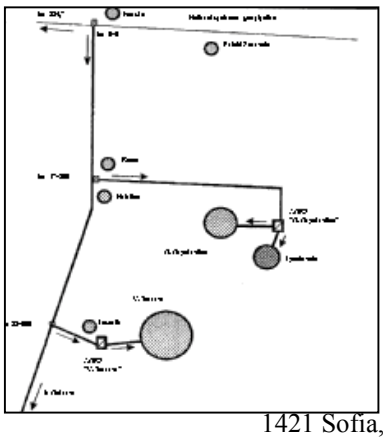
- Natural gas transportation by means of surface and underground gas pipelines, adjustment of pressure and its maintenance (increasing or reducing it);
- Scrubbing the natural gas from mechanical impurities;
- Odouring of natural gas for public services;
- Natural gas transmission to consumers;
- Metering of natural gas temperature and its debit;

All technological processes are monitored and controlled automatically. They are carried out in an underground laid, closed, tubular gas supply network. The basic technological processes are not a source of environmental hazardous emissions.

While gas appliances and equipment are not part of the consumer gas-supplying network, they are treated as output. They are used in the technological process of gas combustion with waste emissions, which interact with the environmental components.

Technological flow chart of the gas supply chart of the town of Veliko Tarnovo

In the process of the development of the flow chart for the gasification of the town of Veliko Tarnovo, multiple variants have been examined and compared to select the one having the best technical and economic characteristics. In the EIS, the approved alternative for the Gasification of the town of Veliko Tarnovo was examined and analyzed (in accordance with the Feasibility Study), the total flow chart of which comprises the following basic elements:



1. Initial Section - natural gas supplies from the Northern Semi-Ring of the Republican Gas Transportation Network to the town of Veliko Tarnovo by Gas Connection (GC) (P = 5.5 MPa = 55 bar), supplying gas to AGRS V. Tarnovo – (Preliminary REEA on the Gas Main Pipeline for the areas of Gabrovo and Veliko Tarnovo,

Stroykomplekt – PEK Veliko Tarnovo, 1996

2. AGRS (Automatic gas regulation station) - No. 1

The natural gas is supplied to the users at a specific pressure depending on the conditions of its utilization. By the AGRS, reduction of pressure from 55 to 12 bars is effected, as well as the maintenance of this level, regardless of its consumption and pressure fluctuations, before and after the AGRS. In order to achieve safe gas supply (with no interruptions), the AGRS includes several regulation lines and a bypass connection. Simultaneously with the pressure reduction, in AGRS gas scrubbing is effected from mechanical impurities, and the input and output pressure and temperature metering occurs, the consumption is metered and protection of the gas transporting network is made from any pressure increase or decrease. All AGRS processes are automated. The gas supply to Veliko Tarnovo will be done through 50000 nm^3/h capacity AGRS, which shall be built on a platform on the municipally owned land of the Ledenika village, about 2.4 km west of the town. The technological flow chart of AGRS with the said parameters is shown in Fig. 2.

3.GRP-T (Gas Regulation Points) – Town – 1 psc. (12/4 bar)

Town GRPs (GRP-T) reduce the natural gas pressure supplied by AGRS from 12 bar to 4 bar in the town distribution network. GRPs purify, odour and measure gas consumption for residential needs. The structure of the GRPs is analogous to AGRS. GRPs have main and back-up regulation lines and a measuring bypass line.

According to the authentic variant the gas supply system of Veliko Tarnovo comprises 1 GRP-T, which technological chart is shown on Fig. 2. GRP-T has a debit capacity of 16000 nm^3/h and is located in the Central Town Part on a green grass area east of SPTU – Secondary School for Construction. GRP-T supplies all consumers in the Central Town Part (without central heating) directly and via GRP-TS. The residential areas: Kartala, Assenov, Trapezitsa and Varusha are supplied from gas pipeline connections and GRP-TS. In order to meet the needs of Veliko Tarnovo there will be 4 GRP-TS - 2000 nm^3/h capacity, 2 GRP-TS - 1000 nm^3/h capacity and 1 GRP TS - 400 nm^3/h capacity. Each GRP-T will be mounted on the surface into steel cabinets 3,8x2,4m, 2,0 m on concrete foundations. All steel cabinets are equipped with ventilation plugs and are put 3 m above ground. The electrical board and odour installation (if appropriate) are mounted in separate steel cabinets, which have ground connection and thunderbolt protection. The corrosion protection is made by means of painting and lacquer coating.

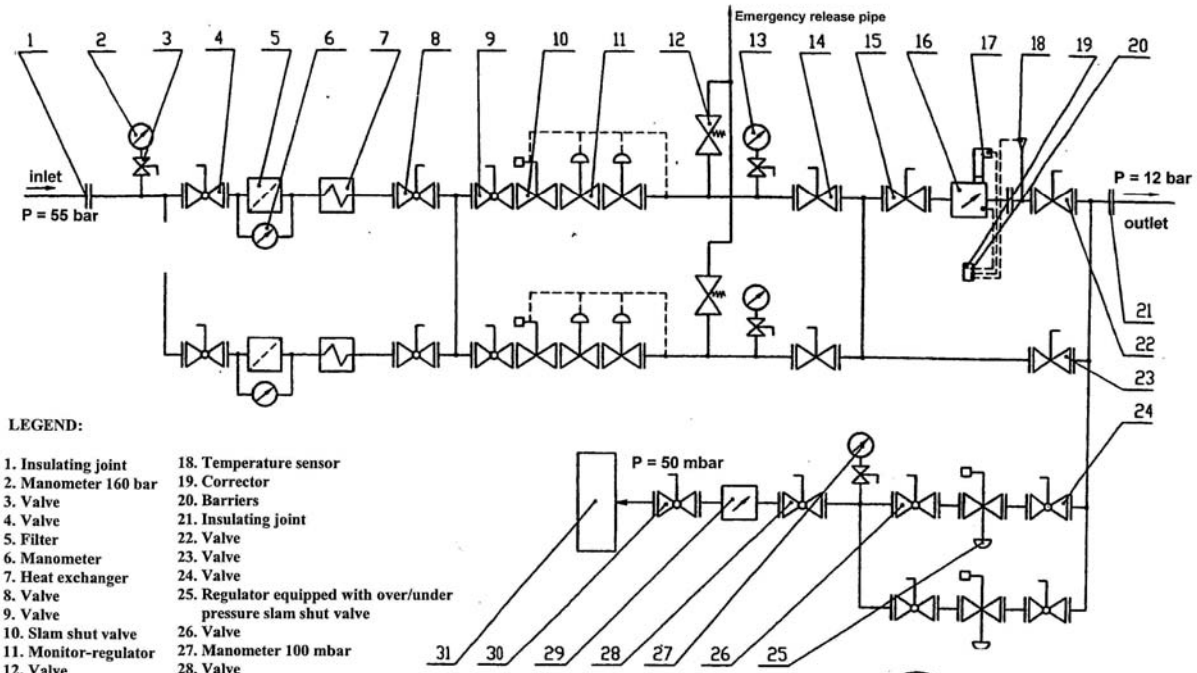
4. GRP-TS (Gas Regulation Points) – Town Section – 7 psc. (4 bar/ 100mbar) and 3 pcs. (12 bar/100mbar)

Seven Town Section GRPs reduce the natural gas pressure supplied by GRS-T from 12 bar to 100 mbar in the town distribution network. The other 3 GRP-TS have 12 bar/100 mbar regulation lines. In these points gas scrubbing also occurs. In order to avoid any discontinuation of the gas supply, 2 separate regulation lines are envisaged in the GPR-TS. GRP-TS does not measure gas consumption. According to the authentic variant in the gas supply network of Veliko Tarnovo envisages construction of 10 GRP-TS. Four of them, each having 2000 nm^3/h capacity, will service the Town Sections (GRP1-TS, GRP2-TS, GRP4-TS, GRP5-TS), 3 with 1000 nm^3/h capacity (GRP3-TS, GRP7-TS, GRP11-TS) and GRP8-TS with 400 nm3/h capacities. They shall be mounted on the surface in steel cabinets on concrete foundations, which are equipped with ventilation plugs, thunderbolt protection and grounding connection.

5.GRMP (Gas regulation and metering points)

In the sections of the gas supply network of high, medium and low pressure, wherein the respective torch is the final component of the arm, a GRMP is fitted the objective of which is to reduce the pressure and meter the gas consumption for commercial purposes. A basic element of these points is the gas consumption corrector. It is designed for converting in

AGRS TECHNOLOGICAL SCHEME

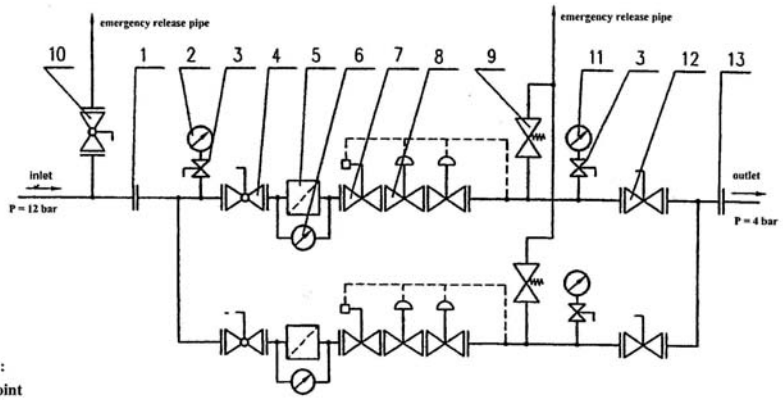


LEGEND:

1. Insulating joint
2. Manometer 160 bar
3. Valve
4. Valve
5. Filter
6. Manometer
7. Heat exchanger
8. Valve
9. Valve
10. Slam shut valve
11. Monitor-regulator
12. Valve
13. Manometer 16 bar
14. Valve
15. Valve
16. Gas meter
18. Temperature sensor
19. Corrector
20. Barriers
21. Insulating joint
22. Valve
23. Valve
24. Valve
25. Regulator equipped with over/under pressure slam shut valve
26. Valve
27. Manometer 100 mbar
28. Valve
29. Gas meter
31. Boiler

Fig. 1

GAS REGULATION POINT (GRP) - SCHEME



LEGEND:

1. Insulating joint
2. Manometer
3. Valve
4. Valve
5. Filter
6. Manometer
7. Slam shut valve
8. Monitor-regulator
9. Valve
10. Valve
11. Manometer 10 bar
12. Valve
13. Insulating joint

Fig.2

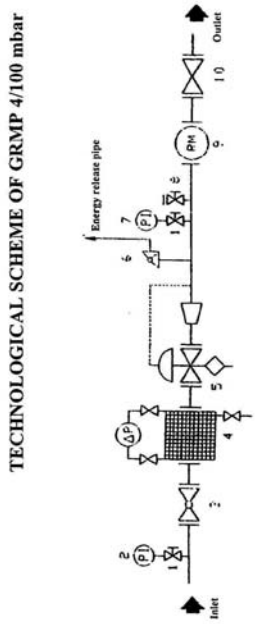

TECHNOLOGICAL SCHEME OF GRMP 4/100 mbar
Energy release pipe
Inlet
Outlet
LEGEND:
1. Valve
2. Manometer 0-16 bar
3. Valve
4. Filter
5. Regulator equipped with over/under pressure slam shut valve
6. Safety relief valve
7. Manometer 0-250 mbar
8. Valve
9. Gas meter
10. Valve

Fig. 4

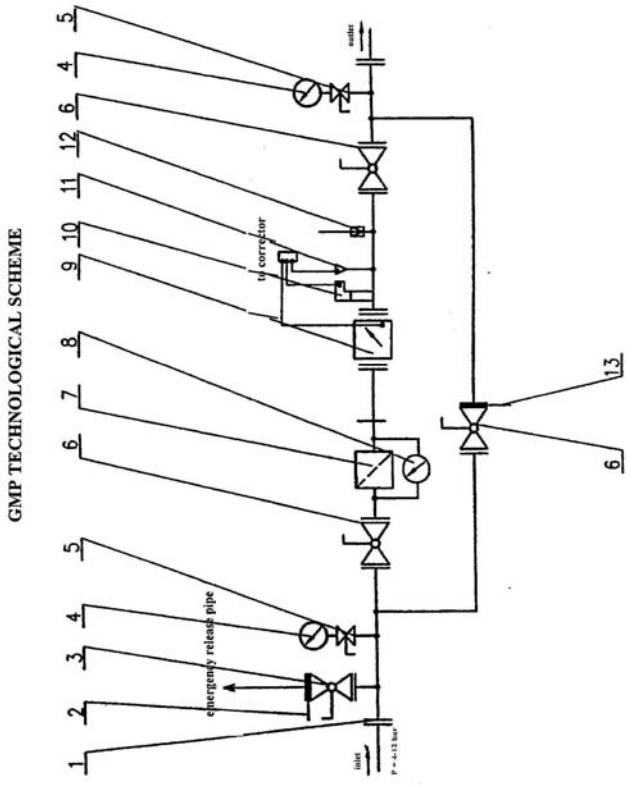

GMP TECHNOLOGICAL SCHEME
energy release pipe
inlet
outlet
LEGEND:
1. Insulating joint
2. Plug
3. Valve
4. Manometer
5. Valve
6. Valve
7. Filter
8. Manometer
9. Gas meter
11. Pressure sensor
11. Temperature sensor
12. Temperature meter
13. Plug

Fig. 3

measurements, by means of a flow meter, the volume consumption of the gas under different conditions to standard units.

The number of GRMP depends on the number of industrial and public- administrative users, which are to be connected to the network. The number of GRMP for the industrial enterprises of outlet pressure of 12 bar in Veliko Tarnovo is 16 used for 16 industrial enterprises and ORB Dr. St. Cherkezov. The PAS users, supplied from the 4 bar gas supply network having over 100 nm^3/h capacity are equipped with 4/0,1 bar GRMPs, which number depends on the position of the boiler rooms and the modes of operation, approximately No. 19.

The technological flow chart of GRMP is shown in Fig. 4. They are assembled on the surface in the territory of the users, in steel cabinets on concrete foundations, and are equipped with ventilation plugs, thunderbolt protection and grounding connection.

6. SCU (Stop-cock units)

SCUs are installed at the end of every arm of the gas pipeline connection, before and after AGRS, GRP and GRGMP, to distribute the gas flow. They are equipped with pipe couplings for blowing and emptying the gas pipelines. In the urban areas, steel cabinets are mounted on the surface and underground, which are grounding-connected. The corrosion protection is made by means of painting and lacquer coating.

7. VP (Ventilation Plugs)

They ar e used for emptying the gas pipelines and their ventilation. They are mounted onto a concrete site to the surface equipment and the protection casings when crossing obstacles.

8. PH (Protection Casings)

When gas pipelines pass under railway lines and roads they are mounted in protection steel casings of diameters min 200 mm larger than the diameter of the gas line. When crossing a railway line, the depth of laying should be no less than 2 m from the base of the rail to the top of the casing, and for roads this shall be no less than 1.4 m.

9. Gas distribution network

The gas distribution networks secure the constant supply of natural gas to the user at safe operation, reliability and easy usage. In accordance with the authentic variant of the Design, 3 degrees of pressure regulation in the gas transportation network are specified.

- Gas distribution pipeline - 12 bar;
- Town distribution network - 100 mbar;
- Town section distribution network – 4 bar and 100 mbar.

9.1 <u>Sub-project: Gas Distribution pipeline from AGRS to GRP-1 Town Section, GRP2-Town Section, GRP3-Town Section and gas pipeline connection to consumers in the Industrial Zone</u>

The main designation of the 12 bar gas distribution pipeline (GDP) is to supply natural gas to GRP-T and users in the industrial zones of Veliko Tarnovo. GDP starts southward from TS1 (Town Section) in the area of AGRS, continues westwards, parallel to the road that is envisaged to divide the land in the plan (now a cart road to the Ledenika village) located in the secured area of AGRS.

Then it reaches GDP-4 Sofia – Varna (Ist category) GDP and continues northwest near the West Ring Road. Before reaching the West Ring Road the track of the pipeline passes through GDP-4 wrapped in steel protection casing and crosses the regulated territory of Veliko Tarnovo. This section of the GDP is 3100 m long and has been approved by a Committee with Protocol dated 12.06.1998 pursuant to art. 29 of the Ordinance for the implementation of the Law for preservation of agricultural lands (OILPAL) towards determination, coordination and approval of roadbeds of linear objects and Order No. 416/5.06.1998 of the Mayor of Veliko Tarnovo. Within the regulated territory the GDP continues southward from San Stefano Street to G. Gabrovski Street and divides into two

arms (SCU2): the northern arm continues eastward along N. Gabrovski Street and supplies natural gas to Zone C of Buzludzha Town Section, the Central Town Section (the areas of the Western Region, the Central town section, Kartala and Varusha, which do not have central heating), Trudov Front, Industrial Zone Arbanasi, Trapezitsa and Asenov. This arm ends in the area of GRP-T located in the park west of IZ Arbanasi across SPTU – Secondary School for Construction. The southern arm continues south after N. Gabrovski Street along San Stefano Street and supplies natural gas to Tcholakovtsi TS and all consumers in IZ Dalga Luka. The total length of GDP (12 bar) is 14943m, of which: ∅325mm – 4889m; ∅273/6mm – 1534m; ∅216/6mm – 1582m; ∅159/4,5mm – 3379m; ∅108/4mm – 1490m; ∅76/4mm – 1150m and ∅57/3,5mm – 919m. The GDP track avoids the places having the largest number of underground communications, determined on the basis of the underground cadastre and street with congested traffic.

The GDP section starting from AGRS to the regulated territory of Veliko Tarnovo of ∅325mm and length of near 3100 m passes through farmlands on the territory of Ledenika and Beliakovets villages and the town of Veliko Tarnovo – Veliko Tarnovo Municipality (pt. 1.2). The remaining section of the GDP and GC are within the regulated territory of the town.

Gas pipeline connections to consumers, 12 bar
Northern arm - from SCU2 to GRP-T

- Cholakovtsi TS – 1300nm^3/h; L=811m; ∅76/4mm; P=12 bar;
- Regional Hospital Dr. St. Cherkezov – 1500nm^3/h; L=52m; ∅76/4mm; P=12 bar;
- GRP6-TS – 1300nm^3/h; L=110m; ∅76/4mm; P=12 bar;
- Pobeda VT AD – 1100nm^3/h; Laktima EOOD - 1050nm^3/h; L=18m; ∅76/4mm; P=12 bar; internal GC near DGP – Pobeda L=135m and bear DGP – Laktima L=167m;
- Momina Krepost AD – 280nm^3/h; L=27m; ∅57/3,5mm; P=12 bar;
- Velikotarnovsko Pivo AD – 3000nm^3/h; L=210+8m; ∅108/4mm; P=12 bar;
- Arbanasi EAD – 700nm^3/h; L=275+84m; ∅57/3,5mm; P=12 bar;
- GRP-T – 16000nm^3/h; L=22m; ∅273/6mm; P=12 bar;

Southern arm – from SCU2 to SCU15

- Toplofikacia VT EOD – HQ -15000nm^3/h; L=105m; ∅325mm; P=12 bar;
- CTM AD - 700nm^3/h; L=309+165m; ∅57/3,5mm; P=12 bar;
- GRP11-TS – 1000nm^3/h; L=28m; ∅57/3,5mm; P=12 bar;
- Bitova Electronika EAD – 800nm^3/h; L=121m; ∅57/3,5mm; P=12 bar;
- Darvoprerabovane VT AD – 2300nm^3/h; L=17+49m; ∅76/4mm; P=12 bar;
- MCD EOOD - 700nm^3/h; L=75m; ∅57/3,5mm; P=12 bar;
- Vinprom AD - 600nm^3/h; L=80m; ∅57/3,5mm; P=12 bar;
- VRZ Ivailo - 1500nm^3/h; L=124m; ∅76/4mm; P=12 bar;
- Zarneni Hrani EAD - 700nm^3/h; Hlebopoizvodstvo I sladkarstvo EOOD - 650nm^3/h L=108m; ∅76/4mm; P=12 bar;

To the gas pipeline conection to the industrial users, Stop cocks and GRMP are fitted with output pressure of 12 bar for the gas pressure regulation and metering the gas consumption for commercial purposes, fitted in the territory of the user.

The GDL and the 12 bar gas line connections are made of seamless steel pipes, BSS 6007-80 of St.20 material based on BSS 5785-83 and of spiral-seam pipes, BSS 10208-72 of material Bst3 based on BSS 2592-71. The protection casings for the gas pipeline are made of spiral-seam steel pipes based on BSS 14479-78 of material Bst3cn based on BSS 2592-71. Hot drawn elbows of KGI / 90 type, based on Section Standard (SS) 1062645-86, smooth elbows 30-90 degrees based on SS 1962929 made of St20 and cold-bent elbows of seamless and spiral-seam tubes based on BSS 102-2. DGL and GS are laid underground, ensuring minimum

cover depending on the terrain across which they run (in accordance with Ordinance No. 21/1990). The network has been tested for seismic stability.

Further to Art. 4, para. 1 of Ordinance No. 4/20.02.1995 For Control and Acceptance of Gas Supply Systems in Town Areas and Gas Installations in Building Operating on Natural Gas, in the supply of pipes and fittings, they should be accompanied by a certificate of the manufacturing factory, with guaranteed chemical composition and mechanical properties.

Welding and control of welding connections

The assembly of the steel pipes and fittings shall be made in a trench by means of electric arc welding, in accordance with the provisions of Ordinance No. 21/1990 and Standard Technological Instruction (TTI-01-83) of the Montagi State Economic Corporation. The welding connection control using non-destructive methods shall be made in accordance with the provisions of Ordinance No. 0-31 for operation with radiation defectoscopes, and Ordinance No. 0-35 for operation with radioactive substances and other sources of ionization radiation.

Corrosion protection

The steel pipelines in case of underground assembly shall be protected from soil corrosion and stray currents, according to BSS 15704-83 and BSS 15705-83.

Passive protection – insulation complex of adhesive primer 1019 insulation band Poliken 980-25 - black; and protection band Poliken 955-20 - white.

Active protection – electrochemical protection using cathode station

The gas pipelines on the ground, before the Boiler Rooms, and the open ground parts of the equipment shall be covered with a primer and painted with two coats of yellow auto enamel lacquer.

9.2. Town Gas Distribution Network (4 bar)

The town gas distribution network (TGDN) with average pressure (AP 4 bar) is connected and covers the town section of Veliko Tarnovo, which does not have central heating. It starts from GRP-T, draws a closed contour of 3 circles and through a common boiler supplies natural gas to 7 GRP-TS (4/0, 1 bar), all public, administrative and community buildings (44) and residential buildings. The track of the distribution network is determined on the basis of the specified consumption and the location of the two GRP-T. It objective is the connection of the users in a closed ring, using the shortest path, having the shortest possible connections to them and avoids the places having the largest number of underground communications.

The whole TGDN is 14617 m long. It is made from polyethylene high density tubes PE-HD under DIN 13395-97 – ∅32mm – 480m; ∅63/5,8mm – 5312m; ∅110/10mm – 3210m; ∅160/14,6mm – 3836m; ∅200/18,2mm – 1551m. It includes two steel pipeline sections ∅273mm – 22m and ∅219mm – 204m laid underground, ensuring their minimum covering, depending on the type of the terrain across which they run (in accordance with ordinance No. 21/1990 - min 0.8 m in greenery areas and min 1.0 m under road surfacing. When the gas pipelines cross other engineering equipment, the regulated clear distances between them (both horizontal and vertical) shall be observed.

The network has been tested for seismic stability.

In the AP network, in all distribution points stopcocks are fitted to all users connected in the network. Stopcocks are also installed to each user of the AP network. All fittings: 3-way pieces, elbows, reducing fittings, unions, etc. are PE-HD made. The connection between the individual parts is done through butt welding with a hot element or by means of pipe unions and fittings with a built-in resistance conductor, mounted on their internal side and connected to the contact plug.

