REPORT ON ENVIRONMENTAL IMPACTS OF INVESTMENT PROJECT „CHP CZESTOCHOWA", COVERING CONSTRUCTION OF HEAT AND POWER GENERATING PLANT ON the SITE OF FORTUM CZESTOCHOWA S.A.

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1 INTRODUCTION

1.1 FORMAL BASES

The study titled *Report on environmental impacts of "CHP Czestochowa" investment project covering construction of heat and power generating plant on site of FORTUM CZESTOCHOWA S.A., was worked out upon the Investor's order , i.e. of* Fortum Heat Polska Sp. z o.o., having their seat in Wroclaw, at ul. Walonska Street, 3-5.

1.2 PREMISES FOR PREPARATION OF THEIS REPORT

In conformity with Art. 51. ust. (passage) 1 of the Act dated 27 April 2001 , the Environment Protaction law (*Prawo ochrony srodowiska)* (Official Gazette Dz. U. 2001 Nr 62, poz. (item) 627, tekst jednolity (unified text) : Official Gazette Dz. U. 2006 nr 129 poz. (item) 902), hereinafter called the POS Act, the following need to produce a report on the environmental impacts of the project:

1) planned project of possible significant environmental impacts,
2) planned projects of possible significant environmental impacts, for which the duty is established on the basis of ust. (passage) 2,
3) planned projects of possible significant impacts upon the area Natura 2000, for which the duty is established on the basis of ust. (passage) 2.

The ust. (passage) 2 cited hereinabove says: the *duty to develop a report for the planned project , mentioned in ust. (passage) 1 point 2 and 3, is established, on the way of a decision, by the body competent to produce decisions on environmental impacts, defining – at the same time – the report scope, concerning environmental impacts; the competent body takes into consideration, in total, the detailed conditions mentioned in ust. (passage) 8 point 2; the decision is issued also if the body does not state the need to produce the report.*

For investment procedures, e.g. such as the subject matter of the present report, the Acts and Ordinances , and decisions specified hereinafter are of special significance:

1. Ordinance of Minister Board, dated 9 November 2004 *concerning definition of projects that may significantly impact onto the environment and specific conditions concerned with qualification of the project for production of a report on the environmental impacts* (Official Gazette Dz. U. Nr 257, poz. (item) 2573, zm. Official Gazette Dz. U. 2005.92.769).
2. Act dated 27 March 2003 concerning *planning and spatial development* (Official Gazette Dz. U. Nr 80, poz. (item) 717, zm.: 2004.6.41, 2004.141.1492, 2005.113.954, 2005.130.1087, 2006.45.319, 2006.225.1635)
3. Act dated 7 July 1994 *Prawo budowlane (Constructional Law)* (tekst jednolity (unified text) : Official Gazette Dz. U. z 2006 Nr 156, poz. (item) 1118, zm. (and later amendments) : Official Gazette Dz. U. 2006.170.1217).
4. Act dated 27 April 2001 concerning *waste* (Official Gazette Dz. U. Nr 62, poz. (item) 628, tekst jednolity (unified text) Dz.U.2007.39.251)
5. Act dated 13 September 1996 concerning *keeping cleanness and order in communes* (Official Gazette Dz. U. Nr 132, poz. (item) 622, tekst jednolity (unified text) : Dz.U.2005.236.2008, zm. (and later amendments) Dz.U.2006.144.1042)
6. Act dated 11 May 2001 concerning *packing and packing waste* (Official Gazette Dz. U. Nr 63, poz. (item) 638, zm. (and later amendments) : Official Gazette Dz. U. : 2003.7.78, 2004.11.97, 2004.96.959, 2005.175.1458).
7. Act dated 11 May 2001 concerning *duties of entrepreneurs within the scope of some waste management and concerning the product payment and deposit payment* (Official Gazette Dz. U. Nr 63, poz. (item) 639, and later amendments: Official Gazette Dz. U. : 2002.113.984, 2003.7.78, 2004.96.959, 2004.121.1263, 2005.33.291, 2005.175.1458, 2005.180.1495)
8. Act dated 18 July 2001 *Prawo wodne (Water Law)* (Official Gazette Dz. U. Nr 115, poz. (item) 1229, tekst jednolity (unified text) Official Gazette Dz. U. 2005.239.2019, and later amendments: Official Gazette Dz. U. : 2005.267.2255, 2006.170.1217, 2006.227.1658,

2007.21.125).

9. Act dated 7 June 2001 concerning *collective supply with water and collective discharge of sewerage* (Official Gazette Dz. U. Nr 72, poz. (item) 747, tekst jednolity (unified text): Dz.U.2006.123.858),
10. Act dated 16 April 2004 concerning *nature protection* (Official Gazette Dz. U. Nr 92, poz. (item) 880, zm. (and later amendments) 2005.113.954, 2005.130.1087)
11. Ordinance of the Environment Minister (Ministra Srodowiska) , dated 26 July 2002, concerning the *issue of instalyears ion types that may cause considerable pollution of individual natural components or the natural environment as a whole* (Official Gazette Dz. U. Nr 122, poz. (item) 1055)
12. Ordinance of the Internal Affairs and Administration Minister (Ministra Spraw Wewnetrznych and Administracji), dated 21 April 2006, concerning *fire protection of buildings , other building facilities and terrains (sites)* (Official Gazette Dz. U. Nr 80, poz. (item) 563).
13. Ordinance of Ministra Srodowiska , dated 28 November 2006 , concerning *product fee rates* (Official Gazette Dz. U. nr 225 poz. (item) 1645).
14. Ordinance of MS, dated 27 September 2001, concerning *catalogue of waste* (Dz. U Nr 112, poz. (item) 1206).
15. Ordinance of Ministra Srodowiska , dated 21 April 2006, concerning *waste type list that may be handed over to individuals or organisational units that are not entrepreneurs , and permissible recovery methods* (Official Gazette Dz. U. Nr 75 poz. (item) 527)
16. Ordinance of the Environment Minister (Ministra Srodowiska), dated 11 December 2001, concerning *types of waste or its amount, for which there is no duty to keep the waste records, and the categories* of small and medium enterprises that may keep simplkified waste records (Official Gazette Dz. U. Nr 152, poz. (item) 1735).
17. Ordinance of the Environment Minister (Ministra Srodowiska), dated 14 February 2006, concerning *tempyears es used for* purposes of waste records (Official Gazette Dz. U. Nr 30, poz. (item) 213)
18. Ordinance of the Environment Minister (Ministra Srodowiska), dated 9 September 2002, concerning *soil quality standards nad earth quality standards* (Official Gazette Dz. U. 2002 nr 165 poz. (item) 1359).
19. Ordinance of the Environment Minister (Ministra Srodowiska), dated 24 July 2006, concerning the *issue of conditions to be met when introducing waste water into water or earth, and concerning substances particularly harmful for water environment* (Official Gazette Dz. U. Nr 137 poz. (item) 984).
20. Ordinance of the Building Industry Minister, dated 14 July 2006 , concerning the *way of fulfilling the duties of industrial waste provider and the conditions of waste water discharge to sewerage devices* (Official Gazette Dz. U. Nr 136, poz. (item) 964).
21. Ordinance of Infrastructure Minister (Ministra Infrastruktury), dated 14 January 2002, concerning *determination of mean water consumption standards* (Official Gazette Dz. U. Nr 8, poz. (item) 70).
22. Ordinance of the Environment Minister (MS), dated 6 June 2002, concerning *permissible levels of some substances in airs and tolerance margins for permissible levels of some substances* (Official Gazette Dz. U. Nr 7, poz. (item) 796).
23. Ordinance of the Environment Minister (THE Environment Minister (MS), dated 5 December 2002, concerning the *reference levels of some substances in air* (Official Gazette Dz. U. z 2003 Nr 1, poz. (item) 12).
24. Ordinance of the Environment Minister (Ministra Srodowiska), dated 6 June 2002, concerning the *issue of evaluation of substance levels in air* (Official Gazette Dz. U. Nr 87 poz. (item) 798)
25. Ordinance of the Environment Minister (MS), dated 20 December 2005, concerning *instalyears ion emission standards* (Official Gazette Dz. U. Nr 260, poz. (item) 2181).
26. Ordinance of the Environment Minister (MS), dated 29 July 2004, concerning *permissible noise levels in environment* (Official Gazette Dz. U. Nr 178, poz. (item) 1841).

27. Ordinance of the Economy Minister (Ministra Gospodarki), dated 21 December 2005, concerning *basic requirements for devices used outdoors, within the scope of noise emission into environment* (Official Gazette Dz. U. Nr 263, poz. (item) 2202, zm. (and later amendments): Official Gazette Dz.U.2006.32.223)

The report on environmental impacts is prepared in order that:

a) effects are predicted for the investment project under planning, in reyears ion to the environment condition,
b) its use in designing and locating the investment project is defined,
c) a design rational from the environment protection viewpoint is obtained
d) conclusions concerning possible and necessary remedies are formuyears ed as bases to undertake the decision and administrative arrangements recommending the necessary actions.

On the powers of the Ordinance of the Environment Minister (MS) (Official Gazette Dz. U. 2004.257.2573, zm. (and later amendments)), §3 ust. (passage) 1 point 4:
Conventional power plants, heat and power generating plants or other instalyears ions for combustion of fuels in order to produce electric or heat energy, not specified in § 2 ust. (passage) 1 point 3, concerning thermal power understood as the amount of energy input in the fuel into the instalyears ion in a time unit, at the rated load, not lower than 25 MW, and when using solid fuel, including biomass, not lower than 10 MW , may require to produce *the* report concerning the environmental impacts. On its turn, §2 ust. (passage) 1 point 3 referred to herein, defines the following as absolutely needing to produce the Report:
Conventional power plants, heat and power generating plants or other instalyears ions combusting fuels in order to generate electric or heating energy, concerning the heating power not lower not lower than 300 MW , understood as the amount of energy introduced into the instalyears ion in fuel, in a time unit, at the rated load.
Considering the above, the construction of the boiler unit of the power value 200 MW may need to produce the Report. However, on the powers of §2 ust. (passage) 2. *To prepare the report concerning environmental impacts of the project, there need the projects:*
(...)
point 2) being executed on the area of works or facility, being the projects , the execution of which will make that the works or facility will be included in the projects specified in ust. (passage) 1.
The total heating power of the existing heating plant, complete with the new fluidised bed complex will exceed the limit of 300 MW – in such aspect, preparation of the Roport becomes necessary.
On this basis, it should be recognised that <u>for the investment project "CHP Czestochowa" investment project under planning, preparation of the Report concerning the environment impacts is mandatory</u>

The Addressee of the Request concerning granting the decision of the environmental conditions of the investment project is – i8n conformity with the Record of the Act POS (Environment Protection Law), Art. 46a, ust. (passage) 7, point 4 - Prezydent Miasta Czestochowy (Czestochowa Town President). Town Office Seat (Siedziba Urzedu Miasta): ul. Slaska 11/13; 42-217 Czestochowa, Poland.

The planned project shall not impact on the areas of Natura 2000.

An Appendix to the Request , required by the POS (Environment Protection Law) Act (Art. 46a, ust. (passage) 4, point . 1), is *a filed evidence map confirmed by the competent body*, *showing the limits of the terrain (site) the request refers to, and covering the area that shall be under the project impacts.* In the analysis (Section 5), it was shown that the instalyears ion impacts shall be limited to the area for which the Investor possesses the legal title and, therefore, the scope of such map shall be limited to the most direct neighbourhood in order that it is possible to identify the parties interested in the course of the proceeding in the case of environmental impacts.

1.3 REPORT SCOPE

The report was made taking into consideration the scope defined in article 52 of the Act, dated 27 April 2001 *Prawo ochrony srodowiska (Environment Protaction Law)* (Official Gazette Dz. U. 2001 Nr 62 poz. (item) 627 and later amendments). Hereinafter, therer have been presented the legal requirements and the information concerning the place, the information is given in the report.

Legal requirements	*Report point*
1. Report concerning environmental impacts of the project is to include, with the reservation of ust. (passage) 1a:	
1) description of the project planned, in particular:	
a) characterisation of the complete project and terrain (site) use conditions in the execution and useful operation phases	2.2 and 4.2
b) main characteristic features of production processes,	4.2 and 5
c) foreseen emission amounts implied by operation of the project planned,	5.3, 5.4, 5.5 and 5.6
2) description of natural components of environment covered by the scope of assumed planned impacts	3
2a) description of monuments existing in the neighbourhood or the direct impact scope of the project planned, protected on the basis of reguyears ions concerning monument protection and care,	None exist
3) description of alternatives analysed, including the one:	
a) consisting in not undertaking the project,	4.1
b) the most profitable for the environment,	4.2 and 5
Complete with the reasons for selection,	4.1 and 5
4) definition of assumed environmental impacts of the alternatives under analysis; including also the case of occurrence of a serious industrial failure and also of possible trans-border environmental impacts,	5 – no hazard of a serious industrial failure; no trans-border impacts
4a) analysis and evaluation of possible hazards and damages for monuments protected in conformity with reguyears ions concerning monument protection, in particular archaeological monuments within the extent of the terrain (site) wherein the project is to be executed,	There is no hazard for occurrence of such hazards
5) reasons for the alternative selected by the requester of the alternative , with indication of the environmental impacts , in particular upon the following:	
a) people, animals, plants, water and air,	5.1, 5.3, 5.4, 5.5 and 5.7
b) earth surface, taking into consideration the mass earth movements, climate and landscape,	5.2, 5.7
c) material goods,	there shall not be any impact due to the small investment project scale and its location
d) monuments and cultural landscape, covered by the existing documentation , in particular with the monument register or files,	
e) mutual impacts between the components mentioned in letter a-d,	
6) description of predicted significant impacts of the project planned, upon the environment, covering the direct, indirect, secondary, cumuyears ed, short- and long-term, permanent and momentary impacts upon the environment, resulting from:	due to the scale of the investment project, there shall not be any significant environmental impacts, emergency cases – point 4.4
a) project existence,	
b) use of environment resources,	
c) emissions,	
and description of the forecasting methods applied by the requester,	
7) description of predicted actions aimed towards avoidance, limiting or natural compensation of negative impacts upon the environment,	no need of such actions
7a) for the ways being projects of potential significant impacts upon the environment, mentioned in art. 51 ust. (passage) 1 point 1 – assumption	Not applicable
a) safety research for identified monuments located on the area of the planned project, found during the work,	
b) protection safety for existing monuments against negative impacts of [planned project and cultural landscape protection	
8) if the project planned is connected with use of instalyears ions, comparison with the reservation of ust. (passage) 2, of the proposed technology with that meeting the requirements mentioned in art. 143,	4.5

statute requirements	*report point*
9) indication if , for the project under planning, it is necessary to establish a limited use area and to define the limits of such area, limitations with regard to terrain (site) intention, technical requirements concerning building facilities and the way of their use,	it is not necessary – the impacts are limited to the site property limits
10) presentation of problems in the graphic form,	on various pages of points 2, 3, 4 and 5
10a) maps for projects that may be of significant environmental impacts, mentioned in art. 51 ust. (passage) 1 point 1:	not applicable to investment projects
a) roads and railways – in scale 1:10000 or bigger – for projects located on areas subject to protection on the basis of the Act dated 16 April 2004 , concerning nature protection and on the area of their envelopes – in 1:25000 or more – for projects on the other areas.	
b) overhead electric power lines,	
c) instalyears ions for transfer of crude oil, oil products, chemical substances or	
11) analysis of possible social conflicts connected with the project under planning,	point 10
12) a presentation of a proposal of monitoring of impacts of the project under planning on the stage of its construction and useful operation,	point 11
13) indication of difficulties following from technology deficiencies or gaps in the contemporary knowledge met when working out the report,	point 12
14) summary in a non-specialised language , for the information in the report,	point 14
15) name of the person or persons working out the report,	cover page
16) information sources constituting the basis for generation of the report.	cited at various places of the report
1b. Information mentioned in ust. (passage) 1 point 4-7, shall take into consideration the predicted impacts of alternatives under analysis in reyears ion natural habitats and flora and fauna species for protection of which, the area Natura 2000 was appointed.	no such areas within the investment project impact scope
1c. If for the project under planning it is necessary to establish a limited use area, the report should be appended with a map copy confirmed by the competent body , with marked course of the area limits, wherein it is necessary to create the limited use area; this does not refer to any projects concerned in construction of a national road.	establishment of limited use area is not necessary
2. If the project under planning is connected with use an instalyears ion covered by the duty of obtaining the integrated permission, the report concerning the project impacts shall include the comparison of the technique proposed with the best techniques available.	point 4.6
3. The report concerning the project impacts upon the environment should take into consideration the project impacts on the stages of its execution , useful operation and liquidation.	points 2.3.1 5 2.3 .3, respectively
4. (annulled)	
4a. in a case that a possibility of trans-border environmental impacts is found, the information mentioned in ust. (passage) 1 point 1-13, shall take into consideration the impacts of the planned project outside the Polish Republic territory.	The trans-border impacts shall not occur
5-9. (annulled)	

2 DESCRIPTION OF PLANNED PROJECT

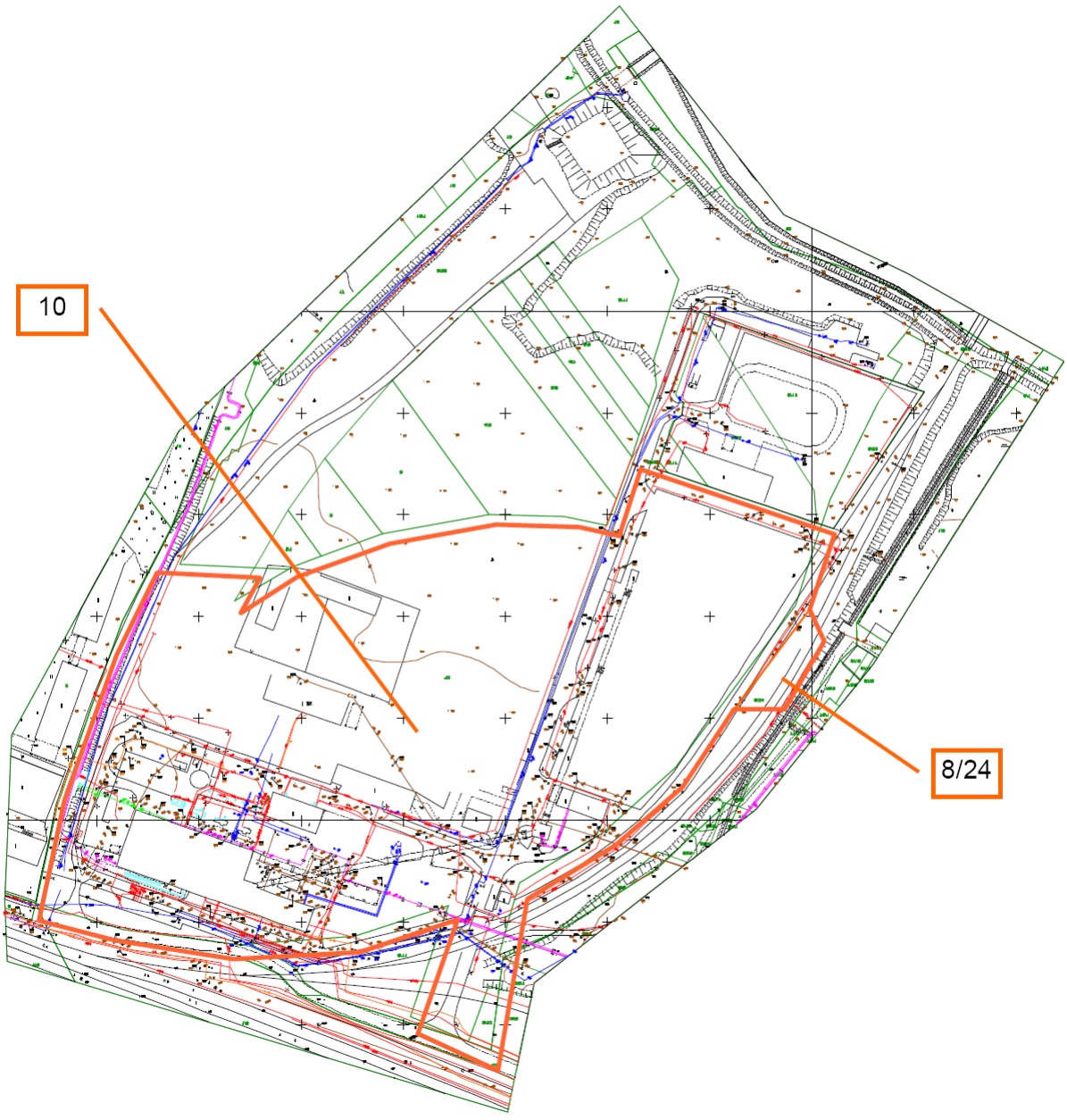
2.1 LOCATION

The public purpose investment project will be located in Czestochowa, in conformity with the decision of the Czestochowa Town President (Prezydent Miasta Czestochowy), dated 13 March 2007 (Ref. PP.I.7331-6-97/06-07), on the area of the heating Plant at ul. Rejtana street, being in the Investor's possession.

Address: street: ul. Rejtana 37/39; 42-202 Czestochowa, Poland.

The investment project is planned on a part of the lot nr 10 (m.k 277) and small (of surface area ca. 0,07 ha) fragment of the lot 8/24 (railway areas). The location of the public purpose investment project was established in the decision within the terrain (site) limits identified in the graphic appendix to the decision.

Drawing 1. Investment project limits (orange line) on the basis of the graphic appendix to the decision of the Czestochowa Town President (Prezydent Miasta Czestochowy) ,concerning location of the public goal.



On the basis of the true copy from the Perpetual Register KW Nr 124235 of the Regional Court, the IX-th Perpetual Register in Czestochowa, made on 16 March 2006, it was stated that the lot nr 10 extent 277 covers the surface area 6,7562 ha. The lot owner is the State Treasury and the perpetual user - Fortum Czestochowa S.A. in Czestochowa.

Construction of the railway car coal unloading station has been assumed on the railway siding; this is a small fragment of the lot number 8/24 (railway areas).

The heat-generating plant „Rejtana" is located in the Sout-Eastern part of the town, in the district Ostatni Grosz, in a surrounding of the railway terrains (from the South), industrial terrains (from the West), from the East – single family dwelling houses and from the North – vast terrains at the Warta river (undeveloped). The site is provided with media and channelled, with a separate rain network (precipitate water is directed into the ditch and, further on , to the Warta river.

Drawing 2. Investment project location

On the terrain (site) intended for the investment project, there are located the facilities used by the constructional company MONOLIT-MONTEX, destined for liquidation: a two-storey office building (dimensions 40x12,5 m in the view) and the storage umbrella roofs, and other, of the total surface area 850,5 m^2, production range of concrete pavement (1160 m^2). The terrain (site) is provided with, in a part, hardened pavement; the roads and walkways occupy the surface area of 630 m^2, on the lawns (370 m^2) grow individual trees and bushes. The dimensions and surfaces have been determined on the basis of the documentation made available by the Investor.

The present view of the terrain (site) has been presented in the photos on page 12. The investment is planned at a place not too distant from the dwelling development. It is a sparse villa development. Behind it, there are located the terrains also of the single-family dwelling development. From the Northern side, the investment project area (site) is adjacent to an undeveloped terrain that stretches down to the Warta river; bush bundles and individual trees constitute the coverage of that terrain. Behind the river, the terrain is of a similar character. Only in a further distance, there is a dwelling, multi-family development. On the West from the investment terrain (site), there are buildings and structures of the works POLONTEX

(production of curtains and other textile products), originated before the World War II. On the Northern side, the closest neighbourhood for the installation under planning will be the development of the Heating Plant – the main building complete with auxiliary devices, reinforced concrete stack of height 150 m and necessary devices.

Drawing 3. Investment project terrain (site) – general view; two storey building visible – for demolition

Drawing 4. Panorama – view from the heating plant roof towards West, North and East

<- West East ->

The factory buildings visible in the panorama, on the Western side (the first photo from the left) belong to POLONTEX; on the Eastern side (the last photo on the right), between the roof and the coaling lane, railway tracks are visible.

On the Southern side, the investment terrain (site) neighbours with the existing facility – the hall – Heating Plant „Rejtana" (view on the right), that, together with the auxiliary facilities: coal store yard , transportation system and furnace waste damp area, flue gas drought devices (fans, dust removers, stack), constitutes the main source of heat under management of FORTUM. Behind the heating plant, there are routed the railway tracks – in that place the wide track ways of the goods station and, further behind them, the town areas with multiple-family dwelling development, including also multi-storey buildings.

Drawing 6. „Rejtana" heat gen.

Drawing 5. Railway terrains and far away developments (vie towards South)

The terrain development concepts are shown in Drawing 7.

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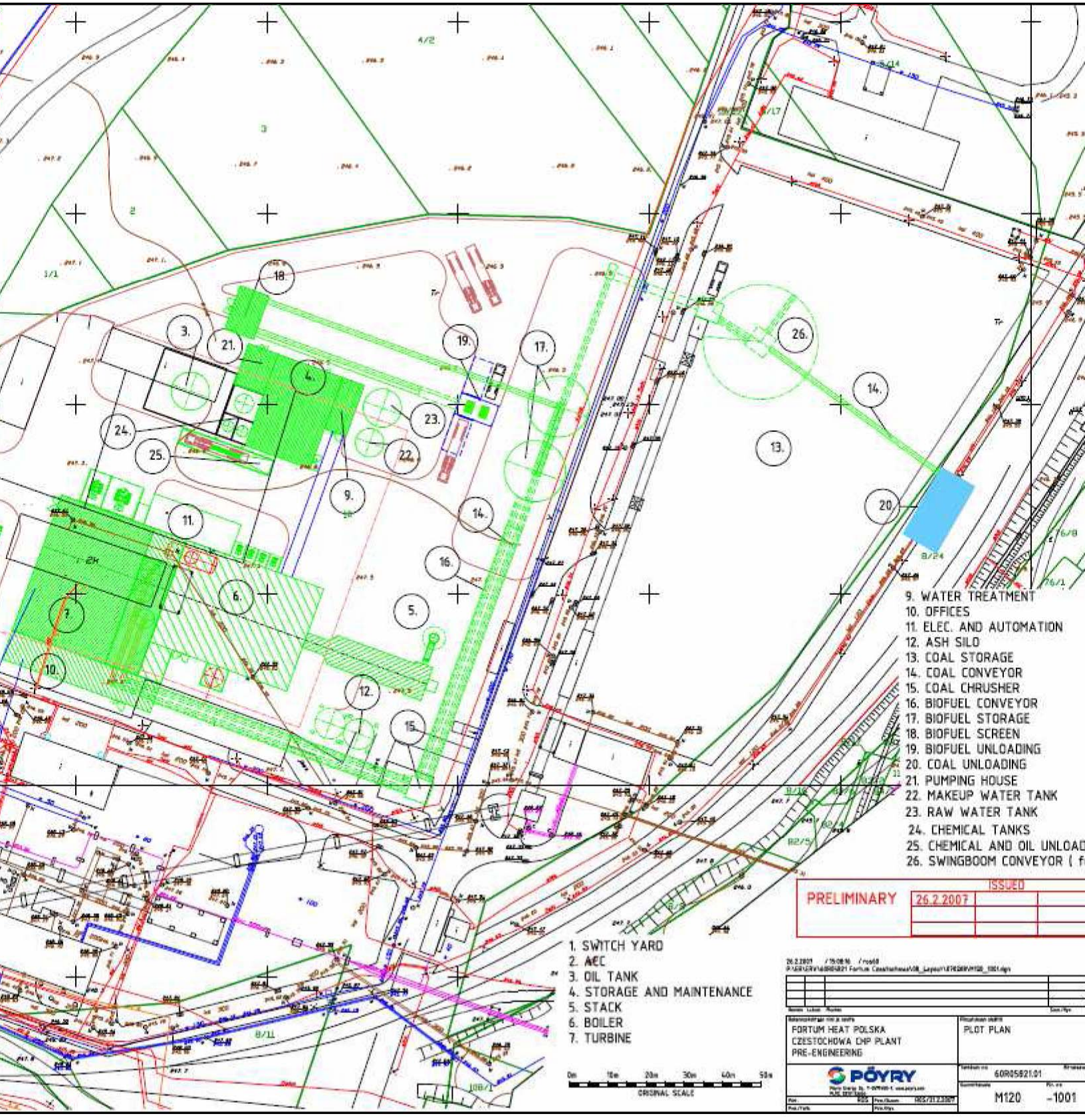

9. WATER TREATMENT
10. OFFICES
11. ELEC. AND AUTOMATION
12. ASH SILO
13. COAL STORAGE
14. COAL CONVEYOR
15. COAL CHRUSHER
16. BIOFUEL CONVEYOR
17. BIOFUEL STORAGE
18. BIOFUEL SCREEN
19. BIOFUEL UNLOADING
20. COAL UNLOADING
21. PUMPING HOUSE
22. MAKEUP WATER TANK
23. RAW WATER TANK
24. CHEMICAL TANKS
25. CHEMICAL AND OIL UNLOAD
26. SWINGBOOM CONVEYOR (f
1. SWITCH YARD
2. AEC
3. OIL TANK
4. STORAGE AND MAINTENANCE
5. STACK
6. BOILER
7. TURBINE
PRELIMINARY
ISSUED
26.2.2007
FORTUM HEAT POLSKA
CZESTOCHOWA CHP PLANT
PRE-ENGINEERING
PLOT PLAN
PÖYRY
60R05821.01
M120
-1001

2.2 FACILITIES PLANNED FOR EXECUTION

Within the framework of the investment project, it is assumed to build a new facility – the heat and power generating plant building including the fluidised bed steam boiler complete with outfit and auxiliary instalyears ions, steam turbine and turbine-generator set. The electric power value - 64 MW, the heating value - 120 MW; the total thermal power at the boiler inlet - 205 MW. The fuel for firing the boiler will be hard coal (delivery by trains to the coal damping yard) or hard coal with addition of biomass: waste wood and cuts of energy willow (delivery by trucks, stored in silos).

The biomass share in the energetic balance shall not exceed 25%.

The house will also comprise the compressor station and, near the building, the transformer station and the ash container.

Behind the building, there will also be located the cold store – it is assumed the closed circuyears ing water cooling system (closed type) with use of air.

It is planned also to build a less storage building including also the water treatment station and pumping stations; next to it, raw water tank and treated water tank, light oil tank (ignition fuel). New belt conveyor flights shall be constructed for transportation for transportation of coal and other flights for transportation of biomass (in the form of wooden chips).

