# CO-GENERATION GAS POWER STATIONS
# AKB FORES PLC Financial Industrial Group
# Polymeri JSC
# Kostenets HHI JSC
# Toplofikatsia Kazanlak JSC
# Toplofikatsia Yambol JSC

## ANNEXES

## AKB FORES PLC, SOFIA, BULGARIA

## Volume 2

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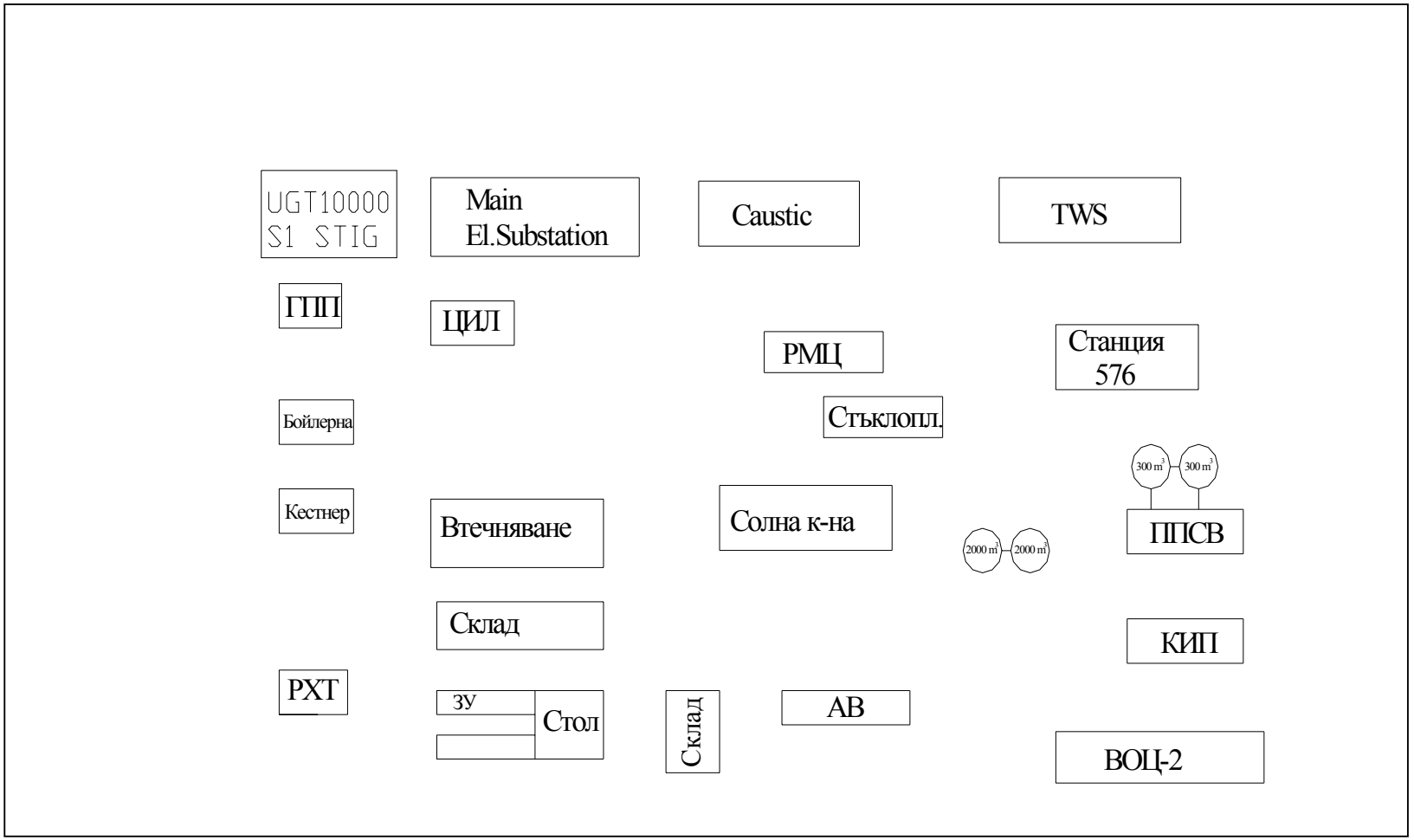
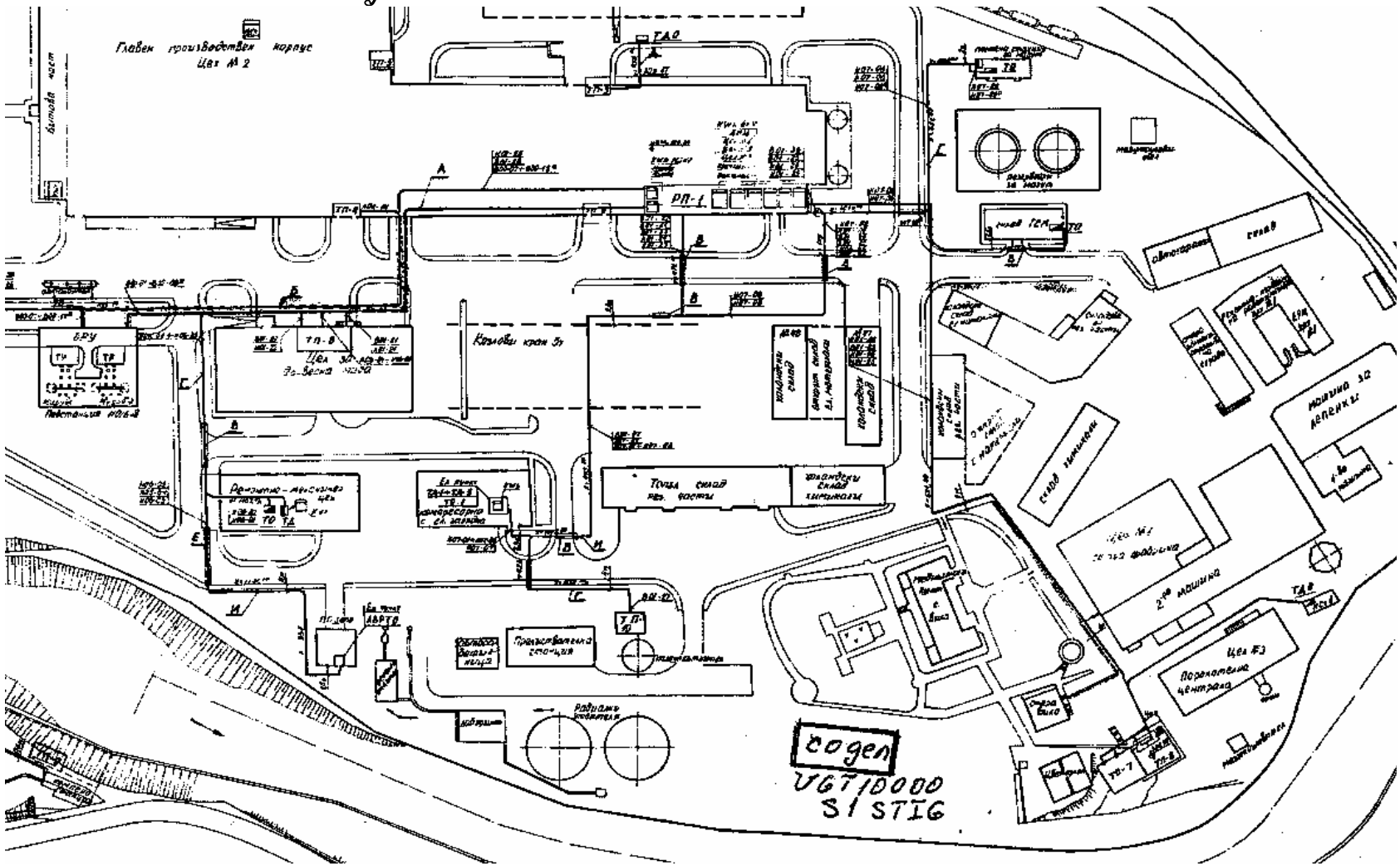
**Part of General Layout Polimery JSC** **Annex No. 1-1**



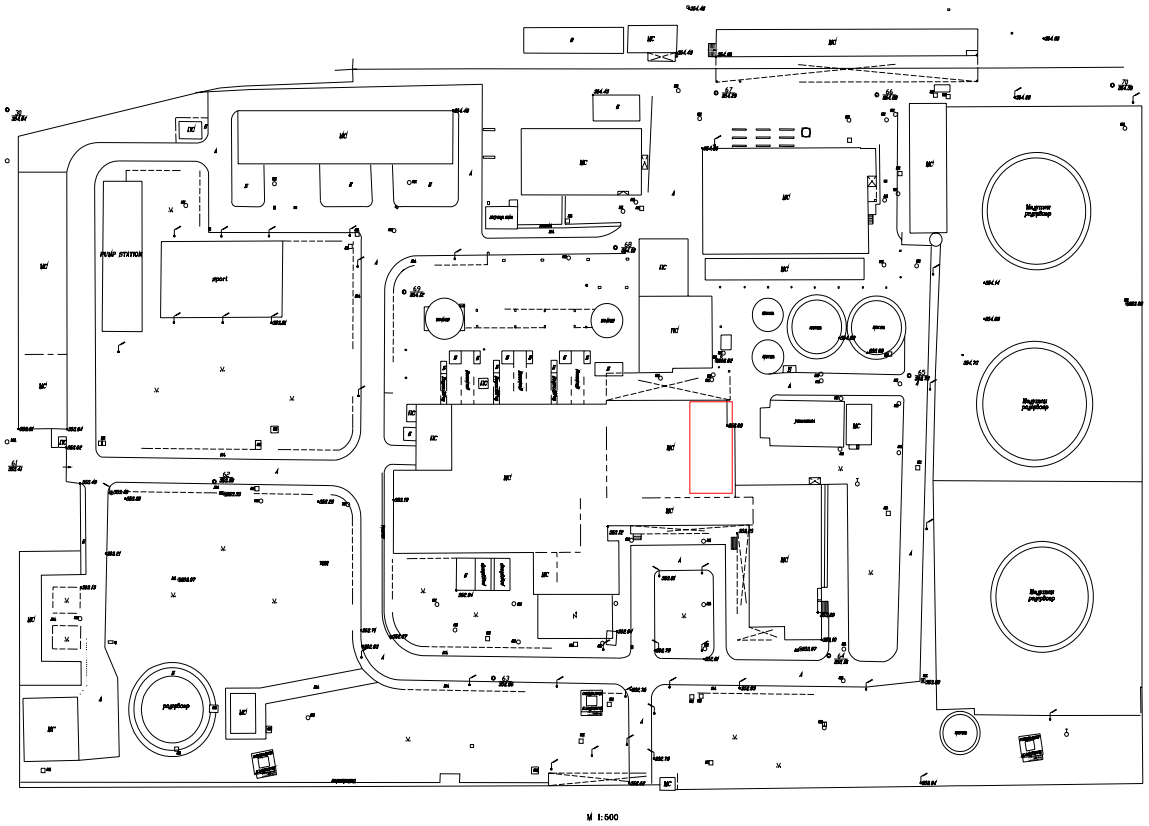
# Part of General Layout Kostenets HH JSC

Annex No. 1-2

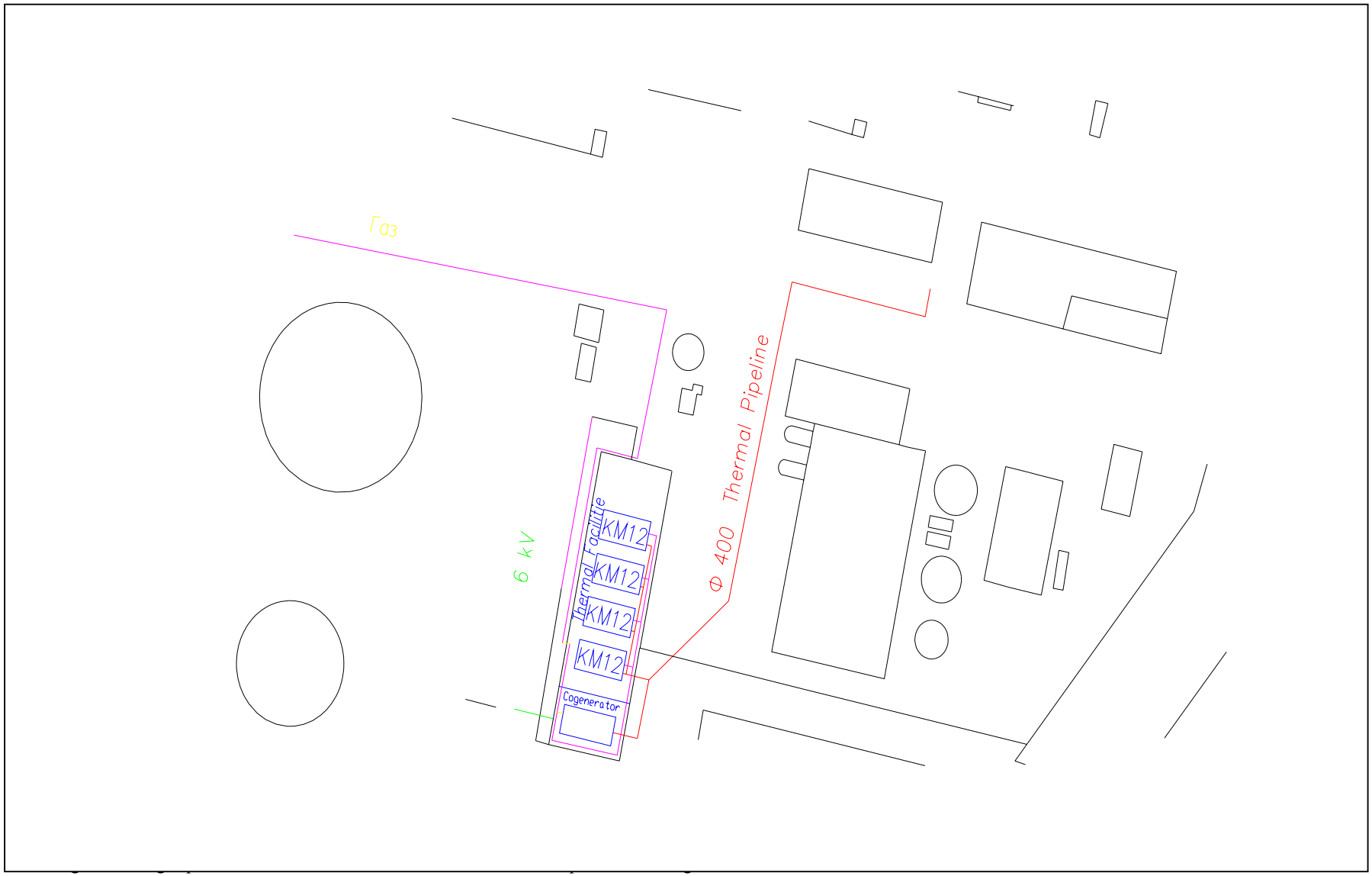


# Part of General Layout Toplofikatsia Kazanlak

**Annex No.1-3**



**Part of General Layout Toplofikatsia Yambol** **Annex No. 1-4**



## Prognostication development of the factories

**Anex No 2**

### Prognostication Polymeri JSC development

| | Years | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total cemical products /incl.** | [tons] | 155123 | 135817 | 174378 | 175600 | 176630 | 178350 | 178800 | 179851 | 180931 | 181930 | 182951 | 183990 | 186021 |
| **- Caustic soda –Diaphr.** | | 22723 | 30493 | 16500 | 16500 | 16500 | 16500 | 16500 | 16500 | 16500 | 16500 | 16500 | 16500 | 16500 |
| **- Caustic soda-Purified** | | 11754 | 10025 | 36000 | 36600 | 37100 | 37600 | 38100 | 38600 | 39100 | 39600 | 40100 | 40600 | 41600 |
| **- Hydrochloric Acid** | | 35007 | 35045 | 48000 | 48000 | 48000 | 48000 | 48000 | 48000 | 48000 | 48000 | 48000 | 48000 | 48000 |
| **- Liquid Chloride** | | 14058 | 18656 | 24600 | 25200 | 25700 | 26200 | 26800 | 27300 | 27800 | 28300 | 28800 | 29300 | 30300 |
| **- Others** | | 71581 | 41598 | 49278 | 49300 | 49330 | 49370 | 49400 | 49450 | 49510 | 49530 | 49550 | 49590 | 49620 |
| **Total production** | [thous. EURO] | 10725 | 13413 | 19 584 | 19 747 | 20 106 | 18 716 | 19 691 | 20 497 | 21 134 | 20 968 | 20 256 | 21 511 | 22 377 |
| **Annual electricity consumption** | [MWh] | 139395 | 156649 | 159500 | 152000 | 148000 | 145000 | 142000 | 142000 | 142000 | 142000 | 142000 | 14200 | 142000 |
| **Average hour electricity consumption** | [MWh e /h ] | 16.5 | 18.5 | 18.9 | 17.9 | 17.5 | 17.1 | 16.8 | 16.8 | 16.8 | 16.8 | 16.8 | 16.8 | 16.8 |
| **Annual steam consumption - total** | MWht | 116075 | 127452 | 131000 | 132700 | 130500 | 128500 | 126500 | 124500 | 124500 | 124500 | 124500 | 124500 | 124500 |
| **- steam 36 barg** | | 3495 | 3694 | 3500 | 3500 | 3500 | 3500 | 3500 | 3500 | 3500 | 3500 | 3500 | 3500 | 3500 |
| **- steam 15 barg** | | 71678 | 83355 | 84500 | 85200 | 84000 | 83000 | 82000 | 80000 | 80000 | 80000 | 80000 | 80000 | 80000 |
| **- steam 6 barg** | | 40902 | 40403 | 43000 | 44000 | 43000 | 42000 | 41000 | 41000 | 41000 | 41000 | 41000 | 41000 | 41000 |
| **Average hour steam consumption** | [ MWh t /h ] | 13.73 | 15.08 | 15.50 | 15.70 | 15.44 | 15.20 | 14.97 | 14.73 | 14.73 | 14.73 | 14.73 | 14.93 | 14.93 |

Average sold to NEC electricity price /2007-2015/ - 49 EURO/MWhe
Average bought from NEC electricity price 2007-2015 - 38 EURO/MWhe.
Average sold thermal energy price 2007-2015 – 13.9 EURO/MWht.
Annual average capacity of cogeneration 8200 h

## Prognostication Kostenets HHI JSC development

| | Years | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total paper /incl.** | [tons] | 16410 | 17341 | 19200 | 34550 | 38120 | 40120 | 42120 | 43120 | 45120 | 45120 | 45120 | 45120 | 45120 |
| **- wall paper base** | | 5263 | 6390 | 6120 | 6120 | 6120 | 6120 | 6120 | 6120 | 6120 | 6120 | 6120 | 6120 | 6120 |
| **- tissue paper** | | 9281 | 8595 | 11220 | 24220 | 22000 | 24100 | 26000 | 27000 | 29000 | 29000 | 29000 | 29000 | 29000 |
| **- MG paper** | | 1902 | 2356 | 1860 | 4210 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 |
| **Total production** | [thous. EURO] | 6696 | 8511 | 8 929 | 20 931 | 24 948 | 26 909 | 28 570 | 29 424 | 31 102 | 31 149 | 31 149 | 31 149 | 31 149 |
| **Annual electricity consumption** | [MWh] | 25066 | 25076 | 25955 | 46751 | 53295 | 53852 | 56530 | 57911 | 60615 | 60685 | 60685 | 60685 | 60685 |
| **Average hour electricity consumption** | [ MWh /h ] | 2.86 | 2.87 | 2.96 | 5.33 | 6.08 | 6.15 | 6.45 | 6.61 | 6.91 | 6.92 | 6.92 | 6.92 | 6.92 |
| **Annual steam consumption** | tons | 81260 | 79377 | 97937 | 148137 | 116216 | 120376 | 124536 | 126616 | 130776 | 130776 | 130776 | 130776 | 130776 |
| **steam 15 barg/199º C** | MWht | 63058 | 61596 | 75999 | 114954 | 90183 | 93412 | 96639 | 98254 | 101482 | 101482 | 101482 | 101482 | 101482 |
| **Average hour steam consumption steam 15 barg/199º C** | [MWht /h ] | 7.20 | 7.03 | 8.67 | 13.12 | 10.29 | 10.66 | 11.03 | 11.21 | 11.58 | 11.58 | 11.58 | 11.58 | 11.58 |

Average sold to NEC electricity price /2007-2015/ - 49 EURO/MWhe
Average bought from NEC electricity price 2007-2015 - 38 EURO/MWhe.
Average sold thermal energy price 2007-2015 – 13.9 EURO/MWht.
Annual average capacity of cogeneration 8200 h

## Prognostication DHC Kazanlak JSC development

| | | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Thermal energy production** | [MWht] | 100696 | 96075 | 71593 | 93616 | 101939 | 103934 | 104417 | 105274 | 105274 | 105274 | 105274 | 105274 | 105274 |
| **Thermal energy sold** | [MWht] | 84796 | 80670 | 55606 | 77095 | 85114 | 86550 | 87147 | 87605 | 87147 | 87605 | 87147 | 87605 | 87147 |
| **- Steam** | | 32330 | 36313 | 5412 | 16810 | 16810 | 16810 | 16810 | 16810 | 16810 | 16810 | 16810 | 16810 | 16810 |
| **- Hot water** | | 52466 | 44357 | 50194 | 60275 | 68304 | 69740 | 70335 | 70793 | 70335 | 70793 | 70335 | 70793 | 70335 |
| | [Th.EUR] | 3701 | 3521 | 2427 | 3365 | 2255.5 | 2293.5 | 2309.4 | 2321.5 | 2309.4 | 2321.5 | 2309.4 | 2321.5 | 2309.4 |
| **Electrical energy annual production** | [MWhe] | 4867 | 3168 | 862 | 20 | 39456 | 40305 | 39522 | 40330 | 39522 | 40330 | 39522 | 40330 | 39522 |
| **Electrical energy own needs** | [MWhe] | 1768 | 1751 | 1948 | 1968 | 7713 | 7555 | 7588 | 7467 | 7588 | 7467 | 7588 | 7467 | 7588 |
| **consumption** | [Th.EUR] | 72.3 | 71.6 | 79.7 | 80.5 | 279.0 | 281.0 | 276.0 | 281.0 | 276.0 | 281.0 | 276.0 | 281.0 | 276.0 |
| **Electrical energy sold** | [MWhe] | 3573 | 2426 | 619 | 15 | 31743 | 32750 | 32055 | 32742 | 32742 | 32742 | 32742 | 32742 | 32742 |
| **to NEC** | [Th.EUR] | 220 | 149 | 38 | 0.9 | 1488 | 1496 | 1494 | 1500 | 1494 | 1500 | 1494 | 1500 | 1494 |
| **Cogenerations modules annual capacity** | h | - | - | - | - | 6250 | 6250 | 6250 | 6250 | 6250 | 6250 | 6250 | 6250 | 6250 |
| **Natural gas consumption** | x 1000 $Nm^3$ | 0 | 0 | 0 | 0 | 17090 | 17472 | 17432 | 17635 | 17635 | 17635 | 17635 | 17635 | 17635 |
| **Heavy fuel oil consumption** | t | 12766 | 11542 | 8306 | 10826 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Average sold to NEC electricity price /2007-2015/ - 49 EURO/MWhe
Average bought from NEC electricity price 2007-2015 - 37 EURO/MWhe.
Average sold thermal energy price 2007-2015 – 26.5 EURO/MWht.
Annual average capacity of cogenerations 6250 h

## Prognostication DHC Yambol JSC development

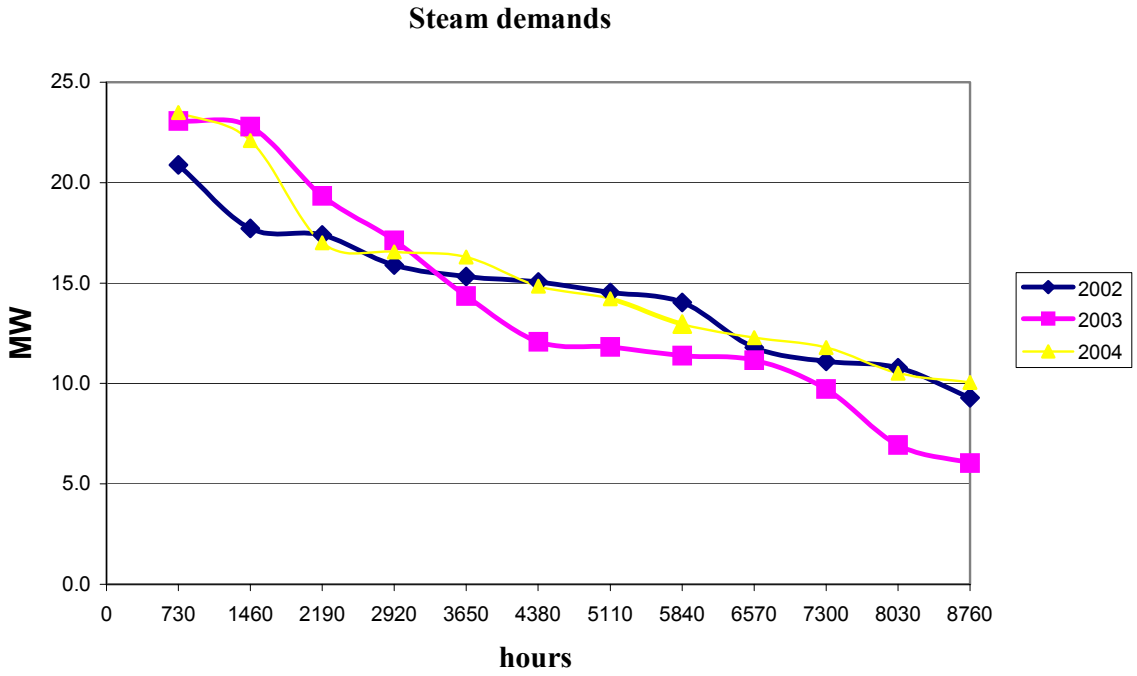
| | | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Thermal energy production** | [MWht] | 4400 | 4400 | 4400 | 4400 | 62000 | 62000 | 62000 | 62000 | 62000 | 62000 | 62000 | 62000 | 62000 |
| **Thermal energy sold** | [MWht] | 3540 | 3540 | 3540 | 3540 | 48197 | 48197 | 48197 | 48197 | 48197 | 48197 | 48197 | 48197 | 48197 |
| | [ Th.EUR ] | 91.3 | 91.3 | 91.3 | 91.3 | 1243 | 1243 | 1243 | 1243 | 1243 | 1243 | 1243 | 1243 | 1243 |
| **Electrical energy annual production** | [MWhe] | 0 | 0 | 0 | 0 | 24000 | 24000 | 24000 | 24000 | 24000 | 24000 | 24000 | 24000 | 24000 |
| **Electrical energy own needs consumption** | [MWhe] | 280 | 280 | 280 | 280 | 2680 | 2680 | 2680 | 2680 | 2680 | 2680 | 2680 | 2680 | 2680 |
| | [ Th.EUR ] | 11 | 11 | 11 | 11 | 49 | 119 | 119 | 119 | 119 | 119 | 119 | 119 | 119 |
| **Electrical energy sold to NEC** | [MWhe] | 0 | 0 | 0 | 0 | 21320 | 21320 | 21320 | 21320 | 21320 | 21320 | 21320 | 21320 | 21320 |
| | [ Th.EUR ] | 0 | 0 | 0 | 0 | 1044 | 1044 | 1044 | 1044 | 1044 | 1044 | 1044 | 1044 | 1044 |
| **Cogenerations modules annual capacity** | h | | | | | 8000 | 8000 | 8000 | 8000 | 8000 | 8000 | 8000 | 8000 | 8000 |
| **Natural gas consumption** | x 1000 $Nm^3$ | 565 | 565 | 565 | 565 | 6080 | 6080 | 6080 | 6080 | 6080 | 6080 | 6080 | 6080 | 6080 |
| **Heavy fuel oil consumption** | t | 824 | 824 | 824 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

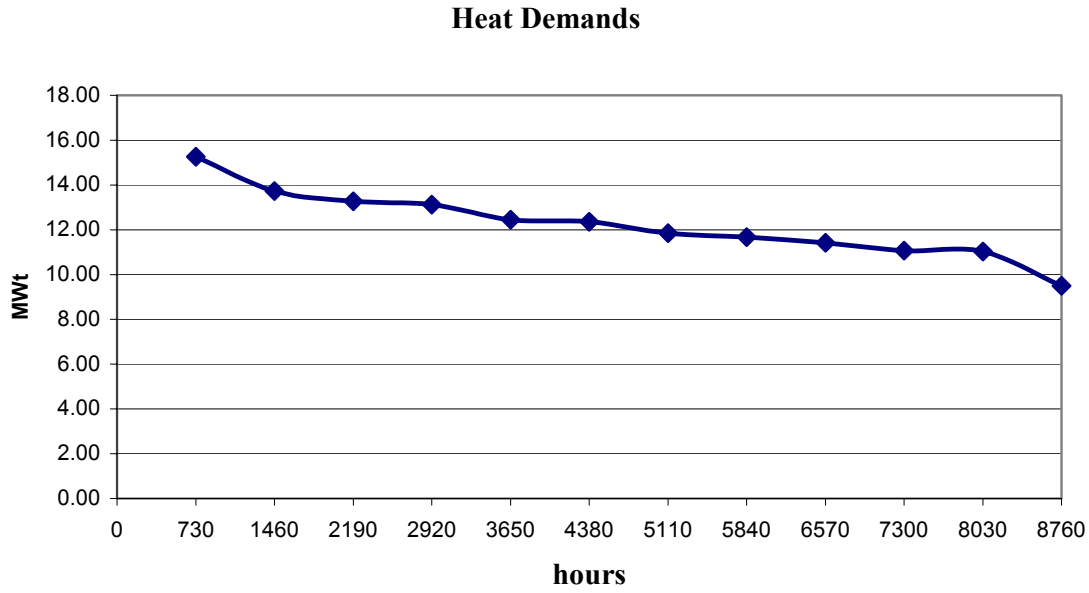
Average sold to NEC electricity price /2007-2015/ - 49 EURO/MWhe
Average bought from NEC electricity price / 2007-2015 / - 39 EURO/MWhe.
Average sold thermal energy price /2007-2015/ – 25.8 EURO/MWht.
Annual average capacity of cogenerations 8000 h

## Load profile of thermal energy demands

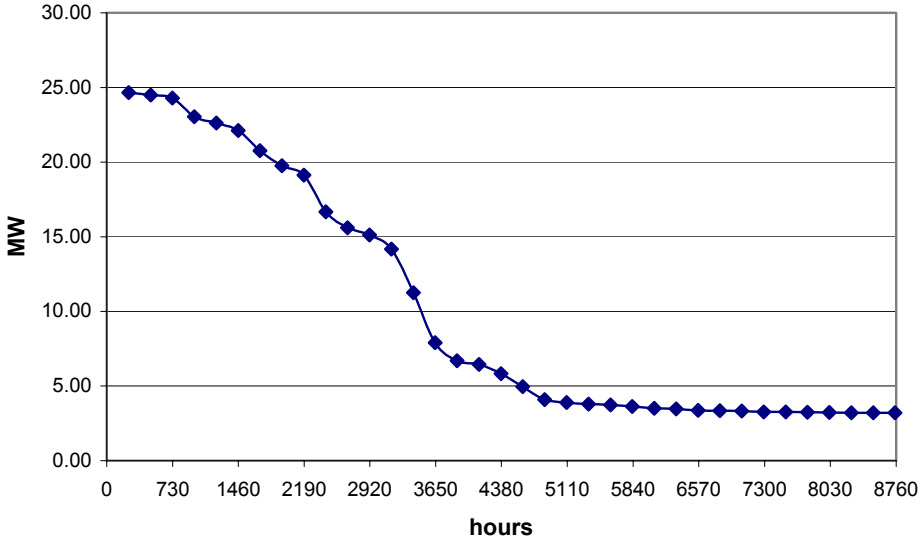
**Annex No. 3**

### Polymeri JSC

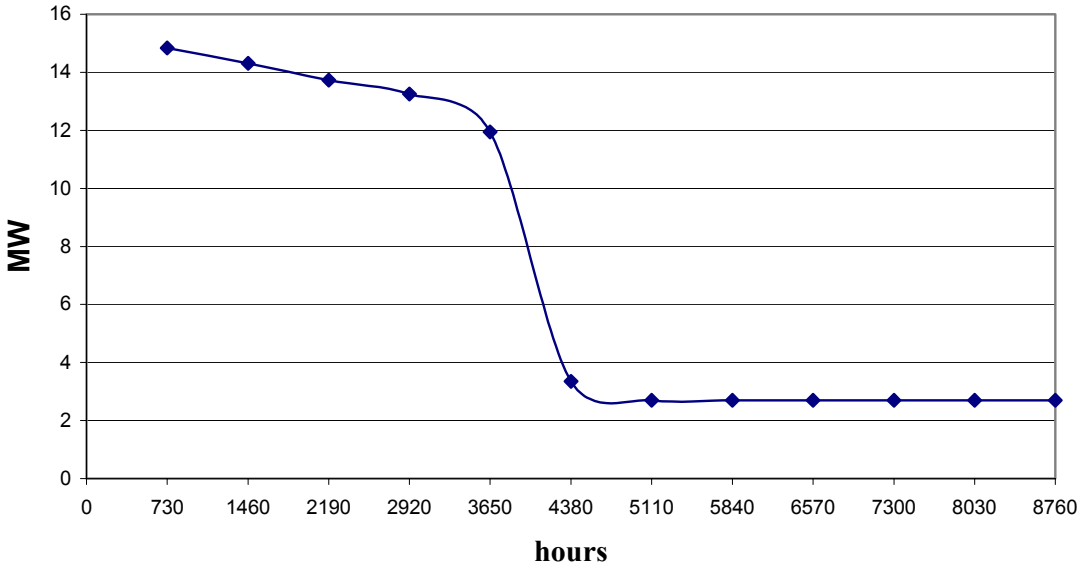



Heat Demands
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
MWt
0
730
1460
2190
2920
3650
4380
5110
5840
6570
7300
8030
8760
hours

