DHC "TOPLOFIKATSIA BOURGAS" JSC

CO – GENERATION GAS POWER STATION

ANNEXES

VOLUME 2

VERSION 1

November, 2005
Sofia

DHC "TOPLOFIKATSIA BOURGAS" JSC

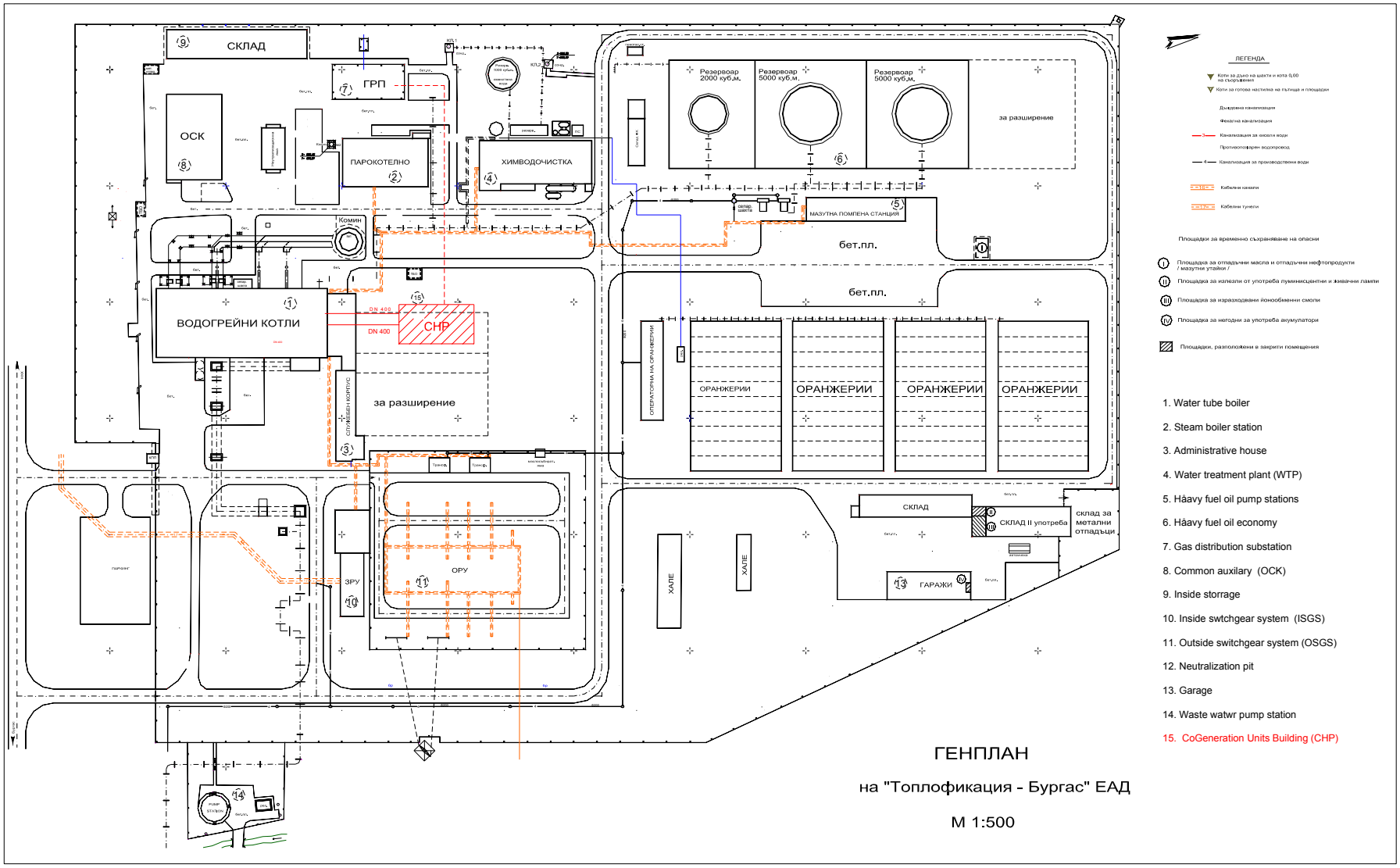
CO – GENERATION GAS POWER STATION

ANNEX No. 1

GENERAL LAYOUT

VOLUME 2
Version 1

November, 2005
Sofia



1. Water tube boiler
2. Steam boiler station
3. Administrative house
4. Water treatment plant (WTP)
5. Hâavy fuel oil pump stations
6. Hâavy fuel oil economy
7. Gas distribution substation
8. Common auxilary (OCK)
9. Inside storrage
10. Inside swtchgear system (ISGS)
11. Outside switchgear system (OSGS)
12. Neutralization pit
13. Garage
14. Waste watwr pump station
15. CoGeneration Units Building (CHP)

ГЕНПЛАН

на "Топлофикация - Бургас" ЕАД

М 1:500

DHC "TOPLOFIKATSIA BOURGAS" JSC

CO – GENERATION GAS POWER STATION

ANNEX No. 2

TECHNOLOGICAL SCHEMES FOR 100 %, 75 %, 50 % LOADING

VOLUME 2
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November, 2005
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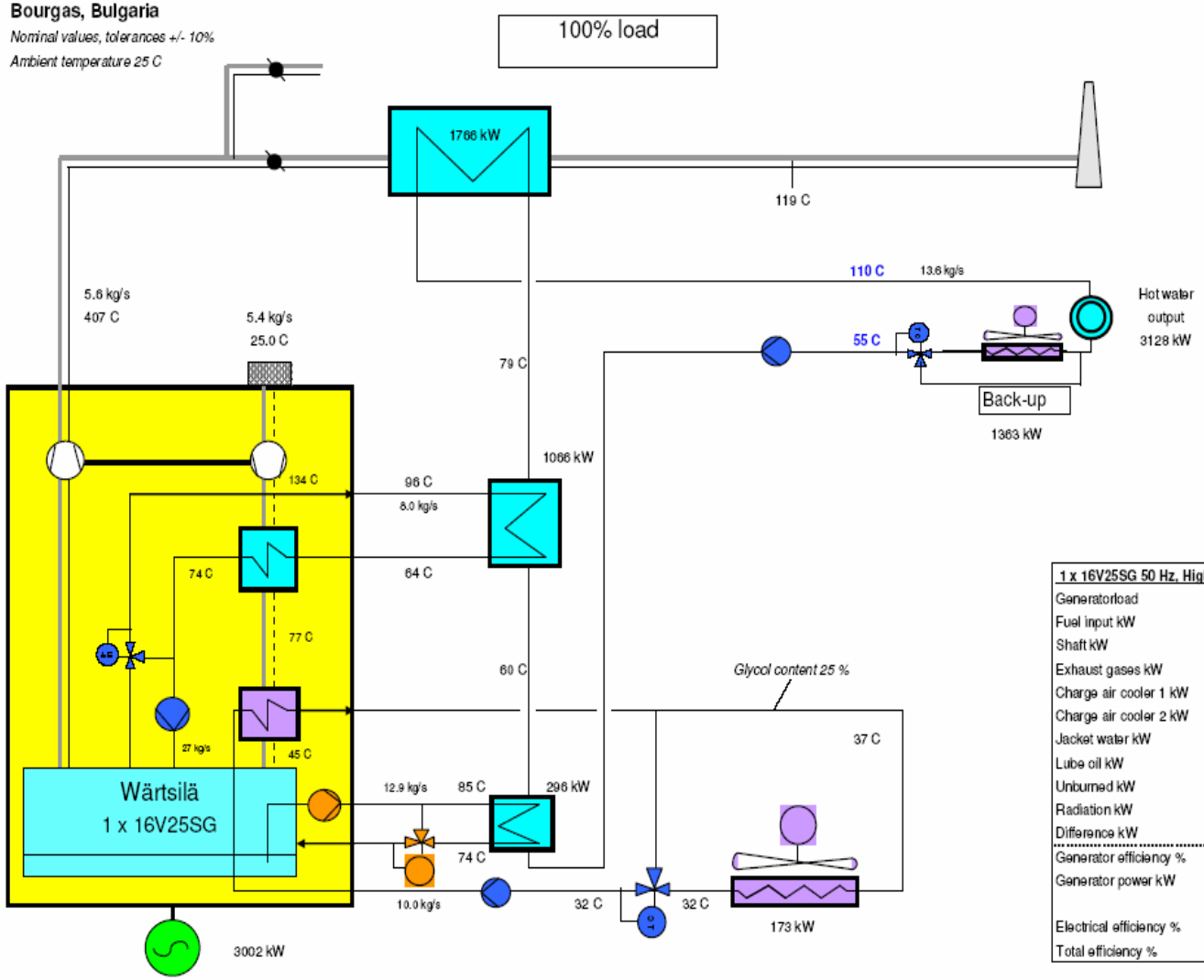
WÄRTSILÄ

20.10.2005

Bourgas, Bulgaria

Nominal values, tolerances +/- 10%

Ambient temperature 25 C



1 x 16V25SG 50 Hz, High efficiency	
Generatorload	96 %
Fuel input kW	7476
Shaft kW	3112
Exhaust gases kW	2282
Charge air cooler 1 kW	314
Charge air cooler 2 kW	173
Jacket water kW	752
Lube oil kW	296
Unburned kW	388
Radiation kW	159
Difference kW	0
Generator efficiency %	96.5
Generator power kW	3002
Electrical efficiency %	40.1
Total efficiency %	82.0

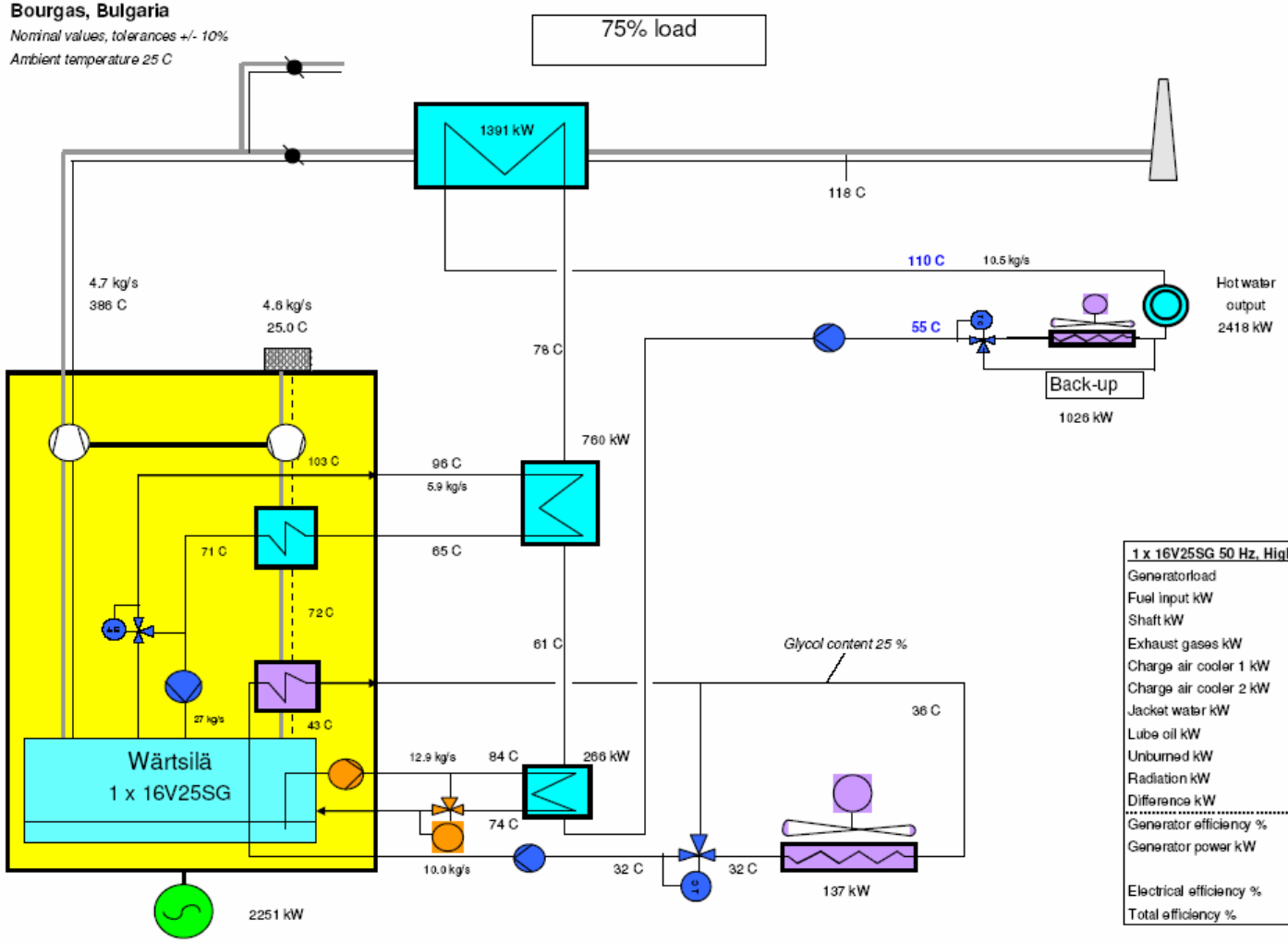
WÄRTSILÄ

20.10.2005

Bourgas, Bulgaria

Nominal values, tolerances +/- 10%

Ambient temperature 25 C



1 x 16V25SG 50 Hz, High efficiency	
Generatorload	72 %
Fuel input kW	5891
Shaft kW	2341
Exhaust gases kW	1830
Charge air cooler 1 kW	146
Charge air cooler 2 kW	137
Jacket water kW	614
Lube oil kW	266
Unburned kW	407
Radiation kW	149
Difference kW	0
Generator efficiency %	96.2
Generator power kW	2251
Electrical efficiency %	38.2
Total efficiency %	79.3

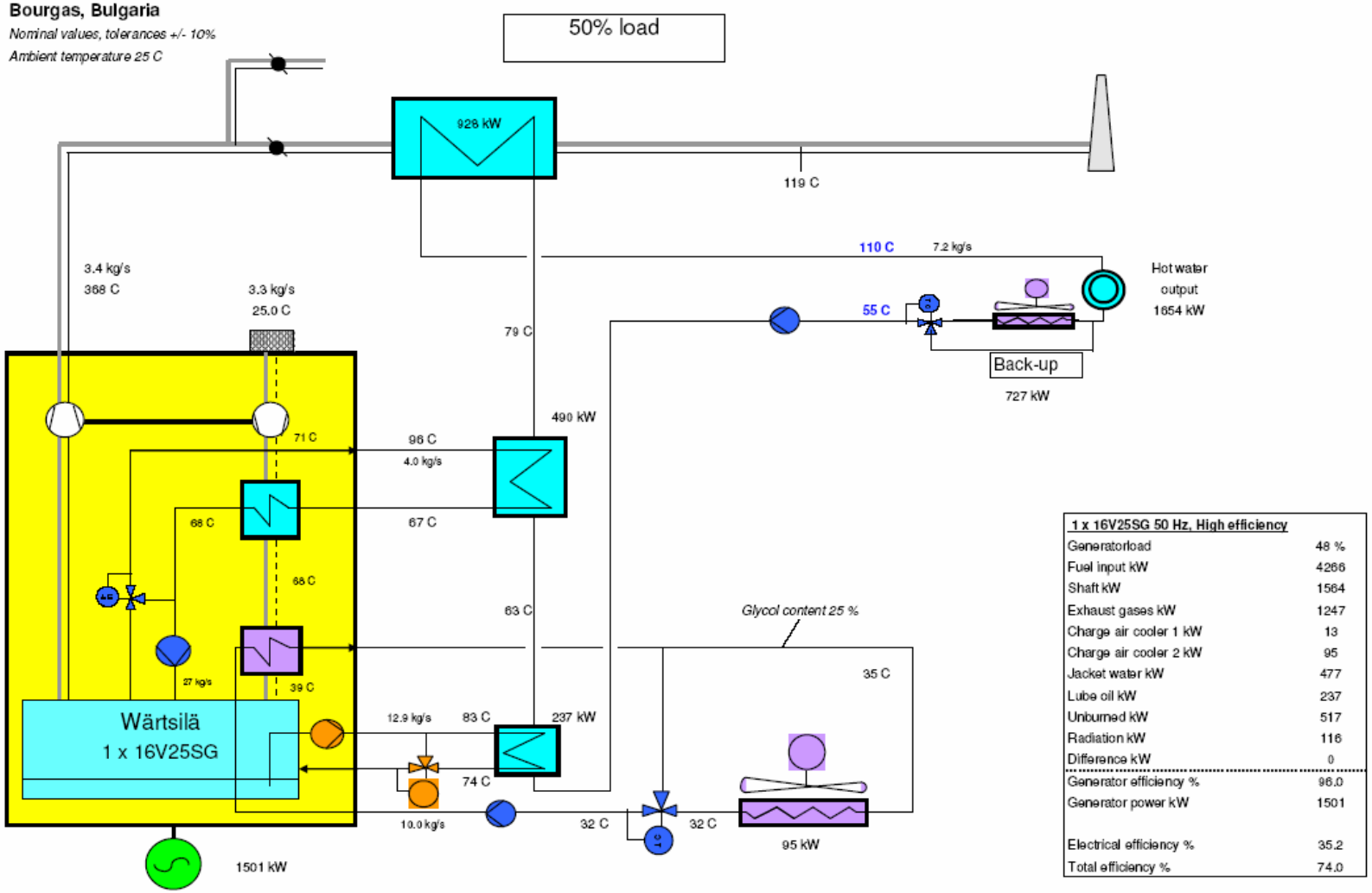
WÄRTSILÄ

20.10.2005

Bourgas, Bulgaria

Nominal values, tolerances +/- 10%

Ambient temperature 25 C



1 x 16V25SG 50 Hz, High efficiency	
Generatorload	48 %
Fuel input kW	4266
Shaft kW	1564
Exhaust gases kW	1247
Charge air cooler 1 kW	13
Charge air cooler 2 kW	95
Jacket water kW	477
Lube oil kW	237
Unburned kW	517
Radiation kW	116
Difference kW	0
Generator efficiency %	96.0
Generator power kW	1501
Electrical efficiency %	35.2
Total efficiency %	74.0

