APPENDICES

REDUCTION OF GREENHOUSE GASES BY GASIFICATION

of Sofia Municipality

JI Project Design Document

Appendix 3: Extract from Sociological survey conducted by GALLUP regarding the willingness of residential users to use natural gas in Sofia (2003)

Generally using natural gas is considered to be the best way of heating for households	
Electric power	5%
Diesel oil	1%
Wood	6%
Coal/briquettes	3%
Propane butane (bottled)	2%
District heating - central	20%
Local (in-house boiler) heating	9%
Natural gas	**48%**
Combined	5%
I cannot say	1%

Will you please state to what extent it is probable that you decide to switch to natural gas in your household?	
Definitely not probable at all	3%
Not probable	2%
Rather not probable	4%
Neither yes, nor no	11%
Rather probable	16%
Probable	26%
Quite probable	35%
No answer	2%

Extract from Sociological survey conducted by NATIONAL CENTER FOR RESEARCH OF PUBLIC OPINION regarding the willingness of residential users to use natural gas, 14-17 July, 2001

Use of natural gas for residential needs - advantage or disadvantage	
More advantage that disadvantage	77.8
More disadvantage that advantage	1.2
As advantage as disadvantage	8.9
I don't know	12.1
Total	100.0

What are the basic advantages of using the natural gas for residential needs?	
Cheaper	47.4
Cleaner	36.1
More economically	21.2
Not labor-consuming	18.6
Fast get warm	17.0
Ecologically clean	4.9
Modern	1.6
More qualitative	1.1
More reliable	0.9
It's to regulate the temperature	0.8
Universality of all appliances	0.8
I don't know	9.1

Notice: The total sum is more than 100% because of the respondents are give more than 1 answers.

Appendix 4: List of the companies, which had sent declarations for addition of their greenhouse gases emissions reduction as a result of the switch to natural gas to the total quantity of the emission reduction units of the project "Reduction of greenhouse gases by the gasification of Sofia Municipality"

Name of The company	*Tax №*	*BULSTAT*	*Signed by Name*
1. Metro cash and carry Bulgaria EOOD	2220095021	121644736 U	D-r E.Abadjiev & D-r M. Dikta
2. Agro Business Center Europe	1220161079	130943748	Ivo Mladenov Bojanov
3. MDM Tiin Impex OOD	1145000706	010799481	Ognian Kirilov Medarov
4. MAN Transport OOD	1223050170	831656836	Daniela Ivanova Davidkova
5. Sternberg Bulgaria EOOD	1160037357	115307535	Milan Isaev Milovanov
6. Milo – 5 Milan Milovanov ET	1220010895	030213925	Milan Isaev Milovanov
7. Gevag Bulgaria OOD	1223058716	831815950	Valentin Todorov
8. OMZ OOD	3223010716	831641688	Jordan Hristov
9. Dika Stil OOD	1227023127	041027759 U	Mihail Iliadis
10. Lejarmash AD Sofia	2222090175	130510451	Philip Savov Savov
11. Aroma AD	224014743	831643066 U	Ilia Atanasov Chakarov
12. Bozel EOOD	1227051414	121082432	Renzo Martineli
13. Remontno – vastanovitelno predpriatie Kione AD	1224059449	121301965	George Lasarov Georgiev
14. IMMI AD Sofia	2224018730	831371545 U	Tzvetko Popov
15. Evro UUD OOD	1224063403	121452052	Marko Medichi
16. Vinarska Izba Kehlibar OOD	1225077440	121663373	Asen Ivanov Asenov
17. Atea OOD	123568504	832071846 U	Blagovest Detelinov Fumtorov
18. EP Laboratory za mizel	123006767	000636596	Nacho Valkov Nachev
19. Tangra AV OOD	122201523	121114339 U	Yrii Lazarov Armianov
20. Vladimpeks EOOD	222403351	831301899	Ivan Stojanov Hristov
21. Kotlostroene AD	1224010474	121117602	Hristofor Baramov & Ivan Donchev
22. Bioprograma EOOD	3224008960	831367228 U	Dessislav Veselinov Dionisiev
23. El Bi Bulgarikum EAD – klon Malaschevska	1220024969	8316229690011	Bojan Iliev
24. PSSR Sofstroi AD	1223004659	0006245760020	Stefan Ganev
25. Sofgeoprouchvane EOOD	122401209	831643785	Ilia Kostadinov Iliev
26. Injstroi Sofia AD - LAB	2221158930	130463628	Nikolai Despotov
27. TPK Iskra	3224006380	000627145 U	Varban Tzvetanov Josiphov
28. Kmetstvo Mramor - Vrabniza	12302772	0006963270667	Ruska Droseva – kmet