**Heat demands**

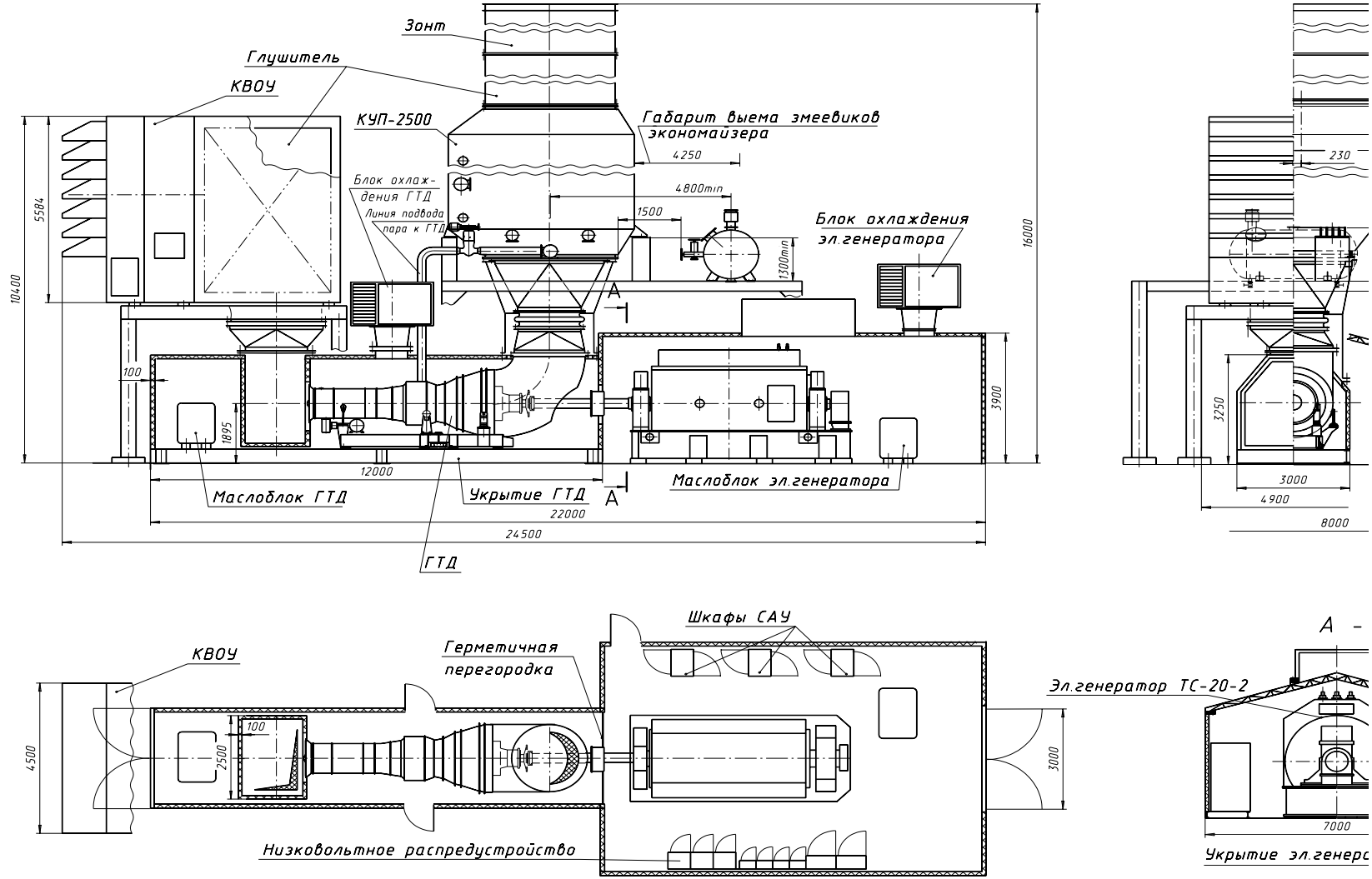


**Heat demands 2007**



# Cogeneration UGT 10000 S1 " STIG "

**Annex No. 4**



## UGT 10000 gas turbine Data Sheet **Annex No. 5**

# DATA SHEET

**Specification of the characteristics of gas turbine engine, type UGT 10000**

| *№* | *Description* | *Dimension* | *Value* | *Comments* |
|---|---|---|---|---|
| *1.* | *Characteristics* | | | |
| 1.1. | Nominal power under normal conditions as per ISO 2314 not considering the resistance of the inlet and outlet tract. | kW | 8450 in working regime | See the characteristic N /tH |
| 1.2. | Nominal power of the power turbine shaft under station conditions and when:<br>- Barometric pressure 1013 Pa (760 mmHg);<br>- Air temperature at the engine inlet 288 K (15 ˚C);<br>- Resistance of the GTCU air intake system to the turbo package inlet – not more than 981 Pa;<br>- Resistance of the exhaust stack – not more than 1470 Pa – when there is no utilization heat exchanger.<br>- No air consumption from the compressor for the anti-icing system and other needs and without an utilization heat exchanger. | kW | 8220 in working regime | Power in working regime by 25 º C of the air<br>8220 kW<br>See the characteristic N /tH |
| 1.3. | Minimum power output of the power turbine shaft | kW | 3500 | Parallel work |
| 1.4. | Allowable increase of rated power when the air inlet temperature goes below 288 K ($15^0$C). | kW | 9600 | |
| 1.5. | Efficient efficiency coefficient: | | | |
| 1.5.1. | At normal conditions as per ISO 2314 in accordance with item 1.1 (not considering the inlet and outlet resistance). | % | 33,2 | |
| 1.5.2. | When:<br>- Barometric pressure 101325 Pa (760 mmHg)<br>- Air temperature at the inlet of the engine 288 K (15 ˚C);<br>- Resistance of the GTCU air intake system to the turbo package inlet – not more than 981 Pa;<br>- Resistance of the exhaust stack – not more than 1470 Pa – when there is no utilization heat exchanger. | % | 32,45 | 32,2 by the outside air temperature 25º C |
| 1.6. | Compression ratio. | P2/P1 | 16,4 | |
| 1.7. | Number of the gas generator compressor stages:<br>- For low pressure;<br>- For high pressure. | <br>pcs<br>pcs | <br>9<br>9 | |
| 1.8. | Number of the gas generator turbine stages:<br>- For low pressure;<br>- For high pressure. | <br>pcs<br>pcs | <br>1<br>1 | |
| 1.9. | Number of stages of the power turbine. | Pcs | 3 | |
| 1.10. | Gas temperature at the power turbine inlet. | K (˚C) | 965.2(692) | |
| 1.11. | Gas temperature at the outlet pipe section. | K (˚C) | 745.2(472) | |
| 1.12. | Compressor air consumption. | kg/s | 31.6 | |
| 1.13. | Power turbine nominal rpm. | $min^{-1}$ | 8 200 | |
| 1.14. | Rated rpm of gas generator rotors:<br>- For low pressure;<br>- For high pressure. | <br>$min^{-1}$<br>$min^{-1}$ | <br>10 340<br>14 260 | |
| 1.15. | Maximum allowable rpm of the power turbine. | $min^{-1}$ | 8 610 | |
| 1.16. | Minimum rpm of the power turbine. | $min^{-1}$ | 6 150 | Limitation from the compressor |
| 1.17. | Maximum allowable rpm of the gas generator:<br>- For low pressure; | <br>$min^{-1}$ | <br>10 750 | |

| | | | | |
|---|---|---|---|---|
| | - For high pressure. | min $^{-1}$ | 14 800 | |
| 1.18. | Type of cooling of the GTU that is situated in the GTCU container:<br>- Ejector by the exhaust gases;<br>- Forced by blast and exhaust fans;<br>- Other. | | <br>-<br>yes<br>- | |
| 1.19. | Type of cooling of the GTU power turbine. | | - | |
| 1.20. | Heat generation during cooling. | KW | 160 | |
| 1.21. | Consumption of cooling air in % from the passing through the GTU compressor air consumption. | % | 15 | |
| 1.22. | Minimal temperature in the GTU container when starting of the GTCU is allowed. | ˚C | + 5 | |
| 1.23. | Direction of rotors rotation /following ГОСТ 22378-77/:<br>• Of the gas generator rotor<br>• Of the power turbine rotor | | <br>Left<br>Right | |
| 1.24. | Air relief valves of the gas generator compressor:<br>- From the HPC /high pressure compressor/<br>- From LPC /low pressure compressor/ | Pcs | <br>2<br>5 | |
| 1.25. | Inlet guiding vanes of the axial compressor /IGV/:<br>- control;<br>- Range of position variation /degrees/. | | <br>?<br>-25º to 0º | |
| 1.26. | Contents of hazardous emissions in the exhaust gases during nominal mode of operation at 0˚C, 0.1013 MPa barometric pressure and conventional oxygen concentration of 15 % (ГОСТ 28775-90):<br>- COx<br>- NOx<br>- Sulphur oxides | ppm<br>mg/Nm$^3$<br>etc.<br><br>mg/Nm³<br>mg/Nm³<br>mg/Nm³ | <br><br><br><br>30<br>74<br>? | |
| 1.27 | Allowable air consumption on the compressor outlet for the anti-icing system and the needs of the GTCU | kg/sec | 0,7 | |
| ***2.*** | ***Starter*** | | | |
| 2.1. | Type of the starter:<br>- Turbo starter<br>- electric starter<br>- other device | | <br>-<br>yes<br>- | |
| 2.2. | Available power output of the starter. | KW | 70 | |
| 2.3. | Duration of one Start cycle. | S | 180 | |
| 2.4. | Operating pressure and energy consumption:<br>- electric energy<br>- natural gas – at pressure .....(bar) and temperature ..... (˚C)<br>- other type of working media and energy | <br>kW<br>m$^3$ | <br>See the diagrams UGT<br>10000 | |
| 2.5. | Minimum temperature of the natural gas when the START is allowed. | ˚C | ? | |
| 2.6. | Oil system:<br>- using oil from the GTE<br>- separate oil system (type of system and type of oil) | | <br>Yes GTE | |
| 2.7. | Allowed number of starts and stops for 1000 hours in operation of the GTE. | Pcs. | 30 | |
| 2.8. | Resource of the starter, depending on the number of starts. | Pcs. | 1200 | |
| 2.9. | Type of the coupling between the starter and the shaft used as a gas generator actuator / transmission /. | | Centrifugal tooth coupling ( automatic ) | |
| 2.10. | Possibilities for Washing mode of operation.<br>Possibilities for Conservation mode of operation | YES/NO | Yes<br>Yes | |
| 2.11. | Possibilities for Cold Start. | YES/NO | Yes | |
| 2.12. | Other | | ? | |
| ***3.*** | ***GTE oil system*** | | | |

| | | | | |
|---|---|---|---|---|
| 3.1. | Type of the used oil. | | Tp 32 BDS 5976-80 | |
| 3.2. | Possibilities for using of other alternative types of oil. | | Tp22C “MACT” TU 224099155.006-98 Tp22GOST9972-74, Turbonikoil 321, Turbonikoil 210A, Shell Turbine oil 3SP | |
| 3.3. | Irreparable oil losses (average) during normal mode of operation. | l/h | 0,3 | |
| 3.4. | Oil coolers heat generation. | KW | 200 | |
| 3.5. | Oil pressure at the GTE inlet. | MPa | 0,5 ÷ 0,6 | |
| 3.6. | Minimum allowable oil temperature at the GTE inlet when START is allowed. | ˚C | 35 | |
| 3.7. | Operating oil temperature at the GTE inlet during a certain mode of operation. | ˚C | 40 ÷ 55 | |
| 3.8. | Operating oil temperature at the GTE outlet during a certain mode of operation. | ˚C | Max.110 | |
| 3.9. | Consumption of oil through the GTE oil system during nominal mode of operation. | l/min | 130 | |
| 3.10. | Power turbine lubrication system (details if there is separate lubrication). | | Not | |
| 3.11. | Oil filtration degree at the engine inlet. | μm | 10 | |
| 3.12. | Type of the system. | (stand.) | Under pressure, with pumping from reservoir | |
| ***4.*** | ***Fuel system*** | | | |
| 4.1. | Fuel gas pressure at GTE inlet | MPa | 2,5 ÷ 0,05 | In the previous Data Sheet was done mistake |
| 4.2. | Fuel gas temperature at GTE inlet | ˚C | 20 ÷ 50 | |
| 4.3. | Fuel gas consumption during nominal mode of operation under the conditions of item 1.1 | kg/h | 1780 | |
| 4.4. | Fuel gas consumption during maximal mode of operation as per item 1.1. | kg/h | 2050 | |
| 4.5. | Filtration degree . | μm | 10 | |
| 4.6. | Lowest heat of combustion at $20^0$C and absolute pressure of 101,325 кPa. | kкal/kg | 11955 | |
| ***5.*** | ***Weight and overall dimensional characteristics*** | | | |
| 5.1. | Length – maximum | mm | 3090 | |
| 5.2. | Height – maximum | mm | 1585 | |
| 5.3. | Width – maximum | mm | 1250 | |
| 5.4. | Weight – maximum | kg | 3500 | |
| ***6.*** | ***Switching indexes*** | | | |
| 6.1. | Duration of start up operations and loading when the pre-commissioning conditions are fulfilled | min | 10 | |
| 6.2. | Duration of start up operations and full loading when the pre-commissioning conditions are fulfilled | min | 20 | |
| 6.3. | Range of the power turbine capacity variation from minimum to maximum mode of operation | MW | 3,5 ÷ 9,6 /4,5* ÷ 9,6/ | * Limitation from the compressor |
| 6.4. | Range of the power turbine rpm variation from minimum to maximum mode of operation | $min^{-1}$ | 6150 ÷ 8610 | |
| ***7.*** | ***Reliability indexes*** | | | |
| 7.1. | General technical (prognosed) hours in operation of the GTU:<br>- of the gas generator<br>- of the power turbine | <br>hours<br>hours | <br>100 000<br>100 000 | |
| 7.2. | Hours in operation before overall repair:<br>- of the gas generator | <br>hours | <br>25 000 | Can more by condition |

| | | | | |
|---|---|---|---|---|
| | - of the power turbine | hours | 25 000 | estimate |
| 7.3. | Hours in operation before planned repair:<br>- of the gas generator<br>- of the power turbine | <br>hours<br>hours | <br>-<br>- | |
| 7.4. | Allowed number of start up and stopping operations of the GTE and the starter during operation (if there are such limits) | Pcs | 200 per year | |
| 7.5. | Formula for considering the influence of the number of start up and stopping operations upon using up of the hours in operation until the overall repair (if there are such limits) | | Not | |
| 7.6. | Average hours in operation until failure (defect) related with the GTE emergency stop | Hours | 3500 | |
| 7.7. | Average hours in operation until failure (defect) related with the GTE normal stop. | hours | Not | |
| 7.8. | A list of details, assemblies, modules, which have a limited hours in operation and shall be obligatory replaced during operation or repair | | Not | |
| 7.9. | Type of the technical operation:<br>- hours in operation,<br>- by level of reliability<br>- limit condition of the operational parameters | | <br>Yes ?<br>?<br>Yes ? | |
| 7.10. | Expected aging of the equipment in % at the end of the hours in operation up to the firs repair or rejection<br>Due to power output<br>Due to efficiency coefficient | <br>%<br>% | <br>4<br>2 | |
| ***8.*** | ***Operational technology*** | | | |
| 8.1. | Regularity for technical servicing /routine inspection/ when the GTU and the GTCU shall be stopped. | hours | 3 000 | |
| 8.2. | Time consumption | Man-hours | 16 | |
| 8.3. | Consumption of materials and consumables | | - | |
| 8.4. | Regularity for partial analysis of used oil in the compressor station laboratory. | hours | 168 | |
| 8.5. | Regularity for complete analysis of used oil in specialized laboratories. | Hours | 1 time for month | |
| ***9.*** | ***Obligatory but not limiting operational characteristics*** | | See the diagrams UGT 6000+ | |
| 9.1. | Environmental characteristics and correction coefficients of the gas turbine: | | | |
| 9.1.1. | $\delta = f(p_1, H)$ | | | |
| 9.1.2. | $\varepsilon_1 = f(\delta p_1)$ | | | |
| 9.1.3. | $\varepsilon_2 = f(\delta p_5)$ | | | |
| 9.1.4. | $\varepsilon_3 = f(\delta Q_a)$ | | | |
| 9.1.5. | $COx = f(T_{5,4}), f(P_2)$ | | | |
| 9.1.6. | $NOx = f(T_{5,4}), f(P_2)$ | | | |
| 9.1.7. | $NOx = f(COx)$ | | | |
| 9.2. | Characteristics reduced to ISO ,$p_0$ = 760 mmHg (1013 mbar), $T_0$ = 15 ˚C: | | | |
| 9.2.1. | $W_e = f_1(T_1, f_2(T_4), f_3(p_2), f_4(\eta_e))$ | | | |
| 9.2.2. | $W_e = f_1(N_{TL}, f_2(N_{GG}), f_3(\eta_e), f_4(W_{cp}))$ | | | |
| 9.2.3. | $(T_2, T_3, T_4, T_5) = f(N_{GG})$ | | | |
| 9.2.4. | $(Q_a, Q_f, P_2) = f(N_{GG}, W_e)$ | | | |
| 9.2.5. | $\alpha_{RDE} = f_1(N_{GG}, f_2(T_1))$ | | | |
| 9.2.6. | $\pi_{k\varepsilon} = p_2 / p_1 = f_1(Q, f_2(N_{GG}))$ $Q = Q_a + Q_f$ | | | |
| 9.3. | Additional characteristics for two-shaft gas generators | | | |

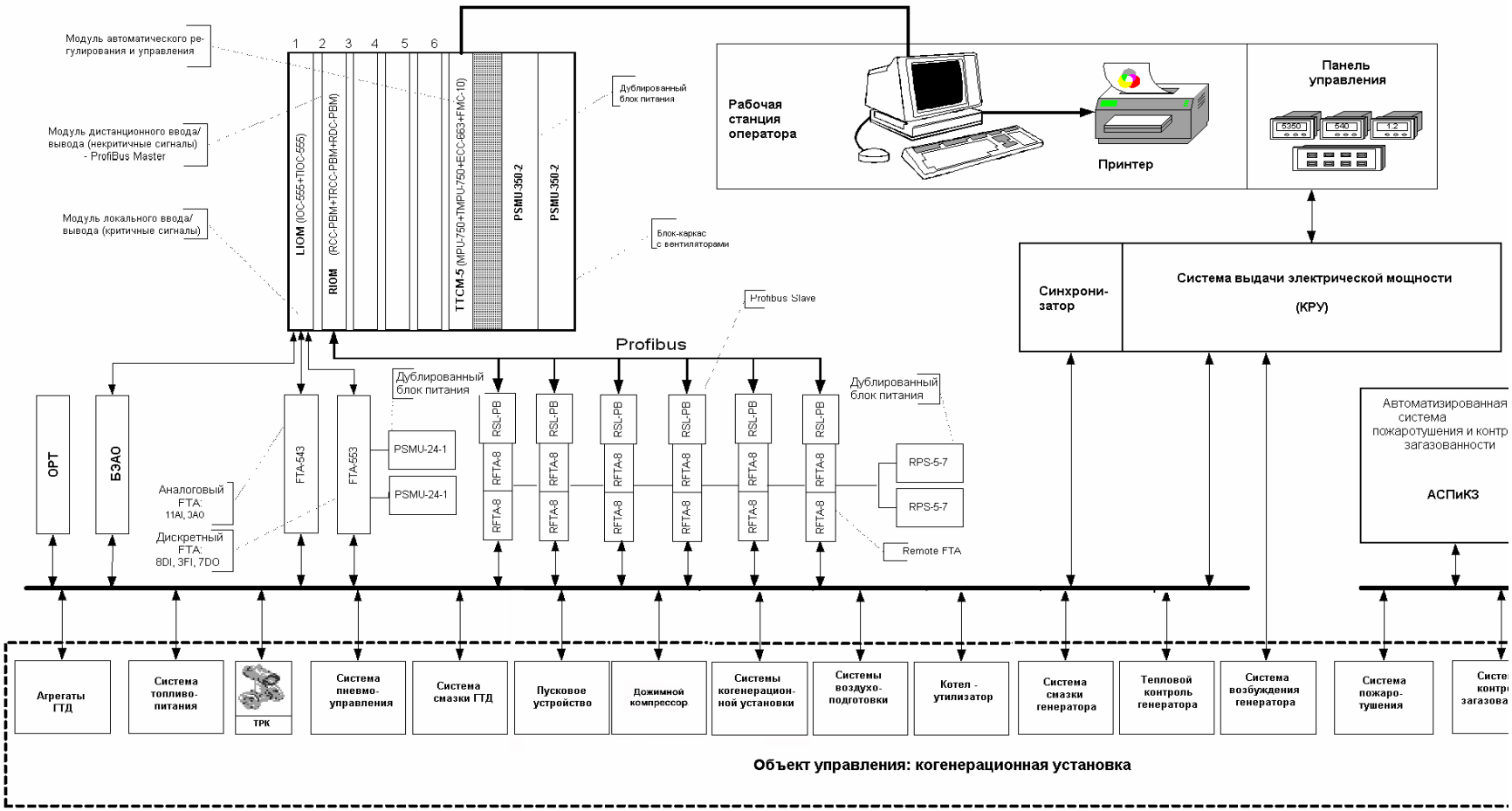
| | | | | |
|---|---|---|---|---|
| 9.3.1. | $W_e = f_1 (N_{TL}, f_2 (N_{GG1}), f_3 (N_{GG2}), f_4 (\eta_e))$ | | | |
| 9.3.2. | $W_e = f_1 (S, T_5)$ | | | |
| 9.3.3. | $T_5, N_e, \pi\kappa\varepsilon = f_1 (S)$ | | | |
| 9.4 | Additional characteristics | | | |

***SYMBOLS:***

- **H(m) -** altitude;
- **δ [%]** – coefficient of correction;
- **$\varepsilon_1, \varepsilon_2$ [%]** – coefficients of correction from losses at the gas turbine inlet and outlet;
- **$\varepsilon_3$ [%]** – coefficient of correction for air off-take from the gas turbine compressor for the needs of the GTCU;
- **($\delta p_1$), ($\delta p_5$) [mm$H_2O$];**
- **$\delta Q_a$ [kg/s]** - air off-take for the needs of the GTCU;
- **$P_H$ [Pa]** - barometric pressure
- **$p_1$ [Pa]** ; compressor inlet pressure
- **$p_2$ [Pa]** – air pressure at the outlet of the gas turbine compressor;
- **$\pi_{\kappa\varepsilon} = p_2/p_1$** - total compression ratio in the gas generator compressor
- **$T_H$ [°C]** –ambient temperature
- **$T_1$ [°C]** – gas turbine inlet temperature;
- **$T_2$ [°C]** – gas turbine compressor outlet temperature;
- **$T_3$ [°C]** – gas generator vane inlet temperature;
- **$T_4$ [°C]** – gas generator vane outlet temperature;
- **$T_5$ [°C]** – power turbine inlet temperature;
- **$W_e$ [kW]** – efficient calculated power turbine shaft output;
- **$W_{cp}$ [MW]** – thermal power;
- **$N_{GG}$ [$min^{-1}$]** – rpm of the gas generator rotor;
- **$N_{GG1}$ [$min^{-1}$]** – rpm of the low pressure gas generator rotor;
- **$N_{GG2}$ [$min^{-1}$]** - rpm of the high pressure gas generator rotor;
- **$N_{TL}$ [$min^{-1}$]** – power turbine rpm;
- **$\eta_e$ [%]** – efficiency coefficient
- **$Q_a$ [kg/sec]** – calculated air consumption of the gas turbine compressor;
- **$Q = Q_a + Q_f$** – total gas consumption of the gas turbine.
- **$Q_f$ [кг/сек]** - calculated fuel consumption of the gas turbine combustion chamber water column;
- **$\alpha_{RDE}$ [angular degrees]** - angular deviation of the inlet guiding vanes of the GTU compressor;
- **$s = N_{GG1}/ N_{GG2}$ [%]** – sliding between the low pressure and high pressure gas generator shafts (for two-shaft engines);
- **COx [ppm, mg/Nm $^3$, gr/kg fuel or other]** – volume of carbon oxides in the engine exhaust gases;
- **NOx [ppm, mg/Nm $^3$, gr/kg fuel or other]** – volume of nitrogen oxides in the engine exhaust gases;

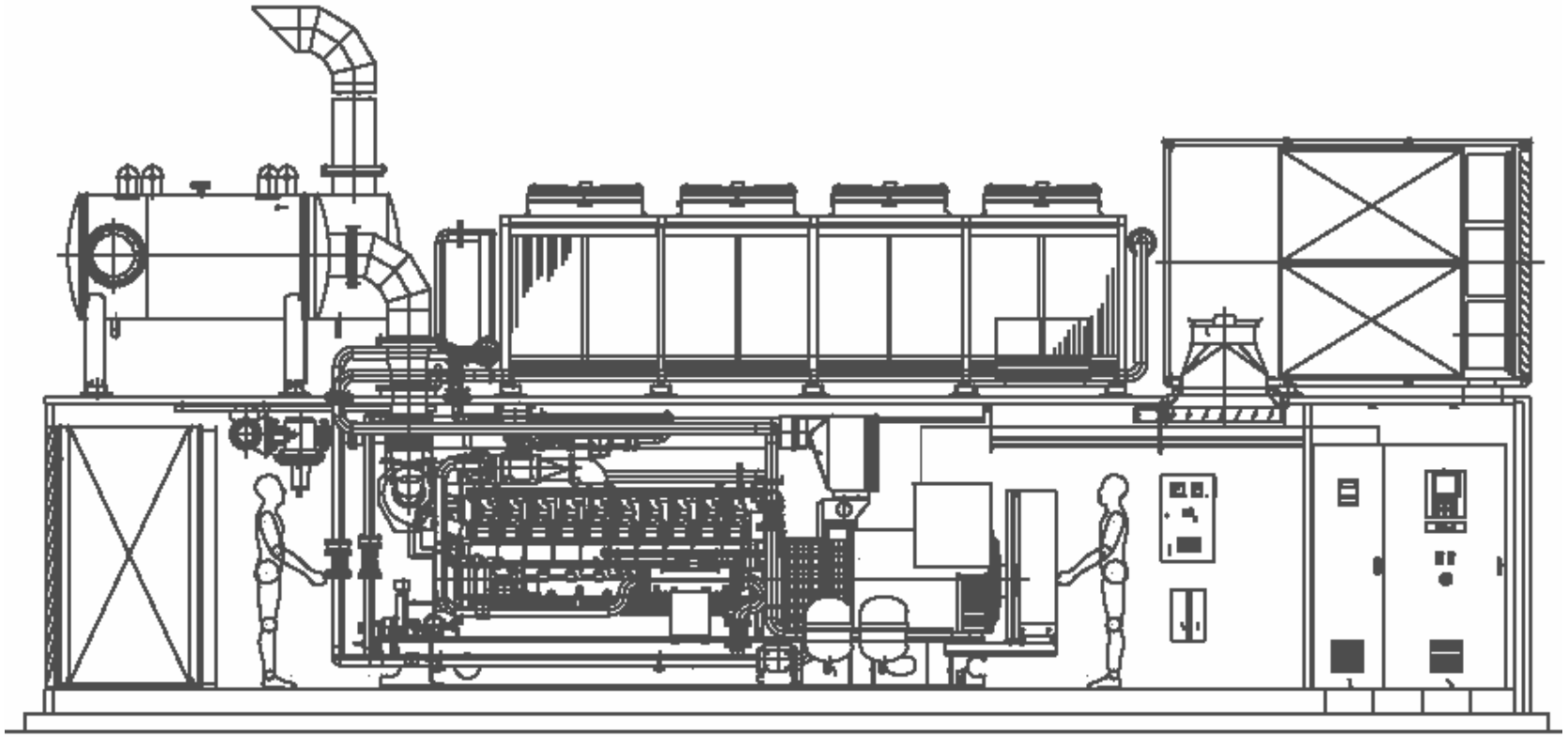
# UGT 10000 S1 “STIG” electrical control block scheme

**Annex No. 6**



## Enbacher J 620 GS cogeneration common view

**Annex No. 7**



# Enbacher J 620 GS gas engine Data Sheet

**Annex No. 8**

JENBACHER

**J 620 GS - E01**

Valid to: 31.12.04

| | | | |
|---|---|---|---|
| Speed | **1500 rpm** | BMEP at M.C.R. | **20,00 bar** |
| Fuel Gas | **Natural Gas (MN 94)** | Compression ratio | **11** |
| NOx-emission | **500 mg/m3** | CO-emission (app. value) | **1050 mg/m3** |
| Jacket water outl.max. | **95 °C** | intercooler watertemp. max | **40 °C** |
| Min. Methane number | **80** | Exhaust gas manifold | **Uncooled** |
| Max. Oil temperature | **80 °C** | Interco. flow rate; low-temp. | **40 m3/h** |
| Return temp. high-temp. | **70 °C** | Interco. flow rate; high-temp. | **50 m3/h** |

standard rating conditions and tol. see general spec.; volume values at normal conditions; exhaust flow at silencer; Pe = ICFN (ISO 3046/I)

## Energy balance

| | | | | | | |
|---|---|---|---|---|---|---|
| Engine load | : | [%] | 100 | 75 | 50 | 25 |
| Engine rating | : Pe | [kW] | 3119 | 2339 | 1559 | 780 |
| BMEP | : pme | [bar] | 20,00 | 15,00 | 10,00 | 5,00 |
| Heat consumption | : we | [kWh/kWh] | 2,27 | 2,34 | 2,48 | 2,89 |
| Energy balance absolute | | | | | | |
| Input | : Qzu | [kWh] | 7076 | 5468 | 3860 | 2251 |
| Mechanical | : Qne | [kWh] | 3119 | 2339 | 1559 | 780 |
| Jacket water | : Qkw | [kWh] | 538 | 465 | 386 | 268 |
| Oil-cooler | : Qkö | [kWh] | 326 | 297 | 255 | 199 |
| Exhaust gas total | : Qag | [kWh] | 2119 | 1770 | 1343 | 829 |
| Exhaust gas 180°C | : Qag | [kWh] | 1363 | 1198 | 952 | 610 |
| Exhaust gas 120°C | : Qag | [kWh] | 1658 | 1421 | 1105 | 696 |
| Exhaust gas 100 °C | : Qag | [kWh] | 1756 | 1495 | 1155 | 724 |
| Hightemp. Intercooler | : Qgkh | [kWh] | 525 | 271 | 76 | -1 |
| Lowtemp. Intercooler | : Qgkt | [kWh] | 188 | 119 | 70 | 31 |
| Surface heat | : Qst | [kWh] | 188 | 148 | 131 | 123 |
| Balance | : Qre | [kWH] | 71 | 55 | 39 | 23 |
| Energy balance relative [%] | | | | | | |
| Mechanical | : Qne | [%] | 44,1 | 42,8 | 40,4 | 34,6 |
| Jacket water | : Qkw | [%] | 7,6 | 8,5 | 10,0 | 11,9 |
| Oil-cooler | : Qkö | [%] | 4,6 | 5,4 | 6,6 | 8,8 |
| Exhaust gas total | : Qag | [%] | 29,9 | 32,4 | 34,8 | 36,8 |
| Exhaust gas 180°C | : Qag | [%] | 19,3 | 21,9 | 24,7 | 27,1 |
| Exhaust gas 120°C | : Qag | [%] | 23,4 | 26,0 | 28,6 | 30,9 |
| Exhaust gas 100 °C | : Qag | [%] | 24,8 | 27,3 | 29,9 | 32,1 |
| Hightemp. Intercooler | : Qgkh | [%] | 7,4 | 5,0 | 2,0 | 0,0 |
| Lowtemp. Intercooler | : Qgkt | [%] | 2,7 | 2,2 | 1,8 | 1,4 |
| Surface heat | : Qst | [%] | 2,7 | 2,7 | 3,4 | 5,5 |
| Balance | : Qre | [%] | 1,0 | 1,0 | 1,0 | 1,0 |
| Exh. gas temp. | : ta | [°C] | 425 | 464 | 509 | 555 |
| Fuel/Air ratio | : La | [1] | 1,92 | 1,88 | 1,82 | 1,73 |
| Exhaust gas mass flow rate, wet | : maf | [kg/h] | 17325 | 13121 | 8966 | 5001 |
| Exhaust gas mass flow rate, dry | : mat | [kg/h] | 16181 | 12237 | 8342 | 4638 |
| Exhaust gas volume, wet | : Vaf | [m3/h] | 13666 | 10354 | 7079 | 3953 |
| Exhaust gas volume, dry | : Vat | [m3/h] | 12293 | 9293 | 6331 | 3516 |
| Combustion air mass flow rate | : ml | [kg/h] | 16816 | 12727 | 8688 | 4840 |
| Combustion air volume | : Vl | [m3/h] | 13008 | 9845 | 6721 | 3744 |

offical in charge: ElsenbrT | Sign: te | Printed: 28.09.04

| | | | |
|---|---|---|---|
| Speed | **1500 rpm** | BMEP at M.C.R. | **20,00 bar** |
| Fuel Gas | **Natural Gas (MN 94)** | Compression ratio | **11** |
| NOx-emission | **500 mg/m3** | CO-emission (app. value) | **1050 mg/m3** |
| Jacket water outl.max. | **95 °C** | intercooler watertemp. max | **40 °C** |
| Min. Methane number | **80** | Exhaust gas manifold | **Uncooled** |

standard rating conditions and tol. see general spec.; volume values at normal conditions;
exhaust flow at silencer; Pe = ICFN (ISO 3046/I)

## Energy balance

## EXHAUST GAS AND POLLUTANT EMISSIONS

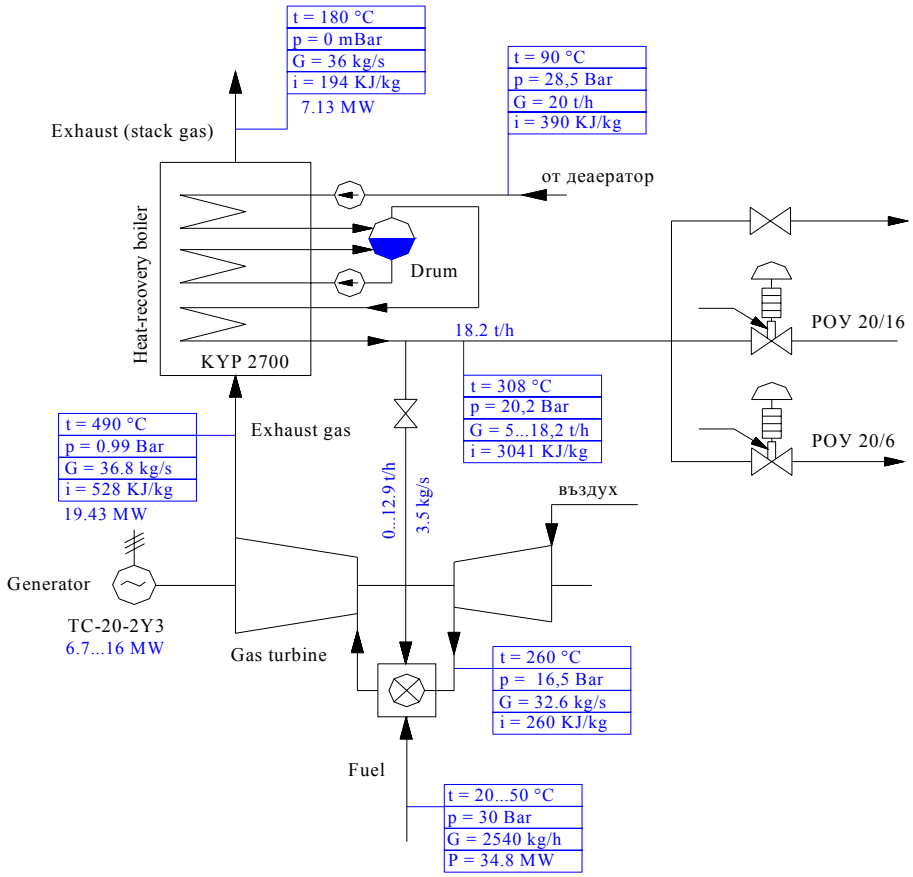
| | | | |
|---|---|---|---|
| Engine load | | [%] | 100 |
| Theor. composition of wet exhaust gas at 100% fuel gas combustion: | | | |
| N2 | | Vol % | 74,3 |
| O2 | | Vol % | 9,5 |
| AR | | Vol % | 0,9 |
| CO2 | | Vol % | 5,2 |
| H2O | | Vol % | 10,0 |
| O2 dry exhaust gas | | Vol % | 10,6 |
| Emission | | | |
| NOx | 1) | ppm | 154 |
| NOx (als NO2) | | g/kWh Qne | 1,33 |
| NOx (als NO2) | | kg/h | 4,14 |
| NOx (als NO2) | 2) | mg/m3 | 500 |
| NOx (als NO2) | | g/GJ Qzu | 157 |
| CO | 1) | ppm | 546 |
| CO | | g/kWh Qne | 2,79 |
| CO | | kg/h | 8,69 |
| CO | 2) | mg/m3 | 1050 |
| CO | | g/GJ Qzu | 329 |

1, in dry exhaust gas
2, in dry exhaust gas at 5% oxygen

offical in charge: ElsenbrT | Sign: te | Printed: 28.09.04

# Cogenerations thermal flows schemes

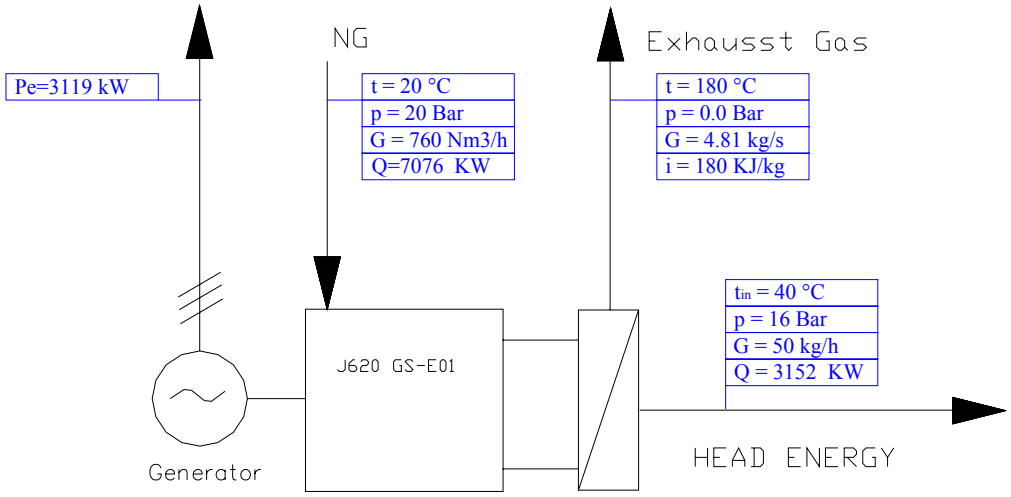
**Annex No. 9 -1**




UGT 10000 S1 STIG

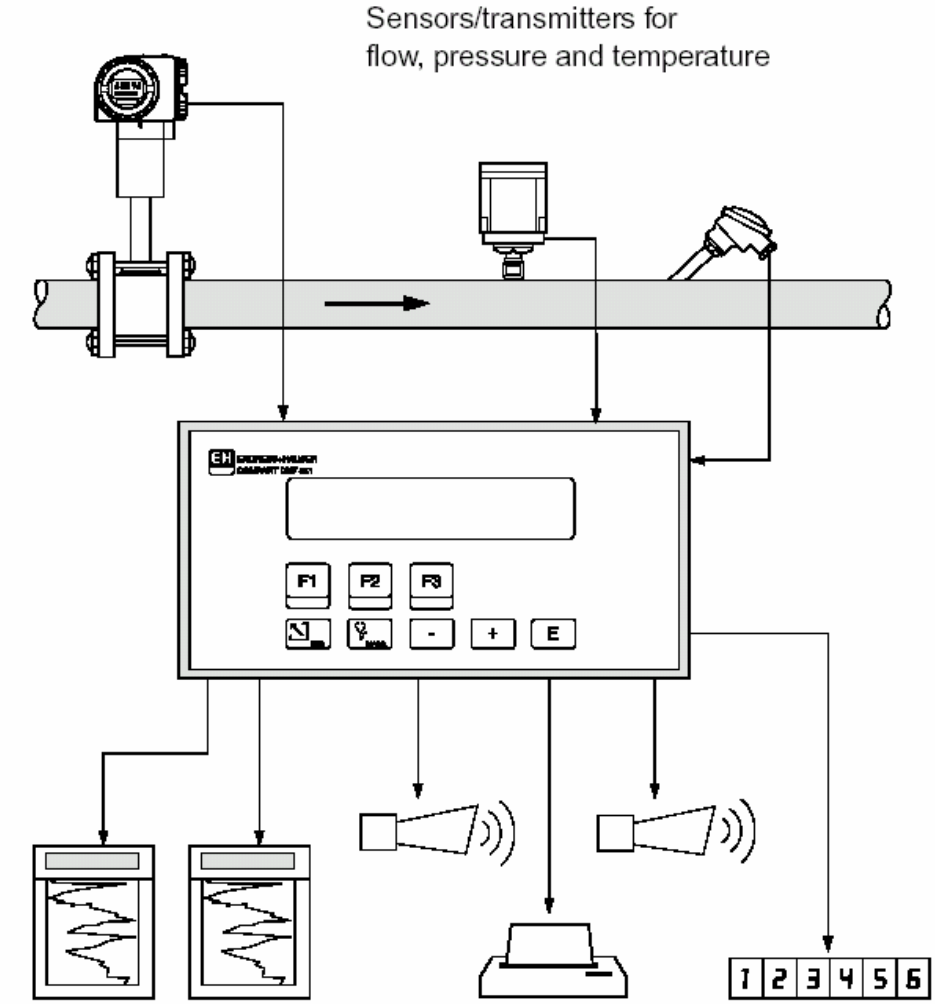
## Enbavher J 620 GS cogeneration thermal flow scheme

**Annex No 9 - 2**



## Measurement devices for custudy transfer

**Annex No. 10**



**Function and fields of application**

The Compart DXF 351 flow computer combines signals from volumetric flowmeters with those from pressure, temperature and density sensors. Using various flow formulae, the computer is capable of calculating variables important for the measurement and control industry (see page 4):

- Mass, operating volume and corrected volume flow
- Heat flow
- Delta heat
- Combustion heat

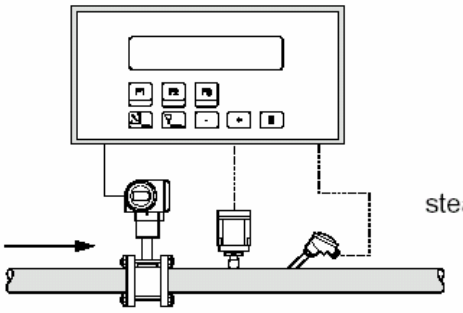
All data required for steam and water such as the saturated steam curve, density and heat content are permanently stored in the Compart DXF 351.

For various other fluids such as air, natural gas and other fuels, default data is stored and can be adjusted by the user according to individual process conditions. This eliminates tedious searching in reference manuals.

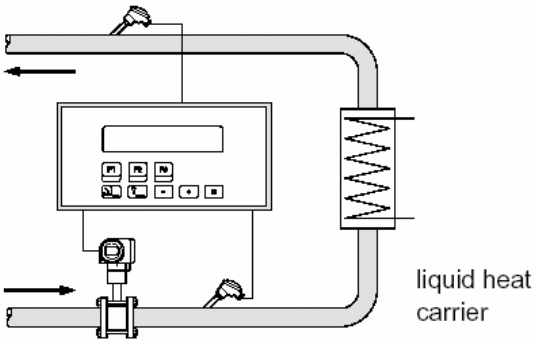
The measured and calculated variables can be displayed in selectable engineering units, assigned to various outputs and printed out either automatically at programmed intervals or by pressing a key.