Flue gas from the fluidised bed boiler will be de-dusted in the electro-filter (option: bag filter battery) and routed to the new stack. It is assumed to build a steel stack up to the height chosen with respect to the emission effect; initially, the assumed height is at least 80 m; the maximum height of the new stack shall not be bigger than that of the existing stack (150 m). The detailed description of the designed technical and technological (process) solutions is included in Section 4 of the Report.

2.3 INVESTMENT PROJECT CONSTRUCTION, USEFUL OPERATION AND LIQUIDATION PHASES

2.3.1 CONSTRUCTION PHASE

Construction of a new facility on a developed lot requires, in the first order, that the lot is tidied what will be connected with the necessity of demolition of the two-storey building (visible on the photography – Drawing 3) as well several facilities of the umbrella roof character, and removal of a silo, travelling crane and several smaller facilities. From the investment project terrain (site) there will be removed a part of trees and bushes, mostly of self-sown character.

After tidying of the terrain (site), its development stage will happen. To make foundations will need earth work with use of heavy equipment. There will be done the reinforcement and concrete work and, next, the erection of the main building and the auxiliary building. A successive stage will be the instalyears ion of all equipment, starting from the coaling up to the furnace waste receiving system at the end.

It has been assumed to build a steel stack set on a foundation. A supplement to this work will be formation of roads and yards for hardened and dewatered surface and developed green areas.

Considering the present condition of the terrain (site) on which the facility under planning shall operate, the following will have impact upon the environment during the construction phase:

- => emission of gases and dusts originated at fuel combustion in combustion engines of mechanical vehicles used during constructional work,
- => dust emission during demolition and earth work depends strongly on atmospheric conditions (wind speed and substrate moisture content)
- => movement of earth masses (the necessity of rational utilisation of humus),
- => noise caused by mechanical equipment operation

The predicted influence of the construction upon individual natural environment components has been presented hereinafter.

2.3.1.1 Atmospheric air

During the construction, the following emissions will be of influence upon the condition of atmospheric air:

=> from operation of the equipment used during the construction,
=> from conduction of the demolition work (in a limited extent),
=> from conduction of the earthwork (in a limited extent).

In order to limit the negative impact of the equipment and transportation vehicles upon the environment, it should be taken care on their correct operation and adequate maintenance. In the opposite case, there will happen an increase in fuel consumption and the amount of produced fuel gases, and in the noise level. The equipment used during the work should meet the requirements concerning protection against noise and flue gases, specified in appropriate ordinances and standards.

The problem of dusting connected with exposal of of a soil layer should not be arduous at such investment project scale. If, - due to the fact of conduction of the work at dry and windy weather – severe dustiness constituted a problem (in the first order to the work performers – it could be limited by wetting the terrain (site) surface. Good organisation of the work consists, in that case, in possibly fast coverage of the surface exposed.

The dusting problem may occur also in connection with temporary storage of loose materials on prisms (e.g. of sand). Due to the transitional character of the emission, it is not recommended to undertake specific actions to limit the same.

2.3.1.2 Noise

In most constructional work, there will be employed the equipment constituting a source of noise and vibration (pneumatic hammers, transportation vehicles, constructional equipment). The equipment should be used in daytime only. Care should be taken of the good technical condition of the machinery and its systematic maintenance (lubrication, tightening screws, etc.).

The requirements put to the devices within the scope of noise emission were defined in the Ordinance of the Economy Minister, dated 21 December 2005, concerning the *basic requirements for devices used outdoors, within the scope of noise emission into the environments* (Official Gazette Dz. U. Nr 263, poz. (item) 2202, zm. (and later amendments) : Dz.U.2006.32.223)

Limitation of emitted noise and vibration may be also obtained through:

=> enclosing a part or a complete machine into acoustic shields,
=> application of components absorbing shocks, e.g. flexible washers,
=> application of high quality dampers in combustion engines.

2.3.1.3 Vegetation

The terrain (site) under analysis is covered with grassy vegetation; there grow also single specimens of deciduous trees. The trees existing on the lot, after agreements with the Environment Department, will be intended for re-planting or cutting off.

The work connected with the removal covers:

- cutting off with a mechanical saw the branches, boughs and trunk parts,
- cutting off the trunks with a mechanical saw and cutting into pieces,
- digging out and stubbing of roots
- backfilling of pits,
- transportation of tree residues out of the construction site (terrain).

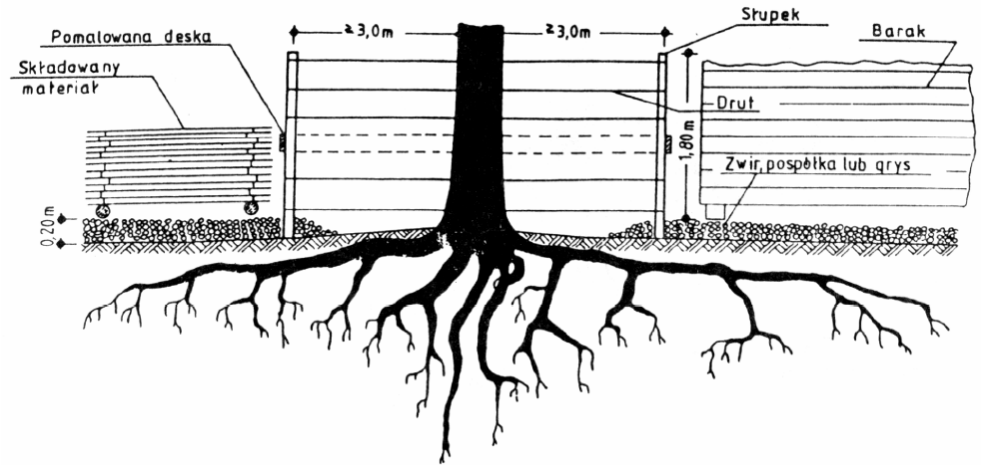
The disposal place for the residues after cutting off the trees should be chosen by the contractor and agreed upon with competent authorities.

During the construction, the factors endangering the greenery and the soil include the excessive compaction of soil by machines and vehicles.

The investor should aim towards maintaining possibly highest amount of vegetation; where possible the trees colliding with the construction should be replanted and not cut off. It should be also taken into consideration that trees in the direct surrounding are adequately protected during the construction work being carried out, by covering the trunks with jute, moss or other soft material and,

next, with boards , and tying with string or wire protecting against exposing. Below tree crowns, do not store constructional materials or equipment.

Drawing 8. Protection of a tree at a place of storage of material of low density and location of a barrack (it is not allowable to store oils, fuels, cement)



Legend

Pomalowana deska	Painted board
Składowany material	Stored material
Słupek	Post
Drut	Wire
Żwir, pospółka lub grys	Gravel, mix or grit
Barak	Barrack

Root damage may also happen when making underground instalyears ions. The most dangerous for plants is doing the earthwork in summer (over-drying) and in winter (over-freezing). It is most safe when the plants are in the rest period. Since heavy building equipment may destroy roots of trees, within the root system, all work will be done manually. Exposed tree roots (for the construction time, will be covered with e.g. mats of straw or sack fabrics.

Prior starting to set up new greenery, all constructional and instalyears ion work should be completed. For setting up green areas, use a part of humus taken off the area covered by the investment project. The greenery should undergo adequate cultivation actions.

2.3.1.4 Ground/Water Environment and Water/Sewage Management

During the construction, there is some though minute hazard of pollution the grounds and and underground water with substances coming from mechanical vehicles staying there (trucks, rolls, bulldozers, diggers) and materials necessary for current operation and maintenance of the equipment. To minimise the pollution hazard, the construction site back-up facilities should be organised on a hardened terrain. Oils, lubricants, fuel oil – only in the scope and amounts necessary – must be stored in tight containers, in conditions of effective limitation of access to third persons.

On the stage of working out the construction organisation, it should be ensured adequate conditions to employees through ensuring the access to sanitary facilities.

2.3.1.5 Waste

On the stage of the construction, there will be generated waste connected with demolition of the building, umbrella roofs, liquidation of smaller fracilities as well as construction of new roads and yards.

It is preferable that the constructional work scope is conducted on the basis of the modern technologies and the waste produced during the construction is, where

possible, used secondarily or disposed in accordance with the valid reguyears ions concerning constructional work execution.

The following waste types may be produced on the construction area:

- concrete and debris from demolition,
- steel scrape,
- destroyed cables,
- gravel, concrete cube,
- soil from excavations,
- fragments of roofing, including sheet metal and roofing paper,
- structural materials containing gypsum,
- ceramic materials, glass, wood, plastics – remaining after completion of the work scope,
- living waste of employees – e.g. cans, bottles, papers – for the waste , adequate containers should be prepared and systematically emptied.

The classification of the above mentioned waste, defined on the basis of the Ordinance of the Environment Minister, dated 27 September 2001, concerning *waste catalogue* (Official Gazette Dz. U. Nr 112, poz. (item) 1206), is presented in table 1.

Dangerous waste (soil or earth polluted with hazardous substances and used cleaning agents as well as packaging polluted with hazardous substances) may be produced during constructional work, due to demolition of structural components etc. and during maintenance and useful operation of machinery and devices used for constructional work.

In conformity with the valid reguyears ions, hazardous waste should be collected and stored separately. Dangerous waste may be collected and stored exclusively in the case that it is intended for further use or utilisation (not by dumping). Waste sorts of the same technology of use or utilisation may be stored together (also for the purpose of improvement the recovery process safety). The hazardous waste should be stored in tight containers, resistant to action of the components located inside them. Such waste will be stored in roofed and gardened rooms provided with sorbents intended for splash liquidation. Transportation of hazardous waste from the places of their production to the place of their recovery or neutralisation should be done with observation of the reguyears ions valid during transportation of dangerous materials.

Waste other then dangerous will be produced during demolition and erection/assembly work in progress. The maximum use of such waste is possible only at adequately programmed system for collection and disposal of the waste. When planning the construction site organisation, one should, therefore, foresee selective collection of waste with division into components of the secondary raw material character.

Waste other than hazardous are produced during the constructional work and during preparation of the terrain (site) for construction. The group of the waste includes the waste produced when building the works facilities and outfitting them. The waste includes primarily brick debris and concrete, ceramics, roofing waste, electric instalyears ion waste, reinforcing steel. It should be aimed towards recovery and recycling of constructional materials, e.g. waste metals (ferrous and non-ferrous). Scrap metal may be transferred to a metallurgical plant, via scrap store, to be used in production.

Constructional waste constitutes precious secondary raw material that is used as constructional aggregate in production of building materials and components, as well as during building constructional facilities and roads. The maximum use of such waste is possible only with an adequately programmed selective collection system and disposal system, with distribution into components of the secondary raw material character. The waste should also be transported selectively to a processing plant or to a dump area.

In addition to the waste specified and discussed hereinabove, site employee living waste will be produced on the construction terrain (site), i.e. cans, bottles, papers. Prepare appropriate containers for the waste, that should be emptied systematically.

Table 1. Classification of waste that may be produced on the construction terrain (site)

No.	Waste sort	Waste subgroup	Waste group	Code
1	Mineral hydraulic oils not containing halogen-organic compounds	*Waste hydraulic oils 13 01*	*Waste oils and liquid fuel waste - 13*	**13 01 10***
2	Synthetic hydraulic oils			**13 01 11***
3	Mineral engine oils, gear oils and lubricating oils, not containing halogen-organic compounds	*Waste engine oils, gear oils and lubricating oils not containing halogen-organic compounds*		**13 02 05***
4	Packages of paper and cardboard	*Package waste 15 01*	*Package waste:*	**15 01 01**
5	Plastic packages			**15 01 02**
6	Wooden packages			**15 01 03**
7	Metal packages			**15 01 04**
8	Multi-material packages			**15 01 05**
9	Glass packages			**15 01 07**
10	Packages including hazardous substance residues or polluted with them			**15 01 10***
11	Sorbents and filter ation materials, wiping fabrics, protective clothes other than those specified in 15 02 02*	*Sorbents, filter . Materials, wiping fabrics and protective clothes 15 02*		**15 02 03**
12	Concrete waste and debris of demolitions and repairs	*Building material and component waste and road*	*Waste of construction, repairs and disassembly*	**17 01 01**
13	Brick debris			**17 01 02**
14	Wastes of other ceramic materials and outfit components			**17 01 03**
15	Mixed waste of concrete, brick debris, waste materials , ceramic materials and components, other than those specified in 17 01 06			**17 01 07**
16	Removed plasters, wall papers, veneers,			**17 01 80**
17	Glass	*Wooden, glass and plastic waste 17 02*		**17 02 02**
18	Copper, bronze or brass	*Waste and scrap metals and*		**17 04 01**
19	Iron and steel			**17 04 05**
20	Metal mixes			**17 04 07**
21	Cable other than those specified in 17 04 10			**17 04 11**
22	Soil and earth, including stones, with dangerous substances	*Soil and earth (including soil and earth of polluted terrains*		**17 05 03***
23	Soil and earth, including stones, other than those specified in 17 05 03			**17 05 04**
24	Deepening output containing hazardous substances or polluted with them			**17 05 05***
25	Output of deepening other than that specified in 17 05 05			**17 05 06**
26	Other waste of construction, repairs and disassembly (including mixed dangerous waste)	*Other waste of construction, repairs and disassembly -17 09*		**17 09 03***
27	Mixed waste of construction, repairs and disassembly, other than those specified in 17 09 01, 17 09 02 and 17 09 03			**17 09 04**
28	Waste wall paper	*Waste of asphalts, tar and tar products 17 03*		**17 03 80**
29	Not segregated (mixed) communal waste	*Other communal waste 20 03 01*	*Communal waste together with fractions gathered selectively 20*	**20 03 01**

To limit the environmental impacts of the investment project, if is preferable that the constructional work scope are conducted on the basis of the modern technologies and the waste produced during the construction should be , where possible, utilised secondarily or disposed in accordance with the valid reguyears ions.

The soil and earth from excavations are the diggings created from excavations. They consist of the two parts. The first one is a soil layer while the other – earth of various properties, depending on the geological structure of the terrain (site) (sands of various granuyears ion, gravels, stones, etc.

Fertile top soil layer (humus) should be used on the spot (e.g. planting on the terrains intended for arrangement of green areas) or at another place; in such case, the Investor or the work contractor is responsible for finding the humus receiver. Temporarily, till the instant of removing from the construction site, collected humus should be gathered on prisms.

2.3.1.6 Landscape

Continued constructional work will cause gradual changes in the landscape. Some of them will be of a transitory character, typical for constructional sites. After completion of the work scope, all temporary components: dumps, umbrella roofs, barracks, etc. will be removed and the lot surface will be arranged. The impact of the investment project upon the landscape is not necessarily be negative; a lot is dependent on the work organisation and on the order on the construction terrain (site).

The number of persons that will be able to observe the changes in the landscape, connected with execution of the investment intention , is limited. These will be employers of the "Rejtana" Heating Plant and non numerous citizens of surrounding houses.

2.3.2 Useful Operation Phase

The investment project impact on the stage of useful operation has been discussed in **point 5** of the present report. The impacts of the investment project upon atmospheric air, soil/water environment, landscape and people have been presented and its influence in respect to noise, water/sewage and waste management has been discussed.

2.3.3 Liquidation phase

In a case that there exists, because of any reason, a necessity to liquidate the investment project described, the existing facilities and the whole infrastructure will be able to be used by the new terrain (site) owner.

However, if this is not possible, the buildings should be demolished and the terrain (site) recovered to the state wanted by the next user. For demolition work (as per the current state of law) it is required to obtain a permission; at present, it can not be foreseen what legal requirements will be valid when the possible demolition happens. The demolition work will be connected with generation of waste that , in conformity with the currently valid Ordinance of the Environment Minister, dated 27 September 2001 , concerning the waste catalogue, will be qualified into the group 17 –*Waste from construction, repairs and dismantling of building facilities and road infrastructure (including soil and earth of polluted areas) the* influence upon the other environment components will be close to impacts described in **point 2.3.1.**

It is recommended that demolition or adaptation work is performed on the basis of the modern technologies and the waste produced during the construction should be, where possible, secondarily used or removed in conformity with the valid reguyears ions concerning execution of constructional work. It should be also aimed towards protection and repeated use of the soil layer. Demolition work should be conducted under ecological supervision and all actions should be reported.

Debris produced due to demolition of building facilities should be used in a maximum possible extent for the building work scope connected with the new terrain (site) development. It should be attempted also to recover or recycle other building materials, e.g. metals, glass. Mixed byearen glass may be utilised on the spot as an addition e.g. to concrete, provided that it is comminuted earlier. Ferrous and non ferrous metals are accepted by some metallurgical plants and used as secondary raw materials.

The maximum use of such waste type is possible only at an adequate programming of the waste collection and disposal system. When planning the organisation of the construction

site at this stage, assume selective collection of waste with distribution into components of the secondary raw material character, in a selective way; the waste should be transported to processing works as well as onto a dump area.

2.4 Sorts and Amounts of Pollution Connected with Project Functioning

The assumed sorts and amounts of waste implied by functioning of the project under planning are presented in **point 5** of the present report.

3 ENVIRONMENT COMPONENT DESCRIPTION

Czestochowa is situated on the Slasko – Krakowska upland (sub-province of code 341, as per Kondracki[1]), in the in macreo-region 341.2: the Woznicko-Wielunska Upland and in mezzo-region the Gorna Warta Depression (341.25). The Gorna Warta Depression was created by separation of the clayey Dogger series, susceptible to erosion (Middle Jura). The valley bottom reaches the level of ca. 240 m. asl., of ca. 100 m downstream the river sources. The years ter are located near the Kromolow village on the Czestochowska Upland (341.31), belonging already to the macro-region 341.3: the Krakowsko-Czestochowska Upland. The absolute heights in the administrative limits of the town are included between 235 m (at the Warta river and its tributaries) up to 305 m (the Osson Mountain).

From the administrative aspect, the town on the administrative district (starosty) rights is situated in the Southern part of the Silesian province (voivodeship), occupying surface area of 160 km^2. At the end of 2005 , in the town there were logged 244 185 citizens and actual citizen number amounted to 246 890 (data of GUS (the Main Statistical Office)), where 66% of the citizens were in the production age.

The terrain (site) of the investment project under planning is located on the industrial area, at Rejtana street, South-East from the city centre. The terrain surface is almost fears, of the ordinate value ca. 245 m. asl., in part, developed with industrial facilities

3.1 Geo-technical Condition Characterisation

Recognition of the geo-technical conditions is necessary because of the character of the investment project under planning – construction of big facilities and a stack. The investment project is planned in the near neighbourhood of the Warta River, wherein the geo-technical characteristics typical for river beds and their near surrounding is to be expected. The terrain is good for industrial development what is evidenced by the fact of development of the neighbouring lots: the Heating Plant „Rejtana" and the industrial buildings and structures of Polontex). However , from the investigations carried out (ENVIRON, November 2004) it follows that on this terrain, formerly occupied by a waste dump area, there lays an organic fraction (mineral-organic) of reyears ively considerable thickness (in five boreholes, 0,9...2,9 m). Among the boreholes made on this area, two identified by Cz-2 and Cz-3, are located in the region of the development planned. In the boreholes, there was found a layer of mixed waste, with a share of glass, rags, sand and slag, below which there lay fine sands (Cz-3) or mud (Cz-2). The water table level was found at the depth of 2,25 m. ppt (below terrain level) (Cz-2) and 2,9 m. ppt (below terrain level) (Cz-3).

The borehole location is shown in Drawing 9.

It was investigated also the pollution of soil and water in the boreholes. The investigation results were compared with the valid standards that, for the soil on the industrial terrain (site) belong to the group C as per the Ordinance of the Environment Minister (MS) , dated 9-09-2002 .

The following was found:

- within the scope of metals – meeting of the standards;
- aromatic hydrocarbons – meeting the standards;
- multiple-ring aromatic hydrocarbons – meeting the standards;
- halogen-derivative organic compounds – meeting the standards

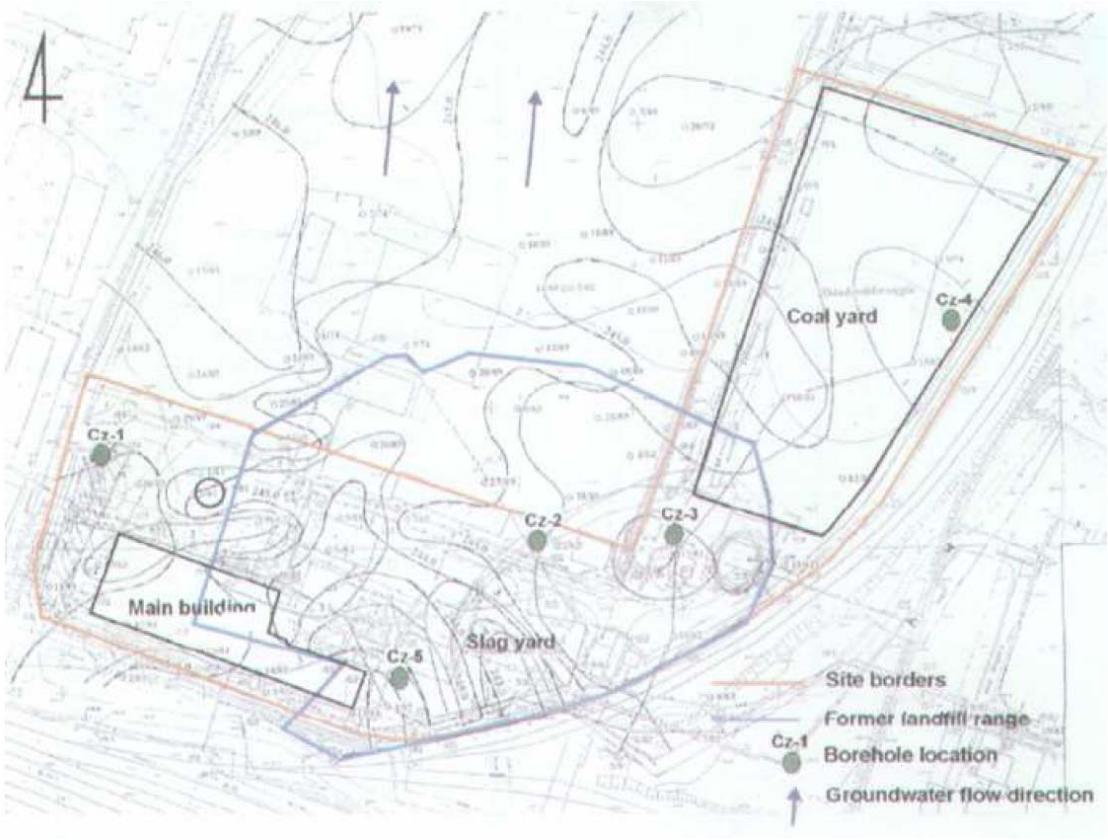
- pesticides – meeting the standards;
- other – meeting the standards.

Water investigations showed also meeting the standards with one exception:

- in the borehole Cz-2 , it was found the mineral oil concentration C-10...C-40 in amount of 2200 ug/dm^3, comparing with the standard value of 600 ug/dm^3.

[1] Jerzy Kondracki: Geografia Regionalna Polski. Issue threetrzecie. Wydawnictwo Naukowe PWN, Warszawa 2002

Drawing 9. Location of boreholes, ENVIRON 2004



3.2 Water conditions

Surface water

The main town river is Warta.
The description below as in Wikipedia (http://pl.wikipedia.org/wiki/Warta)

Upper section

The Warta sources are situated in the surroundings of Kromolow, the oldeset district of Zawiercie, on the Upland Krakowsko-Czestochowska. In Czestochowa, Warta changest the direction of its route to the Northern one, unchangeable to the height of the Kolo town, whereat it turns to the West and flows into the Pradolina Warciansko-Odrzanska and, at the same time, it finishes its upper course.

Middle section

Near Srem , flows into the Poznanski Warty Gap. After flowing via Poznan, the river finds its way on the obstacle in the surroundings of Oborniki in the form the primeval forest Puszcza Notecka and, once again, it changes its direction to the West one. Next, Warta passes by the

primeval forest Puszcza Notecka on the Western side and flows into the Pradoline Torunsko-Eberswaldzka Pradolina.

Lower Section

At the beginning of the lower section of the river course, in the locality Santog, the greatest tributary of Warta discharges - the Notec river. After flowing via Gorzow Wielkopolski, Warta flows into a picturesque area whereat the NationaL Park Warta Mouth (Park Narodowy Ujscie Warty), was established and, thereafter, in Kostrzyn, it discharges to the Odra river.

The Warta river flowing via its terrain has several tributaries. They are the: Sa nimi: Bialka, Brzezinka, Gorzelanka, Konopka, Kucelinka, Sobuczyna, Stradomka rivers.
The Stradomka and Kucelinka rivers flow closest to the investment terrain (site) , therefore short descriptions of them have been included.

The Stradomka river is the LH side tributary of the Warta river, discharging to the years ter on the terrain of Czestochowa , near the Krakowska street. The river sources are situated on the terrain of wooded Herbski Ridge (Grzbie Herbski) in the surroundings of the Puszczew village. In the Blachownia locality, on the river, there is a water reservoir „Blachownia" , of surface area 20 ha, that – in some degree – impacts upon equalisation of flows, especially after short-term freshets. The most important tributaries of Stradomka are the Aleksandria stream, Gorzelanka and Konopka. The Stradomka river, on the terrain of the Czestochowa town is reguyears ed along its full length and embanked, partially. The Administrator of the river the Silesian Managerial Board for Melioration and Water Devices in Katowice, the Czestochowa Branch (Slaski Zarzad Melioracji and Urzadzen Wodnych in Katowicach Oddzial in Czestochowie). The total river length is ca. 20 km, of which ca. 9 km on the town terrain. The river is monitored by IPOS at two measuring/control points located on the bridge at the road Wyrazow - Lojki (9.4 km) and in Czestochowa, in the mouth to Warta (0.5 km). In the target state, water of that river should meet the requirements of the class II. The devices and structures situated on the river: weirs and water stages, bank reinforcements in the form of rakings and fascine as well as coverings , mattresses and fascine/stone rollers. The river bed is irregular – of variable width and depth, strongly whirling. The terrains adjacent to the river are , in a high part, damp areas and waterlogged ones. In: http://www.czestochowskie.pl

Kucelinka – a water course of length 6,87 km, flowing via the Eastern part of Czestochowa. *De facto* , it is not a river but the right hand leg of the Warta river, its relief channel routing from Bugaj to Zlota Gora. The sources on Kreciwilk feed Kucelinka in a minute percentage only. In: http://pl.wikipedia.org

The monitoring of water quality conducted at seven points on the Warta river , within the extent of the Silesian Province (Voivodeship) showed, in 2004 the belonging to the III class (moderate water quality) in Kromolow, Korwinow, Mstow and Wasoczu, thus both upstream Czestochowa and downstream the town, downstream of the Stradomka tributary.

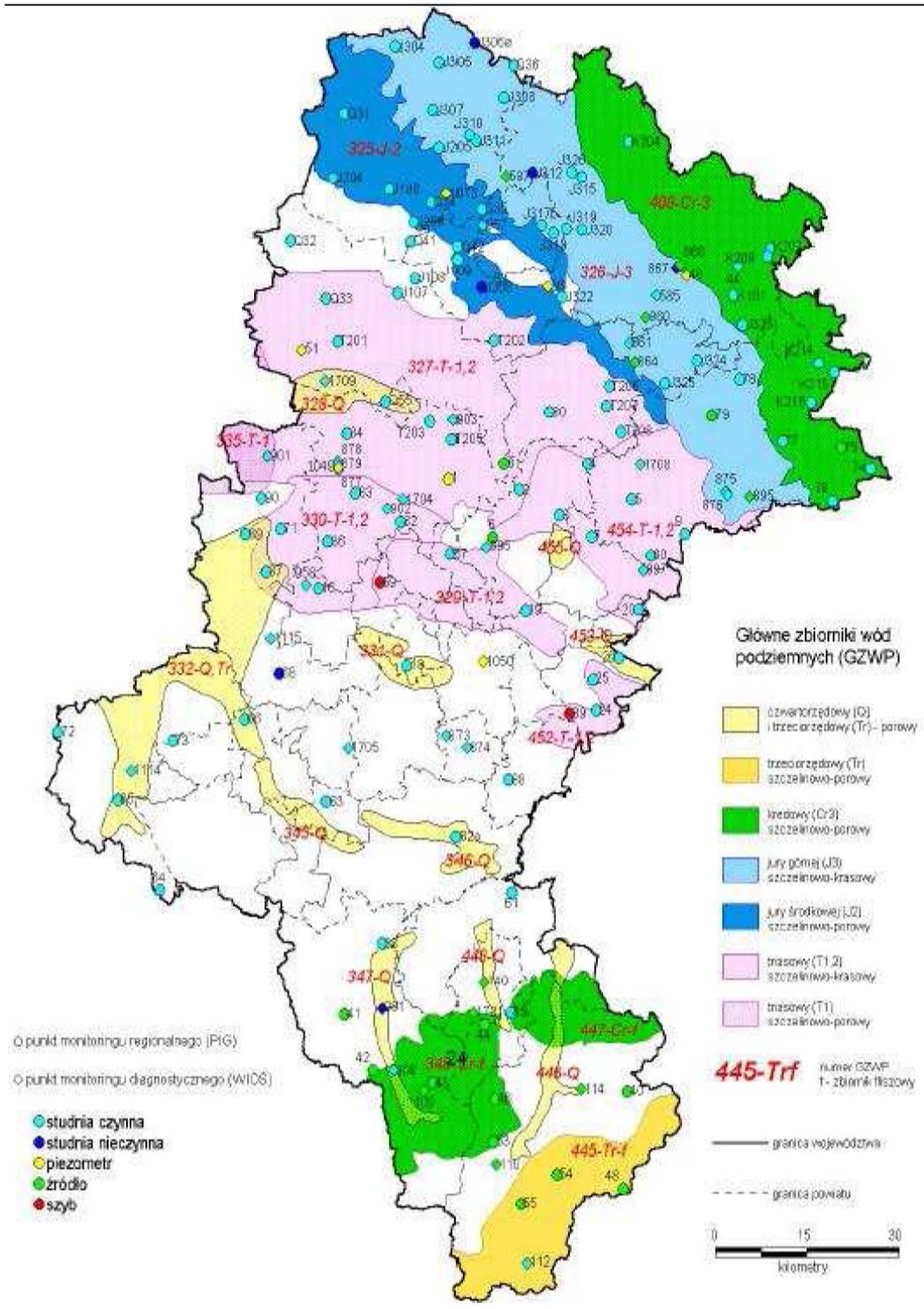
Underground water

Czestochowa is situated near the Main Underground Water Reservoirs (Glowne Zbiorniki Wody Podziemnej), of which the most important is GZWP 326 formations of the Upper Jura (Czestochowa E), where the underground water take-offs are located. The other reservoir in the town region is GZWP 325 (Czestochowa W) in Middle Jura formations. The water quality in the tanks, on the basis of the investigations conducted in 2004 is presented in the table hereinafter.