DHC “TOPLOFIKATSIA BOURGAS” JSC

CO – GENERATION GAS POWER STATION

ANNEX No. 3

INSTALATION ARANGEMENT MODEL

VOLUME 2
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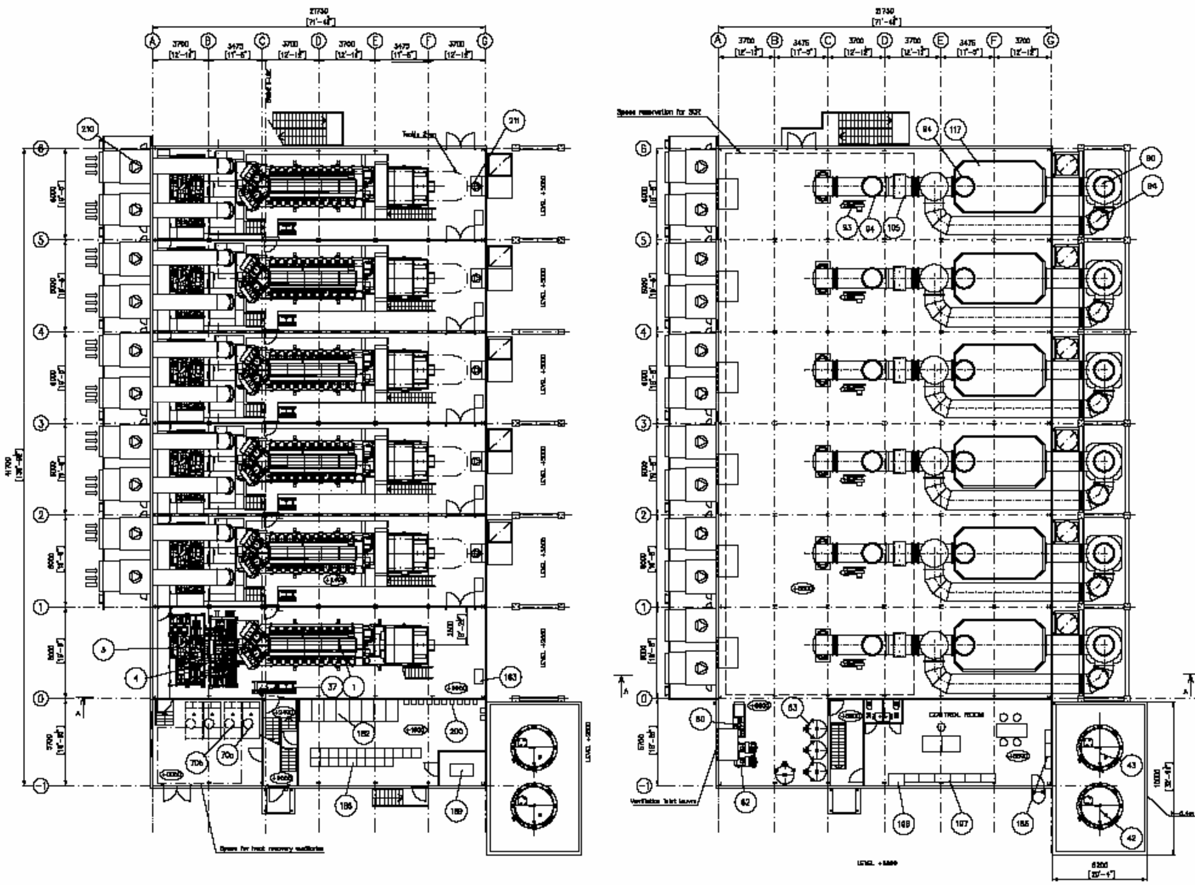
November, 2005
Sofia



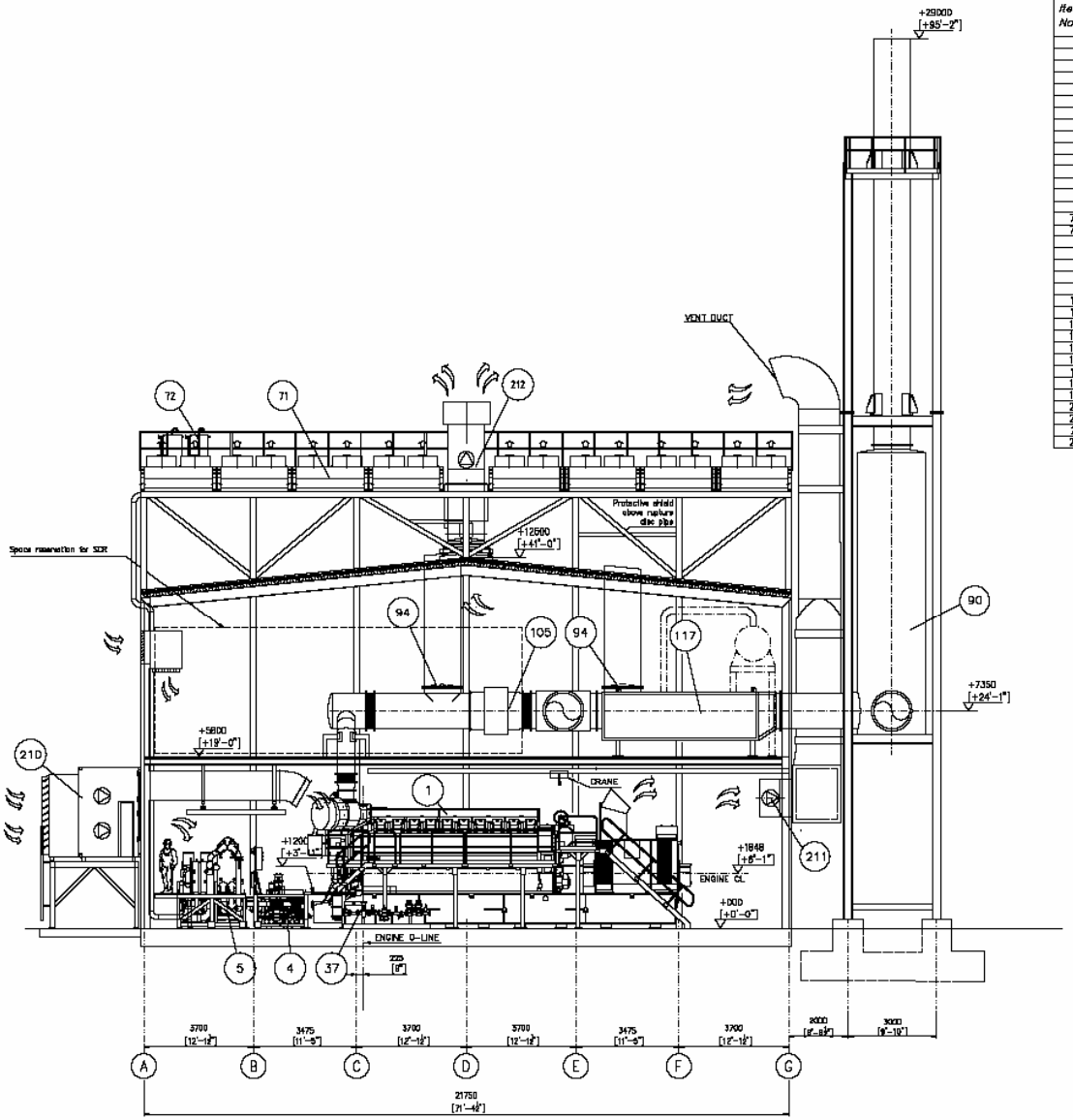
Item No	Pcs.	Code (First)	DESCRIPTION	WEIGHT Incl. liquids kg	lb	MOUNTING LEVEL millim.	(Floor level) inch.
1	6	SQA	Engine generator set	134700	296960	+0.000	0'– 0"
4	6	QEA	Engine auxiliary module including:	2500	5500	+0.000	0'– 0"
			– HT thermostatic valve				
			– LT thermostatic valve				
			– Preheating unit				
5	6	MDD	CHP module (optional)	2500	5500	+0.000	0'– 0"
37	6	ZBB	Gas regulating unit	200	440	+0.000	0'– 0"
40	1	QAA	LO unloading pump (clean)	–			
41	1	QAA	LO unloading pump (dirty)	–			
42	1	QAC	Lube oil tank (clean) 16m3	–			
43	1	QAD	Lube oil tank (dirty) 13m3	–			
44	1	QAE	LO Transfer pump unit	–			
60	1	TCA	Working air unit	670	1480	+5.800	19'– 0"
62	1	TSA	Starting air unit	1700	3750	+5.800	19'– 0"
63	4	TSB	Starting air bottle 3m3/790 gal	1445	3190	+5.800	19'– 0"
70a	2	VBA	Maintenance water tank 2.5m3/1060gal	3180	7010	+0.000	0'– 0"
70b	2	VBA	Glycol tank 2.5m3/1060gal (optional)	3180	7010	+0.000	0'– 0"
71	24	–	Radiators	3750	8270	+14.830	48'– 8"
72	6	VEA	LT–water expansion vessel 600l/160gal	765	1690	+15.500	50'– 10"
90	6	NHA	Exhaust gas silencer	~6300	~13900	+6.500	21'– 4"
93	6	NHA	Exhaust gas ventilation unit	–		+5.800	19'– 0"
94	18	NGA	Rupture disc	–		–	–
105	6		OXI–CAT (optional)	–		+6.600	21'– 8"
117	6		Heat recovery boiler	–		+6.600	21'– 8"
182	9	BAC	MV Switchgear	–		+1.600	5'– 3"
183	6	BAN	Neutral point cubicle	–		+0.000	0'– 0"
185	1	BEY	DC–system	–		+5.800	19'– 0"
186	21	BFA	MCC panels	–		+1.600	5'– 3"
189	1	BFB	Station transformer	–		+1.600	5'– 3"
196	1	CFA	Control panel, common	–		+5.800	19'– 0"
197	6	CFC	Control panel, engine wise	–		+5.800	19'– 0"
200	12		Frequency converter	–		+1.600	5'– 3"
210	12		Ventilation unit 38100 cmf (18m3/s)	2100	4630	+2.250	7'–5"
211	6		Ventilation unit 53000 cmf (25m3/s)	–		+3.750	12'– 4"
212	3		Ventilation unit	–		+12.600	41'– 4"

NOTE!

This is a conseptual drawing. Units, ventilation, layout and dimensions to be verified according to site conditions, environmental/project specific requirements and to process design.

FOR TENDERING ONLY

WÄRTSILÄ	© Wärtsilä Finland Oy Power Plants	Master layout, plan 6x20V34SG CHP Town	
	CITEC		
Product 20V34SG CHP		WNSFI–P PP TECH	Proj. no.
MADE 26–Nov–2004 AWR011/MGk		6x20V34SG	IND62
CHKD	SCALE 1:150	SIZE A1	WDAAA364990 XX
APPD			



SECTION A–A

Item No	Pcs.	Code (First)	DESCRIPTION	WEIGHT Incl. fluids kg	WEIGHT Incl. fluids lb	MOUNTING LEVEL millim.	MOUNTING LEVEL (Floor level) inch.
1		SQA	Engine generator set	134700	296960	+0.000	0'– 0"
4		QEA	Engine auxiliary module including:	2500	5500	+0.000	0'– 0"
			– HT thermostatic valve				
			– LT thermostatic valve				
			– Preheating unit				
5		MDD	CHP module (optional)	2500	5500	+0.000	0'– 0"
37		ZBB	Gas regulating unit	200	440	+0.000	0'– 0"
40		QAA	LO unloading pump (clean)	–			
41		QAA	LO unloading pump (dirty)	–			
42		QAC	Lube oil tank (clean)	–			
43		QAD	Lube oil tank (dirty)	–			
44		QAE	LO Transfer pump unit	–			
50		TCA	Working air unit	670	1480	+5.800	19'– 0"
52		TSA	Starting air unit	1700	3750	+5.800	19'– 0"
53		TSB	Starting air bottle 3m3/790 gal	1445	3190	+5.800	19'– 0"
70a		VBA	Maintenance water tank 2.5m3/660 gal	3180	7010	+0.000	0'– 0"
70b		VBA	Glycol tank 2.5m3/660 gal (optional)	3180	7010	+0.000	0'– 0"
71		–	Radiators	3750	8270	+14.830	48'– 8"
72		VEA	LT-water expansion vessel 600l/160gal	786	1680	+15.500	50'– 10"
90		NHA	Exhaust gas silencer	~8300	~13900	+6.500	21'– 4"
91		NHA	Exhaust gas ventilation unit	–		+5.800	19'– 0"
94		NGA	Rupture disc	–		–	–
105			OXI-CAT (optional)	–		+6.600	21'– 8"
117			Heat recovery boiler	–		+6.600	21'– 8"
182		BAC	MV Switchgear	–		+1.600	5'– 3"
183		BAN	Neutral point cubicle	–		+0.000	0'– 0"
186		BEY	DC-system	–		+5.800	19'– 0"
188		BFA	MCC panels	–		+1.600	5'– 3"
189		BEB	Station transformer	–		+1.600	5'– 3"
196		CFA	Control panel, common	–		+5.800	19'– 0"
197		CFC	Control panel, engine wise	–		+5.800	19'– 0"
200			Frequency converter	–		+1.600	5'– 3"
210			Ventilation unit 38100 cmf (18m3/s)	2100	4630	+2.250	7'–5"
211			Ventilation unit 53000 cmf (25m3/s)	–		+3.750	12'– 4"
212			Ventilation unit	–		+12.000	41'– 4"

NOTE!

This is a conseptual drawing. Units, ventilation, layout and dimensions to be verified according to site conditions, environmental/project specific requirements and to process design.