STEAM MASS
STEAM HEAT
GAS MASS
CORRECTED GAS VOLUME
GAS COMBUSTION HEAT

For saturated steam:
*only* pressure or
*only* temperature measurement

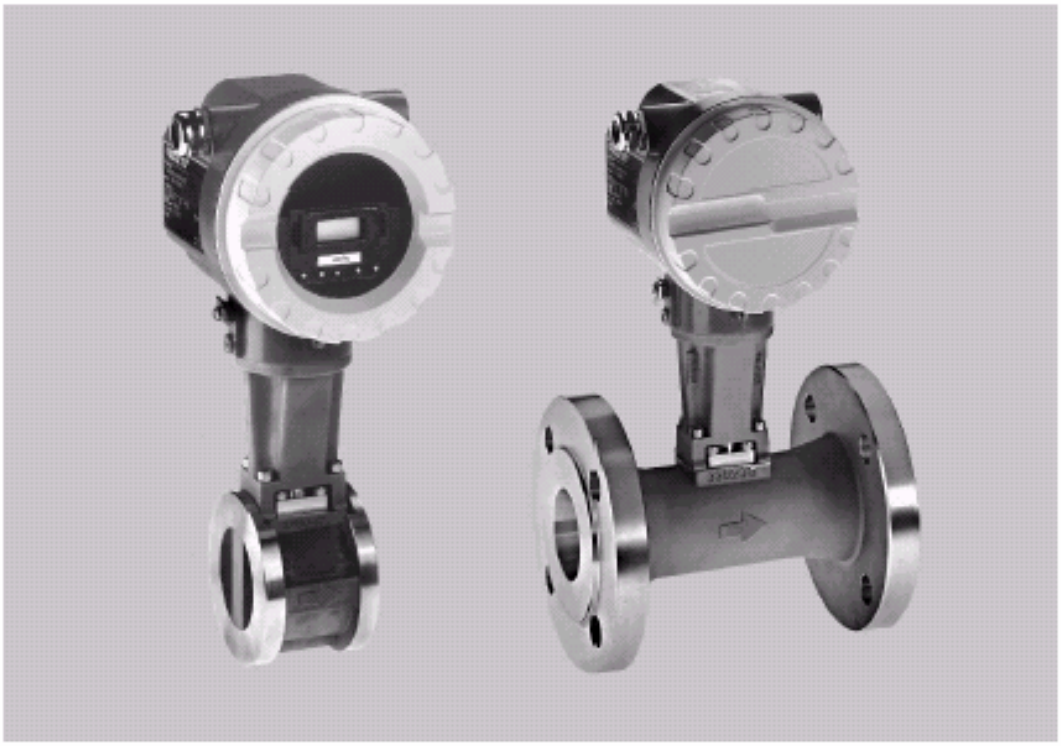



LIQUID DELTA HEAT



# Vortex Flow Measuring System
# *prowirl 77*

## Reliable Flow Measurement of Gases, Steam and Liquids



**Safe**
- Verified electromagnetic compatibility according to IEC and NAMUR
- Every instrument hydrostatically pressure tested
- Sensor and electronics self-diagnostics with alarm function
- Proven capacitive sensor: high resistance to thermal shock, water hammer and vibration
- Sensor, meter body and bluff body made of stainless steel, NACE MR 0175 conform

**Accurate**
- Low measuring uncertainty: <1% o.r. (gas, steam) <0.75% o.r. (liquids)
- Wide turndown of up to 40:1
- Every flowmeter wet calibrated

**Flexible**
- One standard, compact flowmeter for all fluids and a complete process temperature range of –200...+400 °C
- Available in pressure ratings up to PN 160/Cl. 600
- Flanged and high pressure version with standard ISO face-to-face lengths (DN 15...150)
- Wafer version with standard 65 mm face-to-face length

**Universal**
- HART communication for remote reading and configuration
- Fieldbus communication via PROFIBUS-PA interface
- Operating under E+H Windows software "Commuwin II", can be fully configured off-line
- Output signal simulation

# Electromagnetic Flow Measuring System *promag 50/53 P*

## Flow measurement in chemical or process applications

**Features and benefits**

- Nominal diameters DN 15...600
- PTFE or PTA lining
- PFA for high-temperature applications up to +180 °C
- Fitting lengths to DVGW and ISO
- High measuring accuracy for improved process control:
  - Promag 50: ± 0.5% (option: ± 0.2%)
  - Promag 53: ± 0.2%
- Robust field housing, IP 67
- IP 67 wall-mount housing for straightforward installation of the remote version
- Promag 53 with Touch Control: Operation without opening the housing – also for Ex-rated applications
- Expandable software packages:
  - for batching applications
  - for electrode cleaning
  - for extended diagnosis and enhanced operational dependability
- Quick Setup menus for straightforward commissioning in the field
- Interfaces for integration into all major process-control systems:
  - HART interface as standard
  - Promag 50: PROFIBUS-PA
  - Promag 53: PROFIBUS-PA/-DP, FOUNDATION fieldbus
- Ex approval for installation in zone 1 (ATEX, FM, CSA, etc.)

**Application**

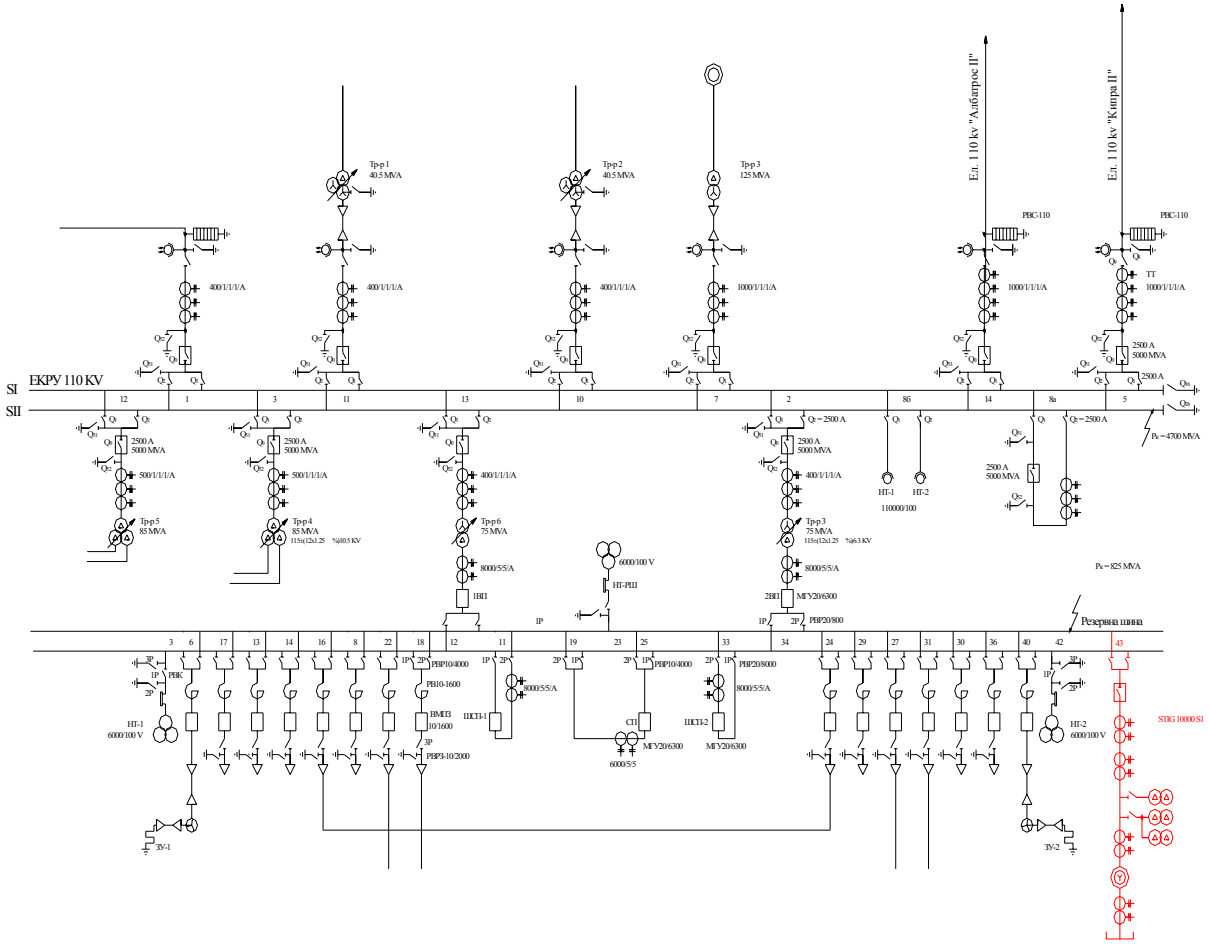
All fluids with a minimum conductivity of ≥ 5 µS/cm can be measured:

- acids and alkalis
- paints, lacquers
- pastes, mashes
- water, wastewater, etc.

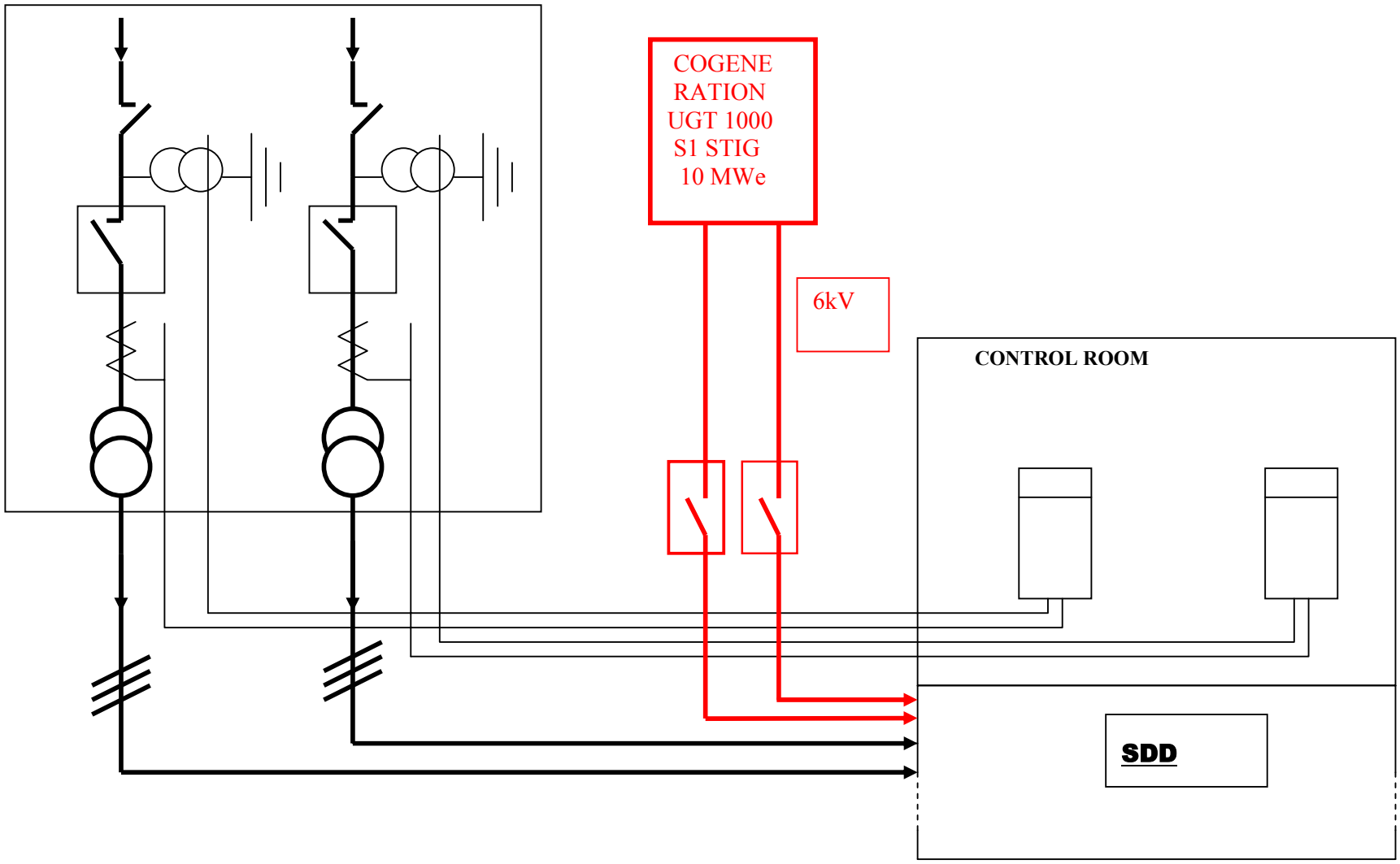
A minimum conductivity of ≥ 20 µS/cm is required for measuring demineralized water.

# SINGLE LINE DIAGRAM ELECTRICITY POLYMERI JSC

**Annex No. 11-1**

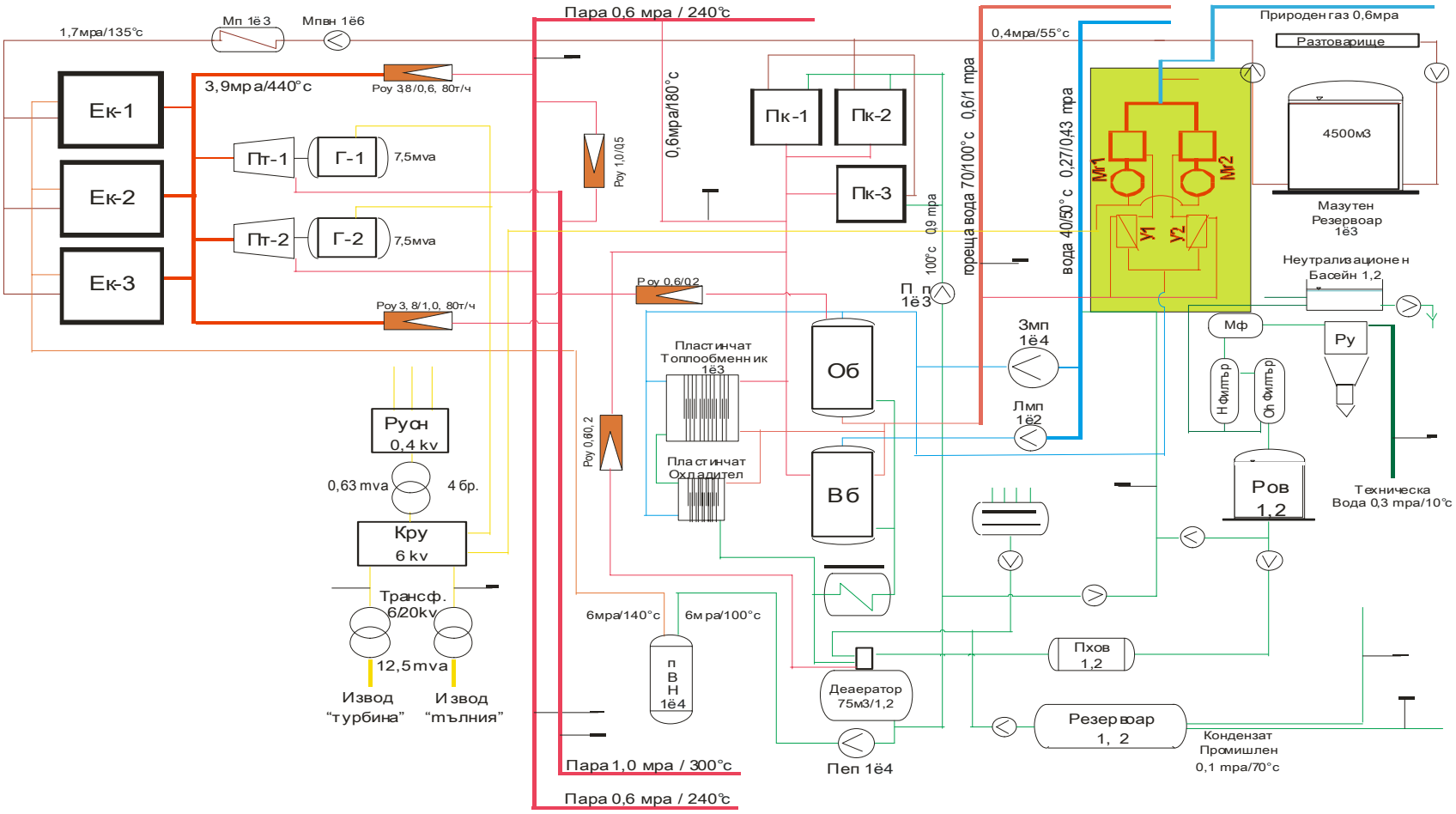


Kostenets HHI JSC electricity scheme Annex No. 11 - 2



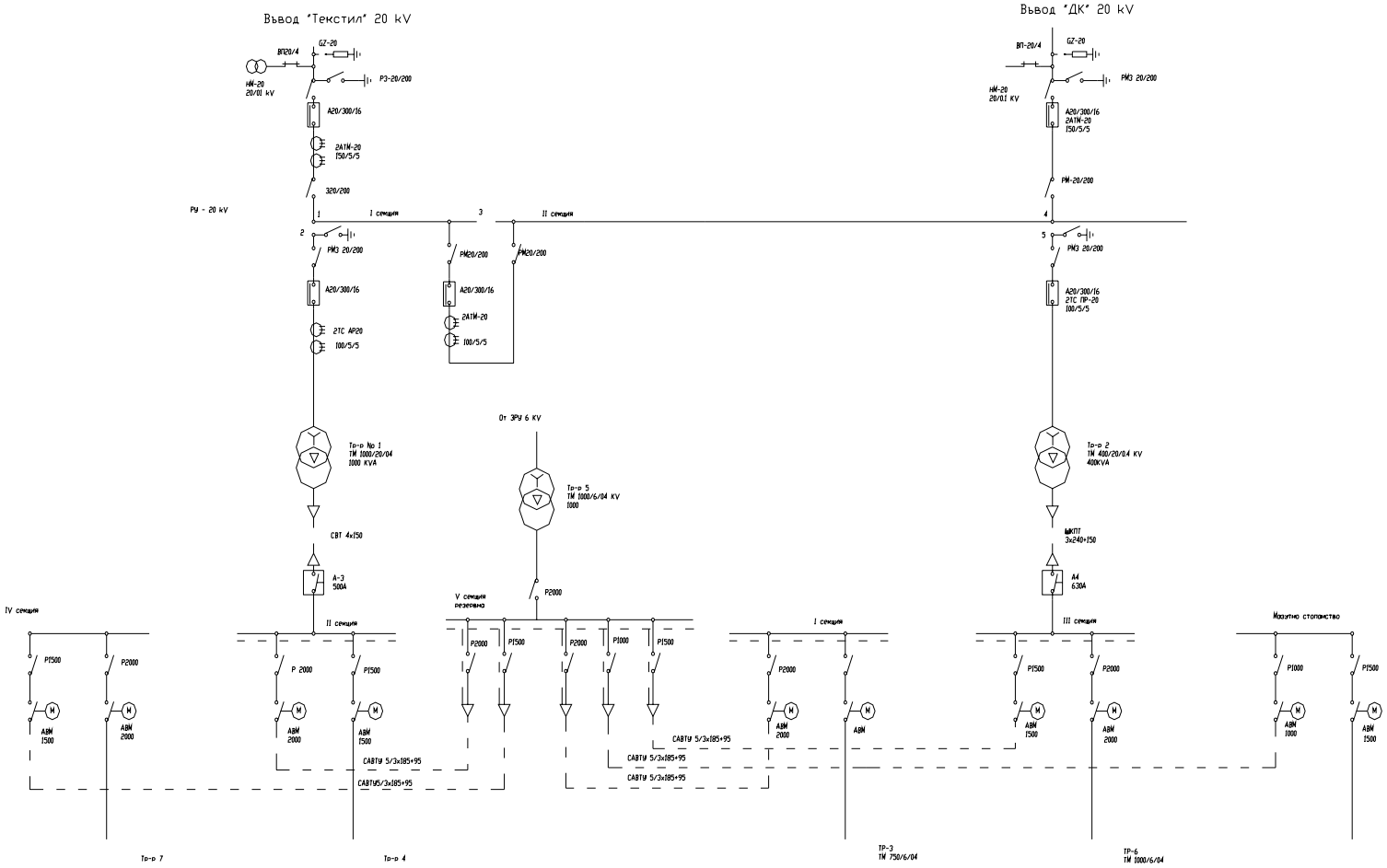
# BLOCK SCHEME TOPLOFIKATSIA KAZANLAK

**Annex 11-3**



## SINGLE LINE DIAGRAM ELECTRICITY TOPLOFIKATSIA YAMBOL

**Annex No. 11-4**



**Annex No. 12**

## Excerpts from the price list approved by the State Committee on Energy Regulation as to 02.2005

## Prices

**V. Prices for active electric energy, consumed for domestic needs by the population**

| Measurement method | Time zones | Monthly consumption | Price (BGN/kWh) | Applies to the following consumers |
|---|---|---|---|---|
| On two scales | Day time | Up to 75 kWh | 0.098 | Everyone |
| | | Over 75 kWh | 0.174 | Everyone |
| | Night time | Total consumption | 0.093 | - not connected to the thermal energy transmission network<br>- not connected to the thermal energy transmission network during the April 1st – October 31st period |
| | | Up to 50 kWh | 0.053 | - not connected to the thermal energy transmission network during the November 1st – March 31st period |
| | | Over 50 kWh | 0.093 | - not connected to the thermal energy transmission network during the November 1st – March 31st period |

*Remark:* The above prices is included value-added tax.

**VI. Prices for active electric energy, consumed for business and public activities by state and municipal entities, by real persons and legal entities**

| Measurement method | Time zones | Price (BGN/kWh) for voltage | | |
|---|---|---|---|---|
| | | HV | MV | LV |
| 1. On three scales | Peak time | 0.122 | 0.137 | 0.163 |
| | Daytime | 0.076 | 0.085 | 0.101 |
| | Nighttime | 0.046 | 0.052 | 0.062 |

*Remark:* The above prices include value-added tax.

**VII. Prices for active electric energy, consumed for business and public activities by state and municipal entities, by real persons and legal entities on holidays and rest days, for consumers, who are connected to the transmission network, with an annual consumption of over 50 mln. kWh and regular payers to NEC EAD**

| Measurement method | Time zones | Price (BGN/kWh) HV |
|---|---|---|
| 1. On three scales | Peak time | 0.122 |
| | Daytime | 0.068 |
| | Nighttime | 0.038 |

*Remark:* The above prices include value-added tax.

**X. Limit prices for thermal power supply**

**2. Plant Stations**

| No. | Plant Stations | Price of water steam (BGN/MWh) | Price of hot water (BGN/MWh) |
|---|---|---|---|
| 1 | TPS at "BRIKEL" EAD, town of Galabovo | | 32.92 |
| 2 | TPS at "Sviloza" AD | 28.31 | 24.53 |
| 3 | TPS at "ZAHARNI ZAVODI" AD, town of Gorna Oryahovitsa | 36.29 | |
| 4 | TPS at "DEVEN" AD, town of Devnya | 22.55 | |

*Remark:* The above prices do not include value-added tax.

**XI. Prices for purchasing electric energy from stations with combined production of thermal and electric power**

**1. From the thermal power supply companies**

| No. | Company | Price of electric energy (BGN/MWh) |
|---|---|---|
| 1 | "Toplofikatsiya – Sofia" EAD | 80 |
| 2 | "Toplofikatsiya – Plovdiv" EAD | 80 |
| 3 | "Toplofikatsiya – Pleven" EAD | 80 |
| 4 | "Toplofikatsiya – Sliven" EAD | 79 |
| 5 | "Toplofikatsiya – Shumen" EAD | 80 |
| 6 | "Toplofikatsiya – Kazanlak" EAD | 120 |
| 7 | "Toplofikatsiya – Gabrovo" EAD | 79 |
| 8 | "Toplofikatsiya – Pernik" EAD | 79 |
| 9 | "Toplofikatsiya – Pravets" EAD | 85 |
| 10 | "Toplofikatsiya – Rousse" EAD | 74.56 |
| 11 | "TEGE 21" Ltd. | 95 |

*Remark:* The above prices do not include value-added tax.

**XVIII. Limit price of natural gas in case of sale by the transmission company to consumers, connected to the gas transmission network - 231.75 BGN/1000 $m^3$**

*Remark:* The above price does not include value-added tax.

## Natural gas certificate for 2004 — Annex No. 13

BULGARGAS -EAD
NATURAL GAS SERTIFICATE FOR 2004

| Components | Formula | Dimens. | VALUES PER MONTH | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Feb | Jan | March | April | May | July | August | Sept. | October | Dec. |
| Methane | $CH_4$ | vol. % | 98,377 | 98,275 | 98,337 | 98,158 | 98,144 | 98,2 | 98,085 | 98,156 | 98,195 | 98,25 |
| Ethane | $C_2H_6$ | vol. % | 0,539 | 0,603 | 0,562 | 0,676 | 0,681 | 0,651 | 0,731 | 0,692 | 0,672 | 0,642 |
| Propane | $C_3H_6$ | vol. % | 0,175 | 0,2 | 0,186 | 0,229 | 0,237 | 0,222 | 0,249 | 0,231 | 0,221 | 0,209 |
| i-Buthane | $I\text{-}C_4H_{10}$ | vol. % | 0,033 | 0,037 | 0,035 | 0,043 | 0,044 | 0,043 | 0,047 | 0,044 | 0,041 | 0,037 |
| n-buthane | $N\text{-}C_4H_{10}$ | vol. % | 0,032 | 0,036 | 0,035 | 0,044 | 0,047 | 0,045 | 0,049 | 0,044 | 0,041 | 0,036 |
| i-penthane | $I\text{-}C_5H_{12}$ | vol. % | 0,005 | 0,007 | 0,007 | 0,009 | 0,009 | 0,009 | 0,009 | 0,008 | 0,008 | 0,006 |
| n-penthane | $I\text{-}C_5H_{12}$ | vol. % | 0,005 | 0,005 | 0,005 | 0,006 | 0,007 | 0,007 | 0,007 | 0,006 | 0,005 | 0,004 |
| neo-penthane | $NEO\text{-}C_5H_{12}$ | vol. % | - | - | - | - | - | - | - | - | - | - |
| i-xeksane | $I\text{-}C_6H_{14}$ | vol. % | 0,006 | 0,007 | 0,007 | 0,008 | 0,007 | 0,009 | 0,009 | 0,008 | 0,007 | 0,006 |
| Nitrogen | $N_2$ | vol. % | 0,791 | 0,789 | 0,787 | 0,784 | 0,781 | 0,772 | 0,77 | 0,77 | 0,767 | 0,768 |
| Carboneoxide | $CO_2$ | vol. % | 0,037 | 0,041 | 0,039 | 0,043 | 0,043 | 0,042 | 0,044 | 0,041 | 0,043 | 0,042 |
| $H_2S$+mercap. | $H_2S$+m | $g/nm^3$ | 0,025 | 0,025 | 0,025 | 0,024 | 0,024 | 0,024 | 0,024 | 0,024 | 0,024 | 0,02 |
| Dencity | R | $kg/nm^3$ | 0,6793 | 0,6802 | 0,06797 | 0,6813 | 0,6815 | 0,6811 | 0,6821 | 0,6813 | 0,681 | 0,6804 |
| LHV | Q | $kcal/nm^3$ | 7987 | 7996 | 7992 | 8009 | 8011 | 8008 | 8019 | 8012 | 8007 | 8002 |
| Dew point | T | ° C | -16,1 | -15,2 | -13,7 | -13,5 | -13,1 | -8,8 | -13,3 | -19,7 | -21,3 | -13,8 |

## Monitoring Models — Annex No. 14

**POYIMERI CoGen Power Plant** Annual consumption

**Natural gas for CHP x1000 Nm3**

| Mont | 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 |

**Production of steam from CHP;[MWh]**

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

**Generated electricity from CHP ;[MWh]**

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

## Estimation of the project emissions

| | | | | |
|---|---|---|---|---|
| **$LHV_{NG}$** | Lower heating value | 7934 kkal/Nm3 | For natural gas in Bulgaria. Value provided by Bulgargas. | |
| **$EF_{NG}$** | 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 | |

**CHP LM2000 STIG 10000S1**

| Year | Year | Natural gas consumption x 1000 Nm3/year | Natural gas consumption (combustion) GJ/year | CO2 emissions (combustion) t/year | $CO_{2equiv.}$ emissions t/year |
|---|---|---|---|---|---|
| 3 | 2006 | 0 | 0 | 0.0 | 0 |
| 4 | 2007 | 0 | 0 | 0.0 | 0 |
| 5 | 2008 | 0 | 0 | 0.0 | 0 |
| 6 | 2009 | 0 | 0 | 0.0 | 0 |
| 7 | 2010 | 0 | 0 | 0.0 | 0 |
| 8 | 2011 | 0 | 0 | 0.0 | 0 |
| 9 | 2012 | 0 | 0 | 0.0 | 0 |

## Calculation of the baseline emissions

| | | | |
|---|---|---|---|
| **LHVNG** | Lower heating value | 7934 | For natural gas in Bulgaria. Value provided by Bulgargas. |
| **Anthracite** | CO2 emissions factor (combustion) | 98.3 | Primary fuel-anthracite: 98.3 t C/TJ |

**CHP STIG 10000 S1 Heat production**

| Year | Year | $\eta$ production O.T.S.G. | Steam production for CHP MWh/year | Replaced head from CHP GJ/year | CO2 emissions (combustion) t/year |
|---|---|---|---|---|---|
| 3 | 2006 | 0.85 | 0 | 0.0 | 0.0 |
| 4 | 2007 | 0.85 | 0 | 0.0 | 0.0 |
| 5 | 2008 | 0.85 | 0 | 0.0 | 0.0 |
| 6 | 2009 | 0.85 | 0 | 0.0 | 0.0 |
| 7 | 2010 | 0.85 | 0 | 0.0 | 0.0 |
| 8 | 2011 | 0.85 | 0 | 0.0 | 0.0 |
| 9 | 2012 | 0.85 | 0 | 0.0 | 0.0 |

# Calculation of the baseline emissions

POLYMERI

| | | | |
|---|---|---|---|
| **$LHV_{NG}$** | Lower heating value | 7934 kkal/Nm3 | For natural gas in Bulgaria. Value provided by Bulgargas. |
| **$EF_{NG}$** | CO2 emissions factor (combustion) | 56.1 kg/GJ | Natural gas (dru): 15.3 t C/TJ lower heating value basis x 44/12 = 56.1 t CO2/TJ |
| **$EF_{ELgen.}$** | CO2 emissions factor - generating electricity | $gCO_2$/kWh | B.4 The standardised carbon emission factors |
| **$EF_{ELcons.}$** | CO2 emissions factor - reducing electricity consumption | $gCO_2$/kWh | Operational Guidelines for PDDs of JI projects |

**CHP STIG 10000S1 Electriciti**

| Year | Year | Natural gas consumption x 1000 Nm3/year | Natural gas consumption (combustion) GJ/year | Electricity production for CHP MWh/year | **$EF_{EL}$** generating t/MWh | CO2 emissions t/year | **$EF_{EL}$** consumption t/MWh |
|---|---|---|---|---|---|---|---|
| 3 | 2006 | 0 | 0 | 0 | 0.797 | 0.0 | 0.934 |
| 4 | 2007 | 0 | 0 | 0 | 0.779 | 0.0 | 0.912 |
| 5 | 2008 | 0 | 0 | 0 | 0.761 | 0.0 | 0.890 |
| 6 | 2009 | 0 | 0 | 0 | 0.743 | 0.0 | 0.867 |
| 7 | 2010 | 0 | 0 | 0 | 0.725 | 0.0 | 0.845 |
| 8 | 2011 | 0 | 0 | 0 | 0.707 | 0.0 | 0.822 |
| 9 | 2012 | 0 | 0 | 0 | 0.689 | 0.0 | 0.800 |

# Anual emissions TOTAL reduction

POLYIMERI

| | | Basis Line | | Project Line | |
|---|---|---|---|---|---|
| Year | Year | CO2equiv. emissions head t/year | CO2 emissions electricity t/year | CO2equiv. emissions CHP t/year | Reduction CO2equiv. t/year |
| 3 | 2006 | 0 | 0 | 0 | 0 |
| 4 | 2007 | 0 | 0 | 0 | 0 |
| 5 | 2008 | 0 | 0 | 0 | 0 |
| 6 | 2009 | 0 | 0 | 0 | 0 |
| 7 | 2010 | 0 | 0 | 0 | 0 |
| 8 | 2011 | 0 | 0 | 0 | 0 |
| 9 | 2012 | 0 | 0 | 0 | 0 |

**KOSTENETS CoGen Power Plant**

# Annual consumption

**Natural gas for CHP x1000 Nm3**

| Mont | 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 |

**Production of steam from CHP;[MWh]**

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

**Generated electricity from CHP ;[MWh]**

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

**Electrisity consumption ; [MWh]**

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

# Estimation of the project emissions

| | | | |
|---|---|---|---|
| **LHV$_{NG}$** | Lower heating value | 7934 kkal/Nm3 | For natural gas in Bulgaria. Value provided by Bulgargas. |
| **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 |

**CHP UGT STIG 10000S1**

| Year | Year | Natural gas consumption x 1000 Nm3/year | Natural gas consumption (combustion) GJ/year | Electricity production MWh/year | Electricity consumption MWh/year | CO2 emissions (combustion) t/year | CO2 emissions repl. Electr. t/year | $CO_{2equiv.}$ emissions t/year |
|---|---|---|---|---|---|---|---|---|
| 3 | 2006 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| 4 | 2007 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| 5 | 2008 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| 6 | 2009 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| 7 | 2010 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| 8 | 2011 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| 9 | 2012 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |

KOSTENETS

# Calculation of the baseline emissions

| | | | |
|---|---|---|---|
| **LHV$_{NG}$** | Lower heating value | 7934 kkal/Nm3 | For natural gas in Bulgaria. Value provided by Bulgargas. |
| **EF heavy oil** | CO2 emissions factor (combustion) | 80.7 kg/GJ | Primary fuel-Heavy Oil: 80.7 t C/TJ |

**CHP STIG 10000 S1 Heat production**

| Year | Year | $\eta$ production S.G. | Steam production for CHP MWh/year | Replaced heat from CHP GJ/year | CO2 emissions (combustion) t/year |
|---|---|---|---|---|---|
| 3 | 2006 | 0.89 | 0 | 0.0 | 0.0 |
| 4 | 2007 | 0.89 | 0 | 0.0 | 0.0 |
| 5 | 2008 | 0.89 | 0 | 0.0 | 0.0 |
| 6 | 2009 | 0.89 | 0 | 0.0 | 0.0 |
| 7 | 2010 | 0.89 | 0 | 0.0 | 0.0 |
| 8 | 2011 | 0.89 | 0 | 0.0 | 0.0 |
| 9 | 2012 | 0.89 | 0 | 0.0 | 0.0 |

KOSTENETS

# Calculation of the baseline emissions

**CHP UGT 10000 S1 STIG**

| Year | Year | Natural gas consumption x 1000 | Electricity consumption | Electricity production for CHP | **EFEL** generating | CO2 emissions | **EFEL** consumption |
|---|---|---|---|---|---|---|---|
| | | Nm3/year | MWh/year | MWh/year | t/MWh | t/year | t/MWh |
| 3 | 2006 | 0 | 0 | 0 | 0.797 | 0.0 | 0.934 |
| 4 | 2007 | 0 | 0 | 0 | 0.797 | 0.0 | 0.912 |
| 5 | 2008 | 0 | 0 | 0 | 0.797 | 0.0 | 0.890 |
| 6 | 2009 | 0 | 0 | 0 | 0.797 | 0.0 | 0.867 |
| 7 | 2010 | 0 | 0 | 0 | 0.797 | 0.0 | 0.845 |
| 8 | 2011 | 0 | 0 | 0 | 0.797 | 0.0 | 0.822 |
| 9 | 2012 | 0 | 0 | 0 | 0.797 | 0.0 | 0.800 |

## Anual emissions TOTAL reduction

| | | Basis Line | | Project Line | |
|---|---|---|---|---|---|
| Year | Year | CO2equiv. emissions head t/year | CO2 emissions electricity t/year | CO2equiv. emissions CHP t/year | Reduction CO2equiv. t/year |
| 3 | 2006 | 0 | 0 | 0 | 0 |
| 4 | 2007 | 0 | 0 | 0 | 0 |
| 5 | 2008 | 0 | 0 | 0 | 0 |
| 6 | 2009 | 0 | 0 | 0 | 0 |
| 7 | 2010 | 0 | 0 | 0 | 0 |
| 8 | 2011 | 0 | 0 | 0 | 0 |
| 9 | 2012 | 0 | 0 | 0 | 0 |

**KAZANLAK CoGen Power Plant**

# Annual consumption

**Natural gas x1000 Nm3**

| Mont | 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 |

**Production of Head ;[MWh]**

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

**Generated electricity from CHP ;[MWh]**

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

**Electricity consumed ; [MWh]**

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

DHC KAZANLAK

## Estimation of the project emissions

| | | | |
|---|---|---|---|
| **LHV$_{NG}$** | Lower heating value | 7934 kkal/Nm3 | For natural gas in Bulgaria. Value provided by Bulgargas. |
| **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 |

CHP Jenbacher

I=G-H

| Year | Year | Natural gas consumption x 1000 Nm3/year | Natural gas consumption (combustion) GJ/year | Electricity production MWh/year | Electricity consumption MWh/year | CO2 emissions (combustion) t/year | CO2 emissions repl. Electr. t/year | $CO_{2equiv.}$ emissions t/year |
|---|---|---|---|---|---|---|---|---|
| 3 | 2006 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| 4 | 2007 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| 5 | 2008 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| 6 | 2009 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| 7 | 2010 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| 8 | 2011 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |
| 9 | 2012 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 |

DHC KAZANLAC

# Calculation of the baseline emissions

| | | | |
|---|---|---|---|
| **LHV$_{NG}$** | Lower heating value | 7934 kkal/Nm3 | For natural gas in Bulgaria. Value provided by Bulgargas. |
| **EF heavy oil** | CO2 emissions factor (combustion) | 80.7 kg/GJ | Primary fuel-Heavy Oil: 80.7 t C/TJ |

**CHP STIG 10000 S1 Head production**

| Year | Year | $\eta$ production S.G. | Steam production for CHP | Replaced head from CHP | CO2 emissions (combustion) |
|---|---|---|---|---|---|
| | | | MWh/year | GJ/year | t/year |
| 3 | 2006 | 0.89 | 0 | 0.0 | 0.0 |
| 4 | 2007 | 0.89 | 0 | 0.0 | 0.0 |
| 5 | 2008 | 0.89 | 0 | 0.0 | 0.0 |
| 6 | 2009 | 0.89 | 0 | 0.0 | 0.0 |
| 7 | 2010 | 0.89 | 0 | 0.0 | 0.0 |
| 8 | 2011 | 0.89 | 0 | 0.0 | 0.0 |
| 9 | 2012 | 0.89 | 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. |
| **$EF_{NG}$** | CO2 emissions factor (combustion) | 56.1 kg/GJ | Natural gas (dry): 15.3 t C/TJ lower heating walue basis x 44/12 = 56.1 t CO2/TJ |
| **$EF_{ELgen.}$** | CO2 emissions factor - generating electricity | $gCO_2$/kWh | B.4 The standardised carbon emission factors |
| **$EF_{ELcons.}$** | CO2 emissions factor - reducing electricity consumption | $gCO_2$/kWh | Operational Guidelines for PDDs of JI projects |

**CHP Jenbacher Electricity**

| Year | Year | Natural gas consumption x 1000 | Electricity consumption | Electricity production for CHP | **$EF_{EL}$** generating | CO2 emissions | **$EF_{EL}$** consumption |
|---|---|---|---|---|---|---|---|
| | | Nm3/year | MWh/year | MWh/year | t/MWh | t/year | t/MWh |
| 3 | 2006 | 0 | 0 | 0 | 0.797 | 0.0 | 0.934 |
| 4 | 2007 | 0 | 0 | 0 | 0.797 | 0.0 | 0.912 |
| 5 | 2008 | 0 | 0 | 0 | 0.797 | 0.0 | 0.890 |
| 6 | 2009 | 0 | 0 | 0 | 0.797 | 0.0 | 0.867 |
| 7 | 2010 | 0 | 0 | 0 | 0.797 | 0.0 | 0.845 |
| 8 | 2011 | 0 | 0 | 0 | 0.797 | 0.0 | 0.822 |
| 9 | 2012 | 0 | 0 | 0 | 0.797 | 0.0 | 0.800 |