Table 2. Classification of underground water occurring in the region of Czestochowa

Number of investigated monitoring points		Number of points in the class				
regional	national	Ia	Ib	II	III	other.
GZWP 326 J3: Upper Jura - Czestochowa E						
22	11		22	2	7	2
GZWP 325 J2: Middle Jura - Czestochowa W						
6	3		3	3	3	

Drawing 10. Silesian Province – Main Underground Water Reservoirs (Glowne Zbiorniki Wod Podziemnych)



Legend

Glowne zbiorniki wod podziemnych (GZWP)	Main underground water reservoirs (GZWP)
Czwartorzędowy (Q) i trzeciorzędowy (Tr) – parowy	Quarternary (Q) and Tertiary (Tr) – paired
Trzeciorzędowy (Tr), szczelinowo-parowy	Tertiary (Tr), sloted/paired
Krepowy (Cr3), szczelinowo-parowy	Constratinted (Cr3), slotted/paired
Jury górnej (J3), szczelinowo-krasowy	Upper Jura (J3), slotted/karst
Jury środkowej (J2), szczelinowo-parowy	Middle Jura (J2), slotted/paired
Trasowy (T1.2), szczelinowo-krasowy	Karst (T1,2)
Trasowy (T1), szczelinowo-parowy	Karst (T1), slotted/paired
Numer GZPW, t – zbiornik ...	Number of underground reservoir GZWP, t-… reservoir

Granica województwa	Province (voivodeship) border
Granica powiatu	Administrative district border
Punkt monitoringu regionalnego	Regional monitoring point
Punkt monitoringu diagnostycznego	Diagnostic monitoring point
Studnia czynna	Operable well
Studnia nieczynna	Inoperable well
Piezometr	Piezometer
Zrodlo	Source
szyb	Shaft

source: Report concerning Silesian Province (Voivodeship) conditions, WIOS Katowice

3.3 Protection of earth surface; earth surface standards

The investment project under designing was located on the area used for industrial purposes.

The earth quality standards (permissible values) are defined by the Ordinance the Ordinance of the Environment Minister, dated 9 September 2002 (Official Gazette Dz. U. nr 165 poz. (item) 1359). For the terrain under discussion, there are valid the standards as for the group C of the soils, i.e. the industrial, mining usable land and communication terrains (sites).

The soil investigation (survey) results on the area of the investment project, from the point of view of meeting the above standards, have been presented in point 3.1.

3.4 Climatic conditions

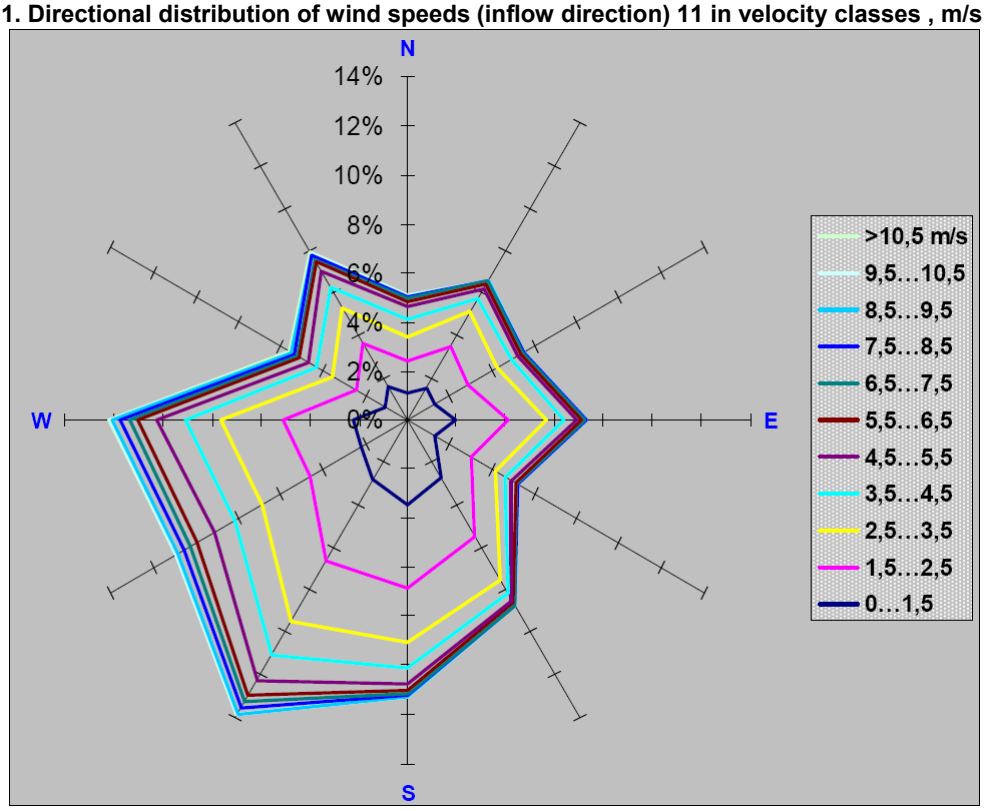
Czestochowa is situated in the central part of the country, of climate presenting typical features. The mean air temperature amounts to ca. 7,5... 8°C, while the yearly precipitate sum – circa 600...700 mm. The maximum monthly precipitate sums fall onto the summer months: July and August, while the minimum ones – onto the winter months: January and February.

Many-year observations show characteristic air temperature variations with a trend towards to warming. The amount of precipitate does not change in such univocal way – in dependence on selection of the time intervals, a decrease (years 1881-1990) or increase (years 1971— 2000) may be seen:

period	1881-1930	1951-1980	1981-1990	1971-2000	1991-2000	1996-2000
temp., °C	7,6	7,7	8,1	8,0	8,2	8,1
precip, mm	678	628	568	617	660	711

The prevailing wind direction is the sector from the South up to the West. Strong wind (of speed >8,5 m/s) shows major directional differentiation: from 0% for the cases of the direction "hour 2", up to 0,48% from the direction „of hour 9". On the other side, the weakest wind (<2,5 m/s) blows most frequently from the South („hour 6") - 6,83% of cases.

Drawing 11. Directional distribution of wind speeds (inflow direction) 11 in velocity classes , m/s

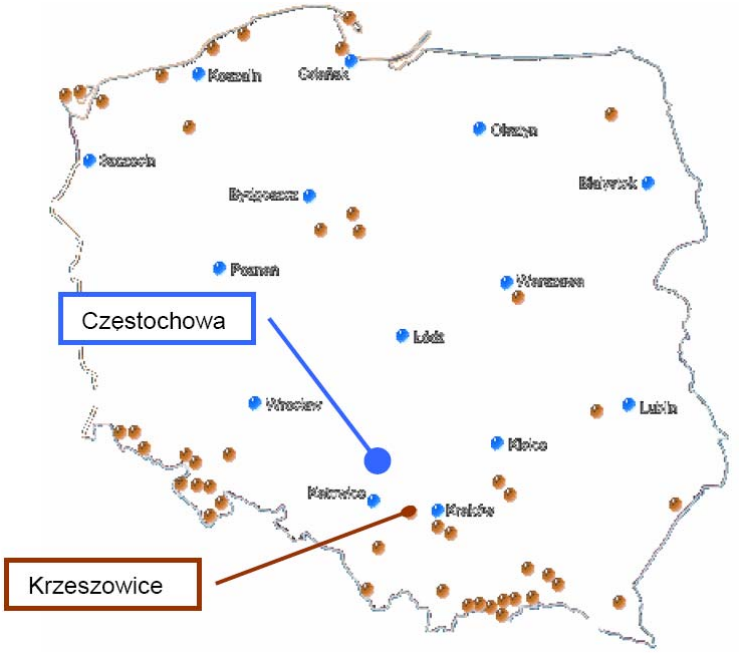


The snow coating laying time in the region of Czestochowa varies from 60 up to 80 days (it is shorter in the town) and the vegetation period length amounts to 200-210 days.

3.5 Protected Terrains and Areas – Natura 2000

Czestochowa nor its surroundings do not possess the health-resort status. The nearest health-resort is Krzeszowice, in the distance of more than 80 km from Czestochowa.

Drawing 12. Health-resort protection areas in Poland



The terrain (site) covered by the investment project is not located on an ecologically

sensitive area, i.e. such protected legally by establishing:

- protected areas,
- natural monuments,
- specimen protection of vegetation, animals and breeding sites.

Within the administrative limits of the town, there is 1 004 ha of the protected area, including 80 ha of the Landscape Park and 924 ha of the Protected Landscape Area. Parks, green areas and estate greenery terrains cover the area of 554 ha. On the town area, there are 11 nature monuments. Three of them were situated by a decision of the Czestochowa Province President (Voivode).

- English oak *(Quercus robur L.)* Park Miejski im. 3-Maja (3-Maja Municipal Park), age ca. 80 years, height 20 m, circumference 306 cm, crown span ca. 26 m
- Sycamore *(Acer pseudopyears anus L.)* Park Miejski 3-Maja (3-Maja Municipal Park), at the park border, at ks. J. Popieluszki Street, age ca. 160 years, height 22 m, circumference 326 cm, crown span ca. 22 m
- Tulip tree *(Liliodendron tulipifera L.).* Park at ul. Lukasinskiego street, between the building of the Culture House Of Czestochowa Metallurgical Plant) (Dom Kultury Huty „Czestochowa") and the building of H. Dabrowski General Secondary School (Liceum im. H. Dabrowskiego); age ca. 90 years, height 22 m, circumference 224 cm

The last natural monument is situated in the lowest distance from the investment project terrain (site) – the distance amounts to ca. 1,4 km.

The eight other natural monuments were established on the powers of the Town Council decisions.

- Red oak (Quercus rubra) Park Miejski 3-Maja (3-Maja Municipal Park); age ca. 150 years, height 22.5 m, circumference 338 cm, crown span 26 x 20 m
- White horse-chestnut (Aesculus hippocastanum), Park Miejski 3-Maja (3-Maja Municipal Park), age ca. 140 years, height 22 m, circumference 393 cm, crown span 18 x 22m.
- European larch (Larix decidua), the Municipal Park (Park Miejski 3-Maja (3-MajaMunicipal Park), age ca. 140 years, height 23.5 m, circumference 311 cm, crown span 19.5 m x 16 m.
- Norway maple (Acer pyears anoides), Park Miejski 3-Maja (3-Maja Municipal Park),age ca. 140 years, height 23 m, circumference 297 cm, crown span 10,7 x 23 m.
- European ash (Fraxinus excelsior), Park Miejski 3-Maja (3-Maja Municipal Park), ; age ca. 140 years , height 25.5 m, circumference 353 cm, crown span 24.9 x 20 m.
- Common pear (Pyrus communis), Park Miejski im. S. Staszica (S. Staszic Municipal Park), age ca. 100 years, height 17.5 m, circumference 235 cm, crown span 14,10 x 14 m.
- Sycamore (Acer pseudopyears anus), Park Miejski im. S. Staszica (S. Staszic Municipal Park); age ca. 130 years, height 26 m, circumference 250 cm, crown span 23 x 20 m.
- Dutch elm, high species (Ulmus hollandica var. major), Promenada im. Cz. Niemena (Cz. Niemen Promenade) – at the crossing with ul. Rolnicza street; age ca. 130 years, height 22.5 m, circumference 324 cm, crown span 20 x 22 m.

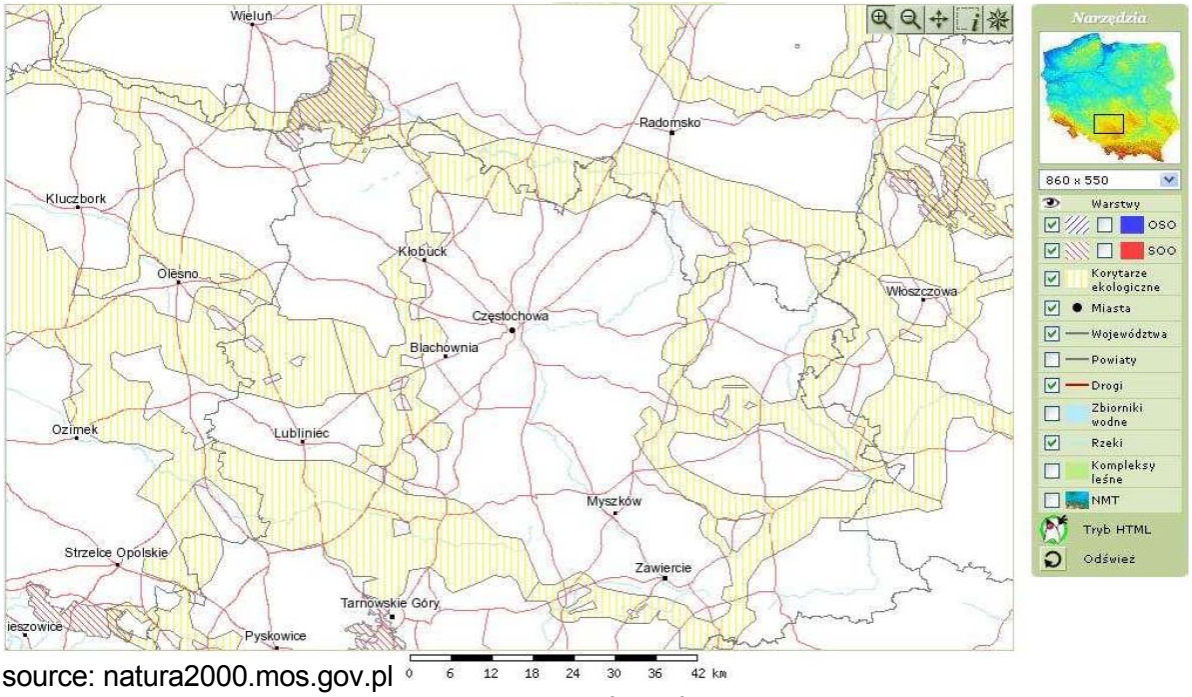
Europejska Sieć Ekologiczna Natura 2000 (European Ecological Network Nature 2000) is a grid of protected areas on the area o the European Union. the purpose of allocating such areas is the protection of precious – from the nature point of view - and endangered components of the biological variety. The Natura 2000 network includes:

- Bird special protection areas (OSO) - (Special Protection Areas - SPA) appointed on the basis of the Council Directive 79/409/EWG , concerning wild bird protection, so called "Avian" Directive,
- Special areas of habitat protection (SOO) - (Special Areas of Conservation - SAC),

appointed on the basis of the Council Directive 92/43/EWG, concerning protection of natural habitats and wild fauna "Habitat Areas" , for the natural habitats specified in the Appendix and for the plant and animal species specified in the Appendix II to the Directive.

The investment project under analysis will not impact upon the areas covered as NATURA 2000. The neares existing area of that type is situated to the Northern West of the investment project area; this is a cave reserve „Szachownica" (Chess-board) at the extreme of the province (voivodeship) (PLH 240012) and, somewhat further in the same direction, Zaleczanski Luk Warty (Zaleczanski Warta River Arc) PLH 100007, located already in thy Lodzkir Province (Voivodeship), at the joint of the Silesian and Wielkopolskie Province (Voivodeship) borders.

Drawing 13. Natura 2000 network areas and ecological corridors in the region of Czestochowa



source: natura2000.mos.gov.pl

Legend

Warstwy	**Layers (strata)**
Korytarze ekologiczne	**Ecological corridors**
Miasta	**Towns and cities**
Województwa	**Provinces (voivodeships)**
Powiaty	**Administrative disctricts**
Drogi	**Roads**
Zbiorniki wodne	**Water reservoirs**
Rzeki	**Roads**
Kompleksy lesne	**Forest complexes**
Tryb HTL	**Mode HTML**
Odswiez	**Restore**

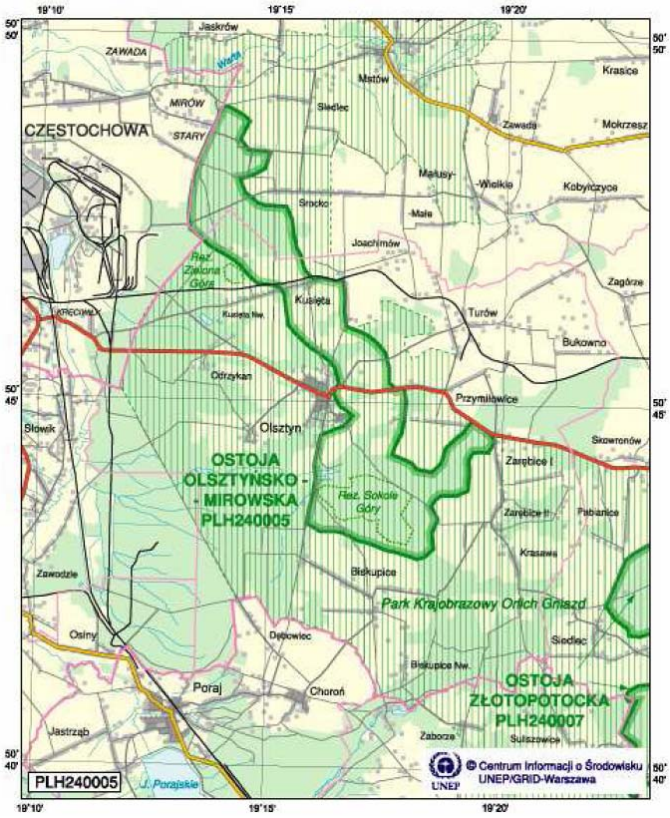
In addition to the areas submitted to the Network Natura 2000, the off-government organisations proposed the list , so called **„Shadow List" ,** expressing **the** opinion that the habitat special protection area network does not include , at a sufficient degree, the Polish resources of natural habitats. The areas have not been included in the lists transferred by Poland to the European Commission but, in conformity with the position of the European Union, for all these areas, the proceeding concerning the project or plan impacts on the area Natura 2000 should be applied. None of the areas is situated within the reach of impacts of the investment project planned, though the one situated in the lowest distance, Ostoja Olsztynsko-Mirowska (Olsztnsko-Mirowska Refuge) is situated in the distance of ca.

5 kilometres to the East from the investment project terrain (site).

Ostoja Olsztynsko-Mirowska (The Olsztnsko-Mirowska Refuge) is located to the East from Czestochowa, on the Northern extreme of Wyzyna Czestochowska (Czestochowska Upland), constituting an enclave of natural and semi-natural ecosystems among the strongly urbanised industrial centre terrains (sites). The area lies fully on the terrain of Park Orlich Gniazd (The Eagle Nest Park). Till now, 2 natural reserves have been established there - Zielona Gora (The Green Mountain) and Sokole Gory (The Falcon Mountains) and one arable ecological land - Gory Towarne (The Goods Mountains).
The refuge covers the lime hill complex (mogots) with numerous karst forms such as caves, mogotes, wells and karst funnels. The hills are built of Upper Jura limestone. The most rigid of them, rock limestone, create characteristic mogotes in the forms of towers, blocks , mushrooms and rock gates – due to airing and erosion of rocks ; at the feet of mogotes, there are produced small rock debris . The karst processes led here to creation of numerous caves of length exceeding 100 m, of a very rich dripstone decorations.
source: http://www.przyroda.katowice.pl/

The status of this area has not been defined yet (March 2007). A proposal of establishing it appears in the documents of 2002 (e.g. on the Internet website of Centrum Dziedzictwa Przyrody Gornego Slaska (The Upper Silesia Nature Heritage Centre)) and in a proposal of off-government organisations of 2004 (The Shadow List) under Ordinary Number 248. The code identification PLH 240005 visible on the map presented in other materials, including those presented in the website of Ministerstwo Srodowiska (The Environment Ministry), is appointed to the area of Beskid Slaski.

Drawing 14. The area of Ostoja Olsztynsko-Mirowska (The Olsztynsko-Mirowska Refuge) planned for connection into the Natura 2000 network



Not judging a priori if the area of Ostoja Olsztynsko-Mirowska (The Olsztynsko-Mirowska Refuge) will be finally included into the Network Natura 2000, and what will be the final borders of the area, (e.g. it is postulated that the Zielona Gora reserve area is included), it may be stated that, the increased standards for the environment quality have not been introduced (in particular, considering the air quality), then the heating plant impacts due to the investment projects , that will not be bigger than the heating plant impacts in the existing state, does not endanger to the areas.

3.6 *ARCHITECTURAL MONUMENTS AND FACILITIES SUBJECT TO CONSERVATOR'S PROTECTION*

Czestochowa is a town rich in cultural monuments, a part of which have been enlisted on the list maintained by the Monument Conservator and are protected by law, while the other should also be cared of as valuable objects.

Monuments[1] of architecture and culture and other precious objects on the terrain of the town are:

- Monastery complex of OO. Paulinow (Paulite Fathers on Jasna Gora: the basilica of Wniebowziecia NMP (Virgin Mary Assumption) and Znalezienia Krzyza Swietego (Holly Cross Finding) , with the oldest part reaching the times of establishing the monastery in 1382 - the Matki Bozej (God Mother) Chapel with its early-baroque ebony/silver altar and the famous painting of Matka Boza Czestochowska (Czestochowska god Mother). The main nave of Bazylika Jasnogorska (The Jasnogorska Basilica) and the North-Eastern of the fortress have their origins in the XV–th and XVI-the Century, while almost complete rest -in the middle of the XVII-the Century. The biggest treasure of Jasna Gora (The Bright Mountain) is Cudowny Obraz Matki Bozej Czestochowskiej (The Miraculous Painting of Czestochowska God Mother), called Czarna Madonna (The Black Madonna), brought by the Prince Wladyslaw Opolczyk from Belz on Russia. From the newest investigations, it follows that this is a Byzantine icon of the VI-VIII-th Century. The most precious places on Jasna Gora include also Skarbiec (The Treasury), Sala Rycerska (The Knight's Hall), Arsenal, refectory, tower with retrenchments and Muzeum 600-lecia (The 600-Anniversary Museum), as well as the plentiful library of the Paulite Fathers.
- Archikatedra Swietej Rodziny (The Holly Family Archsee) (place of John Paul II), neogotic of the 1908-27 , as per the design of K. Wojciechowski
- Kosciol Filialny Pana Jezusa Chrystusa Konajacego (The Filial Church of Dying Jesus Christ)
- Kosciol Parafialny Najswietszego Imienia Marii (The Parish Church of the Name of Our Lady)
- Kosciol Parafialny Sw. Andrzeja and Barbary (The Parish Church of Saint Andrew and Saint Barbara) (ul. sw. Barbary street) with the presbytery and chapel with miraculous springs – the old monastery complex of the Paulite Fathers , of years 1637-42, reconstructed in the XVIII-th and XIX-th Centuries.
- Kosciol Parafialny Sw. Jakuba (The Parish Church of Saint Jacob) (pl. Bieganskiego square), ex-Orthodox Church of Saints Cyril and Methody of 1870
- Kosciol Parafialny Sw. Zygmunta (The Parish Church of Saint Sigmund (pl. Daszynskiego square) of ca. 1350, rebuilt onto a baroque one in the XVIII-th Century.
- Kosciol Wniebowziecia NMP (The Our Lady Assumption Church) at Alei NMP Alley
- Kosciol p.w. Sw. Jozefa (The Church under the Invocation of Saint Joseph) in Rakowie
- Neogotycki kosciol ewangelicko-augsburski (The Neogothic Evangelic-Augsburg Church) (ul. Slaska street) built in years 1912- 1913
- Budynek Kurii Archidiecezjalnej (The Archdiocese Curia Building) of 1870 , at the NMP Alley
- Czestochowski Ratusz (Czestochowski Concil House) with the guardhouse (pl. Bieganskiego square) of 1828, design of. F. Reinsteina, nowadays Muzeum

Czestochowskie (The Czestochowskie Museum)

- Cmentarz Kule (The Kule Cemetery) with Kaplica Przemienienia Panskiego (The Transfiguration Chapel)
- Cmentarz Sw. Rocha (The Saint Roch Cemetery)with the Curch Dedicated to Saint Roch and Saint Sebastian (kosciol p.w. Sw. Rocha i Sebastiana)
- Cmentarz Zydowski (The Jewish Cemetery) in the Zawodzie District
- Aleje Najswietszej Marii Panny (Our Lady Alleys)
- Stary Rynek (Old Market Place)
- Ulica Siedmiu Kamienic (Seven Tenements Street) with development of the XIX-th Century
- rezerwat archeologiczny kultury luzyckiej (Lusatian Culture Archaeological Reserve) in the Rakow District

[1] worked out upon, among other things, http://turystyka.silesia-region.pl/

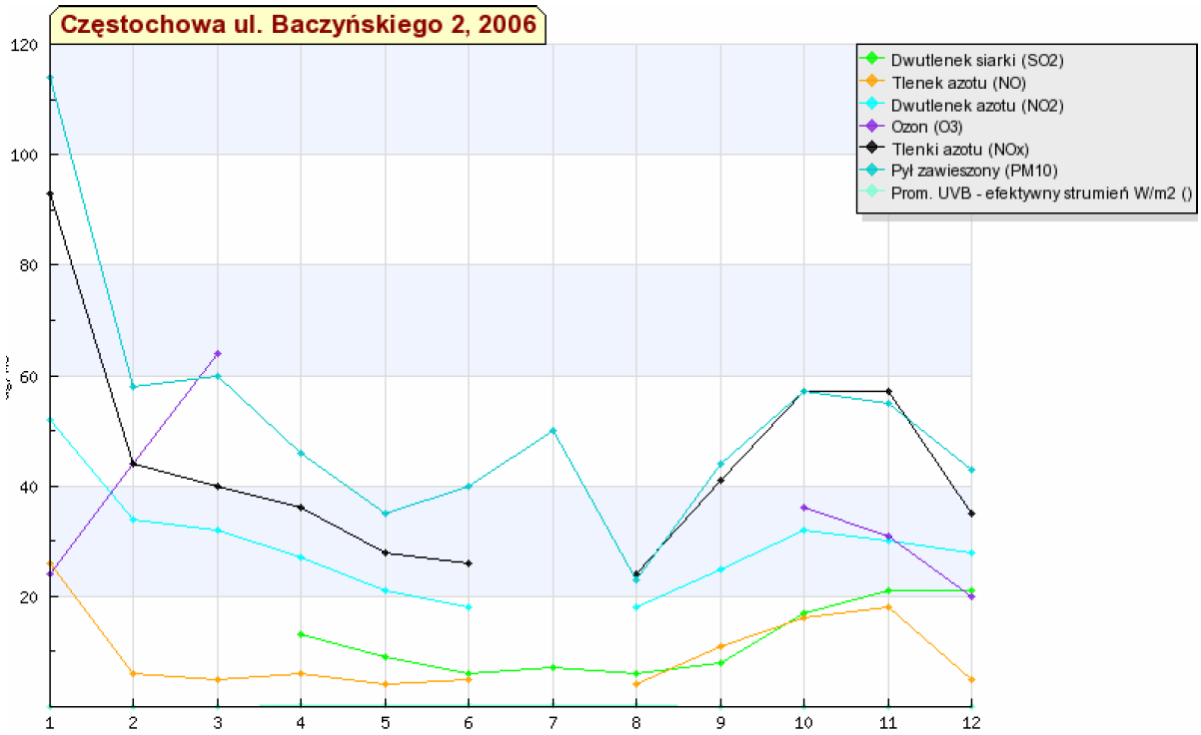
In the surrounding of the investment project and within its impact reach, there are no objects subject to the conservator's protection.

3.7 Atmospheric Air Quality

In conformity with publications of WIOS (The Provincial Environment Protection Authority) in Katowice, the air quality is a subject of investigations conducted within the framework of the provincial (voivodeship) monitoring network. The monitoring network is constituted of stationary test stations and the passive monitoring points. On the area of the town, there act two automatic stations: at the K.K. Baczynskiego street (monitoring of the town background and at the crossing of the Jana Pawla II Alley and Armii Krajowej Alley (the communication point).

The town background measurement being carried out at the stand at the ul. K.K. Baczynskiego 2 street, in the Northern part of the town, in a distance of circa 9 km from the Heating Station terrain (site), shows the typical concentration variations at individual day times.

Drawing 15. Air pollution background measurements in 2006



source: http://stacje.katowice.pios.gov.pl/iseo/

Legend

Dwutlenek siarki	Sulphuor dioxide
Tlenek azotu	Nitrogen monoxide
Dwutlenek azotu	Nitrogen dioxide
Ozon	Ozone
Tlenki azotu	Nitrogen oxides
Pyl zawieszony	Suspended dust
Prom. UVB - efektywny strumien	UVB radiation – effective stream

SO_2 – the yearly mean value has not been determined for the period IV.XII , the mean value amounts to 12 ug/m^3
NO_2 - 29 ug/m^3, i.e. 72,5% of the standard value Da = 40 ug/m^3
PM-10 - 51 ug/m^3, i.e. 127,5% of the standard value Da = 40 ug/m^3

At the other stand located at the joint of the Aleja Armii Krajowej Alley and the Aleja Jana Pawla II Alley (the distance from the Heating Station ca. 3,5 km) higher concentrations of NO_2 ar observed since it is a “communication” stand. The dust concentration at that station was, in 2006, almost identical as that at the ul. K.K. Baczynskiego street.

4 PROJECT UNDER PLANNING – TECHNICAL AND TECHNOLOGICAL SOLUTIONS

The Investor aims to expand the heat sources on the terrain (site) of the „Rejtana" Heating Station. The new fluidized bed boiler will be – in contrast to the existing stoker-fired boilers – a stem and not a water boiler. Production of steam will enable generation of electric power in combination, what is more effective due to the use of the fuel energy. The new boiler will be subject to much more rigorous emission standards and, furthermore, it will show much higher thermal efficiency ; therefore, taking off a part of heat production from the stoker-fired boilers to the fluidized bed boiler means, first of all, lower unit gas and dust emission indices (to air) in comparison with the hitherto existing technology.