Name of The company	*Tax №*	*BULSTAT*	*Signed by Name*
29. Kranostroene – engineering EOOD	1224007325	831641446	Ivan Dimitrov Todorovski
30. Stroitelna mehanizatzia Sofia AD	1224010202	121139495	Angel Radkov Rusanov
31. Tandem – B OOD	1225009755	831456696 U	Todor Marinov Vatev
32. Stanilov EOOD	1223064171	831769677	George Vasilev Stanilov
33. Venistroi OOD	1223072646	121225229 U	Nikolai Marinov Briasnov
34. Boro – Bogomil Dachev ET	3220011630	03052092	Bogomil Davidov Dachev
35. Krameks AD Sofia	1224009670	831635543	Hristo Slavov
36. Stimar OOD	1224053785	121040593 U	Vera Manolova Minkova
37. Evrophrigo AD	1224093388	130951136	Mariana Stephanova Nikolova
38. NZOVS	1226120277	1308382200206	Nikolai Brandjiiski
39. Turmediko AD klon Jeravna	123099102	1301346430010	George Ivanov Georgiev
40. Utcheben Tzentar Bankia kam GDD	120036134	8316152190529	George Grigorov Sasdov
41. PGT Aleko Konstantinov Bankia	3221087282	000670292	Bojidar Tzetkov
42. Spetzializirana bolniza sa rehabilitazia Bankia AD	3221077155	130287411	Petia Milenova Genkova
43. Voden sviat – Bankia AD	327008104	121277005	Tzavdar Kamenov Sokolov
44. Programni produkti I sistemi AD	3221002864	831639462	Rumen Pavlov Pantchev
45. MI – MVR filial Bankia	1223010856	1290072000175	Ivan Aleksandrov Ananiev
46. Hlebni izdelia – Vasrajdane AD	1222081579	121369724	Krasimir Marinov Djankov
47. 80 osnovno bolnitchno utchilistche Vasil Levski	3221059963	000668359	Angelina Aleksandrova Ilieva
48. Hotel Lipite	1221003426	8316421810284	Latchezar Bonev
49. MTZ I Bankia EOOD	321076469	121763982	Lozana Arsova
50. OPT	1223020247	121523325	Mladen Tzonev
51. SO rajon Novi Iskar	1223037772	0006963270671	Zornitza Atanasova
52. Sofia Auto AD	1225103956	130435226 U	Ilian Straschilov Penev
53. Tekom AD	1226023484	831924533	Dimitar Kirilov Tumbanov
54. Murgasch AD	1225107919	130540003	Vene Vasilev Sotirov
55. KOOP Hristo Nikov Sofia	1222009509	000621929 U	Stanko Delev
56. Animeks 98 OOD	1220117983	121695665	Vasil Ivanov Spasov
57. Uspech SSB EOOD	2223016785	8316459250102	Nikolai Iliev Kirilov
58. SAT EOOD Sofia	321018345	121163425	Valeri Andreev
59. Sofstroi AD – P - DIU	1223004659	0006245760069	Bantcho Valtchev Bantchev
60. Gasterm OOD	1225106076	130491652	Andrei Petkov Germanov
61. Mikron 20 EOOD	1222031407	121098600 U	Hristina Kovatcheva
62. Nautchnoizsledovatelski stroitelen institut – NISI EOOD	3221022180	121558493	Rumen Stefanov Guglev
63. Aptetchno Sofia grad AD	3221005839	831635169	Stefan Tzesarov Prunarov
64. Djei I El Center AD	3221014900	121453282	Lubomir Kirilov Hristov
65. Darko AD	2220030817	040047610	Petar Milkov Tzetkov