DHC KAZANLAK

## Anual emissions TOTAL reduction

| | | Basis Line | | Project Line | |
|---|---|---|---|---|---|
| Year | Year | CO2equiv. emissions head t/year | CO2 emissions electriciti t/year | CO2equiv. emissions CHP t/year | Reduction CO2equiv. t/year |
| 3 | 2006 | 0 | 0 | 0 | 0 |
| 4 | 2007 | 0 | 0 | 0 | 0 |
| 5 | 2008 | 0 | 0 | 0 | 0 |
| 6 | 2009 | 0 | 0 | 0 | 0 |
| 7 | 2010 | 0 | 0 | 0 | 0 |
| 8 | 2011 | 0 | 0 | 0 | 0 |
| 9 | 2012 | 0 | 0 | 0 | 0 |

**JAMBOL CoGen Power Plant**

# Annual consumption

**Natural gas x1000 Nm3**

| Mont | 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 |

**Production of Head ;[MWh]**

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

**Generated electricity from CHP ;[MWh]**

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

**Electricity for own needs ; [MWh]**

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

## Estimation of the project emissions

DHC Jambol

| | | | |
|---|---|---|---|
| **LHV$_{NG}$** | Lower heating walue | 7934 kkal/Nm3 | For natural gas in Bulgaria. Value provided by Bulgargas. |
| **EF$_{NG}$** | CO2 emissions factor (combustion) | 56.1 kg/GJ | Natural gas (dru): 15.3 t C/TJ lower heating walue basis x 44/12 = 56.1 t CO2/TJ |
| **EFfuel** | CO2 emissions factor (average) | 43.677 kg/GJ | Statistical value for Jambol city |

CHP Jenbacher

| Year | Year | Natural gas consumption x 1000 | Natural gas consumption (combustion) | Electricity production | Electricity consumption | CO2 emissions (combustion) | CO2 emissions repl. Electr. | $CO_2$ project emissions |
|---|---|---|---|---|---|---|---|---|
| | | Nm3/year | GJ/year | MWh/year | MWh/year | t/year | t/year | t/year |
| 3 | 2006 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 2007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 2008 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 2009 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 2010 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 2011 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 2012 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

DHC Jambol

# Calculation of the baseline emissions

| | | | |
|---|---|---|---|
| **LHVNG** | Lower heating value | 7934 kkal/Nm3 | For natural gas in Bulgaria. Value provided by Bulgargas. |
| **EFfuel** | CO2 emissions factor (average) | 43.677 kg/GJ | Statistical value for Jambol city |

**CHP Jenbacher**

| Year | Year | $\eta$ production S.G. | Head production MWh/year | Replleicet head from CHP GJ/year | CO2 emissions (combustion) t/year |
|---|---|---|---|---|---|
| 3 | 2006 | 0.8 | 0 | 0.0 | 0 |
| 4 | 2007 | 0.8 | 0 | 0.0 | 0 |
| 5 | 2008 | 0.8 | 0 | 0.0 | 0 |
| 6 | 2009 | 0.8 | 0 | 0.0 | 0 |
| 7 | 2010 | 0.8 | 0 | 0.0 | 0 |
| 8 | 2011 | 0.8 | 0 | 0.0 | 0 |
| 9 | 2012 | 0.8 | 0 | 0.0 | 0 |

DHC Jambol

# Calculation of the baseline emissions

| | | | |
|---|---|---|---|
| **$LHV_{NG}$** | Lower heating value | 7934 kkal/Nm3 | For natural gas in Bulgaria. Value providet bu Bulgargas. |
| **$EF_{NG}$** | CO2 emissions factor (combustion) | 56.1 kg/GJ | Natural gas (dru): 15.3 t C/TJ lower heating walue basis x 44/12 = 56.1 t CO2/TJ |
| **$EF_{ELgen.}$** | CO2 emissions factor - generating electricity | $gCO_2$/kWh | B.4 The standardised carbon emission factors |
| **$EF_{ELcons.}$** | CO2 emissions factor - reducing electricity consumption | $gCO_2$/kWh | Operational Guidelines for PDDs of JI projects |

**CHP Jenbacher Electricity**

| Year | Year | Natural gas consumption x 1000 Nm3/year | Electricity consumption MWh/year | Electricity production for CHP MWh/year | **$EF_{EL}$** generating t/MWh | CO2 emissions t/year | **$EF_{EL}$** consumption t/MWh |
|---|---|---|---|---|---|---|---|
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | 2008 | | | | | | |
| 6 | 2009 | | | | | | |
| 7 | 2010 | | | | | | |
| 8 | 2011 | | | | | | |
| 9 | 2012 | | | | | | |

## Annual emissions TOTAL reduction

| | | Basis Line | | Project Line | |
|---|---|---|---|---|---|
| Year | Year | CO2equiv. emissions head t/year | CO2 emissions electriciti t/year | CO2equiv. emissions CHP t/year | Reduction CO2equiv. t/year |
| 3 | 2006 | 0 | 0 | 0 | 0 |
| 4 | 2007 | 0 | 0 | 0 | 0 |
| 5 | 2008 | 0 | 0 | 0 | 0 |
| 6 | 2009 | 0 | 0 | 0 | 0 |
| 7 | 2010 | 0 | 0 | 0 | 0 |
| 8 | 2011 | 0 | 0 | 0 | 0 |
| 9 | 2012 | 0 | 0 | 0 | 0 |

## Calculation IRR of the project excluding the revenue from the sale of AAUs and ERUs

**Annex No. 15**

**Calculations revenues and costs of the project in Polymeri JSC without the effect from AAUs and ERUs**

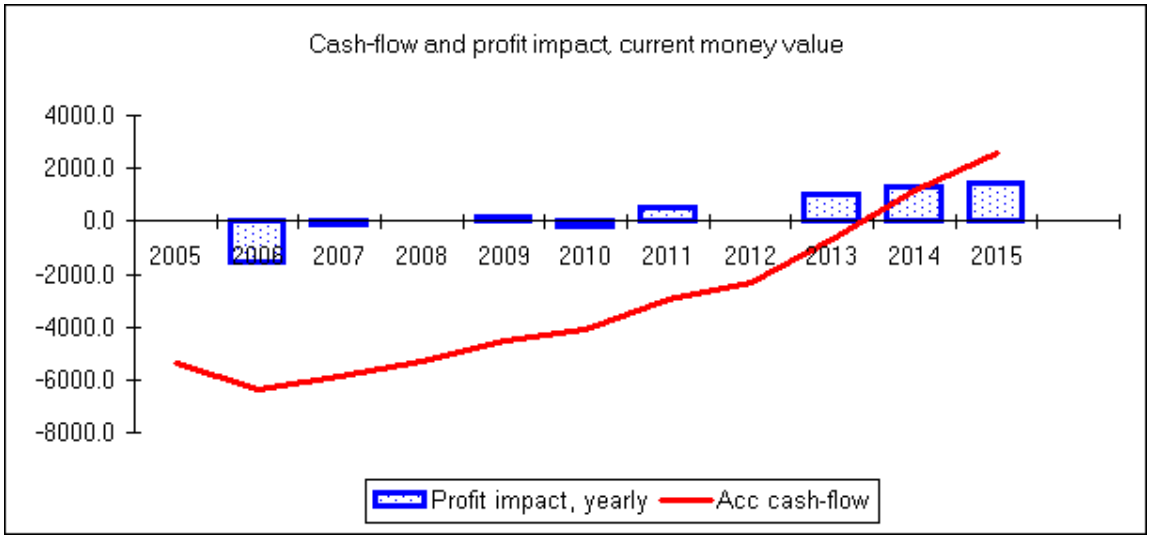
| Years | Investment Credit | Costs | | | | | Revenues | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Interest Costs 8.50% | Average Annual Cogen Gas Consumption for 3300 Nm³/h price 118.5 EUR/1000Nmi | | Maintenance and Operat. Costs | Total Annual Costs without the Credit | Total Annual Costs Interest Included | Electricity Annual Consumption | Electricity sold to NEC | Thermal nergy Annual Consumtio /Sold to consumers/ | CO2 Sold Incomes AAUs and ERUs | Total Annual Revenues |
| | ThEUR | ThEUR | 1000Nmi | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR |
| **2005** | 5403.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **2006** | 0.0 | 459.3 | 0.0 | 0.0 | 0.0 | 0.0 | 459.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **2007** | 900.5 | 459.3 | 27060.0 | 3206.6 | 76.0 | 3282.6 | 3741.9 | 3075.0 | 0.0 | 1595.0 | 0.0 | 4670.0 |
| **2008** | 900.5 | 382.7 | 27060.0 | 3206.6 | 103.0 | 3309.6 | 3692.3 | 3075.0 | 0.0 | 1595.0 | 0.0 | 4670.0 |
| **2009** | 900.5 | 306.2 | 27060.0 | 3206.6 | 135.0 | 3341.6 | 3647.8 | 3075.0 | 0.0 | 1595.0 | 0.0 | 4670.0 |
| **2010** | 900.5 | 229.6 | 27060.0 | 3206.6 | 580.0 | 3786.6 | 4016.2 | 3075.0 | 0.0 | 1595.0 | 0.0 | 4670.0 |
| **2011** | 900.5 | 153.1 | 27060.0 | 3206.6 | 129.0 | 3335.6 | 3488.7 | 3075.0 | 0.0 | 1595.0 | 0.0 | 4670.0 |
| **2012** | 900.5 | 76.5 | 27060.0 | 3206.6 | 700.0 | 3906.6 | 3983.2 | 3075.0 | 0.0 | 1595.0 | 0.0 | 4670.0 |
| **2013** | 0.0 | 0.0 | 27060.0 | 3206.6 | 125.0 | 3331.6 | 3331.6 | 3075.0 | 0.0 | 1595.0 | 0.0 | 4670.0 |
| **2014** | 0.0 | 0.0 | 27060.0 | 3206.6 | 106.0 | 3312.6 | 3312.6 | 3075.0 | 0.0 | 1595.0 | 0.0 | 4670.0 |
| **2015** | 0.0 | 0.0 | 27060.0 | 3206.6 | 580.0 | 3786.6 | 3786.6 | 3075.0 | 0.0 | 1595.0 | 0.0 | 4670.0 |
| **Total** | 5403.0 | 2066.6 | 243540.0 | 28859.5 | 2534.0 | 31393.5 | 33460.1 | 27675.0 | 0.0 | 14355.0 | 0.0 | 42030.0 |

## *ProCalc*

| Prerequisites | |
|---|---|
| Unit: | ths. EUR |
| Indata, FMV or CMV: | FMV |
| Nominell opp cost: | 8.5% |
| >>Real opp cost: | 4.3% |
| Inflation: | 4.0% |
| Calc. time (Yrs): | 11 |
| Depreciation time: | 9 |
| Pmt/yr:end=0, succ=1 | 0 |

| Output | |
|---|---|
| Pay-back-time: | 9 |
| Pos prof.impact, yrs: | 6 |
| Net present value: | 1148.3 |
| Int rate of return: | 12.0% |

| | |
|---|---|
| Max. cash-fl short-fall: | -6339.9 |




| Year: | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| I N D A T A FMV SUM | | | | | | | | | | | |
| In-coming payments | 0.0 | 0.0 | 4670.0 | 4670.0 | 4670.0 | 4670.0 | 4670.0 | 4670.0 | 4670.0 | 4670.0 | 4670.0 |
| Out-going payments | - | -459.3 | -3741.9 | -3692.3 | -3647.8 | -4016.2 | -3488.7 | -3983.2 | -3331.6 | -3312.6 | -3786.6 |
| Investment | -5403.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Net cash-flow | -5403.0 | -459.3 | 928.1 | 977.7 | 1022.2 | 653.8 | 1181.3 | 686.8 | 1338.4 | 1357.4 | 883.4 |
| 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 | -5403.0 | -459.3 | 928.1 | 977.7 | 1022.2 | 653.8 | 1181.3 | 686.8 | 1338.4 | 1357.4 | 883.4 |

C A L C U L A T I O N S, C M V

| **CASH-FLOW/PAY-BACK** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -5403.0 | -477.7 | 1003.8 | 1099.8 | 1195.8 | 795.4 | 1494.7 | 903.8 | 1831.7 | 1932.0 | 1307.6 |
| Interest | 0.0 | -459.3 | -538.9 | -499.4 | -448.3 | -384.8 | -349.9 | -252.6 | -197.2 | -58.3 | 101.0 |
| Net after interest | -5403.0 | -936.9 | 464.9 | 600.4 | 747.5 | 410.6 | 1144.8 | 651.2 | 1634.5 | 1873.7 | 1408.6 |
| Acc cash-flow | -5403.0 | -6339.9 | -5875.0 | -5274.6 | -4527.1 | -4116.4 | -2971.6 | -2320.4 | -686.0 | 1187.7 | 2596.3 |

| *** * * PROFIT-IMPACT * *** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -5403.0 | -477.7 | 1003.8 | 1099.8 | 1195.8 | 795.4 | 1494.7 | 903.8 | 1831.7 | 1932.0 | 1307.6 |
| + Investment | 5403.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Depreciation: | 0.0 | -600.3 | -600.3 | -600.3 | -600.3 | -600.3 | -600.3 | -600.3 | -600.3 | -600.3 | 0.0 |
| Interest | 0.0 | -459.3 | -538.9 | -499.4 | -448.3 | -384.8 | -349.9 | -252.6 | -197.2 | -58.3 | 101.0 |
| Profit-impact: | 0.0 | -1537.3 | -135.4 | 0.1 | 147.2 | -189.7 | 544.5 | 50.9 | 1034.1 | 1273.4 | 1408.6 |

| **NET PRESENT VALUE** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -5403.0 | -477.7 | 1003.8 | 1099.8 | 1195.8 | 795.4 | 1494.7 | 903.8 | 1831.7 | 1932.0 | 1307.6 |
| Annual pres value | -5403.0 | -440.3 | 852.7 | 861.0 | 862.9 | 529.0 | 916.2 | 510.6 | 953.7 | 927.1 | 578.4 |
| Tot pres value | 1148.3 | | | | | | | | | | |

| **INTERNAL RATE OF RET.** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -5403.0 | -477.7 | 1003.8 | 1099.8 | 1195.8 | 795.4 | 1494.7 | 903.8 | 1831.7 | 1932.0 | 1307.6 |
| Nom irr | 12.0% | | | | | | | | | | |
| Discounted net | -5403.0 | -426.6 | 800.8 | 783.6 | 761.0 | 452.2 | 758.9 | 409.8 | 741.9 | 698.9 | 422.5 |
| Tot disc net | 0.0 | | | | | | | | | | |

Preparation for sensivityanalysis

| Basecalculation: | Pres val | Payback | Irr | Prof imp |
|---|---|---|---|---|
| | 1148.3 | 9 | 12.0% | 6 |

## Calculations revenues and costs of the project in Kostenets HHI JSC without the effect from AAUs and ERUs

| Years | Investment Credit | Costs | | | | | | Revenues | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Interest Costs 8.50% | Average Annual Cogen Gas Consumption for 3300 Nm³/h price 118.5 EUR/1000Nmi | | 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 Consumtio /Sold to consumers | CO2 Sold Incomes AAUs and ERUs | Total Annual Revenues |
| | ThEUR | ThEUR | 1000mi | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR |
| **2005** | 5752.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **2006** | 0.0 | 488.9 | 0.0 | 0.0 | 0.0 | 0.0 | 488.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **2007** | 958.7 | 488.9 | 27060.0 | 3206.6 | 76.0 | 3282.6 | 3771.5 | 2025.2 | 1728.0 | 1253.5 | 0.0 | 5006.7 |
| **2008** | 958.7 | 407.4 | 27060.0 | 3206.6 | 103.0 | 3309.6 | 3717.0 | 2046.4 | 1651.0 | 1294.4 | 0.0 | 4991.8 |
| **2009** | 958.7 | 325.9 | 27060.0 | 3206.6 | 135.0 | 3341.6 | 3667.6 | 2148.1 | 1471.0 | 1365.7 | 0.0 | 4984.8 |
| **2010** | 958.7 | 244.5 | 27060.0 | 3206.6 | 580.0 | 3786.6 | 4031.1 | 2200.6 | 1379.0 | 1410.6 | 0.0 | 4990.2 |
| **2011** | 958.7 | 163.0 | 27060.0 | 3206.6 | 129.0 | 3335.6 | 3498.6 | 2303.4 | 1198.0 | 1461.3 | 0.0 | 4962.7 |
| **2012** | 958.7 | 81.5 | 27060.0 | 3206.6 | 700.0 | 3906.6 | 3988.1 | 2306.0 | 1194.0 | 1461.3 | 0.0 | 4961.3 |
| **2013** | 0.0 | 0.0 | 27060.0 | 3206.6 | 125.0 | 3331.6 | 3331.6 | 2306.0 | 1194.0 | 1461.3 | 0.0 | 4961.3 |
| **2014** | 0.0 | 0.0 | 27060.0 | 3206.6 | 106.0 | 3312.6 | 3312.6 | 2306.0 | 1194.0 | 1461.3 | 0.0 | 4961.3 |
| **2015** | 0.0 | 0.0 | 27060.0 | 3206.6 | 580.0 | 3786.6 | 3786.6 | 2306.0 | 1194.0 | 1461.3 | 0.0 | 4961.3 |
| **Total** | 5752.0 | 2200.1 | 243540.0 | 28859.5 | 2534.0 | 31393.5 | 33593.6 | 19947.7 | 12203.0 | 12630.7 | 0.0 | 44781.4 |

The average price of the annual electricity sold to NEC is 49 EURO/Mwhe
The average price of the annual thermal energy consumption or sold to customers is 13.9 EURO/MWht
The annual capacity of the cogeneration istallation is 8200 h/year for every one.

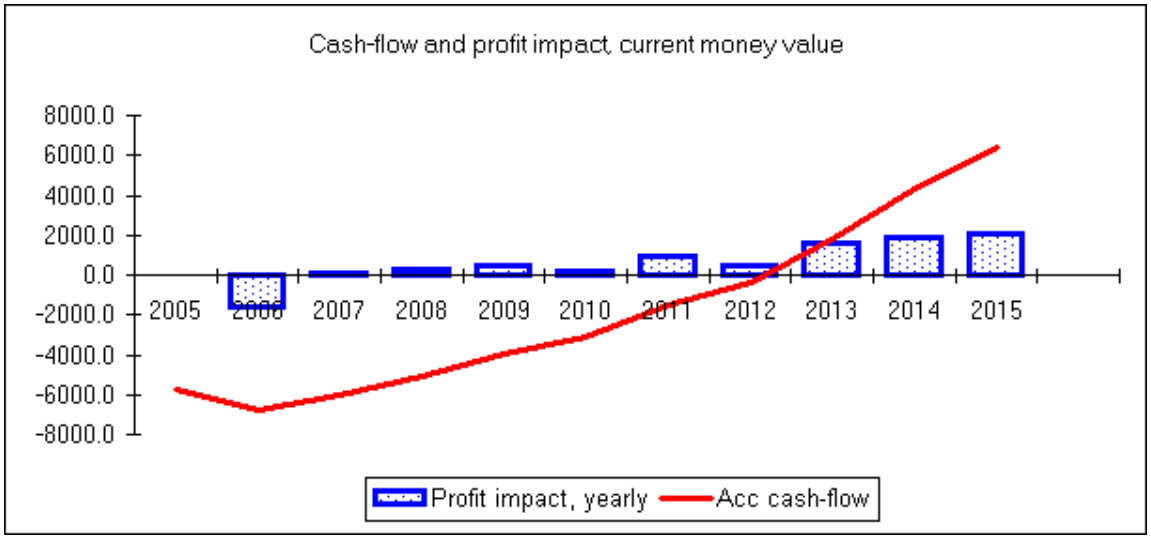
The price of the reduced emissions is 6 EURO per ton CO2

## *ProCalc*

| Prerequisites | |
|---|---|
| | ths. |
| Unit: | EUR |
| Indata, FMV or CMV: | FMV |
| Nominell opp cost: | 8.5% |
| >>Real opp cost: | 4.3% |
| Inflation: | 4.0% |
| Calc. time (Yrs): | 11 |
| Depreciation time: | 9 |
| Pmt/yr:end=0, succ=1 | 0 |

| Output | |
|---|---|
| Pay-back-time: | 8 |
| Pos prof.impact, yrs: | 2 |
| Net present value: | 2840.3 |
| Int rate of return: | 16.1% |

| | |
|---|---|
| Max. cash-fl short-fall: | -6749.4 |




| Year: | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| I N D A T A FMV SUM | | | | | | | | | | | |
| In-coming payments | 0.0 | 0.0 | 5006.7 | 4991.8 | 4984.8 | 4990.2 | 4962.7 | 4961.3 | 4961.3 | 4961.3 | 4961.3 |
| Out-going payments | - | -488.9 | -3771.5 | -3717.0 | -3667.6 | -4031.1 | -3498.6 | -3988.1 | -3331.6 | -3312.6 | -3786.6 |
| Investment | -5752.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Net cash-flow | -5752.0 | -488.9 | 1235.2 | 1274.8 | 1317.2 | 959.1 | 1464.1 | 973.2 | 1629.7 | 1648.7 | 1174.7 |
| 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 | -5752.0 | -488.9 | 1235.2 | 1274.8 | 1317.2 | 959.1 | 1464.1 | 973.2 | 1629.7 | 1648.7 | 1174.7 |

C A L C U L A T I O N S, C M V

| **CASH-FLOW/PAY-BACK** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -5752.0 | -508.5 | 1336.0 | 1434.0 | 1540.9 | 1166.9 | 1852.6 | 1280.7 | 2230.4 | 2346.6 | 1738.8 |
| Interest | 0.0 | -488.9 | -573.7 | -508.9 | -430.3 | -335.9 | -265.2 | -130.3 | -32.5 | 154.3 | 366.9 |
| Net after interest | -5752.0 | -997.4 | 762.3 | 925.1 | 1110.7 | 831.0 | 1587.3 | 1150.4 | 2197.8 | 2500.9 | 2105.7 |
| Acc cash-flow | -5752.0 | -6749.4 | -5987.1 | -5062.0 | -3951.3 | -3120.3 | -1533.0 | -382.6 | 1815.2 | 4316.1 | 6421.8 |

| *** * * PROFIT-IMPACT * *** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -5752.0 | -508.5 | 1336.0 | 1434.0 | 1540.9 | 1166.9 | 1852.6 | 1280.7 | 2230.4 | 2346.6 | 1738.8 |
| + Investment | 5752.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Depreciation: | 0.0 | -639.1 | -639.1 | -639.1 | -639.1 | -639.1 | -639.1 | -639.1 | -639.1 | -639.1 | 0.0 |
| Interest | 0.0 | -488.9 | -573.7 | -508.9 | -430.3 | -335.9 | -265.2 | -130.3 | -32.5 | 154.3 | 366.9 |
| Profit-impact: | 0.0 | -1636.5 | 123.2 | 286.0 | 471.6 | 191.9 | 948.2 | 511.3 | 1558.7 | 1861.8 | 2105.7 |

| **NET PRESENT VALUE** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -5752.0 | -508.5 | 1336.0 | 1434.0 | 1540.9 | 1166.9 | 1852.6 | 1280.7 | 2230.4 | 2346.6 | 1738.8 |
| Annual pres value | -5752.0 | -468.6 | 1134.9 | 1122.7 | 1111.9 | 776.0 | 1135.5 | 723.5 | 1161.3 | 1126.1 | 769.1 |
| Tot pres value | 2840.3 | | | | | | | | | | |

| **INTERNAL RATE OF RET.** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -5752.0 | -508.5 | 1336.0 | 1434.0 | 1540.9 | 1166.9 | 1852.6 | 1280.7 | 2230.4 | 2346.6 | 1738.8 |
| Nom irr | 16.1% | | | | | | | | | | |
| Discounted net | -5752.0 | -437.9 | 990.9 | 916.0 | 847.7 | 552.8 | 755.8 | 450.0 | 674.9 | 611.5 | 390.3 |
| Tot disc net | 0.0 | | | | | | | | | | |

Preparation for sensivityanalysis

| Basecalculation: | Pres val | Payback | Irr | Prof imp |
|---|---|---|---|---|
| | 2840.3 | 8 | 16.1% | 2 |

## Calculations revenues and costs of the project in Toplofikatsia Kazanlak JSC without the effect from AAUs and ERUs

| Years | Investment Credit | Costs | | | | | | Revenues | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Interest Costs 8.50% | Average Annual Cogen Gas Consumption price 118.5 EUR/1000Nmi | | 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 |
| | ThEUR | ThEUR | 1000mi | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR |
| **2005** | 4329.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **2006** | 0.0 | 368.0 | 0.0 | 0.0 | 0.0 | 0.0 | 368.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **2007** | 721.5 | 368.0 | 17090.0 | 2025.2 | 1165.0 | 3190.2 | 3558.1 | 279.0 | 1488.0 | 2255.5 | 0.0 | 4022.5 |
| **2008** | 721.5 | 306.6 | 17090.0 | 2025.2 | 1139.0 | 3164.2 | 3470.8 | 281.0 | 1496.0 | 2293.5 | 0.0 | 4070.5 |
| **2009** | 721.5 | 245.3 | 17090.0 | 2025.2 | 1018.0 | 3043.2 | 3288.5 | 276.0 | 1494.0 | 2309.4 | 0.0 | 4079.4 |
| **2010** | 721.5 | 184.0 | 17090.0 | 2025.2 | 962.0 | 2987.2 | 3171.1 | 281.0 | 1500.0 | 2321.5 | 0.0 | 4102.5 |
| **2011** | 721.5 | 122.7 | 17090.0 | 2025.2 | 956.0 | 2981.2 | 3103.8 | 276.0 | 1494.0 | 2309.4 | 0.0 | 4079.4 |
| **2012** | 721.5 | 61.3 | 17090.0 | 2025.2 | 952.0 | 2977.2 | 3038.5 | 281.0 | 1500.0 | 2321.5 | 0.0 | 4102.5 |
| **2013** | 0.0 | 0.0 | 17090.0 | 2025.2 | 946.0 | 2971.2 | 2971.2 | 276.0 | 1494.0 | 2309.4 | 0.0 | 4079.4 |
| **2014** | 0.0 | 0.0 | 17090.0 | 2025.2 | 936.0 | 2961.2 | 2961.2 | 281.0 | 1500.0 | 2321.5 | 0.0 | 4102.5 |
| **2015** | 0.0 | 0.0 | 17090.0 | 2025.2 | 930.0 | 2955.2 | 2955.2 | 276.0 | 1494.0 | 2309.4 | 0.0 | 4079.4 |
| **Total** | 4329.0 | 1655.8 | 153810.0 | 18226.5 | 9004.0 | 27230.5 | 28886.3 | 2507.0 | 13460.0 | 20751.1 | 0.0 | 36718.1 |

The average price of the annual electricity consumption is 37 EURO/Mwhe
The average price of the annual electricity sold to NEC is 49 EURO/Mwhe
The average price of the annual thermal energy consumption or sold to customers is 26.5 EURO/MWht
The annual capacity of the cogeneration istallation is 6250 h/year for every one.

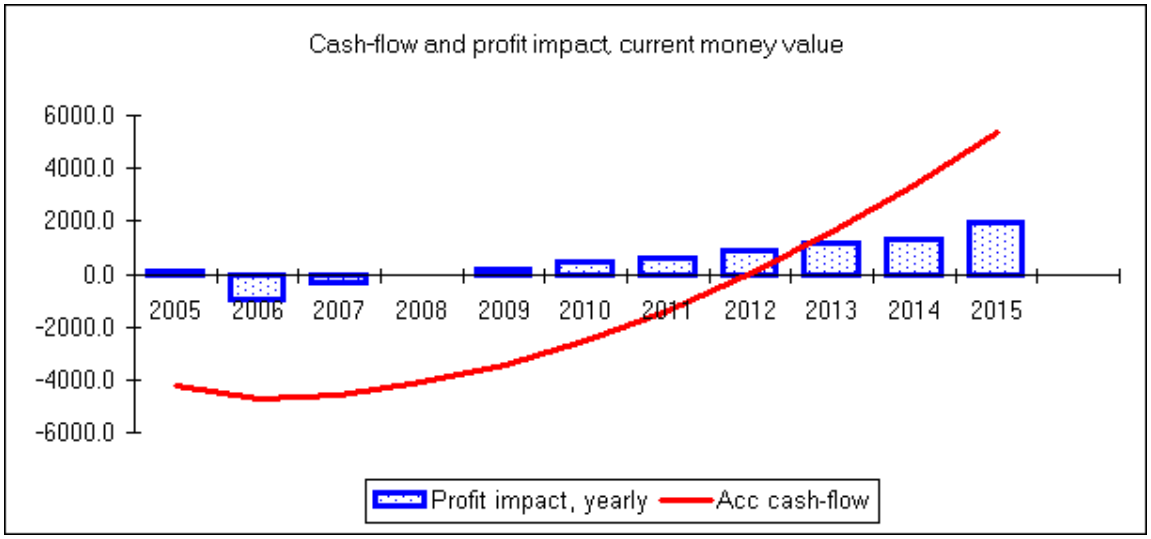
The price of the reduced emissions is 6 EURO per ton CO2

## *ProCalc*

| Prerequisites | ths. |
|---|---|
| Unit: | EUR |
| Indata, FMV or CMV: | FMV |
| Nominell opp cost: | 8.5% |
| >>Real opp cost: | 4.3% |
| 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: | 4 |
| Net present value: | 2361.7 |
| Int rate of return: | 16.6% |

| | |
|---|---|
| Max. cash-fl short-fall: | -4756.7 |




| Year: | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| I N D A T A FMV SUM | | | | | | | | | | | |
| In-coming payments | 76.8 | 230.4 | 4099.3 | 4238.5 | 4156.2 | 4179.3 | 4156.2 | 4179.3 | 4156.2 | 4102.5 | 4079.4 |
| Out-going payments | - | -368.0 | -3558.1 | -3470.8 | -3288.5 | -3171.1 | -3103.8 | -3038.5 | -2971.2 | -2961.2 | -2955.2 |
| Investment | -4329.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Net cash-flow | -4252.2 | -137.6 | 541.2 | 767.7 | 867.7 | 1008.2 | 1052.4 | 1140.8 | 1185.0 | 1141.3 | 1124.2 |
| 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 | -4252.2 | -137.6 | 541.2 | 767.7 | 867.7 | 1008.2 | 1052.4 | 1140.8 | 1185.0 | 1141.3 | 1124.2 |

C A L C U L A T I O N S, C M
V

| **CASH-FLOW/PAY-BACK** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -4252.2 | -143.1 | 585.4 | 863.6 | 1015.1 | 1226.6 | 1331.6 | 1501.2 | 1621.8 | 1624.4 | 1664.1 |
| Interest | 0.0 | -361.4 | -404.3 | -388.9 | -348.6 | -291.9 | -212.5 | -117.4 | 0.3 | 138.1 | 288.0 |
| Net after interest | -4252.2 | -504.5 | 181.0 | 474.6 | 666.5 | 934.7 | 1119.1 | 1383.9 | 1622.0 | 1762.6 | 1952.0 |
| Acc cash-flow | -4252.2 | -4756.7 | -4575.7 | -4101.1 | -3434.6 | -2499.9 | -1380.8 | 3.1 | 1625.1 | 3387.7 | 5339.7 |

| *** * * PROFIT-IMPACT * *** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -4252.2 | -143.1 | 585.4 | 863.6 | 1015.1 | 1226.6 | 1331.6 | 1501.2 | 1621.8 | 1624.4 | 1664.1 |
| + Investment | 4329.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Depreciation: | 0.0 | -481.0 | -481.0 | -481.0 | -481.0 | -481.0 | -481.0 | -481.0 | -481.0 | -481.0 | 0.0 |
| Interest | 0.0 | -361.4 | -404.3 | -388.9 | -348.6 | -291.9 | -212.5 | -117.4 | 0.3 | 138.1 | 288.0 |
| Profit-impact: | 76.8 | -985.5 | -300.0 | -6.4 | 185.5 | 453.7 | 638.1 | 902.9 | 1141.0 | 1281.6 | 1952.0 |

| **NET PRESENT VALUE** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -4252.2 | -143.1 | 585.4 | 863.6 | 1015.1 | 1226.6 | 1331.6 | 1501.2 | 1621.8 | 1624.4 | 1664.1 |
| Annual pres value | -4252.2 | -131.9 | 497.2 | 676.1 | 732.5 | 815.8 | 816.2 | 848.1 | 844.4 | 779.5 | 736.0 |
| Tot pres value | 2361.7 | | | | | | | | | | |

| **INTERNAL RATE OF RET.** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -4252.2 | -143.1 | 585.4 | 863.6 | 1015.1 | 1226.6 | 1331.6 | 1501.2 | 1621.8 | 1624.4 | 1664.1 |
| Nom irr | 16.6% | | | | | | | | | | |
| Discounted net | -4252.2 | -122.7 | 430.5 | 544.6 | 549.0 | 569.0 | 529.7 | 512.1 | 474.4 | 407.5 | 358.0 |
| Tot disc net | 0.0 | | | | | | | | | | |

Preparation for sensivityanalysis

| | Pres val | Payback | Irr | Prof imp |
|---|---|---|---|---|
| Basecalculation: | 2361.7 | 7 | 16.6% | 4 |

## Calculations revenues and costs of the project in Toplofikatsia Yambol JSC without the effect from AAUs and ERUs

| Years | Investment Credit | Costs | | | | | Revenues | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Interest Costs 8.50% | Average Annual Cogen Gas Consumption price 118.5 EUR/1000Nmi | | 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 |
| | ThEUR | ThEUR | 1000mi | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR |
| **2005** | 4100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **2006** | 0.0 | 348.5 | 0.0 | 0.0 | 0.0 | 0.0 | 348.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **2007** | 683.3 | 348.5 | 10995.0 | 1302.9 | 170.0 | 1472.9 | 1821.4 | 119.0 | 1044.0 | 1243.0 | 0.0 | 2406.0 |
| **2008** | 683.3 | 290.4 | 10995.0 | 1302.9 | 170.0 | 1472.9 | 1763.3 | 119.0 | 1044.0 | 1243.0 | 0.0 | 2406.0 |
| **2009** | 683.3 | 232.3 | 10995.0 | 1302.9 | 170.0 | 1472.9 | 1705.2 | 119.0 | 1044.0 | 1243.0 | 0.0 | 2406.0 |
| **2010** | 683.3 | 174.3 | 10995.0 | 1302.9 | 170.0 | 1472.9 | 1647.2 | 119.0 | 1044.0 | 1243.0 | 0.0 | 2406.0 |
| **2011** | 683.3 | 116.2 | 10995.0 | 1302.9 | 170.0 | 1472.9 | 1589.1 | 119.0 | 1044.0 | 1243.0 | 0.0 | 2406.0 |
| **2012** | 683.3 | 58.1 | 10995.0 | 1302.9 | 132.0 | 1434.9 | 1493.0 | 119.0 | 1044.0 | 1243.0 | 0.0 | 2406.0 |
| **2013** | 0.0 | 0.0 | 10995.0 | 1302.9 | 132.0 | 1434.9 | 1434.9 | 119.0 | 1044.0 | 1243.0 | 0.0 | 2406.0 |
| **2014** | 0.0 | 0.0 | 10995.0 | 1302.9 | 132.0 | 1434.9 | 1434.9 | 119.0 | 1044.0 | 1243.0 | 0.0 | 2406.0 |
| **2015** | 0.0 | 0.0 | 10995.0 | 1302.9 | 132.0 | 1434.9 | 1434.9 | 119.0 | 1044.0 | 1243.0 | 0.0 | 2406.0 |
| **Total** | 4100.0 | 1568.3 | 98955.0 | 11726.2 | 1378.0 | 13104.2 | 14672.4 | 1071.0 | 9396.0 | 11187.0 | 0.0 | 21654.0 |

The average price of the annual electricity consumption is 39 EURO/Mwhe
The average price of the annual electricity sold to NEC is 49 EURO/Mwhe
The average price of the annual thermal energy consumption or sold to customers is 25.8 EURO/MWht
The annual capacity of the cogeneration istallation is 8000 h/year for every one.