4.1 ALTERNATIVE CONSISTING IN NOT UNDERTAKING THIS PROJECT

Resignation of the investment project would mean that the heat production would be carried out as till now, id est, in a considerable degree, in water stocker-fired boilers built some 20 years ago and even earlier, characterised by rather high gaseous combustion product emission indices and dust emission indices, in conformity with the valid law. Some of the boilers are exploited in such degree that they will need considerable financial outlays in a near future.

Investing in severely exploited boilers (e.g. the Heating Plant at the Brzeznicka street) in order to adapt them to the gradually increasing emission requirements is possible but it is not an optimum use of the economic potential of the Company.

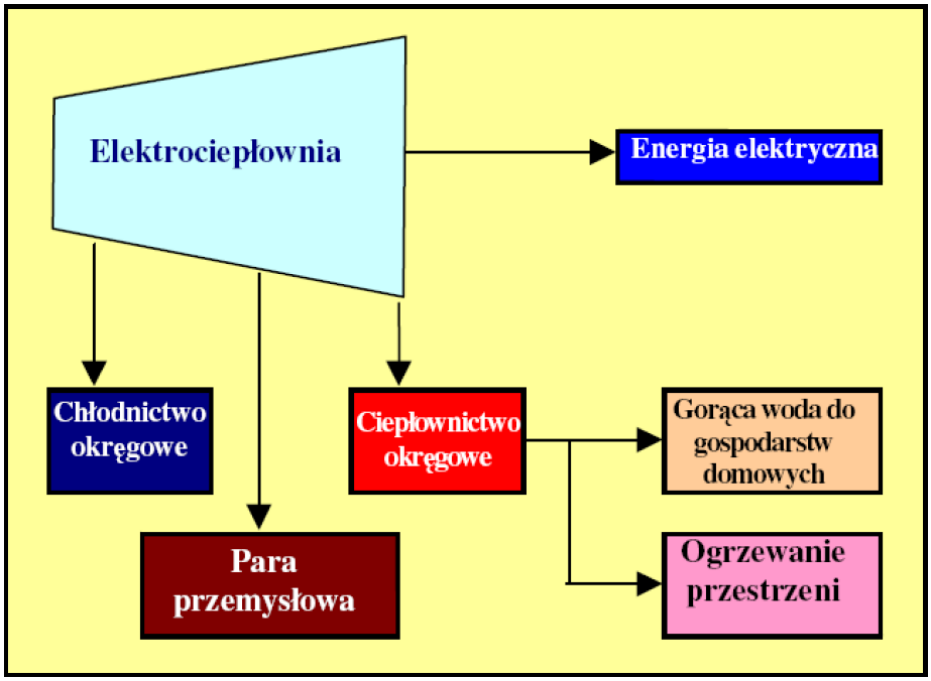
In addition, leaving the thermal source system in the present state means a further intensive operation of the stoker-fired boilers of rather inefficient de-dusting what, in connection with the location of the Heating Station Brzeznicka and the limited height of its stack will mean maintaining its negative impacts upon the air condition at that part of the town.

Therefore, it may be stated that resignation of this investment project will provide no benefits to the environment and simply it will be unprofitable for the same.

4.2 DESCRIPTION OF ALTERNATIVE CONSISTING IN EXECUTION OF INVESTMENT PROJECT PLANNED

The idea of co-generation (combined generation) (Drawing 16), i.e. production of the heating and electric power in combination, is well known and applied for decades , In comparison with separate production, it shows better use of energy contained in the fuel (effectiveness higher of ca. 40% - Drawing 17), and – therefore – beneficial to the environment.

Drawing 16. Co-generation products

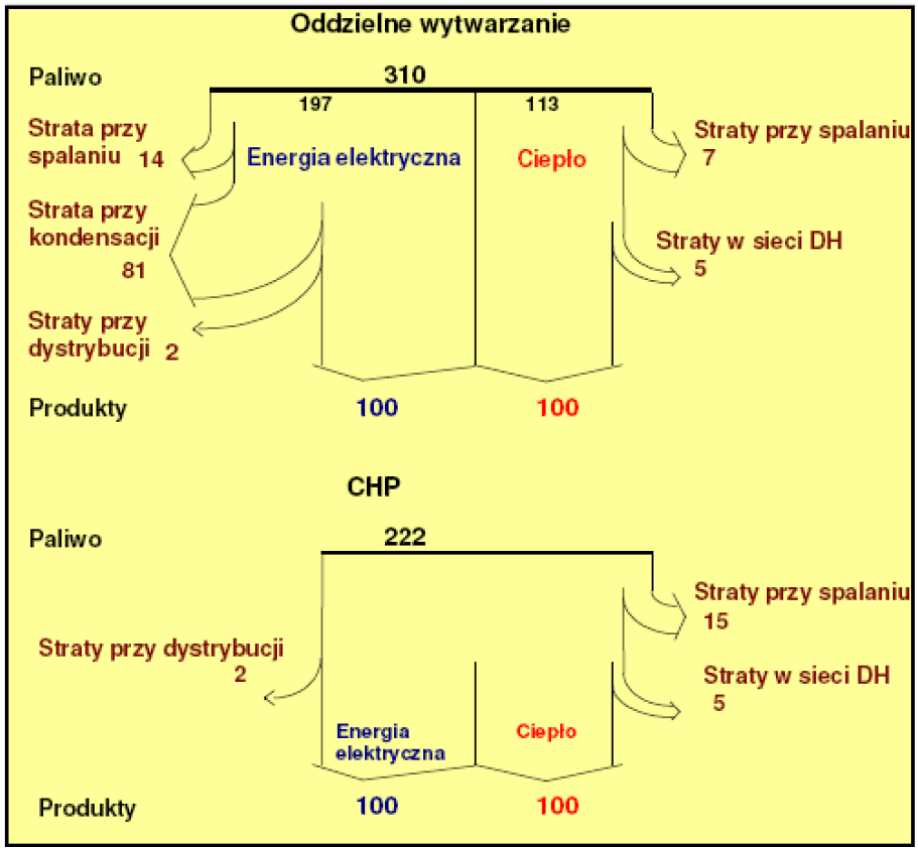


source: Krajowa Agencja Poszanowania Energii (National Energy Respect Agency) S.A., Author: Arto Nuorkivi

Legend

Electro ciepłownia	Heat and power generating plant
Energia elektryczna	Electric power (energy)
Chlodnictwo okregowe	District cooling
Para przemyslowa	Insdustrial steam
Cieplownictwo okregowe	District heating
Goraca woda do gospodarstw domowych	Hot water for households
Ogrzewanie przestrzeni	Space heating

Drawing 17. Exemplary Sankey's plot showing differences between separate production of heating and electrical power and production in co-generation (CHP); fuel: natural gas



source: Krajowa Agencja Poszanowania Energii (National Energy Respect Agency) S.A., Author: Arto Nuorkivi

Legend

Oddzielne wytwarzanie	Separate generation
Paliwo	Fuel
Strata przy spalaniu	Combustion loss
Strata przy kondensacji	Condensation loss
Straty przy dystrybucji	Distribution losses
Produkty	Products
Straty przy spalaniu	Combustion losses
Cieplo	Heat
Straty w sieci DH	District Heating network losses
Paliwo	Fuel
Straty przy dystrybucji	Distribution losses
Produkty	Products
Energia elektryczna	Electric energy
Cieplo	Heat
Straty przy spalaniu	Combustion losses
Straty w sieci DH	District Heating network losses

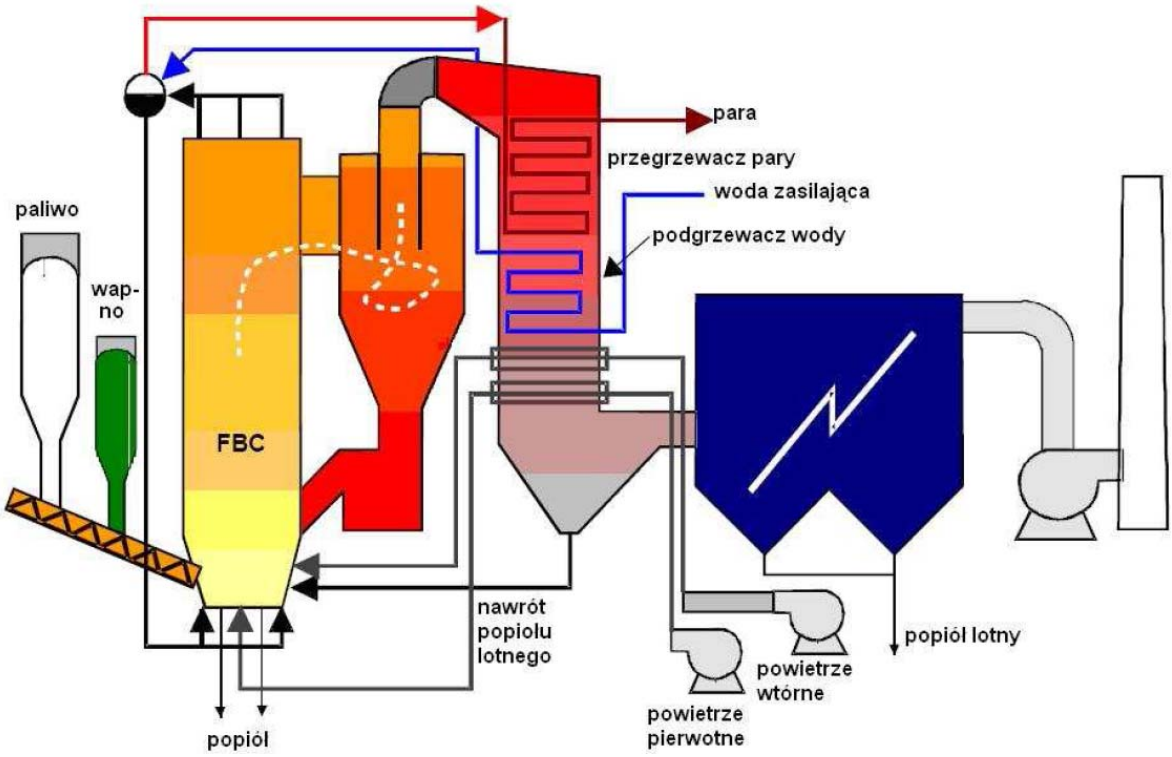
The above balance refers to gas combustion; when combusting coal, the general effectiveness of co-generation is higher also of ca. 40% in comparison with separate heating and electric power generation; there are different proportions of electric power and heating power (less of electric power (energy)).

4.2.1 Fluidized Bed Boiler and Turbo-generator

Among various species of fluidized bed boilers, for the investment project purposes, the boiler type with a circulating bed - CFBC (Circulating Fluidized Bed Combustion), or CFB - Circulat Fluidized Bed) has been specified. The

circuit diagram of such boiler is depicted in Drawing 18. The technology has been used in practice since 1982 (Lurgi).

Drawing 18. Circuit diagram of fluidised bad water boiler with circulating bed



source: BREF Large Combustion Plants July 2006 (ref. point 4.6)

Paliwo	Fuel
Wapno	Lime
Popiol	Ash
Nawrot popiolu lotnego	Volatile ash return
Powietrze pierwotne	Primary air
Powietrze wtorne	Secondary air
Popiol lotny	Volatile ash
Podrzewacz wody	Water re-heater
Woda zasilajaca	Feeding water
Przegrzewacz pary	Stem super-heater
Para	Steam

In relation to the investment project under planning, the boiler is to be, at one time, a water and steam boiler, to enable production of electric power (energy) in co-generation. It will be provided with separate bundles for heating up network water and a separate steam circulation. In order that it is possible to generate electric power (energy) out of the heating season and in the period that the network heat demand is lower that the heat production size in the boiler, it has been assumed to build a closed water/air cooling system for reception of surplus heat from the boiler.

The design assumes construction of a coal and biomass fired boiler of the total heating power ca. 205 MW, providing the thermal energy (power) stream at the output 120 MW and production of electric power (energy) up to ca. 65 MW in the turbo-generator. However, since in the summer season, the amount of the thermal energy (power) generated in the co-generation mode highly exceeds the demand (reception in the town in the form of c.w.u. (hot usable water)), the cooling systems will be used. At the lowest air temperature values, from the combined system, there may be obtained 133 MW in the form of heat and ca. 55 MW of the electric power.

During the springtime or autumn-time (and during a mild winter), when heat production reaches 119 MW, the electric power (energy) production will reach maximally 68 MW. At higher air temperature values, the demand for heat in the network is lower than the amount of heat generated in the boiler and, to maintain the ability to generate electric power (energy), surplus heat is to be taken off the system. For this purpose, it has been assumed to build a cooling system (closed cooling water circulation, cooled with water, of the cooling power up to 100 MW); due to that, production of electric power (energy) may rich 50 MW in summertime. When cooling at the maximum efficiency, the boiler may operate at a higher power; when the boiler operates at the minimum power for the stable operation (ca. 40% of the rated power value), then the cooling demand in the summer season is lower but the electrical power (energy) is lower then. In dependence on selection:

a) additional cooling at the minimum necessary level
b) additional cooling at the maximum power value of 100 MW.

it is assumed that the fuel demand is in conformity with the listing

Table 3. Fuel balance in two operating alternatives

	Additional cooling at the minimum level	Additional cooling at the power value of 100 MW
coal, Mg/year	133 000	226 000
biomass, Mg/year	101 000	101 000

The demand for limestone, sand and ammonia (or urea) has been determined at:

- limestone 13 000 Mg/year
- sand 1 430 Mg/year
- ammonia 700 Mg/year

In addition to the above mentioned, there will be used , at lower amounts, chemicals for water treatment, including those for bed regeneration in ionite columns (hydrochloric acid or sulphuric acid, sodium hydroxide) and, for water softening – phosphates or hydrazine derivatives).

The yearly water demand has been determined at roughly 78 tys. m^3 in the operating alternative with the minimum cooling. The water balance is depicted in Tables. The first Table (table 4) presents the balance from the viepoint of the water consumption purpose, while the other one balances the outcome.

Table 4. Water balance – with regard to objective

	m^3/h	m^3/year
Network water make up	6,8	50 000
Cooling system	2,4	12 569
Process water and additional cooling	3,0	15 496
Total	12,2	78 065

Table 5. Water balance with regard to outcome

	m^3/h	m^3/year
Condensate to waste water and waste water from the station	1,3	7 530
Cooling water losses	0,7	3 691
Evaporation to atmosphere	2,2	11 338
Losses in network and possible ash moistening	8,0	55 505
Total	12,2	78 065

The amounts of furnace waste has been evaluated as follows:

- ash from boiler 13 000 Mg/year
- volatile ashes 19 400 Mg/year

Fuel deliveries

At present, coal is delivered mainly by truck transportation but it is assumed to make use of the existing railway siding. Its unloading capacity has been determined at 630 m^3/h. Fuel will be dumped in the existing coal yard of surface area ca. 10 tys. m^2 and dumping capacity ca. 50 tys. m^3. Heaping up on the dumping yard, at efficiency pf 260 m^3/h. Transport of fuel to the boiler will be ensured by a belt-flight system of the throughput value 260 m^3/h.
Biomass will be delivered by truck transportation to the unloading station of the reception capacity 200 m^3/h and the storage capacity 2 * 2500 m^3. Transport of fuel to the boiler will be provided by the system of built-up belt flights of the throughput value 230 m^3/h.
Fuel unloading is planned for five days per week, exclusively in hours 7-^21 (limitation due to noise).

Boiler

Boiler efficiency and specifications:

- production of steam at rated load 77,2 kg/s
- steam pressure 111 bar
- temperature 515 °C (788 K)
- feeding water temperature 230 °C (503 K)
- minimum boiler load 35-^40% of rated power
- energy (power) stream in fuel at the rated power 200-^210 MW (in dependence on fuel)

Turbine

- steam consumption under load 77,2 kg/s
- steam pressure 110 bar
- steam temperature 515 °C (788 K)
- electric power 64,5 MW

Generator

- speed 3000 min"[1]
- voltage 10,5 kV
- power 75,9 MVA

Cooling

- closed system of power 4-5 MW

- Additional cooling system 55 MW or 100 MW

Two operating alternatives are considered, of various cooling power, with indication at the first one.

Flue gas disposal and de-dusting

- electro-filter or bag filters
  guaranteeing dust concentration of 30 mg/m^{3}U
- boiler ash silos capacity 400 m^3
- silo capacity (volatile ash) 1400 m^3

this capacity will enable boiler operation for 7 days without ash taking-off. Ash transportation (disposal) is planned for five days per week in daily hours 7-^21 (limitation due to noise).

Miscellaneous

- transformer output voltage
  110 kV

Electric current will be directed to the power network of the country.

4.2.2 Auxiliary Installations

The auxiliary installations will be the ventilating systems, compressed air installation, lubricating and cooling systems, extinguishing installation (hydrants and sprinklers), boiler ignition installation (oil tank, oil handling pipeline to boiler burners) limestone installation (storage tanks, handling system to the boiler) and sand constituting the bed in the boiler (as above), and ammonia or urea for the SNCR (selective non-catalytic reactor). An auxiliary installation is the water preparation (treatment) station based upon the ion-exchange technology, complete with raw and demineralised water tanks.

The installations will be worked out in the design phase, during which the required arrangements will be done. Presently, it is known that the oil tanks and the liquid chemical tanks (e.g. for acid) will be set up in tubs capable of containing the tank connect in a case of a spillage. It is also known that advanced control and protection systems will be built.

4.3 Protective Actions

4.3.1 **A**tmospheric Air

The sources of emissions connected with the investment project under planning will be the fluidized bed boiler complete with the accompanying installation, covering handling and storage of fuels (coal and biomass) as well as of auxiliary materials, including limestone, storage and handling of ashes constituting furnace waste. Emission at a small scale may occur in the agent store or in the water treatment station. Emission reduction will be supported by:

- the modern structure of the fluidized bed boiler that will significantly reduce the nitrogen oxide emission
- the high energetic efficiency of the boiler that reduces the fuel demand and , thus, has its share in decreasing the emission,
- application , in the fluidized bed boiler, an additive of calcium that binds sulphur oxides and other gases of the acidic character (HCl, HF), and – thus – decreases the emission,
- application of Selective Non-Catalytic Reactor (SNCR) for reduction of the nitrogen oxide emission – the reagent will be ammonia or urea,
- effective treatment of flue gases of dust in the electro-filter,

- closure of processes – casing of the handling belt flights, storage in silos (ash),
- application of filters on storage silos for dusty materials (e.g. ash).

4.3.2 GROUNDS AND UNDERGROUND WATER

To protect grounds against pollution with substances originated at the work conducted (oils and other substances), the room surfaces will be made as tight, avoiding of penetration of substances into soil.

There is no need of special soil and underground water protection outside the hall terrain (site) and the area of roads and yards.

4.3.3 WASTE WATER MANAGEMENT

Waste water generated on the investment project terrain (site) will not be arduous one. This is because that the will be:

- living waste water incoming from various sanitary facilities, of composition typical for such waste water and produced in amounts close to the present state (the works expansion will not result in increased employment),
- industrial waste water (water treatment, keeping cleanness in the hall, post-cooling water from device cooling) in a major volume; in relation to the present state ; with regard to composition, waste water must observe the general requirements defined in the detailed legal regulations and the requirements defined by the operator of the waste water treatment plant,
- rain waste water from the roof of the new main hall and the technical/storage building
- rain waste water from hardened surface of roads and yards, containing typical pollution for that waste water type, including suspension and possible oil derivative substances.

Sanitary waste water will be, like presently, disposed to the municipal sewerage network; this waste water needs no pre-treatment.

Rain waste water discharged from roof surfaces may be recognised as unpolluted and may be disposed without treatment to surface water or into soil.

Precipitate (rain) water and melting water, possibly polluted with oil derivative substances, will be treated in a coalescent separator prior discharging into surface water – via the ditch running along the Eastern lot border and discharging to the Warta river

4.4 EMERGENCY CASES

4.4.1 CONSTRUCTION PHASE

The main hazard for the closest surrounding and people residing on the terrain (site) covered by the investment project are:

- a constructional disaster, accident or another event connected with the work being conducted – it should be cared of the high qualifications of the work contractors, adequate supervision and appropriate work organisation; this aspect is subject to the building (construction) law regulations and does not constitute the analysis subject within the framework of the Report concerning the environmental aspects;
- pollution of soil and underground water with oil derivative substances originating in mechanical vehicles under operation and operating machines,
- possible damage of existing underground infrastructure.

In order to avoid such failure types ant to minimise their effects, the following

should be done:

- provide the necessary daily service for vehicles and machinery, taking a special attention on possible leakages,
- for network erection/assembly, use attested materials and agree the technical and technological (process) with the infrastructure user.

4.4.2 USEFUL OPERATION PHASE

Due to the scale of activities and the amount of raw materials stored the Works have not be included in the category of works endangered by a serious industrial failure (Official Gazette Dz. U. 2002.58.535, zm. (later amendments): Official Gazette Dz. U. 2006.30.208). Possible failure that may happen on the area (site) of the Works is not encountered in the "serious failure" category; it may be defined as a plain failure. The impact reach of such "plain failure" is comprised, in general, within the borders of the area wherein the installation owner possesses its legal title. Only at some events of the failure character e.g. at a big fire, the impacts may also cover the terrain located further, e.g. due to a discharge of waste water produced when extinguishing a fire.

The main hazard for the closest surrounding and people residing (staying) on the area of the Works may be the possibility of fire occurrence. The minimisation of that hazard will be achieved through fulfilling, by the Investor, the requirements covered by the Ordinance of the Environment Minister (MS), WiA, dated 21 April 2006, concerning *fire protection of buildings, other constructional facilities and terrains* (Official Gazette Dz. U. 2006.80.563). In the Ordinance, there were described in detail the fire protection rules and fire protection rules for buildings and their outfit with equipment and fire protection devices.

4.5 MEETING THE REQUIREMENTS OF ARTICLE 143 OF POS (ENIVIRONMENT PROTECTION LAW) ACT

The Act defines the requirements with regard to newly started installations or to modified ones at a significant degree – the investment project under planning is connected with the latter state of matters.

1) Application of substances of low hazard potential. The main items in the mass balance are coal, biomass and limestone, as well as water. The hazardous substances specified in the Ordinance of the Haelth Minister [Official Gazette Dz. U. 2005.201.1674] are not foreseen for use or will be applied at a very small scale only (e.g. in laboratories for analyses).
2) Effective generation and use of power (energy). Power (energy) will be generated from combustion of coal and biomass, in a modern boiler of efficiency higher than that of other boilers operated hitherto, of some 6...7%. Effective use of power (energy) will be ensured by a modern boiler power control system. Mechanical energy of generated steam in the boiler will be transferred into electric energy (power) in a modern turbine, of good energy transformation efficiency.
3) Provision of rational water and other raw material consumption, as well as fuel consumption. Water will be used for the process (technological) purposes: making up the steam circulation – a new item; making up network water circulation – as till now; for device cooling
   - Considerable increase with regard to the existing state, due to the need of filling up the cooling water circulation in the steam system and routine making up the circulation; the effective use follows from the fact that, in new devices, losses will be minute. The fuel in use will be coal and biomass, and the ignition fuel – lightweight fuel oil. The modern structure of the fluidised bed boiler of a high efficiency and the power control system will ensure a very rational fuel consumption.
4) Application of waste-free low-waste processes (technologies) and possible regaining of the waste produced. The combustion technology (processes) of mined solid fuels and, at a less degree, of biomass generates furnace waste in

the form of ashes, in that case. It will be used in full by management out of the Heating Station area (site) (e.g. for production of constructional materials). The amounts of other waste are constituted of a minute part of furnace waste; it will be, in a high degree, the same waste that is generated presently in connection with useful operation of the „Rejtana". Heating Station. The waste management of that Heating Station was verified positively as "the best available technique (method)", within the framework of the proceeding for achievement of the integrated permission.

5) The kind, reach and amount of emission. The installation impacts due to noise emissions, gas and dust emission into atmosphere will be enclosed within the limits of the terrain (site), to which the Investor possesses the legal title. Outside the terrain (site), the environment quality standards will be observed.
6) The use of comparable processes and methods that have been successfully applied at the industrial scale. Fluidized bed boilers with a circulating bed and electric power (energy) production in turbo-generators, as well as other auxiliary processes with respect to the main one have been proven and perfectly mastered with.

Note

In the publication titled *Ustawa - Prawo ochrony srodowiska. (The Act, Environment Protection Law) Komentarz (Comments),* issued by Centrum Prawa Ekologicznego (Ecological Law Centre) in 2001 , Editor dr Jerzy Jendroska, the following opinion has been expressed: *the addressee of the regulation* (article 143 of the Act *POS (Environment Protection Law)) are the bodies competent in defining such requirements and not the owner of an installation or device. First of all, it refers to the minister competent for the issue of the environment protection matters, authorised for issuance of executive ordinances (e.g. on the basis of art. 146, ust. (passage) 2), but also to the body competent for granting permissions mentioned in art. 181, as well as for issuance of the decision indicated in art. 154.*

The requirements mentioned in article 143 of the Act *POS (Environment Protection Law)* have not been defined yet in the form of an executive ordinance so there is no possibility to refer to the requirements when assessing meeting the statute requirements by installations.

4.6 COMPARISON OF TECHNIQUE PROPOSED WITH THE BEST SOLUTIONS AVAILABLE

Identified reference document (BREF):

„Integrated Pollution Prevention and Control. Reference Document on Best Available Techniques for Large Combustion Plants. July 2006"; the solutions proposed were compared with those defined as the best technique available.

The summaries of the BAT document (translated into Polish); it is worthwhile to note the following sentence: *„Co-generation, i.e. combined production of electric and heating power (energy) (CHP) is recognised to be the best way to reduce the total amount of CO2 emission and is always taken into consideration when building new power plants, provided that the local demand for electric power (energy) is high enough to guarantee the profitability of constructing a facility applying more expensive co-generation solutions in contrast to the well-known power plants or heat and power generating plants.* This means that, concerning the planning rules, the investment project under planning is a solution corresponding the idea of the best available technique / technology.

The details defined in the reference document are very rich and the full comparative analysis of them and the solutions proposed exceeds far the frameworks of the present study. Moreover, the data contained in the reference document may not be treated as the only indices, without connections with the whole. Therefore, only the most important specifications of the BAT installation have been presented. The CHP investment project assumptions are conformant with them.

1. Storage of solid fuels and their transportation should ensure safety, reduce emission into air (fuel unloading, storage and transfer systems), protect rhe water/soil environment (water drainage, collection and treatment system for slurge precipitation).
2. Liquid fuel storage and handling: under the storage tanks, there is a tight tub of volume equal to 75% of the maximum capacities of all tanks, or at least to the maximum volume of the biggest tank.
3. Storage and transportation of lime (limestone or other forms): closed system, pneumatic handling, effective dust removal.
4. Application of electrostatic de-dusters or fabric filters is considered to be the best available technique for combustion gas de-dusting.
5. The de-dusting level recommended for units of the power value within the range 100...300 MW amounts to 5...20 mg/m^3 , with the reservation that the industry suggests, as real values, those of the interval 10...30 mg/m^3. The de-dusting effectiveness of electro-filters is at least 99,5%, and of bag filters - 99,95%. The Polish law requires obtaining dust concentrations <30 mg/m^3.
6. Concentrations of sulphur dioxide in combustion gases from the fluidized bed boiler with circulating bed (CFBC) of the power value within the range 100...300 MW should not exceed the level of 100...200 mg/m^3. The recommended flue gas desulphurization method – lime compound injection. The Polish law requires that concentrations SO_2 <200 mg/m^3 are achieved for such units.
7. Nitrogen oxide concentration calculated for nitrogen dioxide in flue gases from the fluidised bed boiler with circulating bed (CFBC) of the power value within the range 100...300 MW should not exceed the level of 100...200 mg/m^3. The recommended emission reduction method is a combination of thw primary methods (combustion temperature) and, where needed, , SNCR. For such units, the Polish law requires to obtain the concentrations of NO_2 <200 mg/m^3. Application of the ammonia compounds (ammonia, urea) in the SNCR technique may result in ammonia emission, the concentrations of which should not exceed 5 mg/m^3U due to decreasing the ash quality and the problems with ash management at a higher ammonium content.

The fluidized bed boilers produce excellent conditions for co-combustion of coal and biomass, where the circulating bed boilers (CFBC) show the highest flexibility with regard to fuels applied, enabling both combustion of coal alone, biomass alone (various biomass sorts are acceptable) , as well as mixes of coal and biomass. Separate boiler feeding with coal and biomass produces the best operating conditions. An addition of biomass to fuel decreases the supply of sulphur and decreases the amount of SO_2 produced, thus it enables to decrease metering of calcium compounds.

5 ENVIRONMENTAL IMPACS OF THE INVESTMENT PROJECT

In the present section, there have been presented the impacts of the investment project planned on the useful operations stage, considering especially the influence on human beings, flora, soil, water, air, landscape, and mutual interactions between the components.

The investment project impacts upon individual environment components on the construction and liquidation stages have been presented in **point 2.3** of the present report .

5.1 VEGETATION

On the terrain (site) of the investment project and in its surrounding, there is no precious vegetation; there grow individual trees upon which the investment project will have no influence. Action on a bigger distance will be possible by the following ways:

- Via influence upon the water/soil environment, due to consumption of underground and surface water, it is considered reception of water from an underground take off, for the technological (process) purposes and for making up the circulations in the cooling systems. For consumption of water, the installation contractor will have to obtain the legal water permission that will define such water take off conditions that are not harmful for the environment and, thus, for the flora world;
- Through water/soil environmental impacts due to discharge of waste water to surface water or into the ground, waste water is, at present, discharged to surface water – this is rain water from the Works terrain (site); due to the investment project execution, e.g. due to road and yard surface compaction for hardened and dewatered areas, the waste water stream will increase. Since they will contain limited amounts of pollution, there is no base to be afraid that the waste water may be of negative influence upon the flora worlds.
- Through influence upon atmospheric air, due to emission of substances I not air; this emission, in spite of increased production, will be lower than the hitherto existing one (the new boiler must meet the severe emission standards) and, therefore, it will not produce over-standard concentrations in air. The substances limited do not show significant action on the flora world; the new boiler accepting the main load of the heat production from the existing stoker fired boilers will be characterised by lower emission coefficients and, thus, the stream of gaseous substances (SO_2, NOx), especially dusts finding their way into the environment will undergo decreasing in spite of increased demand for fuel (in addition to heat power (energy), electric power (energy) is to be generated in the co-generation mode).