Name of The company	*Tax №*	*BULSTAT*	*Signed by Name*
66. KET AD	1222011732	831642968 U	Liliana Zaharieva Valkova
67. Metropoliten EAD	1222024885	000632256	Stojan Bratoev Ivanov
68. DI SV hotel Champion	1221006646	1305683830185	Anastasia Kirilova Petrova
69. Pangea AD	1221009947	831308908	George Tzangaris
70. Evrohoteli AD	321056220	121475777 U	Jan Brjesina
71. SBDPLPODA BUL – PRO EAD	3221065548	121801123	Vladislav Borisov Ivanov
72. SBAL po ortopedia prof. Boitchev EAD	3221023632	831900201	Evgenii Mednikarov
73. Klimat Inkom VK OOD	1224007309	030211957	Danail Kirilov Vidolov
74. Bulminveks GB EOOD	3221009850	000622340	Ivan Kirilov Petrov
75. Injstroi Sofia	2222115893 0	130463628	Ilia Dragomirov Tasev
76. Siemens Information and Communication EOOD	2223004671	000723421 U	Tomas Landrok
77. Bulgarlaser OOD	2223053125	121588376 U	Lubomir Scharankov
78. Hlebni izdelia Kniajevo AD	3220082406	121372299	Nikolai Taparov
79. Glavbolgarstroy AD	3220011142	831652485	Evgeni Marinov & Stanoi Milatchkov
80. Nationalen center po radiobiologia I radiatzionna zastita	2227012431	000662801	Radostina Georgieva
81. Magnum F OOD	3222109311 8	131106675	Valentin Krumov Hristov
82. Profesionalna gimnazia po ekologia I biotechnologii	3220074608	000669692	Krasimir Gavrilov Bilev
83. Bojana film EAD	3220042536	831905091 U	Evgeni Mihailov
84. Nationalen istoriitcheski musei	2221016478	000673210 U	Bojidar Dimitrov Stojanov
85. Geoplanproekt EAD	3220011312	831140467 U	Stojan Kirilov Tzvetkov
86. Jurnalist EOOD	1220071916	831903653 U	Valentin Krumev Janev
87. Bukoton EOOD	2220125601	130555208	Havier Vila Trasera
88. MBAL Raina Kniaginia AD	3220070025	121777569 U	Snejina Petrova Mitcheva
89. Pen D'or AD	3222072858	121675386 U	Kristina Dimitrova
90. Gloria Palas OOD	1223034981	831036162	Nikolai Bojinov
91. Hotelska veriga Hrankov AD	1222043731	121253709 U	Plamen Simeonov Hrankov
92. Erato Holding AD	1263000753	126061958 U	Krasimir Stantchev
93. Beni AD	1061571287	106015960	Lubomir Atanasov Lukarov
94. Unitreid 2002 OOD	2223075080	130910844	Plamen Kirilov Tomov
95. SOMAT AD	2226003064	831635144 U	Ivan Hristov Popov
96. Vitoscha Faktori EOOD	2220145649	131098335	Venzislav Simeonov Venev
97. Skai Geit Bulgaria EOOD	2221116529	121447219	Emil Totomanov
98. Bulgaria Term OOD	2221067153	831528975 U	Nikolai Panajotov Belovejdov
99. Solid 55 OOD	2226018193	831608297	Ivan Hristov Akov
100. Leda AD Sofia	2220011774	831635518	Atanas Klimentov Simoitchev

Name of The company	*Tax №*	*BULSTAT*	*Signed by Name*
101. Florina – Bulgaria AD	1223013496	831112560	Valentin Stanov
102. Furnir AD	1227019847	831475907 U	Aleksandar Zdravkov Tasev
103. Metatron MT OOD	2225016847	121120865 U	Geno Mikov Krastev
104. ISMA EOOD	2220022849	121327675	Petar Stefanov Stefanov
105. Institut po tzeluloza I hartia	2225025080	831488726	Krasimir Andreev Savov
106. Demaks AD	1226033838	831453003	Marin Nestorov
107. Konikonsult OOD	2220126393	130547688	Nadia Ivanova
108. Rigana OOD	2220024256	831081467	Aleksandar Grosdanov
109. Hydroizomat AD	2225018343	121732517	Jeko Jekov
110. SD Dies electronic	2220028537	040673061 U	Dotcho Dotchev
111. Bolid – Nikolai Zahariev ET	1221000702	040889924 E	Nikolai Zahariev
112. Intcho OOD	2220031058	129008761	Latchezar Nikolov Stephanov
113. Bikel I Volf EOOD	2221015068	040212301	Atanas Ivanov Ovtcharkin
114. Hlebni izdelia – Lozenetz AD	2220085638	11420492	George Gentchev Hristov
115. Sofia AD	2225025013	121693320 U	Nikolai Ivanov Nankov
116. Valmeks OOD	3222043815	010700093 U	Latchezar Tzvetkov
117. Hotel Ambassador AD	220074784	121078220	Evgenia Jeleva
118. Balkan Consult Comers	2227041954	121145377	Pentcho Petkov Ivankin
119. Etna Kargo OOD	1235689134	122020693 U	Vasil Velkov Borisov
120. Veleks Ink OOD	1227020802	040822726	Dotcho Tzolov Dotchev
121. Daru kar	2221028077	121243960	Zdravko Mirtchev Kostov
122. Asansjorostroene 98 AD	2225079598	121839153	Kiril Vladimirov
123. TTZ Boila OOD	1226066558	121255261 U	Rusi Hubanov Rusev
124. Technotest AD	2225018521	831434141	Dragomir Mitzov
125. Inter Expo Center AD	1220125064	121849591	Steftcho Stefanov Vankov
126. Bulgarkoop EOOD	1223035805	000627914	Ludmila Simontcheva
127. NSB EAD	1220006278	831635354 U	Metodi Jordanov Philipov
128. Akademika 2000 EOOD	1226103666	130170855	Rumen Goranov
129. Germi – Gergana Blagova ET	1221025497	121158086 E	Gergana Blagova Toteva
130. Sofiiska duhovna seminaria Sveti Ivan Rilski	123026644	000185339 U	Arhimandrit Sionii