According to the provisions of Art. 4, para. 1 of Ordinance No. 4/20.02.1995 "For the Control and Acceptance of Gas Supply Systems in Town Areas and Gas Installations Operating on

Natural Gas", in the supply of pipes and fittings, they should -be accompanied by a certificate by the manufacturer, with guaranteed chemical composition and mechanical properties.

The piping and fittings of PE-HD are corrosion-resistive and need no electrochemical protection.

Gas pipeline connections to the users (4 bar)

The configuration of GRM (4 bar) offers different technical options to supply gas to consumers: direct connection to the network via 4 bar SCUs antenna type or use of the 100mbar town section network. All consumers using local heating plants or boilers from PAS and RS will be connected to 4 bar network due to their many hourly consumption and close proximity to the network roadbed. The (4 bar) connections to the public, administrative and community buildings in the town zone are made from PE-HD pipelines with diameters measured to the maximum hourly consumption – ∅63 – 110 mm. The attachment of SCU to the distribution network is done through a connection component with a stopcock. The component ending with a torch is equipped with GDMP to control the gas pressure and register gas consumption for commercial purposes. The total number of GDMP (4bar/100mbar) is 19, each having 37-1100 nm^3/h debit capacity.

9.3. Town Section Gas Distribution Network (100 bar)

The Town Section Low Pressure (100 mbar) Distribution Network is connected, starting from the relevant GRP-TS and supplies the necessary quantity of gas to every user. It covers mainly PAS and RS. It is made from polyethylene high-density tubes - PE-HD under DIN 13395-97. In building the millibar network, the total length of the network is 33942m: Central Town Section – 28578m incl. ∅63/5,8mm – 19043m; ∅110/10mm – 4905m; ∅160/14,6mm – 4554m; ∅200/18,2mm – 76m; Zone C – 3104m, incl. ∅63/5,8mm – 1959m; ∅110/10mm – 892m; ∅160/14,6mm – 229m; ∅200/18,2mm – 24m; TS Cholakovtsi –2260m, incl. ∅63/5,8mm – 1102m; ∅110/10mm – 1115m; ∅160/14,6mm –43m. Where possible, the double use of medium-pressure network (4 bar) roadbeds is avoided.

Gas pipeline connection to residential consumers

In the residential and public buildings, the natural gas flows from the town distribution network of 100mbar pressure. The connections are made in several variants, depending on the positioning and the type of the user. They are made of PE-HD pipes, connected to the distribution network by a welding union. Each connection is put at 0,5 m away from the building and the internal installation is constructed out of steel or copper pipelines with PE coating. The LP network has no stopcocks and when needed the stopping is done by means of stopping bags. A stopcock shall be mandatory when the connection diameter is D>63 mm. For the neutralization of stresses in the piping outside the building due to soil subsidence, temperature fluctuations and earth layer movements, elastic compensators are provided, connecting the PE and metallic pipes. All the connections end by a gas metering board for measuring the gas consumption. The gas metering instruments are in accordance with BS 10809-73.

Internal gas pipeline installations and equipment

The internal gas line installations transport the natural gas inside the premises to the combustion equipment of the user, wherein the technological process of combustion occurs, related to the separation of exhaust gases. They are executed in accordance with individual designs for the individual user equipment, depending on the gas instruments used, and the architectural and building structures. They commence from the gas metering board and include horizontal and vertical pipe connection of copper or steel pipes with PE coating. They include a stopcock before each gas-fired instrument. The premises are equipped with vents and airing chimneys and the discharge of the natural gas combustion products. The Design offers 5 model type schemes of internal gas line installations, depending on the structural design and the gas equipment used:

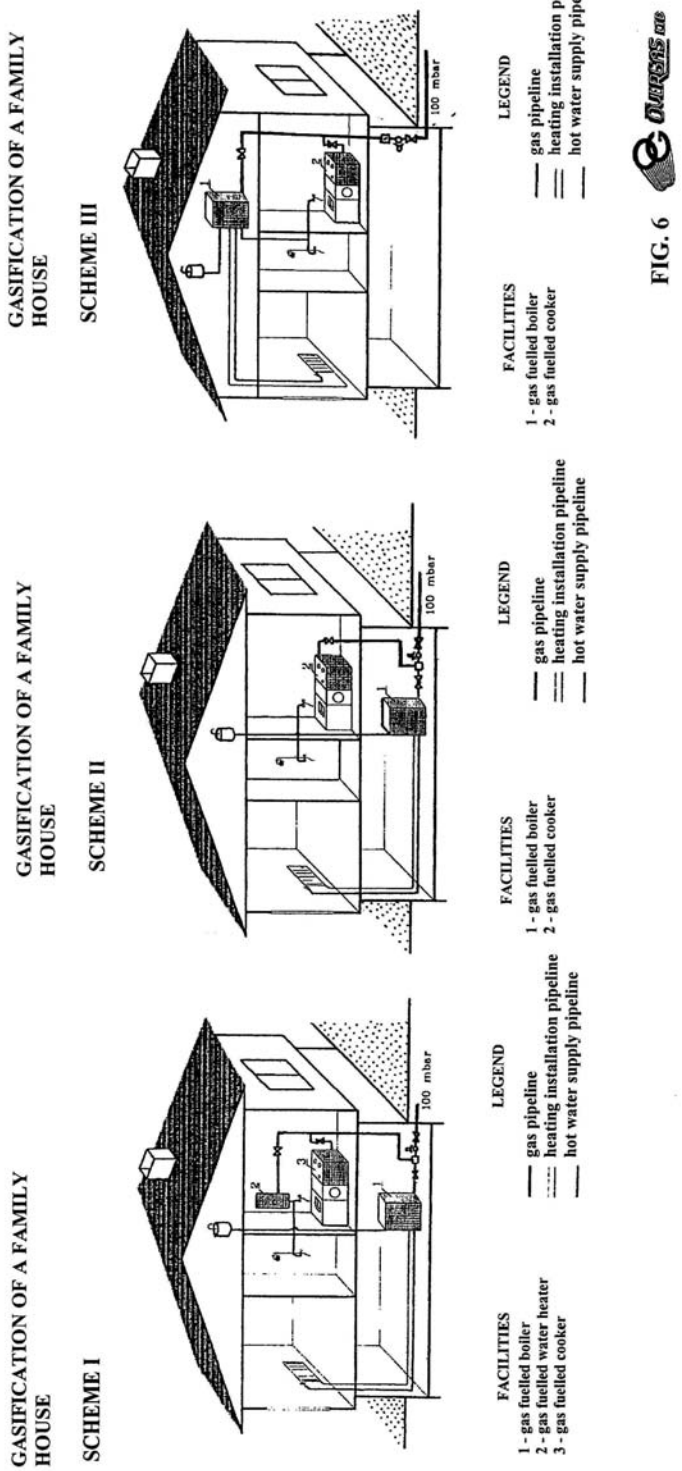

GASIFICATION OF A FAMILY HOUSE
SCHEME III
FACILITIES
1 - gas fuelled boiler
2 - gas fuelled cooker
LEGEND
gas pipeline
heating installation pipeline
hot water supply pipeline
100 mbar
GASIFICATION OF A FAMILY HOUSE
SCHEME II
FACILITIES
1 - gas fuelled boiler
2 - gas fuelled cooker
LEGEND
gas pipeline
heating installation pipeline
hot water supply pipeline
100 mbar
GASIFICATION OF A FAMILY HOUSE
SCHEME I
FACILITIES
1 - gas fuelled boiler
2 - gas fuelled water heater
3 - gas fuelled cooker
LEGEND
gas pipeline
heating installation pipeline
hot water supply pipeline
100 mbar

FIG. 6

GASIFICATION OF A MULTI-FLOOR BUILDING
SCHEME II
100 mbar
FACILITIES
1- Gas fuelled boiler on each floor, combined
2 - Gas fuelled cooker
LEGEND
gas pipeline
heating installation
pipelines
GASIFICATION OF A MULTI-FLOOR BUILDING
SCHEME I
100 mbar
FACILITIES
1 - Gas fuelled boiler for central heating
2 - Gas fuelled water heater
3 - Gas fuelled cooker
LEGEND
gas pipeline
heating installation
pipelines

FIG. 7

- family houses (Fig. 6) – **1st scheme** – gas heating boiler in the basement, gas water heater on each floor, gas cooker; **2nd scheme:** gas heating boiler combined

- with water heater fitted in the basement, and gas cooker; **3rd scheme -**gas heating boiler, combined with water heater, fitted in the under-the-roof space or on the story, and a cooking range;
- Multi-floor buildings (Fig. 7) - **1st scheme** – gas heating boiler in the basement, on the roof, or in the under-the-roof space. It is beneficial in case of changing the torch in the existing local boiler room and having an already built heating transportation network in the building. It is connected to the gas distribution network 4 bar over 400nm^3/h debit and 100 mbar below 400nm^3/h debit. The remaining gas devices are connected appliances to a separate low pressure gas circuit; **2nd scheme -** gas heating boiler, combined with water heater, mounted in the individual apartment, and a gas cooker, connected to a low pressure circuit.

When setting up gas connection for already existing boilers located in the basement it is compulsory to put three-round exchanging ventilation (mechanical and permanently operating) and emergency ventilation with eight-round air exchange. Individual gas heating devices and water heaters are often placed at close or semi-closed terraces and lodges.

The construction of ventilation air holes and chimneys for waste emissions is a compulsory requirement.

10. Electrical equipment, instrumentation and automation

These are designed for the automatic control of the technological processes in the gas distribution system and the prevention of emergency situations. It comprises an electrical supply and gas metering board (ESGMB); CF300T2 gas consumption corrector, metering lines, stabilitron units and sparkling protection to the corrector, configuration of the converter; lighting, thunderbolt protection and grounding installations.

11. Technological communication network

The management information system, which controls the gas supply network in Veliko Tarnovo has the following functions: pressure and temperature gas control, metering the gas consumption, transmitting operative information about any arising emergency modes. The system includes a dispatching point and sensors at specified points of the network, automatically connected by means of a local radio network. In the urban zone the ultra short wave radio stations, equipment for data transmission and relaying equipment shall be fitted.

2.2. Total required area (decares, farm land or forestry land, categories, stages of acquisition, nearness to protected territories)

The gas supply system of Veliko Tarnovo shall be laid completely underground along the street network of the town. It requires no special area, will not limit the street network and the equipment and installation of the underground cadastre, as it shall be laid down in accordance with the requirements of Ordinance No. 3/1995, observing all the required vertical and horizontal distances. Ground surface equipment shall be the AGRS, GRP-Town, GRP-TS and SCU, which will require some terrain for fitting in the neighborhood of the street network.

- AGRS – 1 platform 18x30 – 540 m^2 (Ledenika village – Veliko Tarnovo Municipality)
- External road to AGRS 150 m long – 1200 m^2 (Ledenika village – Veliko Tarnovo Municipality)
- SCU after AGRS – Veliko Tarnovo 2,0x3,0 - 6 m^2 (Ledenika village – Veliko Tarnovo Municipality)
- GRP-T – 1 platform 4,2x3,3 m – total of 14m^2 (Veliko Tarnovo)
- GRP-TS - 4 platforms 4,2x3,3 m – total of 140m^2 (Veliko Tarnovo)
- SCU-T (town) - 44 platforms 1,2x1,3 m – total of 69m^2 (Veliko Tarnovo)

- SCU-I (industrial) - 26 platforms 1,2x1,3 m – total of 41m^2 (Veliko Tarnovo)

The total area required for the above structures is 2010m^2. The required area for SCU before AGRS, AGRS platform and external road to AGRS with 1740 m^2 area are located on the land of Ledenika village – Veliko Tarnovo Municipality and are engaged under another project. The platform for the SCU before AGRS for the Gasification of the town of Veliko Tarnovo project 2,0x3,0 m - 6 m^2 (Ledenika village – Veliko Tarnovo Municipality) is located at Salamata area in pasture ground (mera) VII category. It must be expropriated under a procedure for changing the use of the farmland for non-agricultural purposes. It is municipally owned and its expropriation does not affect any individuals and legal persons. The platforms for the construction of GRP-T, GRP-TS, SCU-T and SCU-I are within the regulated territory of Veliko Tarnovo. The required area is municipally owned and its expropriation shall not affect the interests of physical and legal persons.

The GDP section from AGRS to the regulated area of the town of Veliko Tarnovo is 3100m long and is located on farmland (Attachment 1). Pursuant to Ordinance No. 1 Art. 56(1) and (2) the roadbed located on farmland is not subject to expropriation because the pipeline is placed at min. 0,8 m > 0,7 m depth. In such cases the agricultural use of the land is not changed, however, pursuant to Decree No. 38 (1977) the 10 m area stripes on both sides of the gas pipeline should be put under restrictions due to safety reasons. To this end the restricted area will be near 62 dca. According to the Attachment 1 the roadbed of the GDP passes through lots 288 and 170 (43,36m and 52,16m long, respectively), which belong to the DFG, however, as per the Protocol for the selection of the roadbed (Attachment 2) it does not affect any forests.

The area does not enter any protected natural reserves. There are no previously contaminated or highly inflammable areas along the roadbed of the GDP and the gas distribution network itself.

The GDP section from P1 to P30 is 3100 m long and has been determined by a Committee with Protocol dated 12.06.1998 on the ground of the OILPAL towards determination, coordination and approval of roadbeds of linear objects and Order No. 416/5.06.1998 of the Mayor of Veliko Tarnovo and coordinated with the UAIC (Urban Architecture And Infrastructure Committee) with The Decision No. 180/15.07.1998 – Protocol No. 14/15.07.1998

2.3. Basic raw and other materials; natural resources and energy sources (type, stocks and resources, annual consumptions)

The implementation of the Gasification of the town of Veliko Tarnovo project is not related to the use of natural raw materials and resources. The basic materials which are used for building the gas supply network are pipes of different diameters, fittings, etc., and standard equipment (AGRS, GRP, GRMP). The pipes are of two types:

- Steel - steel seamless, BSS 6007-80 of St.20 material based on BSS 5785-83, and of spiral seam pipes, based on BSS 10208-72 of Sst3 material, based on BSS 2592-71;
- PE-HD - polyethylene pipes, high density, based on BSS 8075 (BSS 13395-97).

The sole energy source, serving the technological processes in the gas supply system of Veliko Tarnovo is electric power. It is used by the electrical equipment, instruments and automation, as well as in the electrochemical protection, related to the safety and reliability of the system, described in pts. 9.1 and 10.

The main objective of the Gasification of the town of Veliko Tarnovo project is the transportation of natural gas from its source to the users. Natural gas is a natural resource, which is not produced in the Republic of Bulgaria.

According to the data provided by Overgas the natural gas obtained in Bulgaria accounts for only 1% of its consumption. Because of this after the construction of the Main Gas Pipeline Russia-Rumania-Bulgaria in 1974, the commencement of the gasification was laid in this country entirely by the importation of natural gas from Russia. A Main Gas Transportation Line was built with maximum pressure of 5.5 Pa, and a ring-type form, getting

across Northern and Southern Bulgaria, with connections for Turkey, Greece, Macedonia and Serbia. From the Main Gas Pipelines, by means of gas line connections and AGRS, the natural gas enters the gas distribution network to the users. Until now priority gasification has been made to industrial enterprises and energy projects, whilst the gasification of the urban areas is in its initial phase.

Physicochemical properties and toxicity of natural gas

The exemplary composition of natural gas used in Bulgaria is the following: methane (CH_4) – 98,52%; ethane (C_2H_6) – 0,42%; propane (C_3H_8) – 0%; H – butane (C_4H_{10}) – 0,05%; N – butane (C_4H_{10}) – 0.03%; nitrogen (N_2) – 0,95%; CO_2 – 0.03%; sulphur dioxide + merkaptani – 21 mg/nm^3; density – 0,677 kg/nm^3; cal – 7943 Kcal /nm^3; dew point – (-) 9°.

Quantities, reserves and resources of the natural gas

As the natural gas at this moment is entirely imported from Russia, its quantity, deposits and resources, used by the Republic of Bulgaria are directly related to the interstate agreements.

Natural gas source for the Gasification of the town of Veliko Tarnovo

The town of Veliko Tarnovo is located near the track of the main pipeline of the Northern Semi-Ring of the Republican Gas Supplying Network. Out of it, for the gas supply of Veliko Tarnovo, by a gas conducting connection (GC) 55 bar, it is envisaged to supply a common AGRS 55/12 bar with a capacity of 50 000 nm^3/h, fitted on a municipally-owned site on the territory of the Ledenika village.

Natural gas consumption in the gas supply system of Veliko Tarnovo

In accordance with the submitted designs, the natural gas consumption was determined during the Feasibility Study for the three types of users, different by nature: industrial, public-administrative and residential ones. The maximum hourly consumption (Qmax, nm^3/h) and the annual consumption (W, nm^3) have been determined, depending of the validity of each of the following cases:

- users having built their own heating boiler room fired by solid or liquid fuel
- users having no heating boiler room of their own, but having built-in inner heating transportation system, supplied by an external source;
- users having no heating boiler and internal heating transportation system built.

Considering the trends of development of the town of Veliko Tarnovo, the natural gas consumption has been determined as maximum hourly consumption (Qmaxh, nm^3/h), and annual consumption (W, nm^3), shown in Table 1.

Table 1. Forecast natural gas consumption in Veliko Tarnovo

№	User	Qmax, nm^3/h	W nm^3.10^6
1.	Industrial sector	31350	47.15
2.	Public and Administrative Sector (PAS)	5300	4.298
3.	Residential Sector (RS)	11977	30.725
4.	TOTAL	48627	82.2

2.4. Bondage to the technical infrastructure of the area (including accompanying activities and production)

The building of the project as a whole is not bound to the technical infrastructure of the area. Due to the requirements of Ordinance No. 21/1990, all civil engineering works shall be made by a licensed building organization and specialists. All raw and other materials shall be supplied by an external storage, which would not require any accompanying works and production. The civil works shall temporarily affect the street network, but it is due to

restoration. In the restoration works of the road facing and the affected greenery area, local civil engineering companies shall be employed.

During the operation of the project, the carrying out of the technological processes shall be directly related to the electrical and communication networks in the town of Veliko Tarnovo. As the Gas Supply Network of Veliko Tarnovo shall supply energy resource to industry users, PAS and RS, it would become part of the energy infrastructure of the area and the thus resulting relations with the remaining elements of the technical infrastructure.

2.5. Social effect (manpower employment, social needs, social benefits), risky workplaces, provision of healthy and safe labors conditions

Manpower employment

A specialised group, in accordance with the provisions of Ordinance No. 21, is making the construction of the gas supply system in Veliko Tarnovo. In agreement with the social policy of the Investor the restoration work of the road surfacing shall be entrusted to local building companies.

The Gas Company shall ensure the safe and normal functioning of the system in putting the project in operation. A team of about 15 specialists shall be formed for carrying out its activities.

Public need for the project

The aim of this project is, by means of building a comprehensive system of gas supply of the town of Veliko Tarnovo, to offer an alternative energy carrier to the so-far used ones in the industrial enterprises, the public and administrative buildings and in the residential sector (not included in the central heating). The possibilities and the advantages of natural gas, expressed in the opportunities for the introduction of new ecologically clean technologies, direct combustion in the user equipment, personal regulation and metering of consumption, its low costs as an energy carrier, determine it as a competitive energy carrier, meeting the desire for sustainable environmental development and reproduction.

The need for the implementation of this project has been dictated from the absence of a heating and gas-supplying network in Veliko Tarnovo. The use of energy carriers, such as crude and light oils and coal, both in Toplofikacia VT (CHP and RHP) and industry and in the public and communal service sector conceals a potential risk of the deterioration of the health and sanitation conditions and the pollution of the atmospheric air, the waters and soils with anthropogenous products.

There are opportunities for the materialization of the project - in the industrial zone and the residential area of Veliko Tarnovo, subject of this Study, as well as the necessary energy, ecological, technical and town-building prerequisites for the effective gas supply of the potential users.

Social benefits

The town of Veliko Tarnovo is a community center, having 85,485 inhabitants in 29046 households. There is a larger industrial zone in the southern part of the town (IZ Dalga Luka) and a smaller one located northwest of the southern zone (IZ Arbanasi). The total number of the industrial enterprises is 12 of different industrial sectors. They include Central Heating Plant (CHP) in the West Town Area and Regional Heating Plant (RHP) in the Central Town area of Toplofikacia VT AD. They are the main air polluters with injurious emissions. The public administrative and communal services building are 45. All of them have local boiler rooms. The residential sector includes 2649 one-family two floor buildings, 1376 3-5-floor apartment blocks, and 633 apartment blocks, higher than 5 floors (5 to 8 floors), located in 9 major town sections: K. Ficheto, Buzludzha, Zapaden Raion, Kartala, Tcholakovtsi, Central Town part (CTP), Varusha, Asenov and St. Gora. The housing is in good conditions. The old town, St. Gora and Asenov are surrounded by the hills: St. Gora, Tzarevetz, Trapezitsa and Kartala, which has preconditioned their specific location along the narrow

Yantra River defile and their terrace-way of construction. The town has central water supply and refuse collection. The town of Veliko Tarnovo has partial central heating system. It is serviced by CHP Veliko Tarnovo for TS K. Ficheto and Buzludzha and by RHP for the CTP. 13666 apartments or 7904 residential buildings from the PAS and RS, having 22000 inhabitants (26% of the populations) are on central heating. The street network is over 80% asphalted or covered with other suitable surfacing. In town planning, the town shall develop on the basis of the now occupied area. The basic funds, related to the town social infrastructure are in the sphere of housing supply, education, health protection, culture, state and municipal administration, commercial network, public catering and communal services.

Veliko Tarnovo has its own University, Military School, 24 schools and educational facilities for children. Its educational network is well developed and meets the requirements of the population both in the town and the region.

The health sphere in the town of Veliko Tarnovo is divided in dispensary and polyclinic establishments and prophylactic medical institutions. The town has got a municipal hospital, polyclinic, stomatology. The existing infrastructure is adequate for satisfying the health necessities of the population.

The cultural monuments are located in the central urban area.

The town of Veliko Tarnovo is a center of a municipality. As such, it has all the necessary sections required for the normal functioning of the town and the municipality.

The network of commercial, public catering and services centers has been developing dynamically in accordance with market principles. The local government authorities impose restrictive measures with respect to the building, the ownership and the exploitation of these sites.

The availability of a competitive energy carrier such as natural gas is a prerequisite for improving the living standards of the population - independence in planning and consumption of energy resources, reducing the costs for heating and residential utilities, making lighter the labour for the maintenance of the households and having longer free time for the social life of the family.

Better conditions shall be formed for the development of the economic activities in the area of the town of Veliko Tarnovo.

The labor conditions of the staff, servicing the boiler room equipment in the industrial enterprises, the public and administrative sector and the residential sectors shall be improved.

Risky workplaces

The construction and the operation of the project are not related to any risky workplaces.

Provision of healthy and safe labour conditions

The control of the technological processes in the gas distribution system is automatic and is performed from the dispatching point.

2.6. Stages for the implementation of the project

It is envisaged that the implementation of the project shall be in one stage, in accordance with a Working Design for the organization of the building works of the Contractor Company, in agreement with the Investor.

2.7. Project costs

The Investor shall submit the value of the project costs to the competent authority separately from the EIS

3. ANALYSIS OF THE PRESENT STATE, PROGNOSTICATION AND ANALYSIS OF THE EXPECTED IMPACT ON THE ENVIRONMENTAL COMPONENTS WHICH ARE EXPECTED TO BE AFFECTED BY THE IMPLEMENTATION OF THE PROJECT

3.1. ATMOSPHERIC AIR

3.1.1. Brief characteristics and analysis of the climatic and meteorological factors, related to the concrete effect and quality of the atmospheric air.

The condition of the atmospheric air in populated districts depends on the morphological features and meteorological factors in the region, location, character and capacity of the pollution sources, and the degree of urbanization. The Gasification of the town of Veliko Tarnovo project covers the whole area of Veliko Tarnovo and the west suburban parts. The town of Veliko Tarnovo is situated in the River Yantra valley in the Central part of the Danube plain. The relief is hilly-flat, with average above sea level altitude of 210 m.

The climate of Veliko Tarnovo region belongs to the Middle climatic region of the Danube plain, included in the Temperate-continental sub-area of the European-continental climatic area.