5.2 Soil/Water Environment

The investment project in the useful operation stage will not be of significant impacts, direct or indirect, on the soil/water environment. There is no hazard of ground surface pollution with oils or other materials used, since any and all operations will be carried out inside rooms provided with tight and hardened floor surfaces.

The fuel oil storage tank (ignition oil) should be set on tight substrate that avoids soil pollution in a case of uncontrolled leakage; such solution has been accepted in the assumptions. The details of solutions will depend on the choice of the tank structure and should be agreed upon with the Fire Brigade.

5.3 Water/Waste Water Management

Legal Acts:

- Act dated 27 April 2001 *Prawo ochrony srodowiska (Environment Protaection Law)* (Official Gazette Dz. U. Nr 62, poz. (item) 627, and later amendments),

- Act dated 18 July 2001 *Prawo wodne (Water Law)* (Official Gazette Dz. U. Nr 115, poz. (item) 1229, z pozn. zm. (and later amendments)),
- Act dated 7 June 2001, concerning *common supply with water and common waste water disposal* (Official Gazette Dz. U. Nr 72, poz. (item) 747, z pozn. zm. (and

later amendments),
- Ordinance of Minister of Infrastructure, dated 14 January 2002, concerning *definition of average water consumption standards* (Official Gazette Dz. U. Nr 8, poz. (item) 70),
- Ordinance of Minister of the Building Industry, dated 14 July 2006, concerning *the way to execute the duties of suppliers of industrial waste water and to introduce waste water into sewerage devices* (Official Gazette Dz. U. Nr 136, poz. (item) 964).

5.3.1 WATER DEMAND

It is considered to create a new water intake on the terrain (site) of the investment project being planned, from the underground resources. The investment project will be supplied from the municipal water pipeline network. Water from the network will provide the required volume that, at the same time, will meet the qualitative conditions for water intended for the nutrition and household purposes.

Water for social purposes

In connection with the planned investment project, it is not assumed that the staff number will increase. Therefore, the demand for water for the staff purposes will remain at the unchanged level in relation to that existing now. The investment project environmental impacts due to intake of network water for the staff rest purposes will not change. In accordance with the integrated permission, the water consumption amount for this purpose equals to ca. 2 150 m^3/year.

Water for process (technological) purposes

The demand for water in the CHP installation has been determined at 12,2 m^3/h and ca. 78 thousand m^3 per year, as described in point 4.2. On the other hand, in conformity with the integrated permission, water consumption amounts to:

- For the process (technological) purposes: ca. 43 800 m^3/year (regeneration of columns, hall washing, slag extinguishing)
- For purposes of cooling: ca. 36 m^3/year
- for making up water in the heating network: ca. 56 500 m^3/year.

In total: 100 336 m^3/year

In connection with the investment project under planning, there will decrease the water balance of the existing installation at the first two items (they may be evaluated on the level of 30...40% of the present values), due to decreased use of the existing stoker-fired boilers. Making up network water will need similar water amounts. Therefore, the total demand for water will amount to, in the worst case, 0,4*(43 800+36) + 78 000 = 95 534 m^3/year and will not exceed the water demand for the process (technological) purposes.

The water source will be the municipal network and, possibly, the Works own water intake. At present, the Works have their own intake but they do not use it in spite of possessed permission (integrated permission); the reason is the unsatisfactory quality of water. If required, it is considered to build a new intake, after exerting the hydro-geological survey and acquisition of the permissions required by the valid law. These options should be treated at present as an option.

Water will undergo treatment in dependence of its application and quality (dependent on the origin source). Here, it haven assumed both softening (phosphates, hydrazine derivatives and other) and ion exchange. Ionite recovery (regeneration) needs use of acid (sulphuric, hydrochloric) and bases (sodium hydroxide).

5.3.2 WASTE WATER MANAGEMENT

On the terrain (site) of the Works, there will be produced:

- Living/household wastewater,
- Process (technological) waste water,
- Precipitate (rain) and melting water.

5.3.2.1 Living/Household Waste Water

The volume of produced living/household waste water will be equal to the demand for water for the staff rest purposes. This amount follows from the employment level planned, that will not be changed with regard to the present state. Since, as per the integrated permission, the water consumption for this purpose will amount to ca. 2 150 m^3/year, the amount of living/household waste water will be the same.

The living/household wastewater will be generated in sanitary centres (nodes). They will include pollution typical for thet waste water sort, mainly organic pollution, expressed by oxygen expressions such as: BZT_5 (BOT) and ChZT (COD).

5.3.2.2 Process Waste Water

The process (technological) waste water will be created mainly in connection with preparation of treated water and other processes. Its volume has been determined at 1,3 + 0,7 = 2,0 m^3/h and ca. 11 220 m^3 per year (Table 5, page 38).

Waste water will be discharged to the municipal sewerage and their specifications (temperature, reaction, concentrations of selected substances) must meet the requirements defined in the valid regulations (Official Gazette Dz. U. 2006.136.964). Therefore, on the stage of the engineering (executive) design, there should be taken into account, where required, the solutions ensuring composition and waste water specification equalising ; the simplest solution are surge tanks wherein the acid-base balance is established , hot waste water temperature decreases and component concentration undergo averaging.

5.3.2.3 Rain Waste Water

Rain waste water will be produced during atmospheric precipitates and due to melting. There will be produced then the waste water from roof surfaces as well as from roads and yards.

Precipitate water from the roofs will be qualified as clean rain waste water and, as such, it may be discharged directly into the ground or to a receiver.

In accordance with the standard PN-92/B-01707 *Instalacje kanalizacyjne. Wymagania przy projektowaniu (Sewerage installations. Requirements when designing).* The volume of precipitate water is calculated on the basis of the formula hereinafter:

$$q_{śd} = q \times \sum_{i=1}^{n} (F_i \times \Psi_i) \quad \textbf{(1)}$$

where:

$q_{śd}$ – volume of rain waste water during conclusive rain [dm^3/s],
q – precipitate intensity in amount of 130 l/s ha – heavy rain
Ψ – flow-down coefficient: from 0,8 up to 1,0
F – roof surface;
The planned buildings: the main hall, technical building and the other minute facilities will have the total roof surface of ca. 4520 m^2 = 0,452 ha

$$Q_{śd} = q_{śd} \, x \, t \qquad \textbf{(2)}$$

where:

Q_{sd} – volume of rain waste water during a 15-minute conclusive rain; [m^3], t – conclusive rain duration time : here: 900 s.

The volume of clean rain waste water from surfaces of new roofs has been determined at: F = 0,4520 ha,

- ¥ = 0,9.

The volume of *clean* rain waste water for the investment project under analysis amounts to **q_sd = 52,88 dm^3/s.**

The total volume of *clean* rain waste water , assuming the duration time of conclusive rain on the level of 15 minutes amounts to **Q_{sd} = 47,60 m^3.**

Precipitate water from the biomass unloading terrain (site) may be polluted with suspension and, therefore, it will be pre-treated prior being discharged into the sewerage.

The biomass unloading terrain (site) surface area includes two yards of dimensions 10x5 m each, i.e. – in total - 100 m^2 = 0,01 ha.

The volume of rain waste water polluted with suspension, from the biomass unloading terrain (site) has been determined at:

- F = 0,01 ha,
- **¥ = 0,9.**

The volume of rain waste water *polluted* amounts, for the investment project under analysis, to q_sd = **1,17 dm^3/s.**

The total volume of rain waste water *polluted*, assuming the conclusive rain duration time on the level of 15 minutes, amounts to Q_sd = **1,05** m^3.

Precipitate water from the bowl under the oil tank and from the bowls under the chemical tanks may be polluted with oil derivative products and other products as well as with suspension and, therefore, they will be collected in a hollow of the bowl and, therefrom, pumped (after a composition control) into the sewerage. In a case that pollution is found, there will be undertaken actions for treatment of this water – in dependence on polluting substance.

The volume of rain waste water possibly polluted with oil and suspension from the bowl below the tank has been determined at

- F = 20x17 m = 340 m^2 = 0,034 ha,
- **Y = 1,0.**

The amount of rain waste water *polluted,* for the investment project under analysis, amounts to q_sd = **4,42 dm^3/s.**

The total volume of rain waste water *polluted,* assuming that conclusive rain duration time on the level of 15 minutes, amounts to Q_{sd} = **3,98** m^3.

Precipitate (rain) water from roads and yards, as possibly polluted with suspension and oil derivative substances, will be pre-treated and routed to the ditch running along the Eastern Works border. The ditch dewaters the PKP (Polish Railways) terrain (site) and discharges into the Warta river at km 736+738. At present, in accordance with the contents of the integrated permission, discharging treated precipitate (rain) waste water to this ditch refers to the three outlets (W1...W3):

- outlet W1 in km 0+420 , volume qs = 94,32 l/s
- outlet W2 in km 0+310 , volume qs = 82,53 l/s
- outlet W3 in km 0+120 , volume qs = 44,80 l/s

and total yearly Q = 12 960 m^3/year.

After the analysis of the terrain (site) balance (on the basis of the detailed design of the lot development), there will be required to apply for a change of the above mentioned data, what will need working out a water/legal assessment for

specific use of water within the scope of disposal of precipitate (rain) water into the receiver – the ditch mentioned hereinabove and, further on, into the Warta river. The receiver is capable of accepting the full precipitate (rain) water from the terrain (site). Therefore, it may be stated , even before obtaining the final data concerning the terrain (site) balance and prior determining the volume of precipitate (rain) water from the new hardened surfaces, that the decision concerning ehvironmental investment project premises does not have to define the volumes in detail, since it is known that obtaining the above mentioned water/legal permission is in the interest of the new installation owner, that may be approved for useful operation without obtaining any and all permissions needed on the powers of the Acts POS (Environment Protection Law), Prawo Wodne (Water Law) and the Act concerning waste.

Drawing 19. PKP (Polish Railways) area draining ditch, view in the mouth direction

Drawing 20. River Warta in Heating Plant region (site)

5.3.3 SUMMARY

The investment project under planning will be a facility of minute arduousness for the environment the environment within the scope of water intake and waste water discharge. The execution of the investment project will not influence upon the living waste water balance, the amount of rain waste water will increase in connection with construction of new facilities (roof dewatering) as well as with expansion of the road network of hardened pavement. Due to the qualitative requirements put for waster water discharged to sewerage as well as for waste water disposed to surface water, the investment project will not be arduous for the environment provided that the requirements set up for waste water are observed. Construction of suspension separators, oil derivative substance separators and possible averaging tank (especially at the water treatment station) will be an effective measure for leading the waste water specifications to the required level. Increasing the volume of waste water discharged from the hardened areas.

5.4 Atmospheric air

The purpose of this section is to determine the air pollution state that will happen after execution of the investment project and to state if the assumed pollution emission sources into air will not result in violations of the permissible concentrations of the pollution in the environment. The analysis being conducted is based on the data handed over by the Investor and on the computer simulation of pollution spreading.

Note: over-standard dust concentration, recorded on the terrain of the town, makes that a new emission source may be initiated (in conformity with z Art. 225 of the Act POS (Environment Protection Law) only when a significant reduction of emission from other sources happens at the same time. This reduction should be of at least 30% bigger from the emission from the new source. In relation with the fluidized bed boiler, the emission reduction will happen on the terrain (site) of the „Rejtana" Heating Plant and „Brzeznicka" Heating Plant, and – in relation to dust, it will be much bigger than 130% of dust emission from the new source.

5.4.1 LEGAL ACTS

The basic legal acts taking into consideration the environment protection requirements within the atmospheric air protection are:

- Act dated 27 April 2001 *Prawo ochrony srodowiska (The Environment Protection Law)* (Official Gazette Dz. U. Nr 62. poz. (item) 627 , and later amendments),
  Ordinance of the Environment Minister (MS) , dated 6 June 2002 , concerning *the permissible levels of some substances in air, alarm levels of some substances in air and the tolerance margins for permissible levels of some substances* (Official Gazette Dz. U. Nr 87, poz. (item) 796),
  Ordinance of the Environment Minister (MS), dated 5 December 2002, concerning *the reference values for some substances in air* (Official Gazette Dz. U. of 2003 Nr 1, poz. (item) 12),
- Ordinance of Ministra Srodowiska, dated 20 December 2005, concerning *installation emission standards ,* Official Gazette Dz. U. Nr 260 poz. (item) 2181,
- Ordinance of Ministra Srodowiska, dated 22 December 2004, concerning *installation types the useful operation of which requires notification,* Official Gazette Dz. U. Nr 283 poz. (item) 2839,
- Ordinance of Ministra Srodowiska, dated 22 December 2004, concerning *cases in which introduction of gases or dusts into air does net require a permission,* Official Gazette Dz. U. Nr 283 poz. (item) 2840,
- Ordinance of Ministra Srodowiska, dated 23 December 2004, concerning *requirements within the scope of conduction of emission value measurements,* Official Gazette Dz. U.

Nr 283 poz. (item) 2842,

- Ordinance of Ministra Srodowiska, dated 27 February 2003, concerning *the measurement types conducted in connection with useful operation of an installation or a device being handed over to competent environment protection authorities and the presentation due date and ways,* Official Gazette Dz. U. Nr 59 poz. (item) 529.

5.4.2 EMISSION SOURCE CHARACTERISATION

In the Works under analysis, the sources of emission of gases and dusts to air will be:

> The fluidized bed boiler – a new emission source;
> Existing stoker-fired boilers operating in a limited time scope;
> Auxiliary devices.

The fluidized bed boiler will take over the main heat production load and, additionally, it will generate steam for production of electric power (energy). It will be a modern unit of the power output of ca. 200 MW. At present there are being carried out the preparation for selection of the boiler supplier; it is known that it will be selected of bidders having wide experience. The boiler together with auxiliary devices (electro-filter installation, limestone feeding installation) will meet the emission standards that are much more severe than the standards valid in relation to the existing stoker-fired boilers. Thus, the emission from the whole installation will be decreased (especially considerably, the emission of dust and sulphur dioxide).

5.4.3 EMISSION STANDARDS

5.4.3.1 Fluidized Bed Boiler

The emission value is limited to the level implied by the valid emission standards. Presently, within that scope, it is valid the Ordinance of the Environment Minister concerning *installation emission standards,* Official Gazette Dz. U. 2005.260.2181. For the new unit, the construction of which is under planning, and which will be encountered within "new boilers", of the rated heating power value 100-K300 MW, the emission standards at burning hard coal and biomass amount to, in conformity with the Appendix 3 to the Ordinance of the Environment Minister (MS):

- for NO_2
  of 300 mg/m^3U (6% O_2) when burning biomass ,
  of 200 mg/m^3U (6% O_2) when burning coal
- for SO_2
  of 200 mg/m^3U (6% O_2) , the same for coal and biomass
- for dust
  of 30 mg/m^3U (6% O_2) , the same for coal and biomass. The emission standard is defined for the following reference conditions (contractual):
- dry flue gases (steam content not higher than 5 g/kg of outlet gases),
- oxygen content: 6%,
- temperature: 273 K,
- pressure: 101,3 kPa.

The emission standard is expressed by the measure mg/m^3U.

5.4.3.2 Existing Boilers

In the case of the "existing boilers" of the rated thermal power value 5-^50 MW, among which the boilers WR-25 and WRp-46 are included, the emission standards at combustion hard coal amount to, in accordance with the Appendix nr 1 to the Ordinance of the Environment Minister (MS) :

- for NO_2 - 400 mg/m^3U (6% O_2)
- for SO_2

of 2000 mg/m^{3}U (6% O_2) , up to 31-12-2007
of 1500 mg/m^{3}U (6% O_2) , from 1-01-2008

- for dust
  of 1000 mg/m3U (6% O2) up to 31-12-2006
  of 400 mg/m3U (6% O2) from 1-01-2007 up to 31-12-2015
  of 100 mg/m3U (6% O2) from 1-01-2016

The three boilers WR-25 have been put on the derogation list included in the Ordinance concerning dust emission what means that, on the basis of that Act, after 1 January 2016, the emission standard of 400 mg/m^{3}U will be allowed for already during the period of two years. In the case of the "new boilers", of the rated thermal power of 5-^50 MW, among which the boiler WRm-40 is included, the emission standards when burning hard coal amount to, in conformity with the Appendix 2 to the Ordinance of Environment Minister (MS) :

- for NO_2 - 400 mg/m^{3}U (6% O_2)
- for SO_2
  - 1300 mg/m^{3}U (6% O_2)
- for dust
  - 400 mg/m^{3}U (6% O_2) till 31-12-2015
  - 100 mg/m^{3}U (6% O_2) from 1-01-2016

Considering the plans of the future modernisation of the boiler WRp-46 (after modernisation, it will be the second boiler WRm-40) , the unit will be subject to the emission standards defined in the Appendix nr 3 (a significant change of source after the day of 27 November 2003):

- for NO_2 - 400 mg/m^{3}U (6% O_2)
- for SO_2
  of 1300 mg/m^{3}U (6% O_2)
- for dust
  of 100 mg/m^{3}U (6% O_2)

The emission standard is defined for the following reference conditions (contractual):

- dry flue gases (the steam content not higher than 5 g/kg of outlet gases),
- oxygen content: 6%,
- temperature 273 K,
- pressure: 101,3 kPa.

The emission standard is expressed by the measure mg/m^{3}U.

5.4.4 Ecological Effect Connected with Heat Generation Source Change

The Heating Plant „Rejtana" is provided with five water stack-fired boilers:

Table 6. Characterisation of Existing Stoker-Fired Boilers

	WR-25	WR-25	WR-25	WRp^6	WRm^O
year of manufacture/modernisation	1982	1982	1982	1986	1996/2003
Maximum power, MW	29,075	29,075	29,075	46,52	40,00
Rated power, MW	23,26	23,26	23,26	37,216	32,00
Efficiency	83%	83%	83%	84%	84%
De-dusting	cyclone	cyclone	cyclone	filter	filter
effectiveness	85%	85%	85%	99%	99%
Operating time in 2006, h	2935	3096	3360	2276	3158

In 2006, it was produced 370 508,28 GJ of thermal energy, consuming at that time 84 757,90 Mg of coal, that results in the index of 16,17 GJ of energy obtained from one ton of coal.

5.4.4.1 Calculations for the existing state

In the conditions of the integrated permission (the official letter of the Czestochowa Town Office (Urzad Miasta Czestochowy), reference OSR.I.7681-5/04/05 , dated 19-10-2005), the allowable emission was defined via the emission standards. At that time, the following items were not defined:

- fuel specifications
- yearly emission for individual substances

since it was recognised that meeting the emission specifications was the sufficient condition for the emission amount control.
In such conditions, the Works have a rather considerable freedom in selection of fuel.
For the calculations, coal of the following limit specifications has been assumed:

- calorific value 19,5 GJ/Mg
- sulphur content 0,7%
- ash content 18%

Use of fuel of other specifications will influence the calculated emission amount, but it will refere both to the existing boilers and the new one. For the purposes of the present study, the ecological effect is of importance, being the emission difference for the existing state and the planned state; therefore, the fuel specification change is of a secondary significance.
At the yearly coal consumption of B = 84 757,90 Mg and its calorific value of 19,5 GJ/Mg, the energy stream in fuel amounts to 1 652 779 GJ.

Sulphur dioxide, SO_2

For the calculations, it has been assumed that the sulphur conversion coefficient into sulphur dioxide amounts, in coal being fired on a stoker, to 1,70 (of 1 kg of sulphur, into the flue gas stream, there passes: 7,944 m^3U/kg
The emission of SO_2 , counted from the sulphur content in fuel): 11,9 g/kg, concentration 1498 mg/m^3U, lower than the standard S1 = 1500 mg/m^3U, that will be valid after 2007.
The emission index: $SO_2$11 900 mg/kg / 19,5 MJ/kg = 610,26 mg/MJ = 610,26 g/GJ
The yearly emission: 26 g/GJ * 1 652 779 GJ/year
Ea (SO_2) = 1 008,62 Mg/year

Nitrogen oxides computer per nitrogen dioxide, NO_2

The assumption is that the emission standard is maintained.
Flue gas amount: 7,944 m^3U/kg
The emission of NO_2 calculated from the emission standard S1 = 400 mg/m^3U.
E(NO_2) = 400 mg/m^3U * 7,944 m^3U/kg.

$E(NO_2)$ = 3,178 g/kg.
The emission standard for NO_2 : 3 178 mg/kg / 19,5 MJ/kg = 163,0 mg/MJ = 163,0 g/GJ.
The yearly emission: 163,0 g/GJ * 1 652 779 GJ/year.
$Ea(NO_2)$ = 269,40 Mg/year.

Dust

The assumption is to keep the emission standard
The amount of flue gases: 7,944 m^3U/kg
The dust emission calculated from the emission standard S1 = 400 mg/m^3U.
E(dust) = 400 mg/m^3U * 7,944 m^3U/kg
E(dust) = 3,178 g/kg
Dust emission index 3 178 mg/kg / 19,5 MJ/kg = 163,0 mg/MJ = 163,0 g/GJ
The yearly emission: 163,0 g/GJ * 1 652 779 GJ/year
Ea(dust) = 269,40 Mg/year

5.4.4.2 Calculations for Planned State without Increase in Heat Production and without Electric Power Production

For the calculation, coal of the following limit specifications has been assumed:

- calorific value 19,5 GJ/Mg
- sulphur content 0,7%
- ash content 18%

An addition of biomass in the form of wooden chips will not be of any significant impact upon the energetic balance of the combustion process. Therefore, to simplify the ecological effect in the current calculations, the share of biomass has been omitted. Consideration of the emission from biomass combustion will be necessary on the next arrangement step, i.e. within the framework of preparation of the request concerning a change of the integrated permission conditions.

Fluidized bed boilers with circulating bed acre characterised by, among other things:

- higher fluidized bed boiler energy efficiency (at least 90%) in comparison with the stoker fired boilers (84%);
- sulphur dioxide emission considerably decreased due to intentional and controlled addition of calcium compounds to the bed – the emission standard depends on the proportion (Ca : S);
- nitrogen oxide emission – in approximation, of half value lower than in the case of stoker-fired boilers (per average, 70 g/GJ compared with 150 g/GJ for stoker fired boilers)[1];
- much more (above 50 times) increased, in relation to stoker-fired boilers, emission of nitrogen suboxides[2]; nitrogen suboxide has been recognised as a "hothouse" gas and its emission is not covered by the contents of *the permission for introduction of gases and dusts into air nor the integrated permission* ; there are also no established *emission standards;*
- the high dust lift from the furnace, which dust is returned in its prevailing weight, since such is the boiler structural principle (circulating bed)

For produce 1 370 508,28 GJ of thermal energy in the boiler of efficiency 90% , it is needed to deliver, with fuel, 1 522 787 GJ of energy. At the calorific value of 19,5 GJ/Mg, the amount of coal will amount to 78 091,64 Mg, i.e. of 5 766 Mg less than at production of heat in stoker-fired boilers.

Sulphur dioxide, SO_2

Emission of SO_2 is controlled with use of surplus calcium. As per the study US-EPA, AP-42, cited hereinabove, the emission index for SO_2 is given by the formula:
$1,98x(S_{paliwo})x(Ca:S)$-[19]

In this formula, the proportion Ca : S is defined in the mole mode; the formula is valid within

the proportion range 1,5... 7,0.
For the sulphur content in coal, S = 0,7% , obtaining the concentration of SO_2 , not higher than the emission standard, S1 = 200 mg/m^{3}U , requires application of surplus calcium, Ca : S = 3,13. In such conditions, the sulphur dioxide emission index amounts to 1,586 g/kg, and its concentration to 199,6 mg/m^{3}U and is lower than the standard .

Note: the above specified data will be verified during operation of the boiler: it is of importance that, controlling the calcium surplus, it is possible to control, rather accurately, the desulphurisation process and achieve the required sulphur dioxide in outlet flue gas streams.

The emission index SO_2 1 586 mg/kg / 19,5 MJ/kg = 81,33 mg/MJ = 81,33 g/GJ
The yearly emission: 81,33 g/GJ * 1 522 787 GJ/year
Ea(SO_2) = 123,85 Mg/year
What constitutes 12,3% of the emission of SO_2 , calculated for the stoker-fired boilers.

[1] Joint EMEP/CORINAIR Atmospheric Inventory Guidebocirca European Environmental Agency. Copenhagen 1996
[2] Compilation of Air Pollutant Emission Factors, AP-42. Volume I: Stationary and Area Sources. Fifth Edition. US-EPA, Research Triangle Park

The ecological effect will amount to 87,7%.

Nitrogen oxides calculated per nitrogen dioxide, NO_2
The assumption here is that the emission standard is observed.
The flue gas volume: 7,944 m^{3}U/kg
The emission of NO_2 , calculated from the emission standard: S1 = 200 mg/m^{3}U.
E(NO_2) = 200 mg/m^{3}U * 7,944 m^{3}U/kg
E(NO_2) = 1,589 g/kg
The emission index: NO_2 1 589 mg/kg / 19,5 MJ/kg = 81,5 mg/MJ = 81,5 g/GJ
The yearly emission: 81,5 g/GJ x 1 522 787 GJ/year
Ea(NO_2) = 124,11 Mg/year,
What constitutes 46,1% of the emission of NO_2 , calculated for the stoker-fired boilers.
The ecological effect amounts to 53,9%.

Dust
The assumption here is that the emission standard is observed.
The flue gas volume: 7,944 m^{3}U/kg
The dust emission calculated from the emission standard: S1 = 30 mg/m^{3}U.
E(dust) = 30 mg/m^{3}U * 7,944 m^{3}U/kg
E(dust) = 0,238 g/kg
The dust emission index 238 mg/kg / 19,5 MJ/kg = 12,2 mg/MJ = 12,2 g/GJ
The yearly emission: 12,2 g/GJ x 1 522 787 GJ/year
Ea(dust) = 18,58 Mg/year,
What constitutes 6,9% of the dust emission calculated for the stoker-fired boilers.
The ecological effecte amounts to 93,1%.

Conclusion:
Substitution of the stoker-fired boilers by a fluidized bed one will produce the ecological effect in the form of reduced emission

SO_2 of 88%
NO_2 of 54%
dust of 93% in relation to the same heat production.

Actually, the production of heat will be carried out both in the fluidized bed boiler and in the stoker-fired ones (at an air temperature drop), and – in addition – the fluidized bed boiler will operate for the benefit of the electric energy (power) production. Therefore, the actual scale

of the emission decrease will be lower but, in relation to dust, it will be still very high and will, considerably, exceed the emission decrease scale required in connection with the source useful operation approval.

5.4.5 EMISSION OF GASES AND DUSTS INTO AIR

5.4.5.1 Boilers

It is assumed that, for the heat production purpose, the fluidized bed boiler will operate for the whole year while the stoker-fired boilers will be switched on where required, for making up the heat balance . In the "Alternative I", the following assumptions have been accepted.

1) The total considered operating interval for the system for the years 2007-2020, that was divided into two subsequent periods 2007-2009 and 2010-2020, as per the modernisation criterion for the present production capabilities in Czestochowa.
2) The maximum possible demand for the thermal power for the bus system has been assumed on the level of 300 MW.
3) The ordered power demand in the system within the interval I (years 2007-2009) is distributed into the following way between the sources:

- The Heating Plant Rejtana: 173,7 MW
  The power available continuously , taking into consideration the necessity of setting of individual boilers for cleaning and due to other technical/operational reasons is established on the level of 133 MW (three boilers WR 25 + WRp 46 and WRm 40 as a reserve),
- The Heating Plant Brzeznicka: 34,89 MW
  The power available continuously , taking into consideration the necessity of setting of individual boilers for cleaning and due to other technical/operational reasons is established on the level of 23 MW (two boilers WR 10 and the third one, WR 10 as a reserve),
- Elsen: 85 MW

4) The demand for ordered power in the system, in the interval II, is distributed as follows between the sources:

- CHP operates as the basic source , at the maximum power of 120 MW
- The Heating Plant Rejtana operates as a supplementing source, at the maximum power value of 173,7 MW
  The power available continuously , taking into consideration the necessity of setting of individual boilers for cleaning and due to other technical/operational reasons is established on the level of 133 MW (three boilers WR 25 + WRp 46 and WRm 40 as a reserve),
- The Heating Plant Brzeznicka: liquidation of the source,
- Elsen: lack of purchase in a foreign source,

For the alternative I and for the interval of years 2010 - 2020 , the ordered plot of the heat demand in the town system is depicted in Drawing 21 on page 59.

Assuming, for the calculations, the operating time and the loading values for the stoker-fired boilers as shown in the plot, and the emission indices as in point 5.4.4.1 „Obliczenia dla stanu istniejacego" (Calculations for the existing state), the yearly emission from the stoker-fired boilers has been calculated (individually K1... K5 and together), the yearly emission from the new source CHP in the conditions of full load 200 MW (CHP200), and – next – the total emission value for the Works (stoker + CHP200), that has been compared with the emission value calculated in point 5.4.4.1 for the current conditions.

Table 7. Yearly emissions after execution of investment project, Mg

	SO_2	NO_2	**pyl**
K1 (K4)	6,985	1,866	1,866
K5	20,956	5,597	5,597
K3	97,739	30,122	30,122
K2	173,171	46,254	46,254
Stoker-fired total	298,852	83,839	83,839
CHP200	**569,961**	**571,152**	**85,498**
Stoker + CHP200	868,8	655,0	169,3
Current state	1008,6	269,4	269,4

The listing enables to state that, within the dust emission scope, there will be achieved the requirement of decreasing emission from the Works. The yearly emission value from the new source and the existing sources will constitute a half of the hitherto existing emission. Dust emission from the new source will result in decreasing emission from the sources operated till now of 69%; this is much more than the required 30% (in conformity with Art. 225 of the Act POS (Environment Protection Act)).
The total emission of SO_2 will be lower of 26% in relation to the hitherto existing conditions. On the other hand, emission of nitrogen oxides will increase. After recalculation to nitrogen dioxide, NO_2, this increase amounts to 143%. The stoker boilers (the decrease in emission of 69%) will have a minute share in emission from the Works (circa 13%); the main emission source being the new fluidized bed boiler of a high power value. As shown hereinafter in the Report u, this emission (87% of the total emission) , even in spite of the lower stack, does not generate high concentration of nitrogen oxides in air: they do not exceed 2 ug/m^3, what constitutes 5% of the standard Da = 40 ug/m^3 (Drawing 30 on page 71).