Appendix 6: Plan for construction of gas distribution network (GDN) and facilities in Sofia Municipality

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
Total GDN, m	**80 281**	**95 298**	**89 639**	**87 214**	**84 789**	**79 130**	**67 077**	**0**	**0**	**0**	**583 428**
High pressure GDN (16 bar and 10 bar), m	20 210	20 210	14 551	12 126	9 701	4 042	0	0	0	0	80 840
Middle pressure GDN (4 bar), m	60 071	75 088	75 088	75 088	75 088	75 088	67 077	0	0	0	502 588
Facilities, units	**3 141**	**3 518**	**3 764**	**4 089**	**4 070**	**3 733**	**3 103**	**2 483**	**2 172**	**2 173**	**32 246**
Gas regulation station	16	11	10	10	6	3	0	0	0	0	56
Facilities for industrial, and public and administrative sectors	35	108	46	62	47	22	13	11	9	10	363
Facilities for households	3 090	3 399	3 708	4 017	4 017	3 708	3 090	2 472	2 163	2 163	31 827

Appendix 7: End users in Sofia Municipality provided for switch to natural gas by sectors and by Municipal Regions

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
Total number of consumers of natural gas (number)	**3 127**	**3 505**	**3 754**	**4 079**	**4 064**	**3 730**	**3 103**	**2 483**	**2 172**	**2 173**	**32 190**
Industrial sector	**9**	**22**	**30**	**34**	**15**	**6**	**4**	**1**	**7**	**7**	**135**
MR Novi Iskar	0	0	2	7	0	0	0	0	2	1	12
MR Kremikovtsi	0	2	0	0	1	2	1	0	2	3	11
MR Vazrazhdane	0	0	3	0	0	0	0	0	0	0	3
MR Iskar	0	0	4	6	4	0	0	0	0	0	14
MR Izgrev	0	0	0	0	1	0	0	0	0	0	1
MR Krasna Polyana	0	0	0	0	0	0	1	0	1	0	2
MR Krasno selo	0	0	0	1	0	0	0	0	0	0	1
MR Lulin	0	0	3	0	0	0	0	0	0	0	3
MR Mladost	5	1	0	1	0	0	0	0	0	0	7
MR Nadezhda	0	3	1	1	0	0	0	0	0	0	5
MR Pancharevo	0	3	2	9	2	0	0	1	2	2	21
MR Poduyane	0	0	5	7	0	0	0	0	0	0	12
MR Serdika	0	2	7	2	0	0	0	0	0	0	11
MR Slatina	0	0	0	0	0	0	1	0	0	0	1
MR Lozenets	0	6	1	0	0	0	0	0	0	0	7
MR Studentski	0	0	0	0	0	1	0	0	0	0	1
MR Triaditsa	0	0	0	0	0	0	0	0	0	0	0
MR Ilinden	0	0	0	0	4	0	0	0	0	0	4
MR Vrabnitsa	0	0	0	0	3	3	1	0	0	1	8
MR Vitosha	3	2	1	0	0	0	0	0	0	0	6
MR Ovcha Kupel	1	3	1	0	0	0	0	0	0	0	5
MR Bankya	0	0	0	0	0	0	0	0	0	0	0