Features of the atmospheric circulation

The cyclonic circulation (area of low atmospheric pressure) over Bulgaria is due to the Atlantic cyclones passing throughout the whole year (up to 10 overall) and to Mediterranean cyclones – predominantly during winter months (up to 18 overall). They have duration of 156 days. They make winters milder and increase the quantity and frequency of precipitation. The anti-cyclonic circulation (area of high atmospheric pressure) has duration of 209 days and is affected by the following groups of anti-cyclones: northwest group (16 overall per year); west and south-west groups (summer droughts); north-east group (arctic – causing the formation of local anti-cyclones and the lowest winter temperatures). This anti-cyclonic type of atmospheric circulation, characterized by an active air transfer, has a purifying effect – it refreshes the climate of Bulgaria, including Veliko Tarnovo.

Effect of the meteorological conditions on the atmospheric air pollution under urban conditions

The air quality is affected most by the following meteorological factors - thermal inversions and fogs, wind and precipitation. Since the main sources of pollutant emissions under urban conditions are low, a direct correlation between the content of ingredients in the air and the ground inversions has been identified. During inversion days the concentrations of SO_2, NOx and Pb increase up to two times. During foggy days the concentrations of NO_2, NO, SO_2, H_2S double, as compared to clear days. The concentration of oxidants, formaldehyde, phenol and dust increases to a smaller degree.

The dustiness is due primarily to the wind.

The precipitation has a distinctly purifying effect. It has been found out that the air is much clearer in rainy/snowy days, whereas that effect is stronger in winter and weaker in summer months. The snowfalls have a greater purifying capacity than the rainfalls.

As the diffusion of pollutants in the atmosphere is a direct function of the meteorological conditions in the region, the regime of the main meteorological elements (Fig. 8) has been reviewed, according to the perennial data for Hydro-Meteorological Station (HMS) – Veliko Tarnovo (above sea level altitude of 128 m).

1. Solar radiation

The quantity of direct radiation depends predominantly on the elevation of the sun, determining also the type of its daily and annual course. The maximum of solar radiation is at

noon and in June and July respectively. The intensity of direct solar radiation upon the horizontal surface of Bulgaria at noon varies from 0,24 kW/m in winter to 0,70 kW/m in summer. The total average annual sunshine for the reviewed region (according to data from HMS - Pavlikeni) is 2141 hours, the minimal – 1888 hours and the maximal – 2339 hours respectively. The maximum is during summer months (July – 308 hours), whereas the minimum – during winter months (December – 62 hours). The average number of the days without sunshine is 78, whereof 40 days are in winter months.

2. Air temperature

The average annual twenty-four-hour air temperature in the region is 11,5°C. During the coldest winter month – January, the average monthly temperature is around (-2,3°C). The average monthly maximal temperature is 17,5°C, whereas the minimal is (-4,7°C). The average maximal temperature is 29,4°C (July). The absolute maximal temperature is 41,1°C, whereas the minimal is (-28,1°C). The average monthly amplitude of the air temperature is 11°C (7,8 – 13,6).

The average date of the last spring is 1 April (7.03 – 25.04), whereas that of the first autumn is 3 November (30.09 – 3.11), therefore the average duration of the vegetation period of plants is 215 days.

The duration of the heating period is 185 days. The estimated temperature of heating is minus 20°C, of ventilation minus 7°C, a period of tav < 0°C – 56 days, den degrees – 2800.

3. Air humidity

The atmospheric humectation can be generally characterized by the relative humidity. The average air humidity deficit is 6 mb (millibars), with maximal values during summer months (August – 12,3 mb) and minimal during winter months (January – 1,3 mb). The relative average monthly air humidity is 72% (62 – 81%), reaching its maximum in winter months (January-December – 81%) and minimum in August – 62%. The high air humidity in winter months contributes to the retention of pollutants in the ground air layer.

4. Precipitation

The precipitation is one of the main meteorological elements, influencing the degree of climatic comfort and the self-purification mechanism of the atmosphere. The annual course of precipitation in the reviewed area has a distinctly continental character. The total average annual precipitation is 680 mm. The annual maximum of twenty-four-hour precipitation is 118,1 mm (May). The seasonal total sum of precipitation is unevenly distributed. The spring-summer period is characterized by maximal precipitation – 193-207 mm, whereas the autumn-winter months - by minimal precipitation – 137-142 mm. The precipitation has two maximal values: May – 88 mm and November – 51 mm, and two minimal values: September – 41 mm and March – 43 mm, which is typical of the Danube plain. The total number of days with precipitation is 137, whereof 103 days with rainfalls (maximum 15 days in May and minimum 7 days in September), 25 days with snowfalls (8 days in January), 7 days with rainfalls and snowfalls (1-2 days in winter months). The period without precipitation lasts up to 114 days/per year maximum (on average 9,5 days/per month). The maximal drought is in October – up to 13 days, whereas the minimal drought is in June – 6 days.

The average height of the snow-cover is around 10 cm, whereas the average number of days with snow-cover is around 42.

The average number of foggy days is 26,3, whereof 23,4 are in the period October-March and 2,9 in the period April-September.

The total average monthly and annual cloudiness (wind force) is 5,0 degrees on the Beaufort scale.

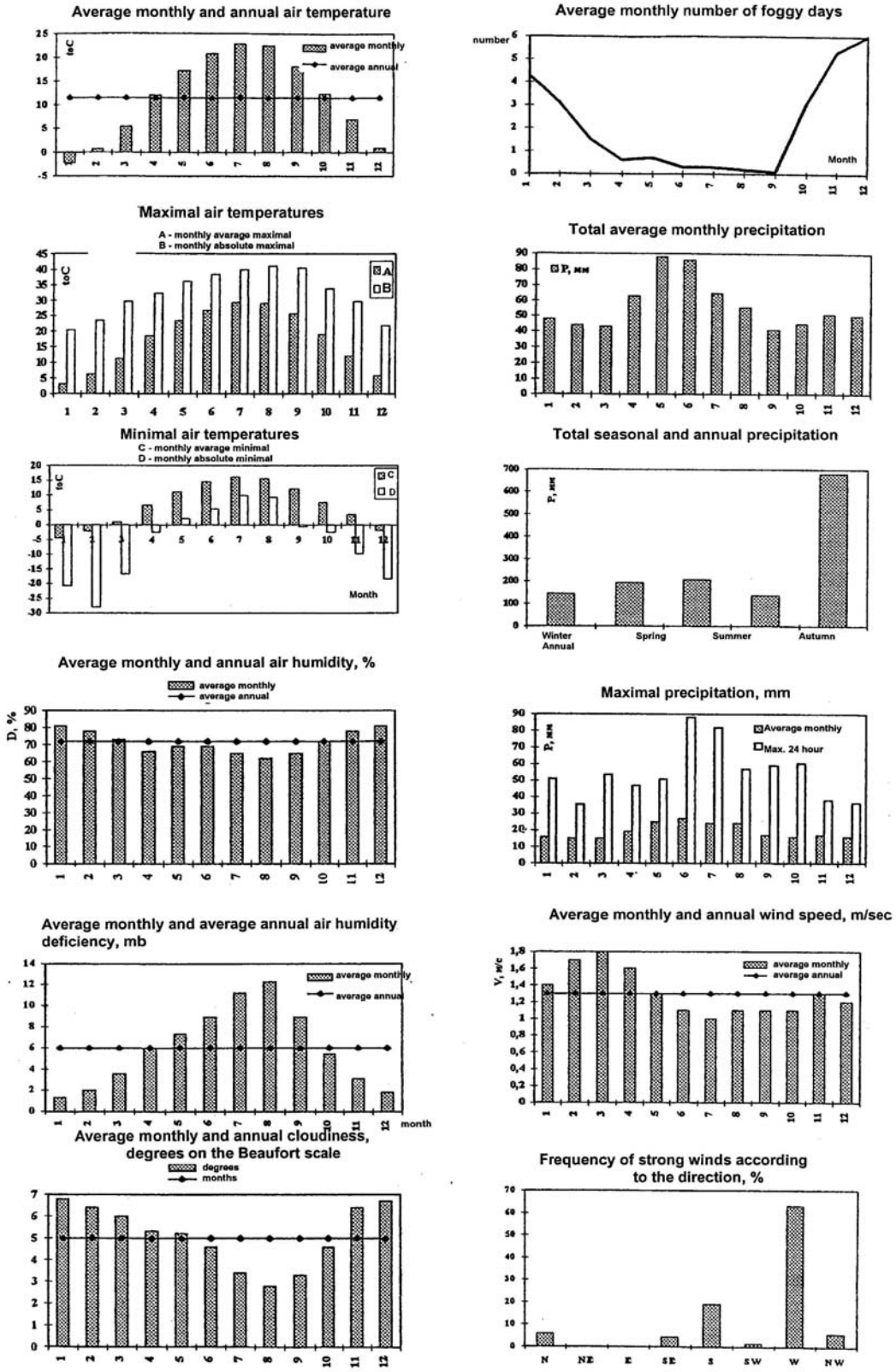
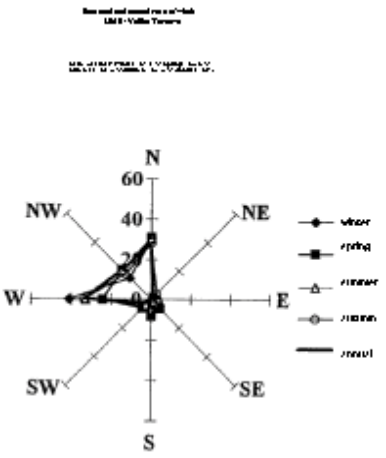


Fig. 8. Meteorological factors - the town of Veliko Tarnovo

5. Wind

According to data from HMS – Veliko Tarnovo, the predominant weather in the region is calm - 62,7% (67,3% during autumn and 61% during winter). The predominant annual direction of wind is westwards (33,4%). Western winds predominate during the heating period: 33,2% during autumn and 40,8% during winter.



Besides the heating period, the western winds are the most frequent in summer – 32,8%, whereas the northern winds are the most frequent in spring – 30,6%. The average annual wind speed is very low – 1,3 m/sec. The most frequent winds in the region have speed of 0-1 m/sec (73,2%) and 2-5 m/sec (23,3%). The number of days with strong wind (V>14 m/sec) is 14,5, which is equal to 3,97%.

Out of the strong winds the western (63,2%) are predominant, followed by the southern (19,1%).

In order to assess the climatic conditions as a factor for environmental pollution, two groups of indicators are applied, using the scale from 1 to 3 (favourable, average favourable and unfavourable):

- Characterization of the climate as a factor for self-purification of atmosphere:

Number of days with wind of over 14 m/sec – 3,97% - average favourable;

Number of days with precipitation of over 10 mm – 19,1 - average favourable;

Correlation - the number of days with precipitation in the cold/warm semi-annual period – 1.04 - average favourable;

- Characterization of the climate as an obstacle for self-purification of atmosphere:

Number of calm weather cases (average monthly) – 62,7% - unfavourable;

Number of days with inversions - >150 – unfavourable.

The climatic features of the town of Veliko Tarnovo are typical of the Middle part of the Danube plain and are characterized by continuous lack of wind and high air humidity in the autumn-winter period, which determine the low self-purification capacity and create preconditions for lasting retention of the air pollutants, due to the anthropogenic impact upon the air.

3.1.1. Assessment of the quality of atmospheric air (based on available data)

The condition of atmospheric air in certain, limited regions results to a great extent from local sources. The level of pollutant concentration in the atmosphere depends on several factors, affecting the circumstances for pollutant retention or diffusion:

- the change of local climatic conditions, caused by the morphographic features of the region;
- the area occupied and the power of pollutant emissions;
- the character of urbanization.

According to art. 4 (1) of the Law on the Purity of Atmospheric Air (State Gazette, Issue 45/1996) the main indicators, characterizing the quality of atmospheric air in the ground

layer, are the concentrations of: components (aerosols, fogs, smoke, dust); sulphur dioxide; nitrogen dioxide; carbon dioxide; ozone; lead (aerosol).

According to Regulation No14/23.09.1997, stipulating the norms of Utmost Concentration (UC) of detrimental substances in the atmospheric air within populated areas (State Gazette, Issue 88/1997), the stipulated UC of the main pollutants are average annual, average twenty-four-hour and maximal single (Appendix No 1, under art.2, para.1).

The town of Veliko Tarnovo is included in the National Network for Air Monitoring (National Automated System for Ecological Monitoring=NASEM). The emissions are measured by the Regional Inspectorate on Environment and Waters (RIEW) – Veliko Tarnovo. The number of stations is 2: Hygiene-Epidemiology Inspectorate (HEI) Station, located in N. Gabrovski St. and RIEW Station, located in the central town part of Veliko Tarnovo. The following indicators are monitored: dust, SO_2, NO_2, H_2S, Pb and NO. According to the quarterly bulletins about the condition of the environment, published by the National Centre on Environment and Sustainable Growth (NCESG) – the Ministry of Environment and Waters (MEW), the average daily UC of the monitored indicators has exceeded in the period 1996-1998 (Table 2).

Table 2. Maximal excess of the UC average daily/month/% days for the period

Year	Quarter	Dust	Pb	SO_2	NO_2	H_2S	NO
1996	1	1.5/02/24.5	-	1.1/01/0.9	-	-	-
	2	1.8/05/41.2	2/05/12.5	-	1.3/06/3.0	-	-
	3	1.6/08/24.1	1.3/07/8.8	-	-	-	-
	4	1.6/10/23.5	-	-	-	1.1/10/1.2	-
1997	1	1.3802/21.4	-	-	-	-	-
	2	1.7/05/30.3	-	-	-	-	-
	3	1.6/07/16.1	-	1.5/09/4.5	3/09/7.5	-	-
	4	1.5/11/15.2	-	-	-	-	-
1998	1	3.1/02/19,0	-	1.3/03/2.4	-	1.5/01/2.9	-
	2	1.7/06/30.9	-	-	-	-	-

It is evident that in the town of Veliko Tarnovo the most serious atmospheric air pollution is due to the dust and it is permanent. The maximal excess of the daily average UC is within the range of 1,5-3,1 times. The number of days with UC excess for the respective periods is 15,2 – 41,2. Although slightly marked, there is a tendency of stronger dust pollution during the warm semi-annual period (besides the heating season). The remaining indicators

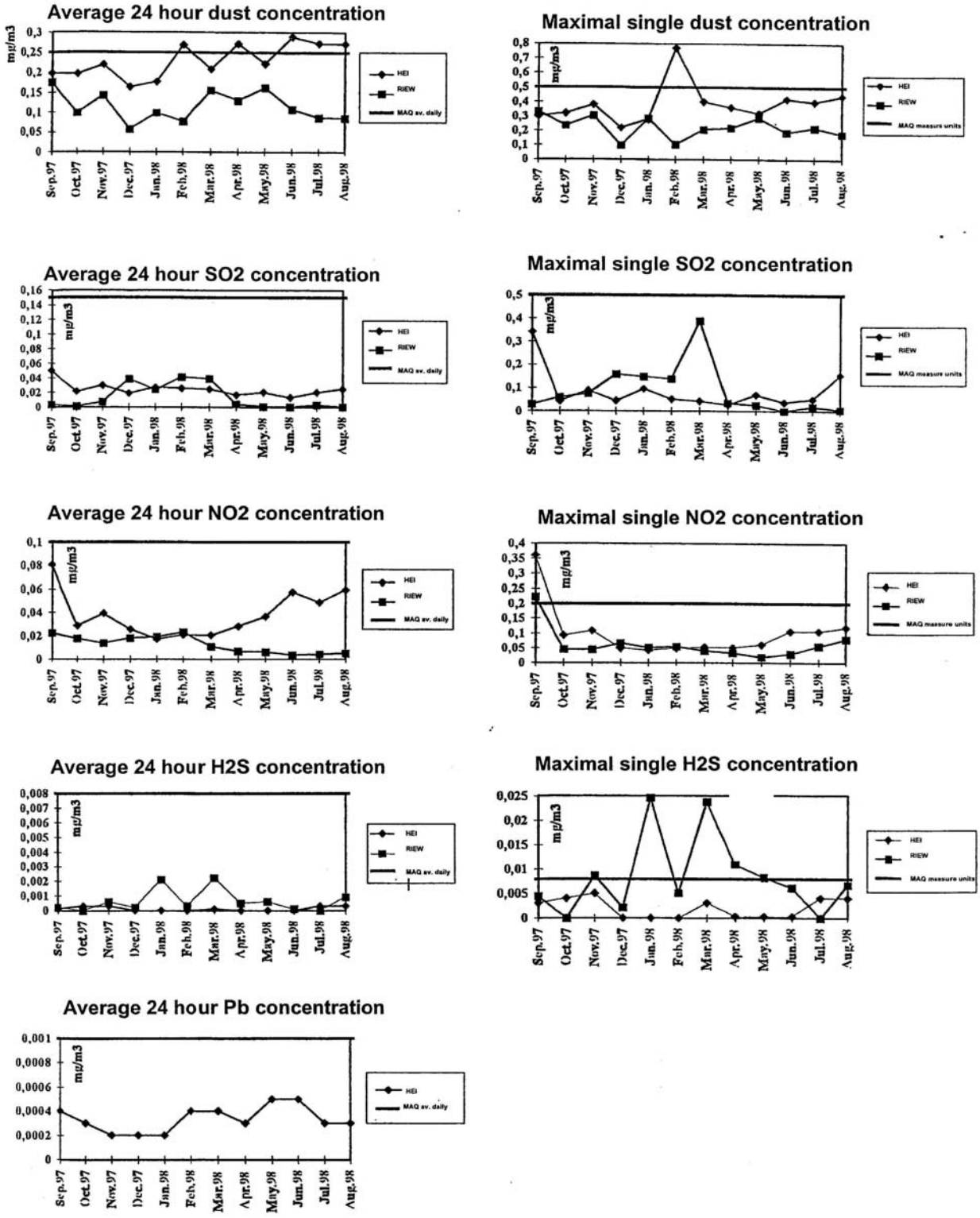


Fig. 9. Quality of the atmospheric air in the town of Veliko Tarnovo

have been exceeded incidentally, with a low degree and small percentage of days with UC excess for the respective period.

The MAQ units of SO_2 did not exceed during the period 1996 – 1998, whereas the MAQ units of NO_2 exceeded once by 5% during the third quarter of 1997.

During the IInd quarter of 1996, RIEW Station ranks 6th, according to the average twenty-four-hour concentration of NO_2 in the country. During the IIIrd quarter of 1997, the same station ranks 7th, as regards the dust and NO_2 (under MAQ average daily). During the IVth quarter of 1997, it ranks 10th, as regards NO_2 (under MAQ average daily). During the Ist quarter of 1998, it ranks 6th, as regards the dust.

For the purposes of preparing the present EIS, the respective data on the atmospheric air in Veliko Tarnovo for the period 1.09.1997 – 31.08.1998 has been reviewed and summarized. Based on the results from the emission monitoring, displayed Fig. 9, the following conclusions could be made:

- **Dust** - the average twenty-four-hour dust concentrations during the reviewed period, ascertained at HEI Station, are within the range of 0,1625-0,2881 mg/m^3. Pursuant to Regulation No14/1997, they exceed the UC average daily (0,25 mg/m^3) from 1,07 to 1,15 times during five of the months. The concentrations, ascertained at RIEW Station, are within the range of 0,0573-0,174 mg/m^3 and they are lower than the UC average daily from 4,36 to 1,44 times. The maximal single concentrations, ascertained at HEI Station, are within the range of 0,22 – 0,44, which is from 2,27 to 1,14 times lower than the UC measure units (0,5 mg/m^3). In February 1998 alone the UC measure units are exceeded 1,54 times. The maximal single concentrations, ascertained at RIEW Station, are within the range of 0,098-0,332, which is lower than the UC measure units from 5,1 to 1,5 times. The values, ascertained at HEI Station, are almost 2 times higher than the ones, identified at RIEW Station. There is an explicit trend, regarding the distribution of dust emissions during each season – they increase in all periods, excluding the heating period.
- **Sulphur dioxide** – the average twenty-four-hour values, ascertained at HEI Station, are almost permanent (0,0131-0,0499 mg/m^3) and are up to 11,4 times lower than the UC average daily (0,15 mg/m^3, pursuant to Regulation No14/1997). They have a clear-cut upward trend in the heating season, as identified at RIEW Station, and are higher than those, identified at HEI Station. The variation range is 0,0032 – 0,0419, which is up to 3,57 times lower than the UC average daily. The maximal single SO_2 concentrations, ascertained at both stations do not exceed the UC measure units (0,5 mg/m^3) and are significantly lower than the latter. The distinctly upward trend of SO_2 concentration in the heating period can be ascribed to the applied power sources.
- **Nitrogen dioxide** – the average twenty-four-hour concentrations, ascertained at HEI Station, display a clear-cut upward trend in all periods, except in the heating season. They are within the range of 0,0172-0,0809 mg/m^3 and are from 5,8 to 1,24 times lower than the UC average daily (0,1 mg/m^3, pursuant to Regulation No14/1997). The values, ascertained at RIEW Station, are lower, whereas they are higher in winter months. They are within the range of 0,0037-0,0223 mg/m^3 and are considerably lower than the UC average daily. The maximal single NO_2 concentrations, ascertained at both stations do not exceed the UC measure units (0,2 mg/m^3) and are up to 2 times lower than the latter. In September 1997 alone the UC measure units, ascertained at both stations, are exceeded, whereas the excess, identified at HEI Station, is higher (1,8 times). The same trend of seasonal distribution of the NO_2 concentration is evident here.
- **Hydrogen sulphide** – the average twenty-four-hour concentrations, ascertained at HEI Station, are within the range of 0,0-0,0003 mg/m^3, which is 20 times lower than the UC average daily (0,008 mg/m^3), whereas they increase in the warm semi-annual period. The

values, ascertained at RIEW Station, are higher, with a marked upward trend in the heating period. They are within the range of 0,0-0,0022 mg/m^3, which is up to 3,6 times lower than the UC average daily. The maximal single concentrations, ascertained at HEI Station, during all months of the reviewed period, are lower than the UC measure units (0,008 mg/m^3), whereas the ones, ascertained at RIEW Station, are above the UC measure units for 5 months. The highest excess was registered in January 1998 – three times. The same trend of reciprocal seasonal distribution of the H_2S concentration has been ascertained at both stations.

- **Lead –** this indicator is being monitored only at the HEI Station. The ascertained average twenty-four-hour concentrations are within the range of 0,0002-0,0005 mg/m^3. They are up to 2 times lower than the UC average daily (0,001 mg/m^3). It is evident, that the Pb concentration increases during the warm semi-annual period.

The above analysis points to the conclusion, that there is not a lasting tendency of atmospheric air pollution in the town of Veliko Tarnovo during the heating or any other period. As regards the monitored indicators of the average twenty-four-hour concentrations, the highest degree of pollution is caused by dust – up to 1,15 times above the UC average daily, ascertained at HEI Station during the warm semi-annual period. The remaining indicators have insignificant values. The ascertained maximal single concentrations show that the highest degree of pollution is caused by H_2S – 3 times above the UC measure units, identified at RIEW Station in the heating season, followed by NO_2 and dust, identified at HEI Station. Considering the upward trend of pollution by SO_2, NO_2 and H_2S during the heating season, identified at RIEW Station, as well as Veliko Tarnovo's climatic and morphographic conditions and infrastructure, we can specify the main source of air pollution in that station. These are the conventional fuels, used by the organized sources and to a smaller extent by the motor transport. The seasonal distribution of air pollution, identified at HEI Station, shows that the main source of pollutant emissions is the motor transport and its secondary additional impact as an unorganized source.

Considering that the main technological processes in the project Gasification of the town of Veliko Tarnovo are not a source of environmental pollutants, the condition of atmospheric air should not impede the implementation of the project.