FOR TENDERING ONLY

WÄRTSILÄ

CITEC

Master layout, section
2-6x20V34SG CHP Town

Product: 20V34SG CHP | ADA | UNITS

WNSFI-P PP TECH
2-6x20V34SG

Proj. no. IND62

DATE: 14-Jun-2004 KM011/MA

SCALE 1:75 SIZE A1

Page No. | DRW. No. WDAAA342616 XX

DHC “TOPLOFIKATSIA BOURGAS” JSC

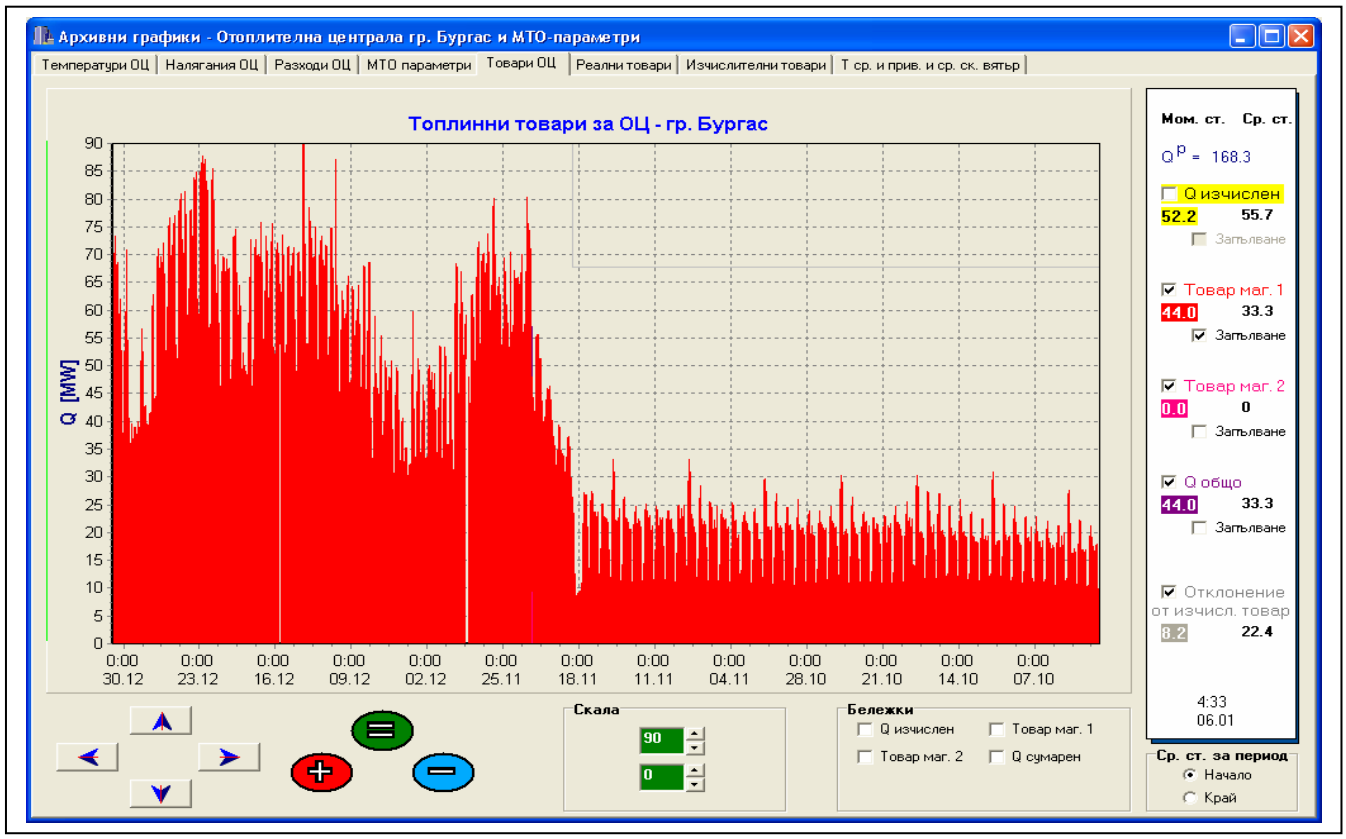
CO – GENERATION GAS POWER STATION

ANNEX No. 4

THERMAL ENERGY DEMANDS LOAD PROFILE

VOLUME 2
Version 1

November, 2005
Sofia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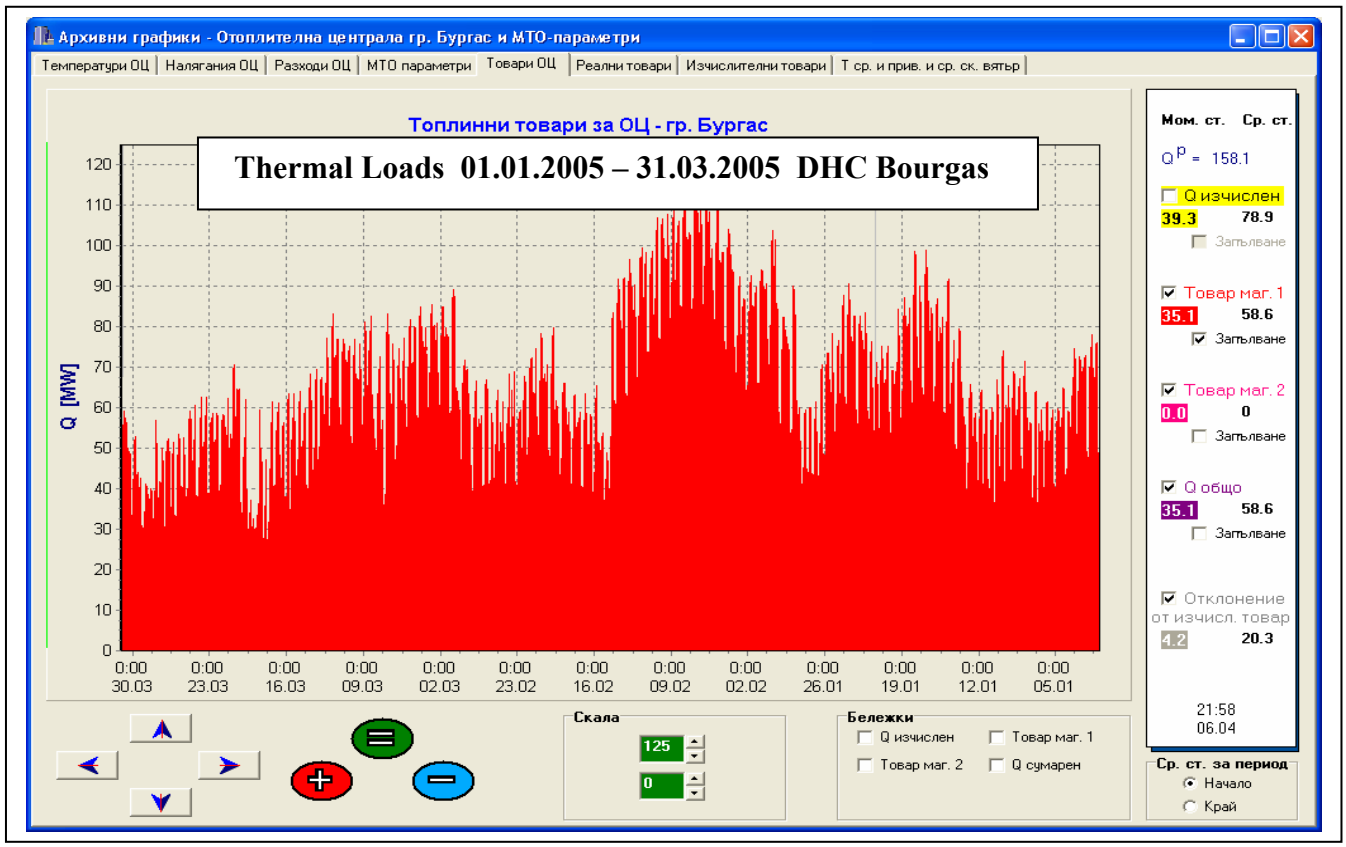
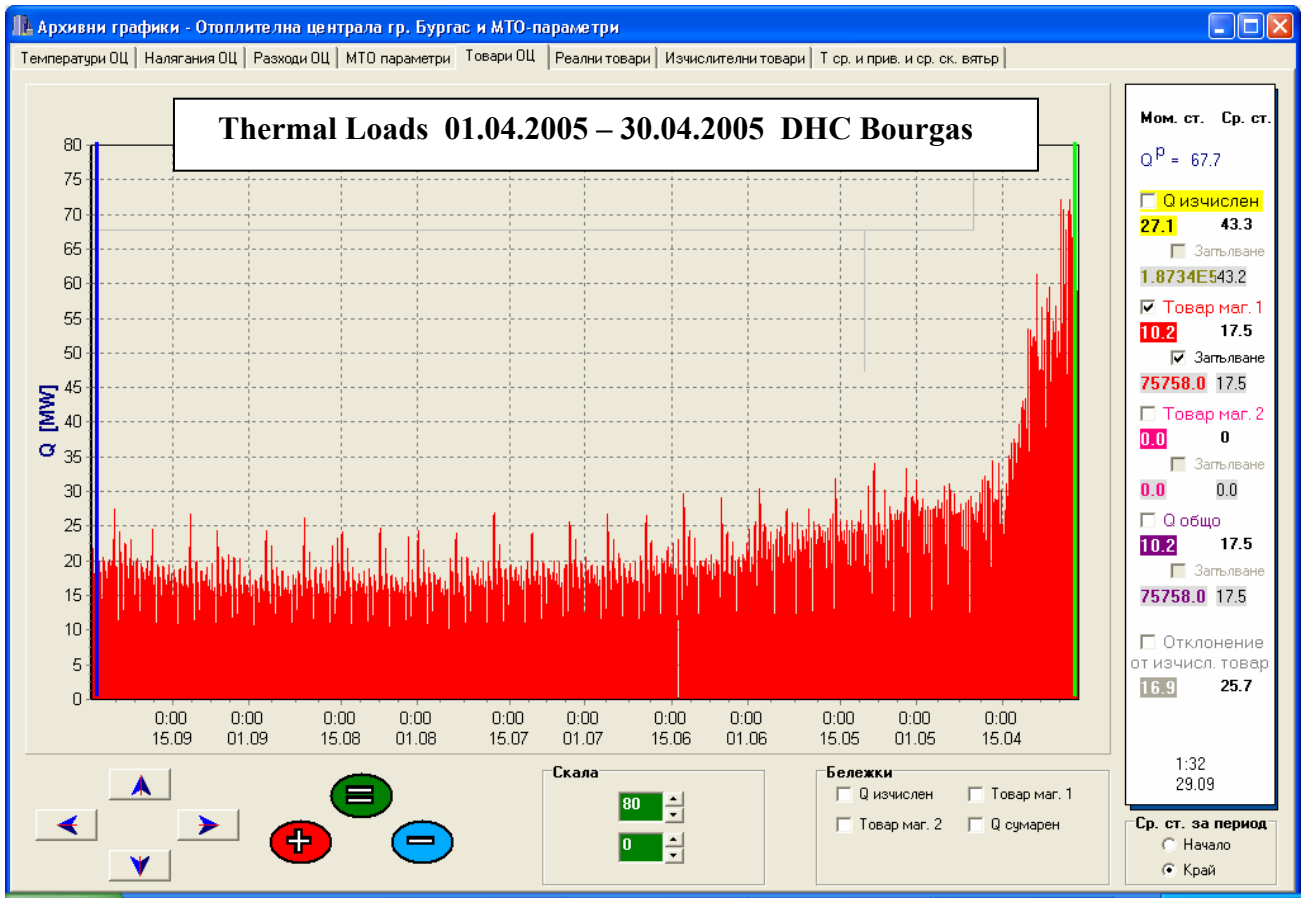
Температури ОЦ | Налягания ОЦ | Разходи ОЦ | МТО параметри | Товари ОЦ | Реални товари | Изчислителни товари | Т ср. и прив. и ср. ск. вятър
Топлинни товари за ОЦ - гр. Бургас
Q [MW]
Мом. ст. Ср. ст.
Q p = 168.3
Q изчислен
52.2 55.7
Запълване
Товар маг. 1
44.0 33.3
Запълване
Товар маг. 2
0.0 0
Запълване
Q общо
44.0 33.3
Запълване
Отклонение от изчисл. товар
8.2 22.4
4:33
06.01
Скала
90
0
Бележки
Q изчислен
Товар маг. 1
Товар маг. 2
Q сумарен
Ср. ст. за период
Начало
Край


Архивни графики - Отоплителна централа гр. Бургас и МТО-параметри
Температури ОЦ | Налягания ОЦ | Разходи ОЦ | МТО параметри | Товари ОЦ | Реални товари | Изчислителни товари | Т ср. и прив. и ср. ск. вятър
Топлинни товари за ОЦ - гр. Бургас
Thermal Loads 01.01.2005 – 31.03.2005 DHC Bourgas
Q [MW]
Мом. ст. Ср. ст.
Q p = 158.1
Q изчислен
39.3 78.9
Запълване
Товар маг. 1
35.1 58.6
Запълване
Товар маг. 2
0.0 0
Запълване
Q общо
35.1 58.6
Запълване
Отклонение от изчисл. товар
4.2 20.3
21:58
06.04
Скала
125
0
Бележки
Q изчислен
Товар маг. 1
Товар маг. 2
Q сумарен
Ср. ст. за период
Начало
Край


Архивни графики - Отоплителна централа гр. Бургас и МТО-параметри
Температури ОЦ
Налягания ОЦ
Разходи ОЦ
МТО параметри
Товари ОЦ
Реални товари
Изчислителни товари
Т ср. и прив. и ср. ск. вятър
Thermal Loads 01.04.2005 – 30.04.2005 DHC Bourgas
Q [MW]
0:00 15.09
0:00 01.09
0:00 15.08
0:00 01.08
0:00 15.07
0:00 01.07
0:00 15.06
0:00 01.06
0:00 15.05
0:00 01.05
0:00 15.04
Мом. ст. Ср. ст.
Q^P = 67.7
Q изчислен
27.1 43.3
Запълване
1.8734E5 43.2
Товар маг. 1
10.2 17.5
Запълване
75758.0 17.5
Товар маг. 2
0.0 0
Запълване
0.0 0.0
Q общо
10.2 17.5
Запълване
75758.0 17.5
Отклонение от изчисл. товар
16.9 25.7
1:32
29.09
Скала
80
0
Бележки
Q изчислен
Товар маг. 1
Товар маг. 2
Q сумарен
Ср. ст. за период
Начало
Край

DHC "TOPLOFIKATSIA BOURGAS" JSC

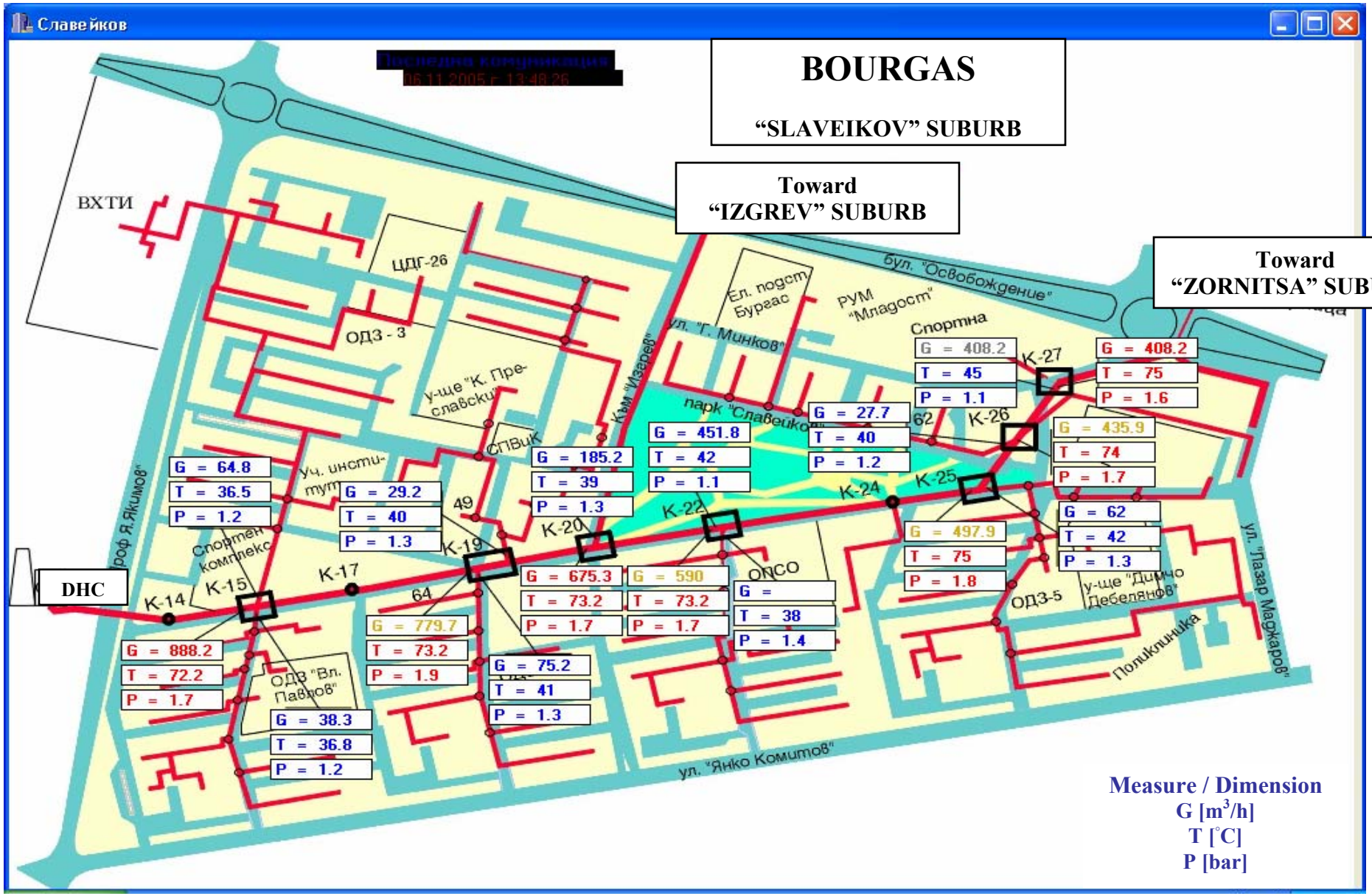
CO – GENERATION GAS POWER STATION

ANNEX No. 5

THERMAL ENERGY NETWORK

VOLUME 2
Version 1

November, 2005
Sofia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Последна комуникация
06.11.2005 г. 13:48:26
BOURGAS
"SLAVEIKOV" SUBURB
Toward
"IZGREV" SUBURB
Toward
"ZORNITSA" SUBURB
DHC
ВХТИ
ЦДГ-26
ОДЗ - 3
у-ще "К. Пре-
славски"
СПВиК
Ел. подст
Бургас
РУМ
"Младост"
бул. "Освобождение"
ул. "Г. Минков"
Спортна
парк "Славейков"
Към "Изгрев"
проф Я.Якимов
Спортен
комплекс
Уч. инсти-
тут
49
64
62
К-14
К-15
К-17
К-19
К-20
К-22
К-24
К-25
К-26
К-27
ОПСО
ОДЗ-5
у-ще "Дичо
Дебелянов"
Поликлиника
ул. "Пазар Маджаров"
ул. "Янко Комитов"
ОДВ "Вл.
Павлов"
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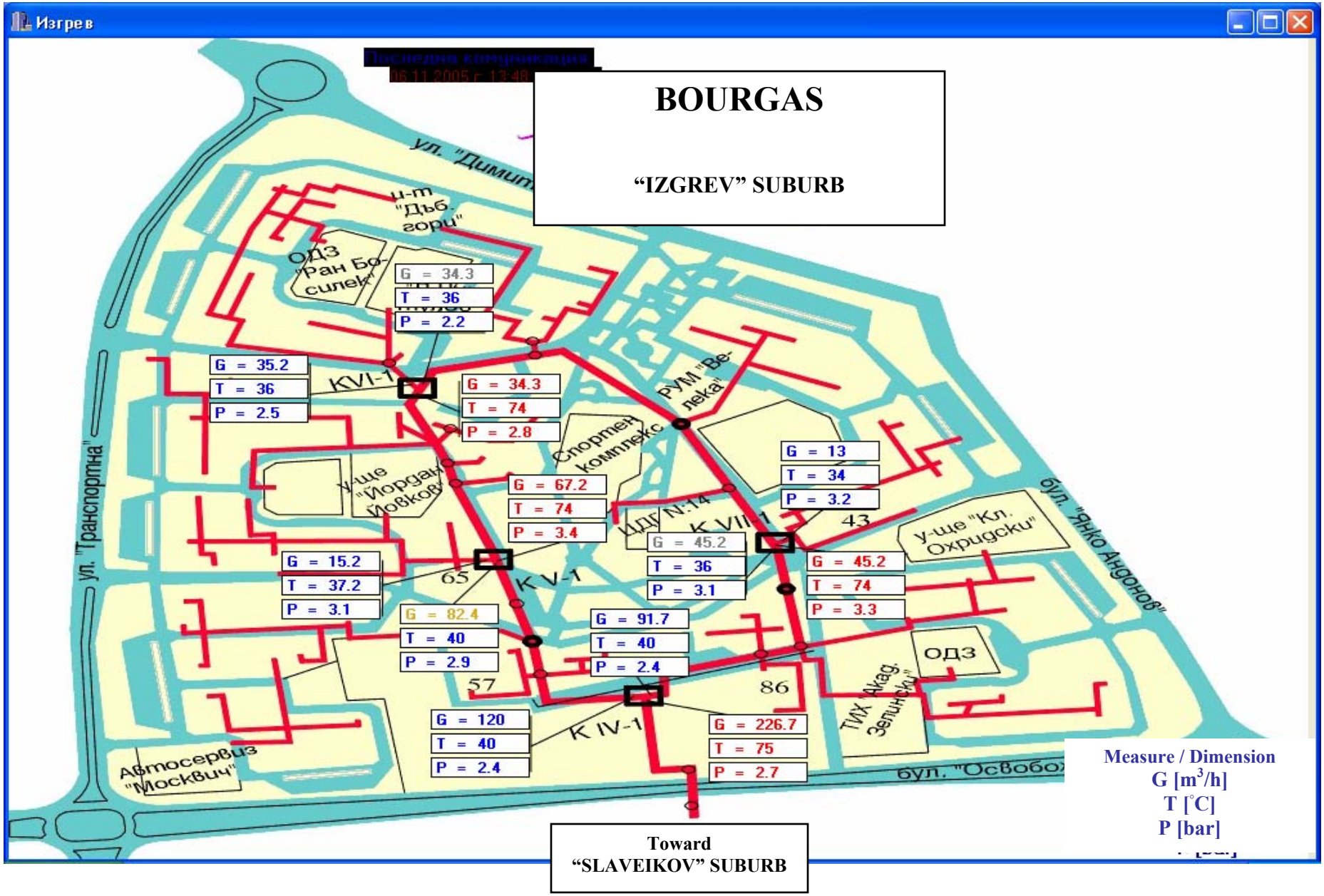
T = 36.5
P = 1.2
G = 29.2
T = 40
P = 1.3
G = 888.2
T = 72.2
P = 1.7
G = 38.3
T = 36.8
P = 1.2
G = 779.7
T = 73.2
P = 1.9
G = 185.2
T = 39
P = 1.3
G = 675.3
T = 73.2
P = 1.7
G = 75.2
T = 41
P = 1.3
G = 451.8
T = 42
P = 1.1
G = 590
T = 73.2
P = 1.7
G = 27.7
T = 40
P = 1.2
G = 408.2
T = 45
P = 1.1
G = 497.9
T = 75
P = 1.8
G = 435.9
T = 74
P = 1.7
G = 408.2
T = 75
P = 1.6
G = 62
T = 42
P = 1.3
G =
T = 38
P = 1.4
Measure / Dimension
G [m3/h]
T [°C]
P [bar]