In the "Alternative II', the following assumptions have been made:

1) The total considered operating interval for the system for the years 2007-2020, that was divided into two subsequent periods 2007-2009 and 2010-2020, as per the modernisation criterion for the present production capabilities in Czestochowa.
2) The ordered power demand in the system within the interval I (years 2007-2009) is distributed into the following way between the sources:

- The Heating Plant Rejtana: 173,7 MW
  The power available continuously , taking into consideration the necessity of setting of individual boilers for cleaning and due to other technical/operational reasons is established on the level of 133 MW (three boilers WR 25 + WRp 46 and WRm 40 as a reserve),
- The Heating Plant Brzeznicka: 34,89 MW
  The power available continuously , taking into consideration the necessity of setting of individual boilers for cleaning and due to other technical/operational reasons is established on the level of 23 MW (two boilers WR 10 and the third one, WR 10 as a reserve),
- Elsen: 48 MW

4) The demand for ordered power in the system, in the interval II, is distributed as follows between the sources:

- CHP operates as the basic source , at the maximum power of 120 MW
- The Heating Plant Rejtana : 138 MW
  The power available continuously , taking into consideration the necessity of setting of individual boilers for cleaning and due to other technical/operational reasons is established on the level of 109 MW (three boilers WR 25 + WRp 40 and successive WRm 25 as a reserve),

- The Heating Plant Brzeznicka: liquidation of the source,
- Elsen: 42 MW,

For the alternative I and for the interval of years 2016 - 2020, the ordered plot of the heat demand in the town system is depicted in Drawing 22 on page 60.

Assuming, for the calculations, the operating time and the loading values for the stoker-fired boilers as shown in the plot, and the emission indices as in point 5.4.4.1 „Obliczenia dla stanu istniejacego" (Calculations for the existing state), the yearly emission from the stoker-fired boilers has been calculated (individually K2... K5 and together), the yearly emission from the new source CHP in the conditions of full load 200 MW (CHP200), and – next – the total emission value for the Works (stoker + CHP200), that has been compared with the emission value calculated in point 5.4.4.1 for the current conditions.

Table 8. Yearly emissions after execution of investment project, Mg

	SO_2	NO_2	dust
K2	5,757	1,538	1,538
K5	17,271	4,613	4,613
K3	54,400	16,766	16,766
K4n	94,032	25,116	25,116
Stoker total	171,460	48,032	48,032
CHP200	569,961	571,152	85,498
Stoker + CHP200	741,4	619,2	133,5
Current state	1008,6	269,4	269,4

The listing enables to state that, within the dust emission scope, there will be achieved the requirement of decreasing emission from the Works. The yearly emission value from the new source and the existing sources will constitute a half of the hitherto existing emission. Dust emission from the new source will result in decreasing emission from the sources operated till now of 82%; this is much more than the required 30% (in conformity with Art. 225 of the Act POS (Environment Protection Act)).
The total emission of SO_2 will be lower of 26% in relation to the hitherto existing conditions. On the other hand, emission of nitrogen oxides will increase. After recalculation to nitrogen dioxide, NO_2, this increase amounts to 130%. The stoker boilers (the decrease in emission of 69%) will have a minute share in emission from the Works (circa 8%); the main emission source being the new fluidized bed boiler of a high power value. As shown hereinafter in the Report u, this emission (92% of the total emission) , even in spite of the lower stack, does not generate high concentration of nitrogen oxides in air: they do not exceed 2 ug/m^3, what constitutes 5% of the standard Da = 40 ug/m^3 (Drawing 30 on page 71). The comparison of the emission effects obtained in the two alternatives is presented in Table 9.

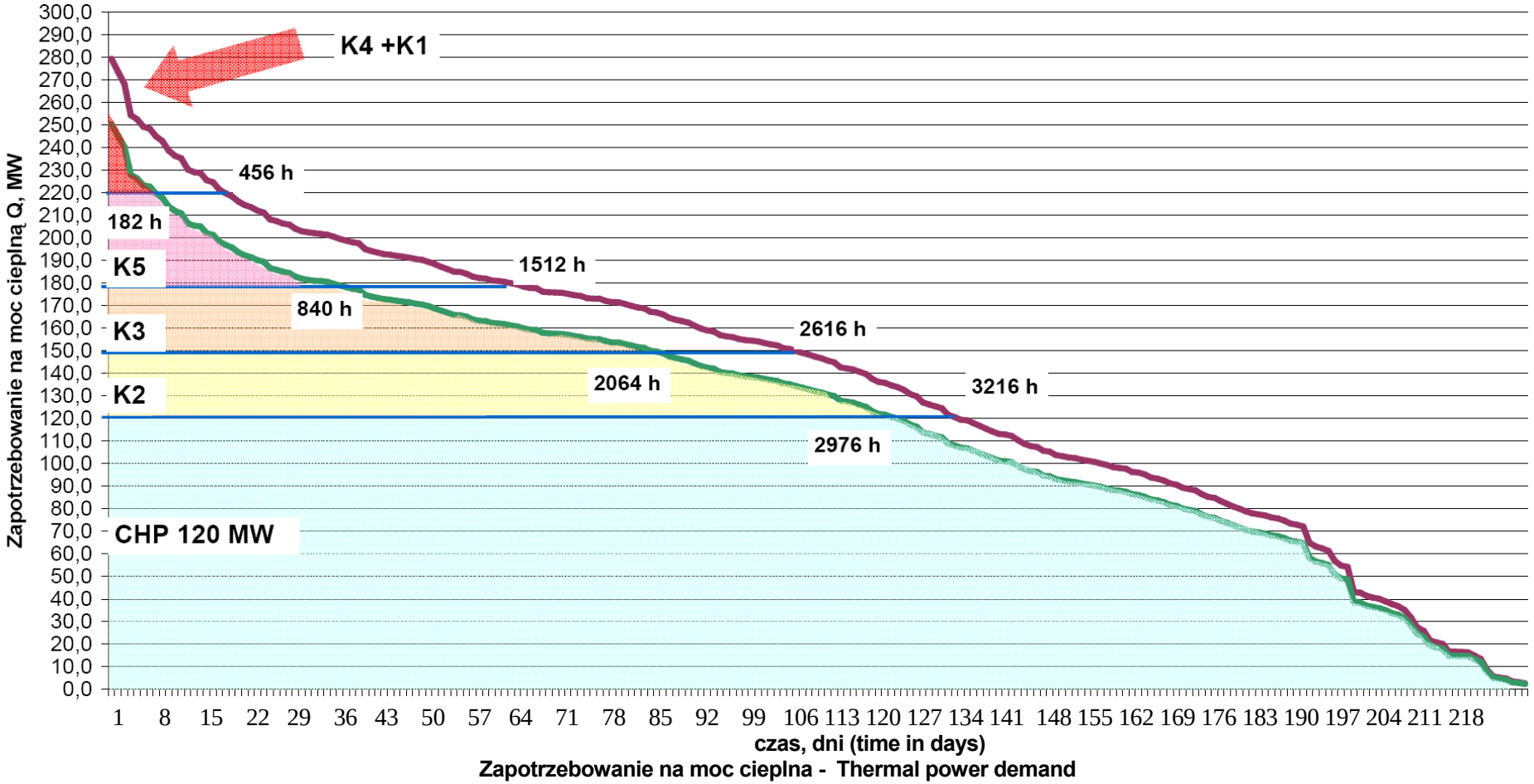
Table 9. Emission effect in two alternatives, Mg

	SO_2	NO_2	pyl
Alternative I			
Stoker total	298,852	83,839	83,839
CHP200	569,961	571,152	85,498
Stocker + CHP200	**868,8**	**655,0**	**169,3**
Alternative II			
Stocker total	171,460	48,032	48,032
CHP200	569,961	571,152	85,498
Stocker + CHP200	**741,4**	**619,2**	**133,5**
Existing conditions			
Stocker	1008,6	269,4	269,4

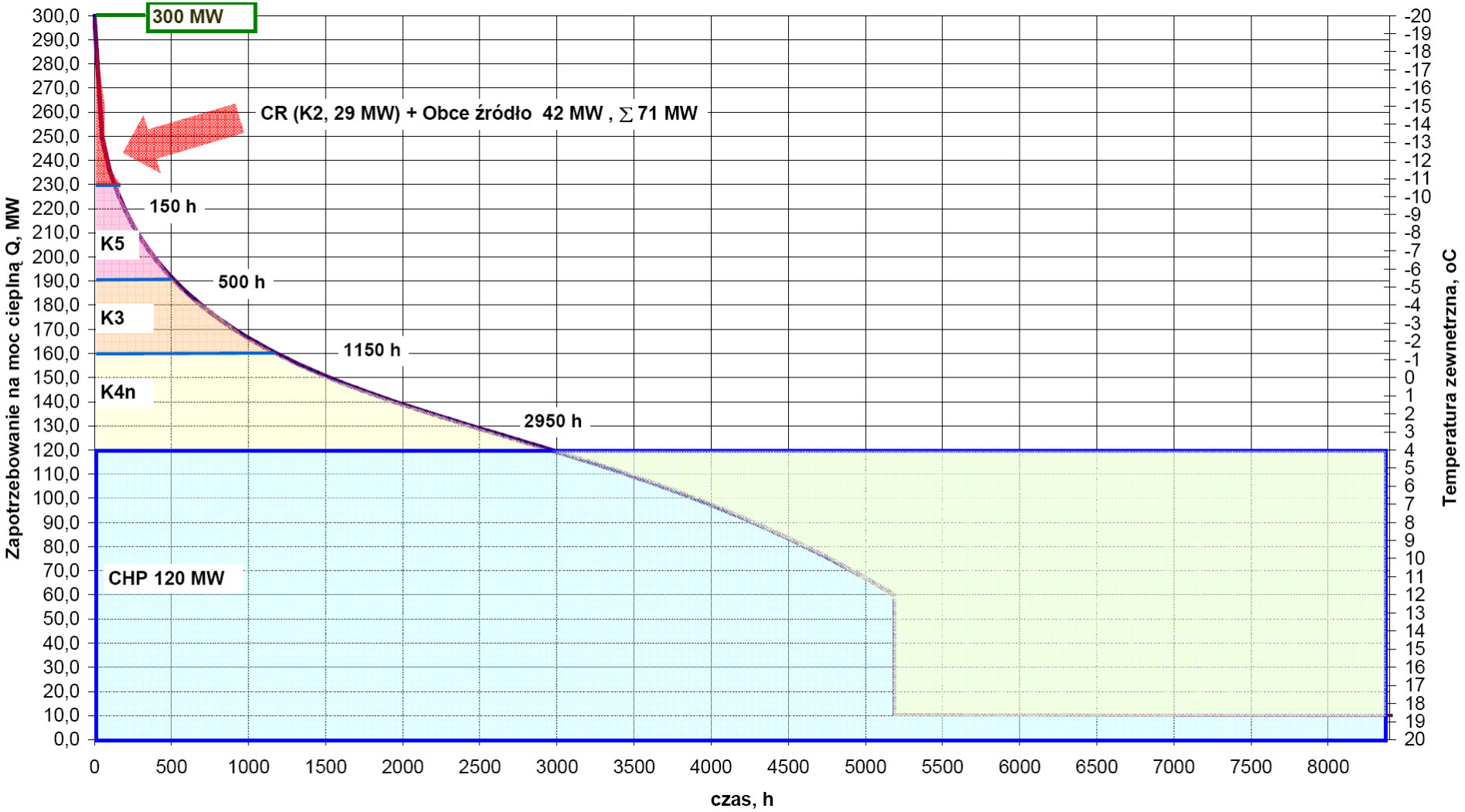
From the above listing, it can be seen that the Alternative II is connected with a lower total emission for all substances under analysis:

SO_2 85,3% of emission calculated for Alternative I,
NO_2 94,5% of emission calculated for Alternative I,
pyl 78,9% of emission calculated for Alternative I.

Drawing 21. Alternative I: Ordered plot of heat demand in town system, years 2010-2020; 12% production increase being taken into consideration



Drawing 22. Alternative II: Ordered plot of heat demand in town system, years a 2016-2020



Legend

Zapotrzebowanie na moc cieplna	Thermal power demand
Obce zrodlo	Foreign source
Czas	Time
Temperatura zewnetrzna	External temperature

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5.4.5.2 Auxiliary Devices

Emission from auxiliary devices, in particular that organised from de-dusting centres (nodes) for storage tanks (silos) of loose materials will be of a small scale and of limited impact reach. The storage silos of ash and other loose materials will be provided with filtering devices. At the emitter height of ca. 15 metres and dust emission on the level of 0,1 kg/h , the maximum dust concentration on the terrain level does not exceed 10 μg/m^3, i.e. ca. 3,6% of the standard D1.

The height of 15 m, assumed for the calculations is of the exemplary character and will be made more precise on the engineering design stage. A height change of 10%, i.e. in the range 13,5... 16,5 m , will result in a change of the maximum concentrations within the limits 127,4...80,4% of concentration defined for the emitter of height 15 m.

The dust emission value assumed in the calculations will be also verified on the stage of the design. However, it is known that the bag filters installed on the silos ensure highly effective de-dusting and that emission on a level not exceeding 0,1 kg/h is highly probable. In the calculation example given, the distance of the maximum concentration occurrences, Xmm, is kept within the limits 48,6...68,4 m; that means that the emitted dust maxima will

- occur on the terrain (site) of the works,
- not cumulate strongly (because of the distance between emission sources comparable with the value of Xmm),

therefore, the resultant action of several emission sources does not endanger to the air quality. In addition, auxiliary devices emitting ash will not influence on a distant town terrain where the over-standard air dusting is found. This statement is of a general character; on the design stage, it is needed that:

- emitter specifications are made more precise (silos and other),
- the dust emission value is defined on the basis of the de-dusting device characterisation,

and, on this basis, possible de-dusting device selection correction should be done, for devices installed on the dust emission sources , so that the resultant action does not endanger with excessive dusting of air around the Works.

5.4.6 Atmospheric Air Impacts

The standards concerning the permissible concentrations of the substances under analysis in air were defined in the Ordinance of the Environment Minister (MS), concerning *permissible levels of some substances in air, alarm levels of some substances in air and tolerance limits for permissible levels of some substances,* in the Ordinance of the Environment Minister (MS), concerning *the reference value for some substances in air* .They have been specified in the table.

Table 10. Permissible concentrations and reference values of analysed pollution in air

No.	Substance	Permissible or reference concentration		Frequency[1)]
		1 hour (D1)	yearly (Da)	1 hour
		Mg/m^3	Mg/m^3	%
1	Suspended dust PM-10	**280**	**40**	0,200
2	Nitrogen dioxide	**200**	**40**	0,200
3	Sulphur dioxide	**350**	**30**	0,274

[1)] permissible frequency of exceeding the 1-hour concentration of the substance during

5.4.6.1 Methodology as per Valid Regulations

The regulations concerning calculation of the substance levels in air , included in the Appendix nr 4 of the Ordinance of the Environment Minister (MS) , concerning *the reference values for some substances in air* define that the standards concerning the reference values for the substances in atmospheric air are recognised observed provided that:

a) The maximum concentration values for individual substances, averaged for 1 hour, do not exceed the reference values or the permissible levels in air, averaged for 1 hour, *D1* , more frequently than allowed by the permissible frequency of exceeding,
b) The yearly mean concentration values determined at each point of the calculation grid do not exceed the yearly mean reference values or allowable levels in air.

The reference methodology constitutes that if the maximum value of concentration in air does not exceed 10% of the relevant standard value, the calculations should be terminated ("shortened range"). Thus, for such substance, the yearly mean concentration on the terrain level is not determined. If, in a distance lower than 10/7 *(h* denotes the emitter height above terrain level) there are dwelling buildings higher than one-storey ones, office buildings, nurseries, kindergartens, schools, hospitals and sanatoria, then it should be verified if, on the development level, there are observed the maximum concentration standards (with an allowance for of the exceeding time as on the terrain level). Furthermore: if in a distance lower than 30Xmm (where Xmm denotes the distance from the emitter, at which the concentration maximum happens on the terrain level) , there is situated an area of a national park of health resort protection, then it should be determined the impact of the emission source upon the areas, assuming the reference values adequate for them.

5.4.6.2 Substance background

In accordance with the rules defined in the Ordinance of the Environment Minister (MS) concerning *the reference values for some substances in air* (the reference methodology), the substance background for which the permissible levels have been determined (here: of: SO_2, NO_2, suspended dust) constitutes the current air quality condition, defined by the competent sanitary inspectorate as the averaged concentration for .

The substance background values determined by WIOS (Provincial (Voivodeship) Inspectorate for Environment Protection) on the measuring way in 2006 are depicted in the Table.

Table 11. Substance background

No.	Substance	R	Note
		[Mg/ml	
1	Suspended dust, PM-10	**51,0**	Measurement, sub-point 3.7
2	Nitrogen dioxide	**29,0**	Measurement, sub-point 3.7
3	Sulphur dioxide	**12,0**	Measurement, sub-point 3.7

5.4.6.3 Meteorological and Field Conditions

The height of the anemometer on the synoptic station in Czestochowa h_a = 14 m, corresponds to the standard height (in Poland, in conformity with the reference methodology). The directional statistics of wind (the average of many years for Czestochowa is presented in Drawing 11 on page 26. The substrate roughness coefficient, z_0 , influences rather significantly upon the distance of occurrence of the maximum concentrations (Xmm), while more weekly upon the concentration values (Smm). On the area of a higher value of the coefficient, z_0, the maximum concentrations occur more closely to the emission source and achieve higher values than in the terrain of a low substrate roughness. The value of the coefficient z_0 is not subject to a direct measurement and, when determined by indirect methods, it presents a high variability. In this situation, tabular values are accepted commonly, defined for various terrain coverage and development kinds. Such listing is included in the Ordinance of the Environment Minister (MS), dated 5 December 2002, and the modelling methodology described therein (the reference methodology).

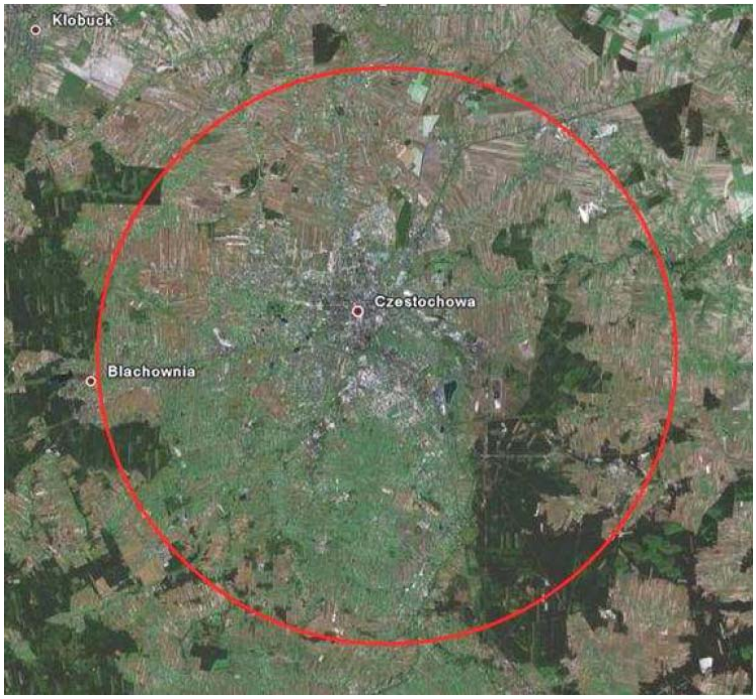
Among the terrains surrounding the Works (it is mandatory to determine the roughness coefficient within the radius of 50-ple highest emitter in the Works, in this case 7,5 km) , there occur the centre of the big town , with its high development, as well as fields and meadows, and forests in the Eastern region (Park Krajobrazowy Orlich Gniazd (The Eagle

Nest Landscape Park)), in the Western region (region of Blachownia) and distributed forest and park areas. A considerable part of the area are the out-town terrains of the open character – fields, meadows as well as non-arable land of a low value of the coefficient z_0. This was evaluated on the basis of cartographic maps and satellite photos, where the value of z_0, averaged for the area under discussion amounts to ca. 0,65 m.

Table 12. Substrate roughness coefficient value - selection

Terrain coverage type	z_0, m
Meadows, pastures	0,02
Arable land	0,035
Orchards, bushes, coppices	0,4
Forests	2,0
Coherent urban development	0,5
Town of 100...500 thousand citizens	
— low development	0,5
— medium development	2,0
— high development	3,0

Drawing 23. Area wherein z_0 substrate roughness value has been defined



Backing source: http://maps.google.com/

5.4.6.4 Analysis of Substance Propagation in Air

Calculations of the concentration distribution of substances in atmospheric air were done by the reference methodology (Official Gazette Dz. U. 2003.1.12) , making use of specialised software (program ZANAT 6), while our own tool for the initial calculations, built on a spreadsheet. This tools enables tracking of influence of the emitter specifications defined within the variability interval upon the maximum concentration distribution in the wind axis and was used in scientific work [1]. This tool was used because of the lack of surety concerning the final emitter height, while it is known that the specification is of a very strong impact upon the calculation result.

5.4.6.4.1 Influence of selected emitter specifications upon substance concentrations in air

The boiler will operate at a variable load, within the limits of 40... 100% of

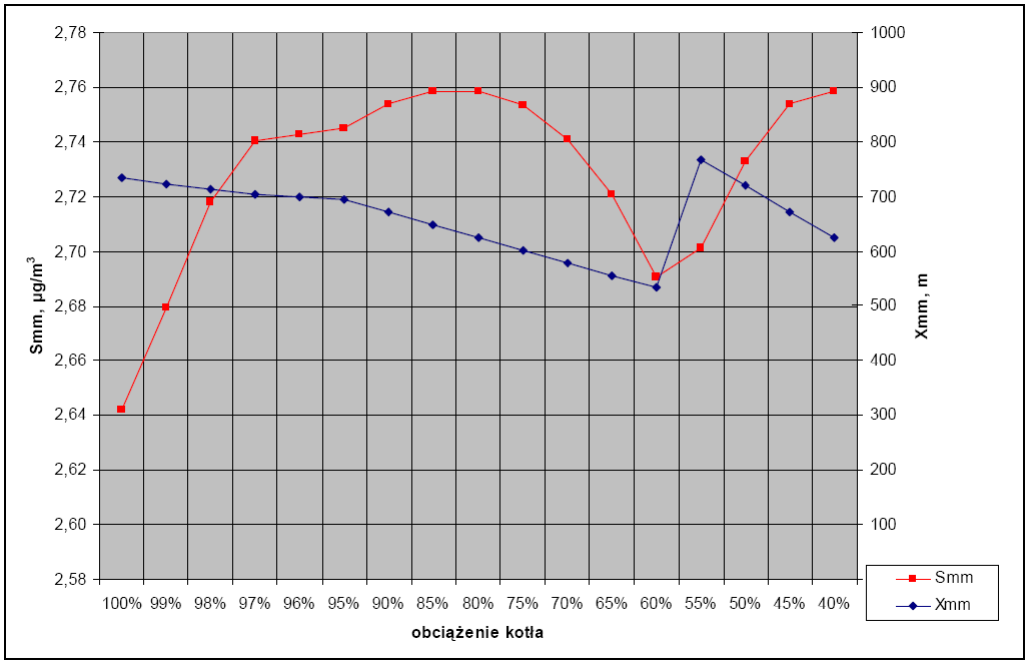
power and, within these limits, the two specifications will vary at the same time : flue gas stream and emission, when observing the condition for constant concentrations of the substance emitted in outlet gases (on the level defined by the emission standard).

Ph.D. Thesis „Wplyw istotnych parametrow emitora na wielkość bledu prognozowania stanu zanieczyszczenia powietrza in procesie inwestycyjnym" (Influence of significant emitter parameters (specifications) upon the forecasting error for air pollution in investment project process), Michal Neumann, Politechnika Wroclawska (Wroclaw University of Technology), 2005

When the flue gas stream changes, the gas outlet speed changes too and, consequently, the streak lift (thermal and dynamic) varies. The variations are of the nonlinear character, in connection with a calculation formula changes at the limit of 16 MW heat in the flue gas stream and in connection with the meteorological condition change, whereat the maximum concentrations occur for the emitter of the height *h* = 80 m and the outlet diameter *d* = 2,5 m; they are defined by the instable atmospheric balance condition (2-nd class) and the wind speed 2 m/s (within the load range 100...59%) or 1 m/s (58...40% of power).

The streak lift changes and the concentration maximum occurrence condition changes result in that , together with the load changes, there change the maximum concentration values, Smm, as well as the distance from the emitter, at which the concentrations occur. This is illustrated in the following plot prepared for dust chosen due to the poor air conditions in the town.

Drawing 24. Change of concentrations Smm and distances Xmm versus boiler load changes; emitter 80 m



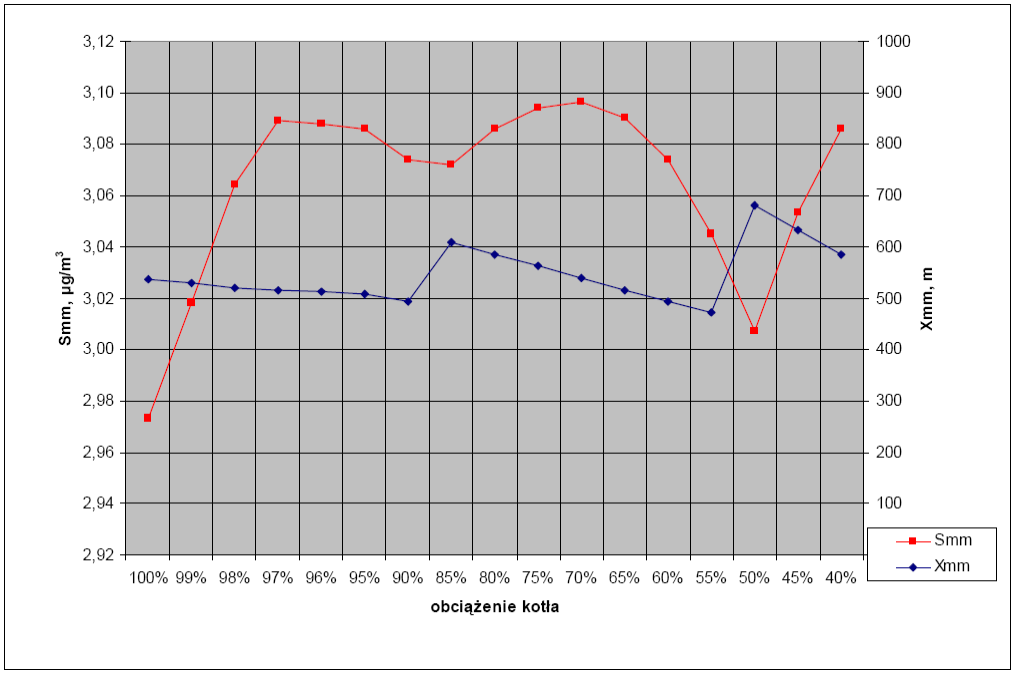
Legend

Obciazenie kotla	Boiler load

The above plot depicts the fact that the maximum concentrations occur not only at the full boiler load, but at the load on the level of ca. 80...85% of power and ca. 40% of power. The maximum dust concentrations occur at the distances of 533...768 m and do not exceed the value Smm = 2,76 ug/m^3, what constitutes less than 1% of the standard, *D1* = 280 ug/m^3. A fact is characteristic that the variability of the maximum concentrations within the full boiler loading variability range (40... 100% of the power value) amounts only to circa 95,7... 100%. Analogical calculations done for the emitter height of *h* = 70 m prove that the maximum of the concentrations occur at the boiler loading level of circa 70% of the power value and, in such conditions, it does not exceed 3,10 ug/m^3, i.e. 1,11% of the standard, *D1*

= 280 ug/m^3. The conditions for occurrence of the maximum concentrations are: weak wind (u_a = *2* m/s) and instable atmospheric balance (2-nd class). The calculation results are presented in Drawing 25.

Drawing 25. Change of concentrations, Smm , and distances Xmm versus boiler load; emitter 70 m



Legend

Obciazenie kotla	Boiler load

Analysing the calculation results, it may be found the variability range:

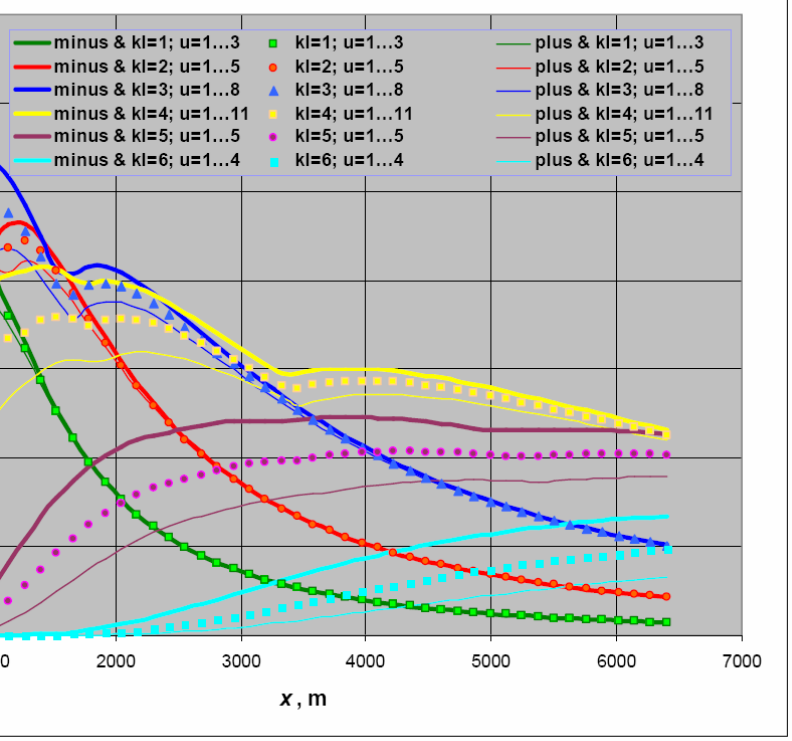
- of concentrations, Smm: 2,973...3,096 ug/m^3 (that corresponds to 96,1... 100% of the highest value)
- of distance Xmm: 471... 682 m.

Further calculations were carried out to evaluate the influence of the emitter height upon the concentrations generated. The change margin has been determined at 80±10 m and the concentration, S, value calculations have been done versus the distance, x. The calculation results have been presented in the form of plots in six triple series representing the six atmospheric balance states (class 1...6), and accepting the values in conformity with the reference methodology, within each wind speed class, u_a , (from three values for the classes 1 up to 11, for the class 4) after each 1 m/s. The three waveforms in each series correspond to the given emitter specification (here: the height: h_e = 80 m) and the decreased one (series „minus") , as well as the increased one (series „plus") with regard to the preset value (here: 10 m). The plots have been worked out for selected boiler loads: 100%, 95%, 82,5% and 40% -Drawing 26.