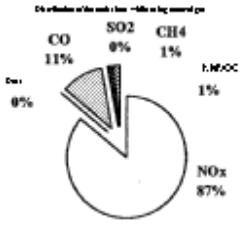
3.1.3. Characteristics of the sources of pollution provided for in the project (quantity and concentration of pollutant emissions)

The technological processes in the gas supply system, such as delivery, transportation, distribution, regulation and maintenance of pressure, gas gauging, scrubbing and odouring of natural gas are not a source of detrimental emissions for the environment. They are effected through a closed gas pipe distribution network, installed underground and through surface equipment, working automatically under guaranteed security and reliability. Upon necessity, in the process of maintenance and repair activities separate sections of the gas pipe network are being blown through. That is effected by the StopCock Unit (SCU) and ventilation candles, located on the surface. The natural gas, released in the atmosphere (with a certain controlled intensity), is diffused and is not dangerous for people and the environment, since it is lighter than air.

Due to the implementation of the project Gasification of the town of Veliko Tarnovo, certain changes have been introduced in the fuel, used in the industrial, public administrative services and residential household sector in Veliko Tarnovo. The solid and liquid fuels are substituted for natural gas, which has a much lower generating capacity in the process of combustion, as regards pollutants (emissions). The heating devices of consumers especially are the source of detrimental emissions for the environment. Due to the introduction of natural gas as power source the composition of emissions has changed – dust, ashes and SO_2 are hardly released; NOx, CO (depending on the quality of combustion processes), Non-methane volatile organic compounds (NMVOC) and CH_4 are released. The most crucial component of the above is NOx.

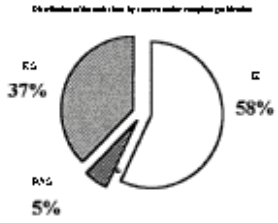
Considering the trends of development of the town of Veliko Tarnovo and the consumption of natural gas, specified in Table 1, there are prognostications on the composition and quantity of detrimental substances, emitted from the heating devices of the consumers, have been made (Table 3).

No	Consumers	W $nm^3.10^6$	NOx t/year	CO t/year	NMVOC t/year	CH_4 t/year
1.	Industrial Zone	47,15	200,39	26,05	3,02	3,02
2.	Public and Administrative Sector (PABS)	4,298	18,27	2,37	0,29	0,29
3.	Residential Sector (RHS)	30,752	130,07	16,99	2,09	2,09
4.	Total	82,2	312,83	40,67	5,0	5,0



The overall quantity of emissions is 405,95 tons per year. The quantity of NOx is 87%, followed by CO – 11%. The overall amount of hydrocarbon is 2%. As it has already been mentioned, dust and SO_2 are not emitted. According to the distribution of natural gas consumption in the industrial sector, PAS and RS overall in Veliko Tarnovo, 13% of emissions are released in summer months, whereas the remaining 87% - in the heating period (winter). It is obvious that the main source of emissions in Veliko Tarnovo is the Industrial Zone (IZ) – 58%,

followed by RS – 37 % and PAS – 5%.



3.1.4. Scrubbing equipment (type, scrubbing effect)

Out of all main technological processes in the gas supply network, only the scrubbing of natural gas from mechanical admixtures is effected through filters (screen or centrifugal type), which are fixtures within the technological scheme of the Automatic Gas Distribution Station (AGDS), Gas Distribution Point – Town /GDP-T/, Gas Distribution Point - residential and Gas distribution and metering point. Their function is to guarantee the hydraulic conductivity of the network. Their scrubbing effect is above 90%. The scrubbing is effected automatically.

Steam boiler units of the consumers are heating installations with a small thermal capacity (Group I, pursuant to Regulation No1/1997 on the Operation of dust-catching and gas-scrubbing devices - installations). Supplementary scrubbing equipment is not installed with them, because there are not such technological or sanitary requirements.

3.1.5. Prognostication and assessment of the expected changes in the quality of atmospheric air (atmospheric air pollution), including the ground layer of the atmosphere, territorial range of zones with polluted air, as a result of the project implementation

The impact of the Gasification of the town of Veliko Tarnovo projects should be reviewed within two periods –Construction Period and Operation Period.

Construction period

During the civil works there will be noise effect and dust pollution of the atmospheric air as a result of the execution of the civil and assembly works and the operation of the

construction machinery. The construction of the distribution gas pipeline from the agds to the regulated territory of veliko tarnovo is effected outside the populated areas in agricultural lands. the local on-site effect is significantly lower than the effect of the agricultural technology. the dust pollution is ascribed primarily to the ground activities, related to the installation of gas pipeline network in the populated area.

During the operation of the civil works mechanization there will be emissions, characteristic for the exhaust gases of the internal-combustion engines (ICE). Pursuant to art.12 of the Law on Preservation of the Atmospheric Air Purity, the detrimental substances in the gases, released by internal-combustion engines (ICE) are standardized by the indicators: degree of smoke and content of carbon oxide, nitrogen oxides and hydrocarbons. The monitoring authorities measure the emissions from motor vehicles at least once a year.

According to the WPORC developed for an identical project by the construction company,project contractor, the required constructional machinery includes the following standard working unit: single-bucket excavator with reversible shovel 1,5 m^3 – No. 1; bulldozer with spreader width 3,20 m – No.1; pipeline carrier – No.1; auto crane with 3 ton lifting capacity– No. 2; auto crane with 5 ton lifting capacity – No. 2; asphalt-laying machine – No.1; petrol or pneumatic flex – No. 1; compressor – No.1; mechanical rammers – No. 5. The motor vehicles should not be refueled in the project area. The subsequent fumes, including concentrated hydrocarbons, benzene, toluene and xylene are not taken into consideration. The diffusion of exhaust gases within the project area (up to 2,4 m) in the direction of the wind, identified by simulation, shows that the emissions, released at this direction of the wind are within the norm (UC measure units).

Cm ‘(MCO) = 0,01 mg/m^3	UC measure units – 60 mg/m^3
C ‘(Mhydrocarbons) = 0,00105 mg/m^3	- not subject to standardization
C ‘(MNO2) = 0,0016 mg/m^3	- 0,2 mg/m^3
C ‘(MSO2) = 0,00105 mg/m^3	- 0,5 mg/m^3
C ‘(Mashes) = 0,00009 mg/m^3	- 0,15 mg/m^3
C ‘(MPb) = 0,0000068 mg/m^3	-

When the wind blows perpendicularly to the source, the values of the UC measure units are again not exceeded.

Cm’’(MCO) = 0,13 mg/m^3	UC measure units – 60 mg/m^3
Cm’’(Mhydrocarbons) = 0,0137 mg/m^3	- is not standardized
Cm’’(MNO2) = 0,0206 mg/m^3	- 0,2 mg/m^3
Cm’’(MSO2) = 0,0137 mg/m^3	- 0,5 mg/m^3
C m’’(Mashes) = 0,00118 mg/m^3	- 0,15 mg/m^3
C m’’(MPb) = 0,00009 mg/m^3	-

Based on the above results and considering the construction-assembly works and the composition of the unit, the effect of the building mechanization can be overlooked.

Territorial range of the dust and noise effect – only within the project area (significantly under the lowest degree of the criterion 5 km) – small; degree of the effect – insignificant; duration – short; frequency – once in the period of construction; opportunity for reconstruction – yes; cumulative effect – no.

If the technology of ground operations is properly chosen, the effect of the project on the air, limited by time and space, can be practically overlooked. The construction stage of the project does not affect characteristics such as air temperature, humidity deficit, precipitation and winds.

Operation period

As already mentioned, the main technological processes carried out in the Gasification of the town of Veliko Tarnovo project, such as deliveries, supply, distribution, pressure regulation and maintenance, gas gauging, scrubbing and odouring of natural gas are not a source of detrimental emissions and will not change the quality of atmospheric air. If appropriate, in the process of maintenance and repair activities separate sections of the gas pipe network are being blown through. The natural gas released in the atmosphere (with a certain controlled intensity), is diffused and is not dangerous for people and the environment, since it is lighter than air.

At the same time the key objective of the project is to substitute the conventional fuels in industry, PAS and RS of Veliko Tarnovo for alternative energy source i.e. natural gas. During the operation period, the sources of emissions, affecting the atmospheric air features are the heating and power installations, using natural gas (emissions from immovable sources), owned by the consumers.

In this connection, regardless of the fact that the heating system user installation are not the subject of the EIS, comparison was made between two alternative hypotheses in order to fully assess the effect of the gasification of the town of Veliko Tarnovo:

- 1st Hypothesis (zero hypothesis) – use of conventional fuels as energyr source and assessment of their effect on the atmospheric air;
- 2nd Hypothesis - Implementation of the project – use of the natural gas as energy carrier and assessment of its effect on the atmospheric air.

In both cases all the sources of emissions, related to the project, are analyzed in terms of their contribution to air pollution. The motor transport has not been reviewed, because it is not subject to the substitution of conventional fuels for natural gas.

Existing situation (zero hypothesis) – conventional fuels

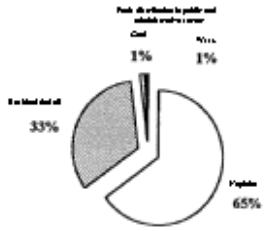
The main sources of emissions in the region of Veliko Tarnovo, subject to analysis and assessment, are:

- industrial enterprises and heating plants;
- public administrative and public services sector;
- residential sector;

The detrimental substances, emitted by them, are due exclusively to the combustion of various fuel types, according to their needs.

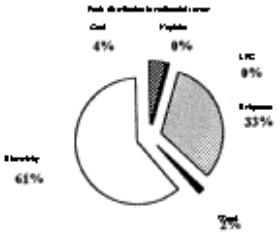
Industrial Zone (IZ)– the big industrial enterprises in Veliko Tarnovo are 12. They are concentrated in the IZ "Arbanasi" and IZ "Dalga Laka", located in the southern part of the town. They belong to different industries. They are provided with individual steam-boiler rooms, working with liquid fuels. The existing heating system is operated by a Heating Plant (HP), located in the western part of the town and Regional Heating Plant (RHP), located in the Central Town Part (CTP). The two heating plants operate with oil residue. The overall consumption of fuels in IZ (in the enterprises, included in the project) and the central heating system of Veliko Tarnovo is: oil residue 53470 TEF (Ton of Equivalent Fuel); naphtha – 937 TEF. The predominant consumption is of oil residue – 98% and naphtha – 2%. At the moment the industrial capacities are not optimally used, due to the overall drop in production. The two heating plants are the main consumers – 53% of fuels. Considering the urban planning, the IZ in Veliko Tarnovo has a favorable location – in the southern part of the town. In view of the regime of climatic factors, especially the wind (predominant direction west, followed by north and north-west – see rose of winds), we can assume that the IZ does not have a significant effect on the quality of atmospheric air in the town part of Veliko Tarnovo. The HP "Veliko Tarnovo" is expected to have a greater impact.

Town Part – Veliko Tarnovo is a municipal center with 85 485 inhabitants in 29 046 households. Two industrial zones have been formed – a bigger one, located in the southern part of the town (IZ "Dalga Laka") and a smaller one, located north-east of the southern part (IZ "Arbanasi"). The total number of industrial enterprises is 12, distributed in various industries. They include the Heating Plant in the Built-up Town Part (BTP) and the Regional Heating Plant in the Central Town Part (CTP) of "Toplofikacia VT" EAD. They are the main air pollutants, due to their detrimental emissions. The public administrative and public services buildings are 45. They are all provided with local steam-boiler rooms. The residential household sector includes 2 649 one-family buildings with up to two floors, 1 376 flats in blocks of 3-5 floors and 633 flats in blocks of over 5 floors (5-8 floors), distributed in 9 main residential districts: K. Ficheto, Buzludja, Zapaden Rayon, Kartala, Cholakovtzi, CTP, Varusha, Assenov and Sveta Gora. The available buildings are in a good condition. The old town, Sveta Gora and Assenov residential districts are surrounded from all sides by the hills Sveta Gora, Tzarevetz and Kartala, which has predetermined their specific terrace-like construction along the narrow gorge of the Yantra River. In view of the economic situation, there will be neither many new buildings in the administrative and public services sector, nor in the residential sector. Most of the available buildings are expected to undergo reconstruction.

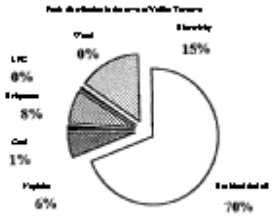


Considering the urban planning, the built-up town part is not expected to expand, however the number of floors will increase. Veliko Tarnovo has a central heating network, servicing the needs of 26% of the population.

The total consumption of fuels in PAS is: naphtha – 3860,3 TUG (65%), oil residue – 1978,54 TEF (33%), coal – 68,4 TEF (1%) and wood – 43,2 TEF (1%).



In RS the consumption of fuels is: coal – 843,6 TEF; naphtha – 58,26 TEF; LPG – 1,13 TEF; briquettes – 6366,9 TEF; wood – 344,74 TEF and electric power – 11958,3 TEF. The consumption of electric power predominates in RS – 61%, followed by briquettes – 33%, coal – 2%, wood – 2%, naphtha and LPG – approximately 0%.



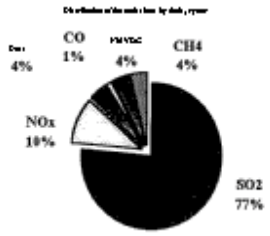
The whole area of Veliko Tarnovo is characterized by predominant consumption of fuels, emitting pollutants in the atmospheric air – residual fuel oil – 70%; coal and briquettes – 9%; naphtha – 6% (total 85%). The energy sources, which do not pollute the air, such as electric power, coal and wood account for 15%.

The extremely high pollutant potential of fuels used is evident from the distribution of fuels.

Based on the quantity of used-up fuels under the "CORINE AIR" methodology for identifying emissions in the combustion processes in power engineering, industry and heating in the household sector (ratified by the MEW), the quantities of pollutant emissions have been measured – Table 4.

Table 4. Composition of emissions, based on the fuels used

Fuel	Emissions, tons/per year						
	SO_2	NOx	Dust	CO	NMVOC	Methane	Total
Oil residue	1895,95	296,243	296,24	38,41	4,94	4,94	2332,84
Naphtha	63,33	11,95	7,53	1,55	0,23	0,23	84,81
Coal	51,2	0,92	3,2	0,12	1,5	1,5	58,44
Briquettes	357,44	11,17	22,34	1,45	111,7	111,7	615,80
Wood	0	1,50912	0,059	0,2	4,85	3,23	9,85
LPG	0	0,0005	0	0,000066	0	0	0,0006
Total	2367,93	321,77	125,48	41,73	123,22	121,60	3101,74



The total quantity of emissions as a statistical indicator is 3101,74 t/year. SO_2 has the greatest amount – 77%, followed by NOx – 10%, dust – 4%, hydrocarbons – 8% and CO – 1%. Under this distribution of fuels by type and amount, oil residue has the greatest contribution to the atmospheric air pollution – 75,2%, followed by briquettes – 19,9%, naphtha – 2,7%, coal – 1,9%. The low content of emitted mechanical admixtures (ashes, dust) indicate that the reason for the dust pollution of Veliko Tarnovo should be searched in the unorganized sources and motor transport (secondary dust pollution). Table 5 displays the impact of individual sources upon the composition of emissions:

Table 5. Composition of emissions, based on the sources, t/year

Source	SO_2	NOx	Ashes-Dust	CO	NMVOC	Methane	Total
IZ	1840,52	287,99	90,50	37,34	4,81	4,81	2265,97
PAS	121,84	20,65	9,53	2,68	0,91	0,73	156,35
RS	405,56	13,15	25,54	1,71	117,49	116,06	679,42
Total	2367,93	321,77	125,48	41,73	123,22	121,60	3101,74

The table shows that the industrial sector has the main contribution – 73%, whereas PAS – 2% and RS – 22%. Therefore under this distribution of fuels by type and amount, IZ turns out to be the biggest source of pollutant emissions in the atmospheric air of Veliko Tarnovo. Although the contribution of PAS and RS is only 24%, their impact is growing also due to the fact that the low buildings predominate in the town of Veliko Tarnovo. The residual gases are emitted at a low level above the ground; therefore they can be mixed with the gases from unorganized sources (motor transport) and retained in the ground air layer of the populated area.

Simulation of the emissions distribution in space

While assessing the quality of the atmospheric air, it is especially important to identify the distribution of pollutant emissions in space in order to outline the zones with unfavourable features and their range. Furthermore through simulation all sources are set in equivalent power supply conditions, regarding the use of conventional fuels and natural gas. Only in that way it is possible to prognosticate correctly the changes in the atmospheric air after substituting the liquid fuels for natural gas.

For the purpose a stationary numerical simulation has been used. It is designed to calculate the pressures upon the environment, caused by the main point and area sources. The following data on basic indicators has been entered into the simulation: height of the chimney, diameter, t°C of gases, speed of gases, discharge of gases, capacity of emissions. The impact of fuel used on the degree of ground air pollution can be identified through the results from calculating the summed-up field of air pollution, caused by the main organized sources on the territory of Veliko Tarnovo.

We have selected a region on the territory of Veliko Tarnovo, encompassing an area of 5,0x3,5 km, with Decartes co-ordinates, with a beginning located in the south-western angle. We have designed a network with step (x=500)/(y=500) and its points are used for calculating the concentrations of pollutants. While presenting the fields, the isoline is drawn after interpolation between the points of the network. The ground fields are presented in mg/m^3.

The meteorological information is based on the average monthly values of the air temperature, the quantity and duration of precipitation and the frequency of wind by direction and speed, considering the percentage of calm weather, according to perennial observations in HMS– Veliko Tarnovo. The months, representing the heating and non-heating season are January and July respectively.

Due to the use of liquid fuels (oil residue and naphtha) and solid fuels (coal, briquettes, wood) the main pollutants, emitted in the atmosphere are sulphur dioxide, nitrogen oxides and dust, stipulated under Regulation No14/1997. The average pollution field is calculated for each of these ingredients for the months January and July (Charts 10-12). The charts display the zones with polluted air, their territorial range and degree of pollution.

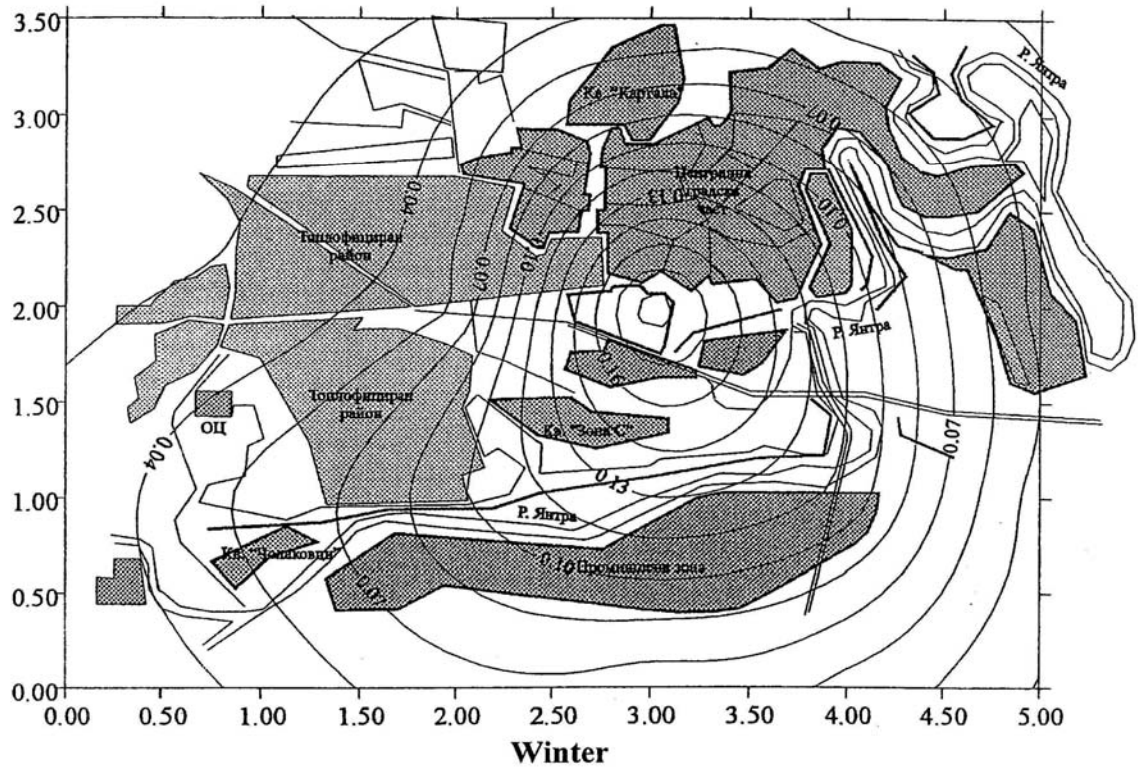
In order to comment the obtained fields of average monthly concentration of pollutants, we have applied the average twenty-four-hour UC, characteristic of the respective month. The EIS does not review cases of extreme conditions (emissions from firing volleys).

Sulphur dioxide

During the heating season the calculated concentrations vary within a range of 0,02-0,2 mg/m^3. The maximal model concentration is 1,33 times above the UC average daily (0,15 mg/m^3). The whole territory of Veliko Tarnovo is surrounded by an isoline 0,04 mg/m^3 (Fig. 10). The region between the central town part and IZ "Arbanisi" is the most affected, whereas the model concentration is above 0,16 mg/m^3. The topography in this part of Veliko Tarnovo contributes to the lasting retention of pollutants in the air. During summer the model concentration is in the range of 0,004-0,047 mg/m^3, which is 3,2 times below the UC average daily. The center of impact is moved to the region of IZ "Dalga Laka". That is due to the fact that during summer PAS and RS do not consume conventional fuels, whereas the industrial zones and central heating installations use fuel for technological needs. The seasonal distribution of SO_2 indicates the high generating capacity of solid and liquid fuels, used in the heating period. During winter the unfavorable zone of impact is bigger, whereas in summer it shrinks in close proximity to the sources.

Nitrogen dioxide

During both reviewed seasons the model fields display concentrations of NO_2 lower than the UC average daily (0,1 mg/m^3) in a region, analogous to the one with SO_2 – Fig. 11.