Изгрев
BOURGAS
"IZGREV" SUBURB
ул. "Транспортна"
ул. "Димит
ц-т "Дъб. гори"
ОДЗ "Ран Бо-силек"
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T = 36
P = 2.2
G = 35.2
T = 36
P = 2.5
KVI-1
G = 34.3
T = 74
P = 2.8
РУМ "Ве-лека"
Спортен комплекс
у-ще "Йордан Йовков"
G = 67.2
T = 74
P = 3.4
G = 13
T = 34
P = 3.2
43
K VII-1
G = 45.2
T = 36
P = 3.1
G = 45.2
T = 74
P = 3.3
у-ще "Кл. Охридски"
бул. "Янко Андонов"
G = 15.2
T = 37.2
P = 3.1
65
K V-1
G = 82.4
T = 40
P = 2.9
G = 91.7
T = 40
P = 2.4
57
86
ОДЗ
ТИХ "Акад. Зелински"
G = 120
T = 40
P = 2.4
K IV-1
G = 226.7
T = 75
P = 2.7
Автосервиз "Москвич"
бул. "Освобо
Measure / Dimension
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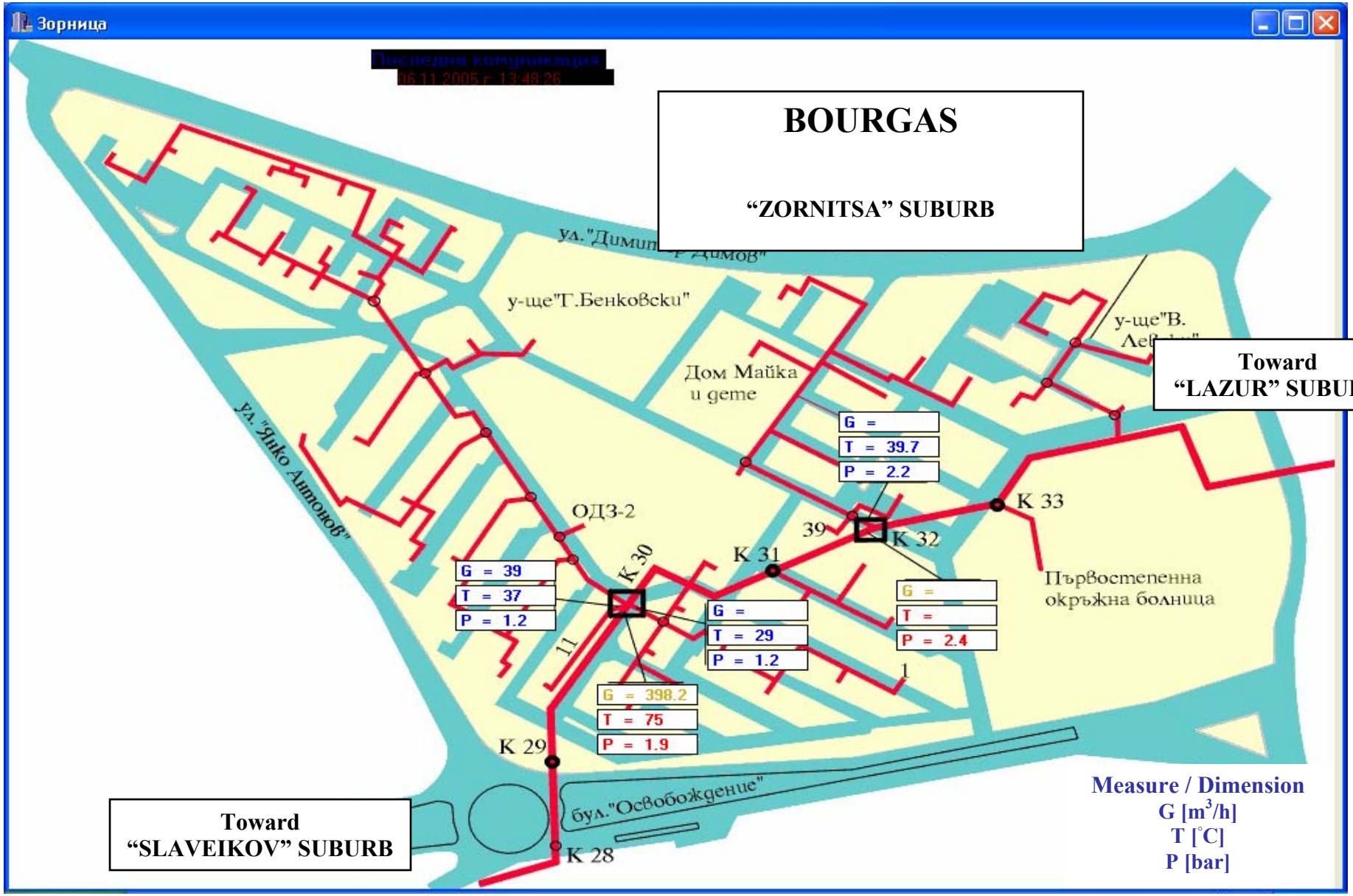
T [°C]
P [bar]
Toward
"SLAVEIKOV" SUBURB


Зорница
BOURGAS
"ZORNITSA" SUBURB
Toward
"LAZUR" SUBURB
Toward
"SLAVEIKOV" SUBURB
ул."Димитър Димов"
у-ще"Т.Бенковски"
у-ще"В.
Дом Майка
и дете
ул."Янко Антонов"
ОДЗ-2
К 30
К 31
К 32
К 33
39
11
1
К 29
К 28
бул."Освобождение"
Първостепенна
окръжна болница
G = 39
T = 37
P = 1.2
G =
T = 29
P = 1.2
G = 398.2
T = 75
P = 1.9
G =
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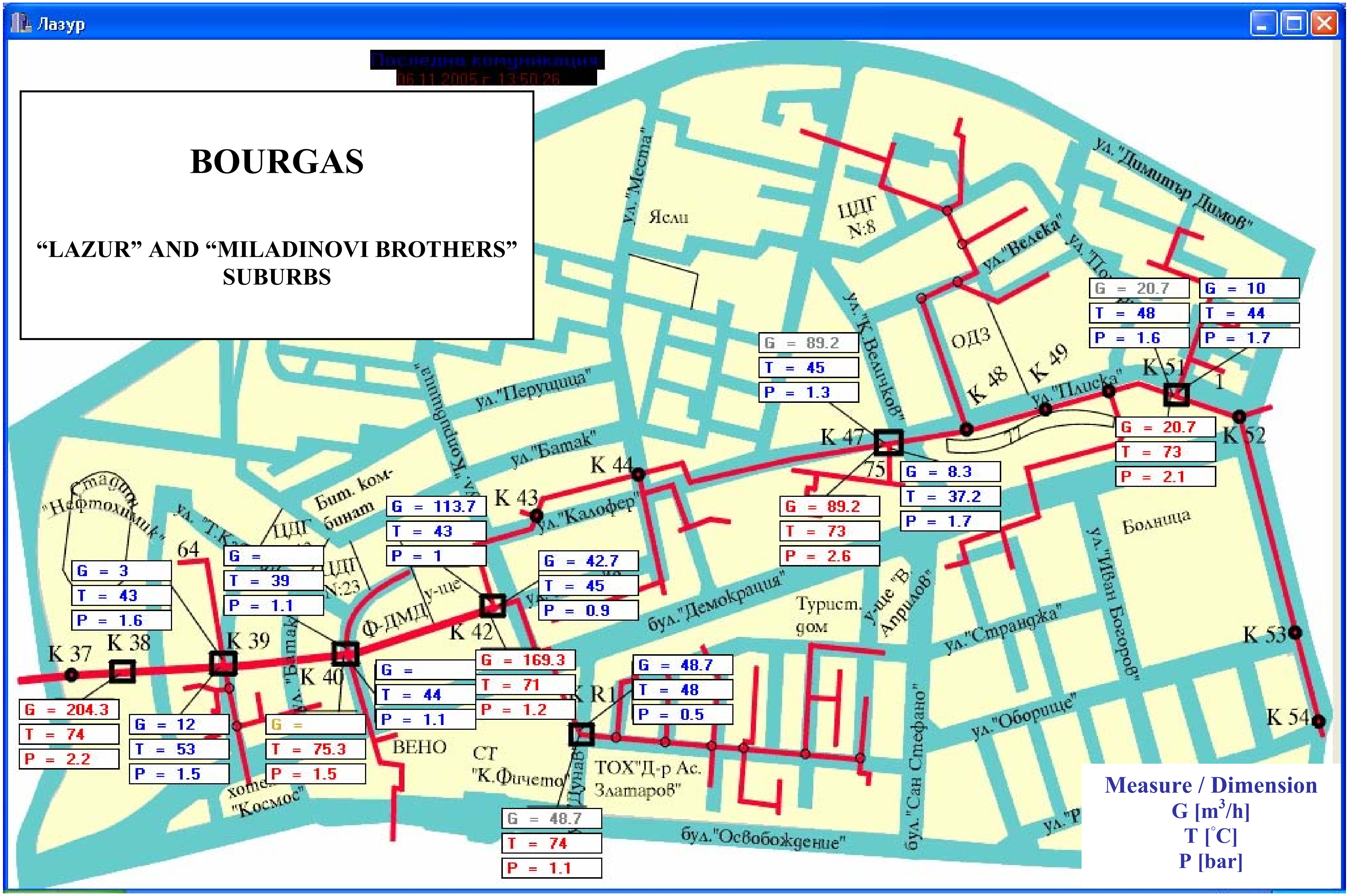
G =
T =
P = 2.4
Measure / Dimension
G [m3/h]
T [°C]
P [bar]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Последна комуникация
06.11.2005 г. 13:50:26
BOURGAS
"LAZUR" AND "MILADINOVI BROTHERS"
SUBURBS
Measure / Dimension
G [m3/h]
T [°C]
P [bar]
K 37
K 38
K 39
K 40
K 42
K 43
K 44
K 47
K 48
K 49
K 51
K 52
K 53
K 54
K R1
G = 204.3
T = 74
P = 2.2
G = 3
T = 43
P = 1.6
G = 12
T = 53
P = 1.5
G =
T = 39
P = 1.1
G =
T = 75.3
P = 1.5
G =
T = 44
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G = 113.7
T = 43
P = 1
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P = 0.9
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P = 1.2
G = 48.7
T = 74
P = 1.1
G = 48.7
T = 48
P = 0.5
G = 89.2
T = 45
P = 1.3
G = 89.2
T = 73
P = 2.6
G = 8.3
T = 37.2
P = 1.7
G = 20.7
T = 48
P = 1.6
G = 10
T = 44
P = 1.7
G = 20.7
T = 73
P = 2.1
ул."Места"
Ясли
ЦДГ N:8
ул."Велека"
ул."Димитър Димов"
ул."К.Величков"
ОДЗ
ул."Плиска"
ул."Перущица"
ул."Батак"
ул."Калофер"
бул."Демокрация"
Турист. дом
ул."Странджа"
ул."Иван Богоров"
Болница
ул."Оборище"
бул."Сан Стефано"
бул."Освобождение"
ТОХ"Д-р Ас. Златаров"
СТ "К.Фичето"
ВЕНО
Ф-ДМД
ЦДГ N:23
Бит. комбинат
Стадион "Нефтохимик"
хотел "Космос"
64
75

DHC “TOPLOFIKATSIA BOURGAS” JSC

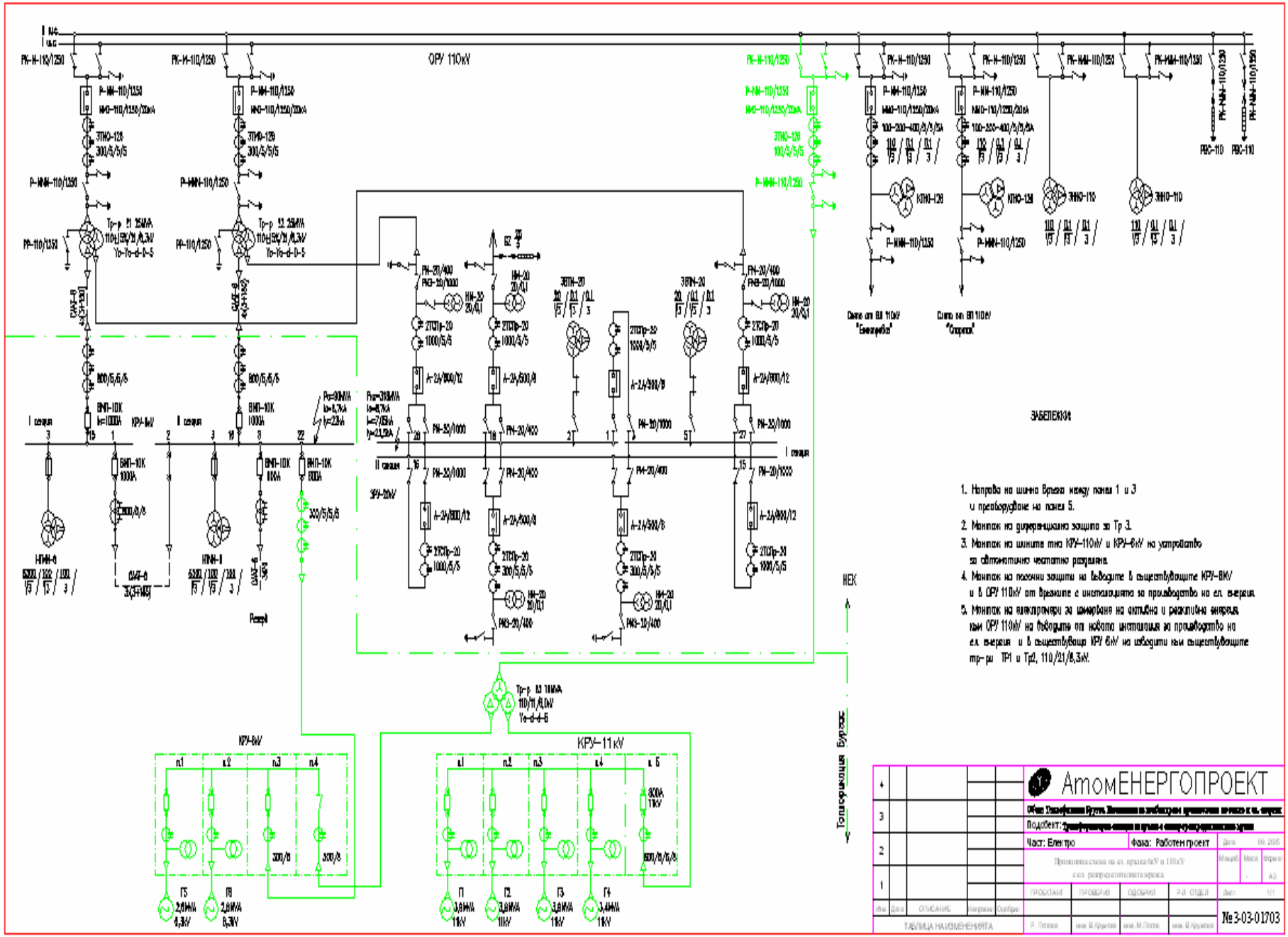
CO – GENERATION GAS POWER STATION

ANNEX No. 6

SINGLE LINE ELECTRICAL SCHEME

VOLUME 2
Version 1

November, 2005
Sofia


ОРУ 110kV
КРУ-6kV
КРУ-11 kV
I секция
II секция
ЗАБЕЛЕЖКИ
1. Направа на шинна връзка между поле 1 и 3 и преобурудване на поле 5.
2. Монтаж на диференциална защита за Тр 3.
3. Монтаж на шинната база КРУ-110kV и КРУ-6kV на устройство за автоматично честотно разтоварване.
4. Монтаж на полеви защити на въводите в съществуващите КРУ-6kV и в ОРУ 110kV от времето с инсталацията за производство на ел. енергия.
5. Монтаж на електромери за измерване на активна и реактивна енергия, към ОРУ 110kV на въводите от новата инсталация за производство на ел. енергия и в съществуващ КРУ 6kV на въводи към съществуващите тр-ри ТР1 и Тр2, 110/21/6,3kV.
Топлофикация Бургас
АтомЕНЕРГОПРОЕКТ
Част: Електро
Фаза: Работен проект
№ 3-03-01703

DHC “TOPLOFIKATSIA BOURGAS” JSC

CO – GENERATION GAS POWER STATION

ANNEX No. 7

MONITORING MODELS

VOLUME 2
Version 1 Rev1

November, 2005
Sofia

Monitoring models

BURGAS CoGen Power Plant

Total Production of Heat; [MWht]

Month	2006	2007	2008	2009	2010	2011	2012
Jan							
Feb							
Mar							
Apr							
May							
Jun							
Jul							
Aug							
Sep							
Oct							
Nov							
Dec							
Total (MWht)	0	0	0	0	0	0	0

CHP Production of Heat; [MWht]

Month	2006	2007	2008	2009	2010	2011	2012
Jan							
Feb							
Mar							
Apr							
May							
Jun							
Jul							
Aug							
Sep							
Oct							
Nov							
Dec							
Total (MWht)	0	0	0	0	0	0	0

Generated electricity from CHP; [MWhe]

Month	2006	2007	2008	2009	2010	2011	2012
Jan							
Feb							
Mar							
Apr							
May							
Jun							
Jul							
Aug							
Sep							
Oct							
Nov							
Dec							
Total (MWhe)	0	0	0	0	0	0	0

Steam production of Back-up boilers; [MWht]

Mont	2006	2007	2008	2009	2010	2011	2012
Jan							
Feb							
Mar							
Apr							
May							
Jun							
Jul							
Aug							
Sep							
Oct							
Nov							
Dec							
Total (MWht)	0	0	0	0	0	0	0

Sold steam to external consumers; [MWht]

Mont	2006	2007	2008	2009	2010	2011	2012
Jan							
Feb							
Mar							
Apr							
May							
Jun							
Jul							
Aug							
Sep							
Oct							
Nov							
Dec							
Total (MWht)	0	0	0	0	0	0	0

Annual consumption

CHP consumption of Natural gas x 1000 Nm3

Month	2006	2007	2008	2009	2010	2011	2012
Jan							
Feb							
Mar							
Apr							
May							
Jun							
Jul							
Aug							
Sep							
Oct							
Nov							
Dec							
Total (1000 Nm3)	0	0	0	0	0	0	0

Water and Steam Boilers consumption of Natural gas x 1000 Nm3

Month	2006	2007	2008	2009	2010	2011	2012
Jan							
Feb							
Mar							
Apr							
May							
Jun							
Jul							
Aug							
Sep							
Oct							
Nov							
Dec							
Total (1000 Nm3)	0	0	0	0	0	0	0

HFO /mazut/ for Water and Steam Boilers; tons

Month	2006	2007	2008	2009	2010	2011	2012
Jan							
Feb							
Mar							
Apr							
May							
Jun							
Jul							
Aug							
Sep							
Oct							
Nov							
Dec							
Total (tons)	0	0	0	0	0	0	0

Electricity for auxiliary needs ; [MWhe] (ET09/110KV)

Month	2006	2007	2008	2009	2010	2011	2012
Jan							
Feb							
Mar							
Apr							
May							
Jun							
Jul							
Aug							
Sep							
Oct							
Nov							
Dec							
Total (MWhe)	0	0	0	0	0	0	0

Electrisity for CHP needs ; [MWhe] (ET07/0,4 KV)

Month	2006	2007	2008	2009	2010	2011	2012
Jan							
Feb							
Mar							
Apr							
May							
Jun							
Jul							
Aug							
Sep							
Oct							
Nov							
Dec							
Total (MWhe)	0	0	0	0	0	0	0

Heat for auxiliary needs; [MWht]