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
Public and adminstrative sector	**26**	**86**	**16**	**28**	**32**	**16**	**9**	**10**	**2**	**3**	**228**
MR Novi Iskar	0	0	4	8	2	2	0	0	0	0	16
MR Kremikovtsi	0	0	1	1	1	2	4	2	1	0	12
MR Vazrazhdane	0	0	0	0	0	0	0	0	0	0	0
MR Iskar	0	0	0	3	4	0	0	0	0	0	7
MR Izgrev	0	0	0	0	0	2	0	0	0	0	2
MR Krasna Polyana	0	0	0	0	0	2	0	2	0	0	4
MR Krasno selo	0	0	0	0	5	1	0	0	0	0	6
MR Lulin	0	0	1	2	0	0	0	0	0	0	3
MR Mladost	2	1	7	1	2	0	0	0	0	0	13
MR Nadezhda	0	0	0	2	1	0	0	0	0	0	3
MR Pancharevo	0	1	1	4	8	3	3	6	1	3	30
MR Poduyane	0	0	0	2	4	1	0	0	0	0	7
MR Serdika	0	0	0	1	1	0	0	0	0	0	2
MR Slatina	0	0	0	0	0	0	2	0	0		2
MR Lozenets	0	3	1	3	2	0	0	0	0	0	9
MR Studentski	0	5	1	0	0	0	0	0	0	0	6
MR Triaditsa	0	1	0	1	0	0	0	0	0	0	2
MR Ilinden	0	0	0	0	0	0	0	0	0	0	0
MR Vrabnitsa	0	0	0	0	2	3	0	0	0	0	5
MR Vitosha	7	19	0	0	0	0	0	0	0	0	26
MR Ovcha Kupel	14	21	0	0	0	0	0	0	0		35
MR Bankya	5	33	0	0	0	0	0	0	0	0	38
Residential sector	**3 090**	**3 399**	**3 708**	**4 017**	**4 017**	**3 708**	**3 090**	**2 472**	**2 163**	**2 163**	**31 827**

MR –Municipal Region

Appendix 8: Projected natural gas utilization, thousand sm^3

	2004	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*
Industrial sector	1212	14139	61037	66031	76634	77684	79734	80552	81378
Public and administrative sector	2187	11770	12766	14696	18138	19279	19934	20441	20851
Households	2014	7222	12588	18394	24516	30352	35493	39704	43209
All sectors	***5413***	***33131***	***86392***	***99121***	***119288***	***127316***	***135161***	***140697***	***145438***

Appendix 9: Type and characteristics of the boilers in public and administrative, and industrial sectors

№	TYPE OF BOILER	RATED THERMAL INPUT	
	I. WATER HEATING BOILERS	**Gcal/h**	**KW**
1	KVN-0,06	0,06	70
2	KVN-0,1	0,1	116
3	KVN-0,15	0,15	174
4	KVN-0,25	0,25	290
5	KVN-0,35	0,35	407
6	KVN-0,55	0,55	640
7	KVN-0,65	0,65	755
8	KVN-1,0	1	1163
	II STEAM HEATING BOILERS		
1	KPN-0,1	0,1	170
2	KPN-0,15	0,15	257
3	KPN-0,25	0,25	420
4	KPN-0,35	0,35	600
5	KPN-0,55	0,55	940
6	KPN-0,65	0,65	1110
7	KPN-1,0	1	1710
8	KVM-2,5	2,5	2900
9	KVM-4	4	4650
10	VKM-2,5	2,5	2900
11	VKM-4	4	4650
12	VKM-7,5	7,5	8720
13	PKN-0,4	0,4	
14	PKN-0,7	0,7	
15	PKN-1	1	
16	PKN-1,6	1,6	
17	PKN-2,0	2	
18	PKM-2,5	2,5	
19	PKM-4,0	4	
20	PKM-6,5	6,5	
21	PKM-12	12	

Appendix 10.1: Company procedures of Overgas Inc. AD for quality assurance of operation and reporting on natural gas consumption and leakage

1. INSTRUCTION for monitoring and diagnostics of the technical conditions of the Distribution Gas Pipelines for natural gas leakages
The Instruction is a method for monitoring underground and ground gas pipelines, equipment and installations in case of any breakage and leaking of natural gas, as well as their classification, depending on their potential danger and the undertaking of measures against leakage and for damage elimination

2. INSTRUCTION for measuring of the protection polarization potentials of underground metallic equipment protected from soil corrosion by cathode and protector protection.
This working document presents to the operational staff in the gas distribution enterprises the requirements and methods of measuring the protection polarization potentials of underground metallic pieces of equipment, protected from soil corrosion by cathodes of protector protection

3. INSTRUCTRION for technical servicing and repair of gas regulation points and boards and gas regulation and metering points and boards.
The intervals of time and the complex of operations for performing the preventive measures and repairs of the gas regulation points and boards and of gas regulators and metering points and boards are determined. The manner and the times for carrying out of inspections/calibration of metering devices used are also specified.

4. INSTRUCTION for the operation, servicing and maintenance of distribution gas pipelines and the appurtenant equipment.
It specified the activities of the operational staff for securing safe and emergency-free operation of gas pipelines and their maintenance and repairs in accordance with the Ordinance for the Structure and Safe Operation of the Transportation and Distribution Gas Pipelines of equipment, installation and apparatus for natural gas and the times for making the necessary metering.