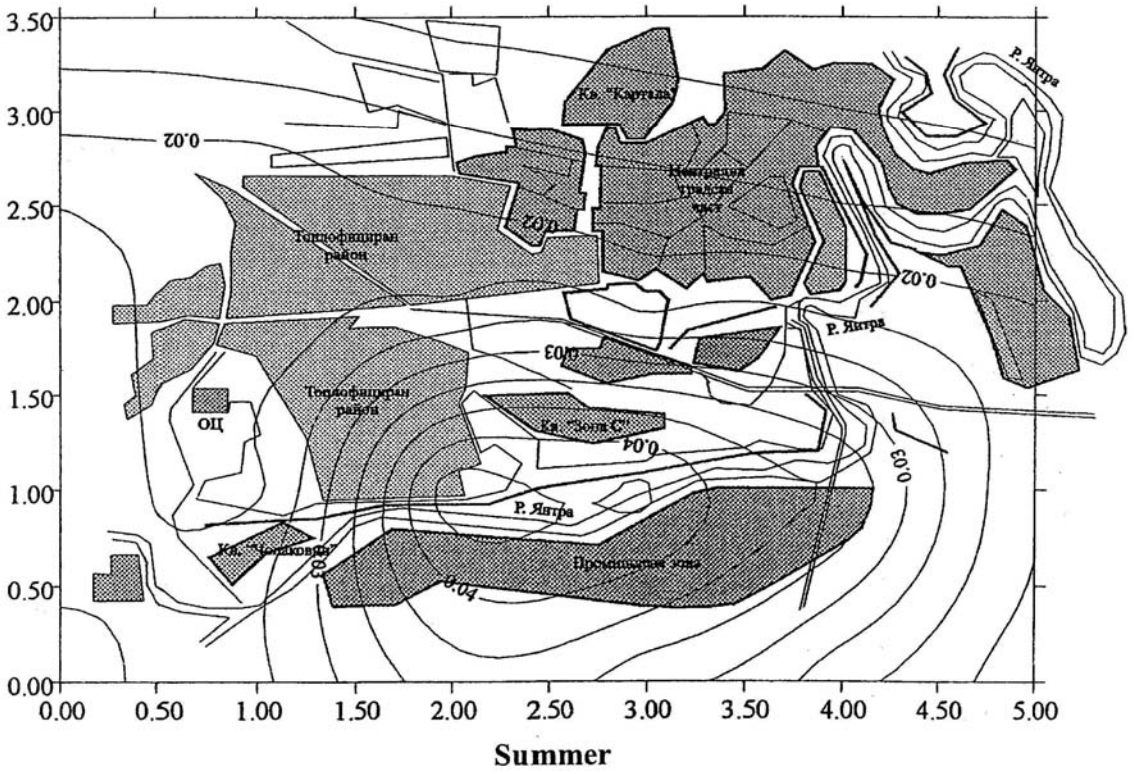
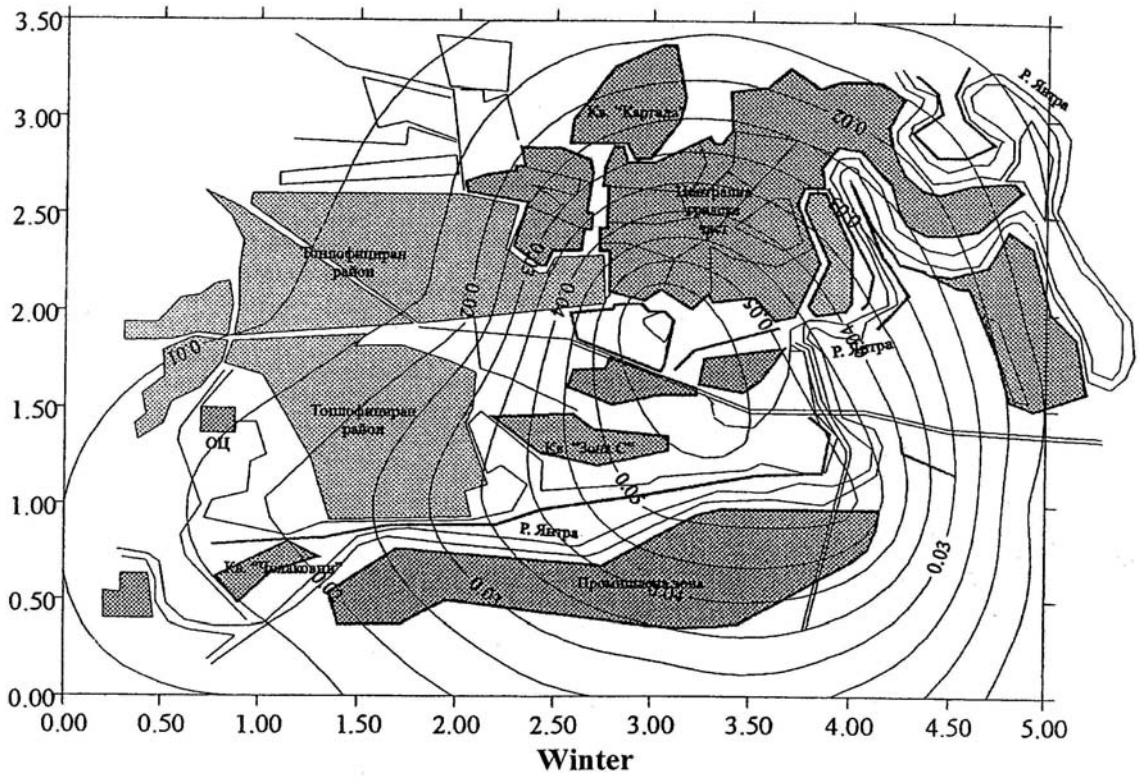


Fig. 10. The avarage monthly field of concentration of SO2 in the air when using conv. fuel



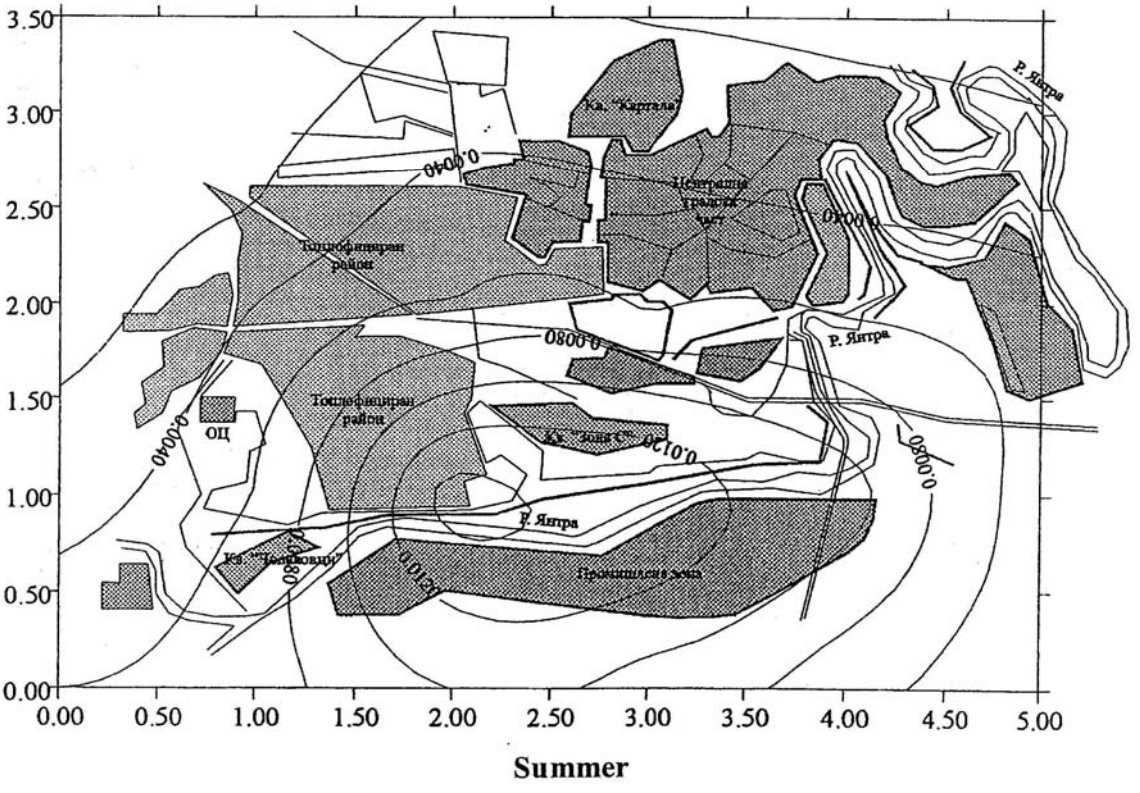
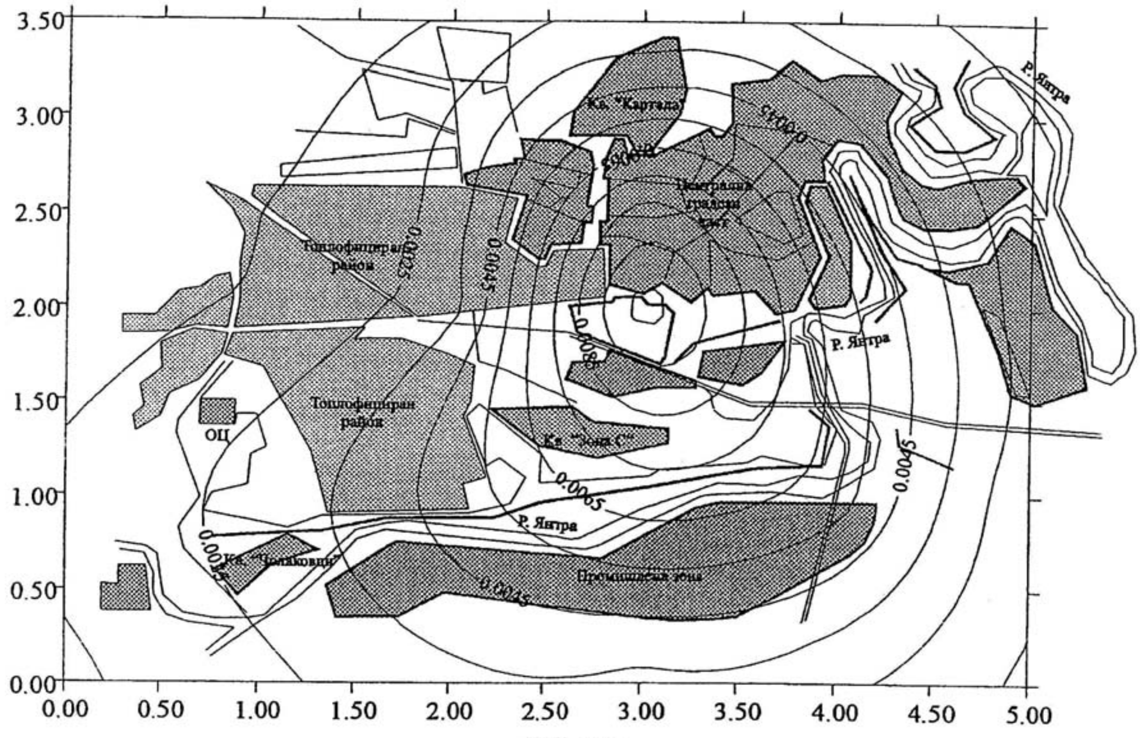
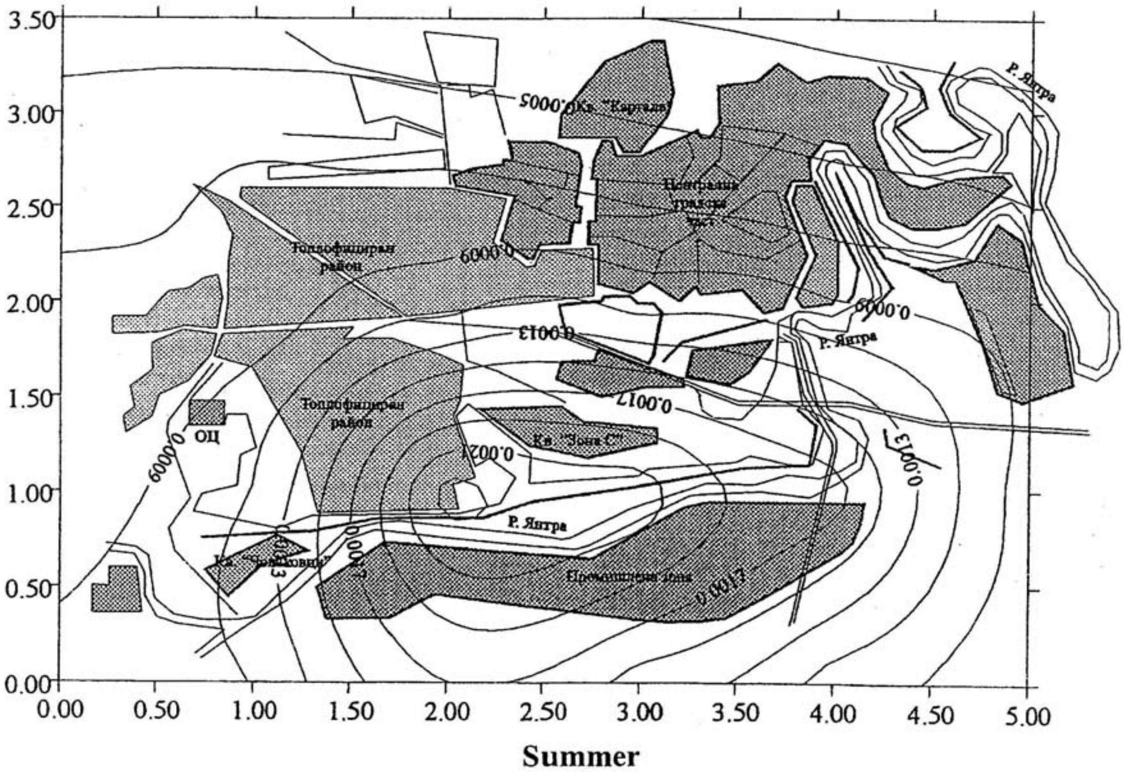


Fig.11. The avarage monthly field for concentration of NO2 in the air when using conv. fuel



Winter



Summer

Fig. 12. The average monthly field of concentration of □ dust in the air when using conv. fuel

In January the maximal model concentration is 0,06 mg/m^3 (0,6 times UC), whereas in July it is 0,015 mg/m^3 (0,15 times UC). During winter the zone of air, polluted by NO_2, is wider and located further northwards. During summer it shrinks around the industrial zone "Dalga Laka". The region south of the residential district Zone C is considered to be the center of the zone.

Dust (ashes)

It is evident from the enclosed charts (Fig.12) that the dust pollution, due to the simulation sources, is insignificant. In winter the maximal calculated concentration is 0,012 mg/m^3 (20 times below the UC average daily – 0,25 mg/m^3), whereas in summer it is 0,0024 mg/m^3 (significantly below the UC). The dust pollution is spread all over the territory of Veliko Tarnovo, however the regions, mentioned above, display the highest values.

Based on the results from the simulation of atmospheric air condition in the region of Veliko Tarnovo under the current situation, it has been found out that:

- The range of impact is over the whole territory of the town;
- During the heating season the region between the CTP and IZ "Arbanasi" is considered to be the center of the zone with unfavorable atmospheric air characteristics, whereas in summer it is the region around IZ "Dalga Laka".
- As regards the monitored indicators SO_2, NO_2 and dust, there are prognostications for excessive SO_2 concentrations in the heating period, whereas the highest values above the UC average daily are typical of the already mentioned risky regions – up to 1,33 times above the UC average daily.
- The impact has a long-term duration within the heating season.
- The model concentrations while using conventional fuels exceed the UC average daily of SO_2 in a limited area, therefore the cumulative effect should be expected only there.

Implementation of the project (alternative hypothesis) – natural gas

Due to the implementation of the project Gasification of the town of Veliko Tarnovo, the number of consumers, specified in the "zero hypothesis" remains the same, whereas changes are made only in the type of fuel, used in the industrial, public administrative services and residential sector in Veliko Tarnovo. The solid and liquid fuels are substituted for natural gas, which has a significantly lower generating capacity, as regards pollutants (emissions).

Due to the introduction of natural gas as energy source in the town of Veliko Tarnovo, the composition of emissions, emitted from the heating devices of consumers, has changed – dust, ashes and SO_2 are hardly released, NOx, CO (depending on the quality of combustion processes), NMVOC and CH_4 are released. The most crucial component of the above is NOx.

Considering the trends of development of the town of Veliko Tarnovo and the consumption of natural gas, specified in Table 1, there are prognostications on the composition and quantity of detrimental substances, emitted from the heating devices of consumers (Table 2) – i.3.1.3. The total amount of emissions is 405,94 t/year and it decreases 7,6 times while using conventional fuels 3101,74 t/year. It is important that the quantity of nitrogen oxides has increased 1,08 times and NMVOC and CH_4 have dropped significantly – 22 times. CO concentrations increase 1,1 times, whereas sulphur oxides, dust and ashes completely disappear.

According to the distribution of natural gas consumption in the industrial sector, PAS and RS overall in the town of Veliko Tarnovo 13% of emissions are released in summer months, whereas the remaining 87% - in the heating period (winter). It is obvious that no matter if conventional fuels or natural gas are used, the Industrial Zone is the main source of pollutant emissions – 58%, followed by RS – 31% and PAS – 5%.

Depending on the quality of the combustion process (incomplete or complete combustion of fuels), CO and CO_2 are emitted in the atmosphere. The world practices show that the complete combustion of natural gas is characterized only by emissions of CO_2, which is not standardized under our ecological legislation.

Table 6 is prepared in compliance with Regulation No2/19.02.1998 on the norms of acceptable emissions (concentrations in residual gases) of pollutants, emitted in the atmosphere by immovable sources (State Gazette, Issue 51/1998), art.22, para.1 and Appendix No4-1 and No4-2. It displays the norms of emissions, based on the thermal capacity of heating devices in the process of gas fuel combustion, with oxygen content in the flue gases, presented in volume %.

Thermal Capacity	Dust Mg/m^3	Sulphur oxides Mg/m^3	Nitrogen oxides Mg/m^3	CO Mg/m^3
Over 500 MW	10	35	350	100
100-500 MW	10	-	350	100
50-100 MW	10	-	350	100
0,5-50 MW	-	-	250	100

If natural gas, amounting to 82,2.106 nm^3/year, is used in compliance with the above norms, up to 8,22 t/year of CO will be emitted in the atmosphere, which is 2,1 times lower than the amount of CO, emitted in the use of conventional fuels by consumers with the same thermal capacity. This shows the extreme importance of the correct regulation of combustion processes. As regards consumers with capacity of up to 50 MW, such as the ones in Veliko Tarnovo, the amount of nitrogen oxides would be only 22,55 t/year, which is 6,5 times lower than the amount, emitted in the use of conventional fuels by consumers with the equivalent thermal capacity.

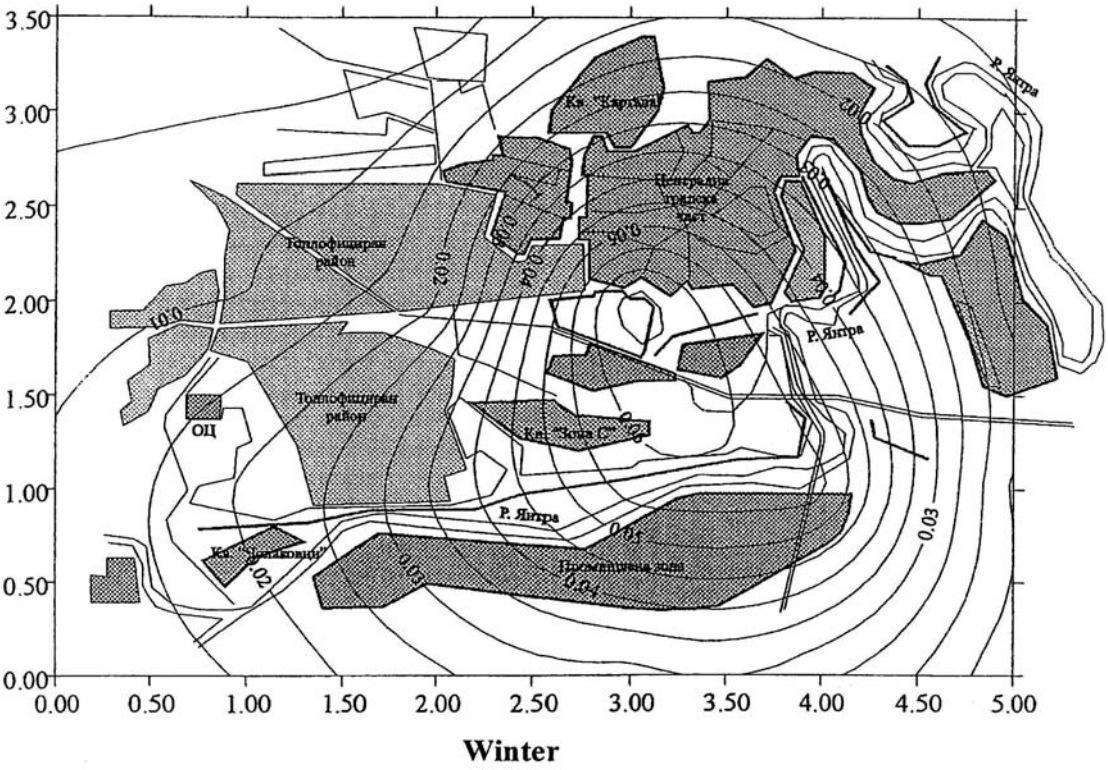
All technical tools on reduction of nitrogen oxides, applied for the conventional fuels, are applicable for the natural gas. The following technological solutions can also be used:

- correct operation regime – 15-20% reduction of nitrogen oxides;
- step-by-step air supply – 15-30% reduction;
- burners with minimal formation of nitrogen oxides – 40-50% reduction;
- combined burners with step-by-step fuel and air supply – 75% reduction;
- catalytic reduction of nitrogen oxides (denitrificaiton) – 50-80% reduction;

The simulation helps identify the pressure upon environment, caused by the main point (organized) and area sources (residential districts) in Veliko Tarnovo, working with natural gas (Version 2). The main pollutants, emitted in the atmosphere, while using natural gas, are nitrogen oxides. Fig. 13 displays the zones with polluted air, their territorial range and degree of pollution.

Nitrogen dioxide

Due to the use of natural gas as a fuel, the level of pollution slightly increases, which is evidenced by the maximal model concentration in January – 0,07 mg/m^3, which is 1,1 times higher in comparison with the conventional fuels, but lower than the UC average daily (Fig. 13). During summer the extreme model values in that case are 0,017 mg/m^3 (1,13 times higher in comparison with the conventional fuels). Despite the slightly higher values of NO_2,



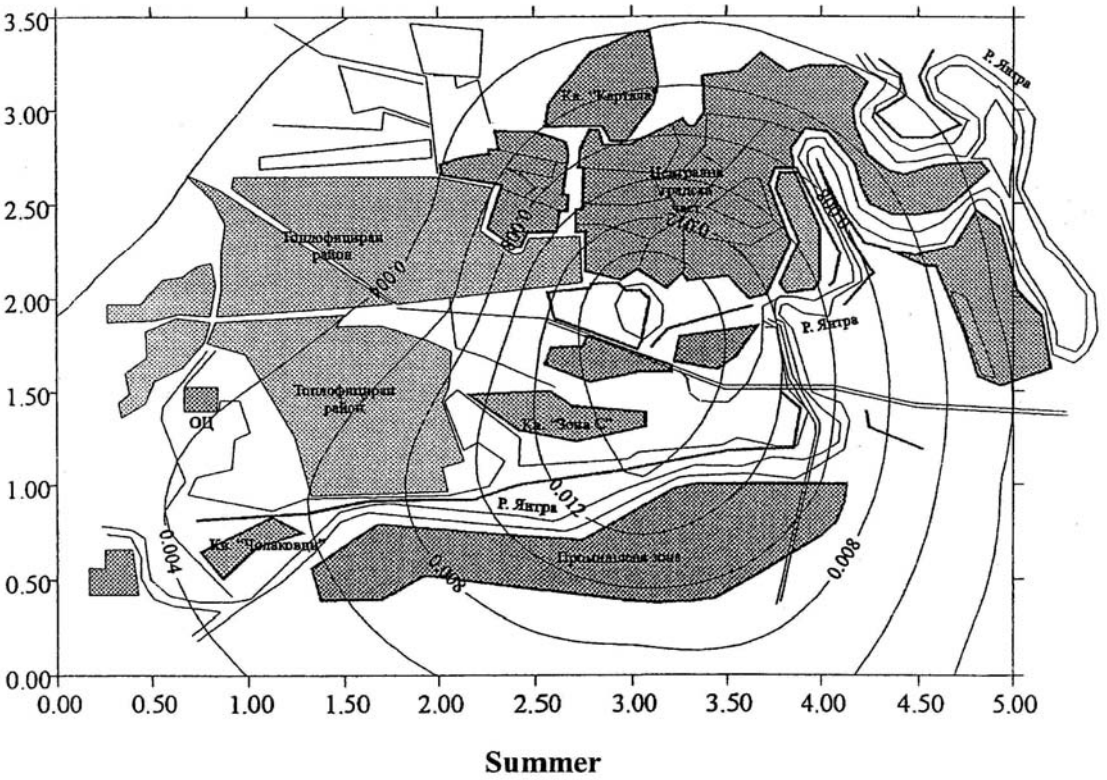


Fig. 13. Average monthly field of concentration of NO2 in the air when using natural gas combustion

the UC average daily values are not exceeded while using natural gas in both seasons. Unlike the conventional fuels, the zone of impact is similar in both seasons and is concentrated between the CTP and IZ "Arbanasi". The underlying reason is that the amount of natural gas to be used by RS is commensurate with the amount, to be used in the industrial sector in summer months.

The simulation highlights the benefits of using natural gas both in the industrial sector and the RS.

Sulphur dioxide

Sulphur dioxide is not emitted in the process of using natural gas.

Dust (ashes)

Dust and ashes are not emitted in the process of using natural gas.