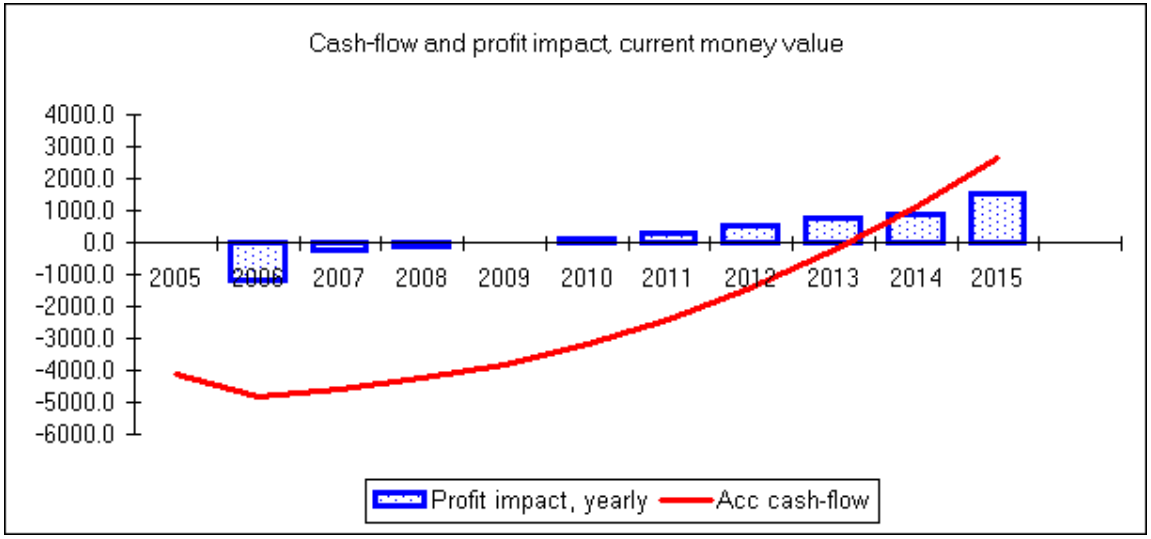
The price of the reduced emissions is 6 EURO per ton CO2

## ProCalc

| Prerequisites | |
|---|---|
| | ths. |
| Unit: | EUR |
| Indata, FMV or CMV: | FMV |
| Nominell opp cost: | 8.5% |
| >>Real opp cost: | 4.3% |
| Inflation: | 4.0% |
| Calc. time (Yrs): | 11 |
| Depreciation time: | 9 |
| Pmt/yr:end=0, succ=1 | 0 |

| Output | |
|---|---|
| Pay-back-time: | 9 |
| Pos prof.impact, yrs: | 4 |
| Net present value: | 1177.9 |
| Int rate of return: | 12.9% |

| | |
|---|---|
| Max. cash-fl short-fall: | -4810.9 |




| Year: | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| I N D A T A FMV SUM | | | | | | | | | | | |
| In-coming payments | 0.0 | 0.0 | 2406.0 | 2406.0 | 2406.0 | 2406.0 | 2406.0 | 2406.0 | 2406.0 | 2406.0 | 2406.0 |
| Out-going payments | - | -348.5 | -1821.4 | -1763.3 | -1705.2 | -1647.2 | -1589.1 | -1493.0 | -1434.9 | -1434.9 | -1434.9 |
| Investment | -4100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Net cash-flow | -4100.0 | -348.5 | 584.6 | 642.7 | 700.8 | 758.8 | 816.9 | 913.0 | 971.1 | 971.1 | 971.1 |
| 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 | -4100.0 | -348.5 | 584.6 | 642.7 | 700.8 | 758.8 | 816.9 | 913.0 | 971.1 | 971.1 | 971.1 |

C A L C U L A T I O N S, C M V

| **CASH-FLOW/PAY-BACK** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -4100.0 | -362.4 | 632.3 | 723.0 | 819.8 | 923.2 | 1033.6 | 1201.4 | 1329.0 | 1382.2 | 1437.5 |
| Interest | 0.0 | -348.5 | -408.9 | -389.9 | -361.6 | -322.7 | -271.6 | -206.9 | -122.3 | -19.8 | 96.0 |
| Net after interest | -4100.0 | -710.9 | 223.4 | 333.0 | 458.2 | 600.5 | 762.0 | 994.6 | 1206.7 | 1362.4 | 1533.5 |
| Acc cash-flow | -4100.0 | -4810.9 | -4587.6 | -4254.6 | -3796.4 | -3195.9 | -2433.9 | -1439.3 | -232.6 | 1129.8 | 2663.3 |

| *** * * PROFIT-IMPACT * *** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -4100.0 | -362.4 | 632.3 | 723.0 | 819.8 | 923.2 | 1033.6 | 1201.4 | 1329.0 | 1382.2 | 1437.5 |
| + Investment | 4100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Depreciation: | 0.0 | -455.6 | -455.6 | -455.6 | -455.6 | -455.6 | -455.6 | -455.6 | -455.6 | -455.6 | 0.0 |
| Interest | 0.0 | -348.5 | -408.9 | -389.9 | -361.6 | -322.7 | -271.6 | -206.9 | -122.3 | -19.8 | 96.0 |
| Profit-impact: | 0.0 | -1166.5 | -232.2 | -122.5 | 2.6 | 145.0 | 306.4 | 539.0 | 751.1 | 906.8 | 1533.5 |

| **NET PRESENT VALUE** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -4100.0 | -362.4 | 632.3 | 723.0 | 819.8 | 923.2 | 1033.6 | 1201.4 | 1329.0 | 1382.2 | 1437.5 |
| Annual pres value | -4100.0 | -334.0 | 537.1 | 566.0 | 591.6 | 614.0 | 633.6 | 678.7 | 692.0 | 663.3 | 635.8 |
| Tot pres value | 1177.9 | | | | | | | | | | |

| **INTERNAL RATE OF RET.** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -4100.0 | -362.4 | 632.3 | 723.0 | 819.8 | 923.2 | 1033.6 | 1201.4 | 1329.0 | 1382.2 | 1437.5 |
| Nom irr | 12.9% | | | | | | | | | | |
| Discounted net | -4100.0 | -321.1 | 496.3 | 502.8 | 505.2 | 504.0 | 500.0 | 514.9 | 504.6 | 465.0 | 428.4 |
| Tot disc net | 0.0 | | | | | | | | | | |

Preparation for sensivityanalysis

| Basecalculation: | Pres val | Payback | Irr | Prof imp |
|---|---|---|---|---|
| | 1177.9 | 9 | 12.9% | 4 |

## Calculation IRR of the project including the revenue from the sale of ERUs

**Annex No. 16**

## Calculations revenues and costs of the project in Polymeri JSC with the effect from ERUs

| Years | Investment Credit | Costs | | | | | | Revenues | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Interest Costs 8.50% | Average Annual Cogen Gas Consumption for 3300 Nm³/h price 118.5 EUR/1000Nmi | | 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 Consumtio /Sold to consumers | CO2 Sold Incomes AAUs and ERUs | Total Annual Revenues |
| | ThEUR | ThEUR | 1000Nmi | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR |
| **2005** | 5403.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 202.8 | 202.8 |
| **2006** | 0.0 | 459.3 | 0.0 | 0.0 | 0.0 | 0.0 | 459.3 | 0.0 | 0.0 | 0.0 | 608.4 | 202.8 |
| **2007** | 900.5 | 459.3 | 27060.0 | 3206.6 | 76.0 | 3282.6 | 3741.9 | 3075.0 | 0.0 | 1595.0 | 202.8 | 4872.8 |
| **2008** | 900.5 | 382.7 | 27060.0 | 3206.6 | 103.0 | 3309.6 | 3692.3 | 3075.0 | 0.0 | 1595.0 | 0.0 | 4670.0 |
| **2009** | 900.5 | 306.2 | 27060.0 | 3206.6 | 135.0 | 3341.6 | 3647.8 | 3075.0 | 0.0 | 1595.0 | 202.8 | 4872.8 |
| **2010** | 900.5 | 229.6 | 27060.0 | 3206.6 | 580.0 | 3786.6 | 4016.2 | 3075.0 | 0.0 | 1595.0 | 202.8 | 4872.8 |
| **2011** | 900.5 | 153.1 | 27060.0 | 3206.6 | 129.0 | 3335.6 | 3488.7 | 3075.0 | 0.0 | 1595.0 | 202.8 | 4872.8 |
| **2012** | 900.5 | 76.5 | 27060.0 | 3206.6 | 700.0 | 3906.6 | 3983.2 | 3075.0 | 0.0 | 1595.0 | 202.8 | 4872.8 |
| **2013** | 0.0 | 0.0 | 27060.0 | 3206.6 | 125.0 | 3331.6 | 3331.6 | 3075.0 | 0.0 | 1595.0 | 202.8 | 4872.8 |
| **2014** | 0.0 | 0.0 | 27060.0 | 3206.6 | 106.0 | 3312.6 | 3312.6 | 3075.0 | 0.0 | 1595.0 | 0.0 | 4670.0 |
| **2015** | 0.0 | 0.0 | 27060.0 | 3206.6 | 580.0 | 3786.6 | 3786.6 | 3075.0 | 0.0 | 1595.0 | 0.0 | 4670.0 |
| **Total** | 5403.0 | 2066.6 | 243540.0 | 28859.5 | 2534.0 | 31393.5 | 33460.1 | 27675.0 | 0.0 | 14355.0 | 2028.0 | 43652.4 |

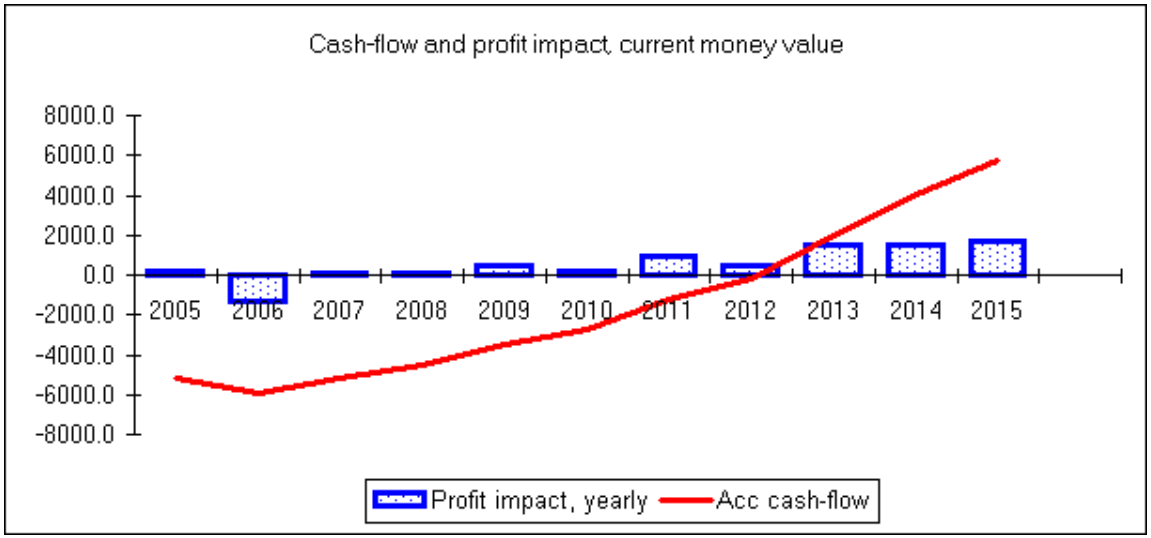
The average price of the annual electricity consumption is 38.0 EURO/Mwhe
The average price of the annual electricity sold to NEC is 49 EURO/Mwhe
The average price of the annual thermal energy consumption or sold to customers is 13.9 EURO/MWht
The annual capacity of the cogeneration istallation is 8200 h/year for every one.
The price of the reduced emissions is 6 EURO per ton CO2

## *ProCalc*

| Prerequisites | |
|---|---|
| | ths. |
| Unit: | EUR |
| Indata, FMV or CMV: | FMV |
| Nominell opp cost: | 8.5% |
| >>Real opp cost: | 4.3% |
| Inflation: | 4.0% |
| Calc. time (Yrs): | 11 |
| Depreciation time: | 9 |
| Pmt/yr:end=0, succ=1 | 0 |

| Output | |
|---|---|
| Pay-back-time: | 8 |
| Pos prof.impact, yrs: | 2 |
| Net present value: | 2519.7 |
| Int rate of return: | 16.2% |

| | |
|---|---|
| Max. cash-fl short-fall: | -5909.0 |




| Year: | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| I N D A T A FMV SUM | | | | | | | | | | | |
| In-coming payments | 202.8 | 202.8 | 4872.8 | 4670.0 | 4872.8 | 4872.8 | 4872.8 | 4872.8 | 4872.8 | 4670.0 | 4670.0 |
| Out-going payments | - | -459.3 | -3741.9 | -3692.3 | -3647.8 | -4016.2 | -3488.7 | -3983.2 | -3331.6 | -3312.6 | -3786.6 |
| Investment | -5403.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Net cash-flow | -5200.2 | -256.5 | 1130.9 | 977.7 | 1225.0 | 856.6 | 1384.1 | 889.6 | 1541.2 | 1357.4 | 883.4 |
| 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 | -5200.2 | -256.5 | 1130.9 | 977.7 | 1225.0 | 856.6 | 1384.1 | 889.6 | 1541.2 | 1357.4 | 883.4 |

C A L C U L A T I O N S, C M V

| **CASH-FLOW/PAY-BACK** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -5200.2 | -266.8 | 1223.2 | 1099.8 | 1433.1 | 1042.2 | 1751.3 | 1170.7 | 2109.2 | 1932.0 | 1307.6 |
| Interest | 0.0 | -442.0 | -502.3 | -441.0 | -385.0 | -295.9 | -232.5 | -103.4 | -12.6 | 165.6 | 343.9 |
| Net after interest | -5200.2 | -708.8 | 720.9 | 658.8 | 1048.1 | 746.3 | 1518.9 | 1067.3 | 2096.6 | 2097.6 | 1651.5 |
| Acc cash-flow | -5200.2 | -5909.0 | -5188.1 | -4529.3 | -3481.2 | -2734.9 | -1216.0 | -148.7 | 1947.9 | 4045.4 | 5696.9 |

| *** * * PROFIT-IMPACT * *** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -5200.2 | -266.8 | 1223.2 | 1099.8 | 1433.1 | 1042.2 | 1751.3 | 1170.7 | 2109.2 | 1932.0 | 1307.6 |
| + Investment | 5403.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Depreciation: | 0.0 | -600.3 | -600.3 | -600.3 | -600.3 | -600.3 | -600.3 | -600.3 | -600.3 | -600.3 | 0.0 |
| Interest | 0.0 | -442.0 | -502.3 | -441.0 | -385.0 | -295.9 | -232.5 | -103.4 | -12.6 | 165.6 | 343.9 |
| Profit-impact: | 202.8 | -1309.1 | 120.6 | 58.5 | 447.8 | 146.0 | 918.5 | 467.0 | 1496.3 | 1497.2 | 1651.5 |

| **NET PRESENT VALUE** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -5200.2 | -266.8 | 1223.2 | 1099.8 | 1433.1 | 1042.2 | 1751.3 | 1170.7 | 2109.2 | 1932.0 | 1307.6 |
| Annual pres value | -5200.2 | -245.9 | 1039.0 | 861.0 | 1034.1 | 693.1 | 1073.5 | 661.3 | 1098.2 | 927.1 | 578.4 |
| Tot pres value | 2519.7 | | | | | | | | | | |

| **INTERNAL RATE OF RET.** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -5200.2 | -266.8 | 1223.2 | 1099.8 | 1433.1 | 1042.2 | 1751.3 | 1170.7 | 2109.2 | 1932.0 | 1307.6 |
| Nom irr | 16.2% | | | | | | | | | | |
| Discounted net | -5200.2 | -229.6 | 905.8 | 700.8 | 785.8 | 491.8 | 711.2 | 409.1 | 634.2 | 499.9 | 291.2 |
| Tot disc net | 0.0 | | | | | | | | | | |

Preparation for sensivityanalysis

| | Pres val | Payback | Irr | Prof imp |
|---|---|---|---|---|
| Basecalculation: | 2519.7 | 8 | 16.2% | 2 |

## Calculations revenues and costs of the project in Kostenets HHI JSC with the effect from ERUs

| Years | Investment Credit | Costs | | | | | | Revenues | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Interest Costs 8.50% | Average Annual Cogen Gas Consumption for 3300 Nm³/h price 118.5 EUR/1000Nmi | | 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 Consumtio /Sold to consumers | CO2 Sold Incomes AAUs and ERUs | Total Annual Revenues |
| | ThEUR | ThEUR | 1000mi | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR |
| **2005** | 5752.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 143.4 | 143.4 |
| **2006** | 0.0 | 488.9 | 0.0 | 0.0 | 0.0 | 0.0 | 488.9 | 0.0 | 0.0 | 0.0 | 430.2 | 430.2 |
| **2007** | 958.7 | 488.9 | 27060.0 | 3206.6 | 76.0 | 3282.6 | 3771.5 | 2025.2 | 1728.0 | 1253.5 | 143.4 | 5150.1 |
| **2008** | 958.7 | 407.4 | 27060.0 | 3206.6 | 103.0 | 3309.6 | 3717.0 | 2046.4 | 1651.0 | 1294.4 | 0.0 | 4991.8 |
| **2009** | 958.7 | 325.9 | 27060.0 | 3206.6 | 135.0 | 3341.6 | 3667.6 | 2148.1 | 1471.0 | 1365.7 | 143.4 | 5128.2 |
| **2010** | 958.7 | 244.5 | 27060.0 | 3206.6 | 580.0 | 3786.6 | 4031.1 | 2200.6 | 1379.0 | 1410.6 | 143.4 | 5133.6 |
| **2011** | 958.7 | 163.0 | 27060.0 | 3206.6 | 129.0 | 3335.6 | 3498.6 | 2303.4 | 1198.0 | 1461.3 | 143.4 | 5106.1 |
| **2012** | 958.7 | 81.5 | 27060.0 | 3206.6 | 700.0 | 3906.6 | 3988.1 | 2306.0 | 1194.0 | 1461.3 | 143.4 | 5104.7 |
| **2013** | 0.0 | 0.0 | 27060.0 | 3206.6 | 125.0 | 3331.6 | 3331.6 | 2306.0 | 1194.0 | 1461.3 | 143.4 | 5104.7 |
| **2014** | 0.0 | 0.0 | 27060.0 | 3206.6 | 106.0 | 3312.6 | 3312.6 | 2306.0 | 1194.0 | 1461.3 | 0.0 | 4961.3 |
| **2015** | 0.0 | 0.0 | 27060.0 | 3206.6 | 580.0 | 3786.6 | 3786.6 | 2306.0 | 1194.0 | 1461.3 | 0.0 | 4961.3 |
| **Total** | 5752.0 | 2200.1 | 243540.0 | 28859.5 | 2534.0 | 31393.5 | 33593.6 | 19947.7 | 12203.0 | 12630.7 | 1434.0 | 46215.4 |

The average price of the annual electricity consumption is 38 EURO/Mwhe
The average price of the annual electricity sold to NEC is 49 EURO/Mwhe
The average price of the annual thermal energy consumption or sold to customers is 13.9 EURO/MWht
The annual capacity of the cogeneration istallation is 8200 h/year for every one.

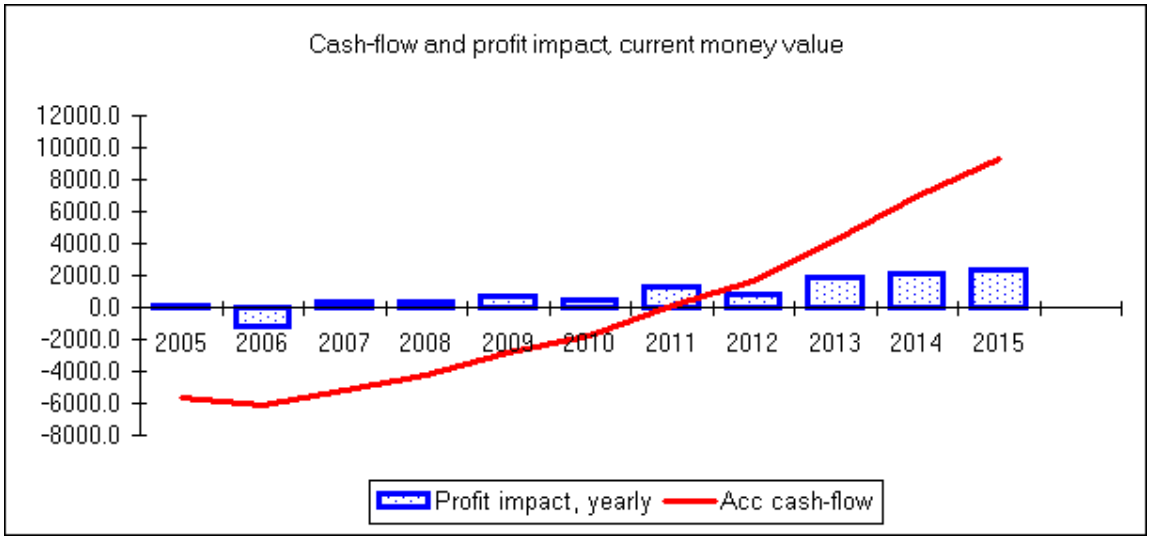
The price of the reduced emissions is 6 EURO per ton CO2

## ProCalc

| Prerequisites | |
|---|---|
| | ths. |
| Unit: | EUR |
| Indata, FMV or CMV: | FMV |
| Nominell opp cost: | 8.5% |
| >>Real opp cost: | 4.3% |
| Inflation: | 4.0% |
| Calc. time (Yrs): | 11 |
| Depreciation time: | 9 |
| Pmt/yr:end=0, succ=1 | 0 |

| Output | |
|---|---|
| Pay-back-time: | 6 |
| Pos prof.impact, yrs: | 2 |
| Net present value: | 4084.9 |
| Int rate of return: | 19.8% |

| | |
|---|---|
| Max. cash-fl short-fall: | -6146.4 |




| Year: | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| I N D A T A FMV SUM | | | | | | | | | | | |
| In-coming payments | 143.4 | 430.2 | 5150.1 | 4991.8 | 5128.2 | 5133.6 | 5106.1 | 5104.7 | 5104.7 | 4961.3 | 4961.3 |
| Out-going payments | - | -488.9 | -3771.5 | -3717.0 | -3667.6 | -4031.1 | -3498.6 | -3988.1 | -3331.6 | -3312.6 | -3786.6 |
| Investment | -5752.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Net cash-flow | -5608.6 | -58.7 | 1378.6 | 1274.8 | 1460.6 | 1102.5 | 1607.5 | 1116.6 | 1773.1 | 1648.7 | 1174.7 |
| 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 | -5608.6 | -58.7 | 1378.6 | 1274.8 | 1460.6 | 1102.5 | 1607.5 | 1116.6 | 1773.1 | 1648.7 | 1174.7 |

C A L C U L A T I O N S, C M V

| **CASH-FLOW/PAY-BACK** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -5608.6 | -61.0 | 1491.1 | 1434.0 | 1708.7 | 1341.4 | 2034.0 | 1469.4 | 2426.6 | 2346.6 | 1738.8 |
| Interest | 0.0 | -476.7 | -522.4 | -440.1 | -355.6 | -240.6 | -147.1 | 13.3 | 139.4 | 357.5 | 587.3 |
| Net after interest | -5608.6 | -537.8 | 968.7 | 993.9 | 1353.1 | 1100.7 | 1886.9 | 1482.7 | 2566.0 | 2704.1 | 2326.2 |
| Acc cash-flow | -5608.6 | -6146.4 | -5177.7 | -4183.9 | -2830.8 | -1730.0 | 156.9 | 1639.6 | 4205.6 | 6909.7 | 9235.8 |

| *** * * PROFIT-IMPACT * *** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -5608.6 | -61.0 | 1491.1 | 1434.0 | 1708.7 | 1341.4 | 2034.0 | 1469.4 | 2426.6 | 2346.6 | 1738.8 |
| + Investment | 5752.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Depreciation: | 0.0 | -639.1 | -639.1 | -639.1 | -639.1 | -639.1 | -639.1 | -639.1 | -639.1 | -639.1 | 0.0 |
| Interest | 0.0 | -476.7 | -522.4 | -440.1 | -355.6 | -240.6 | -147.1 | 13.3 | 139.4 | 357.5 | 587.3 |
| Profit-impact: | 143.4 | -1176.9 | 329.5 | 354.8 | 714.0 | 461.6 | 1247.8 | 843.6 | 1926.9 | 2065.0 | 2326.2 |

| **NET PRESENT VALUE** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -5608.6 | -61.0 | 1491.1 | 1434.0 | 1708.7 | 1341.4 | 2034.0 | 1469.4 | 2426.6 | 2346.6 | 1738.8 |
| Annual pres value | -5608.6 | -56.3 | 1266.6 | 1122.7 | 1233.0 | 892.1 | 1246.7 | 830.1 | 1263.5 | 1126.1 | 769.1 |
| Tot pres value | 4084.9 | | | | | | | | | | |

| **INTERNAL RATE OF RET.** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -5608.6 | -61.0 | 1491.1 | 1434.0 | 1708.7 | 1341.4 | 2034.0 | 1469.4 | 2426.6 | 2346.6 | 1738.8 |
| Nom irr | 19.8% | | | | | | | | | | |
| Discounted net | -5608.6 | -50.9 | 1038.3 | 833.3 | 828.6 | 542.8 | 686.8 | 414.0 | 570.6 | 460.4 | 284.7 |
| Tot disc net | 0.0 | | | | | | | | | | |

Preparation for sensivityanalysis

| Basecalculation: | Pres val | Payback | Irr | Prof imp |
|---|---|---|---|---|
| | 4084.9 | 6 | 19.8% | 2 |

## Calculations revenues and costs of the project in Toplofikatsia Kazanlak JSC with the effect from ERUs

| Years | Investment Credit | Costs | | | | | | Revenues | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Interest Costs 8.50% | Average Annual Cogen Gas Consumption price 118.5 EUR/1000Nmi | | 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 |
| | ThEUR | ThEUR | 1000mi | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR |
| **2005** | 4329.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 76.8 | 76.8 |
| **2006** | 0.0 | 368.0 | 0.0 | 0.0 | 0.0 | 0.0 | 368.0 | 0.0 | 0.0 | 0.0 | 230.4 | 230.4 |
| **2007** | 721.5 | 368.0 | 17090.0 | 2025.2 | 1165.0 | 3190.2 | 3558.1 | 279.0 | 1488.0 | 2255.5 | 76.8 | 4099.3 |
| **2008** | 721.5 | 306.6 | 17090.0 | 2025.2 | 1139.0 | 3164.2 | 3470.8 | 281.0 | 1496.0 | 2293.5 | 0.0 | 4070.5 |
| **2009** | 721.5 | 245.3 | 17090.0 | 2025.2 | 1018.0 | 3043.2 | 3288.5 | 276.0 | 1494.0 | 2309.4 | 76.8 | 4156.2 |
| **2010** | 721.5 | 184.0 | 17090.0 | 2025.2 | 962.0 | 2987.2 | 3171.1 | 281.0 | 1500.0 | 2321.5 | 76.8 | 4179.3 |
| **2011** | 721.5 | 122.7 | 17090.0 | 2025.2 | 956.0 | 2981.2 | 3103.8 | 276.0 | 1494.0 | 2309.4 | 76.8 | 4156.2 |
| **2012** | 721.5 | 61.3 | 17090.0 | 2025.2 | 952.0 | 2977.2 | 3038.5 | 281.0 | 1500.0 | 2321.5 | 76.8 | 4179.3 |
| **2013** | 0.0 | 0.0 | 17090.0 | 2025.2 | 946.0 | 2971.2 | 2971.2 | 276.0 | 1494.0 | 2309.4 | 76.8 | 4156.2 |
| **2014** | 0.0 | 0.0 | 17090.0 | 2025.2 | 936.0 | 2961.2 | 2961.2 | 281.0 | 1500.0 | 2321.5 | 0.0 | 4102.5 |
| **2015** | 0.0 | 0.0 | 17090.0 | 2025.2 | 930.0 | 2955.2 | 2955.2 | 276.0 | 1494.0 | 2309.4 | 0.0 | 4079.4 |
| **Total** | 4329.0 | 1655.8 | 153810.0 | 18226.5 | 9004.0 | 27230.5 | 28886.3 | 2507.0 | 13460.0 | 20751.1 | 768.0 | 37486.1 |

The average price of the annual electricity sold to NEC is 49 EURO/Mwhe
The average price of the annual thermal energy consumption or sold to customers is 26.5 EURO/MWht
The annual capacity of the cogeneration istallation is 6250 h/year for every one.

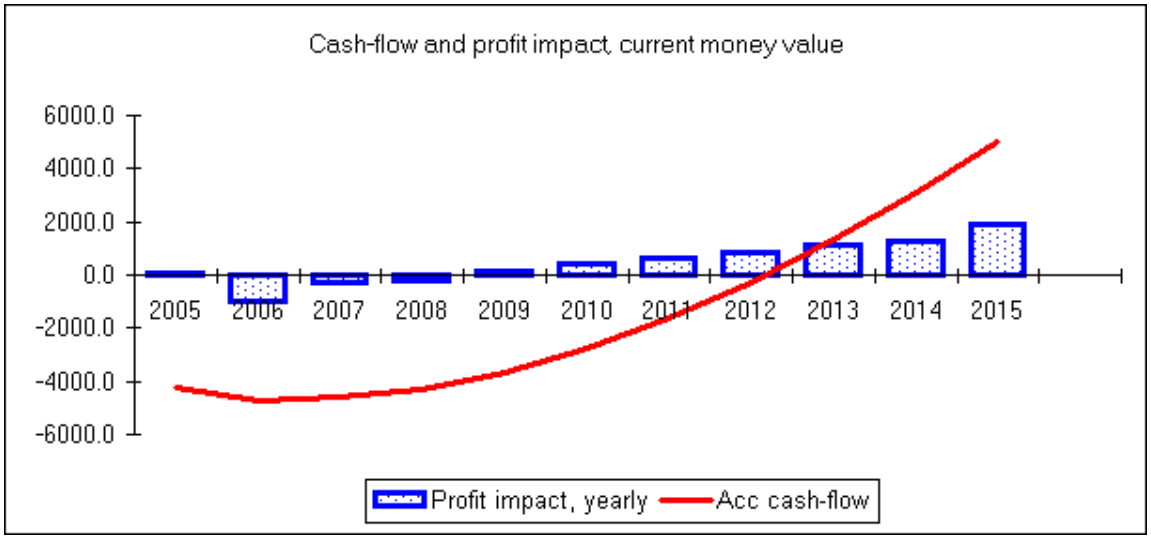
The price of the reduced emissions is 6 EURO per ton CO2

## ProCalc

| Prerequisites | |
|---|---|
| | ths. |
| Unit: | EUR |
| Indata, FMV or CMV: | FMV |
| Nominell opp cost: | 8.5% |
| >>Real opp cost: | 4.3% |
| Inflation: | 4.0% |
| Calc. time (Yrs): | 11 |
| Depreciation time: | 9 |
| Pmt/yr:end=0, succ=1 | 0 |

| Output | |
|---|---|
| Pay-back-time: | 8 |
| Pos prof.impact, yrs: | 4 |
| Net present value: | 2213.8 |
| Int rate of return: | 16.1% |

| | |
|---|---|
| Max. cash-fl short-fall: | -4756.7 |




| Year: | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| I N D A T A FMV SUM | | | | | | | | | | | |
| In-coming payments | 76.8 | 230.4 | 4099.3 | 4070.5 | 4156.3 | 4179.3 | 4156.2 | 4179.3 | 4156.2 | 4102.5 | 4079.4 |
| Out-going payments | - | -368.0 | -3558.1 | -3470.8 | -3288.5 | -3171.1 | -3103.8 | -3038.5 | -2971.2 | -2961.2 | -2955.2 |
| Investment | -4329.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Net cash-flow | -4252.2 | -137.6 | 541.2 | 599.7 | 867.8 | 1008.2 | 1052.4 | 1140.8 | 1185.0 | 1141.3 | 1124.2 |
| 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 | -4252.2 | -137.6 | 541.2 | 599.7 | 867.8 | 1008.2 | 1052.4 | 1140.8 | 1185.0 | 1141.3 | 1124.2 |

C A L C U L A T I O N S, C M V

| **CASH-FLOW/PAY-BACK** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -4252.2 | -143.1 | 585.4 | 674.6 | 1015.2 | 1226.6 | 1331.6 | 1501.2 | 1621.8 | 1624.4 | 1664.1 |
| Interest | 0.0 | -361.4 | -404.3 | -388.9 | -364.7 | -309.4 | -231.4 | -137.9 | -22.0 | 114.0 | 261.8 |
| Net after interest | -4252.2 | -504.5 | 181.0 | 285.6 | 650.5 | 917.3 | 1100.2 | 1363.3 | 1599.8 | 1738.4 | 1925.9 |
| Acc cash-flow | -4252.2 | -4756.7 | -4575.7 | -4290.1 | -3639.5 | -2722.2 | -1622.0 | -258.7 | 1341.1 | 3079.5 | 5005.4 |

| *** * * PROFIT-IMPACT * *** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -4252.2 | -143.1 | 585.4 | 674.6 | 1015.2 | 1226.6 | 1331.6 | 1501.2 | 1621.8 | 1624.4 | 1664.1 |
| + Investment | 4329.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Depreciation: | 0.0 | -481.0 | -481.0 | -481.0 | -481.0 | -481.0 | -481.0 | -481.0 | -481.0 | -481.0 | 0.0 |
| Interest | 0.0 | -361.4 | -404.3 | -388.9 | -364.7 | -309.4 | -231.4 | -137.9 | -22.0 | 114.0 | 261.8 |
| Profit-impact: | 76.8 | -985.5 | -300.0 | -195.4 | 169.5 | 436.3 | 619.2 | 882.3 | 1118.8 | 1257.4 | 1925.9 |

| **NET PRESENT VALUE** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -4252.2 | -143.1 | 585.4 | 674.6 | 1015.2 | 1226.6 | 1331.6 | 1501.2 | 1621.8 | 1624.4 | 1664.1 |
| Annual pres value | -4252.2 | -131.9 | 497.2 | 528.1 | 732.5 | 815.8 | 816.2 | 848.1 | 844.4 | 779.5 | 736.0 |
| Tot pres value | 2213.8 | | | | | | | | | | |

| **INTERNAL RATE OF RET.** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -4252.2 | -143.1 | 585.4 | 674.6 | 1015.2 | 1226.6 | 1331.6 | 1501.2 | 1621.8 | 1624.4 | 1664.1 |
| Nom irr | 16.1% | | | | | | | | | | |
| Discounted net | -4252.2 | -123.3 | 434.6 | 431.5 | 559.5 | 582.5 | 544.9 | 529.3 | 492.7 | 425.2 | 375.3 |
| Tot disc net | 0.0 | | | | | | | | | | |

Preparation for sensivityanalysis

| Basecalculation: | Pres val | Payback | Irr | Prof imp |
|---|---|---|---|---|
| | 2213.8 | 8 | 16.1% | 4 |

## Calculations revenues and costs of the project in Toplofikatsia Yambol JSC with the effect from ERUs

| Years | Investment Credit | Costs | | | | | | Revenues | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Interest Costs 8.50% | Average Annual Cogen Gas Consumption price 118.5 EUR/1000Nmi | | 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 |
| | ThEUR | ThEUR | 1000mi | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR |
| **2005** | 4100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 114.0 | 114.0 |
| **2006** | 0.0 | 348.5 | 0.0 | 0.0 | 0.0 | 0.0 | 348.5 | 0.0 | 0.0 | 0.0 | 342.0 | 342.0 |
| **2007** | 683.3 | 348.5 | 10995.0 | 1302.9 | 170.0 | 1472.9 | 1821.4 | 119.0 | 1044.0 | 1243.0 | 114.0 | 2520.0 |
| **2008** | 683.3 | 290.4 | 10995.0 | 1302.9 | 170.0 | 1472.9 | 1763.3 | 119.0 | 1044.0 | 1243.0 | 0.0 | 2406.0 |
| **2009** | 683.3 | 232.3 | 10995.0 | 1302.9 | 170.0 | 1472.9 | 1705.2 | 119.0 | 1044.0 | 1243.0 | 114.0 | 2520.0 |
| **2010** | 683.3 | 174.3 | 10995.0 | 1302.9 | 170.0 | 1472.9 | 1647.2 | 119.0 | 1044.0 | 1243.0 | 114.0 | 2520.0 |
| **2011** | 683.3 | 116.2 | 10995.0 | 1302.9 | 170.0 | 1472.9 | 1589.1 | 119.0 | 1044.0 | 1243.0 | 114.0 | 2520.0 |
| **2012** | 683.3 | 58.1 | 10995.0 | 1302.9 | 132.0 | 1434.9 | 1493.0 | 119.0 | 1044.0 | 1243.0 | 114.0 | 2520.0 |
| **2013** | 0.0 | 0.0 | 10995.0 | 1302.9 | 132.0 | 1434.9 | 1434.9 | 119.0 | 1044.0 | 1243.0 | 114.0 | 2520.0 |
| **2014** | 0.0 | 0.0 | 10995.0 | 1302.9 | 132.0 | 1434.9 | 1434.9 | 119.0 | 1044.0 | 1243.0 | 0.0 | 2406.0 |
| **2015** | 0.0 | 0.0 | 10995.0 | 1302.9 | 132.0 | 1434.9 | 1434.9 | 119.0 | 1044.0 | 1243.0 | 0.0 | 2406.0 |
| **Total** | 4100.0 | 1568.3 | 98955.0 | 11726.2 | 1378.0 | 13104.2 | 14672.4 | 1071.0 | 9396.0 | 11187.0 | 1140.0 | 22794.0 |

The average price of the annual electricity consumption is 39 EURO/Mwhe
The average price of the annual electricity sold to NEC is 49 EURO/Mwhe
The average price of the annual thermal energy consumption or sold to customers is 25.8 EURO/MWht
The annual capacity of the cogeneration istallation is 8000 h/year for every one.