5. INSTRUCTION for carrying out gas-risk operations
The Instruction supplies indications and determines the technical rules valid for all planned and emergency repair works on gas pipelines and pieces of equipment in the gas distribution networks which are executed in gas-containing medium or in which there is a danger of gas leakage.

6. INSTRUCTION for safety technology and fire safety in operation with SPOTLEAK 1005 deodorant.
The purpose of this Instruction is to make the operational staff of the gas distribution enterprises familiar with the requirements of safety technology and fire safety in operation with the SPOT LEAK 1005 deodorant in operation, and environmental protection.

7. INSTRUCTION for the initial filling of the gas distribution network with natural gas.
The Instruction determines the required initial conditions, the participants and the technological sequence of works in filling the gas distribution network with natural gas.

8. INSTRUCTION for operation with repair brackets.

The Instruction shows the potentials of using and assembling repair brackets intended for temporary sealing of localized breakage and leakage in steel and polyethylene gas pipelines.

9. INSTRUCTION for operating with gripping tools for polyethylene gas pipelines.
The instruction supplies the technical rules in the operation with gripping tools (hand-screws) of polyethylene gas pipelines in operation for stopping the gas flow.

10. PLAN for the operation in case of the origination of a major production emergency in the gas transportation network in the territory of municipality
The plan includes the prevention of allowing any origination of emergency situations, prognostication of the nature and the aftermath of any emergencies in the gas distribution network, specifying the operations and the duties of the operational staff.

11. INSTRUCTION for residential users about the safe utilization of natural gas and the operation of installations and gas-employed devices.
The purpose of the Instruction is to acquaint the consumers (owners or users) with their obligations for safe work with natural gas of assembled installations and gas-using appliances in residential buildings.

12. INSTRUCTION for setting of gas regulation points and boards.
The Instruction includes instructions for the sequence and technology of operations carried out in setting the regulation and the safety equipment in the installations of the gas distribution network.

13. INSTRUCTION for putting into operation and subsequent monitoring of building gas installations of residential users.
The work document supplies the necessary instructions for the operational staff of the Distribution Enterprises in putting into operation and subsequent monitoring of the building gas installations of residential users.

14. INSTRUCTION for adjusting the reading of natural gas flow meter systems.
The purpose of this document is to give instructions about the transition to standard conditions for comparison in reading the supplied natural gas quantities to the users in the OVERGAS system.

15. COMPANY STANDARD for natural gas odoring.
The purpose of the Company Standard is to give a definition of the concept of odoring, the general requirements to means of odoring, the types of odorants, the safety measures and the inspection intervals for the determination of the odorant concentration in the Gas Distribution Network, and the odoring intensity intended to facilitate the detection of leakage in the Gas Distribution Network, the equipment, the installations and the natural gas appliances.

Appendix 10.2: Description of the automatic dispatcher system OVERCOMM 2.0.

The system OVERCOMM 2.0.consists of the following three main component parts:

1. Automation tools for the GDN:

- Adjusters of natural gas consumption with the following functions: calculation of gas consumption in standard units, recording emergency values of the technological parameters, 500 log books of hours, 20 log books of work shifts, 35 logbooks of days and 13 log books of months with entries of the consumption and technological parameters, 10 logbooks for emergency situations;
- Controllers of odorizing installations, which control the proportioning of odorant in the GDN and maintain records of the odorant consumption.

2. The system OVERCOMM 2.0 uses the GSM network as a carrier medium. The communications are organized in the following two flows:

- Reading of current values of technological parameters, hourly, shift, daily and monthly logbook entries by the gas consumption adjusters and the odorizing stations, as well as remote configuring of electronic devices is done following the initiative of the dispatcher center and is carried out through a switchable connection /the DATA CALL service/ between a GSM communication module mounted on the gas unit and a GSM modem at the dispatcher center;
- The transmission of alarm signals about the above mentioned emergency situations is done following the initiative of the GSM communication module mounted on the gas unit to the dispatcher center by means of priority SMS messages. The high priority of SMS messages is guaranteed by an agreement with the GSM operator.

3. Software for automated dispatcher system with the following main functions:

- Automatic initiation of cycles for collection of logbook data from the equipment;
- Additional data gathering;
- Processing, recording and filing of alarm SMS messages;
- Automatic notification to the operator and the emergency response group about alarms;
- Recording the actions performed by the dispatcher staff;
- Automatic generation of information and analysis from the system database;
- Information export for further processing in CSV format;
- User identification with all tools of MS Windows ’98, NT4, 2000 and XP.