Based on the simulation of the atmospheric air condition in the region of Veliko Tarnovo and the project implementation, the following has been found out:

- The range of impact is over the whole territory of the town;
- Both in winter and summer the degree of impact is most explicitly marked in the region, specified in the zero hypothesis;
- Out of all monitored indicators SO_2 and dust are not emitted, whereas NO_2 excessive (above the norm) concentrations have not been prognosticated;
- The impact has a long-term duration within the whole year, whereas the intensity is considerably higher in the heating season (87% of the impact);
- The frequency of duration is permanent;
- The model concentrations are significantly lower than the UC daily average and no cumulative effect is expected.

After comparing the two hypotheses, it is evident that the atmospheric air condition improves considerably due to the project implementation. That will have an indirect impact upon all environmental components, however it will be most considerable on soils, vegetation, animal species and the living environment of people in the region of Veliko Tarnovo.

3.1.6. Assessment of the effect on the atmospheric air in accordance with the standards and norms for content allowance, operating in this country, and in case of lack thereof - in accordance with the accepted criteria.

It is evident form the analysis of the substitution of solid and liquid fuels in industry, the PAS and RS of the town of Veliko Tarnovo for natural gas that the total emissions amount rises 7.6 times. The quantity of CO and nitrogen oxides increases 1.08 times but sulphur oxides, dust, soot are entirely removed. When observing the content allowance regulations the quantity of CO is insignificant as a result of complete combustion in the heating and power facilities using natural gas.

During the heating season the 24 hour daily average concentration of the determinant pollutant NO_2 in the region of the IZ is equal to 0.7 times $MAQ_{24h\ d\ av}$, while in summer – only to 0.17 times the $MAQ_{24h\ d\ av}$. In both cases the concentration is simulated for a restricted region. This complies with the requirements in Ordinance N0.14/1997 and shows the advantage of natural gas to the remaining fuels and the actuality of the project for improvement of the ecological situation in the town of Veliko Tarnovo.

3.2. SURFACE AND GROUND WATERS

3.2.1. Hydro geological and hydrological conditions and factors, which may impact on the quantity and quality of surface and ground waters

The hydro geological and hydrological conditions, which impact the formation and the state of surface and ground waters in the area of the town of Veliko Tarnovo, are as follows:

Surface waters

Veliko Tarnovo is located in the main valley of the Yantra River, which passes through the town. The hydrographic and hydrological conditions are characterized by the following:

Concentration of the river networks 0.4-0.5 km/ km^2.

The module of the annual surface stream is very low - 2-3 l/s/ km^2. it is categorized into: winter <2 l/s/km^2; spring 1-2/s/km^2; summer 0.4 l/s/ km^2; and autumn 0.4-l/s/ km^2.

The deviation ratio of the surface stream is 0.7-0.8, whereby the stream ratio itself is 0.1.

The average high water period is 7 months, beginning in December and ending in June. This region is characterized by a unsteady high water period. The stream level during the high water period represents 60-70% of the annual stream.

The average low water period is 3-4 months (July-November). The stream level during the low water period is up to 10% of the annual stream. The timeframe within the surface waters in the area of the Yantra River runs from low stream to dryness is usually 45 to 75 days p.a.

The module of the absolute surface stream shallowness is 0.3-l/s/ km^2 and its deviation ratio is 1.0-1.25. It starts around 1-10 September or 10 November, with fluctuations in July and October.

The average annual temperature of the river waters is 8-10° C (April 10° C; July 21° C, October 12° C).

The turbidity of the waters in the river stream is 1000-2500 g/m^3, and the floating residue is 100-500 t/km/year

The total amount of dissolved salts in the spring high waters is 300-400 mg/m^3, and 300-400 mg/m^3 in the summer low waters. Their solidity is 8.4-12.6°H during the high waters period, and 8.4-12.6°H during the low water period.

The waters are not concrete-destructive. There are no natural lakes in the area. The hydrological mapping shows that rain and snows satiate surface waters and have unstable phased stream distribution as a result from the European continental climate.

Ground waters

The Urogonski limestones are trimmed and carry a huge amount of karsts. The area covered by marls and marl sandstones accumulate an insignificant amount of leaking water. The Yantra River is draining the region.

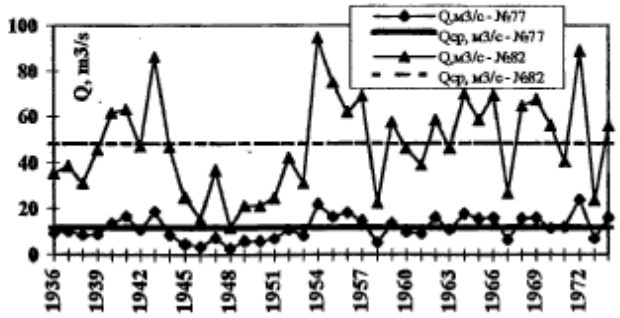
In the area between the town of Veliko Tarnovo and Samovodene village the valley of the Yantra River has intruded into sandstones and limestones. The wider part of the valley between the Samovodene village and Draganovo village, where the town of Veliko Tarnovo is located, includes marls, covered by alluvial materials 5-7m thick. The alluvial is formed of lower gravel layer 0.8 to 3 m. thick, and upper sandy-clay layer over 4 m thick. The *alluvial deposits* contain gravitational ground waters, which have straight through hydraulic connection with the surface river water - the Dryanovo gully. The "hydrologic" regime of the ground water levels depends on the spring high water period, resulting from the snowmelt during spring and the shallowness during autumn. (September-October).

Karst areas, karst ground water with deep circulation and thermal waters have not been established in close proximity to Veliko Tarnovo. Such are found northwest of the town between Veliko Tarnovo and Sevlievo.

3.2.2. Quantitative and qualitative characteristics of the water resources on the territory of the project and types of water carriers

The Gasification of the town of Veliko Tarnovo project covers the entire territory of the town of Veliko Tarnovo. The water resources in the area include the Yantra River and the ground waters within its terrace. It passes through the town dividing it into town sections. The Yantra River is included in the hydro-meteorological network of the National Institute of Meteorology and Hydrometeorology and the monitoring network of the National Center of Environment and Resources - the Ministry of Environment and Waters (NACEM). HMS No. 77 – Cholakovtsi is located in the southwest part of the town. There is no other HMS anywhere near Veliko Tarnovo. The first one is upstream; the second is downstream after Veliko Tarnovo. Forests surround 55.7% of the water carriers. Data from HMS No. 77 shows that within a 40-year period the water carriers spread out on a territory of 1289 km^2 have an average multi annual stream of 11.9 m^3/s, the stream module is 9.23 l/s/km^2; the stream level amounts to 375.3 mln m^3, the deviation ratio is 0.434. The above chart indicates the reflection curve of a natural stream in two spots and compares it to the multi annual stream. According to ECO for HMS No. 77 - $Q_{50\%}$ = 11.5 m^3/s; $Q_{75\%}$ = 8.01 m^3/s; $Q_{95\%}$ = 3.93 m^3/s. For HMS No. 82 - $Q_{50\%}$ = 46.5 m^3/s; $Q_{75\%}$ = 32.5 m^3/s; $Q_{95\%}$ = 16.0 m^3/s.

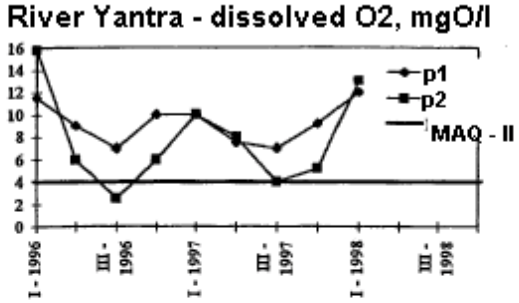
The quantitative characteristics of the Yantra River in HMS No. 77 - Cholakovtsi, and HMS - No. 82 - Karantsi

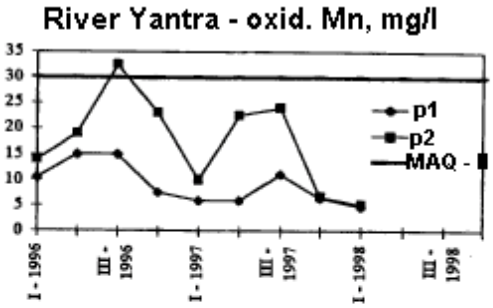


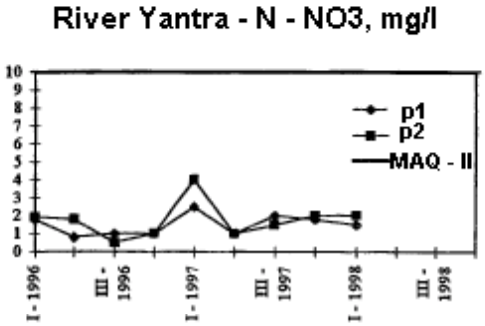
The Yantra River and its feeders are the basic water source for the urban areas located in its upper course and for irrigation of the farmlands near them. Its natural stream to the said sites is disturbed by many water catchments and pumping stations used for irrigation. In the meantime over 15 small dam reservoirs with total volume over 3.7 mln m^3 have been built in this section of the river main. The H. Smirnenski Dam designed for water supply has been built near the town of Gabrovo.

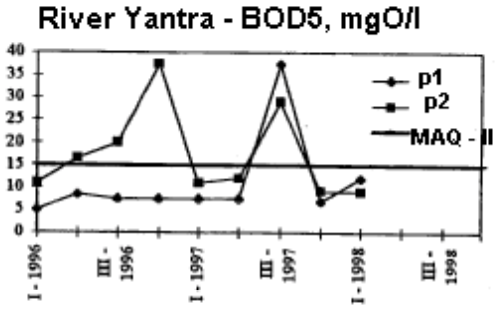
The qualitative characteristics of the Yantra River watercourse, by basic indicators, before and after Veliko Tarnovo and before being updated by NACEM are shown in P1 – Gabrovo and P2 - Samovodene village. After the update in 1998 those characteristics are defined into P1 – at the bridge of the Debelets River and P2 – Samovodene village. The water stream condition is shown at the tables below. The quality of the water in this section is basically the result of the impact on the town of Veliko Tarnovo.

The waters of the Yantra River in the area of Veliko Tarnovo are not used for water supply, but only for irrigation of farmlands, where possible. The underground waters of its









terrace after the town are used for industrial water supply of Gorna Oryahovitsa and Lyaskovets and for potable water supply of the villages of Pisarevo, Vurbitsa, Dolna Oryahovitsa, Dobri Dial and Kozarevets, with a population of about 10500 people. The town of Veliko Tarnovo is supplied with potable water mainly from the "Yovkovtsi" Water Supply System (250 – 300 l/s), put in operation after 1982, having the Yovkovtsi reservoir as it basic water source. The waters are purified in a two-stage Waste Water Treatment Station with a capacity of 2.5 m^3/s.

The water carrier of public and industrial waste in Veliko Tarnovo is the Yantra river. The town of Veliko Tarnovo has wastewater purification station. All waste - industrial, residential wastewaters and pluvial waters are discharged in the Veliko Tarnovo gully, via the sewage system, which is of a mixed type. Half of the waste is purified, the other half is released unpurified in the Yantra river. The sewage system is built at 90%, whereby its utilization is 95%. The incoming collector for the town wastewater treatment station (TWWTS) has been constructed. The measuring water capacity of TWWTS is 45000 m^3/d, its exploitation capacity is 37000 m^3/d and its actual capacity is 45000 m^3/d. The purification effect on insoluble composites is 81,1%, while according to BNO5 – 94,1%. All principal facilities on the water main are built. Some things still need to be finalized and equipped – anaerobic rot-protection devices and the accompanying industrial equipment, the filter pressure building and its equipment, as well as the primary radial depositors and the accompanying industrial equipment. The normative category of the water carrier in the area of Veliko Tarnovo is № II at station № 58 (the Yantra river at the bridge to the village of Debelets – before Veliko Tarnovo) and № III at station № 59 at SAMOVODENE village (the bridge to Samovodene village – after Veliko Tarnovo). The industrial enterprises in the town

with TWWTS are Velikotarnovsko pivo AD, Mesokombinat, Bitova electronika AD, Laktima AD.

3.2.3. Characteristics of the water sources and the water consumption of the project

The technological processes carried out in the Gasification of the town of Veliko Tarnovo project including: transportation, distribution, reduction and automatic maintenance of pressure in the gas distribution network, scrubbing and quantitative metering of the natural gas, are not related to any water consumption for industrial and potable needs, and are no source of waste waters.

3.2.4. Sources of pollution envisaged by the project - quantity and quality of the wastewater (by technological flows and in general), treatment methods

In accordance with the technological scheme of the project and the technological processes carried out, listed in pt. 2.1 and the provisions of pt. 3.2.3 of the project, no sources of pollution of the surface and the ground waters are envisaged and no wastewaters, requiring treatment are released.

3.2.5. Technological flow chart of the water treatment and equipment (type, water treatment effect)

The Gasification of the town of Veliko Tarnovo project does not target any water resources, thus, in conjunction with pt. 3.2.4 does not require any water treatment equipment.

3.2.6. Forecasts and assessment of the expected changes in the regime of the water flows and ground waters as a result of those provided for in the project: water consumption, river bed correction, hydro technological equipment, etc., as well as their effect on the quantitative regime and qualities of the ground waters, the general state of the water ecological systems and the process of self-treatment under the conditions of normal and dry years

The Gasification of the town of Veliko Tarnovo project is not hydro-technological and uses no water for its technological processes, therefore, is not a source of any wastewater and products, which may contaminate surface and ground waters. In this aspect the implementation of the Project will not have an adverse impact on the regime of the water flows and ground waters, neither will affect the quality of the water resources and the overall condition of the water ecosystems.

3.2.7. Prognostication and assessment of the expected changes in the quality of the water carriers as a result of the project implementation

Period of construction

Most of the construction works under the Project are excavation works for laying the gas transportation network. The excavation works along the AGRS track to the regulated area of the town of Veliko Tarnovo will not have any negative impact on the surface waters, for there are no such waters. The Distribution Pipeline (DP) crosses the Yantra River along the existing bridges on two spots – for water supply at STM AD and in the upstream of IZ “Dalga Laka”. The town gas distribution network crosses the Yantra River along the existing bridge at one spot i.e. in the old town. During the excavation works for laying the gas distribution network, temporary pollution of the surface waters may be expected with soil depositions carried by the pluvial waters sewage system.

During the construction works the technology for project implementation envisages minimum wet processes, related to the concrete laying of the GRP-Town, GRP-TS, SCU, Control Metering Column (CMC), and Electrochemical protection (ECP). The different types of building mortars are supplied from outside sites. The flowing pluvial waters may cause

pollution, but due to the very small size of the sites this pollution will not have any effect on the quality of the surface waters.

Based on the prospecting drilling works it was established that the ground waters in the area of Veliko Tarnovo are accumulated in the gravel deposits in the valley of the Yantra River and are in direct hydraulic connection. This presupposes the immediate effect on the water constructions in the river and on the level of ground waters. Due to the specific configuration of the terrain no ground waters flow in the civil engineering excavations is expected in the earth works along the street network.

The construction works under the project are expected to have one-time, local and very low impact on the surface and ground waters, by site, and high probability for recovery as well as no cumulative effect.

Period of operation

The technological processes during the implementation of The Gasification of the town of Veliko Tarnovo project are not related to water consumption, thus there are no technological products, which may potentially change the regime and the quality of the surface and ground waters.

The implementation of the project objective will not impact in any way the regime of the surface and ground waters.

The impact of the project on the overall condition of the water ecosystems is very valuable. The substitution of the solid and liquid fuels used by the industrial enterprises and population for natural gas will eliminate the need for maintaining large storage facilities, unloading sites and servicing motor-car and railway transportation, the operation of which may cause contamination of the surface and ground waters with oil products, coal dust and other pollutants.

3.2.8. Description of the environmental components, which may be impacted by the changes in the hydrological and hydro-geological conditions and the changed quality of waters

The implementation of the Gasification of the town of Veliko Tarnovo project will not change the hydrological and hydro-geological conditions of the town of Veliko Tarnovo. An indirect positive effect can be expected on the state of the water carriers caused by the elimination of the storage facilities for conventional fuels, which are a potential source of pollution for the surface and ground waters.

3.3. WASTES

3.3.1. Expected quantity of generated wastes (names, codes, quantities)

The main technological processes in the Gasification of the town of Veliko Tarnovo project, such as transportation and distribution of natural gas, regulation and maintenance of the pressure in the gas pipeline network, scrubbing the gas from mechanical impurities, odouring, measuring the gas flow parameters will not generate any waste. When natural gas is fired in the user heating system plants, no waste will be released. To this end the project implementation will eliminate the waste products released from the use of solid and liquid fuels in the different sectors in the town of Veliko Tarnovo.

Most of the constructions works under the project are related with laying of the gas distribution network underground along the town streets. The technology used in laying of the asphalt or asphalt-and-concrete street surfacing puts a requirement that the excavation ditch is as wide as the trench. In excavation works the street surfacing on the side of the trenches must remain intact. The excavated mass of crumbling surfacing will be shipped away and stored in a place indicated by the Investor and the local authorities in advance. The earth mass that is ready for refilling, depending on its location to the excavation works along the entire track,

will be piled up on a spoil heap aside from the trenching. Therefore, the technical parameters of the project may include 3386 m^3 construction waste (code 211414).

3.3.2. Collection and shipment (description of the system, storage facilities)

The construction waste (useless street surfacing material) will be collected upon excavation and transported by motor vehicles to the place of their deposition.

3.3.3. Waste treatment before shipment for final decontamination

The surfacing material, which has proven unfit for refilling streets, will not be treated before deposition.

3.3.4. Waste storage

The town of Veliko Tarnovo has one operating spoil-heap storage. It is located in the landfill of the Cheremetya village and is also used by the town of Lyaskovets. It has 25 decares and its capacity is near to full utilization.

As was said above the excavated mass of crumbling surfacing will be deposited to a place indicated in advance by the Investor and the local authorities. It is possible to use the storage heap for building wastes of the town of Veliko Tarnovo, or the construction waste may also be used as fillings for other engineering projects, old excavations or other planning works.

3.3.5. Other forms of decontamination

Other forms of decontaminating construction waste, apart from deposition in spoil heaps, are not envisaged.

3.3.6. Wastes submitted for/produced from the treatment/decontamination of/from other enterprises or from import/export

The Gasification of the town of Veliko Tarnovo project does not envisage the release of any waste products, which can be submitted for or exported for re-treatment, and does not expect to receive or import such product from any other treatment sources. In the meantime the limited use of coal and briquettes will eliminate the formation of cinders (code 11504), resulting from their burning.

3.4. HAZARDOUS SUBSTANCES (based on UN classification)

3.4.1. Toxic substances – sources and characteristics of toxic substances

In compliance with the UN classification no use of toxic substances, which may endanger the living environment and the ecosystem are envisaged during the construction and operation works under the Gasification of the town of Veliko Tarnovo project.

3.4.2. Other hazardous substances - sources, types, characteristics

The main objective of the gas supply system in the town of Veliko Tarnovo is to supply natural gas to the users. Natural gas has specific properties, such as fire risk, explosion risk and toxicity, which make it dangerous when is used improperly or in the event of breakdown. Its composition is described in pt. 2.3, and the potential risks are examined in para. 4.2. When the provisions of Ordinance No. 1/1991, Ordinance No. 3/1995, Ordinance No. 4/1995 and Ordinance No. 2 for the PSST are complied with, then the dangerous properties of natural gas are reduced to a minimum.

When natural gas is fired in the user heating system equipment, it releases dangerous emissions in the atmosphere, such as NOx and CO. Those emission and immisions are standardized by Ordinance No. 2/1998 on the maximum allowed limits (concentration in waste gases) of dangerous emissions released in the atmosphere by stationary sources (State Gazette, No. 51/1998|, Art. 22, para. 1 and Annexes No. 4-1 and No. 4-2 and Ordinance No.

14/1997. In compliance with the assessment made and the prognostication in pt. 3.1, these pollutants may be classified as potentially dangerous.

3.5. HAZARDOUS PHYSICAL FACTORS

3.5.1. Existing sources of hazrdous physical factors and information on their impact

The basic sources of noise and vibrations in the town of Veliko Tarnovo are motor vehicles and industrial enterprises. There are indicators for noises, which are above the standard measured on the main streets of the town. The central part is restricted in space, with intensive traffic, and public and administrative buildings and residential buildings located in close proximity to the streets. As a result the buildings are exposed to a constant noise and vibrations due to the traffic of motor vehicles. The land conditions are not favorable for the construction of special noise and vibrations protection equipment, and the only factor that may reduce the harmful effect is forestation.

No sources of dangerous radiation have been established in Veliko Tarnovo. The region has no permanent or temporary centers opened by the National Automated System for Ecological Monitoring (NASEM) for measuring the radiation gamma background and non-ionization radiation. The intensity of the equivalent radiation background dose in the Central North Bulgaria (based on data from the Center in Pleven) in 1997-1998 was 0.10-0.15 μSv/h, which corresponds to the average standards measured by the permanent centers in the country. The town part has no high-pressure sources.

3.5.2. Sources of hazardous physical factors envisaged by the project

The Gasification of the town of Veliko Tarnovo project does not envisage any sources of dhazardous factors. The gas distribution network is laid underground. Only the gas regulation points, equipped with instrumentation and automation for the monitoring and control of the technological processes, are built on the surface. Those are fitted in steel cabinets and represent no source of noise and unsafe radiation. The monitoring of the welding connections in the steel piping using the non-destructive method, is made in accordance with the requirements of Ordinance No. 0-31 for operation with radiation defectoscopes and Ordinance No. 0-35 for operation with radio active substances and other sources of ionization radiation.

3.5.3. Estimation and assessment of the expected impact of the hazardous physical factors

During the construction works of the project, the basic source of dangerous physical factors, such as noise, vibrations and dust pollution is the constructional equipment machines working on earth works (excavation, filling, raw and other materials transportation) within the regulated area of the town. Pt. 3.1.5 shows that the level of released emissions from the constructional machinery after dissipation is within the limits stipulated by Ordinance No. 14/1997. The construction works will be carried out in series and will cover limited urban areas (street). Only when the construction works for a certain area have been completed they will move to the next sector. Thus, the negative dust and noise impact will be localized i.e. will be limited only within the territory of the project (far below the lowest criterion, which is 5 km) - quite small; impact - insignificant; duration - short term; frequency – once during the implementation period; ability to recoup the negative impact - yes; cumulative effect - no.

The project implementation does not envisage any sources of hazardous physical factors, and no effects whatsoever of such type are expected.

3.6. LAND AND SOILS

3.6.1. Soil characteristics and assessment of the impact on soils, incl.-disrupted land on the territory of the project and the adjacent lands; degrees and zones of disruption

The soils are formed as a result of deciduous trees and grass. The sundry relief, the climate, the soil-formation rock, the vegetation and the other conditions for soil formation determine the main natural soils of economic importance for the area of the town of Veliko Tarnovo i.e grey wooded soils. The soils are grouped in areas by identical origin, soil formation factors, similar physical and chemical properties, mechanical composition and parallel agrotechnical and meliorative activities, together with the eroded grey wooded soils and light grey wooded soils.

Gray wooded soils – they cover the suburban hills to the west and town area. They are boundary with rendzina (humus-carbonate) soils, located east of the terrace of the Yantra River. This type of soils has a differentiated profile. The pseudopodzol horizon is 20-40 cm thick. The thickness content at FFH is 1,2 – 1,3 g/cm^3. The alluvial clays content is 10-20%, and physical clay content is 20 – 40%. FFH = 12 – 15% (at pF = 2,5 – 2,7), VTZ = 5 – 8% (at pF = 4,2). The filtration coefficient is FC = 0,7 – 0,13 m/24h. The alluvial-metamorphous horizon is 60 – 90 cm thick. The thickness content at FFH is 1,5 – 1,6 g/cm^3. The alluvial clays content is 30-55%, and physical clay content is 55 – 75%. FFH = 30 – 35%, VTZ = 15 – 20%, FC = 0,01 – 0,05 m/24h. These soils are distinguished by very low natural fertility. The humus content is 1,0 – 1,5 to 2,5%. The quantity of the total nitrogen is 0.10-0.12%.