Month	2006	2007	2008	2009	2010	2011	2012
Jan							
Feb							
Mar							
Apr							
May							
Jun							
Jul							
Aug							
Sep							
Oct							
Nov							
Dec							
Total (MWht)	0	0	0	0	0	0	0

Project emissions

LHV$_{NG}$ - Lower heating value 7934 kCal/Nm3 For natural gas in Bulgaria. Value provided by Bulgargas.
LHV$_{HFO}$ - Lower heating value 39.805 GJ/t For HFO /mazut/ in Bulgaria. Value provided bu BDS
EF$_{NG}$ - CO2 emissions factor (combustion) 56.1 kg/GJ Natural gas (dry): 15.3 t C/TJ lower heating value basis x 44/12 = 56.1 t CO2/TJ
EF$_{HFO}$ - CO2 emissions factor (combustion) 73.3 kg/GJ HFO /mazut/

Year	Year	Natural gas Consumption of WB and CHP (combustion) **GJ/year**	Electricity Production of CHP (Replaced generation of NEC grid) **MWh/year**	Electricity Production of CHP replaced consumption of factory **MWh/year**	CO2 Emissions (combustion) **t/year**	CO2 Emissions repl. Electr. **t/year**	CO2 equiv. Emissions **t/year**
1	2006	0	0	0	0	0	0
2	2007	0	0	0	0	0	0
3	2008	0	0	0	0	0	0
4	2009	0	0	0	0	0	0
5	2010	0	0	0	0	0	0
6	2011	0	0	0	0	0	0
7	2012	0	0	0	0	0	0

Calculation of the baseline emissions

LHV$_{NG}$ - Lower heating value 7934 kKal/Nm3 for natural gas in Bulgaria. Value provided by Bulgargas.
LHV$_{HFO}$ - Lower heating value 39.805 GJ/t For HFO /mazut/ in Bulgaria. Value provided bu BDS
EF$_{NG}$ - CO2 emissions factor (combustion) 56.1 kg/GJ Natural gas (dry): 15.3 t C/TJ lower heating value basis x 44/12 = 56.1 t CO2/TJ
EF$_{HFO}$ - CO2 emissions factor (combustion) 73.3 kg/GJ HFO /mazut/

CHP Heat

Year	Year	h Production PB	Heat Production MWh/year	Heat consumption for own needs MWh/year	Replleiced Heat from CHPand PB GJ/year	CO2 Emissions (combustion) t/year
1	2006	0.97	0	0	0	0
2	2007	0.97	0	0	0	0
3	2008	0.97	0	0	0	0
4	2009	0.97	0	0	0	0
5	2010	0.97	0	0	0	0
6	2011	0.97	0	0	0	0
7	2012	0.97	0	0	0	0

EFELgen. CO2 emissions factor - generating electricity gCO2/kWh
B.4 The standardized carbon emission factors
EFELcons. CO2 emissions factor - consumption electricity gCO2/kWh
B.4 The standardized carbon emission factors
Operational Guidelines for PDDs of JI projects

CHP Electricity

Year	Year	Electricity Production of CHP Electricity (Replaced generation in NEC grid) MWh/year	Electricity Production of CHP replaced consumption of factory MWh/year	**EFEL** Consumption t/MWh	CO2 Emissions t/year
1	2006	0	0	0.934	0
2	2007	0	0	0.912	0
3	2008	0	0	0.890	0
4	2009	0	0	0.867	0
5	2010	0	0	0.845	0
6	2011	0	0	0.822	0
7	2012	0	0	0.800	0

Annual emissions TOTAL reduction

		Basis Line		**Project Line**	**Reduction**
Year	Year	CO2equiv. Emissions Heat t/year	CO2 Emissions Electricity t/year	CO2equiv. Emissions CHP t/year	CO2equiv. t/year
1	2006	0	0	0	0
2	2007	0	0	0	0
3	2008	0	0	0	0
4	2009	0	0	0	0
5	2010	0	0	0	0
6	2011	0	0	0	0
7	2012	0	0	0	0

DHC "TOPLOFIKATSIA BOURGAS" JSC

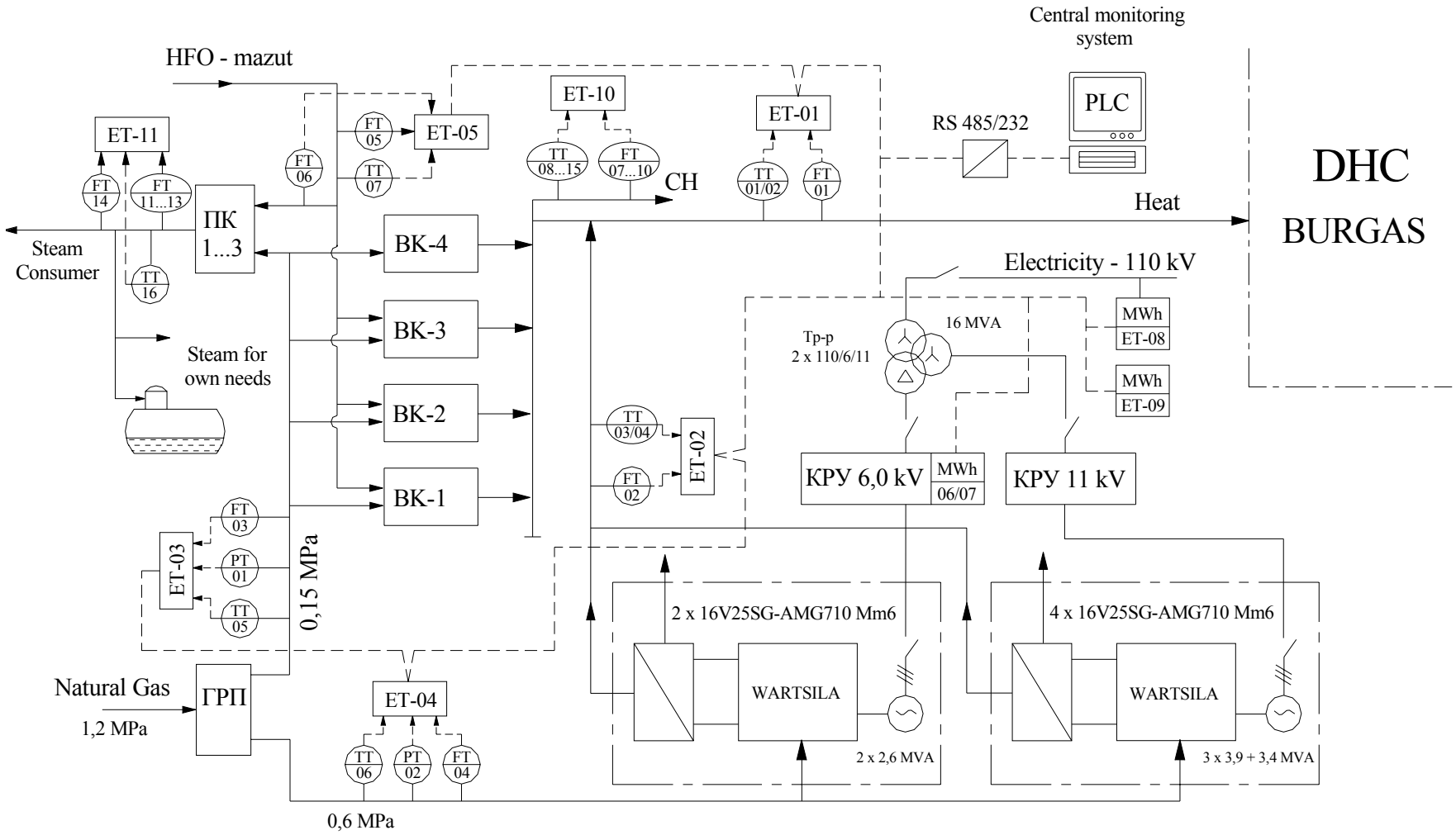
CO – GENERATION GAS POWER STATION

ANNEX No. 8

MONITORING SCHEME

VOLUME 2
Version 1 Rev 1

November, 2005
Sofia


HFO - mazut
Central monitoring system
PLC
RS 485/232
DHC
BURGAS
ET-11
FT 14
FT 11...13
TT 16
ПК 1...3
Steam Consumer
Steam for own needs
FT 06
FT 05
TT 07
ET-05
ET-10
TT 08...15
FT 07...10
CH
ET-01
TT 01/02
FT 01
Heat
Electricity - 110 kV
Tp-p 2 x 110/6/11
16 MVA
MWh ET-08
MWh ET-09
ВК-4
ВК-3
ВК-2
ВК-1
TT 03/04
FT 02
ET-02
КРУ 6,0 kV
MWh 06/07
КРУ 11 kV
FT 03
PT 01
TT 05
ET-03
0,15 MPa
2 x 16V25SG-AMG710 Mm6
4 x 16V25SG-AMG710 Mm6
WARTSILA
WARTSILA
2 x 2,6 MVA
3 x 3,9 + 3,4 MVA
Natural Gas
1,2 MPa
ГРП
ET-04
TT 06
PT 02
FT 04
0,6 MPa

DHC “TOPLOFIKATSIA BOURGAS” JSC

CO – GENERATION GAS POWER STATION

ANNEX No. 9

MONITORING EUQIPMENT SPECIFICATION

VOLUME 2
Version 1 Rev. 1

November, 2005
Sofia

SPECIFICATION

Thermal energy			Preliminary investigations			SITE: DHC Bourgas JSC			
PART: Control & Instrumentation (C & I)			Measurement devices			SUBPROJECT: Monitoring system			
No.	**Tag number**	**Measured parameter**	**Measured parameters**		**Place of assembly**	**Specification of the measurement devices**	**Type**	**Qua.**	**Rem.**
			name	value					
1.	FT-01	Heat-flow at the outlet of the DHC Ist and IInd highways	Heat-flow water WHB 1...4 P_B = 16 Bar T_B = 130 ^oC	Gmax = 4320 m^3/h Gnom = 2000 m^3/h Gmin = 0 m^3/h	Compartment 2A	Ultrasonic flow-meter DN-700 Flanges assembly DIN-2501 Tmax = 200 ^oC Power supply 220 V AC Output: 4…20 mA	SONOFLO 3100/1000	2	extant
2.	FT-02	Heat-flow at the outlet of the CHP modules	Heat-flow water from CHP P_B = 10 Bar T_B = 130 ^oC	Gmax = 400 m^3/h Gnom = 250 m^3/h Gmin = 0 m^3/h	The outlet of CHP DN - 200	Ultrasonic/magnet-inductive flow-meter - Flanges assembly - DIN – 2501/ PN-1 - compact version IP - 67 - power supply 18...36 V DC - outlet: PFM / 4…20 mA, HART - accuracy ≤ 0,5 %		1	DN 200 PN 16
3.	FT-03	Natural gas flow for the water heated boiler (WHB) and the CHP	Natural gas for WHB and CHP P_G = 1.2Bar T_G = 20 ^oC	Gmax =50000 Nm^3/h Gnom =30000 Nm^3/h Gmin = 700 Nm^3/h	Gas line 1.2 Bar outlet GDS DN-700/250/150	Orifice flow-meter with differential converters Flanges assembly DIN-2501 Tmax = 400 ^oC Power supply: 18...36 V DC Outlet: 4…20 mA, HART		3	extant
4.	FT-04	Natural gas flow for the CHP	Natural gas for the co-generator P_G = 6 Bar T_G = 20 ^oC	Gmax = 7000 Nm^3/h Gnom = 4800 Nm^3/h Gmin = 200 Nm^3/h	On the line of the co-generator DN - 100	Whirlwind/Supersonic flow-meter Flanges assembly DIN-2501 Compact version PN-25 Tmax = 100 ^oC Power supply: 18...36 V DC Outlet: PFM / 4…20 mA, HART EEx-ia IIC-T6		1	DN 80 PN 16

Thermal energy			Preliminary investigations			SITE: DHC Bourgas JSC			
PART: C & I			Measurement devices			SUBPROJECT: Monitoring system			
No.	Tag number	Measured parameter	Measured parameters		Place of assembly	Specifications of the measurement device	Type	Qua.	Rem.
			name	value					
5.	FT-05	Flow	HFO for WHB - 1..3 P_M = 6 Bar T_M = 160 °C	Gmax = 20000 kg/h Gnom = 10000 kg/h Gmin = 200 kg/h	HFO line 6 Ata installations inlet DN - 80	PD-meter; mass flow-meter Flanges assembly DIN-2501 Tmax = 400 °C Power supply 18...36 V DC Outlet: 4…20 mA, Impulse / HART		1	DN 80 PN 40
6.	FT-06	Flow	HFO for SB-3 P_M = 6 Bar T_M = 160 °C	Gmax = 1000 kg/h Gnom = 800 kg/h Gmin = 200 kg/h	HFO line 6 Ata installations inlet DN - 25	PD-meter; mass flow-meter Flanges assembly DIN-2501 Tmax = 400 °C Power supply 18...36 V DC Outlet: 4…20 mA, Impulse / HART		1	DN 25 PN 40
7.	FT-07 FT-08 FT-09 FT-10	Hot water flow For auxiliary needs	- OSC - hidropony - HVO - PKC	9 m^3/h 216m^3/h 7 m^3/h 3 m^3/h	Collector №6 in DHC	Whirlwind flowmeters Flange connecting DIN-2501 Tmax = 170 °C Voltage 18...36 V DC Impulse – 25 impulses/l		4	existing
8.	FT-11 FT-12 FT-13	Saturated Steam Flow from Steam Boilers	Saturated Steam $P_П$ = 10 Bar $T_П$ = 180 °C	Gmax = 12000 kg/h Gnom = 8000 kg/h Gmin = 1000 kg/h	Steam pipelines from the Steam Boilers	Whirlwind flowmeters Flange connecting DIN-2501 Tmax = 400 °C Voltage 18...36 V DC Output: 4…20 mA, Accuracy 0.5 %	ROSEMOUN T Vortex-8800	3	existing
9.	FT-14	Saturated Steam Flow to external consumers	Saturated Steam $P_П$ = 10 Bar $T_П$ = 180 °C	Gmax = 3000 kg/h Gnom = 2500 kg/h Gmin = 500 kg/h	Steam pipelines to external consumers	Whirlwind flowmeters Flange connecting DIN-2501 Tmax = 400 °C Voltage 18...36 V DC Output: 4…20 mA, Accuracy 0.5 %	DANFOS DN 50, PN 40	1	existing
10.	TT-01 TT-02	Temperature	Heat-flow water for the network and the co-generator	Tmax = 150 °C Tmin = 0 °C Pmax = 16 Bar Pmin = 6 Bar	At the water heat transfer highways	Thermo resistor with a built in converter Outlet: 4…20 mA, HART Range: 0...+150 °C Inserting: L = 250mm With thermal wall - 1,4571 Process connection – DIN 43772	TRN-2WR3 DIN-IEC 751	4	extant

Thermal energy			Preliminary investigations			SITE: DHC Bourgas JSC			
PART: C & I			Measurement devices			SUBPROJECT: Monitoring system			
No.	**Tag number**	**Measured parameter**	**Measured parameters** name	**Measured parameters** value	**Place of assembly**	**Specifications of the measurement device**	**Type**	**Qua.**	**Rem.**
11.	TT-03 TT-04	Temperature	Heat-flow water for the CHP	Tmax = 150 °C Tmin = 0 °C Pmax = 16 Bar Pmin = 6 Bar	On the line of the CHP	Thermo resistor with a built in converter Outlet: 4…20 mA, HART Range: 0...+150 °C Inserting: L = 160mm With thermal wall - 1,4571 Process connection – DIN 43772	Pt-100, DIN-IEC 751	2	
12.	TT-05	Temperature	Natural gas for the WHB and SB	Tmax = 50 °C Tmin = 0 °C Pmax = 1,5 Bar Pmin = 0,5 Bar	At the gas pipeline after the GDP DN- 700	Thermo resistor with a built in converter Outlet: 4…20 mA, HART Range: -20...+50 °C Inserting: L = 250 mm With thermal wall - 1,4571 Process connection – DIN 43772 EEx	Pt-100, DIN-IEC 751	1	extant
13.	TT-06	Temperature	Natural gas for the CHP	Tmax = 50 °C Tmin = 0 °C Pmax = 1,5 Bar Pmin = 0,5 Bar	At the gas pipeline after the GDP DN- 100	Thermo resistor with a built in converter Outlet: 4…20 mA, HART Range: -20...+50 °C Inserting: L = 110 mm With thermal wall - 1,4571 Process connection – DIN 43772 EEx-ia IIC-T6	Pt-100, DIN-IEC 751	1	
14.	TT-07	Temperature	HFO For WB 1...3 и and SB	Tmax = 100 °C Tmin = 0 °C Pmax = 40 Bar Pmin = 0 Bar	On pipeline MHC DN- 100	Thermo resistor with a built in converter Outlet: 4…20 mA, HART Range 0...+200 °C Floating dept L = 110 mm With protection cartridge - 1,4571 Connection – DIN 43772 EEx-ia IIC-T6 performance	Pt-100, DIN-IEC 751	1	

Thermal energy			Preliminary investigations			SITE: DHC Bourgas JSC			
PART: C & I			Measurement devices			SUBPROJECT: Monitoring system			
No.	**Tag number**	**Measured parameter**	**Measured parameters**		**Place of assembly**	**Specifications of the measurement device**	**Type**	**Qua.**	**Rem.**
			name	value					
15.	TT-08/09 TT-10/11 TT-12/13 TT-14/15	Hot water temperature for auxiliary needs	- OSC - hidropony - HVO - PKC	Tmax = 170 °C Tmin = 0 °C Pmax = 25 Bar Pmin = 0 Bar	Collector №6 in DHC	Thermoresistors Range 0...+200 °C Floating dept L = 110 mm With protection cartridge - 1,4571	Pt-100, DIN-IEC 751	8	existing
16.	TT-16/1 TT-16/2 TT-16/3 TT-16/4	Steam temperature	External consumers and auxiliary needs	Tmax = 190 °C Tmin = 0 °C Pmax = 16 Bar Pmin = 0 Bar	Steam pipelines in Steam station	Thermoresistors Range 0...+200 °C Floating dept L = 110 mm With protection cartridge - 1,4571	Pt-100, DIN-IEC 751	4	existing
17.	PT-01 PT-02	Pressure	Natural gas for KM-12 and co-generator	0...10Bar abs. Tmax= 30 °C	After gas flow flow-meter 3...5 DN	Absolute pressure converter Process supply G ½" A, DIN - 16288 In package with manometer valves. DN-5 / PN-100 Power supply 18...36 V DC two-way conducted Output: 4…20 mA, HART Accuracy ≤ 0,2 % from the range EEx-ia IIC-T6		2	
18.	ET-01	Flow and thermal energy from the DHC	**Heat-flow water** Energy Flow Temperature Totalize Enthalpy	- MWht - t/h - °C - t - kJ/kg	In "Monitoring" control panel	Double-channel calculating device "Flowcomputer" for the thermal energy commercial measurement of heat-flow – IAPWS-IF-97. Input signals by two-way conducted converters, supplied with 24 V DC. - 4…20 mA, programmable – 6 бр. - buttons for working with the menu - matrix and lightened display - interface – RS 485; PROFIBUS Certificate – OIML R75, Written in the State allowances register for the commercial payments, measurement resources.	Double channel measurement device	1	It duplicates EMAJ -DANFOSS