Natural gas balance for identifying leakages is done on the basis of filed data about the gas consumption at the input and output points of the GDN

Appendix 10.3: Data collected to perform monitoring /tracing the project activity/

ID	*Data type*	*Data variable*	*Unit*	*Measured, calculated or estimated*	*Method of recording and filing*	*Recording frequency*
1	Pressure /average per hour/	P	Bar	measured	electronic	1 hour
2	Temperature /average per hour/	T	ºC	measured	electronic	1 hour
3	Unadjusted consumption /per hour/	Vb	m^3	measured	electronic	1 hour
4	Adjusted consumption /per hour/	Vn	Stm^3	calculated	electronic	1 hour
5	Lower technological alarm level of pressure	LTP	Bar	measured	electronic	Upon occurrence
6	Upper technological alarm level of pressure	HTP	Bar	measured	electronic	Upon occurrence
7	Lower technological alarm level of temperature	LTT	ºC	measured	electronic	Upon occurrence
8	Upper technological alarm level of temperature	HTT	ºC	measured	electronic	Upon occurrence
9	Lower sensor alarm level of pressure	LSP	mA	measured	electronic	Upon occurrence
10	Upper sensor alarm level of pressure	HSP	mA	measured	electronic	Upon occurrence
11	Lower sensor alarm level of temperature	LST	Ω	measured	electronic	Upon occurrence
12	Upper sensor alarm level of pressure	HST	Ω	measured	electronic	Upon occurrence
13	Availability of supply voltage at the measuring units	OFF/ON	V	measured	electronic	In case of change in condition (drop off/reoccurrence)
14	Alarm SMS from a consumer	ALARM C C-consumer code	Text	measured	electronic	When a button is pressed
15	Gas losses from the GDN	ΔV	Stm^3	calculated	electronic	1 hour

ID	*Data type*	*Data variable*	*Unit*	*Measured, calculated or estimated*	*Method of recording and filing*	*Recording frequency*
16	Availability of methane along the GDN route	% CH_4	ppm (VOL %)	measured	electronic	**Steel:** $P_{operating} \leq 0,5$ MPa – 4 years $0,5 < P_{oper} \leq 1,6$ MPa – 2 years **PE-HD:** $P_{oper} \leq 0,01$ MPa – 6 years $0,01 < P_{oper} \leq 0,1$ MPa – 4 years $0,1 < P_{oper} \leq 0,5$ MPa – 2 years $0,5 < P_{oper} \leq 1,0$ Mpa – 1 year
17	Availability of methane in the facilities	% CH_4	ppm (VOL %)	measured	electronic	3 months
18	Odorant concentration in the gas	C_n	mg/m^3	measured	electronic	1 month
19	Gas odor intensity	THT/TBM	бал	estimated	paper	1 month
20	Output electric current from the Cathodic Protection System (CPS)	I_{out}	A	measured	electronic	1 month
21	Output voltage from the CPS	U_{out}	V	measured	electronic	1 month
22	Polarization potential at a drainage contact point	$U_{pol..dr.}$	V	measured	electronic	1 month
23	Polarization potential at check points	$U_{pol.}$	V	measured	electronic	1 month
24	Total potential in check points	$U_{c-з}$	V	measured	electronic	1 month

Methods of measurement			
Measuring method	*Institution/function, which will take measurements*	*Calibration method*	*Calibration frequency*
Measuring of pressure, lower and upper technological alarm levels of pressure by means of transmitter for pressure with output 4-20mA	Gas Distribution Company ("Sofiagas" EAD)	Comparison with standard pressure	1 year
Measuring of temperature, lower and upper technological alarm levels of temperature by means of platinum thermal resistance Pt100	"Sofiagas" EAD	Comparison with standard resistance	1 year
Measuring of non-adjusted volume of gas, by means of turbine, rotary, membrane or aperture consumption meter /to be selected depending on the consumer characteristics or the unit in the GDN	"Sofiagas" EAD	Comparison with standard consumption meter	2 years – for rotary and turbine ones 3 years – for membrane ones
Calculation of adjusted consumption by means of specialized electronic adjuster, in the configuration of which coefficients are set	P_{atm}, bar = average annual atmospheric pressure in the region; Tb=293,15 K Pb=101,325 kPa Kz – is set or calculated as per ISO 12213-2:1997 "Natural gas – calculation of compression factor. Part 2: Calculation using molar – composition analysis." Or as per document DVGW G9 "Calculation of natural gas factor /saturation factor / and the contractility factor".	Comparison with standard current signal and standard resistance /calibrator with standard current signal 4-20mA, decade with standard.	2 years
Measuring of lower and upper sensor alarm levels of pressure and temperature by means of electronic scheme included in the structure of the specialized electronic adjuster	"Sofiagas" EAD	Together with the adjuster calibration by means of comparison with standard current signal and standard resistance /calibrator with standard current signal 4-20mA, decade with standard resistances.	1 year