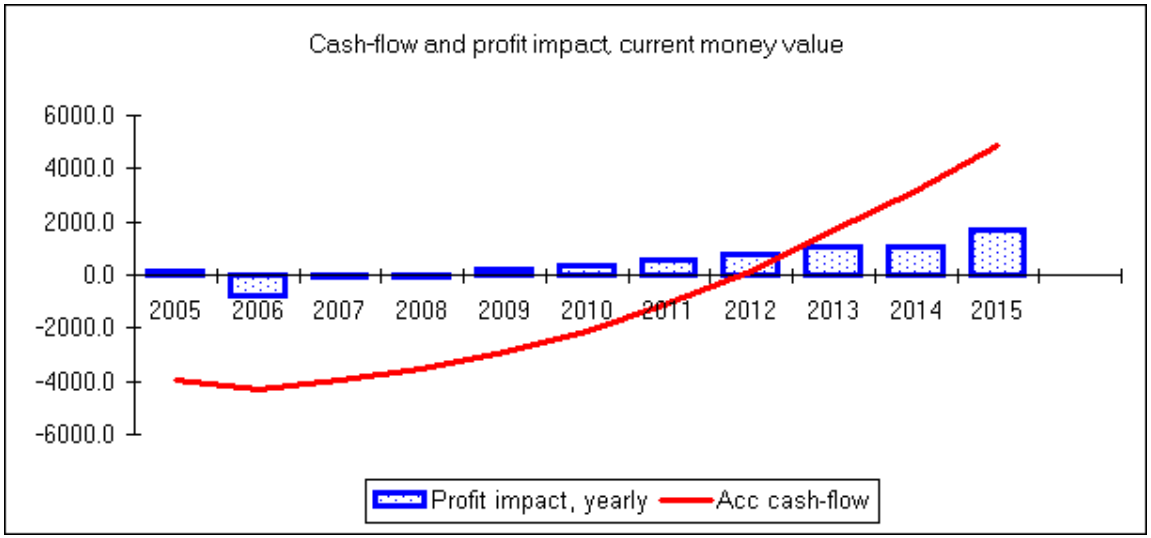
The price of the reduced emissions is 6 EURO per ton CO2

## ProCalc

| Prerequisites | |
|---|---|
| | ths. |
| Unit: | EUR |
| Indata, FMV or CMV: | FMV |
| Nominell opp cost: | 8.5% |
| >>Real opp cost: | 4.3% |
| 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: | 4 |
| Net present value: | 2167.4 |
| Int rate of return: | 16.9% |

| | |
|---|---|
| Max. cash-fl short-fall: | -4331.6 |




| Year: | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| I N D A T A FMV SUM | | | | | | | | | | | |
| In-coming payments | 114.0 | 342.0 | 2520.0 | 2406.0 | 2520.0 | 2520.0 | 2520.0 | 2520.0 | 2520.0 | 2406.0 | 2406.0 |
| Out-going payments | - | -348.5 | -1821.4 | -1763.3 | -1705.2 | -1647.2 | -1589.1 | -1493.0 | -1434.9 | -1434.9 | -1434.9 |
| Investment | -4100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Net cash-flow | -3986.0 | -6.5 | 698.6 | 642.7 | 814.8 | 872.8 | 930.9 | 1027.0 | 1085.1 | 971.1 | 971.1 |
| 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 | -3986.0 | -6.5 | 698.6 | 642.7 | 814.8 | 872.8 | 930.9 | 1027.0 | 1085.1 | 971.1 | 971.1 |

C A L C U L A T I O N S, C M V

| **CASH-FLOW/PAY-BACK** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -3986.0 | -6.8 | 755.6 | 723.0 | 953.2 | 1061.9 | 1177.9 | 1351.5 | 1485.0 | 1382.2 | 1437.5 |
| Interest | 0.0 | -338.8 | -368.2 | -335.3 | -302.3 | -247.0 | -177.7 | -92.7 | 14.3 | 141.8 | 271.3 |
| Net after interest | -3986.0 | -345.6 | 387.4 | 387.7 | 650.9 | 814.9 | 1000.2 | 1258.8 | 1499.3 | 1523.9 | 1708.8 |
| Acc cash-flow | -3986.0 | -4331.6 | -3944.1 | -3556.5 | -2905.5 | -2090.6 | -1090.4 | 168.3 | 1667.7 | 3191.6 | 4900.4 |

| *** * * PROFIT-IMPACT * *** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -3986.0 | -6.8 | 755.6 | 723.0 | 953.2 | 1061.9 | 1177.9 | 1351.5 | 1485.0 | 1382.2 | 1437.5 |
| + Investment | 4100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Depreciation: | 0.0 | -455.6 | -455.6 | -455.6 | -455.6 | -455.6 | -455.6 | -455.6 | -455.6 | -455.6 | 0.0 |
| Interest | 0.0 | -338.8 | -368.2 | -335.3 | -302.3 | -247.0 | -177.7 | -92.7 | 14.3 | 141.8 | 271.3 |
| Profit-impact: | 114.0 | -801.1 | -68.1 | -67.9 | 195.3 | 359.4 | 544.6 | 803.2 | 1043.8 | 1068.4 | 1708.8 |

| **NET PRESENT VALUE** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -3986.0 | -6.8 | 755.6 | 723.0 | 953.2 | 1061.9 | 1177.9 | 1351.5 | 1485.0 | 1382.2 | 1437.5 |
| Annual pres value | -3986.0 | -6.2 | 641.9 | 566.0 | 687.8 | 706.2 | 722.0 | 763.5 | 773.2 | 663.3 | 635.8 |
| Tot pres value | 2167.4 | | | | | | | | | | |

| **INTERNAL RATE OF RET.** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -3986.0 | -6.8 | 755.6 | 723.0 | 953.2 | 1061.9 | 1177.9 | 1351.5 | 1485.0 | 1382.2 | 1437.5 |
| Nom irr | 16.9% | | | | | | | | | | |
| Discounted net | -3986.0 | -5.8 | 553.3 | 453.1 | 511.2 | 487.3 | 462.6 | 454.2 | 427.1 | 340.2 | 302.8 |
| Tot disc net | 0.0 | | | | | | | | | | |

Preparation for sensivityanalysis

| | Pres val | Payback | Irr | Prof imp |
|---|---|---|---|---|
| Basecalculation: | 2167.4 | 7 | 16.9% | 4 |

## Calculation IRR of the project including the revenue from the sale of AAUs and ERUs

**Annex No. 17**

## Calculations revenues and costs of the project in Polymeri JSC with the effect from AAUs and ERUs

| Years | Investment Credit | Costs | | | | | | Revenues | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Interest Costs 8.50% | Average Annual Cogen Gas Consumption price 118.5 EUR/1000Nmi | | 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 Consumtio /Sold to consumers, | CO2 Sold Incomes AAUs and ERUs | Total Annual Revenues |
| | ThEUR | ThEUR | 1000Nmi | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR |
| **2005** | 5403.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 202.8 | 202.8 |
| **2006** | 0.0 | 459.3 | 0.0 | 0.0 | 0.0 | 0.0 | 459.3 | 0.0 | 0.0 | 0.0 | 608.4 | 608.4 |
| **2007** | 900.5 | 459.3 | 27060.0 | 3206.6 | 76.0 | 3282.6 | 3741.9 | 3075.0 | 0.0 | 1595.0 | 202.8 | 4872.8 |
| **2008** | 900.5 | 382.7 | 27060.0 | 3206.6 | 103.0 | 3309.6 | 3692.3 | 3075.0 | 0.0 | 1595.0 | 444.0 | 5114.0 |
| **2009** | 900.5 | 306.2 | 27060.0 | 3206.6 | 135.0 | 3341.6 | 3647.8 | 3075.0 | 0.0 | 1595.0 | 202.8 | 4872.8 |
| **2010** | 900.5 | 229.6 | 27060.0 | 3206.6 | 580.0 | 3786.6 | 4016.2 | 3075.0 | 0.0 | 1595.0 | 202.8 | 4872.8 |
| **2011** | 900.5 | 153.1 | 27060.0 | 3206.6 | 129.0 | 3335.6 | 3488.7 | 3075.0 | 0.0 | 1595.0 | 202.8 | 4872.8 |
| **2012** | 900.5 | 76.5 | 27060.0 | 3206.6 | 700.0 | 3906.6 | 3983.2 | 3075.0 | 0.0 | 1595.0 | 202.8 | 4872.8 |
| **2013** | 0.0 | 0.0 | 27060.0 | 3206.6 | 125.0 | 3331.6 | 3331.6 | 3075.0 | 0.0 | 1595.0 | 202.8 | 4872.8 |
| **2014** | 0.0 | 0.0 | 27060.0 | 3206.6 | 106.0 | 3312.6 | 3312.6 | 3075.0 | 0.0 | 1595.0 | 0.0 | 4670.0 |
| **2015** | 0.0 | 0.0 | 27060.0 | 3206.6 | 580.0 | 3786.6 | 3786.6 | 3075.0 | 0.0 | 1595.0 | 0.0 | 4670.0 |
| **Total** | 5403.0 | 2066.6 | 243540.0 | 28859.5 | 2534.0 | 31393.5 | 33460.1 | 27675.0 | 0.0 | 14355.0 | 2472.0 | 44502.0 |

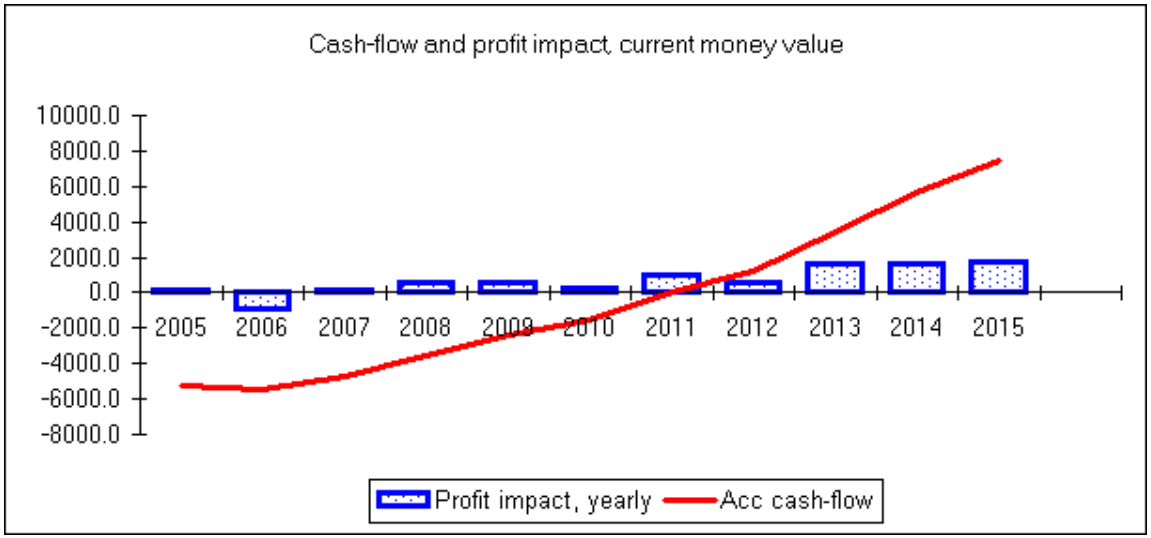
The average price of the annual electricity consumption is 38.0 EURO/Mwhe
The average price of the annual electricity sold to NEC is 49 EURO/Mwhe
The average price of the annual thermal energy consumption or sold to customers is 13.9 EURO/MWht
The annual capacity of the cogeneration istallation is 8200 h/year for every one.
The price of the reduced emissions is 6 EURO per ton CO2

## *ProCalc*

| Prerequisites | |
|---|---|
| | ths. |
| Unit: | EUR |
| Indata, FMV or CMV: | FMV |
| Nominell opp cost: | 8.5% |
| >>Real opp cost: | 4.3% |
| Inflation: | 4.0% |
| Calc. time (Yrs): | 11 |
| Depreciation time: | 9 |
| Pmt/yr:end=0, succ=1 | 0 |

| Output | |
|---|---|
| Pay-back-time: | 6 |
| Pos prof.impact, yrs: | 2 |
| Net present value: | 3299.5 |
| Int rate of return: | 19.1% |

| | |
|---|---|
| Max. cash-fl short-fall: | -5487.2 |




| Year: | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| I N D A T A FMV SUM | | | | | | | | | | | |
| In-coming payments | 202.8 | 608.4 | 4872.8 | 5114.0 | 4872.8 | 4872.8 | 4872.8 | 4872.8 | 4872.8 | 4670.0 | 4670.0 |
| Out-going payments | - | -459.3 | -3741.9 | -3692.3 | -3647.8 | -4016.2 | -3488.7 | -3983.2 | -3331.6 | -3312.6 | -3786.6 |
| Investment | -5403.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Net cash-flow | -5200.2 | 149.1 | 1130.9 | 1421.7 | 1225.0 | 856.6 | 1384.1 | 889.6 | 1541.2 | 1357.4 | 883.4 |
| 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 | -5200.2 | 149.1 | 1130.9 | 1421.7 | 1225.0 | 856.6 | 1384.1 | 889.6 | 1541.2 | 1357.4 | 883.4 |

C A L C U L A T I O N S, C M V

| **CASH-FLOW/PAY-BACK** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -5200.2 | 155.1 | 1223.2 | 1599.2 | 1433.1 | 1042.2 | 1751.3 | 1170.7 | 2109.2 | 1932.0 | 1307.6 |
| Interest | 0.0 | -442.0 | -466.4 | -402.1 | -300.3 | -204.0 | -132.8 | 4.8 | 104.7 | 292.9 | 482.0 |
| Net after interest | -5200.2 | -287.0 | 756.8 | 1197.1 | 1132.8 | 838.1 | 1618.5 | 1175.4 | 2213.9 | 2224.9 | 1789.6 |
| Acc cash-flow | -5200.2 | -5487.2 | -4730.4 | -3533.2 | -2400.5 | -1562.3 | 56.2 | 1231.6 | 3445.5 | 5670.4 | 7460.0 |

| *** * * PROFIT-IMPACT * *** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -5200.2 | 155.1 | 1223.2 | 1599.2 | 1433.1 | 1042.2 | 1751.3 | 1170.7 | 2109.2 | 1932.0 | 1307.6 |
| + Investment | 5403.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Depreciation: | 0.0 | -600.3 | -600.3 | -600.3 | -600.3 | -600.3 | -600.3 | -600.3 | -600.3 | -600.3 | 0.0 |
| Interest | 0.0 | -442.0 | -466.4 | -402.1 | -300.3 | -204.0 | -132.8 | 4.8 | 104.7 | 292.9 | 482.0 |
| Profit-impact: | 202.8 | -887.3 | 156.4 | 596.8 | 532.4 | 237.8 | 1018.2 | 575.1 | 1613.6 | 1624.5 | 1789.6 |

| **NET PRESENT VALUE** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -5200.2 | 155.1 | 1223.2 | 1599.2 | 1433.1 | 1042.2 | 1751.3 | 1170.7 | 2109.2 | 1932.0 | 1307.6 |
| Annual pres value | -5200.2 | 142.9 | 1039.0 | 1252.0 | 1034.1 | 693.1 | 1073.5 | 661.3 | 1098.2 | 927.1 | 578.4 |
| Tot pres value | 3299.5 | | | | | | | | | | |

| **INTERNAL RATE OF RET.** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -5200.2 | 155.1 | 1223.2 | 1599.2 | 1433.1 | 1042.2 | 1751.3 | 1170.7 | 2109.2 | 1932.0 | 1307.6 |
| Nom irr | 19.1% | | | | | | | | | | |
| Discounted net | -5200.2 | 130.2 | 862.8 | 947.3 | 713.0 | 435.4 | 614.5 | 345.0 | 522.0 | 401.6 | 228.3 |
| Tot disc net | 0.0 | | | | | | | | | | |

Preparation for sensivityanalysis

| Basecalculation: | Pres val | Payback | Irr | Prof imp |
|---|---|---|---|---|
| | 3299.5 | 6 | 19.1% | 2 |

## Calculations revenues and costs of the project in Kostenets HHI JSC with the effect from AAUs and ERUs

| Years | Investment Credit | Costs | | | | | Revenues | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Interest Costs 8.50% | Average Annual Cogen Gas Consumption for 3300 Nm³/h price 118.5 EUR/1000Nmi | | 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 Consumtio /Sold to consumers | CO2 Sold Incomes AAUs and ERUs | Total Annual Revenues |
| | ThEUR | ThEUR | 1000mi | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR |
| **2005** | 5752.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 143.4 | 143.4 |
| **2006** | 0.0 | 488.9 | 0.0 | 0.0 | 0.0 | 0.0 | 488.9 | 0.0 | 0.0 | 0.0 | 430.2 | 430.2 |
| **2007** | 958.7 | 488.9 | 27060.0 | 3206.6 | 76.0 | 3282.6 | 3771.5 | 2025.2 | 1728.0 | 1253.5 | 143.4 | 5150.1 |
| **2008** | 958.7 | 407.4 | 27060.0 | 3206.6 | 103.0 | 3309.6 | 3717.0 | 2046.4 | 1651.0 | 1294.4 | 312.0 | 5303.8 |
| **2009** | 958.7 | 325.9 | 27060.0 | 3206.6 | 135.0 | 3341.6 | 3667.6 | 2148.1 | 1471.0 | 1365.7 | 143.4 | 5128.2 |
| **2010** | 958.7 | 244.5 | 27060.0 | 3206.6 | 580.0 | 3786.6 | 4031.1 | 2200.6 | 1379.0 | 1410.6 | 143.4 | 5133.6 |
| **2011** | 958.7 | 163.0 | 27060.0 | 3206.6 | 129.0 | 3335.6 | 3498.6 | 2303.4 | 1198.0 | 1461.3 | 143.4 | 5106.1 |
| **2012** | 958.7 | 81.5 | 27060.0 | 3206.6 | 700.0 | 3906.6 | 3988.1 | 2306.0 | 1194.0 | 1461.3 | 143.4 | 5104.7 |
| **2013** | 0.0 | 0.0 | 27060.0 | 3206.6 | 125.0 | 3331.6 | 3331.6 | 2306.0 | 1194.0 | 1461.3 | 143.4 | 5104.7 |
| **2014** | 0.0 | 0.0 | 27060.0 | 3206.6 | 106.0 | 3312.6 | 3312.6 | 2306.0 | 1194.0 | 1461.3 | 0.0 | 4961.3 |
| **2015** | 0.0 | 0.0 | 27060.0 | 3206.6 | 580.0 | 3786.6 | 3786.6 | 2306.0 | 1194.0 | 1461.3 | 0.0 | 4961.3 |
| **Total** | 5752.0 | 2200.1 | 243540.0 | 28859.5 | 2534.0 | 31393.5 | 33593.6 | 19947.7 | 12203.0 | 12630.7 | 1746.0 | 46527.4 |

The average price of the annual electricity consumption is 38 EURO/Mwhe
The average price of the annual electricity sold to NEC is 49 EURO/Mwhe
The average price of the annual thermal energy consumption or sold to customers is 13.9 EURO/MWht
The annual capacity of the cogeneration istallation is 8200 h/year for every one.

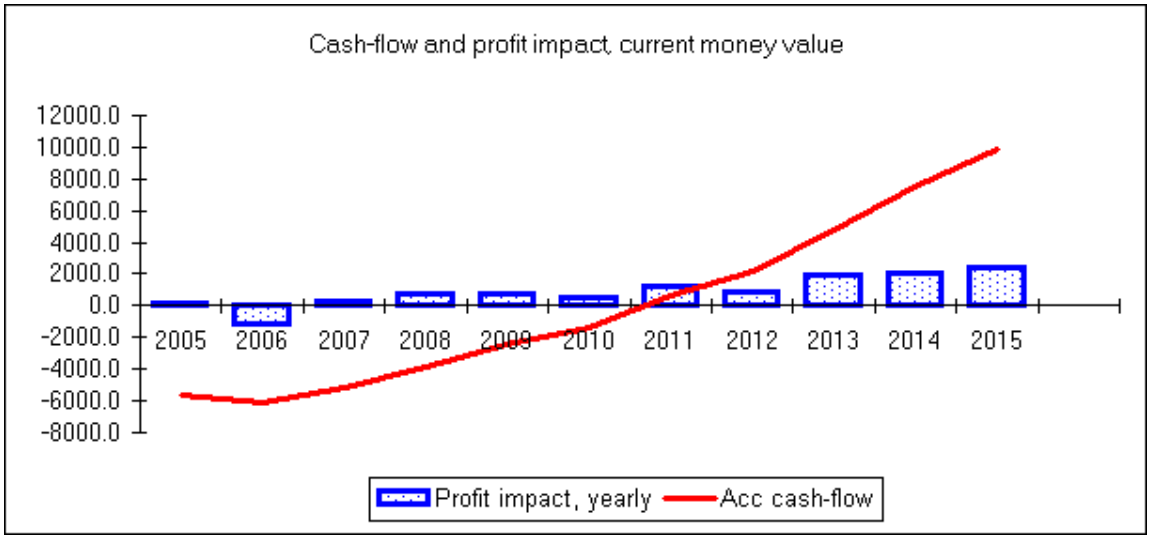
The price of the reduced emissions is 6 EURO per ton CO2

## ProCalc

| Prerequisites | |
|---|---|
| Unit: | ths. EUR |
| Indata, FMV or CMV: | FMV |
| Nominell opp cost: | 8.5% |
| >>Real opp cost: | 4.3% |
| Inflation: | 4.0% |
| Calc. time (Yrs): | 11 |
| Depreciation time: | 9 |
| Pmt/yr:end=0, succ=1 | 0 |

| Output | |
|---|---|
| Pay-back-time: | 6 |
| Pos prof.impact, yrs: | 2 |
| Net present value: | 4359.6 |
| Int rate of return: | 20.7% |

| | |
|---|---|
| Max. cash-fl short-fall: | -6146.4 |




| Year: | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| I N D A T A FMV SUM | | | | | | | | | | | |
| In-coming payments | 143.4 | 430.2 | 5150.1 | 5303.8 | 5128.2 | 5133.6 | 5106.1 | 5104.7 | 5104.7 | 4961.3 | 4961.3 |
| Out-going payments | - | -488.9 | -3771.5 | -3717.0 | -3667.6 | -4031.1 | -3498.6 | -3988.1 | -3331.6 | -3312.6 | -3786.6 |
| Investment | -5752.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Net cash-flow | -5608.6 | -58.7 | 1378.6 | 1586.8 | 1460.6 | 1102.5 | 1607.5 | 1116.6 | 1773.1 | 1648.7 | 1174.7 |
| 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 | -5608.6 | -58.7 | 1378.6 | 1586.8 | 1460.6 | 1102.5 | 1607.5 | 1116.6 | 1773.1 | 1648.7 | 1174.7 |

C A L C U L A T I O N S, C M V

| **CASH-FLOW/PAY-BACK** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -5608.6 | -61.0 | 1491.1 | 1784.9 | 1708.7 | 1341.4 | 2034.0 | 1469.4 | 2426.6 | 2346.6 | 1738.8 |
| Interest | 0.0 | -476.7 | -522.4 | -440.1 | -325.8 | -208.3 | -111.9 | 51.4 | 180.7 | 402.3 | 636.0 |
| Net after interest | -5608.6 | -537.8 | 968.7 | 1344.8 | 1382.9 | 1133.1 | 1922.1 | 1520.8 | 2607.3 | 2748.9 | 2374.8 |
| Acc cash-flow | -5608.6 | -6146.4 | -5177.7 | -3832.9 | -2450.0 | -1316.9 | 605.2 | 2126.0 | 4733.3 | 7482.2 | 9857.1 |

| *** * * PROFIT-IMPACT * *** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -5608.6 | -61.0 | 1491.1 | 1784.9 | 1708.7 | 1341.4 | 2034.0 | 1469.4 | 2426.6 | 2346.6 | 1738.8 |
| + Investment | 5752.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Depreciation: | 0.0 | -639.1 | -639.1 | -639.1 | -639.1 | -639.1 | -639.1 | -639.1 | -639.1 | -639.1 | 0.0 |
| Interest | 0.0 | -476.7 | -522.4 | -440.1 | -325.8 | -208.3 | -111.9 | 51.4 | 180.7 | 402.3 | 636.0 |
| Profit-impact: | 143.4 | -1176.9 | 329.5 | 705.7 | 743.8 | 494.0 | 1283.0 | 881.7 | 1968.2 | 2109.8 | 2374.8 |

| **NET PRESENT VALUE** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -5608.6 | -61.0 | 1491.1 | 1784.9 | 1708.7 | 1341.4 | 2034.0 | 1469.4 | 2426.6 | 2346.6 | 1738.8 |
| Annual pres value | -5608.6 | -56.3 | 1266.6 | 1397.4 | 1233.0 | 892.1 | 1246.7 | 830.1 | 1263.5 | 1126.1 | 769.1 |
| Tot pres value | 4359.6 | | | | | | | | | | |

| **INTERNAL RATE OF RET.** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -5608.6 | -61.0 | 1491.1 | 1784.9 | 1708.7 | 1341.4 | 2034.0 | 1469.4 | 2426.6 | 2346.6 | 1738.8 |
| Nom irr | 20.7% | | | | | | | | | | |
| Discounted net | -5608.6 | -50.6 | 1023.9 | 1015.6 | 805.7 | 524.1 | 658.5 | 394.2 | 539.5 | 432.3 | 265.4 |
| Tot disc net | 0.0 | | | | | | | | | | |

Preparation for sensivityanalysis

| Basecalculation: | Pres val | Payback | Irr | Prof imp |
|---|---|---|---|---|
| | 4359.6 | 6 | 20.7% | 2 |

# Calculations revenues and costs of the project in Toplofikatsia Kazanlak JSC with the effect from AAUs and ERUs

| | | | Costs | | | | | | | Revenues | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Years | Investment Credit | Interest Costs 8.50% | Average Annual Cogen Gas Consumption for 3300 Nm³/h price 118.5 EUR/1000Nmi | | 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 |
| | ThEUR | ThEUR | 1000mi | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR |
| **2005** | 4329.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 76.8 | 76.8 |
| **2006** | 0.0 | 368.0 | 0.0 | 0.0 | 0.0 | 0.0 | 368.0 | 0.0 | 0.0 | 0.0 | 230.4 | 230.4 |
| **2007** | 721.5 | 368.0 | 17090.0 | 2025.2 | 1165.0 | 3190.2 | 3558.1 | 279.0 | 1488.0 | 2255.5 | 76.8 | 4099.3 |
| **2008** | 721.5 | 306.6 | 17090.0 | 2025.2 | 1139.0 | 3164.2 | 3470.8 | 281.0 | 1496.0 | 2293.5 | 168.0 | 4238.5 |
| **2009** | 721.5 | 245.3 | 17090.0 | 2025.2 | 1018.0 | 3043.2 | 3288.5 | 276.0 | 1494.0 | 2309.4 | 76.8 | 4156.2 |
| **2010** | 721.5 | 184.0 | 17090.0 | 2025.2 | 962.0 | 2987.2 | 3171.1 | 281.0 | 1500.0 | 2321.5 | 76.8 | 4179.3 |
| **2011** | 721.5 | 122.7 | 17090.0 | 2025.2 | 956.0 | 2981.2 | 3103.8 | 276.0 | 1494.0 | 2309.4 | 76.8 | 4156.2 |
| **2012** | 721.5 | 61.3 | 17090.0 | 2025.2 | 952.0 | 2977.2 | 3038.5 | 281.0 | 1500.0 | 2321.5 | 76.8 | 4179.3 |
| **2013** | 0.0 | 0.0 | 17090.0 | 2025.2 | 946.0 | 2971.2 | 2971.2 | 276.0 | 1494.0 | 2309.4 | 76.8 | 4156.2 |
| **2014** | 0.0 | 0.0 | 17090.0 | 2025.2 | 936.0 | 2961.2 | 2961.2 | 281.0 | 1500.0 | 2321.5 | 0.0 | 4102.5 |
| **2015** | 0.0 | 0.0 | 17090.0 | 2025.2 | 930.0 | 2955.2 | 2955.2 | 276.0 | 1494.0 | 2309.4 | 0.0 | 4079.4 |
| **Total** | 4329.0 | 1655.8 | 153810.0 | 18226.5 | 9004.0 | 27230.5 | 28886.3 | 2507.0 | 13460.0 | 20751.1 | 936.0 | 37654.1 |

The average price of the annual electricity consumption is 37 EURO/Mwhe
The average price of the annual electricity sold to NEC is 49 EURO/Mwhe
The average price of the annual thermal energy consumption or sold to customers is 26.5 EURO/MWht
The annual capacity of the cogeneration istallation is 6250 h/year for every one.

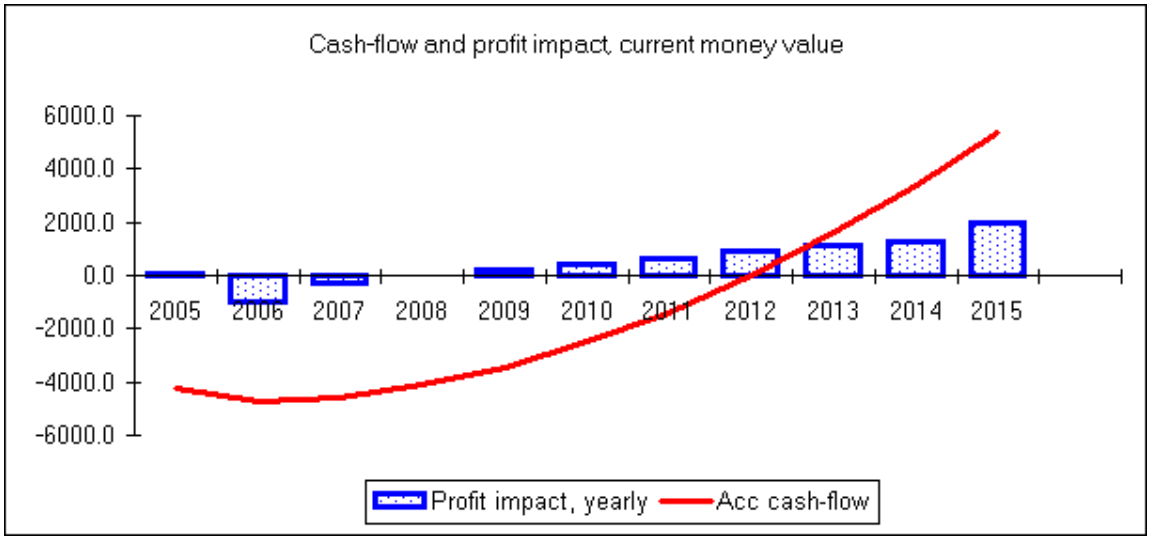
The price of the reduced emissions is 6 EURO per ton CO2

## *ProCalc*

| Prerequisites | ths. |
|---|---|
| Unit: | EUR |
| Indata, FMV or CMV: | FMV |
| Nominell opp cost: | 8.5% |
| >>Real opp cost: | 4.3% |
| 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: | 4 |
| Net present value: | 2361.7 |
| Int rate of return: | 16.6% |

| | |
|---|---|
| Max. cash-fl short-fall: | -4756.7 |




| Year: | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| I N D A T A FMV SUM | | | | | | | | | | | |
| In-coming payments | 76.8 | 230.4 | 4099.3 | 4238.5 | 4156.2 | 4179.3 | 4156.2 | 4179.3 | 4156.2 | 4102.5 | 4079.4 |
| Out-going payments | - | -368.0 | -3558.1 | -3470.8 | -3288.5 | -3171.1 | -3103.8 | -3038.5 | -2971.2 | -2961.2 | -2955.2 |
| Investment | -4329.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Net cash-flow | -4252.2 | -137.6 | 541.2 | 767.7 | 867.7 | 1008.2 | 1052.4 | 1140.8 | 1185.0 | 1141.3 | 1124.2 |
| 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 | -4252.2 | -137.6 | 541.2 | 767.7 | 867.7 | 1008.2 | 1052.4 | 1140.8 | 1185.0 | 1141.3 | 1124.2 |

C A L C U L A T I O N S, C M
V

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **CASH-FLOW/PAY-BACK** | | | | | | | | | | | |
| Net cash-flow | -4252.2 | -143.1 | 585.4 | 863.6 | 1015.1 | 1226.6 | 1331.6 | 1501.2 | 1621.8 | 1624.4 | 1664.1 |
| Interest | 0.0 | -361.4 | -404.3 | -388.9 | -348.6 | -291.9 | -212.5 | -117.4 | 0.3 | 138.1 | 288.0 |
| Net after interest | -4252.2 | -504.5 | 181.0 | 474.6 | 666.5 | 934.7 | 1119.1 | 1383.9 | 1622.0 | 1762.6 | 1952.0 |
| Acc cash-flow | -4252.2 | -4756.7 | -4575.7 | -4101.1 | -3434.6 | -2499.9 | -1380.8 | 3.1 | 1625.1 | 3387.7 | 5339.7 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *** * * PROFIT-IMPACT * *** | | | | | | | | | | | |
| Net cash-flow | -4252.2 | -143.1 | 585.4 | 863.6 | 1015.1 | 1226.6 | 1331.6 | 1501.2 | 1621.8 | 1624.4 | 1664.1 |
| + Investment | 4329.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Depreciation: | 0.0 | -481.0 | -481.0 | -481.0 | -481.0 | -481.0 | -481.0 | -481.0 | -481.0 | -481.0 | 0.0 |
| Interest | 0.0 | -361.4 | -404.3 | -388.9 | -348.6 | -291.9 | -212.5 | -117.4 | 0.3 | 138.1 | 288.0 |
| Profit-impact: | 76.8 | -985.5 | -300.0 | -6.4 | 185.5 | 453.7 | 638.1 | 902.9 | 1141.0 | 1281.6 | 1952.0 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **NET PRESENT VALUE** | | | | | | | | | | | |
| Net cash-flow | -4252.2 | -143.1 | 585.4 | 863.6 | 1015.1 | 1226.6 | 1331.6 | 1501.2 | 1621.8 | 1624.4 | 1664.1 |
| Annual pres value | -4252.2 | -131.9 | 497.2 | 676.1 | 732.5 | 815.8 | 816.2 | 848.1 | 844.4 | 779.5 | 736.0 |
| Tot pres value | 2361.7 | | | | | | | | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **INTERNAL RATE OF RET.** | | | | | | | | | | | |
| Net cash-flow | -4252.2 | -143.1 | 585.4 | 863.6 | 1015.1 | 1226.6 | 1331.6 | 1501.2 | 1621.8 | 1624.4 | 1664.1 |
| Nom irr | 16.6% | | | | | | | | | | |
| Discounted net | -4252.2 | -122.7 | 430.5 | 544.6 | 549.0 | 569.0 | 529.7 | 512.1 | 474.4 | 407.5 | 358.0 |
| Tot disc net | 0.0 | | | | | | | | | | |

Preparation for sensivityanalysis

| | Pres val | Payback | Irr | Prof imp |
|---|---|---|---|---|
| Basecalculation: | 2361.7 | 7 | 16.6% | 4 |

## Calculations revenues and costs of the project in Toplofikatsia Yambol JSC with the effect from AAUs and ERUs

| Years | Investment Credit | Costs | | | | | Revenues | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Interest Costs 8.50% | Average Annual Cogen Gas Consumption price 118.5 EUR/1000Nmi | | 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 |
| | ThEUR | ThEUR | 1000mi | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR | ThEUR |
| **2005** | 4100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 114.0 | 114.0 |
| **2006** | 0.0 | 348.5 | 0.0 | 0.0 | 0.0 | 0.0 | 348.5 | 0.0 | 0.0 | 0.0 | 342.0 | 342.0 |
| **2007** | 683.3 | 348.5 | 10995.0 | 1302.9 | 170.0 | 1472.9 | 1821.4 | 119.0 | 1044.0 | 1243.0 | 114.0 | 2520.0 |
| **2008** | 683.3 | 290.4 | 10995.0 | 1302.9 | 170.0 | 1472.9 | 1763.3 | 119.0 | 1044.0 | 1243.0 | 252.0 | 2658.0 |
| **2009** | 683.3 | 232.3 | 10995.0 | 1302.9 | 170.0 | 1472.9 | 1705.2 | 119.0 | 1044.0 | 1243.0 | 114.0 | 2520.0 |
| **2010** | 683.3 | 174.3 | 10995.0 | 1302.9 | 170.0 | 1472.9 | 1647.2 | 119.0 | 1044.0 | 1243.0 | 114.0 | 2520.0 |
| **2011** | 683.3 | 116.2 | 10995.0 | 1302.9 | 170.0 | 1472.9 | 1589.1 | 119.0 | 1044.0 | 1243.0 | 114.0 | 2520.0 |
| **2012** | 683.3 | 58.1 | 10995.0 | 1302.9 | 132.0 | 1434.9 | 1493.0 | 119.0 | 1044.0 | 1243.0 | 114.0 | 2520.0 |
| **2013** | 0.0 | 0.0 | 10995.0 | 1302.9 | 132.0 | 1434.9 | 1434.9 | 119.0 | 1044.0 | 1243.0 | 114.0 | 2520.0 |
| **2014** | 0.0 | 0.0 | 10995.0 | 1302.9 | 132.0 | 1434.9 | 1434.9 | 119.0 | 1044.0 | 1243.0 | 0.0 | 2406.0 |
| **2015** | 0.0 | 0.0 | 10995.0 | 1302.9 | 132.0 | 1434.9 | 1434.9 | 119.0 | 1044.0 | 1243.0 | 0.0 | 2406.0 |
| **Total** | 4100.0 | 1568.3 | 98955.0 | 11726.2 | 1378.0 | 13104.2 | 14672.4 | 1071.0 | 9396.0 | 11187.0 | 1392.0 | 23046.0 |

The average price of the annual electricity consumption is 39 EURO/Mwhe
The average price of the annual electricity sold to NEC is 49 EURO/Mwhe
The average price of the annual thermal energy consumption or sold to customers is 25.8 EURO/MWht
The annual capacity of the cogeneration istallation is 8000 h/year for every one.

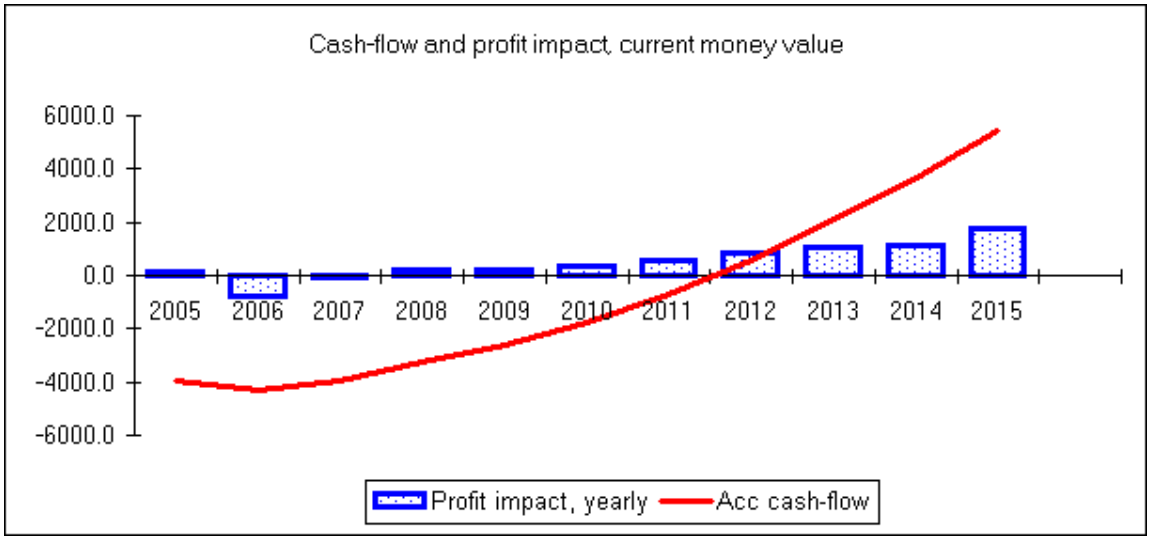
The price of the reduced emissions is 6 EURO per ton CO2

## *ProCalc*

| Prerequisites | |
|---|---|
| Unit: | ths. EUR |
| Indata, FMV or CMV: | FMV |
| Nominell opp cost: | 8.5% |
| >>Real opp cost: | 4.3% |
| 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: | 3 |
| Net present value: | 2389.3 |
| Int rate of return: | 17.8% |

| | |
|---|---|
| Max. cash-fl short-fall: | -4331.6 |




| Year: | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| I N D A T A FMV SUM | | | | | | | | | | | |
| In-coming payments | 114.0 | 342.0 | 2520.0 | 2658.0 | 2520.0 | 2520.0 | 2520.0 | 2520.0 | 2520.0 | 2406.0 | 2406.0 |
| Out-going payments | - | -348.5 | -1821.4 | -1763.3 | -1705.2 | -1647.2 | -1589.1 | -1493.0 | -1434.9 | -1434.9 | -1434.9 |
| Investment | -4100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Net cash-flow | -3986.0 | -6.5 | 698.6 | 894.7 | 814.8 | 872.8 | 930.9 | 1027.0 | 1085.1 | 971.1 | 971.1 |
| 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 | -3986.0 | -6.5 | 698.6 | 894.7 | 814.8 | 872.8 | 930.9 | 1027.0 | 1085.1 | 971.1 | 971.1 |

C A L C U L A T I O N S, C M V

| **CASH-FLOW/PAY-BACK** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -3986.0 | -6.8 | 755.6 | 1006.4 | 953.2 | 1061.9 | 1177.9 | 1351.5 | 1485.0 | 1382.2 | 1437.5 |
| Interest | 0.0 | -338.8 | -368.2 | -335.3 | -278.2 | -220.8 | -149.3 | -61.9 | 47.7 | 178.0 | 310.6 |
| Net after interest | -3986.0 | -345.6 | 387.4 | 671.2 | 675.0 | 841.1 | 1028.5 | 1289.6 | 1532.7 | 1560.2 | 1748.1 |
| Acc cash-flow | -3986.0 | -4331.6 | -3944.1 | -3273.0 | -2598.0 | -1756.9 | -728.4 | 561.2 | 2093.9 | 3654.1 | 5402.1 |

| *** * * PROFIT-IMPACT * *** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -3986.0 | -6.8 | 755.6 | 1006.4 | 953.2 | 1061.9 | 1177.9 | 1351.5 | 1485.0 | 1382.2 | 1437.5 |
| + Investment | 4100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Depreciation: | 0.0 | -455.6 | -455.6 | -455.6 | -455.6 | -455.6 | -455.6 | -455.6 | -455.6 | -455.6 | 0.0 |
| Interest | 0.0 | -338.8 | -368.2 | -335.3 | -278.2 | -220.8 | -149.3 | -61.9 | 47.7 | 178.0 | 310.6 |
| Profit-impact: | 114.0 | -801.1 | -68.1 | 215.6 | 219.4 | 385.5 | 573.0 | 834.0 | 1077.2 | 1104.6 | 1748.1 |

| **NET PRESENT VALUE** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -3986.0 | -6.8 | 755.6 | 1006.4 | 953.2 | 1061.9 | 1177.9 | 1351.5 | 1485.0 | 1382.2 | 1437.5 |
| Annual pres value | -3986.0 | -6.2 | 641.9 | 787.9 | 687.8 | 706.2 | 722.0 | 763.5 | 773.2 | 663.3 | 635.8 |
| Tot pres value | 2389.3 | | | | | | | | | | |

| **INTERNAL RATE OF RET.** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net cash-flow | -3986.0 | -6.8 | 755.6 | 1006.4 | 953.2 | 1061.9 | 1177.9 | 1351.5 | 1485.0 | 1382.2 | 1437.5 |
| Nom irr | 17.8% | | | | | | | | | | |
| Discounted net | -3986.0 | -5.7 | 544.6 | 615.8 | 495.2 | 468.3 | 441.0 | 429.6 | 400.8 | 316.7 | 279.6 |
| Tot disc net | 0.0 | | | | | | | | | | |

Preparation for sensivityanalysis

| Basecalculation: | Pres val | Payback | Irr | Prof imp |
|---|---|---|---|---|
| | 2389.3 | 7 | 17.8% | 3 |

1336 София
ж.к.„Люлин"- 2
бул.„П. Владигеров" № 66
ПК 3

БУЛГАРГАЗ

тел.: 939 62 00
факс: 925 04 01
телекс: 22 929
№ 24-00-303
18.02.2005

**До**
**ФИК АКБ Форес ХАД**
**На вниманието на:**
**Г-н Николай Банев**

На Ваш № 1937/16.02.2005г.