Thermal energy			Preliminary investigations		SITE: DHC Bourgas JSC			
PART: C & I			Measurement devices		SUBPROJECT: Monitoring system			
No.	Tag number	Measured parameter	Measured parameters		Place of assembly	Specifications of the measurement device	Type	Qua.	Rem.
			name	value					
19.	ET-02	Flow and thermal energy from the CHP	**Heat-flow water** Energy Flow Temperature Totalize Enthalpy	- MWh - m^3/h - ^oC - m^3 - kJ/kg	In "Monitoring" control panel	A single channel calculating device "Flowcomputer" for the thermal energy commercial measurement of heat-flow – IAPWS-IF-97. Input signals by two-way conducted converters, supplied with 24 V DC. - 4…20 mA, programmable – 1 бр. - buttons for working with the menu - matrix and lightened display - interface – RS 485; PROFIBUS Certificate – OIML R75, Written in the State allowances register for the commercial payments, measurement resources.	A single channel measurement device	1	
20.	ET-03	Volume flow for the water heat and steam boilers	**Natural gas** Flow Temperature Pressure Totalize	- Nm^3/h - ^oC - Bar - Nm^3	In "Monitoring" control panel	Four-channel calculating device "Flowcomputer" for natural gas commercial measurement - NX19, SGERG88, AGA8. Input signals by two-way conducted converters, supplied with 24 V DC. - 4…20 mA, programmable – 6 бр. - buttons for working with the menu - matrix and lightened display - interface – RS 485; PROFIBUS Certificate – OIML R75, Written in the State allowances register for the commercial payments, measurement resources.	Four-channel measurement device DART II	1	existing

Thermal energy			Preliminary investigations			SITE: DHC Bourgas JSC			
PART: C & I			Measurement devices			SUBPROJECT: Monitoring system			
No.	**Tag number**	**Measured parameter**	**Measured parameters** name	value	**Place of assembly**	**Specifications of the measurement device**	**Type**	**Qua.**	**Rem.**
21.	ET-04	Volume flow for CHP	**Natural gas** Flow Temperature Pressure Totalize	- Nm^3/h - ^oC - Bar - Nm^3	In "Monitoring" control panel	A single channel calculating device "Flowcomputer" for natural gas commercial measurement - NX19, SGERG88, AGA8. Input signals by two-way conducted converters, supplied with 24 V DC. - 4…20 mA, programmable – 6 бр. - buttons for working with the menu - matrix and lightened display - interface – RS 485; PROFIBUS Certificate – OIML R75, Written in the State allowances register for the commercial payments, measurement resources.	A single channel measurement device	1	
22.	ET-05	volume/mass flow	**HFO** Flow Temperature Totalize	- t/h - ^oC - t	In "Monitoring" control panel	Double channel calculating device "Flowcomputer" for liquid fuels commercial measurement - API. Impulse input signals by two-way conducted converters, supplied with 24 V DC. - buttons for working with the menu - matrix and lightened display - interface – RS 485; PROFIBUS Certificate – OIML R75, Written in the State allowances register for the commercial payments, measurement resources.	Double channel measurement device	1	
23.	ET-10/1 ET-10/2 ET-10/3 ET-10/4	Thermal energy for auxiliary needs	Hot flow water for: - OCK - Hydroponi - HVO - PKC	- MWh - m^3/h - ^oC - m^3	Installed in DHC	A single channel calculating devices "Flowcomputers" for thermal energy-hot water flow commercial measurement . Input signals by flow converters – impulse, supplied with 24 V DC: - RTD – converters, Pt -100; - buttons for working with the menu; - matrix and lightened display; - interface – RS 485; PROFIBUS Written in the State allowances register for the commercial payments, measurement resources.	INFOCAL-5; SONO-2500 CT; SONO-3000 CT; SHARKY TYP - 770	4	existing

Thermal energy			Preliminary investigations			SITE: DHC Bourgas JSC			
PART: C & I			Measurement devices			SUBPROJECT: Monitoring system			
No.	Tag number	Measured parameter	Measured parameters		Place of assembly	Specifications of the measurement device	Type	Qua.	Rem.
			name	value					
23.	ET-10/1 ET-10/2 ET-10/3 ET-10/4	Thermal energy for auxiliary needs	Hot flow water for: - OCK - Hydroponi - HVO - PKC	- MWh - m^3/h - ^oC - m^3	Installed in DHC	A single channel calculating devices "Flowcomputers" for thermal energy-hot water flow commercial measurement . Input signals by flow converters – impulse, supplied with 24 V DC: - RTD – converters, Pt -100; - buttons for working with the menu; - matrix and lightened display; - interface – RS 485; PROFIBUS Written in the State allowances register for the commercial payments, measurement resources.	INFOCAL-5; SONO-2500 CT; SONO-3000 CT; SHARKY TYP - 770	4	existing
24.	ET-11/1 ET-11/2 ET-11/3 ET-11/4	Thermal energy Saturated steam	Steam flow	- MWh - t/h - ^oC	Installed in DHC	A single channel calculating devices "Flowcomputers" for thermal energy-hot water flow commercial measurement . Input signals by flow converters – impulse, supplied with 24 V DC: - RTD – converters, Pt -100; - buttons for working with the menu; - matrix and lightened display; - interface – RS 485; PROFIBUS Written in the State allowances register for the commercial payments, measurement resources.	UNISIST CF 300 S1 "Autarkon" DANFOSS	4	existing
25.	ET-06	Electricity from CHP	**6 кV** **Energy** Active Reactive	- MWh - MVArh	Assembled in Switch Gear 6 kV	Three-phase measurement device for active and reactive energy. - according to EN60687p, EN61036 and EN61268 - capability settings of parameters - communication IEC61107	A single channel measurement device	1	

Electrical energy			Preliminary investigations		SITE: DHC Bourgas JSC			
PART: C & I			Measurement devices		SUBPROJECT: Monitoring system			
No.	**Tag number**	**Measured parameter**	**Measured parameters** name	value	**Place of assembly**	**Specifications of the measurement device**	**Type**	**Qua.**	**Rem.**
26.	ET-07	Electricity for auxiliary needs CHP	**6 кV Energy** Active Reactive	- MWh - MVArh	Assembled in Switch Gear 6 kV	Three-phase measurement device for active and reactive energy. - according to EN60687p, EN61036 and EN61268 - capability settings of parameters - communication IEC61107		1	
27.	ET-08 ET-09	Electricity generated by CHP and for auxiliary needs	**110 кV Energy** Active Reactive	- MWh - MVArh	Assembled in Switch Gear 110 kV	Three-phase measurement device for active and reactive energy. - according to EN60687p, EN61036 and EN61268 - capability settings of parameters - communication IEC61107		2	
28.	OC -01	Energy management	Visualization and archiving the data, received through a communication interface – RS-485/ Profibus.			Central monitoring system: - Industrial-type PC suitable for 24 h – operation; - 32 bit CPU compatible with industrial standard;- 256 MB DDR-RAM; - 3/5 serial ports according to CCITT V 24 and/or components for TTY, MPI or Profibus connection; - 2 USB ports; - 2 PS/2 ports; - one 3,5”diskette drive, 1.44 MB; - 80 GB HD; - DVD- ROM drive; 1,6 x; - CD- RW drive, 32 x; - AGP graphics board, 32 MB memory; - 21” color display – 100 Hz; - Keyboard – 105 keys, BG/ EN a PC mouse; - Printer – DIN A4 (min 600x600 dpi);		1	It is executed by the central control system

DHC "TOPLOFIKATSIA BOURGAS" JSC

CO – GENERATION GAS POWER STATION

ANNEX No. 10

Letters from Stakeholders

VOLUME 2
Version 1

December, 2005
Sofia

STATEMENT FROM THE PEOPLE LIVING IN THE VICINITY OF THE PROJECT SITE

ДО
РЪКОВОДСТВОТО НА
"ТОПЛОФИКАЦИЯ – БУРГАС" ЕАД

Вх.N 07-1613 Дело N
Получено на 02.12.05 199 г.

СТАНОВИЩЕ на жители на гр. Бургас, топлоснабдявани от "Топлофикация – Бургас" ЕАД.

ОТНОСНО: Изграждане на инсталация за комбинирано проиводство на електрическа и топлинна енергия.

УВАЖАЕМИ ГОСПОДА,

С радост следим положителните промени, които настъпват в развитието на "Топлофикация – Бургас" ЕАД. Топлинната енергия предлагана от дружеството използваме повече от 17 години. Не сме забравили дима, който изхвърляше комина на отоплителната централа когато се гореше мазут.

Новината, че "Топлофикация – Бургас" ЕАД ще изгражда съоръжение за комбинирано производство на електрическа и топлинна енергия считаме, че е най-правилното решение за:

1. Повишаване сигурността на топлоснабдяването.
2. Намаляване цената на предлаганата топлинна енергия
3. Намаляване на вредните емисии и опазване екологията на родният ни град.

Като приветстваме Вашето мащабно техническо решение, Ви желаем успех!

гр. Бургас, к-с "Изгрев", бл. 70, вх. "В"

Дора Стоева ....
Маргарита Чапрезова ....
[illegible] ....
Атанас Атанасов ....

дата 01.12.2005 г.

STATEMENT FROM THE COMPANY "BurgasCvet", WHICH IS BEEN SUPPLIED WITH HEAT ENERGY FROM DHC BOURGAS

Бургасцвет 90 ЕООД
гр. Бургас – 8000, ул. "Богориди" № 16 тел.: 056 841 660, факс: 056 841 688

ДО
РЪКОВОДСТВОТО НА
"ТОПЛОФИКАЦИЯ – БУРГАС" ЕАД

Вх.N ОП-1614 Дело N
Получено на 02.12.05 199 г.

УВАЖАЕМИ ГОСПОДА,

Запознахме се с Вашия проект за изграждане на собствена централа за производство на топлинна и електрическа енергия, работеща на природен газ.

Като ползватели на произвежданата от Вас топлинна енергия, ние сме заинтересовани както от повишаване сигурността на качеството на доставките, така и от подобряване на екологичната обстановка в района.

Изхождайки от дългогодишните ни добри отношения, изразяваме пълната си подкрепа за реализацията на проекта, като се надяваме, че ефектът от внедряването му ще е взаимно изгоден за двете дружества и ще гарантира бъдещите доставки на топлинна енергия.

С уважение:

Васил Танев
Управител

БУРГАСЦВЕТ - 90 - ТАНЕВ - БУРГАС - ЕООД

30.11.2005 г.
гр. Бургас

STATEMENT FROM THE MUNICIPALITY BOURGAS TO MINISTRY OF ENERGY AND ENERGY RESOURCES

ОБЩИНА БУРГАС

8000 Бургас, ул. "Александровска" 26
тел.: 056/ 80 13 13, факс: 056/ 80 13 14, телекс: 83 433

Вх.N 1892 Дело N
Получено на 11.10 199 г.

До
Министерството на Енергетиката и Енергийните Ресурси
ул. "Триадица" № 8
гр. София, 1040

До
"Топлофикация Бургас" ЕАД
п.к. 642
гр. Бургас, 8000

На вниманието на всички,
които вземат отношение

Относно: Изграждане на инсталация за комбинирано производство на електроенергия и топлоенергия и програма за енергийна ефективност в "Топлофикация-Бургас" – ЕАД.

Уважаеми господа,

Мерките залегнали в горе посочения проект предлаган от "Топлофикация Бургас" ЕАД са потвърдени от проучванията на Световната Банка и програмата с екологична насоченост на правителството на САЩ "Eco Links". Считам, че посредством реализирането на проекта ще се постигне намаляване на разходите на дружеството, редуциране на вредните емисии изхвърляни в атмосферата като цяло и ще се създаде потенциална възможност за бъдещо намаляване на цените на топлинната енергия. Освен това в процеса на реализация на проекта ще се създадат условия за увеличаване на заетостта сред населението на община Бургас.

В потвърждение на горе изложеното изразявам нашата подкрепата за търсенето на инвеститор и реализацията на упоменатия по-горе проект и се надявам на същото от страна на всички институциq имащи отношение към него.

КМЕТ НА ОБЩИНА БУРГАС

КМЕТ:
/ЙОАН КОСТАДИНОВ/

STATEMENT FROM THE ADMINISTRATION OF BOURGAS TO MINISTRY OF ENVIRONMENT AND WATERS

ОБЛАСТЕН УПРАВИТЕЛ НА ОБЛАСТ С АДМИНИСТРАТИВЕН ЦЕНТЪР ГР.БУРГАС

Ул. "Цар Петър" № 1
Бургас, 8000
Република България
телефон: (+359 56) 844 301; 840 485
факс: (+359 56) 840 481; 840 482
e-mail: upravitel@bsregion.org
Изх. № 04-15-8
гр.Бургас 14.10. 2002г.

Вх.N 1891 Дело N
Получено на 14.10.2002 г.

До
Министерството на Енергетиката и
Енергийните Ресурси
ул. "Триадица" № 8
гр. София, 1040

До "Топлофикация Бургас" ЕАД
п.к. 642
гр. Бургас, 8000

На вниманието на всички,
които вземат отношение

Относно: Изграждане на инсталация за комбинирано производство на електроенергия и топлоенергия и програма за енергийна ефективност в "Топлофикация-Бургас" – ЕАД.

Уважаеми Господа,

С това писмо изразяваме своята подкрепа за реализирането на проекта "Изграждане на инсталация за комбинирано производство на електроенергия и топлоенергия и програма за енергийна ефективност в "Топлофикация-Бургас" – ЕАД" предложен в проучванията на Световната банка и програмата "Eco Links" на правителството на САЩ.

Считаме, че предложените мерки в проекта съответстват на приоритетите на националната енергийна стратегия и намирането на подходящ инвеститор реализирането на проекта ще доведе до намаляване на разходите на "Топлофикация Бургас" ЕАД, задържане на цените на топлинната енергия на съществуващите нива с възможности за тяхното намаляване в определени граници в недалечно бъдеще.

Като се надяваме на подкрепа на проекта от всички вземащи отношение институции и неговата бърза реализация оставам,

С уважение,

Иван Витанов
Областен управител
на област Бургас

ОБЛАСТ * ОБЛАСТЕН УПРАВИТЕЛ * БУРГАС

DHC "TOPLOFIKATSIA BOURGAS" JSC

CO – GENERATION GAS POWER STATION

ANNEX No. 11

Statement from Ministry of Environment and Waters about not necessity of EIA

VOLUME 2
Version 1

December, 2005
Sofia

Communication with the Regional Inspections for the Environment that an Assessment of the Environmental Impact is not necessary for the Project.

РЕПУБЛИКА БЪЛГАРИЯ
МИНИСТЕРСТВО НА ОКОЛНАТА СРЕДА И ВОДИТЕ

РЕШЕНИЕ № 7-ПР /2004

за преценяване на необходимостта от извършване на оценка на въздействието върху околната среда

На основание чл. 93, ал. 5 от Закона за опазване на околната среда и представената писмена документация от **инвеститора** "Топлофикация Бургас" ЕАД, гр. Бургас, по приложение № 2 към чл. 6 от Наредбата за условията и реда за извършване на оценка на въздействието върху околната среда на инвестиционни предложения за строителство, дейности и технологии,

РЕШИХ

да не се извършва оценка на въздействието върху околната среда за инвестиционно предложение "**Инсталация за комбинирано производство на топлинна и електрическа енергия и топлопровод на Топлофикация – гр. Бургас**". Предвидено е да се изпълни Ко-генерационна система – инсталация за комбинирано производство на топлинна (с мощност 22,58 MWt) и електрическа (с мощност 23,66 MWt) енергия с 4 газови двигателя и изграждане на нов подземен топлопровод с дължина около 2200 м. След 3-годишна експлоатация на новия топлопровод се предвижда демонтаж на старото трасе на топлопровода.

МОТИВИ:

1. В резултат от реализирането на инвестиционното предложение не се очаква да настъпят неблагоприятни въздействия върху компонентите на околната среда.
2. Като гориво за газово-буталните двигатели ще се ползва природен газ. Предвидено е монтирането на катализатор на изхода на инсталацията и не се прогнозира надвишаване на нормите за допустими емисии на вредни вещества в атмосферния въздух.
3. Водоснабдяването на обекта с вода за питейно-битови нужди ще се осъществи от съществуващата водопроводна система в централата. Водата за технологични нужди ще се осигурява от два броя тръбни кладенци, за което дружеството притежава разрешително за водоползване № 1106/05.08.2002 г., издадено от МОСВ.
4. Отпадъчните води ще се включат в съществуващата площадкова канализация.
5. Необходимите сгради за Ко-генерационната система ще се изградят на територията на "Топлофикация Бургас" ЕАД, а новият подземен топлопровод ще се положи по трасето на съществуващ обслужващ (черен) път с широчина 6 м. Не се налага усвояване на нови площи и територии.
6. С демонтажа на съществуващото въздушно трасе на топлопровода ще се освободят около 100 дка обработваема площ.
7. Площадката на "Топлофикация Бургас" ЕАД е отдалечена на 3 км от най-близко разположения кв. Лозово на гр. Бургас.

София 1000, ул "Уилям Гладстон" 67 тел. 940 6032; факс: 986 48 48

8. Инвестиционното предложение не засяга защитени територии и местообитания на защитени видове, съществуващи паметници на културата и територии със специфичен санитарен статут.
9. Не са изразени устно или депозирани писмено възражения от засегнатата общественост срещу реализацията на инвестиционното предложение.

Настоящето решение не отменя задължения на инвеститора за изпълнение на изискванията на Закона за опазване на околната среда и други специални закони и подзаконови нормативни актове и не може да служи като основание за отпадане на отговорността съгласно действащата нормативна уредба.

Решението може да бъде обжалвано по реда на Закона за административното производство.