Measuring method	*Institution/function, which will take measurements*	*Calibration method*	*Calibration frequency*
Measuring the availability of input current of the measuring unit by means of electronic scheme with reserved battery supply included in the structure of the communication device, which ensures the notification by a priority alarm SMS message through the GSM network	"Sofiagas" EAD	Checks of the daily communication between the measuring unit and the dispatcher center	1 day
Monitoring the condition of the alarm button by means of electronic scheme with reserved battery supply power included in the structure of the communication device, which ensures the notification by a priority alarm SMS message through the GSM network	"Sofiagas" EAD	Checks of the daily communication between the measuring unit and the dispatcher centre	1 day
Quantitative analysis of the contents of methane in the air by means of a specialized device with electro-chemical sensor	"Sofiagas" EAD	On a study punched gas pipeline, which provides controlled gas leakages within the sensitivity range of the device. It is conducted by the "Sofiagas" EAD .	3 months
Balance of input and output volumes for GDN and parts of the GDN – comparative analysis will be prepared	"Sofiagas" EAD	-	-

Appendix 10: Methods used in determining the consumption of natural gas at standard conditions

The standard (or base) conditions for comparison which are used for measuring the physical parameters (volume, density, etc.) of natural gas in Bulgaria are **293,15 K and 101,325 kPa**, in compliance with Bulgarian State Standard ISO 13443:1999 "Natural gas. Standard comparison conditions" and the General Terms for Concluding Contracts for Sales of Natural Gas, approved by the State Energy Regulatory Commission (SERC).

There are two possible approaches for obtaining the volume under standard conditions:

First approach: by using specialized devices called volume adjusters.

Second approach: by multiplying the volume read on the consumption meter counter by a fixed coefficient determined depending on the meteorological characteristics of the respective geographic region.

The choice of approach depends mostly on the maximum consumption and on the absolute pressure of natural gas in the measuring line.

In both cases the volume of natural gas under standard conditions is done applying the following formula:

$$V_{st} = V_p \frac{P}{P_{st}} \frac{T_{st}}{T} \frac{Z_{st}}{Z} \ldots\ldots \left(m^3\right)$$

where:

V_{st} $\left(m^3\right)$ - Volume of gas under standard conditions (293,15 K и 101,325 kPa), recorded by the adjuster or calculated manually by applying a coefficient;

V_P $\left(m^3\right)$ - Volume of gas measured as per the consumption meter counter;

P $\left(bar\right)$ - Absolute pressure of gas in the measuring line;

P_{st} $\left(bar\right)$ - Standard pressure ($P_{st} = 1{,}01325\ bar$);

T $\left(K\right)$ - Absolute temperature of gas in the measuring line;

T_{st} $\left(K\right)$ - Standard temperature (for the Republic of Bulgaria $T_{st} = 293{,}15\,K$);

Z - Over contractility coefficient under working conditions;

Z_{st} - Over contractility coefficient under standard conditions;

Z and Z_{st} – are either set, or calculated as per ISO 12213-2:1997 "Natural gas – calculation of compression factor. Part 2: Calculation using molar – composition analysis", or as per document DVGW G9 "Calculation of the gas factor (saturation index) and contractility coefficient Z ".

Accounting in case of availability of adjuster in the measuring device

The reading for V_{st} in m^3 (20 °C; 1,01325 bar) is reported for directly either by the electronic adjuster, or the consumption meter counter, in case it is equipped with embedded mechanical adjuster of temperature. The reported value accounted for, after deduction of the readings from the preceding report, constitutes the adjusted volume of gas, which the consumer has used during the respective period.

In case an adjuster is missing in the measuring device

For obtaining V_{st} in m^3 (20 °C; 1,01325 bar) the following formula should be applied:

$$V_{st} = V_p \cdot K_{tp} \ldots \left(m^3\right),$$

where:

$$K_{tp} = K_t \,.K_p$$

$K_t = \frac{T_{st}}{T}$ - temperatures adjustment coefficient;

$K_p = \frac{P}{P_{st}}$ - pressure adjustment coefficient

K_{tp} - coefficient for bringing the consumption meter readings into compliance with standard conditions- t = 20 °C and P = 1,01325 bar;

$V_p = V_{отч} - V_{пр.отч.} \quad \left(m^3\right)$

$V_{отч}$ *and* $V_{пр.отч.}$ - consumption meter counter readings during the preceding and the current periods reported;

The value of the adjustment coefficient K_{tp} is determined depending on:

- Natural gas temperature in the measuring line;
- Atmospheric pressure (altitude above sea level) in the population area;