Уважаеми Г-н Банев,

"Булгаргаз" ЕАД изразява своето принципиално положително отношение към реализирането на ко-генерационни инсталации в предприятията Ви "Полимери" АД, "Костенец ХХИ" АД, "Топлофикация – Казанлък" АД и "Топлофикация – Ямбол" АД и горивна база на природен газ.

Реализирането на подобен тип ко-генерации допринася съществено за:

- подобряване ефективността при производство на електрическа енергия и топлинна енергия, на база използването на природен газ;
- увеличаване на дела на енергията, произведена по комбиниран начин, в съответствие с енергийната стратегия на правителството на Република България;
- разширяване на преносната и разпределителна мрежа за природен газ и увеличаване консумацията на природен газ в страната.

"Булгаргаз" ЕАД ще разгледа внимателно своите възможности за подкрепа на проектите в "Полимери" АД, "Костенец ХХИ" АД и "Топлофикация – Казанлък" АД в частта им за осигуряване на природен газ за ко-генерационните инсталации, свързана с изграждане на съответните тръбопроводи високо налягане и АГРС, в съответствие с инвестиционните планове за тяхната реализация и действащия Закон за енергетиката.

Възможните пунктове за подаване на природен газ от магистралния газопровод за предложените от Вас потребители са както следва:

- За "Полимери" АД – ГРС – Девня;
- "Костенец ХХИ"АД – ГИС на 100 м от магистралния газопровод Ду 700;
- "Топлофикация – Казанлък" АД – ГРС – Калитиново;
- "Топлофикация – Ямбол"АД е захранена с природен газ

**С уважение,**

**Кирил Гегов**
**Главен Изпълнителен Директор**
**"БУЛГАРГАЗ" ЕАД**

BULGARGAZ PLC

24-06.303-18.02.2005

To the attention of Mr.Nikolay Banev
Financial Industrial Concern AKB Fores Plc.

Dear Mr.Banev,

Bulgargaz Plc states its principal positive attitude for the implementation of co-generation installations in your factories Polimery Plc, Kostenec HHI Plc, Toplofikazia Yambol Plc, Toploficazia Kazanluk Plc.
The implementation of such kind of co-generations significantly contributes to:

- The improvement of the efficiency during the production of electricity and heat energy while using natural gas
- The increasing of the share of the combined produced energy according to the Energy Strategy of the Government of Republic of Bulgaria
- The extension of the conveying and distribution network of natural fuel and the increasing of the consumption of natural gas in the country.

Bulgargaz Plc will consider carefully its possibilities to support the projects at Polimery Plc, Kostenec HHI Plc, Toplofikazia Yambol Plc, Toploficazia Kazanluk Plc. Regarding the part of supplying with natural gas of the co-generation installations according to the construction of the pipelines with high pressure and automatic gas-distributing stations in reference to the investment plans of their construction and the operative Energy law.

The possible points for feeding of natural gas from the high-way gas-main for the offered consumers are:

- for Polimery Plc – gas-distribution station – Devnya
- for Kostenec HHI Plc – gas station 100 m from the high-way gas-main Du 700
- for Toplofikacia Kazanluk Plc – gas distribution station – Kalitinovo
- Toplofikacia Yambol Plc is supplied with natural gas.

Regards,

Kiril Gegov

Main Executive Director

# Д Е В Н Я И Н В Е С Т  А Д

**9160 ДЕВНЯ, БЪЛГАРИЯ ТЕЛ: (0519) 934 71; ФАКС: (0519) 928 67**

**E-mail: dinvest@devnya.vega.bg**


**Изх.№55/24.02.2005 г.**

**Д О**
**"ПОЛИМЕРИ" АД**
**На вниманието на г-жа Анна Главинова**
**Изпълнителен директор**

**Относно: Изграждане на инсталация за ко-генерация.**

Уважаема г-жо Главинова,

С интерес се запознахме с Вашия инвестиционен проект за изграждане на инсталация за комбинирано производство на електрическа и топлинна енергия с използване на гориво природен газ по метода на ко-генерация.

Като Ваш дългогодишен бизнеспартньор при търговията на течен хлор, ние поддържаме Вашите инвестиционни намерения за повишаване ефективността на производството на хлор-алкални продукти, както и подобряване екологията на региона, вследствие намаление на отделянето на вредни емисии в атмосферата и почвата, дължащи се на използваните сега като гориво каменни въглища.

ДЕВНЯ ИНВЕСТ АД гр. Девня

**С уважение:**
**/Ст.Киров/**
**Изп.директор**

**DEVNYA INVEST PLC**

**9160 Devnya, Bulgaria. Telephone: (0519) 934 1; Fax (0519) 928 67**

**E-mail: dinvest@devnya.vega.bg**

Entry No. 55/February 21, 2005

**TO**

**"POLYMERI" PLC**

**To the attention of Mrs. Anna Glavinova**

**Executive manager**

**Regarding:** construction of a co-generation installation

Dear Mrs. Glavinova,

We were very interested to get acknowledged with your investment project for the construction of an installation for a combined production of electrical and heat energy, using natural gas and the method of co-generation.

As your long-standing business partner in the trade of liquid chlorine, we are supporting your investment intentions of improving the efficiency of the chlorine-alkaline commodities production, as well as improving the ecological balance in the region, due to decrease of harmful emissions in the atmosphere and soil, caused by coals used for fueling the production up until the present moment.

Best regards,

Executive manager:
/St. Kirov/

КОРПОРАТИВНА
ТЪРГОВСКА БАНКА АД

До г-жа Анна Главинова
Изпълнителен директор
Полимери – АД
България, Девня

Относно: Заявление на банката за построяването на станция за производство на електричество и пара на базата на газ като гориво, на територията на Полимери – АД, гр. Девня. Банката заявява следното:

1.Банката има интерес да поддържа строителството на източник на енергия в Полимери - АД, който да е незамърсяващ околната среда.Това ще намали възможни бъдещи загуби на продукция и ще стимулира развитието на Полимери – АД, като гарантира необходимата електроенергия и пара за производствения процес на стабилни и по ниски цени.

2.Построяването на такава електростанция и замяната на конвенционалните източници на енергия е правилният подход, водещ до подобряване на екологията на страната.

3.Ние сме сигурни, че проект като този, отнасящ се за заместване на източници на електроенергия в Енергийния сектор на България, в светлината на закриването на част от мощностите на Козлодуй и необходимостта за намаляване на вредните емисии в атмосферата от централите на въглища, е много нужен и е в съответствие с правилата и законите на европейската общност.

4.Очакванията за покачване на цените на електроенергията и парата са доста реалистични и поради това смятаме, че проекта на Полимери – АД ще е ефективен и е подходящ за финансиране.

5. С ратифицирането на Протокола от Киото, България трябва да намали емисиите на вредни газове с 8% през 2008г., спрямо равнището от 1998г.

В заключение трябва да подчертаем, че развитието на българската промишленост е все още рисково. Поради това подкрепата , която Полимери ще получи от програмата за продажба на газове от парниковия ефект, ще направи финансирането на проекта по гъвкаво, по-малко рисково.

С уважение,

М.Йорданова
Управител

ВАРНА 9000 Варна, ул. Шипка №18, тел.:+359 52 681 235; факс:+359 52 681 240
SWIFT: KORP BG SF, www corpbank bg

# "CORPORATIVE COMMERCIAL BANK" JSC

To the attention of
Mrs. Anna Glavinova
Executive manager
"Polymeri" PLC
Bulgaria, Devnya

Regarding a Bank Statement for the construction of a co-generation of electricity and heat installation, fueled by natural gas in the territory of "Polymeri" PLC, town of Devnya, the Bank states the following:

1. The Bank is interested in supporting "Polymeri" PLC in building an ecologically clean electricity-generating installation. This will decrease any future production losses and will stimulate the development of "Polymeri" PLC, thus guaranteeing the electricity and heating necessary for implementation of the production process at stable and low prices.
2. Building the said power-generating installation and the substitution of conventional electricity sources is the right approach, leading to an ecological improvement of the country.
3. We are certain that such project, relatef the substitution of electrical energy sources in the energy sector of the Republic of Bulgaria, with respect to shutting down a part of the Kozloduy power capacity and the necessity of diminishing harmful atmospheric emissions of the coal power plants, is very necessary and is comforting to the rules of and laws of the European community.
4. Expectation of increasing the price of electrical energy and heating are very realistic and thus we consider the project of "Polymeri" PLC effective and appropriate for financing.
5. Upon ratification of the Kyoto protocol, Bulgaria will have to decrease harmful gas emissions with 8% during 2008 related to the level of 1998.

We would like to conclude this statement by stressing on the fact that the development of Bulgarian industry is still very risky. Thus, the support "Polymeri"

will obtain by the program for sale of greenhouse gases, will secure the project flexibility and will decrease risk factors.

Best regards,

M. Yordanova

Manager

Varna

9000 Varna, No. 18 "Shipka" street, (+359 52 681 235; Fax +359 52 681 240)

SWIFT: KORP BG SF, www.corpbank.bg

АКЦИОНЕРНО ДРУЖЕСТВО
"КОСТЕНЕЦ - ХХИ"
гр. КОСТЕНЕЦ
ИЗХ. № 004/22.02. 20.05

**ОБЩИНСКА АДМИНИСТРАЦИЯ - КОСТЕНЕЦ**

Гр.Костенец, ул."Иван Вазов" № 2, тел/факс 07142/32-34, e-mail kostenetz_adm@yahoo.com

Р В
ОБЩИНА КОСТЕНЕЦ
ПОЩ.КОД 2030 ТЕЛ.2308
ИЗХ.№.04-01-3
22.02.2005 Г
КОСТЕНЕЦ,СОФ ОБ

**ДО**
**ДИРЕКТОРА НА**
**"КОСТЕНЕЦ - ХХИ" АД**
**ГР. КОСТЕНЕЦ**

**На Ваш № А-103 / 17.02. 2005 г.**

**ОТНОСНО: Инвестиционен проект "Газов ко-генератор за електрическа и топлинна енергия в "КОСТЕНЕЦ - ХХИ" АД "**

**УВАЖАЕМИ Г-Н ДИРЕКТОР,**

След като се запознахме с изложеното в горепосоченото писмо намерение за **Инвестиционен проект "Газов ко-генератор за електрическа и топлинна енергия в "КОСТЕНЕЦ - ХХИ" АД "** и отчитайки перспективите за развитие на община Костенец и региона при пълноправното членство на България в Европейския съюз;
в съответствие с Принципите за устойчиво развитие – развитие осигуряващо благоприятна околна среда на бъдното поколение;
в съответствие с целите, заложени в Националната енергийна стратегия за намаляване на емисиите, парниковите газове и повишаване енергийната ефективност на страната;
в съзвучие с дългогодишното взаимоизгодно сътрудничество между "КОСТЕНЕЦ - ХХИ" АД и община Костенец;
в предвид, преките ползи за населението и предприятията от успешното осъществяване на проекта за газификация на град Костенец, а именно: използване на високоефективни, щадящи околната среда горива в бита и промишлеността, подобряване инфраструктурата на района, по-чистата околна среда, нови работни места и вследствие на това повишаване на икономическото състояние и стандарта на живот в региона;
считаме, че изграждането на ко-генерационната инсталация в повереното Ви Дружество ще допринесе съществено за просперитета на град Костенец и

**НЕ ВЪЗРАЗЯВАМЕ**

срещу осъществяването на Инвестиционния проект "Газов ко-генератор за електрическа и топлинна енергия в "КОСТЕНЕЦ - ХХИ" АД " на територията на община Костенец.

ОБЩИНА КОСТЕНЕЦ

**ГОСПОДИН ЗАШЕВ,**
**КМЕТ НА ОБЩИНА КОСТЕНЕЦ**

KOSTENEC HHI
JOINT-STOCK COMPANY
the town of KOSTENEC
Ref. No.: *004/February 22nd, 2005*

KOSTENEC MUNICIPAL ADMINISTRATION

the town of Kostenec, 2, Ivan Vazov St., tel./fax: 07142/32-34, e-mail: kostenetz_adm@yahoo.com

| | | |
|---|---|---|
| REPUBLIC OF BULGARIA<br>KOSTENEC MUNICIPALITY<br>P. CODE 2030 TEL. 2308<br>Ref. No.: *69-01-3*<br>*February 22nd, 2005*<br>KOSTENEC, SOFIA-DISTRICT | | **TO THE DIRECTOR<br>OF KOSTENEC HHI AD<br>THE TOWN OF KOSTENEC** |

**To: Your ref. No.: A-103/17.02.2005**

**RE: "Gas co-generator of electric and thermal power at KOSTENEC HHI AD" Investment Project**

**DEAR DIRECTOR,**

Having got acquainted with your intention, expressed in the abovementioned letter, of implementing a **"Gas co-generator of electric and thermal power at KOSTENEC HHI AD" Investment Project**, and taking into account the development prospects for the Kostenec Municipality, and for the whole region with view to the full EU membership of Bulgaria;

in line with the sustainable development principles – for development ensuring favourable environment for the future generation;

in line with the goals set with the National Power Strategy for emission and greenhouse gas reduction and for improvement of the power efficiency in this country;

in harmony with the long-lasting and mutually beneficial partnership between KOSTENEC HHI AD and the Kostenec Municipality;

taking into account the direct benefits for the population and the business companies from the successful implementation of the Kostenec Gasification Project, namely: utilization of high efficiency, environment-friendly fuels in the households and in industry, improvement of the regional infrastructure, cleaner environment, new workplaces, and as a result of that – improvement of the economic status and the living standards in the region;

we believe, that the construction of the co-generator facility in the Company you manage would significantly contribute to the prosperity of the town of Kostenec, and

**WE DO NOT OBJECT**

against the implementation of the "Gas co-generator of electric and thermal power at KOSTENEC HHI AD" Investment Project in the territory of Kostenec Municipality.

| | | |
|---|---|---|
| | *(Round seal of the Lord Major, Kostenec Municipality)* | GOSPODIN ZASHEV, *(Sgd. ill.)*<br>LORD MAYOR OF KOSTENEC MUNICIPALITY |

*I undersigned, , do hereby certify that this is a true and correct translation I have made from Bulgarian into English of the document "Letter with ref. No.: 004/February 22nd, 2005" attached hereto. The translation contains 1 page.*
*Sworn translator:*

*Elena Mihaylova Zaharieva, personal number 5601226694*

До Директора
на "Костенец – ХХИ" АД
гр. Костенец

Относно: Ваш изх. № К-114 /23.02.2005 г.

Уважаеми г-н Директор,

Запознахме се с Вашето намерение за Инвестиционен проект

***"Газов ко-генератор за електрическа и топлинна енергия в "КОСТЕНЕЦ-ХХИ" АД"***

и

като имаме предвид перспективите за развитие на региона, в който са разположени нашите фирми, а именно:

възможността за по-скорошна газификация на гр. Костенец и изграждането на газоразпределителна мрежа,вследствие на което нашата фирма да подобри съществено енергийната си ефективност и да намали разходите за енергия,

наред с това разшири дейността си и създаде нови работни места,

като съдейства за постигане на благоприятна околна среда за населението на Общината,

в унисон с дългогодишното сътрудничество между нашите две фирми,

считаме, че изграждането на ко-генерационната инсталация ще допринесе както за просперитета на повереното Ви Дружество, така и на нашата фирма и на град Костенец като цяло.

**НЕ ВЪЗРАЗЯВАМЕ**

срещу осъществяването на Инвестиционния проект за газов ко-генератор в "КОСТЕНЕЦ – ХХИ" АД.

С уважение:
/ Д. Тодоров /

Belopaper LTD , Kostenets

*(Translation from Bulgarian)*

| | | |
|---|---|---|
| | | To the Director<br>of Kostenec HHI AD<br>the town of KOSTENEC |

Re.: Your ref. No.: *A-114/23.02.2005*

Dear Director,

We reviewed your idea of Investment Project for

***"Gas co-generator of electric and thermal power at KOSTENEC HHI AD"***

and
taking into account the development prospects for the region in which our companies are located, namely:

the possibility for forthcoming gasification of the town of Kostenec and construction of gas-distribution network, as a result of which our company would significantly raise its power efficiency and would lower its power-related expenses,

in parallel with that to develop its business and to establish new workplaces,

and to help for the attainment of favourable environment for the local population,

in the context of the long-lasting partnership between our two companies,

we believe that the construction of the co-generator facility would not only contribute to the prosperity of the Company you manage, but to the prosperity of our Company and of the town of Kostenec as a whole.

**WE DO NOT OBJECT**

against the implementation of the Gas Co-Generator Investment Project at KOSTENEC HHI AD.

| | | |
|---|---|---|
| | Yours sincerely, *(Sgd. ill.)*<br>D. Todorov | *(Round seal of Belopaper, Kostenec)* |

*I undersigned, , do hereby certify that this is a true and correct translation I have made from Bulgarian into English of the document "Letter from Belopaper, Kostenec " attached hereto. The translation contains 1 page.*
*Sworn translator:*

*Elena Mihaylova Zaharieva, personal number 5601226694*

До Директора
на "Костенец – ХХИ" АД
гр. Костенец

Относно: Ваш изх. № 46/23.02.2005 г.

АКЦИОНЕРНО ДРУЖЕСТВО "КОСТЕНЕЦ - ХХИ"
Вх. № 408/23.02.05 г.
гр. КОСТЕНЕЦ

Уважаеми г-н Директор,

Запознахме с Вашето намерение за Инвестиционен проект

**"Газов ко-генератор за електрическа и топлинна енергия в "КОСТЕНЕЦ – ХХИ" АД"**

и

като имаме предвид перспективите за развитие на региона, в който са разположени нашите фирми, а именно:

възможността за по-скорошна газификация на гр. Костенец и изграждането на газоразпределителна мрежа, вследствие на това нашата фирма да подобри съществено енергийна си ефективност и да снижи разходите за енергия,

наред с това разшири дейността си и създаде нови работни места,

като съдейства за постигане на благоприятна околна среда за населението на Общината,

в унисон с дългогодишното сътрудничество между нашите две фирми,

считаме, че изграждането на ко-генерационната инсталация ще допринесе не само за просперитета на повереното Ви Дружество, но и на нашата фирма и на град Костенец като цяло.

НЕ ВЪЗРАЗЯВАМЕ

срещу осъществяването на Инвестиционния проект за газов ко-генератор в "КОСТЕНЕЦ – ХХИ" АД.

С уважение: .....
И. Ангелов - управител
/име, длъжност, печат/

# Aktiv Komers LTD, Kostenets

*(Translation from Bulgarian)*

Model

To the Director
of Kostenec HHI AD
the town of Kostenec

*Seal:*

| | | |
|---|---|---|
| Re.: Your ref. No.: *46/23.02.2005* | | KOSTENEC HHI<br>JOINT-STOCK COMPANY<br>Inc. No.: *008/February 23rd*, 2005<br>the town of KOSTENEC |

Dear Director,

We reviewed your idea of Investment Project for

**"Gas co-generator of electric and thermal power at KOSTENEC HHI AD"**

and
taking into account the development prospects for the region in which our companies are located, namely:

the possibility for forthcoming gasification of the town of Kostenec and construction of gas-distribution network, as a result of which our company would significantly raise its power efficiency and would lower its power-related expenses,

in parallel with that to develop its business and to establish new workplaces,

and to help for the attainment of favourable environment for the local population,

in the context of the long-lasting partnership between our two companies,

we believe that the construction of the co-generator facility would not only contribute to the prosperity of the Company you manage, but to the prosperity of our Company and of the town of Kostenec as a whole.

WE DO NOT OBJECT

against the implementation of the Gas Co-Generator Investment Project at KOSTENEC HHI AD.

| | | |
|---|---|---|
| | *(Oval seal of Activ Comers EOOD, Kostenec Branch)* | Yours sincerely, ..... *(Sgd. ill.)*<br>*M. Angelov – Manager*<br>/Name, office, seal/ |

*I undersigned, , do hereby certify that this is a true and correct translation I have made from Bulgarian into English of the document "Letter with Inc. No.: 008/February 23rd, 2005" attached hereto. The translation contains 1 page.*
*Sworn translator:*
*Elena Mihaylova Zaharieva, personal number 5601226694*

БУЛКОСТ ООД
гр.КОСТЕНЕЦ
ИЗХ.№ 52
23.02.2005 г.

**До Директора**
**на "Костенец – ХХИ" АД**
**гр. Костенец**

АКЦИОНЕРНО ДРУЖЕСТВО "КОСТЕНЕЦ - ХХИ"
Вх. № 006/23.02.2005 г.
гр. КОСТЕНЕЦ

Относно: Ваш изх. № А-109/23.02.2005 г.

Уважаеми г-н Директор,

Запознахме с Вашето намерение за Инвестиционен проект

**"Газов ко генератор за електрическа и топлинна енергия в "КОСТЕНЕЦ – ХХИ" АД"**

и

като имаме предвид перспективите за развитие на региона, в който са разположени нашите фирми, а именно:

възможността за по-скорошна газификация на гр. Костенец и изграждането на газоразпределителна мрежа, вследствие на това нашата фирма да подобри съществено енергийна си ефективност и да снижи разходите за енергия,

наред с това разшири дейността си и създаде нови работни места,

като съдейства за постигане на благоприятна околна среда за населението на Общината,

в унисон с дългогодишното сътрудничество между нашите две фирми,

считаме, че изграждането на ко-генерационната инсталация ще допринесе не само за просперитета на повереното Ви Дружество, но и на нашата фирма и на град Костенец като цяло.

НЕ ВЪЗРАЗЯВАМЕ

срещу осъществяването на Инвестиционния проект за газов ко-генератор в "КОСТЕНЕЦ – ХХИ" АД.

С уважение: инж. Г. Кирков
.....
/име, длъжност, печат/

*(Translation from Bulgarian)*

BULKOST LTD
The town of KOSTENEC
Ref. No.: *52*

| | | |
|---|---|---|
| *February 23rd, 2005* | | To the Director |

of Kostenec HHI AD
the town of KOSTENEC

| | | |
|---|---|---|
| Re.: Your ref. No.: *A-109/23.02.2005* | | *Seal:* KOSTENEC HHI JOINT-STOCK COMPANY Inc. No.: *006/February 23rd, 2005* the town of KOSTENEC |

Dear Director,

We reviewed your idea of Investment Project for

**"Gas co-generator of electric and thermal power at KOSTENEC HHI AD"**

and
taking into account the development prospects for the region in which our companies are located, namely:

the possibility for forthcoming gasification of the town of Kostenec and construction of gas-distribution network, as a result of which our company would significantly raise its power efficiency and would lower its power-related expenses,

in parallel with that to develop its business and to establish new workplaces,

and to help for the attainment of favourable environment for the local population,

in the context of the long-lasting partnership between our two companies,

we believe that the construction of the co-generator facility would not only contribute to the prosperity of the Company you manage, but to the prosperity of our Company and of the town of Kostenec as a whole.

WE DO NOT OBJECT

against the implementation of the Gas Co-Generator Investment Project at KOSTENEC HHI AD.

| | | |
|---|---|---|
| | *(Round seal of Bulkost Ltd., Kostenec)* | Yours sincerely, *Dipl. Eng. G. Kitov* *(Sgd. ill.)* /name, office, seal/ |

*I undersigned, , do hereby certify that this is a true and correct translation I have made from Bulgarian into English of the document "Letter with Inc. No.: 006/February 23rd, 2005" attached hereto. The translation contains 1 page.*
*Sworn translator:*
*Elena Mihaylova Zaharieva, personal number 5601226694*

„ДИМКО СТАР“ ЕООД гр. София

ФАБРИКА ЗА МЕТАЛОПРЕСОВО ПРОИЗВОДСТВО, гр. Костенец
Тел.: 07142/20-56

Изх№:30/23.02.05

ДО
ДИРЕКТОРА
НА "КОСТЕНЕЦ-ХХИ"-АД
ГР.КОСТЕНЕЦ

**ОТНОСНО:** Ваш изходящ № А- 112 от 23.02.2005 г.

Уважаеми г-н Директор,
Запознахме се с Вашето намерение за Инвестиционен проект **"Газов ко-генератор за електрическа и топлинна енергия в "Костенец-ХХИ" АД** и като имаме в предвид перспективите за развитие на региона в който са разположени нашите фирми, а именно: Възможността за по-скорошна газификация на гр.Костенец и изграждането на газоразпределителна мрежа, вследствие на това нашата фирма да подобри съществено енергийната си ефективност и да снижи разходите за енергия, наред с това разшири дейността си и създаде нови работни места, като съдейства за постигане на благоприятна околна среда за населението на Общината, в унисон с дългогодишното сътрудничество между нашите две фирми, считаме че изграждането на такава инсталация ще допринесе не само за просперитета на дружеството Ви, но и на нашата фирма и на град Костенец, като цяло.

**НЕ ВЪЗРАЗЯВАМЕ** срещу осъществяването на Инвестиционния проект за газов ко-генератор в "Костенец-ХХИ"АД.

„ДИМКО СТАР" ЕООД
УПРАВИТЕЛ:
„ДИМКО СТАР"
ЕООД
гр. СОФИЯ

*(Translation from Bulgarian)*

| | | |
|---|---|---|
| *(Emblem)* | | ***DIMCOSTAR EOOD, the city of Sofia***<br>METALPRESS PRODUCTION FACTORY, the town of Kostenec |

Tel.: 07142/20-56

*Ref. No.: 70/23.02.05*

**TO THE DIRECTOR**
**OF KOSTENEC HHI AD**
**THE TOWN OF KOSTENEC**

**RE.**: Your ref. No.: A-112 of23.02.2005

Dear Director,

We reviewed your idea of Investment Project for **"Gas co-generator of electric and thermal power at KOSTENEC HHI AD"** and taking into account the development prospects for the region in which our companies are located, namely:
the possibility for forthcoming gasification of the town of Kostenec and construction of gas-distribution network, as a result of which our company would significantly raise its power efficiency and would lower its power-related expenses, in parallel with that to develop its business and to establish new workplaces, and to help for the attainment of favourable environment for the local population, in the context of the long-lasting partnership between our two companies, we believe that the construction of such facility would not only contribute to the prosperity of the Company you manage, but to the prosperity of our Company and of the town of Kostenec as a whole.

**WE DO NOT OBJECT** against the implementation of the Gas Co-Generator Investment Project at Kostenec HHI AD.

MANAGER:
*(Sgd. ill.)*
D. Enikiev

*(Rectangular seals of Dimcostar EOOD, the city of Sofia)*

*I undersigned, , do hereby certify that this is a true and correct translation I have made from Bulgarian into English of the document "Letter with ref. No.: 70/February 23rd, 2005" attached hereto. The translation contains 1 page.*
*Sworn translator:*
*Elena Mihaylova Zaharieva, personal number 5601226694*

„МАРИЦА-Н.И.С."ООД
„МАРИЦА-НИС" ООД е сертифицирана по ISO 9001

Гр.Костенец ул."Янтра"№ 20 тел.код.07142/23-07 тел.факс 20-55
E-mail: MARICA_NIS@ABV.BG

МАРИЦА-НИС ООД
гр.КОСТЕНЕЦ
ИЗХ № 21
22.02/ 2005г

**До Директора**
**На „Костенец-ХХИ" АД**
**Гр. Костенец**

АКЦИОНЕРНО ДРУЖЕСТВО "КОСТЕНЕЦ - ХХИ"
Вх. № 005/23.II 20.05 г.
гр. КОСТЕНЕЦ

Относно Ваш изх. № А-111/23.02. 2005г.

**Уважаеми Господин Директор,**

Запознахме се с Вашето намерение за Инвестиционен проект:

**„Газов ко-генератор за електрическа и топлинна енергия в „КОСТЕНЕЦ-ХХИ" АД"**

и

като имаме предвид перспективите за развитие на региона, в който са разположени нашите фирми, а именно:

възможността за по-скорошна газификация на гр. Костенец и изграждането на газоразпределителна мрежа, в следствие на това нашата фирма да подобри съществено енергийната си ефективност и да снижи разходите за енергия,

наред с това разшири дейността си,

като съдейства за постигане на благоприятна околна среда за населението на Общината,

в унисон с дългогодишното сътрудничество между нашите две фирми,

считаме, че изграждането на ко-генерационната инсталация ще допринесе не само за просперитета на повереното Ви Дружество, но и на нашата фирма и на град Костенец като цяло.

**НЕ ВЪЗРАЗЯВАМЕ**

срещу осъществяването на Инвестиционния проект за газов ко-генератор в „КОСТЕНЕЦ-ХХИ" АД

**С УВАЖЕНИЕ:**
**Управител Никола Конаранов**

*(Translation from Bulgarian)*

| NiS | | LLOYD'S REGISTER QUALITY ASSURANCE ISO9001 |
|---|---|---|

# MARITZA-N.I.S. OOD

MARICA-NIS OOD is ISO9001 certified

The town of Kostenec, 20, Yantra St., tel. code: 07142/23-07, tel./fax: 20-55
E-mail: MARICA_NIS@ABV.BG

MARITZA-N.I.S OOD

| the town of KOSTENEC<br>Ref. No.: *21*<br>*February 23rd*, 2005 | | To the Director<br>of Kostenec HHI AD<br>The town of KOSTENEC |
|---|---|---|

*Seal:*

| Re.: Your ref. No.: A-111/23.02.2005 | | KOSTENEC HHI<br>JOINT-STOCK COMPANY<br>Inc. No.: *005/February 23rd*, 2005<br>the town of KOSTENEC |
|---|---|---|

Dear Director,

We reviewed your idea of Investment Project for

**"Gas co-generator of electric and thermal power at KOSTENEC HHI AD"**

and
taking into account the development prospects for the region in which our companies are located, namely:

the possibility for forthcoming gasification of the town of Kostenec and construction of gas-distribution network, as a result of which our company would significantly raise its power efficiency and would lower its power-related expenses,

in parallel with that to develop its business,

and to help for the attainment of favourable environment for the local population,

in the context of the long-lasting partnership between our two companies,

we believe that the construction of the co-generator facility would not only contribute to the prosperity of the Company you manage, but to the prosperity of our Company and of the town of Kostenec as a whole.

**WE DO NOT OBJECT**

against the implementation of the Gas Co-Generator Investment Project at KOSTENEC HHI AD.

| | YOURS SINCERELY, *(Sgd. ill.)*<br>Manager: Nikola Koparanov | *(Round seal of MARITZA-N.I.S OOD, Kostenec)* |
|---|---|---|

*I undersigned, , do hereby certify that this is a true and correct translation I have made from Bulgarian into English of the document "Letter with Inc. No.: 005/February 23rd, 2005" attached hereto. The translation contains 1 page.*
*Sworn translator:*

*Elena Mihaylova Zaharieva, personal number 5601226694*

# Toplofikatsia Kazanlak JSC

„ТОПЛОФИКАЦИЯ-КАЗАНЛЪК" ЕАД
Вх. № 03-86
22.02.05 г.

ДО
Г-Н ИВАЙЛО МАРИНОВ
ИЗПЪЛНИТЕЛЕН ДИРЕКТОР
НА ТОПЛОФИКАЦИЯ КАЗАНЛЪК ЕАД
КАЗАНЛЪК

Уважаеми г-н Маринов,

След като на събрание на 17.02.2005 г. бяхме запознати с намерението Топплофикация да направи инвестиции в промяна на горивото за производство от мазут на природен газ и да пусне в експлоатация газови модули, които да произвеждат едновременно топлинна и електрическа енергия, както и с ефектите от това, изразяваме следното мнение:

Намираме намеренията на Вашето дружество за положителни, като според нас ние потребителите ще почувстваме ефекта им в две направления:

Първо – ще въведете ново оборудване, което ще е с по-висока ефективност и намалени разходи и по този начин ще можете да произвеждате по-евтина топлинна енергия и ще можете по-добре да задоволявате нашите потребности.

Второ – като смените горивото за производство от мазут на природен газ ще се подобри екологичната обстановка в града и от комина на Топлофикация няма да излизат вредни газове и ние и нашите деца ще дишат по-чист въздух.

Надяваме се, че ще можете бързо да реализирате намеренията си.

За присъстващите на събранието:

1. Димчо Колев Иванов
2. Иван Трифонов Иванов
3. Пенка Митева Ганчева
4. Владо Христов Чаушев

18.02.2005 г.
Казанлък

*2, Dondukov Str., Apt. B2*
*Tel./Fax: + 359 431 6 42 76*
*E-mail: interpreto@orbinet.bg*



Translated from Bulgarian
Ref. No. 03-86 22.02.2005

Attention: Mr. Ivaylo Marinov
The Chief Executive Manager:
"TOPLOFIKACIYA" - KAZANLAK, Single Person Joint Stock Company
Kazanlak town

Dear Mr. Marinov,

After a meeting, held on 17/02/2005, we were acquainted with investment intention of "TOPLOFIKACIYA" - Kazanlak, Single Person Joint Stock Company , related to project realization concerning changing fuel line from fuel oil into natural gas and putting into service the co-generating gas modules, which w II simultaneously produce thermal and electrical energy as well as efficiency results, we would like to express our opinion as follows:

According to our consideration, Your intentions will be positive and we, the consumers will feel the effect into two directions:

**First** - you will put into service a new and high efficient equipment that w II reduce expenses and in that way you will produce cheaper thermal energy as to be satisfied our needs

**Second** - by changing fuel line - from fuel oil to natural gas, the environment in the town will be ecologically protected , harmful gases will be eliminated from the chimney of "Toplofikaciya" - Kazanlak company and our children will breathe fresh air.

We hope that you will be able to realize our project as soon as possible.

persons on the meeting:

1. Dimcho Kolev Ivanov
2. Ivan Trifonov Ivanov
3. Penka Miteva Gancheva
4. Vlado Hristov Chaushev

(followed by signatures) 18/02/2005

Kazanlak

# ОБЩИНА КАЗАНЛЪК

**6100 Казанлък, ул. „Розова долина“ 6**

ТЕЛЕФОНИ: КМЕТ /0431/ 22 580, ФАКС /0431/ 25 164
ЗАМ. КМЕТ /0431/ 22 581
ЗАМ. КМЕТ /0431/ 25 149
ЗАМ. КМЕТ /0431/ 22 584
СЕКРЕТАР НА ОБЩИНАТА /0431/ 23 192
e-mail: mayor_kz@kz.orbitel.bg


ОБЩИНА КАЗАНЛЪК
№ 73-00-7
24.01.2005

ДО
Г-Н ИВАЙЛО МАРИНОВ
ИЗПЪЛНИТЕЛЕН ДИРЕКТОР
на "ТОПЛОФИКАЦИЯ – КАЗАНЛЪК" ЕАД
ГР.КАЗАНЛЪК

ОТНОСНО: Инвестиционни намерения на "Топлофикация - Казанлък" ЕАД за реализация на проект за смяна на горивната база от мазут на природен газ и въвеждане в експлоатация на когенериращи газови модули

Уважаеми г-н Маринов,
Община Казанлък е много добре запозната с Вашите инвестиционни намерения за реализация на проект за смяна на горивната база от мазут на природен газ и въвеждане в експлоатация на когенериращи газови модули.
Ние приветстваме тези Ваши намерения, тъй като те ще доведат до положителен ефект в няколко направления:

- ще се замени физическо и морално остаряло оборудване за комбинирано производство на топлинна и електрическа енергия с нови и на високо технологично равнище когенериращи газови модули;
- ще се гарантира непрекъснато и с високи качествени показатели, при приемливи цени, топлоснабдяване на населението на Общината ползващо централизирано топлоснабдяване;
- ще се създаде възможност за присъединяване на нови потребители в т.ч. и общински обекти;
- ще се постигне значителен екологичен ефект от промяната на горивната база от мазут на природен газ чрез намаляне до 2/3 на емисиите на $CO_2$, до 1/2 на емисиите на $NO_x$ и практическо прекратяване емисиите на $SO_2$.
- при предвиденото целогодишно производство на електроенергия, ще се осигури в определена степен автономност и гарантираност на електроснабдяване на важни общински обекти при извънредни ситуации;

Община Казанлък ще предприеме всички зависещи от нея действия, подпомагащи реализацията на проекта.

Като вярвам искренно в успешното изпълнение на проекта, оставам
С уважение

Стефан Дамянов
Кмет

# INTERPRETO

SD "lnterpreto - Nacheva, Tsankova & Kozhuharova"

*BG -6100 Kazanlak*
*2, Dondukov Str., Apt B2*
*Tel./Fax: +359 431 6 42 76*
*E-mail: interpreto@orbinet.bg*


*Translated from Bulgarian.*

**KAZANLAK MUNICIPALITY**
6, Rozova Dolina street, Kazanlak 6100
Tel: Mayor/0431/22 580; Fax: /0431/ 25 164
Deputy Mayor: /0431/ 22 581
Deputy Mayor: /0431/ 25 149
Deputy Mayor: /0431/ 22 584
Municipal Secretary: /0431/23 192
e-mail :mayor__kz.orbitel.bg

Ref. No. 73-00-7
24.02.2005

**Attention:** Mr. Ivaylo Marinov
The Chief Executive Manager:
"TOPLOFIKACIYA" - Kazanlak, Single Person Joint Stock Company
Kazanlak town

**Regarding:** "TOPLOFIKACIYA" - Kazanlak, Single Person Joint Stock Company investment intention, related to project realization concerning changing fuel line from fuel oil to natural gas and putting into service the co-generating gas modules.

Dear Mr. Marinov,

Municipality authorities are very well acquainted with your investment intention, related to project realization concerning changing fuel line from fuel oil to natural gas and putting into service co-generating gas modules.

Congratulations on your intention as it will lead to positive effect in several directions as follows:

- replacement of the old and outdated equipment for combined production of thermal and electrical energy with new and on a high technological level co-generating gas modules.

- Continuous heat supply to Kazanlak Municipality inhabitants using central

heating will be guaranteed in high quality indices at acceptable price.

it will be given a possibility to be joined new consumers including Municipal construction sites;

obtaining considerable ecological effect by changing fuel line from fuel oil into natural gas through 2/3 emissions decrease of $CO_2$, *Vi* $NO_X$ and practical cessation of $SO_2$ emissions;

during annual foreseen energy production, it will be provided, to a certain extent, independence and guaranty in electrical supply to important Municipal sites in case of emergency.

Kazanlak Municipality authorities will take all measures depending on its power concerning project realization.

I sincerely hope that project implementation will be successful. Faithfully

Yours

Stefan Damyanov
The Mayor
(followed by signature and official seal).

РЕПУБЛИКА БЪЛГАРИЯ
ОБЛАСТЕН УПРАВИТЕЛ НА ОБЛАСТ ЯМБОЛ

№ 9110231
16.07. 2004 г.