МИНИСТЪР:

(ДОЛОРЕС АРСЕНОВА)

Дата: 09.04.2004г

София 1000, ул "Уилям Гладстон" 67 **тел. 940 6032; факс: 986 48 48**

DHC "TOPLOFIKATSIA BOURGAS" JSC

CO – GENERATION GAS POWER STATION

ANNEX No. 12

Financial statements:
- **Prognostication table for costs and revenues**
- **Payback and IRR calculation without impact JI**
- **Payback and IRR calculation with impact JI**

VOLUME 2
Version 1

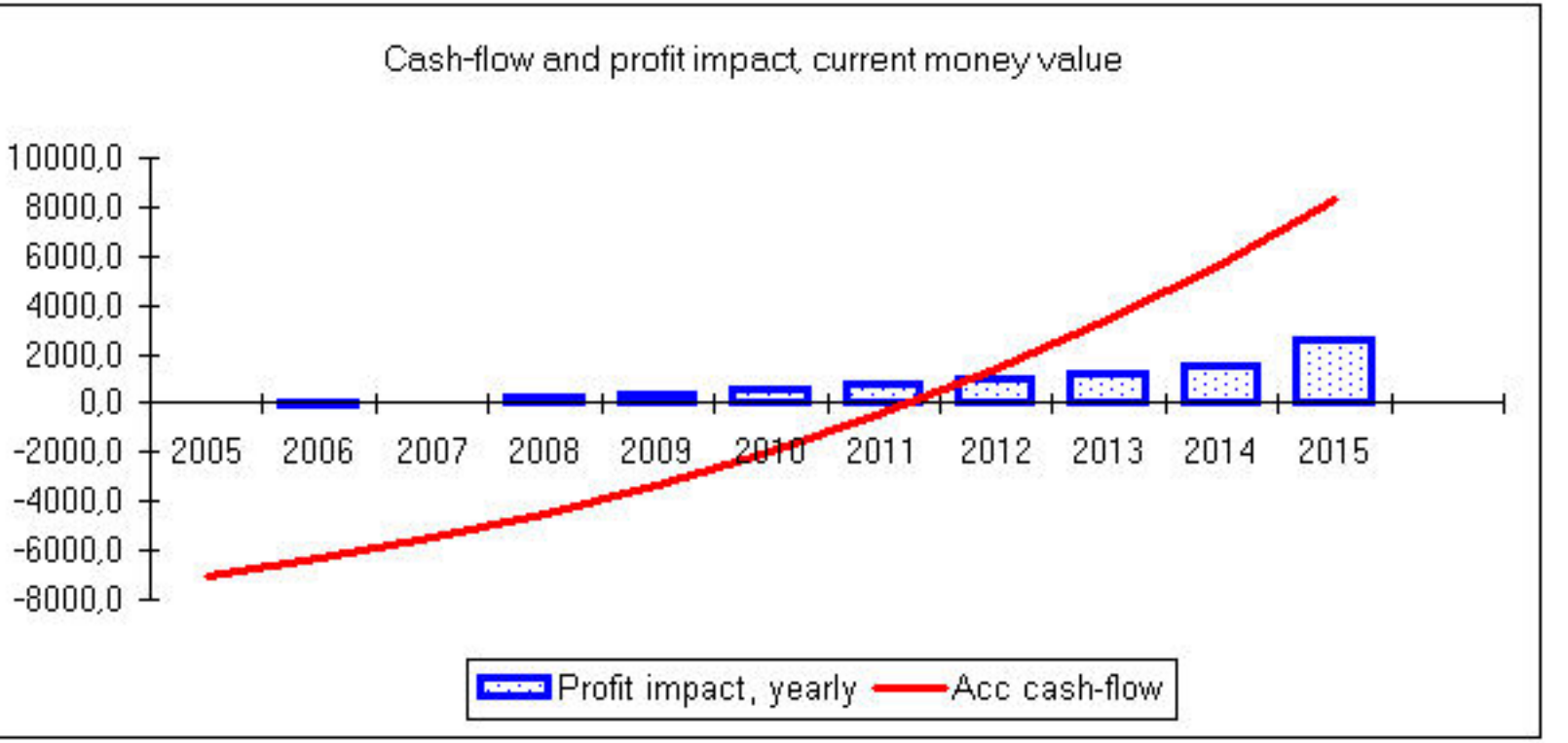
December, 2005
Sofia

			Costs							Revenues			
Years	Investment Credit	Interest Costs 10,00%	Average Annual Cogen Gas Consumption price EUR/1000Nm³	144	Maintenance and Operat. Costs	Total Annual Costs without the Credit	Total Annual Costs Interest Included	Electricity Annual Consumption	Electricity sold to NEC	Thermal nergy Annual Consumtion /Sold to consumers/	CO2 Sold Incomes AAUs and ERUs	Total Annual Revenues without CO	Total Annual Revenues with CO2
	ThEUR	ThEUR	1000m³	ThEUR	ThEUR	ThEUR	ThEUR	ThEUR	ThEUR	ThEUR	ThEUR	ThEUR	ThEUR
2005	7057,6	705,8	0,0	0,0	0,0	0,0	705,8	0,0	0,0	0,0	0,0	0,0	0,0
2006	1176,3	705,8	34260,0	4933,4	1450,0	6383,4	7089,2	139,4	5336,1	2993,4	630,0	8468,9	9098,9
2007	1176,3	588,1	34260,0	4933,4	1450,0	6383,4	6971,6	139,4	5336,1	2993,4	0,0	8468,9	8468,9
2008	1176,3	470,5	34260,0	4933,4	1450,0	6383,4	6853,9	139,4	5336,1	2993,4	1020,0	8468,9	9488,9
2009	1176,3	352,9	34260,0	4933,4	1450,0	6383,4	6736,3	139,4	5336,1	2993,4	294,0	8468,9	8762,9
2010	1176,3	235,3	34260,0	4933,4	1450,0	6383,4	6618,7	139,4	5336,1	2993,4	294,0	8468,9	8762,9
2011	1176,3	117,6	34260,0	4933,4	1450,0	6383,4	6501,1	139,4	5336,1	2993,4	294,0	8468,9	8762,9
2012	0,0	0,0	34260,0	4933,4	1450,0	6383,4	6383,4	139,4	5336,1	2993,4	294,0	8468,9	8762,9
2013	0,0	0,0	34260,0	4933,4	1450,0	6383,4	6383,4	139,4	5336,1	2993,4	294,0	8468,9	8762,9
2014	0,0	0,0	34260,0	4933,4	1450,0	6383,4	6383,4	139,4	5336,1	2993,4	0,0	8468,9	8468,9
Total	7057,6	3175,9	308340,0	44401,0	13050,0	57451,0	59921,1	1254,8	48024,8	26940,8	3120,0	76220,4	79340,4

ProCalc

Prerequisites	
Unit:	ths. EUR
Indata, FMV or CMV:	FMV
Nominell opp cost:	10,0%
>>Real opp cost:	5,8%
Inflation:	4,0%
Calc. time (Yrs):	11
Depreciation time:	9
Pmt/yr:end=0, succ=1	0

Output	
Pay-back-time:	7
Pos prof.impact yrs:	2
Net present value:	3209,3
Int rate of return:	19,1%
Max. cash-fl short-fall:	-7057,6



Year:	2005 0	2006 1	2007 2	2008 3	2009 4	2010 5	2011 6	2012 7	2013 8	2014 9	2015 10
INDATA FMV											
SUM											
In-coming payments	0,0	8468,9	8468,9	8468,9	8468,9	8468,9	8468,9	8468,9	8468,9	8468,9	8468,9
Out-going payments	-	-7089,2	-7089,2	-7089,2	-7089,2	-7089,2	-7089,2	-7089,2	-7089,2	-7089,2	-7089,2
Investment	-7057,6	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Net cash-flow	-7057,6	1379,7	1379,7	1379,7	1379,7	1379,7	1379,7	1379,7	1379,7	1379,7	1379,7
Occ int to end year	-	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Net cash-flow at end of year	-7057,6	1379,7	1379,7	1379,7	1379,7	1379,7	1379,7	1379,7	1379,7	1379,7	1379,7

CALCULATIONS, CMV

CASH-FLOW/PAY-BACK											
Net cash-flow	-7057,6	1434,9	1492,3	1552,0	1614,1	1678,7	1745,8	1815,6	1888,3	1963,8	2042,3
Interest	0,0	-705,8	-632,8	-546,9	-446,4	-329,6	-194,7	-39,6	138,0	340,6	571,1
Net after interest	-7057,6	729,2	859,5	1005,1	1167,7	1349,0	1551,1	1776,0	2026,3	2304,4	2613,4
Acc cash-flow	-7057,6	-6328,4	-5469,0	-4463,8	-3296,1	-1947,1	-396,0	1380,1	3406,3	5710,8	8324,2

*** PROFIT-IMPACT **											
Net cash-flow	-7057,6	1434,9	1492,3	1552,0	1614,1	1678,7	1745,8	1815,6	1888,3	1963,8	2042,3
+ Investment	7057,6	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Depreciation:	0,0	-784,2	-784,2	-784,2	-784,2	-784,2	-784,2	-784,2	-784,2	-784,2	0,0
Interest	0,0	-705,8	-632,8	-546,9	-446,4	-329,6	-194,7	-39,6	138,0	340,6	571,1
Profit-impact:	0,0	-55,0	75,3	220,9	383,5	564,9	766,9	991,9	1242,1	1520,3	2613,4

NET PRESENT VALUE											
Net cash-flow	-7057,6	1434,9	1492,3	1552,0	1614,1	1678,7	1745,8	1815,6	1888,3	1963,8	2042,3
Annual pres value	-7057,6	1304,5	1233,3	1166,1	1102,4	1042,3	985,5	931,7	880,9	832,8	787,4
Tot pres value	3209,3										

INTERNAL RATE OF RET.											
Net cash-flow	-7057,6	1434,9	1492,3	1552,0	1614,1	1678,7	1745,8	1815,6	1888,3	1963,8	2042,3
Nom irr	19,1%										
Discounted net	-7057,6	1205,0	1052,3	919,0	802,6	701,0	612,2	534,6	466,9	407,8	356,1
Tot disc net	0,0										

Preparation for sensivityanalysis

Basecalculation:	Pres val	Payback	Irr	Prof imp
	3209,3	7	19,1%	2

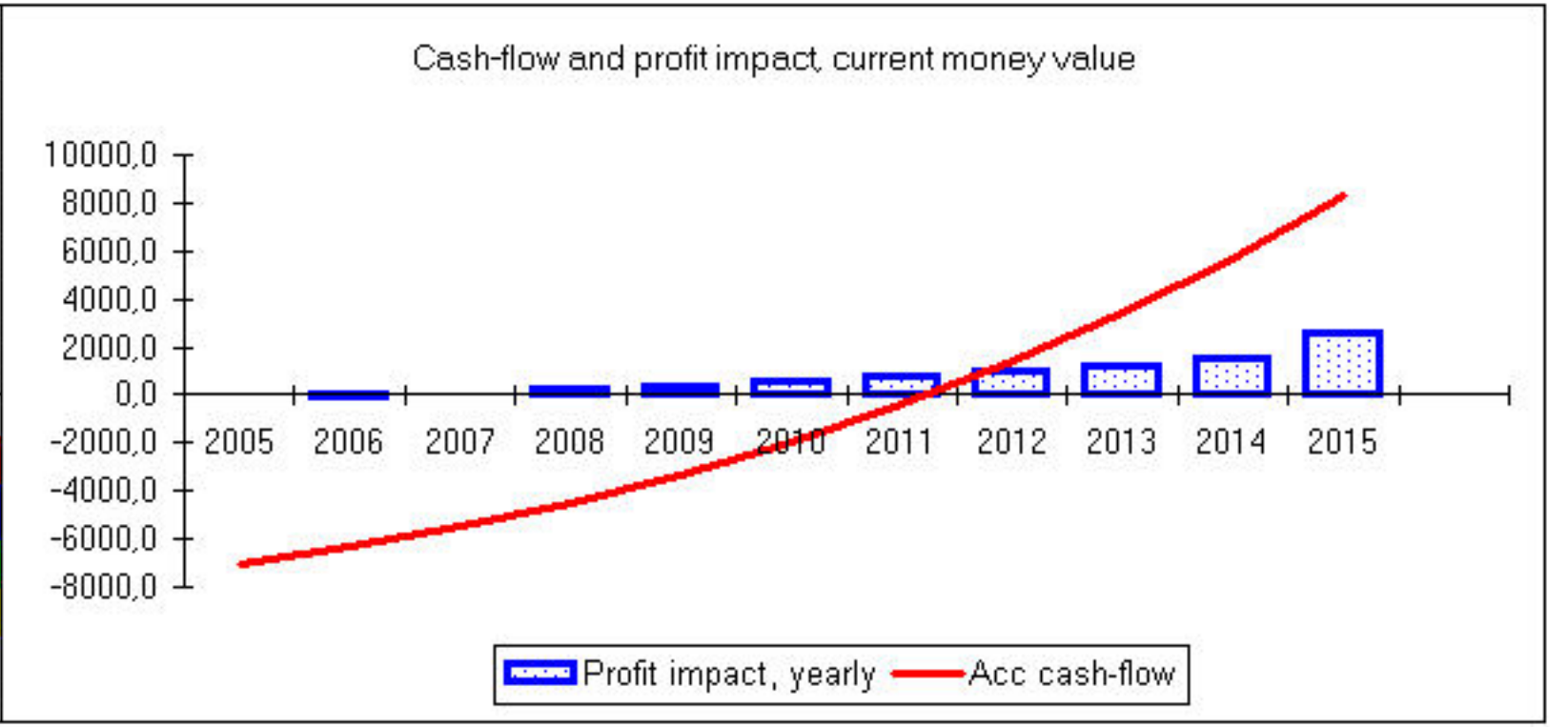
ProCalc

Prerequisites

Unit:	ths. EUR
Indata, FMV or CMV:	FMV
Nominell opp cost:	10,0%
>>Real opp cost:	5,8%
Inflation:	4,0%
Calc. time (Yrs):	11
Depreciation time:	9
Pmt/yr:end=0, succ=1	0

Output

Pay-back-time:	5
Pos prof.impact, yrs:	0
Net present value:	5720,2
Int rate of return:	26,4%
Max. cash-fl short-fall:	-7057,6



Year:	2005 0	2006 1	2007 2	2008 3	2009 4	2010 5	2011 6	2012 7	2013 8	2014 9	2015 10
INDATA FMV											
SUM											
In-coming payments	0,0	9098,9	8468,9	9488,9	8762,9	8762,9	8762,9	8762,9	8762,9	8468,9	8468,9
Out-going payments	-	-7089,2	-7089,2	-7089,2	-7089,2	-7089,2	-7089,2	-7089,2	-7089,2	-7089,2	-7089,2
Investment	-7057,6	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Net cash-flow	-7057,6	2009,7	1379,7	2399,7	1673,7	1673,7	1673,7	1673,7	1673,7	1379,7	1379,7
Occ int to end year	-	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Net cash-flow at end of year	-7057,6	2009,7	1379,7	2399,7	1673,7	1673,7	1673,7	1673,7	1673,7	1379,7	1379,7

CALCULATIONS, CMV

CASH-FLOW/PAY-BACK											
Net cash-flow	-7057,6	2090,1	1492,3	2699,4	1958,0	2036,4	2117,8	2202,5	2290,6	1963,8	2042,3
Interest	0,0	-705,8	-567,3	-474,8	-252,4	-81,8	113,7	336,8	590,7	878,9	1163,1
Net after interest	-7057,6	1384,4	925,0	2224,6	1705,7	1954,6	2231,5	2539,3	2881,4	2842,7	3205,5
Acc cash-flow	-7057,6	-5673,2	-4748,2	-2523,7	-818,0	1136,5	3368,0	5907,3	8788,7	11631,4	14836,8

*** PROFIT-IMPACT **											
Net cash-flow	-7057,6	2090,1	1492,3	2699,4	1958,0	2036,4	2117,8	2202,5	2290,6	1963,8	2042,3
+ Investment	7057,6	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Depreciation:	0,0	-784,2	-784,2	-784,2	-784,2	-784,2	-784,2	-784,2	-784,2	-784,2	0,0
Interest	0,0	-705,8	-567,3	-474,8	-252,4	-81,8	113,7	336,8	590,7	878,9	1163,1
Profit-impact:	0,0	600,2	140,8	1440,4	921,5	1170,4	1447,3	1755,1	2097,2	2058,5	3205,5

NET PRESENT VALUE											
Net cash-flow	-7057,6	2090,1	1492,3	2699,4	1958,0	2036,4	2117,8	2202,5	2290,6	1963,8	2042,3
Annual pres value	-7057,6	1900,1	1233,3	2028,1	1337,4	1264,4	1195,4	1130,2	1068,6	832,8	787,4
Tot pres value	5720,2										

INTERNAL RATE OF RET.											
Net cash-flow	-7057,6	2090,1	1492,3	2699,4	1958,0	2036,4	2117,8	2202,5	2290,6	1963,8	2042,3
Nom irr	26,4%										
Discounted net	-7057,6	1653,7	934,2	1337,0	767,3	631,4	519,6	427,5	351,8	238,6	196,4
Tot disc net	0,0										

Preparation for sensivityanalysis

Basecalculation:	Pres val	Payback	Irr	Prof imp
	5720,2	5	26,4%	0

DHC “TOPLOFIKATSIA BOURGAS” JSC

CO – GENERATION GAS POWER STATION

ANNEX No. 13

Plan of CoGenerations Maintenances

VOLUME 2
Version 2

January, 2006
Sofia

Preventive Maintenance Guidelines
Gas Operation

This guideline gives the average estimated maintenance intervals, in running hours, based on field follow-up and service experience of W25SG type gas engines. The intervals are, however, very much dependent of operational conditions, speed and load variations, gas and lube oil quality as well as engine and auxiliary equipment care. Therefore the actual time between overhauls, based on engine follow-up compared with the instruction manual service data, should be noted in the open column for actual time in the table below, by the operator.

Interval between each action (Running Hrs)		Action	System Refer to Instruction Manual
Guide time	Actual time		
24 (daily)		• Periodical recording and analysis of temperatures and pressures (minimum once per day) • Clean turbocharger(s) compressor side • Check oil level in turbocharger(s) • Check oil level in oil sump or reservoir • Drain crankcase ventilator • Check water level in expansion tank • Check oil level in air starter lubricator • Drain starting air vessel(s) and filter • Drain control air receiver and filter(s)	General Turbocharging system Lubrication system Cooling system Starting system Plant control system
100 (each 4 day)		• Wash charge air heat exchanger, with cleaning system	Turbocharging system
250 (each 10 day)		• Clean by-pass centrifugal filter(s) and change paper inserts Max deposit: 5 - 8 mm	Lubrication system
500		• Check and adjust inlet- and exhaust valves clearance	Cylinder head and valve mechanism
1000 (each 40 day)		• Change oil in turbocharger(s)[1] • Change inserts in main lube oil filter on engine [2] • Analyse oil. Change, if necessary [1]	Turbocharging system Lubrication system

[1] See document 91 939 118 00; Selection of Lubricating Oils
[2] Also refer to system Instruction Manuals and Service Data for first time intervals, pressure drop limits etc.