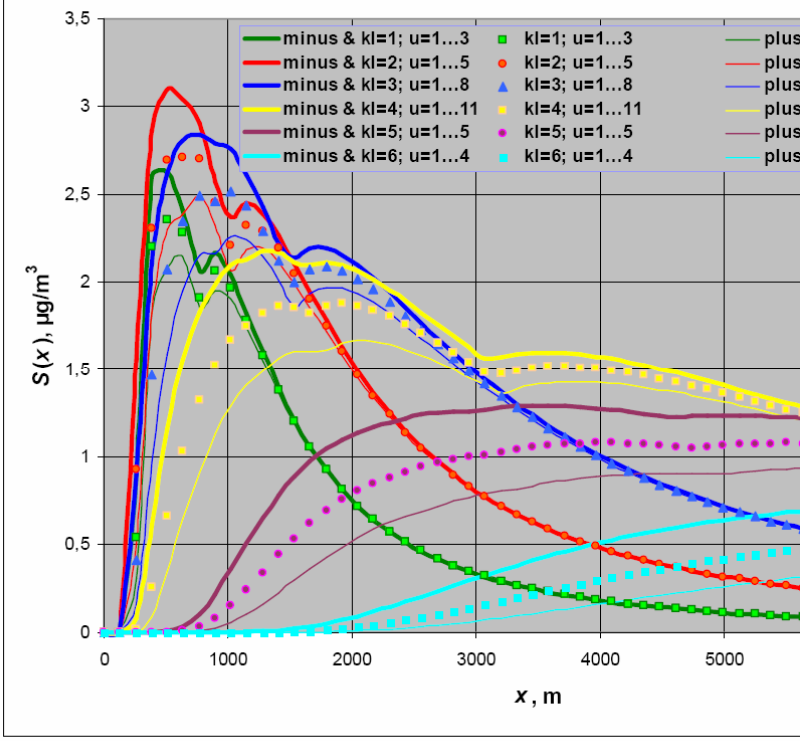
The calculations carried out proved that, together with boiler loach changes within the full operating range, i.e. 40... 100% of the power value, the maximum concentrations of dust emitted change at a minute degree (this refers also to the gaseous substances emitted). In a successive calculation series, it has been found that, at the emitter height of /7 = 70±10m, the maximum dust concentrations are still low, reaching ca. 3,5 ug/m^3 (in the „minus" series, i.e. for h_e = 60 m). This means that, at a considerable charge of heat emitted in the flue gas stream and relatively high outlet speed of outlet gases, 10,76...26,90 m/s (in dependence on the boiler load), the flue gas streak lift is considerable in comparison with the stack height and favours good dispersion of emitted substances in air.

Drawing 26. Plot of dust concentrations versus distance from emitter, at various boiler load values; emitter height h_e = 80±10 m

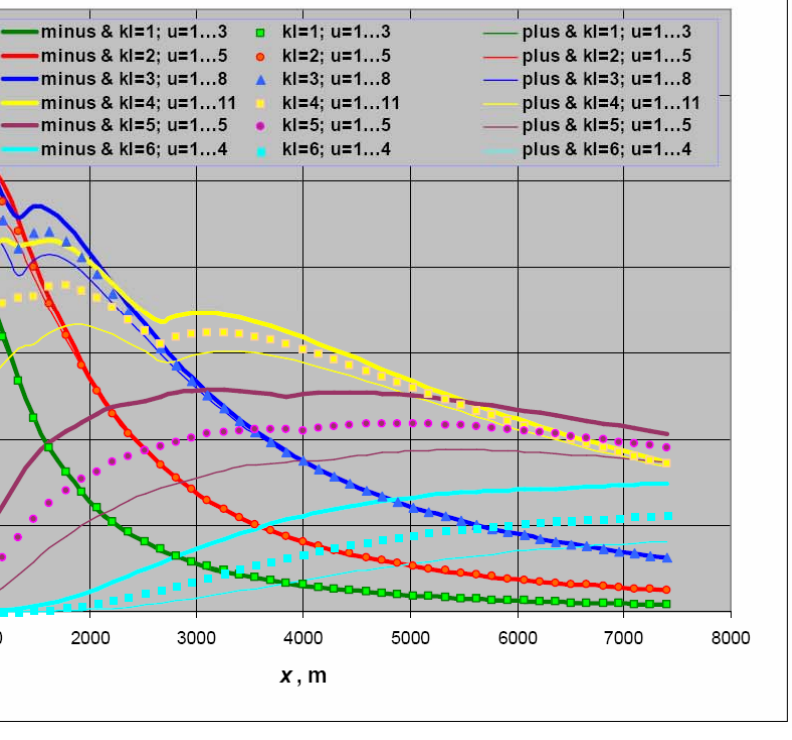
boiler load 100%



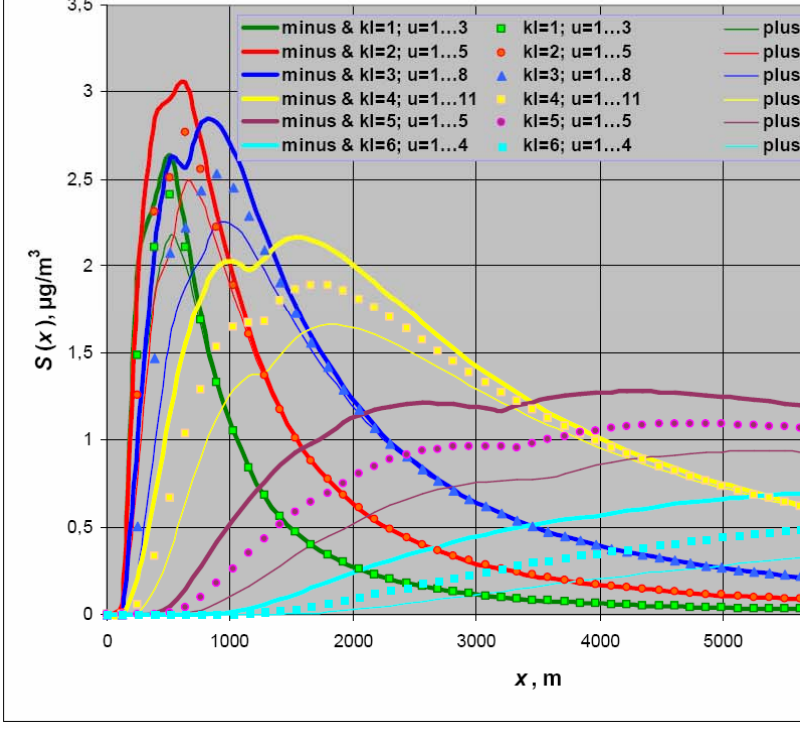
boiler load 95%



obciążenie kotła 82,5%

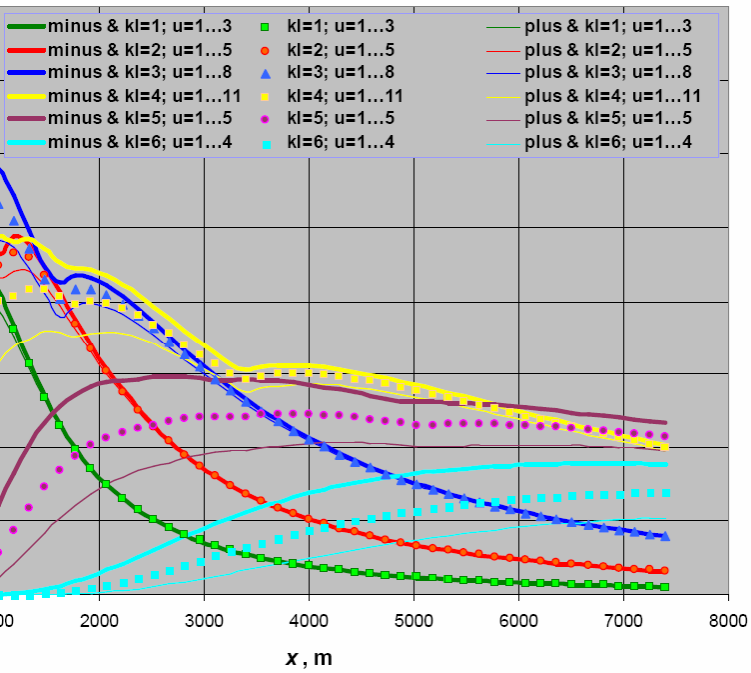


obciążenie kotła 40%

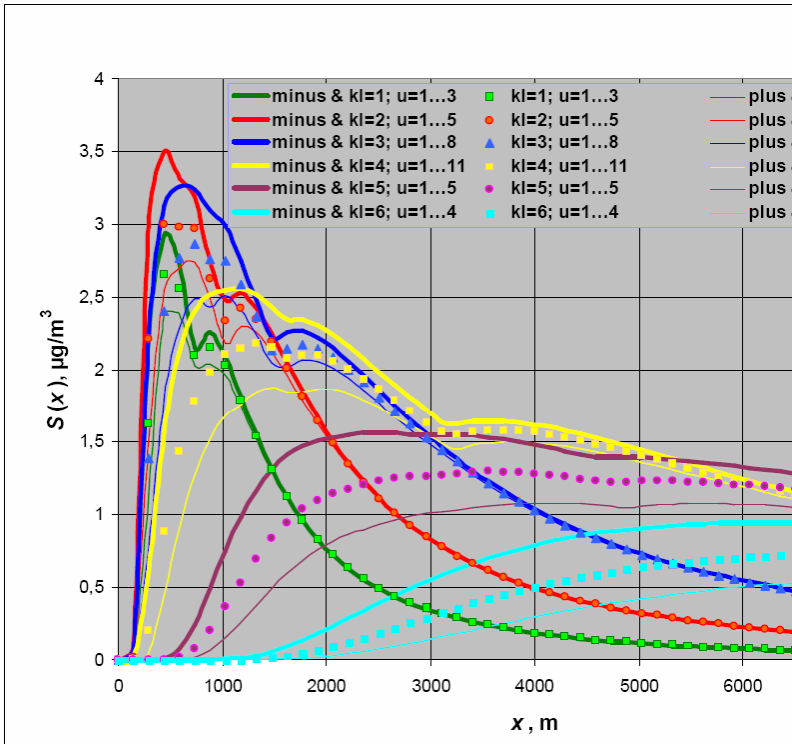


Drawing 27. Plot of dust concentrations versus distance from emitter , at various boiler load values; emitter height h_e = 70±10 m

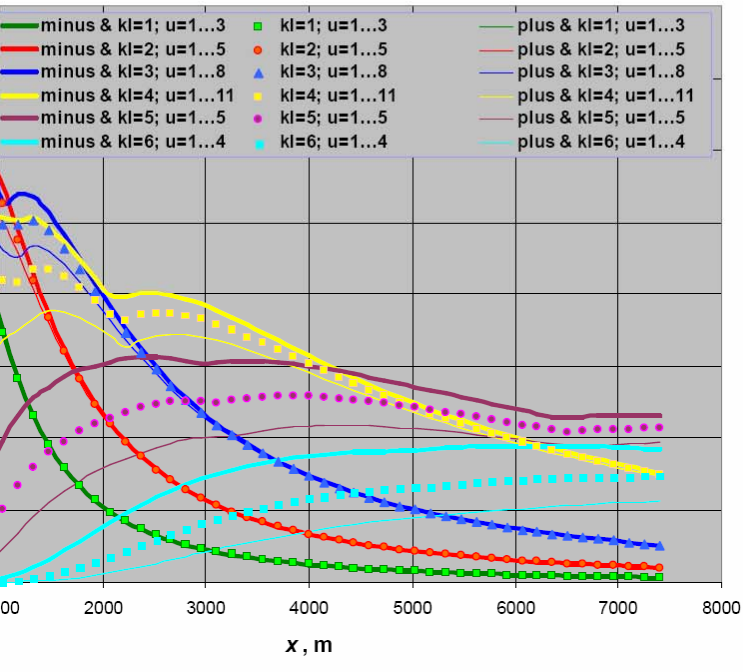
boiler load 100%



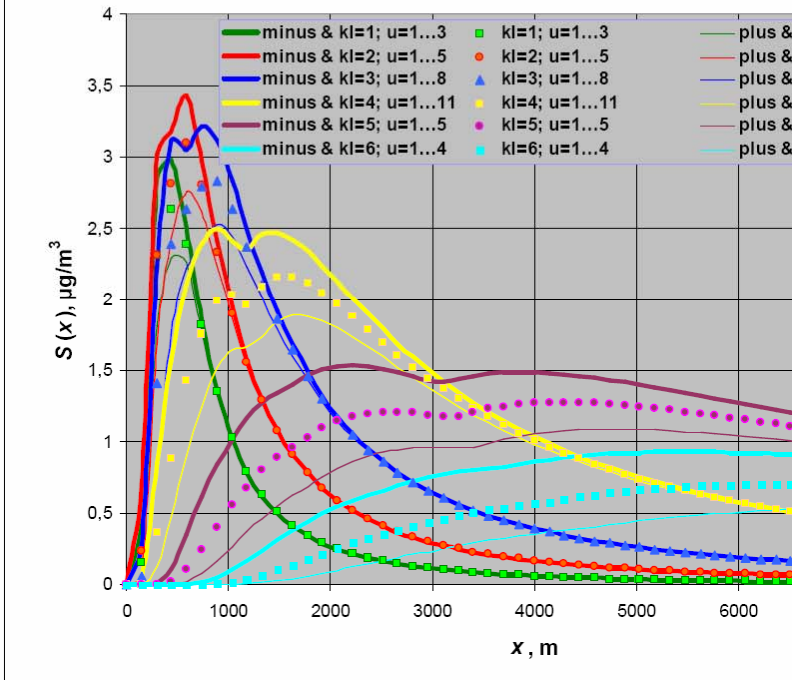
boiler load 97%



obciążenie kotła 70%



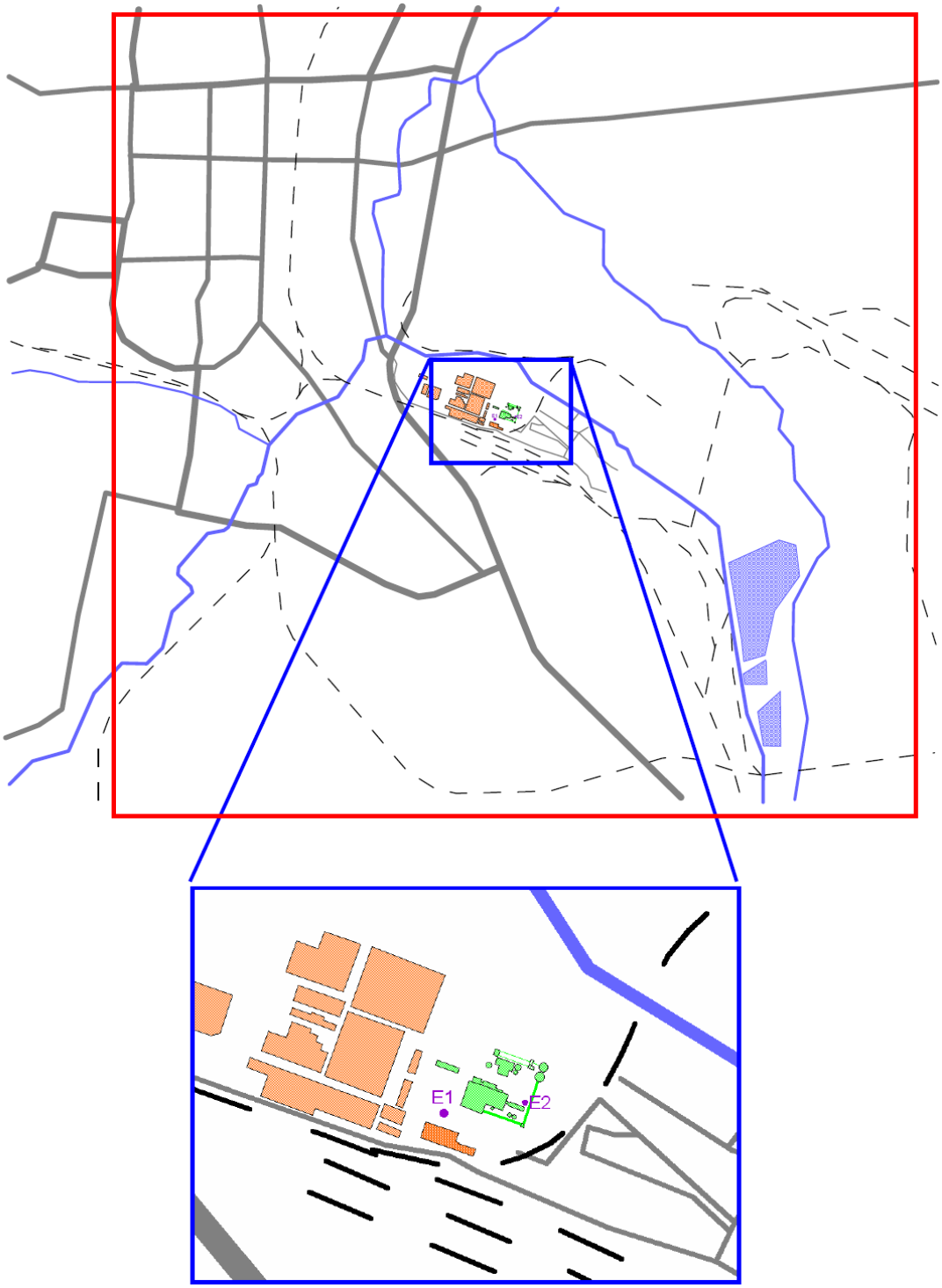
obciążenie kotła 40%



5.4.6.4.2 Concentration distribution on the terrain (site) level

The concentration distribution calculations for substances emitted from the new source, in atmospheric air, have been performed in accordance with the reference methodology, with use of the licensed program ZANAT, version 6.0. The calculations have been done in a regular grid of vertices (nodes), on the terrain (site) level, of dimensions 6000 m x 6000 m, using the calculation step of 200 m in bothe directions. The calculation grid characteristics (parameters) have been chosen taking into consideration the emitter height and terrain (site) roughness.

Drawing 28. Calculation area (red square) and location of existing emitter (E1) and **the new one (E2)**



Calculation Alternatives

The calculations have been done for the emitter height of h_e = 70 m and for two boiler loading values: 100% of the power value and 70% of the power value, maintained uninterruptedly for the full year. The simulation performed in such way, for propagation of emitted gases and dusts in air, is aimed towards determining the maximum possible impact of the new emission source upon the air pollution conditions in the town.

The results of the simulations done have been presented in the form of printouts (the Appendix) and presented in the Drawings.

Maximum Concentrations, Smm

The calculated values of Smm (maximum concentrations) have been depicted in the form of printout fragments, obtained due to the program ZANAT

Calculation identifier: CHP70100

GORNE OGRANICZENIE SUMY STEZEN MAKSYMALNYCH for ZESPOLU EMITOROW
bez badania niejednoczesnosci pracy emitorow in podokresach czasu

nr	nazwa zanieczyszczenia	0.1 * D1	stezenie maksymalne
1	PM10	2 .000	2 .944 [ug/m3]
2	SO2	3 .000	39 .252 [ug/m3]
3	NOx jako NO2	2 .000	39 .335 [ug/m3]

Calculation identifier: CHP7070

GORNE OGRANICZENIE SUMY STEZEN MAKSYMALNYCH for ZESPOLU EMITOROW
bez badania niejednoczesnosci pracy emitorow in podokresach czasu

nr	nazwa zanieczyszczenia	0.1 * D1	stezenie maksymalne
4	PM10	7 28 8 .000 9	3 10 .088 11 [ug/m3]
5	SO2	12 35 13 .000 14	41 15 .166 16 [ug/m3]
6	NOx jako NO2	17 20 18 .000 19	41 20 .253 21 [ug/m3]

Concentration within the calculation grid

Contractual emitter coordinates in the middle of the system have been assumed (X = 0, Y = 0).

The calculated maximum concentration values for the yearly mean concentration and for the concentration calculated as an appropriate percentile (99,8 or 99,726) in the one-hour concentration result set have been depicted in the form of printout fragments, obtained from the program ZANAT (the complete results in the Appendix), as well as in the graphic form.

Calculation identifier: CHP70100

Wyniki obliczen in wezlach siatki prostokatnej

ZANIECZYSZCZENIE NR 1 - PM10

dopuszczalne D1 = 2 8 0.00 Da = 40.000 [ug/m3]
tlo stezenia R = .00 [ug/m3]

numer wezla -	wspolrzedne wezla x [m]	y [m]	z [m]	stezenie srednie +R [ug/m3]	czestość przekr. [%]	+R	stezenia Smax [ug/m3]	+R	1-godz. S99.8 [ug/m3]
576	400	600	0	.108	.000v		2 .88		2 .71*
608	600	800	0	.115*	.000v		2 .64		2 .39

ZANIECZYSZCZENIE NR 2 - SO2

dopuszczalne D1 = 350.00 Da = 30.000 [ug/m3]
tlo stezenia R = .00 [ug/m3]

numer wezla -	wspolrzedne wezla x [m]	y [m]	z [m]	stezenie srednie +R [ug/m3]	czestość przekr. [%]	+R	stezenia Smax [ug/m3]	+R	1-godz. S99.726 [ug/m3]
575	200	600	0	1.192	.000v		37.55		35.76*
608	600	800	0	1.539*	.000v		35.19		31.88

ZANIECZYSZCZENIE NR 3 - NOx jako NO2

dopuszczalne D1 = 200.00 [ug/m3] Da = 40.000 [ug/m3]
tlo stezenia R = .00 [ug/m3]

numer wezla	wspolrzedne wezla x [m]	y [m]	z [m]	stezenie srednie +R [ug/m3]	czestość przekr. [%]	stezenia 1-godz. Smax +R [ug/m3]	S99.8 +R [ug/m3]
576	400	600	0	1 .440	.000v	38 .50	36 .2
608	600	800	0	1 .542*	.000v	35 .26	31 .9

- wartość maksymalna

Calculation identifier: CHP7070

Wyniki obliczen in wezlach siatki prostokatnej

ZANIECZYSZCZENIE NR 1 - PM10

dopuszczalne D1 = 280.00 [ug/m3] Da = 40.000 [ug/m3]
tlo stezenia R = .00 [ug/m3]

numer wezla -	wspolrzedne wezla x [m]	y [m]	z [m]	stezenie srednie +R [ug/m3]	czestość przekr. [%]	stezenia 1-godz. Smax +R [ug/m3]	S99.8 [ug/m3]
544	200	400	0	.090	.000v	2.96	2.80*
576	400	600	0	.130*	.000v	2.85	2.64

ZANIECZYSZCZENIE NR 2 - SO2

dopuszczalne D1 = 3 5 0.00 Da = 30.000 [ug/m3]
tlo stezenia R = .00 [ug/m3]

numer wezla -	wspolrzedne wezla x [m]	y [m]	z [m]	stezenie srednie +R [ug/m3]	czestość przekr. [%]	stezenia 1-godz. Smax +R [ug/m3]	S99.726 [ug/m3]
544	200	400	0	1.206	.000v	39.50	36.17*
576	400	600	0	1.734*	.000v	38.02	35.00

ZANIECZYSZCZENIE NR 3 - NOx j ako NO2

dopuszczalne D1 = 2 0 0.00 Da = 40.000 [ug/m3]
tlo stezenia R = .00 [ug/m3]

numer wezla -	wspolrzedne wezla x [m]	y [m]	z [m]	stezenie srednie +R [ug/m3]	czestość przekr. [%]	stezenia 1-godz. Smax +R [ug/m3]	S99.8 [ug/m3]
54	200	400	0	1 .208	.000v	39 .58	37 .4
57	400	600	0	1 .738*	.000v	38 .10	35 .3

- wartość maksymalna

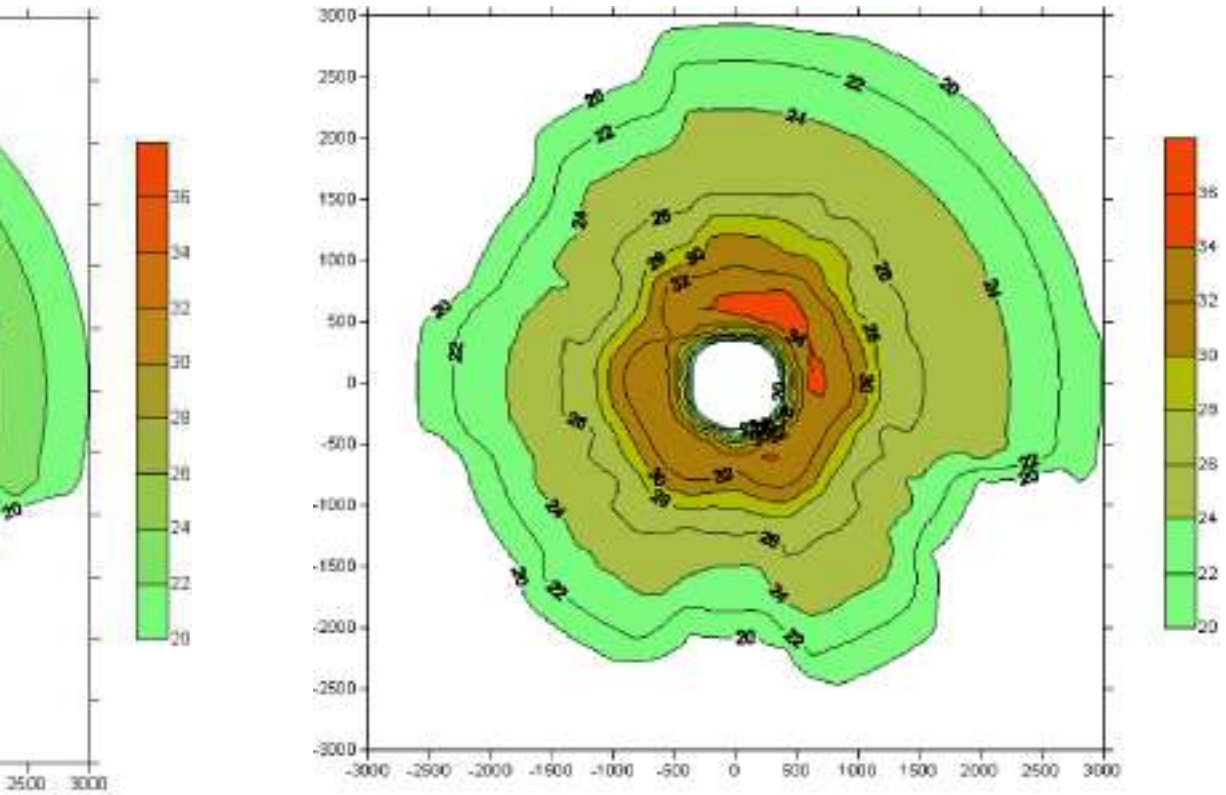
Concentrations of NO_2, SO_2 and dust on the terrain (site) level are lower than the valid standard values and even, when counted with the measure of an appropriate percentile, in relation to dust, they do not exceed 1% D1, while, in relation to gaseous substances, they are lower than 20% of the standard D1. The yearly mean concentrations of NO_2 and SO_2 do not exceed a half of the available value (Da - R). The yearly mean concentrations of dust reach 0,33% of the allowable value, Da. This means that, with regard to dust, the concentration of which exceed the permissible values in our town, the new source will show minimum impacts.

The spatial distributions of the one-hour concentrations (as an appropriate percentile) and of the yearly mean concentrations , in the case of full CHP boiler load , operating uninterruptedly for the full year have been presented on the maps.

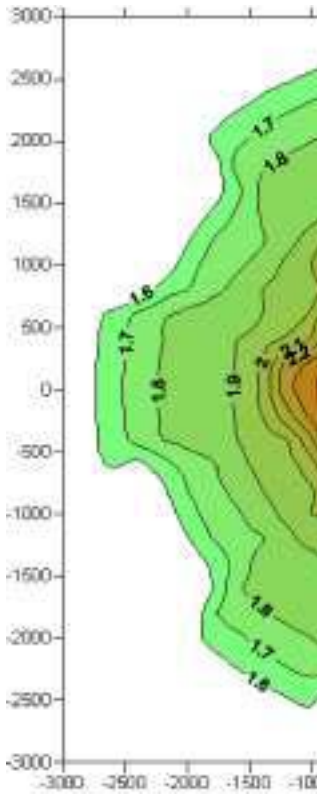
It follows from them that the yearly mean concentration maxima occur in a distance of ca. 0,9 km from the new emitter, in the North-North-Eastern direction (the surroundings Westward from the CKM Wlokniarz (Textile-Worker) stadion).