The design gas pipeline tracks pass through construction soils having different geo-technical properties (Norms for Field Foundation, 1996). The area of the town of Veliko Tarnovo has a variety of exogenous physic and geological phenomena and processes related to the land erosion, karst and landslides. According to the geological risk map (Committee of geology and mineral resources with the Bulgarian Academy of Science, Sofia, 1994) the town falls within the regions exposed to high geological risk. The foundations of the gas pipelines and the adjoining equipment will be executed only after thorough geological researches during the Feasibility Study are made (NPPF, 1996). The area under study seismically belongs to magnitude I = VIII intensity, and seismic coefficient Kc = 0.15 (NPSS, 1987). Veliko Tarnovo is in close proximity to centers with registered high seismic activity and neotectonic conditions, which puts additional requirements before the seismic stability of the network and the equipment.

Disrupted land on the territory of the project and the adjacent lands

The entire gas distribution network, including the Gas Distribution Pipeline from AGRS to the regulated town area is located under the street network of Veliko Tarnovo. Due to urbanization and the intensive industrial activities in the area of the project, the soils have been transformed into *anthropogenous.* The normal interaction between the different ecosystems (soil - plant - water) is destroyed when dangerous substances or solid impurities enter the soil. Under such conditions the soils are slowly, but progressively exhausted, polluted and changed into negative direction compared to their original state. The soils in the area of the project are not disrupted, i.e. they have normal morphological structure, but have deteriorated solid-formation process, due to the road surfacing. They are exhausted, and by the degree of expression of this trend they are medium-changed.

According to the "Annual Book for the Environmental Conditions in the Republic of Bulgaria", the area of the town of Veliko Tarnovo has no soils that have been polluted by heavy metals. According to Decree of the Council of Ministers No. 50/State Gazette No. 24 of 26.03.1993 for the adoption of Ordinance for the implementation of Art. 10, para. 10 of the Law for the Ownership and Utilization of Agricultural land, and Annex No. 1 to it, in the area of Veliko Tarnovo there are no soils that have been contaminated as a result of the industrial activity.

3.6.2. Disruption or change in the category of land depending on the degree of pollution or disruption; changes in soil fertility

Period of construction

As is listed in pt.1.2 and t. 2.1, the track of the Distribution Gas pipeline from AGRS to the regulated area of the town of Veliko Tarnovo, about 3100 m long, is laid in the agricultural lands (Attachments 1, 2 and 3) of Veliko Tarnovo – Ledenika village, Beliakovets

village, the town of Veliko Tarnovo. The gas pipeline is laid at min. 0,8 m > 0.7 m depth not to affect any farmland or forests and following the restrictive provisions of Decree No. 38/1977 (amend. and suppl. in 1988) The track has been determined, coordinated and approved in accordance with the procedures stipulated in LPE and the Ordinance for implementation of LPE/1996. The excavation works shall be executed in accordance with the provisions for the building and technical standards and ordinance No. 26 for the reclaiming of disturbed terrains, improving the poor productivity land and utilization of the humus layer. According to Section II, Art. 7 (1) for building works on land of categories I - VI, can be preformed only after removal of the humus layer. According to Art. 8 (3) for laying underground pipelines the removed humus is used for recultivation after the latter have been covered up. A 10-m wide zone on both sides of the pipeline is envisaged, taken from the central line (a total of 20 m) for temporary storage of the removed humus soil and the soils excavated during the civil work. The depth of the compacted humus layer after recultivation must be no less than 30-35 cm. As aforesaid, regardless of what option is used the fertility of the soil will remain unchanged, and only restricted regime of land usage shall be introduced.

The excavation works within regulated area of the town of Veliko Tarnovo will be made mostly along the street network. Wherein there are asphalt and asphalt-and-concrete surfacing, the excavation shall have the width of the trench. In excavation works the surfacing on the sides shall not be broken. The excavated material for the broken surfaces will be transported away and deposited at a place specified in advance by the Investor and the Local Authorities. The soil used for refilling, depending on the location of the excavation along the entire track, will be piled up on the sides of the trenches. All earthmoving works will be monitored for compliance with the project parameters, levels, distances from other engineering equipment and the safety technical requirements. After laying the pipelines, they shall be filled in 10-15 cm thick layers above the keying, and 20-50 cm above it, depending on the potentials of the construction machinery. The cost for eliminating the defects established during the construction and assembling works (CAW) shall be bourne by the organization carrying out the works under the project.

As the project envisaged, when the gas pipeline track intercepts with greenery area, then the grass and vegetation will be removed and the soil will be cut at 0.2m depth and will have the same width as the trench. The upper humus layer will be piled up separately and when the trenching is filled, it shall be used as a topmost, finishing layer. After recultivation, the compacted humus layer must be no less than 30-35 cm thick in order to allow the soil to be used for replanting of grass and vegetation.

The negative impact of construction works will be localized i.e. will be limited only within the territory of the project, will occur once during the period of construction works; will recoup the negative impact and will have no cumulative effect.

Period of operation

The operation of the project will have no adverse impact on the soils and the soil fertility. Decree No. 38/1977 stipulated the following restrictions, which will enter into force after the construction of the Gas Distribution Pipeline from AGRS to the regulated area of the town of Veliko Tarnovo:

- the 10-m wide strips of arable land on both sides of the gas pipeline will be implanted with annual crops at nurturing depth of 30 cm;
- it is forbidden to grow fruit trees and other similar plants, which have fast growing root systems at less than 10-m from both sides of the pipeline;
- it is forbidden to set fire and burn the fields after the harvest at less than 20 m away from the gas pipeline, and 30 m from the stopcock equipment and the plugs.

The substitution of conventional fuels for natural gas will eliminate any sulphur oxides and dust emissions, which will improve the condition of the soils in project area. The purging of dust depositions will reduce the secondary dust formation and soiling of the surface layer with anthropogenous products. At the same time there shall be no longer any need of storage facilities and transport used for the supply of traditional fuels, which are a source of soil pollution with oil products, coal dust, wastes.

3.7. EARTH GROUND

3.7.1. Geological base

Characteristics of the geological base and anticipated change in its condition as a result from the project

The rock complex forming the Pre-Balkan morphostructural zone consists of old volcanogenous and sediment rocks known as diabasephillitoid formation, Paleozoic granitoids, dyke rocks, conglomerates, sandstones, limestones and dolomites of different facieses and age. Within the mid-area of the zone of Veliko Tarnovo, there are fused sediment rocks (Lower Cretaceous limestones, marls, sandy limestones, sandstones), unfazed rocks (Quaternary materials: sands, clays, loess and alluvial deposits) - erosion-resistant. The Pliocene sediments are represented by sands and clays and occupy large areas of the river valleys. The alluvial depositions are made of boulders, sands and clays of crossed deposition. Their thickness is the greatest in the river valleys - up to 8-12 m. They are not fused and are rich in ground waters.

Engineering-geological and hydro geological characteristics of the town of Veliko Tarnovo

Based on the geologo-lithological structure, the hydro geological conditions and the physic
geological processes manifested in the town of Veliko Tarnovo, the latter falls within a specified geo-morphologic and geologotectonic structural Pre-Balkan area. It is characterized by mountainous and rising ground and hills. The deeply cut valley of the Yantra River and its steep slopes shape to a great extend the general relief of the area. The sea sedimentary rocks and semi-rock types (sediments) are prevailing. Less seen are such substances as clay and clay slates. The region has high tectonic disruption and cut through by smashing sheaves, resulting in deteriorated solidity of the rock masses. The limestone has high amount of karst and is rich in karst waters. There are also few cracks and leakages in the marls and the marl sandstones.

In conclusion, the area of Veliko Tarnovo has complex geologotectonic structure, determined by the variety of geologic forms and their inconsistent engineering and geologic behavior.

The construction and the operation of the project will not result in any modification of the geological base and the relief in the area of the town of Veliko Tarnovo.

Estimation and assessment of the anticipated impact of the modified geological base on the existing structures, other environmental subjects and components

The project implementation i.e. the laying of the gas distribution network at 0.8 - 1.0 m depth from the ground level will not affect the geological base, therefore no effect is expected on the existing buildings and projects in the area of the town of Veliko Tarnovo, as well as to the environmental components, directly related to it.

3.7.2. Natural underground resources

The implementation of the Gasification of the town of Veliko Tarnovo project is not related to the exploitation of any natural underground resources. The natural gas, as an underground natural resource, is produced outside the boundaries of the Republic of Bulgaria.

3.8. FLORA AND FAUNA, PROTECTED TERRITORIES OF NATURE

3.8.1. Characteristics of the current condition; estimation and assessment of the impact on the flora - on dominant and endangered flora species; changes in their condition as a result from the project implementation

The climatic factors, the relief and the soils in the area of the town of Veliko Tarnovo form specific conditions for the growth of different type of plants.

Natural plants

The territory south of Veliko Tarnovo is occupied by cseroterm grass formations with prevailing belizma, bulbous lawns, plants and ephemeras. To the north, the area is occupied by bushes with prevailing thorns (Paliureta spine Christi) together with cseroterm grass formations of oak (Quercus cerris L.) and cerris oak (Q. frainetto). This area has also mixed forests of manna-ash (Fraxinus ornus L.) and is sparsely covered by yoke-elm (Carpinus orientalis) grown as a secondary formation. To the east, the area has mixed forests of silvery-white lime trees (Tilia tomentosa Moench) with ordinary yoke-elm (Carpinus belutus L.) and at places with cerris oak (Quercus cerris L.), as well as durmast (Q. dalechampii), field maple (Acer campestre L.), etc. Next to the agricultural lands west of the town, there are mixed forests of cerris oak (Quercus cerris L.), granitza (Q. pubescens Willd) and Virgilian oak tree (Q. Virgilian Ten.).

The agricultural lands are situated west and southeast of the town of Veliko Tarnovo.

Crops

Vegetation in the town zone is of park-type - grass area sown with ryegrass and street greenery, represented mainly by the tree species: horse chestnut, birch, lime-tree, poplar, silver and common spruce, etc. According to the General Town Plan, the public greenery areas in the town territory come to 8 m^2/citizen.

The farmland areas have annual grain and fodder crops and different vegetables, depending on the market situation.

The construction works on the track of the Gas Distribution Pipeline from AGRS to the regulated area of the town of Veliko Tarnovo may damage the perennial crops during their vegetation period, for which the Investor shall indemnify the owners of the crops. The track of the gas pipelines shall not affect the perennial crops. For this area it is advisable to perform the construction works in September – April period, when the agricultural production is already collected.

The construction works under the project shall have a temporary adverse effect on the existing vegetation in the town greenery areas. The tracks of the gas pipelines shall not affect the perennial crops. According to Ordinance No. 1/10.03.1993 of the Ministry of Territorial Construction for the protection of greenery areas and decorative plantation, Art. 9, para, 10, the Investor shall cover all damages at his own expense. When regenerating the decorative plantation in the gas pipeline zone it is forbidden to plant trees having deep root systems.

The operation of the project is not related to any unfavorable effects on the natural and cultivated vegetable species in the area of the town of Veliko Tarnovo. The basic technological processes will have no direct or indirect effect on the vegetation. Solely the plantation of perennial vegetation species having deep root system is not allowed in the zone of the gas pipelines, in conjunction with the provisions of Decree No. 38 for the safety of the gas supply system.

Nitrogen oxides prevail in the emissions released from the user natural gas-fired heating system equipment. The maximum NO_2 concentration limit released from the user heating system equipment is within 0.7 times the MAQ av.day (Ordinance No. 14/1997), during the heating season and 0.17 times MAQ av.day notduring it. The release of NO_2 is limited on the area between the Central Town Part and Arbanasi Industrial Zone. The NO_2 released in the remaining part of Veliko Tarnovo is considerably under the MAQ av. day. This determines its impact on the town vegetation as insignificant.

To this end the impact of the project on the flora can be assessed as local by territorial range; insignificant; short-term; occurring only once; easy to restore; with no cumulative effect.

The designation of the project, related to the replacement of solid and liquid fuels by natural gas shall improve the quality of the atmospheric air, expressed in the elimination of sulphur oxides and inert particles (dust, ashes). This shall have an exceptionally favorable effect on the greenery areas in the town part and the vegetation in the suburban zones.

3.8.2. Characteristics of the current condition and assessment of the impact on the fauna - on dominant and endangered animal species; migration corridors; changes in their condition as a result of the project implementation

Several basic groups represent birds: Corvidae, Mothacillidae, Emberizide, and others. In the near locus representative are also met of the Colubidae, Hirundinidae, kite (Faslco tinunculus), house sparrow, and others.

Mammalian: in the locus near the town, mainly small mammalian and muridae rodent, hare, foxes and other animals typical for the climatic conditions and the altitudes above the sea level, are found.

The construction and operation of the project are not related to any unfavorable effect on the natural and cultivated animal species in the area of the town of Lyaskovets,

3.8.3. Characteristics of the current condition and assessment of the impact on the protected territories of nature and objects, and changes in their condition as a result of the project implementation

There are no registered protected territories and objects on the territory of the project.

3.9 LANDSCAPE

3.9.1. Brief description of the main features of the structure and the operation of landscapes in the area under examination and assessment of the potentials for the attaining the aims and objectives; any changes in the structure and functioning of landscapes

All environmental components are also elements of the landscape and form an interconnected and determined unity. The hierarchic ladder of the components of the landscape is: geological structure - lithology - relief - climate - waters - soils - vegetation - animal life. The landscapes subject to one or another extent to the anthropologic effect is either transformed or cultural sites.

The quantitative and qualitative indicators and criteria of the landscape system divide it into landscape subsystems and areas. Some of the established conventional limitations of the landscape subsystems and areas overlap with the boundaries of the physic-geographical regions, sub-regions and areas. Veliko Tarnovo is located in the Balkan Mountain landscape subsystem (II), covering, in the said conventional boundaries, a territory of 23660 km^2 (forming 21.4% of the country's territory), a medium-sized Middle Balkan Landscape area (II_2) with a territorial size of 5869 km^2.

The relief of the area of the town of Veliko Tarnovo is plain-type and undulating. It falls within the transition between the Danube morphostructural zone - middle region and the Pre-Balkan morphostructural zone - middle region, but formally belongs to the second one. Low mountainous relief is prevailing; the mountain hills are developed parallel to the Balkan Mountain Range. In the relief the anticline and the monocline elevations and synclinal valleys are predominant. A great part of the gorges are tectonically determined. The Pre-Balkan is formed basically of limestone rocks with prevailing normal folds. The low-mountainous relief is related to normal plicate structures. The average above sea level of the zone is 364 m. The hilly belt occupies 89.6% (14390 km^2), the mountain crests of 600-12500 m height occupy the remaining 10.4%. The valley network is developed in grated form. The valley asymmetry has local distribution. Along the river valleys there is strong soil erosion, due to the relief characteristics, the height above sea level, the rock substrate, the exposition and the inclination of the slopes.

The project is situated in an anthropogenous landscape - the urban medium of the town of Veliko Tarnovo, which is well suited for the implementation of its objectives without changing the structure and the functions of the landscape.

The construction and operation of the project will have no effect on the landscape and will not change its classification.

3.9.2. Analysis and assessment of the landscape pollution migration

The specificity of the technological processes of the Gasification of the town of Veliko Tarnovo project does not involve any release of environmental hazardous emissions. Pt. 3.1.5 explains in greater detail the contribution of the natural gas consumers to the atmospheric air pollution. Nitrogen oxides are the priority pollutants. The migration range is within the anthropogenous landscape (Fig. 11). The impact has low intensity - considerably under the MAQ av. day, according to Ordinance N. 14/1997. Under unfavorable conditions i.e. in quiet weather during the heating period, the most impacted is IZ Arbanasi, while during summer the most affected area is south of IZ Arbanasi. At over 2.0 mm/s velocity of the wind and prevailing westward strong winds, the pollutants are shifted to the east, outside the residential area. Pollutants are migrated through the air, have low intensity and do not adversely impact the landscape structure and functions.

3.9.3. Assessment of the potential for self-cleaning and self-restoration of the landscapes

The implementation of the project will purge the sulphur oxides and dust resulting from the combustion of the conventional fuels and the released wastes. The total amount of emissions is reduced by 9.7 times. This is exceptionally favorable for the self-purification and self-restoration of the landscapes, and that by the introduction of natural gas as energy source, the anthropogenous loading will be reduced to a great extent and will fall within the standards.

3.9.4. Projections and assessment of the expected disruptions of landscapes considering their resistance to the specific disruption

The construction and the operation works under the project will not result to any modification of the classification of the landscape, its structure and functional characteristics.

3.10. CULTURAL HERITAGE

3.10.1 Availability of historical, archaeological and architectural monuments

The town of Veliko Tarnovo has rich historical heritage, which is evidenced by the number of architectural, archeological and cultural monuments. There are total of 1087 reserves, centers, and architectural and unique cultural monuments on and near the territory of the town. Well known amongst them are:

The architectural monument and museum Tsarevets – of national importance;

Trapesitsa Reserve – of national importance;

Momina Krepost Reserve – of national importance;

Churches (5) and old buildings (2) in Assenova Mahala – of national importance;

Architectural monuments - houses and churches dating back to the Bulgarian Renaissance (670), and others.

3.10.2. Prognostication and assessment of the impact of the project on the current condition of the historical, archaeological and architectural monuments

The construction and operation works under the project will not adversely impact the cultural and historical heritage of the town of Veliko Tarnovo. The obliteration of the sulphur oxides and dust will create more favorable conditions for the preservation of open-air monuments of culture.

4. ENVIRONMENTAL HEALTH AND HYGIENIC ASPECTS

4.1. Identification of the potentially endangered population and territories, zones and projects having specific hygiene protection status or subject to health protection, depending on the envisaged territorial range of the environmental component effects

The Gasification of the town of Veliko Tarnovo project covers the entire territory of the town. To this end the whole population of Veliko Tarnovo is exposed to adverse emissions released from natural gas combustion in the user heating system equipment. This

adverse impact is specified in pt. 3.1 as insignificant and within the requirements of Ordinance No. 14/1997. The Project location and activities comply with the provisions of Ordinance No. 21/1990, Art. 7, pt. 5 for the protected zone around the AGRS (100 m from the project boundaries) and Attachment 6 to Art. 26 for the minimum distance requirements between the AGRS and urban areas, industrial enterprises and other structures (max 100 m). The activities specified in Art. 4 of Decree No. 38/1977 and Art. 3 and Art. 5 of the same Decree are forbidden in the protected zone. GRP, which are built in the distribution gas pipelines in urban areas and on the territory of physical and legal persons must meet the requirements of Chapter 4, Section I, of Art. 67 to Art. 83 of Ordinance No. 21/1990. The project also complies with the maximum allowed levels of sound pressure in the different territories and urban areas (State Gazette, No. 16/1975). The emissions released in the air as a result of the construction and operation works under the project must not exceed the norms specified in Ordinance No. 14/23/09.1997 for the MAQ of dangerous substances in the atmospheric air in urban areas (State Gazette, No. 88/1997). The temporary deposition heaps from the excavated soil and humus will be reclaimed. The broken street surfacing and greenery will be restored. The operation works under the project do not require consumption of natural resources and represent no source of wastewaters and wastes requiring treatment and deposition.

The health and hygienic conditions of the living environment will improve along with the elimination of the noxious sulphur oxide and dust deposition.

4.2. Identification of the risk factors, which may damage human health

Natural gas is variable in composition (mainly due to its sulphur content). It is nearly twice lighter than air, which predetermines its retention in the upper parts of closed premises unlike the propane-butane gas. It evaporates in open space and micro sites. It has no smell. In industry no odouring is made, and its presence is established by means of a gas-analyzer. It undergoes odouring treatment when is used in public and residential buildings. It is felt in the air when at 1% concentrations. Natural gas is fired in the form of gas-and-air mixture. The ignition temperature is 650° C, and the time for its ignition at that temperature comes to 10 sec., at t = 1000° C it is 1 sec, and at 2000° C it is instant. The explosion concentration is 5-15 vol.% to air. Explosion occurs in case of availability of gas-and-air mixture in explosive concentration; the source of ignition is the required temperature; opportunity for forming pressure. The building structures are destroyed at explosion wave pressures exceeding 0.035 MPa. The toxicity of the natural gas is bound with the content of methane. If the oxygen content of the gas-and-air mixture is below 20%, then respiration problems may appear, if it is below 12%, this may be lethal.

4.3. Characteristic of the individual factors influencing human health and comparing those to the existing hygienic standards and requirements. Identification of the main risk factors by importance

The technological processes in the Gasification of the town of Veliko Tarnovo project are no source of any harmful impact on human health when carried out in compliance with TBT, as the tubular network is located underground and the gas regulation points are fitted in open air. According to the requirements of Ordinance No. 21/1991 all indoor premises, where gas equipment is fitted must be furnished with vents or forced ventilation, ensuring the necessary air exchange, as well as facilities for discharging the combustion products in the atmosphere. The envisaged instrumentation and automation will reduce to a minimum any potential emergency situations, which might adversely impact human health.

4.4. Assessment of the combined, complex, cumulative and remote effect of the established factors

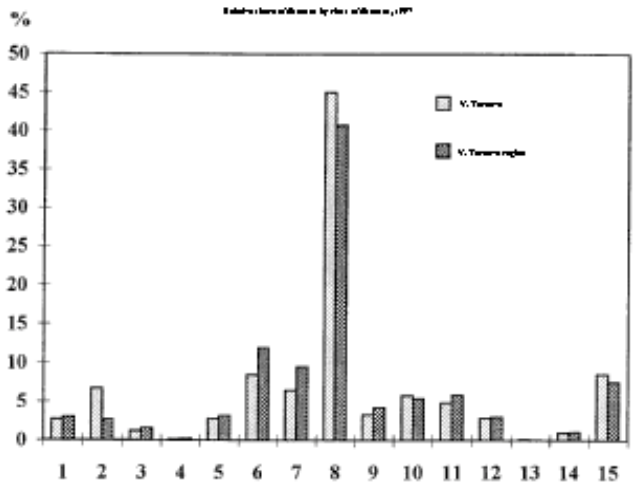
In conjunction with pt. 4.3, no complex and cumulative effect of the potential factors can be expected.

4.5. Characteristics of the risk exposure

The technological processes taking place in the gas supply network of the town of Veliko Tarnovo are no source of dangerous emissions, requiring an analysis of their exposure. In the replacement of conventional fuels with natural gas, the character of the exposure is preserved as far as its range, duration and intensity in pt. 3.1 are concerned, but with the removal of the noxious sulphur oxides and inert pollutants, the health and hygienic conditions of the living and working environment in Veliko Tarnovo will improve.

4.6. Health condition of the affected population

The morbidity of the population in the town of Veliko Tarnovo is formed under the effect of the labor, living, ecological and social environment.



LEGEND:

1. Infectious diseases and parasites; 2. Neoformations; 3. Diseases of the endocrine glands, digestion, metabolism and immunity; 4. Blood diseases and blood organs; 5. Psychic disorders; 6. Nervous system and sensory organ diseases; 7. Blood circulation diseases; 8. Respiratory system diseases; 9. Diseases of the digestive tract system; 10. Urology and gynecology diseases; 11. Skin and subcutaneous tissue diseases; 12. Osteoporosis and muscle system diseases; 13. Congenital diseases; 14. Symptoms, indications and poorly diagnosed conditions 15. Traumas and poisoning.

The distribution of the registered diseases in the town of Veliko Tarnovo and the Veliko Tarnovo Region, by class of diseases for the year 1997 is shown based on the information supplied from the District Health Center in Veliko Tarnovo.

The largest share of diseases belongs to the respiratory system diseases (45.03%), followed by traumas and poisoning (8,54%), neural system and sensory organs (8,47%), neoformations (6,69%) and blood circulation organ diseases (6.43%). The relative share of the respiratory system diseases in the municipality is lower than in V. Tarnovo region – neural system diseases (11.94%) and blood circulation organ diseases (9.43%). It is disturbing that in 1997 the relative share of registered neoformations in the municipality (6,69%) considerably exceeds the percentage for the region (2,26%).