According to supplier's instruction

Interval between each action (Running Hrs)		Action	System Refer to Instruction Manual
Guide time	Actual time		
1 500		• Check ignition timing • Clean and check spark plug extension • Change O-ring in spark plug extension • Change spark plugs • Clean and check non-return valve in prechamber. Change if necessary.	Fuel and ignition system
2 000		• Gauge crankshaft deflection • Clean charge air inlet	Cylinder block and crankshaft Turbocharging system
5 000		• Check tightening of all electrical connections • Check tightening torque of foundation bolts • Check crankcase explosion relief valves • Clean crankcase ventilator • Inspect cam surfaces • Clean charge air heat exchanger (water side) • Change exhaust waste gate valve • Overhaul gas regulating unit[3] • Check that MCC gas valve resistance (incl cable) is < 3,0 ohm Disconnect cable inside CCU and measure • Check that PCC gas valve resistance (incl cable) is < 4,0 ohm Disconnect cable inside CCU and measure • Clean lube oil heat exchanger • Clean cooling water heat exchanger • Test function of overspeed protection • Verify sensor accuracy for temperature and pressure transmitters and other instruments • Check that the supply voltage to all CCUs is >24,0 VDC when the engine is running at full load	General Cylinder block and crankshaft Gear case and camshaft Turbocharging system Fuel and ignition system Lubrication system Cooling system Engine control system
10 000		• Inspect all gear wheels in fore-end housing • Check one piston, piston pin and piston ring set • Overhaul all cylinder heads • Check all valve mechanisms • Inspect all gear wheels • Check camshaft adjustment • Overhaul turbocharger(s) and replace bearings • Check PCC gas control valves. Change if necessary. • Check PCC gas control valves. Change if necessary. • Change spark plug extension • Check and clean water circulation pump(s) • Check and clean air starter. Change worn parts	Cylinder block and crankshaft Piston and connecting rod Cylinder head and valve mechanism Gear case and camshaft Turbocharging system Fuel and ignition system Cooling system Starting system

Interval between each action (Running Hrs)		**Action**	**System** Refer to Instruction Manual
Guide time	Actual time		
20 000		• Clean inside of all cylinder liners. Measure and record diameter and ovality. Remove bore ridges, it any. Change anti-polishing rings.[4] Pull one liner for inspection. Do not remove further, if OK • Inspect two main bearing shells • Check and analyse vibration damper(s) silicone fluid • Remove and clean pistons. Measure ring grooves. Clean and check rings. Clean scraper ring groove drains. Renew piston ring set. Check piston pin • Clean connecting rods, inspect big-end serration and check oil channels • Inspect big-end bearing shells • Inspect gudgeon pin bushings • Check gear bushing collars and gear teeth (without dismantling the wheels) • Change PCC • Change ignition coils • Change cables (with connector) to MCC and PCC gas valves • Check expansion bellows. Change if necessary • Check lube oil pump bearings, clearance and gear backlash • Change exhaust gas temperature sensors and sensor pockets • Change knock sensors	Cylinder block and crankshaft Piston and connecting rod Gear case and camshaft Fuel and ignition system Turbocharging system Lubrication system Engine control system
40 000		• Complete overhaul. Clean and recondition all components. Renew worn parts. Check all bearings and clearances. Check backlash of all gearings. • Pull all cylinder liners and clean completely • Inspect crankshaft, camshaft(s) and other components for cracks • Change torsional vibration damper(s) • Change big-end bearing studs • Check camshaft bearings in cylinder block • Remove and inspect gear wheel drive and pump gear wheels • Dismantle and clean lube oil pump • Renew all gaskets and sealing rings • Empty and clean service tanks	All parts in engine and its systems

[4] Where applicable

NOTE! Special regulations on overhaul laid down by the local authorities must be observed, regardless of the above guidelines.

The air reservoirs must be pressure-tested for the first time after four years of operation and thereafter every other year. For detailed directions on the above overhauls refer to Wartsila Instruction Manuals. Document 91 939 142 00 is the Spare Parts Guideline for Programmed Overhauls.

Maintenance interval schedule

The action intervals for each 24-1 000 running hours, see page 1 above, are considered as operation routine and can be translated to calendar days depending on service.

The action intervals for each 2 000 - 40 000 running hours above are considered as overhaul. After 40 000 hours the sequence starts again and repeats up to 80 000 running hours etc. In the table below each needed service action is marked with a "X" at the right running hours.

Running hours	Action intervals (Refer to page 2 and 3 above)				
	2 000	5 000	10 000	20 000	40 000
4 000	X	X			
5 000	:				
6 000					
8 000	X				
10 000	X	X			
14 000	X				
15 000					
16 000	X		X	X	
20 000	X	X			
22 000	X				
24 000	X				
25 000		X			
26 000	X				
;n<•,.,;l•,	X				
30 000	X	X	X		
	X				
34 000	X				
		X			
36 000	X				
	X				
40 000	X	X	X	X	X

In order to make it easier to determine when an overhaul is necessary, operational records, data loggings etc. can be sent to Wartsila in Trollhattan for analysis.

When the condition of the engine is assessed, special recommendations can be given on the actions that should be taken. Alternatively, service personnel can be provided for condition testing of the engine on site. In any case it is always advisable to consult Wartsila's Service Department before undertaking any major overhaul.

Preventive maintenance criteria

The time intervals in this document must be considered as a guideline. The exact time between the overhauls should be subject to the prevailing operational conditions and the average load on the engine.

The overhaul intervals imply the following important pre-conditions:

- **Use** of **specified gas.** R efer to document 91 939145 00.
- **Use of specified lube oils.** Refer to documents 91 939 118 00 and 91 939 144 00.

  Note document 91 974 002 00 regarding flushing directions for new or complete overhauled engines, auxiliary equipment and pipe systems.
- **Use of recommended anti-corrosion additives.** Refer to document 91 990 007 00.
- **Proper running-in of the engine components.**

  During the initial running-in period after overhaul there may be leakage due to the gaskets bedding down. Pipe unions and flanged connections should therefore be retightened after a time.
- **Proper service and care of all auxiliary equipment.**

DHC "TOPLOFIKATSIA BOURGAS" JSC

CO – GENERATION GAS POWER STATION

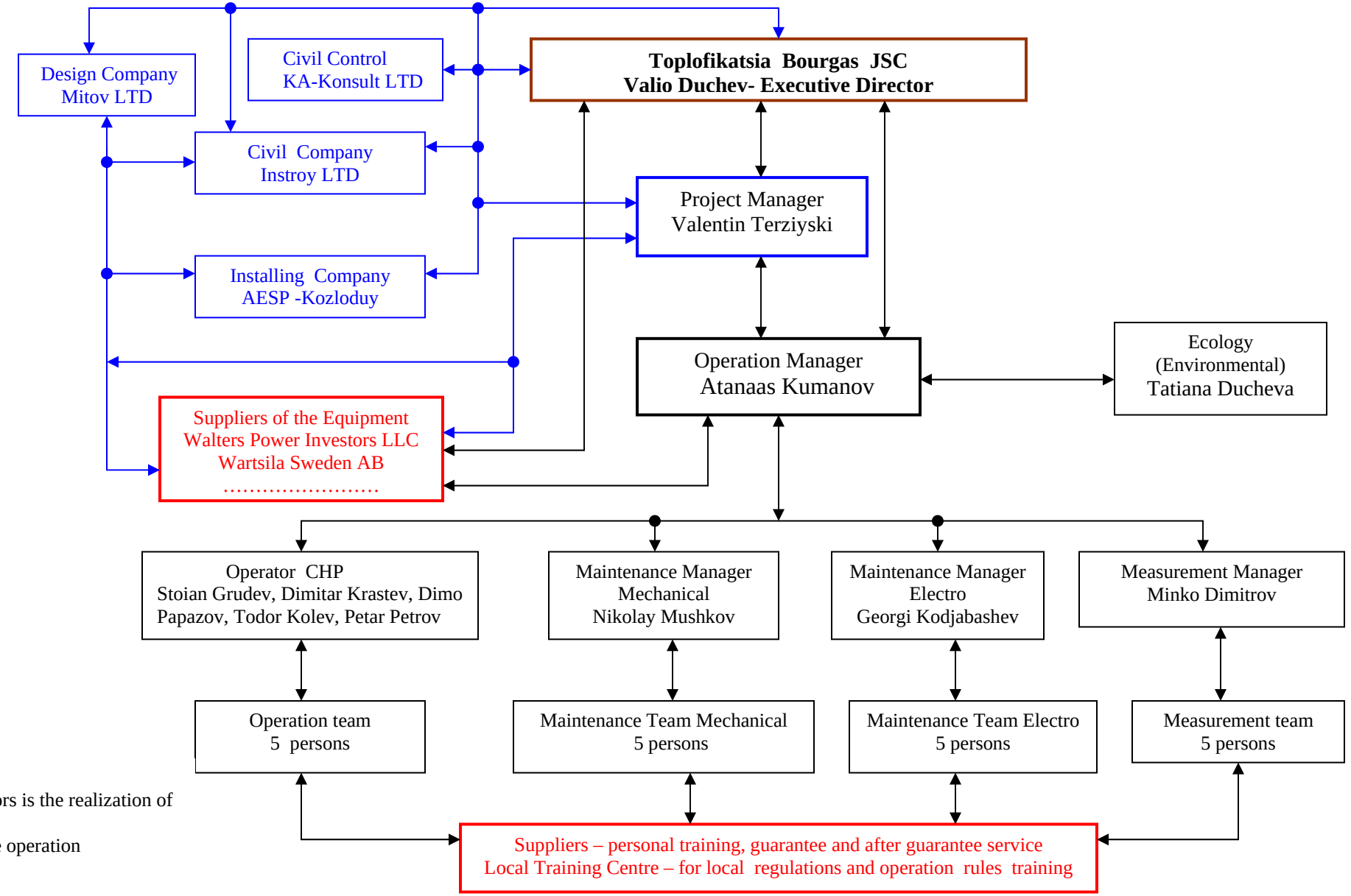
ANNEX No. 14

Organization Structure and Responsibilities - Project Toplofikatsia Bourgas JSC

VOLUME 2
Version 2

January, 2006
Sofia

Organization Structure and Responsibilities - Project Toplofikatsia Bourgas JSC



Remark:
In blue colors is the realization of the project.
In black the operation

Responsibilities for the project implementation and functioning

The obligations and the responsibilities of all parties involved in the project are connected with the relevant position of the staff at the companie.

Executive Director of Toplofikatsia Bourgas JSC

Manages the activities of the company in reference to the obligations set by the Company's Statute and assigned by the Board of Directors.
Assigns tasks and controls the managers of the different departments and thus controlling the Operation Manager of the company.
Interacts with the Project Manager and manages the wholly process of implementation and operations of the project in accordance with the schedules. In case of difficulties in the implementation and operation process he intervenes operatively within the range of his authorities in order to eliminate the difficulties.
Manages the properties and the financial assets of the company.
Approves the reports to the verification company with the results of the measurements and actual reduction of CO_2 emissions.

Project Manager

Plans, observes, implements and controls all the activities in reference to the implementation of the project.
Interacts with the Executive Directors of the company on important matters of the project implementation.
Observes, coordinates and controls the activities of the project in accordance with the time schedules.
Corresponds and keeps in touch with the state authorities in charge of the project.
Corresponds and keeps in touch with the private institutions in charge of the project.
Corresponds and keeps in touch with the design, civil, civil control and installing companies, the suppliers, etc.
He is directly responsible for the commissioning of the installations successfully and in term.

Operation Manager

Coordinates the design of all additional equipment and the connections with the co-generating equipment.
Manages the procedures for preparation of the necessary documents for obtaining licenses and permits.
Develops and implements plans for the training and qualification of the staff.
Manages the activities of the operational personnel.
He is responsible for the thermal and electrical energy energy in the range of the project.
He is responsible for conducting and keeping the necessary documentation for the operation and maintenance of the equipment.
Carries out all operative job for managing of the operation and the maintenance of CHP equipment.
Coordinates the activities of the Operation manager, the Maintenance Manager, Measurement Manager and the Environmental Officer.

Corresponds and keeps in touch with all suppliers of the equipment for ensuring of the necessary maintenances, repairs necessary for the normal operation of the equipment.
Carries out the coordinating procedures for control of the emissions in accordance to the methodology and look at for the normal operation of the central monitoring system.
He is responsible for the preparation of annual report to the verification company with the results of the measurements and actual reduction of CO_2 emissions.
Coordinates and ménages the development of plans for the training and qualification of the staff and their implementation.
He is directly responsible for the observation of the quality standards and GOOD PRACTICE in accordance to the complex permits.

Environmental Officer

She develops an internal methodology for control of the harmful emissions and the monitoring.
She participates in the preparation of annual report to the verification company with the results of the measurements and actual reduction of CO_2 emissions.
Prepares and stores the documentation for the data from the measurements of the emitted emissions in the atmosphere.
Corresponds with the regional authorities of the Ministry of Environment and other state authorities and institutions in charge.

Operator CHP

Manages the activities of the operational personnel.
He is responsible for the thermal and electrical energy energy in the range of the project.
He is responsible for conducting and keeping the necessary documentation for the operation and maintenance of the equipment.
Carries out all operative job connected with the operation of CHP, including start and stop of the CHP modules, including in synchronization with the outside electrical network and in local regime, keeps the necessary operation mode and working regime, observes for the normal operation parameters of the co-generation modules, changes the operation regime in manual control mode etc.
He is directly responsible for the observation of the quality standards and GOOD PRACTICE in accordance to the complex permits.

Maintenance Manager Mechanical

Participates in the installing and commissioning of the CHP equipment.
Supports all activities for the construction and assembling of additional equipment and the connections with the co-generating equipment
He is responsible for the mechanical maintenances of CHP, including inspections, technical service and repairs in accordance with the suppliers maintenance documentation and schedules.
Develops and implements plans for the training and qualification of the mechanical maintenance staff.
Manages the activities of the maintenance staff /prophylaxis, current repairs and overhauls/.
Develops and implements plan for the maintenance and repair of the equipment with special attention to the overhauls.

He is responsible for conducting and keeping the necessary documentation for the maintenances.
He is responsible for the provision of quick- ware spare parts and consumption materials and for the observation of the information of the worked out hours.
Carries out operative contacts with the other sub-managers of the project in reference to the maintenance and the repairs of the equipment.
He is directly responsible for the observation of the quality standards and GOOD PRACTICE.

Maintenance Manager Electrical

Participates in the installing and commissioning of the CHP equipment.
Supports all activities for the construction and assembling of additional equipment and the connections with the co-generating equipment
He is responsible for the electrical maintenances of CHP, including inspections, technical service and repairs in accordance with the suppliers maintenance documentation and schedules.
Develops and implements plans for the training and qualification of the maintenance staff.
Manages the activities of the maintenance staff /prophylaxis, current repairs and overhauls/.
Develops and implements plan for the maintenance and repair of the equipment with special attention to the overhauls.
He is responsible for conducting and keeping the necessary documentation for the maintenance.
He is responsible for the provision of spare parts and for the observation of the information of the worked out hours.
Carries out operative contacts with the other sub-managers of the project in reference to the maintenance and the repairs of the equipment.
He is directly responsible for the observation of the quality standards and GOOD PRACTICE.

Measurement Manager

Develops and implements plans for the training and qualification of the measurements staff.
Plans and manages the activities of the measurement staff.
Develops and implements plans for the measurements in accordance to The State Agency of metrology and standardization.
He is responsible for monitoring, registration, visualization, archiving, reporting of the monitored dates and periodical checking of the measurement devices.
Secures the normal work of the system for monitoring in a whole (local measurement devices and their connection with the local measurement stations, and their connection with central measurement station).
Prepares annual report for the verification company with the results from the measurement and evidence of authenticity.
He is responsible for the metrological compliance of all measurement devices and their monitoring.
He is responsible for conducting and keeping the necessary documentation for the measurements.
Carries out operative contacts with the other managers of the project in reference to the maintenance and the repairs of the equipment and the Environmental Officer in reference to the emission reductions.

He/she is directly responsible for the observation of the quality standards and GOOD PRACTICE.

Measurement Team

The measurement team is responsible for collecting of the measurement dates from the existing measurement devices which are not connected with the Central monitoring system and fill manually the dates in the tables inside of the Central monitoring station incorporated in the Central Information System of DHC every day.

Secures the normal work of the system for monitoring in a whole (local measurement devices and their connection with the local measurement stations, and their connection with central measurement station).

Prepares annual report for the verification company with the results from the measurement and evidence of authenticity.

The team is responsible for the metrological compliance of all measurement devices and their monitoring.

The team is responsible for all maintenances of the measurement devices from the Monitoring system / cleaning the probes etc./ described in maintenance documentation of the suppliers. They can do and small repairs of the devices/changing of electronic module and etc./ if it is permitted from the measurement devices producers.

The team is responsible for conducting and keeping the necessary documentation for the measurements.

He/she is directly responsible for the observation of the quality standards and GOOD PRACTICE.

DHC “TOPLOFIKATSIA BOURGAS” JSC

CO – GENERATION GAS POWER STATION

ANNEX No. 15

TRAINING PROGRAM
PROJECT TOPLOFIKATSIA BOURGAS

VOLUME 2
Version 2

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Sofia

TRAINING PROGRAM PROJECT TOPLOFIKATSIA BOURGAS

The training of the responsible staff of DHC Bourgas in accordance with Annex No. 13 will be performance in two stages – the first during the realization stage of the project and the second during the operation of the cogeneration installations. The time, the length of the training period, the place and the responsible organizations are given below:

	Project Team	Staff	Number of pers.	Period	Dura-tion	Responsible organization	Place to carry out
Training organized from the Suppliers	Operation Team	Operators CHP Stoian Grudev, Dimitar Krastev, Dimo Papazov, Todor Kolev, Petar Petrov	10	03.2006-04.2006	10 days	Wartsila	DHC Bourgas
		Operation Team Valentin Petkanchev, Georgi Kalev, Dimitar Kolev, Vasko Petrov, Dimitar Andreev	6	every 2 years	5 days	TU-Sofia Wartsila	Sofia
	Maintenance Team Mechanical	Nikolay Mushkov- Manager Georgi Nachev Stoian Kirov Atanas Dimov Nachko Enchev Sashko Stefanov	6	03.2006-04.2006	10 days	Wartsila	DHC Bourgas
			4	every 2 years	5 days	TU-Sofia Wartsila	Sofia
	Maintenance Team Electrical	Georgi Kodjabashev- Manager Tenko Stoianov Veliko Nikolov Hristo Hristov Jelio Jelev Nikolay Batlev	6	03.2006-04.2006	10 days	Wartsila	DHC Bourgas
			4	every 2 years	5 days	TU-Sofia Wartsila	Sofia
	Measurements Team	Minko Dimitrov-Manager Nikolay Mitev Ivan Kelevedjiev Ivan Aleksandrov Ilia Iliev Ianko Komitov	6	03.2006-05.2006	6 days	Supplier	TU-Sofia
			3	every 2 years	4 days	Danfoss Supplier	TU – Sofia
Training organized from the Local Training Centre in DHC	ALL PERSONALL	-	28	03.2006-04.2006	3 days	Local Lectors	DHC Bourgas
			2 x 14	every 1 year two times	3 days	Local Lectors	DHC Bourgas

Remark: 1. The training plan is preliminary.
2. Part from the people can be different in the future.
3. The local training is about the local regulations and responsibilities.
4. The suppliers of the existing measurement devices organize periodical training courses and now.