**ДО**

**МИЛКО КОВАЧЕВ**
**МИНИСТЪР НА ЕНЕРГЕТИКАТА**
**И ЕНЕРГИЙНИТЕ РЕСУРСИ**

**ТАСКО ЕРМЕНКОВ**
**ИЗПЪЛНИТЕЛЕН ДИРЕКТОР**
**НА АГЕНЦИЯТА ЗА**
**ЕНЕРГИЙНА ЕФЕКТИВНОСТ**
**СОФИЯ**

**КОПИЕ:**

**ДО**

**ВАСИЛ АЛЕКСИЕВ**
**ИЗПЪЛНИТЕЛЕН ДИРЕКТОР**
**НА "ТОПЛОФИКАЦИЯ-ЯМБОЛ" ЕАД**
**ГР.ЯМБОЛ**

# ПИСМО ЗА ПОДКРЕПА

ОТНОСНО: *Проект за енергийна ефективност: Топлофициране на 6000 броя приведени апартаменти в ж.к. "Златен рог", ж.к. "В. Левски" и централната градска част на гр. Ямбол*

Представен от: "Топлофикация – Ямбол" ЕАД

Проектът на "Топлофикация – Ямбол" ЕАД има за цел да разшири дейността и повиши енергийната ефективност на дружеството. Той обхваща: изграждане на газопроводно

отклонение, подмяна на съществуващата и изграждане на нова топлопреносна мрежа, подмяна на стари абонатни

Във връзка с: хх-4702 / 0107 от 05.7.2004 г. 17:31:28

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станции с нови, доставка и инсталиране на газов модул за когенерация и подмяна на мрежови помпи и управлението им. Проектът е на стойност 9,5 млн. лв., ще бъде изпълнен в сътрудничество с фирма Danfoss и ще доведе до чувствително намаляване на вредните емисии на въглероден диоксид. Проектът съответства на Областната стратегия за развитие и на Общинския план за развитие – Ямбол.

Подкрепям проекта и съм уверен в успешното му изпълнение и устойчивите резултати от него.

**ОБЛАСТЕН УПРАВИТЕЛ:**


**(М. СПАСОВ)**

**REPUBLIK OF BULGARIA**

**REGIONAL GOVERNOR OF REGION OF YAMBOL**

To
Mr.Milko Kovachev
Minister of Energy and
Energy Resources

Mr.Tasko Ermenkov
Executive Director of
Agency for Energy Efficiency
Sofia

Copy to:

Mr-Vassil Alexiev
Executive Director of
Heat Station – Yambol

# LETTER OF SUPPORT

Regarding Project for energy efficiency: supplying with a centralized heating system of 6 000 private custom subscribers /apartments/ in residential quarters of the town of Yambol – Zlaten Rog, Vassil Levski and central part

Presented from Toplofikacia Yambol EAD

The project of Heat Station Yambol aims to expand the activities and to increase the energy efficiency of the company. The project scopes: Construction of a gas-main deviation; Rehabilitation of the existing heat-conveying network and construction of a new heat-conveying network; Replacement of the old vapour subscriber's stations with new one and delivery and installation of new subscriber's stations; Delivery and installation of a gas module for combined production of electrical and heat power; Replacement of the network pumps and their control. The project amounts to 9,5 million levs and it will be implemented in a collaboration with Danfoss Company, as a result tere will be a considerable reduction of damaging emissions of carbon.

The projesct corresponds to the Regional Strategy for development and the Municipal Plan for development – Yambol.

We hereby support the projest and we are convinced in its successful implementation and in its steady results.

**REGIONAL GOVERNER**

**M.SPASOB**

**МИНИСТЕРСТВО НА ЕНЕРГЕТИКАТА
И ЕНЕРГИЙНИТЕ РЕСУРСИ**

ул.Триадица №8
1000 гр.София

Вх 278/20.09.2004г

Тел: 5490 9Факс980 76 30
pressall@doe.bg

26 06/420-15.09.04

Наш регистрационен индекс и дата

**До**
**Г-н Васил Алексиев**
**Изпълнителен директор на**
**"Топлофикация - Ямбол" ЕАД**
**гр. Ямбол**

**На Ваш № 575/05.07.2004г.**

**Относно: Изпълнение на проект за топлоснабдяване на 6000 броя приведени апартамента и инсталиране на ко-генерираща мощност в "Топлофикация-Ямбол" ЕАД**

**Уважаеми Господин Алексиев,**

В изпълнение на одобрената от Министерство на енергетиката и енергийните ресурси Бизнес програма, от месец май 2002 г. "Топлофикация - Ямбол" ЕАД възобнови основната си дейност.

В края на 2003 г. дружеството възстанови статуквото си на пряк потребител на "Булгаргаз"ЕАД чрез изграждане на газопроводно отклонение от Автоматична газоразпределителна станция на "Булгаргаз". Това осигури по-евтин източник на природен газ, с което се намали себестойността на продукцията и позволи привличане на нови промишлени, стопански и битови консуматори на топлинна енергия.

С подмяната на съществуващата топлопреносна мрежа и предстоящото изграждане на 5000 м нова мрежа от предварително изолирани тръби с топлоносител гореща вода ще се осигури намаляване на технологичните разходи при преноса на топлинна енергия и възможност за присъединяване на нови консуматори.

Със заповеди на министъра на енергетиката на дружеството се прехвърли оборудване за 22 броя абонатни станции, доставени със заем 3937 BUL на Световната банка. По този начин старите абонатни станции с топлоносител пара се замениха с нови на топлоносител гореща вода, с което се постига намалена консумация на топлинна енергия при запазване на комфорта в жилищата. Присъединяване на нови консуматори на топлинна енергия започна и чрез монтаж на индивидуални абонатни станции и индивидуални топломери на Danfoss. По този

начин се преминава към директно топлоснабдяване на всеки отделен имот в сгради - етажна собственост и точно отчитане на изразходваната топлинната енергия.

Министерство на енергетиката и енергийните ресурси изразява своята подкрепа за необходимостта от разширяване на топлопреносната мрежа и присъединяване на нови потребители, което ще доведе до увеличение на топлинният товар на дружеството. От своя страна това ще позволи реализация на проект за комбинирано производство на електрическа и топлинна енергия на базата на ко-генерационен двигател, което е важно условие за ефективността на топлофикационната система

По предварителни разчети присъединяването на нови абонати и ефективното използване на природния газ с инсталиране на ко-генерационен модул ще спести изхвърлянето на вредни карбонови емисии в размер на 80 000 т/година. Това кореспондира с ангажиментите на Република България съгласно Протокола от Киото и Директива 2004/8/ЕС на Европейския Парламент и на Съвета.

Министерство на енергетиката и енергийните ресурси подкрепя изпълнението на инвестиционните дейности на "Топлофикация - Ямбол" ЕАД. По този начин ще бъдат осигурени технически и финансови условия за развитие на дружеството, ще се постигне качествено топлоснабдяване и поддържане на приемливо ниво на цената на топлинната енергия за потребителите в гр.Ямбол. Не на последно място горните инвестиционни дейности ще се отразят положително за опазване на околната среда.

Към настоящото писмо прилагаме становището на Агенцията по енергийна ефективност относно реализацията на проекта.

Приложение: Съгласно текста

С уважение,

Ангел Минев
*Зам. министър*

**MINISTRY OF ENERGY AND ENERGY RESOURCES**

**8, Triadiza Str**
**1000 Sofia**

**ATTN: Mr Vasil Alexiev,**
**Executive Director of**
**Toplofikatzia Jambol Plc**
**Town of Jambol**

**To your No 575/ 05.07.2004**

**Re: Execution of the project for heat-supply of 6000 regarded as equal apartments and installation of co-generation power in "Toplofikatzia Jambol" Plc.**

**Dear Mr. Alexiev,**

**In execution of the approved by the Ministry of Energy and Energy resources Business program, dated May 2002 the "Toplofikatzia Jambol" Plc. resumed its main activity.**

**At the end of the 2003 the company restored its status quo as a direct consumer of "Bulgargas" Plc by constructing of a gas-pipe deviation from the Automatic Gas-distribution Station of "Bulgargas" Plc. This ensured a cheaper source of natural gas, which caused a diminution of the prime cost of the production and allowed some new industrial, economic and public consumers of heat power to be attracted.**

**With the replacement of the existing heat – conveying network and the forthcoming construction of a new 5000 m long network, executed with a preliminary isolated pipes and a heat-carrier hot water, a reduction of the technological expenses by the heat-conveying will be insured.**

**With the ordinance of the Minister of energy and energy resources a equipment consisting of 32 heat – supply subscriber's stations had been transferred to the company and they had been delivered against an loan of 3937 BUL from the World Bank. This way the old heat-supply subscriber's stations had been replaced by new one having a heat-carrier - hot water, which will cause a reduced consumption of heat power by preservation of the comfort in the houses. Attachment of new consumers of heat power has been started also by an installation of new heat meters of the type Danfoss. By this has been passed over to a direct heat-supply of each one separate possession in the building – floor property and an exact accounting of the heat power consumed.**

**The Ministry of Energy and Energy Resources expresses its support to the necessity of extension of the heat-conveying network and the incorporation of new consumers, which will bring to an increase of the heat load of the company. On its part this will allow a realization of a project for combined production of electrical and heat power on the base of the co-generation engine, which represents an important condition for the efficiency of the centralized heat supplying system.**

**According the preliminary planning the incorporation of new subscribers and the effective utilization of the natural gas with the installation of the co-generation module will save the ejection of harmful carbon emissions in the amount of 80 000 t/annually. This corresponds to the engagements of the Republic of Bulgaria according to the Protocol from Kyoto and the Directive 2004/8/EU of the European Parliament and of the Council.**

**The Ministry of Energy and Energy Resources supports the execution of the investment activities of the "Toplofikatzia-Jambol" Plc. By this there will be ensured technical and financial conditions for the development of the company and will be achieved a qualitative heat - supply and the price of the heat power for the consumers of Jambol will be kept at an acceptable level. And one substantial point – the above mentioned investments will affect positively to the preservation of the environment.**

**Enclosed to the present letter we apply the Standpoint of the Agency for Energy Efficiency on this project.**

**Appendix: According the text.**

**Kind regards**

**Angel Minev**

**Deputy Minister**

МИНИСТЕРСТВО НА ЕНЕРГЕТИКАТА И ЕНЕРГИЙНИТЕ РЕСУРСИ

АЕЕ ЕЕА

**АГЕНЦИЯ ПО ЕНЕРГИЙНА ЕФЕКТИВНОСТ**

София 1000, ул. Бизарх Йосиф N:37, ет. 3, Тел./ Факс: 981 5802

# СТАНОВИЩЕ

**ОТНОСНО: Проект за енергийна ефективност: Разширяване на дейността и повишаване на енергийната ефективност в "Топлофикация Ямбол" ЕАД**

Целта на проекта е дружеството да осигури съществуването си и да реализира мерки, позволяващи бъдещото му развитие. Тази цел се предполага, че може да бъде реализирана чрез мотивиране на голям брой потребители да изкупуват произведената от дружеството топлинна енергия. Вероятно ръководството на дружеството, от опит и/или чрез проучване и анализ на факторите, влияещи на финансовите постъпления от продажба на топлинна енергия, е стигнало до извода да развие производство и реализация на продукт с гарантиран пазар и нормативно осигурено ритмично заплащане. Горните условия се реализират чрез производството на електрическа енергия, тъй като продажбата й гарантира сигурни и ритмични финансови приходи.

По-различен е случаят с реализирането на топлинната енергия, където трудно би се реализирал планирания брой абонати. Изводът се налага от опита на топлофикационните дружества. В случая има и отежняващи обстоятелства:

- необходимост от съгласие между групи собственици за финансиране закупуването на Групови абонатни станции (ГАС);
- закупуване от собственици на индивидуални микроабонатни станции (ИМАС), закупуване на измерителни уреди, ремонтни работи и др.
- ниска събираемост на дължимите суми, финансовите постъпления значително изостават от продажбите и не постъпват ритмично.

Дружеството приема план за преструктуриране производството и разпределението на енергия. За целта привлича финансови средства и вече е извършило някои строителни и ремонтни работи. Дружеството търси външно финансиране за завършване на започнатата реконструкция и по-нататъшното

реализиране на отделните етапи от проекта. Най-съществения момент е закупуване и монтаж на ко-генерационен агрегат. Цялостното реализиране на проекта е с краен срок 2007 г., при условие, че се осъществи инвестиционния план

Към настоящия момент част от планираните работи за строителни и монтажни работи са в процес на реализация.

В напреднала фаза на строителството е подобект "Подмяна на съществуващата топлопреносна мрежа и изграждане на нова сдвоена с предварително изолирани тръби с дължина 5000м.",

Завършена е подмяната на топлопреносната мрежа в част от ж.к."Златен рог", към която са присъединени 500 приведени апартамента.

Повишаването на енергийната ефективност ще бъде осъществено след внедряване на следните реални мерки:

- Технически – нови тръбопроводи за захранване на дружеството с гориво; нова топлопреносна мрежа; преминаване от топлоносител наситена пара към гореща вода; нови абонатни станции; индивидуално отчитане на повече от половината планирани потребители; монтиране на технологично оборудване, позволяващо гъвкав режим на контрол и промяна парамстрите на подавания топлоносител и др.
- Организационни – възможност за прилагане енергоспестяващи мерки към потребители на топлинна енергия от обществения и държавния сектор.
- Монтаж на ко-генерационен агрегат.

Особено голям ефект ще се получи при реализиране на проекта върху намаляване емисиите на въглеродни окиси, при отпадане използването на твърди и течни горива за отопление на жилищни и обществени сгради.

**С реализирането на проекта се очаква:**

- **"Топлофикация Ямбол" АД да се стабилизира и да си осигури технологични и финансови възможности за бъдещо разширение на абонатната мрежа;**
- **Да се повиши доверието от страна на потребителите по отношение заплащането на стойността на действително получената топлинна енергия;**
- **Да се подобри комфорта на микросредата и чистотата на околната среда.**
- **Като цяло реализирането на проекта да има положителен социален ефект.**

**Като се има предвид държавната политика, провеждана от АЕЕ за насърчаване и съдействие на мерките за енергийна ефективност и реализиране на проекти за намаляване на енергийните разходи на крайните потребители, предлагам да се подкрепи реализирането на проекта.**

Таско Ерменков
Изпълнителен директор

МИНИСТЕРСТВО НА ИКОНОМИКАТА И ЕНЕРГИЙНИТЕ РЕСУРСИ
АГЕНЦИЯ ПО ЕНЕРГИЙНА ЕФЕКТИВНОСТ

AGENCY FOR ENERY EFFICIENCY

STATEMENT

Regarding Project for energy efficiency – Expanding of the activities and increasing the energy efficiency at Yambol Heat Station

The target of the project is to provide the existence of the company and to take steps for company's future development. This target is supposed to be implemented through the motivation of big number of subscribers buying up the heat energy produced by the company. Probably the managers of the company, based on experience or/and through a survey and analysis of the factors influencing the financial receipts from the sale of heat energy, have reached to the conclusion of developing of the production and realization of a product with guaranteed market and normatively provided rhythmical payments. The upper described circumstances are attained through the production of electricity as far as the sale of electricity guarantees sure and rhythmic financial incomes.

The case with the heat energy is different as far as it is difficult to be reached the number of the planned subscribers. The conclusion is made out of the experience of the heating stations. Here there are some complicating circumstances:

- the necessity of an agreement between the groups of owners for the financing of the acquiring of Group Subscribers' Stations;
- acquiring from owners of individual micro subscribers stations, measuring devices, current repairs and so on.
- Low gathering of the amounts due, the financial receipts are significantly falling behind from the sales and are not rhythmical.

The company approves a plan for restructuring of the manufacture and distribution of energy. For that purpose the company attains financial resources and has already completed some construction and repair works. The company is seeking for an outside financing for the completion of the reconstruction and further implementation of the phases of the project. The most essential issue is the delivery and installation of co-generation module.The project should be completed till 2007 on the condition of the fulfilment of the investment plant of the company.

At present a part of the planned construction and assembly works are in a process of realization.

In an advanced state is the phase of Rehabilitation of the existing heat-conveying network and construction of a new heat-conveying network based on preliminary isolated pipes with length of 5000 m.

The replacement of the conveying network in Zlaten Rog estate is completed and 500 subscribers are attached.

The increasing of the energy efficiency will be attained after the implementation of the measures as follows:

- Technical measures – new pipelines for supplying of the company with fuel; new heat-conveying network; transition from one heat carrier to another – t.e. from vapour to hot water; new subscribers' stations; individual reading of more than a half of the planned subscribers; assembling of technical equipment in order of flexible regime of control and alternation of the parameters of heating conduct….

- Organizational measures – possibility of applying energy saving measures towards the consumers of heat energy at the public and state sector.
- Installation of co-generation aggregate

Significantly great effect will be attained after the implementation of the project in reference to the reduction of the emissions of carbon oxide after the dropping out of the consumption of solid and liquid fuels for heating of residential and public buildings.

With the completion of the projects the following results are expected:

- Yambol Heat Station Company to be stabilized and technological and financial opportunities for the future expanding of the conveying system to be provided
- The confidence in the consumers to be increased in reference to the payment of actually delivered heat energy
- The comfort of the micro climate and the cleanliness of the environment to be increased
- The implementation of the project as a whole to have a positive social effect.

Regarding the state policy conducted through Agency for Energy Efficiency pointed towards encouraging and assistance of the measures for energy efficiency and realization of projects for reduction of energy expenses of the ultimate consumers I propose the implementation of the project to be supported.

Tasko Ermenkov
Executive Director

**ДО**
**ИЗПЪЛНИТЕЛНИЯ ДИРЕКТОР**
**НА "ТОПЛОФИКАЦИЯ ЯМБОЛ" ЕАД**
**ГР. ЯМБОЛ**

# С Т А Н О В И Щ Е

**от представители на жителите в ж.к."Златен рог", ж.к."В. Левски", квартал "Възраждане" и централна част на гр. Ямбол**

**ОТНОСНО: Проект за енергийна ефективност на "Топлофикация Ямбол" ЕАД и централно топлофициране на град Ямбол.**

Уважаеми господин Изпълнителен Дириктор,

На основание проведените срещи и направената от Вас разяснителна дейност по смисъла, екологичната значимост и социалния ефект от осъществяването на дългосрочен проект за едновременно производство на топлинна и електрическа енергия и централно топлофициране гр Ямбол, подкрепяме вашите усилия и желаем успешното му реализиране.

Изразяваме нашата увереност, че при цялостната реализация на проекта до края на 2007 год., ще се стимулира присъединяването на много по-голям брой потребители на топлинна енергия.

Известно е на обществеността, че централизираното топлоснабдяване при голям брой на абонатите, дава възможност за най-евтин начин на отопление и за включване на по-голям брой социално слаби семейства.

Монтирането на нови съвременни абонатни станции облегчава индивидуалното топлоснабдяване на всички желаещи, независимо от мнението на останалите собственици във входа на жилищния блок.

Съвременните средства за мерене, дават възможност по всяко време за точно и обективно отчитане на потребената топлинна енергия от всеки абонат.

Като се има в предвид, че до сега в града не е имало централно топлоснабдяване, с изпълнението на Вашия проект ще се даде възможност на гражданите да избират различни алтернативни източници за отопление при икономически най-изгодни пазарни условия.

Като изразяваме мнението на по-голяма част от гражданите в нашите квартали, подкрепяме проекта за топлофициране на града с едновременното производство на топлинна и електрическа енергия.

С уважение !

Представители на:
Ж.К. "Златен рог": .....
Ж.К. "В.Левски": .....
Квартал "Възраждане": .....
Център: .....

TO
ECECUTIVE DIRECTOR OF
"TOPLOFICACIA JAMBOL" J.S.C.
Town JAMBOL

# POSITION

**from represent of inhabitants in l.c."Zlaten rog", l.c. "V.Levski", qarter "Vuzrajdane" and central part of town Jambol**

**ABOUT: Project for energy effective of "Toplofikacia Jambol" J.S.C. and central heating of town Jambol.**

Dear mr. Executive Director,

Basis of organize meetings and your explained activity on sense , ecological importance and social effect from raelization of long – term project for coincident production of warm and electricity energy and central heating of town Jambol we support yours efforts and want it's successful realization.

We express our confidence that at entire realization of this project until end of 2007 year will be stimulated join of more clients of warm energy.

It's popular, that there are more clients of central heating , this is possibility for cheapest way of heating and for including of more social - poor families.

Mounting of new contemporary subscribery stations make lighter individual warm supply for all desire to, independence from opinion of other owner in entry of living block.

Contemporaneous means for measure give possibility on every time for exactly and objectivity reading of using warm energy by every subscriber.

When make reference to that by now in the town doesn't have central heating, with execution of yours project will be given possibility of citizens for heating at iconomical favourable market conditons.

As we express the opinion of large part of citizens in our qarters, we suport project for heating of town with coincident generating of warm and electricity energy.

With respect!

Representatives of:
l.c."Zlaten rog": .....
l.c."V. Levski" : .....
Quarter "Vuzrajdane": .....
Center .....

**ПОЛИМЕРИ АД - Девня**
тел. 0519 9 28-16, факс 0519 9 27-17, e-mail: office@polimeri.org

Изх.№232-с/24.02.2005г.

До Директора
На РИОСВ
Гр. Варна

**Относно: Преценяване на необходимост от извършване на ОВОС**

Уважаема г-жо Караиванова,

Приложено Ви изпращаме документи по чл.6, от Наредба за условията и реда за извършване на оценка на въздействието върху околната среда на инвестиционно предложение за строителство, дейности и технологии (ДВ бр.25/18.03.2003г.) за преценявана на необходимост от извършване на ОВОС на инсталация за когенерация на територията на "Полимери" АД, гр. Девня заедно с информация по приложение №2 от горе посочената наредба.

Приложение: съгласно текста

С уважение,

ИЗПЪЛНИТЕЛЕН
ДИРЕКТОР:.....
/ А. Главинова

РИОСВ-Регионална инспекция
Варна, ул. "Яне Лапчев" 4, тел. 63 45 79
№ 28-00-112 6
24 FEB 2005

Responsible Care

**ПОЛИМЕРИ АД - Девня**
tel.. 0519 9 28-16, fax 0519 9 27-17, e-mail: office@polimeri.org

Reg.№232-с./24.02.2005 Гг.

To the Director
of Regional
Environmental
and Water Inspection
city of Varna

**Regarding: Consideration of the necessity of implementing an assessment of environmental influence**

Dear Mrs. Karaivanova,

Please find the enclosed documentation in relation to article 6 of the Decree of the clauses and the regulation for the environmental assessment of the investment offer for construction, activities and technologies (State gazette, issue 25/ March 18, 2003) for assessment of the necessity of performing an assessment of environmental influence of installations of co-generation within the territory of "Polymeri" PLC, town of Devnya, together with information regarding application No.2 of the aforementioned decree.

Application: according to text

Best regards,

EXECUTIVE
MANAGER:..... /A. Glavinova/

ПОЛИМЕРИ АД гр. Девня обл. Варненска

ЮСЬ-Регионална инспекция
гр.Вн, ул. "Ян Палах" 4 тел. 63 45 79
№ 28-00-112С
24-FEB-2005

Responsible Care

ИНДУСТРИАЛЕН КОНЦЕРН АКБ ФОРЕС ХОЛДИНГ

**КОСТЕНЕЦ**

26-00-1454
25.02.05

АКЦИОНЕРНО ДРУЖЕСТВО
"КОСТЕНЕЦ - ХХИ"
гр. КОСТЕНЕЦ
ИЗХ. № А-122/24.11.20 05 г.

**До**
**Директора**
**на РИОСВ**
**гр. София**

**Относно:**
**Инвестиционно предложение за газов ко-генератор в Костенец**

**УВАЖАЕМА Г-ЖО БЛАГИЕВА,**

Във връзка с Инвестиционния проект "Газов ко-генератор в "Костенец – ХХИ" АД на ФИК"АКБ ФОРЕС" ХАД и в частност на "КОСТЕНЕЦ – ХХИ" АД като Дружество в структурата на Концерна, в изпълнение на изискванията на чл. 81, (1), т.2 и чл. 93, (1), т.1 от ЗООС, приложено Ви предоставяме необходимата информация за преценка на необходимостта от ОВОС, изготвена съгласно изискванията, посочени в Приложение №2 към чл. 6 на НАРЕДБА за условията и реда за извършване на ОВОС на инвестиционни предложения за строителство, дейности и технологии.

В приложението са включени следните документи:

1. Информация за преценяване необходимостта от ОВОС на Инвестиционното намерение
2. Техническо описание на инсталацията UGT1000 S1 STIG
3. Спецификация на характеристиките на газотурбинния генератор тип UGT1000 на англ. език
4. Данни за инсталацията с оборудване на "МАШПРОЕКТ" за емисии в атмосферния въздух
5. Копия от: Разрешително за водоползване № 405/04.07.2001 МОСВ; Разрешително за заустване на отпадъчни води в повърхностен воден обект № 0437/12.04.2002 РИОСВ; Разрешение за дейности по отпадъците № 12-ДО-23-01/04.04.2003
6. Извадка от карта на РБ – района на гр. Костенец, предоставена от ГУГК – София
7. Копие на Скица на парцел III, кв. 137 от Градоустройствен план на гр. Костенец
8. Копие от Чертеж 183-А-06/3 Ген. план на "Костенец – ХХИ" АД
9. Копие от Чертеж 183-А-06/3 Водопроводи на площадката
10. Копие от Чертеж 183-А-06/5 Канализации на площадката
11. Технологично описание на ПСПОВ към "Костенец – ХХИ" АД
12. Копие от Чертеж 183-А-04/2 Външна кабелна мрежа н.н. и в.н.
13. Копие от Чертеж 183-А-02/1 Технологични междуцехови комуникации

**ИЗП. ДИРЕКТОР:** .....
**инж. Цветан Тотев**

АД "КОСТЕНЕЦ ХХИ" АКЦИОНЕРНО ДРУЖЕСТВО

2030 Костенец, ул. Съединение 2

Централа:
07142 2131
02 984 8361

Директор:
тел.: 07142 2125, факс: 07142 2311
GSM: 0888 570 876
e-mail: kosthhi@mbox.infotel.bg
(mailto: kosthhi@mbox.infotel.bg)

Търговски отдел:
тел.: 07142 2260
тел/факс: 07142 2178
e-mail: marketing-spl@hhi-bg.com
(mailto:marketing-spl@hhi-bg.com)

Производствено-технологичен отдел:
e-mail: tehno@hhi-bg.com

Офис:
1113 София
ул. Фр. Ж. Кюри 20
етаж 10
тел.: 02 963 4160
факс: 02 963 4155
e-mail: hhi_sales@ mail.bg

Translation from English:

Attn: Director
of RIEW
Sofia

**Subject:**
**Investment Proposal for Gas Co-Generator in Kostenez**

**DEAR MRS. BLAGIEVA,**

In regard with the Investment Project "Gas Co-Generator in Kostenez – HHI JSC" of FIC AKB Fores HJSC, and Kostenez – HHI JSC in particular as a Company of the Concern Portfolio, considering the requirements of Section 81, Para (1), Item 2 and Section 93, Para (1), Item 1 of Environmental Protection Law, attached hereunder we present the information needed to estimate the necessity of Environmental Impact Evaluation, compiled as per App.No2 to Section 6 of Regulation for Fulfillment of Environmental Impact Evaluation of Investment Proposals for Construction, Activities and Technologies.

The attachment includes the following documents:

1. Information for Estimation of the Necessity of Environmental Impact Evaluation of the Investment Proposal
2. Technical Description of UGT1000 S1 STIG Installation
3. Specification of the characteristics of gas turbine engine, type UGT 10000
4. Atmospheric Emissions Data for the Installation equipped by "MASHPROJECT"
5. Copies of: Permission for Water Consumption No 405/04.07.2001 MOEW; Permission for Waste Water Discharging into Surface Waters No 0437/12.04.2002 RIEW; Permission for Waste Treatment Activities No 12-DO-23-01/04.04.2003 RIEW
6. Excerpt Map of Republic of Bulgaria, Kostenez Region, supplied by Geodesy and Cartography Main Headquarters – Sofia
7. Copy of Drawing of Lot III, Quarter 137 of Kostenetz Urban Plan
8. Copy of Drawing 183-A-06/3 General Plan of Kostenez – HHI JSC
9. Copy of Drawing 183-A-06/3 Water Main of the Site
10. Copy of Drawing 183-A-06/5 Sewers of the Site
11. Technological Description of WWTS of Kostenez – HHI JSC
12. Copy of Drawing 183-A-04/2 External Electrical Wiring law and medium voltage
13. Copy of Drawing 183-A-02/1 Technological Internal Communications

**MAN. DIRECTOR:** /signed, stamped/

**Dipl. Eng. Evgeni Titev**

2, Seadinenie Str., 2030 Kostenetz, Bulgaria **Tel. Operator:** +359 7142/21 31; +359 887 52 27 84
**Director:** +359 7142/21 25, fax: +359 7142/23 11; +359 888 570 876, **e-mail:** kosthhi@mbox.infotel.bg
**Sales Department:** +359 7142/22 60, fax: 21 78, **e-mail:** marketing-spl@hhi-bg.com
Office: 20, F-J Curie Str., Floor 10, 1113 Sofia, Bulgaria, +359 2/963 41 60, fax: +359 2/963 41 55,
**e-mail:** hhi-sales@mail.bg

# МИНИСТЕРСТВО НА ОКОЛНАТА СРЕДА И ВОДИТЕ
# РЕГИОНАЛНА ИНСПЕКЦИЯ - СТАРА ЗАГОРА

Стара Загора 6000
ул. " Стара Планина " № 2
тел. 042 / 602 683 факс 042 /602 447
e–mail: riosvsz@stz.orbitel.bg

РЕГИОНАЛНА ИНСПЕКЦИЯ ПО ОКОЛНАТА СРЕДА И ВОДИТЕ СТАРА ЗАГОРА
Вх. № 633
18-02-05 г.

**ДО : "Топлофикация Казанлък" ЕАД**
**гр. Казанлък,**
**ул. "Цар Освободител" № 42**

**Относно:** Уведомление за инвестиционно намерение за "Въвеждане в експлоатация на два броя газотурбинни модула с мощност всеки по 3,2 MWth и 3 MWe, работещи с гориво природен газ, извеждане в експлоатация на двата броя енергийни котли с обща мощност 70 MWth и преустройство на три броя промишлени котли КМ 12 за работа с природен газ" на площадката на "Топлофикация Казанлък" ЕАД.

Във връзка с прилагане на разпоредбите на раздел III от Глава шеста "Екологична оценка и оценка на въздействието върху околната среда" от Закона за опазване на околната среда и чл. 5 от Наредбата за условията и реда за извършване на оценка на въздействието върху околната среда на инвестиционни предложения за строителство, дейности и технологии, утвърдена с ПМС № 59 от 7 март 2003 г./ДВ бр.25 от 2003г./, Ви уведомяваме, че инвестиционното Ви намерение не попада в приложното поле на ЗООС /Приложение 1 и 2 /към чл. 81, ал. 1 т.2/ за инвестиционни намерения за строителство, дейности и технологии/.

За реализацията на инвестиционното предложение **не е необходимо** мотивирано решение за преценка необходимостта от ОВОС или решение по оценка на въздействието върху околната среда.

***Становището не отменя задълженията на инвеститора (собственика) по 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.***

МП

Директор РИОСВ:.....
/инж. П. Начева/

INTERPRETO
SD "Interpreto - Nacheva, Tsankova & Kozhuharova"

*BG -6100 Kazan la k*
*2, DondukovStr., Apt. B2*
*Tel./Fax: +359 431 6 42 76*
*E-mail: interpreto@orbinet.bg*



Translated from Bulgarian

**MINISTRY OF ENVIRONMENT AND WATER**

**Regional Inspectorate of Environment and Water - Stara Zagora**

2, Stara Planina street
6000 Stara Zagora
tel: +359 42 602 683, fax: +359 42 602 447
e-mail: riosvsz@)stz.orbitel.bg

Regional Inspectorate
Stara Zagora
Ref. No. 633
Date: 18/02/2005

To: "Toplofikacia Kazanlak" Ltd.
42, "Tsar Osvoboditel" street

Ref: Notification for investment intentions for "Leading into exploitation two gas-turbine modules with a capacity 3,2 MWth and 3 MWe each, working with natural gas; leading away of exploitation two power boilers with a total capacity 70 MWth; and reconstruction of three industrial boilers KM 12 for working with natural gas" on the platform of "Toplofikacia Kazanlak" Ltd.

Regarding the decrees enforce in part III, chapter six "Ecological evaluation and evaluation of the impact on the environment " by the Law for environment protection" as well as art. 5 of Decree for the conditions and procedures for evaluation preparation, related to the impact on the environment of investment proposals for construction, activities and technologies, approved by Council of Ministers Decree No. 59 as from 7th of March, 2003 (Official Gazette 25/2003), we would like to inform you that your investment proposal does not belong to the field of applications of the Law for environment protection /Appendix 1 and 2, art. 81, paragraph 1, item 2/ concerning the investment intentions for construction, activities and technologies/.

For execution of investment intention a motivated decision **is not necessary** related to the estimation the necessity from evaluation of the impact on the

***The present standpoint does not cancel investor (owner) obligations according to the Law for environment protection as well as other special laws and under-law normative documents and it does not serve for a reason of responsibility invalidation according operative normative documents.***

Director
Regional Inspectorate of
Environment and Water: (eng. P. Nacheva)
/subscribed/
Followed by the official seal of Regional Inspectorate of
Environment and Water

Вх 267/30.08.2004г

# МИНИСТЕРСТВО НА ОКОЛНАТА СРЕДА И ВОДИТЕ
## РЕГИОНАЛНА ИНСПЕКЦИЯ - СТАРА ЗАГОРА

Стара Загора 6000
ул. " Стара планина " № 2
тел. 042 / 602 683 факс 042 / 602 447
e-mail: riosvsz@stz.orbitel.bg

МИНИСТЕРСТВО НА ОКОЛНАТА
СРЕДА И ВОДИТЕ
РЕГИОНАЛНА ИНСПЕКЦИЯ
Изх. № 2915
24.08.04 г.
СТАРА ЗАГОРА

ДО
"Топлофикация Ямбол" ЕАД
гр. Ямбол, кв. "Индустриален"

КОПИЕ Община Ямбол

**Р Е Ш Е Н И Е**
**№ 109– 04 / 19. 08. 2004г.**

По преценка необходимостта от извършване на ОВОС
/ по чл. 93, ал. 5 от ЗООС /

**За инвестиционно предложение** - "Топлофициране на гр. Ямбол. Инсталиране на ко – генерационен модул на площадката на "Топлофикация Ямбол" ЕАД"

**Инвеститор:** "Топлофикация Ямбол" ЕАД

Инвестиционното предложение е свързано с оптимизиране на дейността на "Топлофикация Ямбол" ЕАД чрез монтиране на газов модул за комбинирано производство на електрическа и топлинна енергия на базата на ко – генерационен двигател с вътрешно горене и гориво природен газ, и изграждане на нова топлопреносна мрежа за гореща вода. Общата инсталирана мощност ще бъде 7 076 кW. Трасето на мрежата е с дължина 5000м. Монтажът на модула ще се осъществи на съществуващата производствена площадка в обособено помещение с площ 500м$^2$. Топлофицирането на града ще се осъществява на база линеен график за строително монтажни работи по сервитутните зони за инфраструктурната мрежа на кварталите, на общинска земя. Предвижда се използване на предварително изолирани тръби. Промяна на съществуващата пътна инфраструктура на се налага.

**На основание чл. 93, ал. 3, ал. 4 и ал. 5 от Закона за опазване на околната среда**
За инвестиционното предложение **не се налага** извършване на ОВОС, поради следните мотиви:

1. Монтажът на ко - генерационния модул ще се извършва на площадка с предназначение за производство на топло- и електроенергия.
2. С реализирането на инвестиционното намерение, при поддържане на оптимален горивен процес ще се намалят емисиите на въглероден оксид / СО / в атмосферния въздух.
3. Дейността не е свързана с генериране на производствени и опасни отпадъци, и емитиране на замърсители във водите.
4. За извършване на дейността няма да се използват значителни количества други природни ресурси освен използвания за гориво природен газ.

5. Осъществяването на инвестиционното намерение ще окаже незначително въздействие върху останалите компоненти на околната среда.
6. Не са депозирани писмено мотивирани възражения срещу реализацията на инвестиционното предложение.

***Решението не отменя задълженията на инвеститора (собственика) по 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.***

Община Ямбол да извърши публично обявяване на Решението на определените за това места съгласно чл. 93, ал. 5 от Закона за опазване на околната среда.

Решението може да бъде обжалвано по реда на Закона за административното производство пред Министъра на околната среда и водите в седем дневен срок или пред Окръжен съд - Стара Загора в четиринадесет дневен срок от предоставянето му.

БМ

**ДИРЕКТОР:.....**
**(ИВА П. НАЧЕВА)**

Interpret PSA-Petia Arnaudova Ñî . 20A D. Blagoev str., Ap 12, 8600 Yambol,Bulgaria, tel.: + + 359 46 2 82 50 fax: + + 359 46 6 42 79

MINISTRY OF ENVIRONMENT AND WATER OF BULGARIA

## STARA ZAGORA REGIONAL INSPECTORATE

Stara Zagora 6000
2 Stara Planina Street
Tel. +359 42 602 683 Fax: +359 42 602 447
E-mail: riosvsz@stz.orbitel.bg

Ministry of Environment and Water of Bulgaria
EAD
Stara Zagora Regional Inspectorate
Ref. No. 2915
Date: 24 Aug 2004
Place: Stara Zagora

TO: "TOPLOFIKATSIA YAMBOL"
Industrial Quarter, town of Yambol

C/C: Yambol Municipality

# D E C I S I O N
## No.109-04 / 19.08.2004

Estimated necessity of performing an Assessment of Impact on Environment

**On Investment Proposal** – "Supply of Central Heating System of the town of Yambol. Installation of a co-generation module on the site of "Toplofikatsia Yambol" EAD"

**Investor:** "Toplofikatsia Yambol" EAD

Investment proposal is related with the operation optimization of "Toplofikatsia Yambol" EAD trough installation of a natural gas operated module for combined production of electrical and thermal power based on an internal combustion engine-co-generator using natural gas fuel and construction of a new heat transfer system for hot water. The total installed capacity is intended to be 7,076 kW. System route is 5,000 m long. Module installation will be carried out on the existing production site in an independent room having area of 500 $m^2$. The supply of Central Heating System of the town will be accomplished according to a liner schedule for construction and installation works on the sufferance zones of the quarters' infrastructure system over owned by the municipality land. It is intended that previously isolated pipes will be used. No any modification of the existing road infrastructure is needed.

**Based on Par.93, Item 3, Item 4 and Item 5 of the Law for Environmental Protection**
Assessment of its Impact on the Environment **is not needed** for this Investment Proposal due to the following reasons:

1. Co-generation module is to be installed on a site designed for thermal and electric power production.
2. Realization of the investment project and maintaining optimal combustion process will reduce carbon oxide emissions to the atmosphere.
3. Operation of the system is not related with generating production and harmful wastes and emitting of contaminants to the waters.

4. With the exception of the natural gas fuel no any considerable quantities of other natural resources will be used.
5. Realization of the investment project will have an insignificant impact on the other environmental components.
6. No any written motivated protests have been entered against the realization of the investment project.

*This Decision will not override investor's (owner's) responsibility under the Law for Environmental Protection and other special laws and regulations, and cannot be considered ground for the withdrawal of responsibility according to the regulatory norms and documentation in force.*

Municipality of Yambol shall publicly announce this Decision at the specified locations in accordance with Par. 93, Item 5 of the Law for Environmental Protection.

This Decision can be appealed in accordance with the provisions of the Law for Administrative Proceedings before the Minister of Environment and Water within a seven days period, or before Stara Zagora District Court within a fourteen days period from the date of its granting.

DIRECTOR: Eng. P. Pancheva, Signed
Stara Zagora Regional Inspectorate of the
Ministry of Environment and Water
SEAL