The diseases of the respiratory system among the children and adult population are in correlation with the air pollution with dust and sulphur gases, released by the use of conventional fuels as energy source. Children have the largest exposure.

The same pollutants, due to their irritation effect, demonstrate a reliable relation to the inflammatory eye and skin diseases.

4.7. Assessment of the health risks, measures for health protection and control

The elimination of pollutants such as dust and sulphur dioxide and the reduction of the quantity of dangerous emissions released in the atmosphere will improve the health and hygienic conditions, the living and working environment in the town of Veliko Tarnovo.

5. LIST OF EMPLOYED METHODS FOR THE ASSESSMENT AND PROGNOSTICATION OF ENVIRONMENTAL EFFECTS

1. Methods for determining the emissions released by the combustion processes carried out in the energy sector, industry, residential heating and by the technological processes, approved by the Minister of the Environment, 1992, amended and supplemented in 1994, included in the List of existing methodology for assessment and prognostication of the environmental impact.
2. PLUME models - for calculation of gas and aerosol dispersion - included in the List of existing methodology for assessment and prognostication of the environmental impact - MEW publication, p. 20, No. 8, No.9, No.10. No.11, No.12/
3. Methods for calculation of concentrations in air of harmful substances present in emissions from enterprises – CIS 86, Gidrometeoizdat, 1986.
4. Instruction No. RD-00-11/1994 of the Ministry of Agriculture for determining the type and degree of pollution of agricultural lands by urban areas and their regime of usage - Bulletin of Ministry of Agriculture, 1994

6. POSSIBLE WAYS AND MEANS FOR ATTAINING THE PROJECT PURPOSES

6.1. Availability and characteristics of the possible ways for project implementation - location, technological capabilities, capacity

There is no alternative source of natural gas for the Gasification of the town of Veliko Tarnovo project in terms of location, technical capabilities and capacity. As far as the technical implementation of the gas supply network is concerned, there are three basic ways to do this: interconnected, branching and mixed network, executed of steel or PE-HD piping. The equipment involved in carrying our the technological processes in the gas supply network, such as AGRS, GRP, GRMP, SCU, gas metering boards, etc. are standard and can be purchased by reputable companies and accompanied by certificates for their fitness.

The feasibility study phase examines and compares three basic alternatives for project implementation:

- 1st Alternative: two-stage pressure regulation - 12/0.1 bar. By means of Gas Distribution Pipelines (GDP) (steel, 12 bar, 23041 m long), commencing at AGRS and supplying all users in the industrial and public and administrative sectors, and No. 11 GRP (TS) where the pressure is reduced to 100 mbar. The town and the town section networks merge into a common low-pressure network (100 mbar), commencing at GRP Town Sector) and covers all the users. It is 42492 m long of PE-HD (polyethylene). The Gas Distribution Pipelines (GDP) network is laid underground, mainly along the street and road network of Veliko Tarnovo. The distribution network is of the ring-type; incl. 4 individual town sections – Central Town Section, Zone C TS, Cholakovtsi TS and Kartala TS.
- 2nd Alternative: three-stage pressure regulation - 12/4/0,1 bar. By means of GDP (steel type, 12 bar, 14943 m long), commencing at AGRS and supplying industrial users, and No. 1 GRP (Town) where pressure is reduced to 4 bar, and No. 3 GRP-TS 12/0,1 bar. The town distribution network of medium pressure (4 bar) starts from GRP (T) and supplies the users in the Public and Administrative Sector (PAS) by means of the existing steam generators and No. 7 GRP-TS. It is made of PE-HD, 18070 m long. The GRP-T reduces the pressure from 4 to 0,1 bar and

supplies gas to the low-pressure town section distribution network (100 mbar). All RS users are connected to this network. It is 33942 m long and is made of PE-HD. The Town and Town Sections distribution networks are of the ring-type.

Due to the advantages of the second alternative i.e. meeting consumption needs, extension of the network without changing the diameters of the gas pipelines, multiplication in the constructional works, and less initial investments, the Internal Technical Committee of OVERGAS Inc. AD has selected and approved it as authentic for project implementation. Based of the authentic project, the Architectural and Town Planning Commission (ATPC) of the Veliko Tarnovo Municipality has prepared all required documentation for the approval of gas pipeline network tracks. The ATPC of the Veliko Tarnovo Municipality. (Annex) has also approved the GDP track from AGRS to the regulated area of the town of Veliko Tarnovo.

6.2. Analysis of the alternatives according to their environmental impact, incl. analysis of the "zero" alternative

The two alternatives for the implementation of the project have different technical characteristics, but represent no alternatives as far as the impact on environmental components is concerned. As aforesaid the basic objective of the project is to replace conventional energy sources with natural gas. To this end the two alternatives envisage the same number of the users, quantity of replaced fuels and levels of natural gas consumption. Pt. 3.1.5 compares the environment impact of the "zero alternative" (existing situation) and the authentic alternative for project implementation. The assessment and the prognostication are based on full utilization of the capacity of the combustion installations and equipment, both fired by liquid and solid fuels, and also by natural gas. During construction works certain changes in some of the elements of the design are possible, however, this must not be seen as alternative of the main scheme and will not change the statements and conclusions already made in the EIS about the positive effect on the environmental components.

The analysis on the replacement of solid and liquid fuels in industry, in the administrative and communal service buildings and the residential sector of the town of Veliko Tarnovo shows that the total amount of released emissions will be reduced 7.6 times. The release of sulphur oxides, dust and ashes from organized sources is terminated at nearly 100%. The amount of nitrogen oxides grows by 1.05 times, but the simulation test for their dissipation shows no excess over the maximum concentration limits. When the standards for the maximum allowed emission (MAE) are observed, the quantities of CO are insignificant as a result of the complete combustion in the natural gas-fired heating and energy installations and equipment. This demonstrates the advantages of the natural gas compared to other fuels and the vitality of the design for improving the ecological situation in the town of Veliko Tarnovo.

The assessment unconditionally proves the insignificant adverse effect and the positive impact on the environmental and human health components, due to the replacement of the conventional fuels with natural gas, and justifies the ecological and social importance of the project. Using the existing prognostication methods, based on mathematical statistics, the probability and digital modeling when estimating the trends of development of the town of Veliko Tarnovo, the reliability of the prognostication was confirmed, regardless of the change in some specific technical solutions, which may occur during construction works.

Based on the above it can be confirmed that given the geographic location, climate, natural, social and economical conditions, as well as the environmental components, there is no other alternative, but the Gasification of the town of Veliko Tarnovo project.

6.3. Characteristics of the possible ways for attaining the project purposes, envisaged during its preparation and reasons for rejecting them

The two alternatives examined for the implementation of the project represent no alternative as far as their environmental impact is concerned, however, they have different technical and economical indicators, safety and reliability of the gas supply. The rejected alternative has lower complex assessment.

7. MEASURES FOR THE REDUCTION OF ANY NEGATIVE CONSEQUENCES

The project implementation will not have any harmful impact on the environmental components, which may later on lead to permanent and irrevocable damages.

The construction works under the project must be carried out in agricultural land only during the non-vegetation period for the crops in order to avoid obliteration of agricultural products.

In order to reduce the quantity of the nitrogen oxides and carbon monoxide released during the combustion of natural gas it is necessary to maintain the high quality of the combustion processes and observe the limitations listed in pt. 4.1 [Standards for allowable emissions (concentration in waste gases) of hazardous emissions released in the Atmosphere (State Gazette, No. 81/1991), Art. 20, paras, 1,2,3,4)].

8. ASSESSMENT OF THE PLANNED ACTION IN EMERGENCY SITUATIONS AND SALVO POLLUTIONS (based on the action plan in emergency situations and containing):

8.1. Risk assessment in emergency situations and salvo discharge of pollutants, which may affect the environmental and human health

Any emergency situation in the Gas Supplying System may impose a risk of uncontrolled gas release, resulting in the formation of fire- or combustible concentrations. Pt. 2.1 examines the basic physic-chemical properties of natural gas and analyses the different risks in emergency situations.

The experience of the countries with developed urban gas supply systems shows that the most frequent emergency situations or salvo natural gas releases are caused by leakage or breaking in the gas pipelines. This is often due to defects in the butt welding seams in assembly works, or factory-made seams, defects in the basic metal of the pipes due to laminations in the metal, non-metallic inclusions, deep injury or corrosion. The above may be also caused by prohibited pressure increase, or external intervention – hit a blow caused by an earth-moving machine or any other mechanism.

If there is an outdoor gas leakage there is no danger of explosion, because natural gas is lighter than air and dissipates in the atmosphere. At small gas leakages there is danger of gas concentration in closed premises. There may be a risk of explosion only in closed premises with high concentration of combustible substances, listed in pt. 2.1.

8.2. Measures and methods for prevention, restriction and elimination of the risk of pollution in emergency situations

Gas supply will be safe only after all normative documents, project regulation, construction works, acceptance and operation of the gas supply systems are complied with, such as: Ordinance No. 3 for designing gas supply systems for the urban areas and gas installations and equipment in buildings operating on natural gas; Ordinance No. 21 for the design and safety operation of the gas equipment and installations; Ordinance No. 4 for monitoring and acceptance of gas supply systems in the urban areas and gas installations in buildings; Ordinance No. 2/1987 for the PSTN, Regulations for the design of electrical equipment, 1981, BSS 15704 - Corrosion Protection. Equipment metal, underground. General Technical Requirements, BSS 15705-83 - Corrosion Protection, equipment, underground, metal. Measuring and supervision methods.

All processes in the gas supply system of the town of Veliko Tarnovo are automated, equipped with the necessary instrumentation, information and communication network. All necessary measures for lightning protection and earthing of the equipment are envisaged. As an example, one can indicate the automatic operation of the regulation lines in GRS, wherein any raising of the initial pressure (e.g. switching off of a large-size user), and inability of the basic regulator to react due to some reason in the supply of 1.1 Pout pressure, the monitor starts up. If for some reason the monitor also fails to reduce the pressure, at 1.25 Pout the

safety valve releases gas in the atmosphere through the plug. If pressure reaches 1.3 Pout a cut-off device is actuated and the pressure at the inlet drops. When reaching 0.9 Pout a spare line opens up. If pressure is again raised, at 11.5 pout the cut-off device of the spare line closes. The gas supply to the users is terminated. When pressure in the basic line goes up to 0.9 Pout, the regulator of the basic line opens. If pressure drops to 0.5 Pout, the supply of gas to the users is terminated.

For the prevention and limitation of natural gas emergency release, according to Art. 409 (1) of Ordinance No. 21/1990, works on the elimination of emergencies are carried out in accordance with specially developed instructions in the introduction and operation of the gas equipment and installations by the owner or the user. In this point, the basic principles of the measures in emergence situation are given in an Emergency Plan, developed by the Employer, which includes the following directions:

1.Announcement - this is made to the people in the area of the emergency (50-100 m radius); the officers in charge of the endangered sites; the Civil Defense; the Ambulance Service; the Gas Supply Company; the dispatcher on duty of BULGARGAZ; the local police office - tel. 160; the Rescue Team; the Traffic Control Police - tel. 166; Overgaz Engineering OOD - tel. 046/3 52 0-3;

2.The Emergency Department of the Gas Supply Company must undertake immediate actions for discontinuing the leakage of natural gas; first aid to the casualties;

3.The security authorities restrict the access by people and motor vehicles to the emergency area.

4.Rehabilitation works:

- Reconstructing the gas pipeline and its equipment;
- Quick continuation of gas supply with the observance of all safety requirements;
- Setting up of the necessary MTB for the due restoration of the faults occurring as a result of the emergency;

The fulfillment of these tasks calls for trained managers, the existence of Civil Defense Teams and the involvement of the population in learning and realizing the protection methods and the rescue and emergency activities in events of explosion or fire. During the training sessions the efforts must be focused at creating such behavior of the population, which will force them to immediately react in the event of uncontrolled leakage of natural gas.

The Gas Supply Company must put all efforts and resources in order to overcome the release of natural gas within 30 minutes after it has started and to reinstate gas supply in the emergency sector within 24 hours.

9. PLAN FOR OWN MONITORING

The basic technological processes in the gas distribution system of the urban areas include: transportation of natural gas, gas distribution and gas metering, and represent no of dangerous emissions. The emissions are released in the user firing installations, which are not property of the gas distribution network owner; thus, shall not be discussed by this Report. In this situation, there is no need for own monitoring system outside the resources used for technical monitoring and control, ensuring the normal operation and safety of the gas distribution network, regulated in the normative enactment provisions for designing, building, acceptance and operation of the gas supply network in urban areas.

According to the requirements of Ordinance No. 21/1990 for the design and safe operation of gas equipment and installations, prophylactic servicing is performed of the underground gas pipelines and the appurtenant equipment by going along the track inspection within times ensuring their safe operation (Art. 330).

When making the inspection along the track any gas presence in all shafts and control piping along the gas pipeline is checked, as wells shafts (water supply, sewing, heating system etc.), as well as collectors, basement premises of buildings, shafts of bridge stays and others, which are found within a distance of 15 m of both sides of the gas pipeline (Art. 334).

The monitoring of the state of the air medium (gas presence) in the collectors, sewages, technical corridors, basements, covered trestles and other premises is made by automatically actuating gas analyzers which send a signal to dispatching or other points wherein the staff is on 24-hour-duty or by periodic inspections for the presence of gas within the terms of time ensuring safe operation (Art. 332, para. 2).

The Gasification of the town of Veliko Tarnovo project is a large-scale infrastructure project, aiming at replacing conventional fuels by natural gas. Via the gas supply network, natural gas is supplied to the three types of users: industrial enterprises, PAS and RS, located on the entire territory of the urban area. The basic pollutants released as a result of natural gas combustion in the energy and heating equipment and user installations are NOx and CO. As aforesaid the owners of the combustion installations shall bear all responsibility for their condition and environmental impact. The competent authorities must supervise the compliance with all normative documents for prevention of atmospheric air pollution within the emissions and immisions framework. The purpose of the project, its capacity and environmental impact do not require monitoring of the state of the remaining environmental components: waters, geological base, relief, soils, flora and fauna.

10.CONCLUSION

10.1. References

The results of the project researches made in order to assess the environmental impact of the Gasification of the town of Veliko Tarnovo project leads to the following:

1.The project has ecological importance. It aims at replacing the use of solid and liquid fuels in industry, in the administrative and communal service and in the residential sector in the town of Veliko Tarnovo with natural gas, which has the lowest possible emission generation.

2.The analysis on the replacement of solid and liquid fuels in industry, the administrative, the communal services and the residential sectors in Veliko Tarnovo, shows that the total quantity of released emissions is reduced 7.6 times. The release of sulphur oxides, dust and ashes from the organized sources is nearly 100%-terminated. The quantity of nitrogen oxides increases by 1.08 times; however, the simulation test for its dissipation shows no excess of the maximum concentration limits. When the standards of the allowable emissions are observed, the amount of CO is insignificant, as a result of the complete combustion in the gas-fired heating and the energy-consuming installations. This shows the advantages of natural gas before the remaining types of fuels and the vitality of the project for improving the ecological atmosphere in the town of Veliko Tarnovo.

3.The project location and activities comply with the existing legislation in the field of environmental protection, the health and hygiene and building standards in the Republic of Bulgaria.

4.The construction and operation works under the project have no negative effect on the environmental components: air, surface and ground waters, soil, flora, fauna and human health; on the contrary, it shall improve the state of the environment and the living environment in the town of Veliko Tarnovo.

10.2. Conclusions

The conditions for the design and construction of gas supply systems in urban areas were regulated by the acceptance of Ordinance No. 3/20.02.1995 for the design of systems for gas supply in urban areas and gas installations in natural gas-fired buildings, and Ordinance No. 4/20.02.1995 for the control and acceptance of gas supply systems in urban areas and gas installations in natural-gas fired in buildings. By their character, these are large-scale infrastructure designs, the designing of which undergoes two phases: feasibility study and working design.

The EIS on the Gasification of the town of Veliko Tarnovo project, the individual subprojects have been examined in their general technological relation intended to make full assessment of the comprehensive environmental impact. The EIS has been developed in

accordance with the requirements of Art. 9 (1), pt. 1 of Ordinance No. 4 for Environment Impact Assessment (7.07.1998). The assessment, the project impact prognostication and the conclusion were made in accordance with the requirements for the norms and standards as per Art. 2 of the Law for Environmental protection (LEP), and in a range provided for in Annex No. 2 to Art. 13, para. 1, pt. 2 of Ordinance No. 4 for the Final report. The made assessment categorically proves the insignificant impact and the positive effect on the environmental components and human health, due to the substitution of the used conventional fuels for natural gas, and specifies the designation of the project as ecological and social. On the basis of present-day prognostication methods made, based on mathematical statistics, the probability and digital simulation in accounting for the development trends of the town of Veliko Tarnovo, the prognostication validity was reliably determined, regardless of the changes of some specific technical decisions which had occurred during the time of construction.

In conclusion, the team of independent experts of CONTROL P EOOD proposes to the Expert Council of the Area Inspectorate of Environment and Waters to accept the present EIS as final, in accordance with the provisions of Art. 9 (2) of Ordinance No. 4/7.07.1998, and gives permission for the implementation of the project, and also in accordance with Art. 20 (2), pt. 2 and Art. 20 (3), pt. 1.

M I N U T E S

Today, 12.06.1998, in the town of Veliko Tarnovo, on the grounds of Art. 29 of the Ordinance for implementation of LPE for determining, coordinating and approving the tracks for linear lines and Order No. 416/5.06.1998 of the Mayor of the Veliko Tarnovo Municipality, a Commission has been gathered consisting of:

CHAIRPERSON: Dobrinka Radkovska –Regional Land and Land Property Office, Veliko Tarnovo,

AND MEMBERS:
1. Ivanichka Viatrova - Veliko Tarnovo Municipality
2. Dipl. Eng. Dimiter Dimitrov - RAHOVETSGAS 96 AD, Gorna Oryahovitsa
3. Dipl. Eng. Nadka Baicheva – PK, Veliko Tarnovo
4. Dipl. Eng. Maria Doncheva – GS – Veliko Tarnovo
5. Dipl. Eng. Iossif Vassilev - OVERGAS Inc. AD - Sofia.

TO: determine the track of the gas pipeline connection from AGRS located on the land of the village of Ledenika to the town of Veliko Tarnovo and its industrial zone.

On the grounds of the proposed options and after the on site inspection of the track area, the Commission has taken the following

DECISION:

Determines the gas pipeline track for the Gasification of the town of Veliko Tarnovo Project, Sub-project: Gas pipeline connection from AGRS to the town of Veliko Tarnovo on the grounds of THE SECOND OPTION, i.e. north of the Sofia-Varna Highway-4 to the crossing point in the area of the western road ring within the regulated area of the town.

From AGRS the gas pipeline track goes down the project road envisaged in the territorial planning scheme i.e. currently known as curbstone to the land of the Ledenika village, Veliko Tarnovo Municipality. In the area of the western road ring the track of the gas pipeline connection crosses the Highway - 4.

The total length of the gas pipeline connection is 3 100 m.

The proposal and the alternatives approved by the Commission shall be inseparable part of these Minutes. No forests belonging to the State Forest Fund, or natural reserves shall be affected.

In accordance with the Ordinance for implementation of LPE the Investor shall seek the approval of TVD Veliko Tarnovo, PK - Veliko Tarnovo and all concerned organizations for the area within the territorial planning of Veliko Tarnovo where the track of the gas pipeline connection will be located.

The Investor shall also prepare a map showing the exact coordinates of the curves of the gas pipeline.

COMMISSION:

CHAIRPERSON: (Sgd) /D. Radkovska/

AND MEMBERS:

1. (Sgd) I. Viatrova

2. (Sgd) Dipl. Eng. D. Dimitrov

3. (Sgd) Dipl. Eng. Iv. Ivanov

4. (Sgd) Dipl. Eng. N. Baicheva

5. (Sgd) Dipl. Eng. M. Doncheva

5. (Sgd) I. Vassilev

VELIKO TARNOVO MUNICIPALITY

TRANSCRIPT – EXCERPT FROM MINUTES
NO. 14/15.07.1998 OF THE ARCHITECTURAL
AND TERRITORIAL PLANNING COMMITTEE
OF THE TOWN OF VELIKO TARNOVO

……
……

16. TRACK OF GAS PIPELINE FOR PROJECT: GAS DISTRIBUTION PIPELINE FROM AGRS – LEDENIKA TO THE TOWN OF VELIKO TARNOVO – II ALTERNATIVE

PREPARED BY: DIPL. ENG. VALENTINA MITKOVA
CHIEF EXPERT "KRVP"

THE ARCHITECTURAL AND TERRITORIAL PLANNING COMMITTEE HAS TAKEN THE FOLLOWING

D E C I S I O N No 180

APPROVES THE TRACK OF THE GAS PIPELINE FOR PROJECT: GAS DISTRIBUTION PIPELINE FROM AGRS – LEDENIKA TO THE TOWN OF VELIKO TARNOVO – II ALTERNATIVE

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SIGNED BY:

CHAIRMAN: (Sgd.) Arch. El. Abadjieva

1. (Sgd) Dipl. Eng. V. Mitkova
2. (Sgd) N. Puichev
3. (Sgd) Dipl. Eng. St. Dimova
4. (Sgd) Arch. Iv. Tcholakov
5. (Sgd) Arch. D. Baklitcharov
6. (Sgd) Dipl. Eng Ts. Markov
7. (Sgd) Arch. R. Brainova
8. (Sgd) Dipl. Eng. Iv. Nikoforov
9. (Sgd) Arch. D. Topalo

TABLE
On the track of the Gas Distribution Pipeline from AGRS Veliko Tarnovo to the town of Veliko Tarnovo

No.	Territory	Lot	Owner	NTP	Type of territory	Category	Length
1.	LEDENIKA VILLAGE	271	RESULTATIVE 1	Pasture, common land	Agricultural	8	186.41
2.	LEDENIKA VILLAGE	236	RESULTATIVE 2	Track road	Agricultural	-	5.44
3.	LEDENIKA VILLAGE	999008	RESULTATIVE 2	Track road	Agricultural	-	1190.71
4.	LEDENIKA VILLAGE	276	RESULTATIVE 2	Gully	Agricultural	10	50.59
5.	LEDENIKA VILLAGE	85006	VITAN ANDREEV KEFIROV	Cornfield	Agricultural	7	16.38
6.	LEDENIKA VILLAGE	277	RESULTATIVE 2	Track road	Agricultural	-	15.68
7.	LEDENIKA VILLAGE	278	PARAGRAH 4	Cornfield	Agricultural	7	352.41
8.	LEDENIKA VILLAGE	289	RESULTATIVE 1	Forest	Agricultural	7	101.19
9.	LEDENIKA VILLAGE	282	RESULTATIVE 2	Track Road	Agricultural	-	5.92
10.	LEDENIKA VILLAGE	88001	RESULTATIVE 1	Vineyard	Agricultural	7	108.68
11.	LEDENIKA VILLAGE	999007	RESULTATIVE 2	Track Road	Agricultural	-	8.33
12.	LEDENIKA VILLAGE	288	SFF	Deciduous forest	Agricultural	-	43.36
13.	BELIAKOVETS VILLAGE	170	STATE FORESTS	Forest	Agricultural	-	52.16
19.	VELIKO TARNOVO	14001	STOYAN NIKOLOV STOYANOV	Abandoned field	Agricultural	6	76.25
18.	VELIKO TARNOVO	14002	IVAN OBRETENOV PECHKOV	Abandoned field	Agricultural	6	90.17
17.	VELIKO TARNOVO	279	V. TARNOVO MUNICIPALITY	Rack Road	Agricultural	7	4.26
16.	VELIKO TARNOVO	278	V. TARNOVO MUNICIPALITY	Pasture, common land	Agricultural	6	45.92
15.	VELIKO TARNOVO	272	V. TARNOVO MUNICIPALITY	Cornfield	Agricultural	6	418.63
14.	VELIKO TARNOVO	270	V. TARNOVO MUNICIPALITY	Road Category I	Transportation (State Road Network)	-	683.50