Drawing 31. Spatial distribution of 99,8 percentile of hourly concentrations of **sulphur dioxide.**

Permissible value D1 = 350 μg/m^3



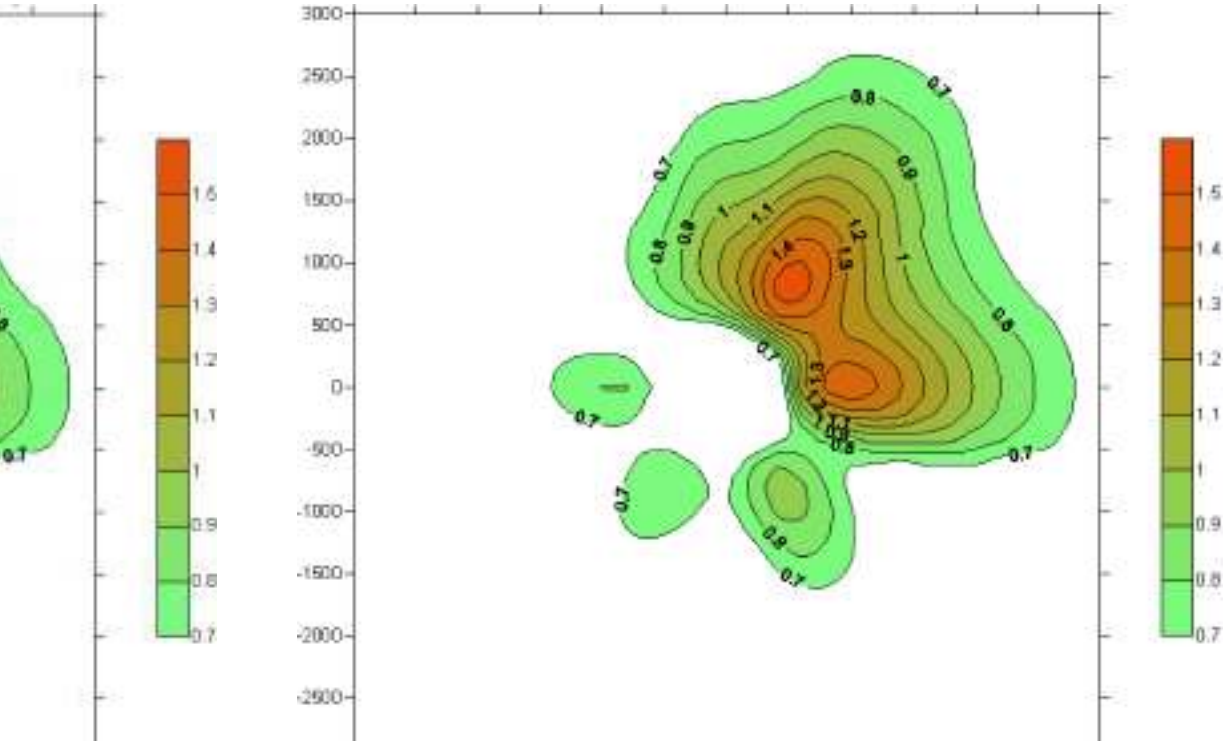
Drawing 33. Spatial di
concentrations of **dus**
Permi



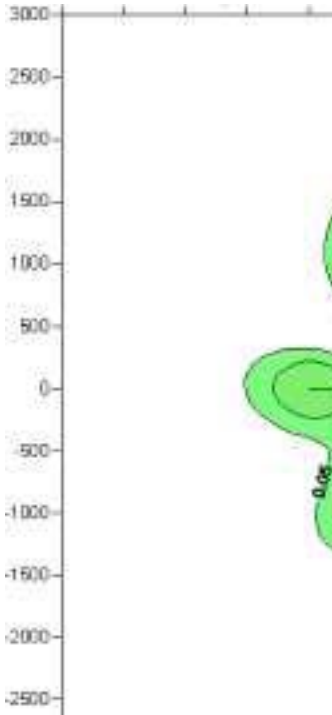
trogen dioxide

Drawing 32. Spatial distribution of yearly mean concentrations of **sulphur dioxide.**

Permissible value, D_a - R = 30,0 - 12,0 = 18,0 μg/ m^3



Drawing 34. Spatial distrib
The permissible value D_a =



In conformity with the reference methodology contained in the Appendix Nr 1 to the Ordinance of the Environment Minister (MS) concerning *the reference values for some substances in air;* if in a distance from some emitters, lower than its 10 heights, there are higher than single-storey buildings of dwelling or office type, as well as buildings of nurseries, kindergartens, schools, hospitals or sanatoria, then it is to be verified if the buildings are not endangered for exceeded reference values of the substances in air, or the permissible substance levels in air.

In another way that on the terrain (site) level, the methodology dictates verification of the maximum concentrations (calculated as an appropriate percentile, they may not exceed the standard D1), but it does not require assessment of yearly mean concentrations.

The calculations have been done on the levels 6 m, 20 m and 35 m, as representative ones for the low, medium and high development, respectively. Though gradual increase of concentrations with increasing height have been found, but the scale of this increase indicates that, even on the high development level, the maximum concentrations of all substances are considerably lower than the reference levels.

Table 13. Concentrations of gaseous substances and dust on development level

Calculation level, m	Maximum concentration as appropriate percentile		
	SO_2	NO_2	dust
0	35,76	36,22	2,71
6	35,82	36,30	2,92
20	36,21	36,91	3,58
35	37,64	38,24	4,79

5.4.7 Summary

The emission calculations done and the simulations of gaseous and dusty pollution propagation showed observation of imission standards on the whole area including, in particular, that out of the investment terrain (site). This means that the investment project execution will not be of over-standard impacts upon atmospheric air. Furthermore, the concentrations generated are considerably than the permissible values: the yearly mean values of SO_2 and NO_2 do not exceed 2,0 ug/m^3; this means that they are lower than 10% of the permissible value Da. The yearly mean dust concentrations do not exceed 0,13 ug/m^3 , i.e. 0,33% of the standard, Da = 40 ug/m^3.

Taking over the role of the stoker-fired boilers operated in the „Rejtana" Heating Plant by the new CHP unit means that the stoker-fired boilers will operate for much shorter times than presently. Therefore the emission of gaseous substances and, in particular, of dust from the boilers will be significantly lower than that at present and , therefore, the total emission of the Works will be decreased what will be of a profitable impact upon the air quality in the town. The decreased dust emission is of a particular significance since its concentration level exceeds the standard in the town.

The detailed calculations of the concentration levels in air, gases and dusts emitted by the two main emitters of the Works, the existing stack of the height 150 m and the new one of the height ca. 70 m will be the subject matter of the analysis performed within the framework of application of the installation owner for a change in the integrated permission contents. On this stage, there will be defined the share of both emitters in formation of the substance concentration field in air.

5.5 ACOUSTIC ENVIRONMENT

The purpose here is to determine the acoustic conditions that will prevail after completion of the investment project and to find if the planned noise sources will not exceed the sound levels in the environment. The acoustic analysis conducted is based

upon the data handed over by the investor and the computer simulation performed, concerning the environmental impacts of the investment project.

5.5.1 Legal Acts

The basic legal acts taking into consideration the environment protection requirements within the scope of acoustic environment protection are:

- Act dated 27 April 2001 *Prawo ochrony srodowiska (Environment Protection Act)* (Official Gazette Dz. U. Nr 62, poz. (item) 627 of 20 June 2001 , and later amendments),
- Ordinance of the Environment Minister (MS), dated 29 July 2004 concerning *allowable noise levels in the environment* (Official Gazette Dz. U. Nr 178, poz. (item) 1841).

5.5.2 Ermissible Values

The allowable sound noise levels in the environment are defined by the Ordinance of the Environment Minister (MS), dated 29 July 2004, concerning *permissible noise levels in the environment.* They are dependent on the destination of the terrain (site) , the definitions of which have been listed in the Table 1 of the Appendix to the Ordinance. In the surrounding of the investment project under analysis, there are acoustically protected areas , of which those located in the closest distance, ca. 50 m, are the dwelling buildings for which permissible noise levels are valid:

- During hours 6^{oo} - 22^{oo} - 55 dB(A),
- During hours 22^{oo} - 6^{oo} - 45 dB(A).

The above levels have been designed in the integrated permission contents.

5.5.3 NOISE SOURCES

Within the main noise source groups located on the area of the CHP Heat and Power Generating Plant, the following should be included:

- The process (technological) and auxiliary source group including the fluidized bed boilers, turbo-generator and the process (technological) devices situated inside the building and the auxiliary devices (pumps and other devices) located in separated technological (process) building rooms; noise from the sources will be emitted during the full Works operating time, i.e. for the whole day and nigh,
- The group of external ventilation and air conditioning sources, such as the air cooler (ACC), intakes and the other; the noise emission from the sources will happen during the full Works operation time, i.e. for the whole day and night,
- The group of external fuel transportation sources : belt flights, reloading stations, eth.; noise emission from the sources will happen during the full Works operation time, i.e. for the whole day and night,
- The communication source group: these will be truck vehicles, cars (employees) moving within the extent of the access roads and the parking area for cars (because of the minute number of the vehicles, their access routes and parking area location have been omitted in the analysis), and trucks (delivery of biomass and other raw materials , and taking off waste, mainly ashes) relocating along internal roads and manoeuvre yards located on the area of the Works ; noise emission from trucks will occur only in the daytime.

5.5.3.1 Main Technological (Process) and Auxiliary Sources

The group of process (technological) noise sources include all devices located indoors. The acoustic power level will be different for individual devices. This refers also to the auxiliary devices that will be installed in the process (technological building). In this connection, inside the Works building, it will be possible to distinguish the zones of various noise intensity levels. However, due to the lack detailed data concerning location of individual devices and their acoustic power values, for the purposes of the acoustic analysis, it has been assumed that the noise level inside the whole building interior will be the same. It has been assumed that the level will be equal to the permissible value defined for the work stands in the Ordinance of the Minister of Labour and Social Policy, dated 29 November 2002 concerning *the highest permissible concentrations and intensities of agents harmful to healt in the work environment* (Official Gazette Dz. U. Nr 217, poz. (item) 1833 , and later

amendments), i.e. 85 dB in the Heat and Power Generating Plant and 75 dB in the storage/technical building.

Noise emitted from the process (technological) and auxiliary devices located in the building of the Works will be screened by the walls and the roof of the building. For the purposes of the present analysis, on the basis of the data concerning the building structure, it has been assumed that the acoustic insulation ability of building baffles is on the level of 22 dB (sandwich components filled with mineral wool or foam PUR).

For the purposes of the acoustic analysis, in conformity with the guidelines included in the Instructions ITB 338/96 *Metoda okreslania emisji and imisji halasu przemyslowego in srodowisku and program komputerowy HPZ_95_ITB (The Method of Determination of Industrial Noise Imission in the Environment and the Computer Program HPZ_95_ITB),* each building of the Works has been modelled as one source of noise, of the building type.

5.5.3.2 External Point Sources

The building will be provided with an air intake for the compressors that will be installed on the building wall. The devices will be point-type noise sources. At present, there is no detailed data on the amount and layout of the devices. Due to the modelling way for sources of the building type, it has been recognised that this additional, point-type sound sources may be neglected, suggesting – at the same time – that, on the design stage, location of the sources on the dwelling development site is avoided.

There is, on the other side, available the data concerning a strong external sound source: the main or flue gas fan situated near the stack, under the electro-filter.

The acoustic power value of that fan has been assumed on the level of 105 dB.

The initial analysis has shown that such source, complete with the sources of the building type, results in violation of the environment acoustic quality standard in the region of the dwelling development, Therefore, it will be necessary to screen the fan from the Eastern side. Selection of the screen specifications (characteristics) will be a subject matter of a separate design.

5.5.3.3 External Linear Sources – Handling Lanes of Coal and Biomass

For modelling of sound emission from the transportation lanes, along each section, there have been distributed the substitute, point-type sound sources of the all-direction source type. The acoustic power level of the handling system (assumed on the basis of the data concerning the sources existing in the Works, in conformity with the records included in the integrated permission), shapes the acoustic power of the substitute source, in accordance with the equation:

$$L_{Wn}=L_w\text{-}10 \cdot \log n \qquad \textbf{(3)}$$

where:

L_{Wn} – acoustic power level of substitute, point-type noise emission source; [dB],
L_W – acoustic power level of a linear source; [dB],
n – number of substitute sound sources representing the given linear source

The initial analysis has shown that maintaining the acoustic power of the fuel handling system on the assumed level of 96,3 dB endangers to the environmental quality on the protected terrains during the night time. In this connection the two solutions are possible:

a) Attenuating the sound source of ca. 10 dB (handling lane casing of adequate acoustic specifications (characteristics))
b) Application of drives of the acoustic power value not higher than 86 dB.

5.5.3.4 External Stationary Sources Operating at Daytime

In this category, there are classified the coal unloading points, biomass unloading points and ash loading points. Due to the nearness of the dwelling development and the sound level during coal car unloading, only the coal unloading stations located on the railway siding have been taken into consideration. The unloading processes (technology) has not been finally decided upon yet but it is known this source of sound will be active periodically and in daytime only. It has been assumed, arbitrarily, that the sound source will feature with

the acoustic power level, averaged to the reference time of 8 hours, amounting to 80 dB. Due to the nearness of the development and the acoustic impact, as well as to the restraints on free migration of dust in air in the development direction, it has been assumed that the wagon unloading station will be cased (in a case of application of a wagon dumper) or, at least, shielded from the development with a tight wall of adequate specifications (characteristics) of sound attenuation. The selection of the solutions will occur on the stage on the unloading station design. When choosing the technical solutions, due protection against noise that may be arduous for citizens of the neighbouring houses should be taken into consideration.

5.5.3.5 External Linear Sources - Vehicle Traffic

To model emission of sound from the handling lanes, along each section, there have been located the substitute, point-type sound sources of the all-direction source type. The acoustic power level for the handling system (assumed on the basis of data sources existing in the Works, as per the records included in the integrated permission), defines the substitute source acoustic power in conformity with the formula (3) given hereinabove.

Trucks delivering raw materials and taking off ash will enter the Works area (site) via the gate from the Rejtana street side. Then, they will relocate , via the internal road, in direction of the coal dump yard and, further, will be directed to the target place. For the acoustic analysis purposes, the following assumptions have been made:

- During each day, onto the Works terrain (site), there will drive in 37 trucks (as per the assumptions: 29...44); they will drive in and out via the same road; therefore, the total traffic intensity on the access road and the manoeuvre yard will be 74 truck vehicles per 44 hours and 44 during 8 hours.
- The total truck traffic will occur during the hours 7—+21—,
- The travelling speed of trucks on the Works terrain (site) is constant and amounts to 20 km/h,
- The noise emission point, from the substitute, point-type noise source is located at the height of 1 m above terrain level.

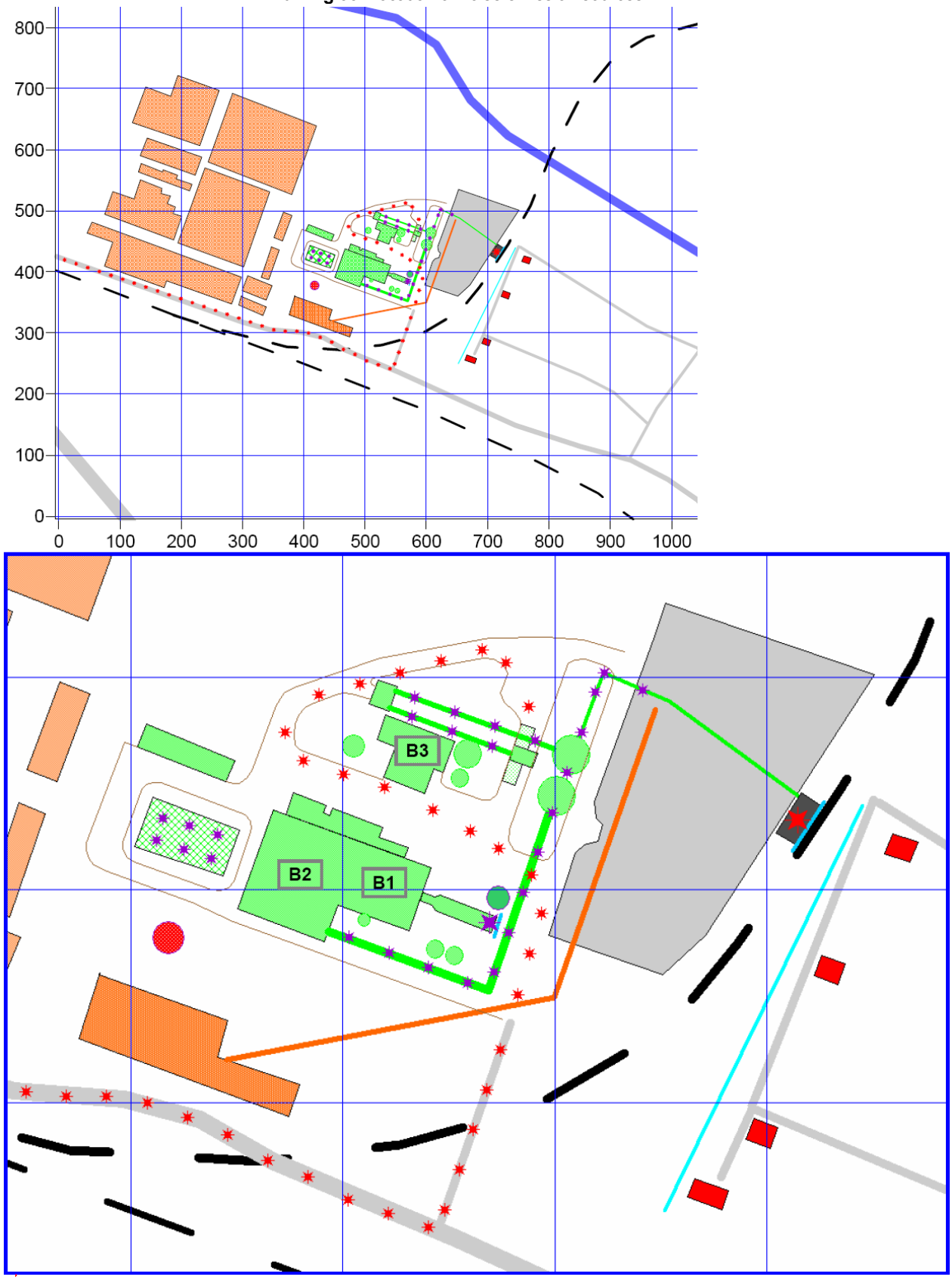
The truck travel route on the access road and on the Works terrain (site) is presented in the Drawing 35. All internal Works roads and the access road have been divided, in conformity with the recommendations of the Instructions ITB 338/96, into sections. Along the sections, there have been dislocated the substitute, point-type noise sources that operate periodically. e periodic character of a substitute source consists in that a truck appears on the road section allocated to the same, the source emits noise corresponding the intensity of the travelling truck - 90 dB (measuring data), while when the vehicle leaves the road section, this noise emission vanishes till the time instant that a successive truck appears on the section. The acoustic power value of the point-type sources located in the middle of the sections has been determined from the formula (4), cited from the Instructions ITB 338/96.

$$L_{Aeq} = 10 \cdot \log \frac{1}{T} \left(t_1 \cdot 10^{0,1 \cdot L_{A1}} + t_p \cdot 10^{0,1 \cdot L_{Ap}} \right) \qquad \textbf{(4)}$$

where:

T – the reference time for the calculated equivalent level; [s];
here: 28800 s (8 h) for daytime
t_1 – noise source operating time during a truck travel [s];
L_{A1} – source noise level during a truck travel; here: 90 dB,
t_p – time period during which the source does not work: [s],
L_{ap} – noise level during the time period that the source does not work; [dB]; here: 0 dB.

Drawing 35. Location of noise emission sources



point-type source active in daytime – wagon unloading
point-type source active in daytime and in night-time – flue gas exhaust fan
point-type sources active in daytime – truck traffic
point-type sources active in daytime and in night-time – cold store and fuel handling

5.5.4 NOISE LEVEL CALCULATIONS

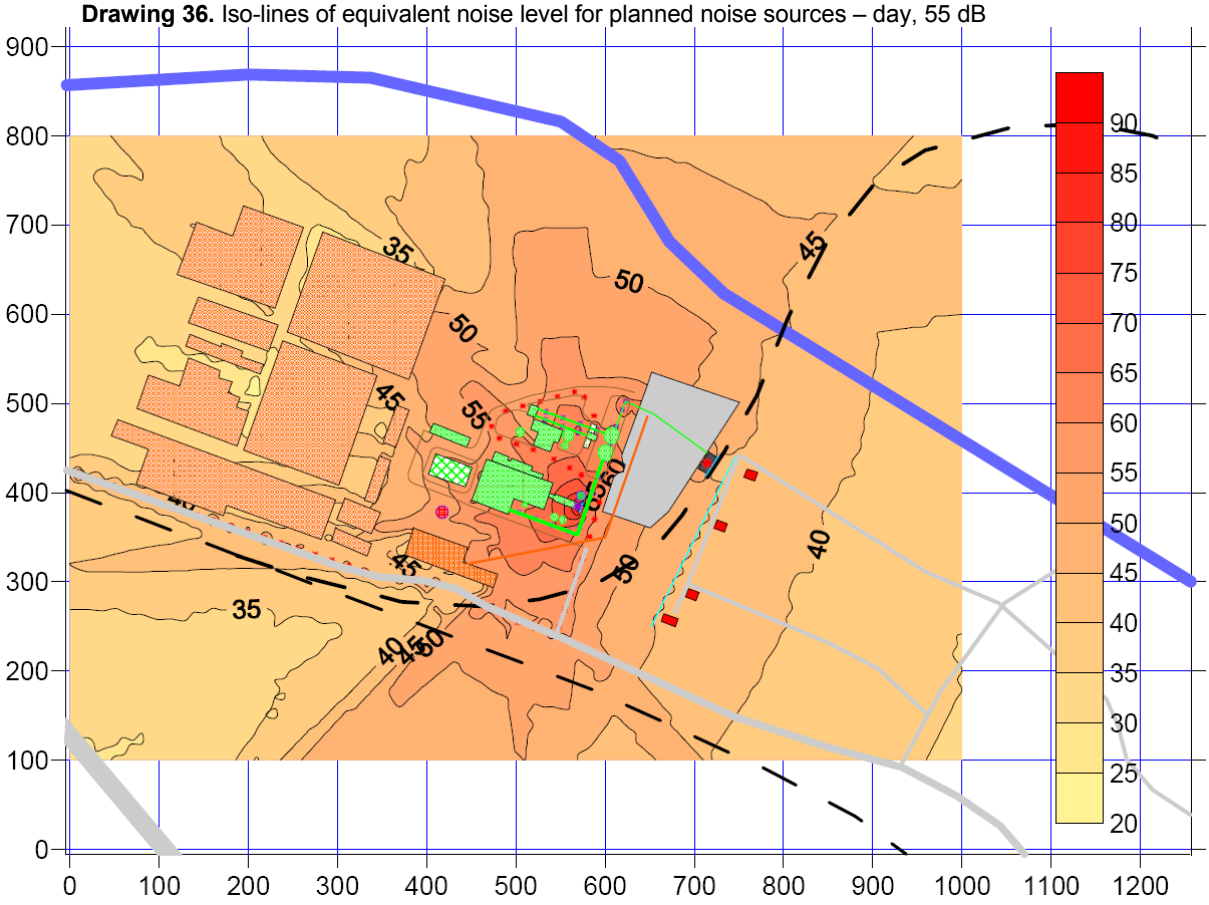
The calculations have been done in conformity with the Instructions ITB 338/96, *The Method of Determination of Emission and Imission of Industrial Noise in the Environment and the Computer Program HPZ_95_ITB (...),* with use of the program HPZ_95_ITB. The noise reach calculations have been done for the observation point grid of dimensions 1000 m x 800 m at k 10 m in both directions and for the observation point height of 1,5 m above terrain level.

In the calculations for the daytime, there have been taken into consideration all noise sources described hereinabove. In the calculations for the night-time, there have been neglected the truck traffic that will occur in the daytime. The noise propagation simulation results have been presented hereinafter in the form of maps for the daytime (Drawing 36) and for the night-time (Drawing 37) and in the form of the computer printouts at the end of the study (Appendix 2)

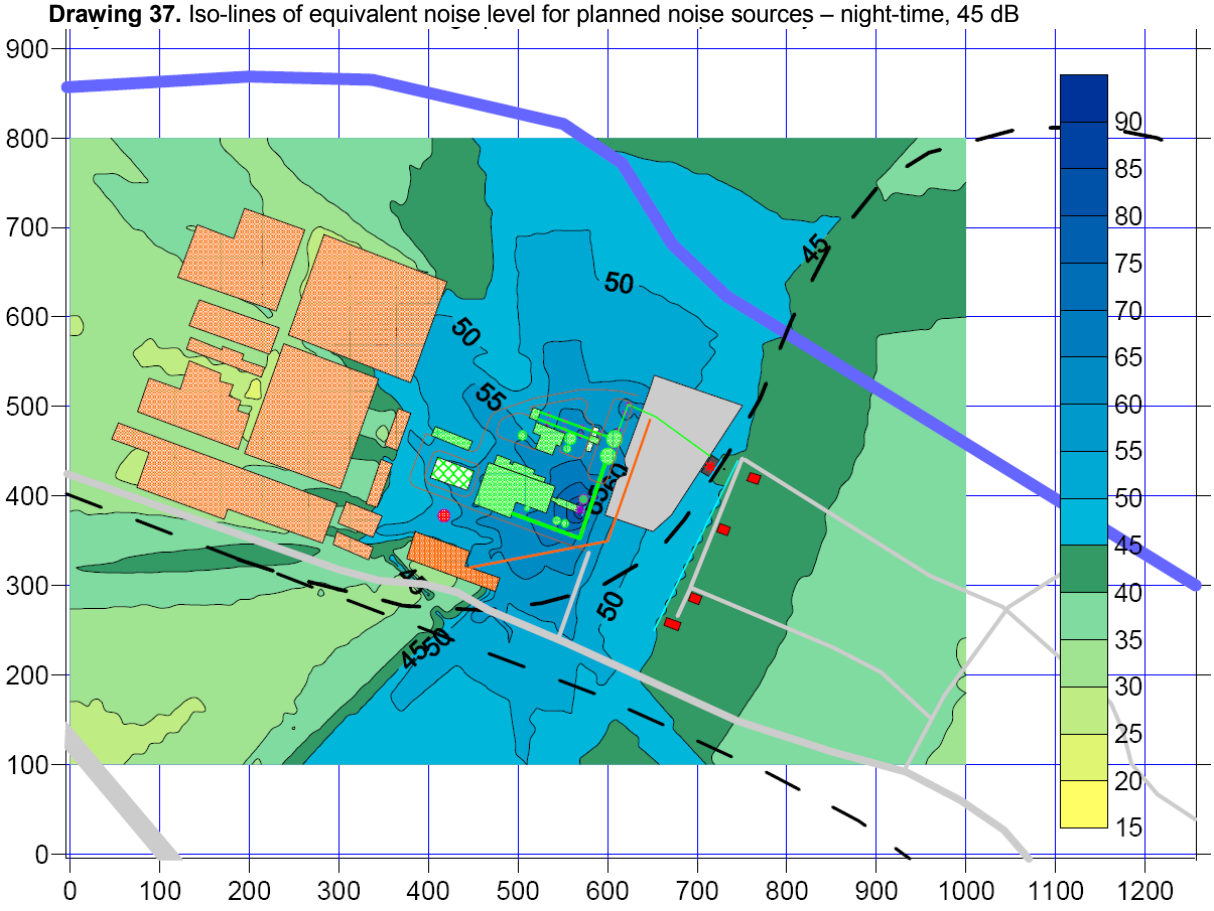
From the noise propagation simulation performed, it follows that the investment project will influence upon the acoustic climate in a permissible degree and, in particular, it will not cause exceeding the permissible noise level on the terrains (sites) protected acoustically in the daytime (55 dB in the development region). However, during the night-time, the calculated sound intensity level calculated at the development line is almost equal to the allowable value for the night-time, that amounts to 45 dB, and on the biggest height, the limit value is minimally exceeded of ca. 0,5 dB – what is kept within the method error limits. It is recommended that, on the constructional design stage, repeated Works impact analysis is done (for the total Works), concerning the acoustic climate, in order that the impact minimisation ways are determined.

It is known that, in a relatively short time, when the thermal power generated by CHP does not meet the receivers' needs, the boilers of the existing „Rejtana” Heating Plant will be started up. Their operation will be also a sound source, superimposing upon the acoustic field shaped by the CHP installations. In the case that it is found that both sound source sets impact over-standard in the protected region (dwelling development), it should be determined in the first sequence which devices have the highest share in that and, next, a way to eliminate this arduousness should be worked out.

Drawing 36. Iso-lines of equivalent noise level for planned noise sources – day, 55 dB



Drawing 37. Iso-lines of equivalent noise level for planned noise sources – night-time, 45 dB



5.5.5 SUMMARY

From the analyses and simulations done in the present Section, it follows that the investment project under planning will have no above-standard impacts on the protected areas (with regard to acoustics) , provided that the following requirements are observed:

- On the design level, good construction baffle acoustic insulation capability should be assumed;
- When selecting devices and their locations, including the intake, look for solutions protecting the near dwelling development ; it is recommended that the air intake is situated on the Northern or Western wall of the building;
- Effective screening should be foreseen for the flue gas exhaust fan, located under the electro filter , from the side of the nearest dwelling development;
  Look for the fuel handling systems (belt flights) characterised by a low acoustic power level, ensuring, in the ultimate case, for the systems a casing of good insulation properties.

Due to the lack of complete data concerning the devices that will be applied and concerning their acoustic features, as well as due to the early phase of the design work, the calculations done have, inevitably, the information character only. Therefore, it is recommended that, during the design work, the problems related to the noise protection are currently consulted with an expert in that domain.

5.6 WASTE MANAGEMENT

The goal of the present study is the classification and characterisation of waste that will be produced in connection with useful operation of the investment project under analysis.

The basic legal Acts taking into consideration the requirements concerning the waste management scope are the following:

- Act dated 27 April 2001 *Prawo ochrony srodowiska (The Environment Protection*

La) (Official Gazette Dz. U. Nr 62, poz. (item) 627 , and later amendments),

- Act dated 27 April 2001 concerning *odpady (waste)* (Official Gazette Dz. U. Nr 62, poz. (item) 628 , and later amendments),
- Ordinance of the Environment Minister, dated 27 September 2001, concerning *sprawa katalogu odpadow (waste catalogue issue)* (Official Gazette Dz. U. Nr 112, poz. (item) 1206),
- Ordinance of the Environment Minister, dated 21 April 2006, concerning *the waste sort list that the waste owner may hand over to individuals or organisational units not being entrepreneurs, and permissible recovery methods* (Official Gazette Dz. U. Nr 75 poz. (item) 527),
- Ordinance of the Economy Minister, dated 30 October 2002 , concerning *the issue of waste kinds that may be dumped in a non-selective way* (Official Gazette Dz. U. Nr 191, poz. (item) 1595).

The present Section has been worked out on the basis of the following:
=> the legal Acts enumerated hereinabove,
=> the specialised references of the waste management scope,
=> the integrated permission contents.

5.6.1 CLASSIFICATION OF WASTE GENERATED

Waste generated on the terrain (site) of the Works under analysis may be divided conventionally into the two groups:

> Process (technological) waste – it is produced during conducting technological (production) processes,
> Staff-rest/living waste – it is produced in connection with residence of employees on the Works terrain (site).

Other division covers the two groups: hazardous waste and waste other than hazardous. Presently, in conformity with the integrated permission contents (a relevant fragment is included in **the Appendix 3),** the amount of hazardous waste is equal to 0,82 Mg/year (the main items are oils – code 13 02 08*) and sorbents , etc. (code 15 02 02*), while that of the other waste – more than 22 000 Mg/year. A considerable disproportion is visible – hazardous waste constitutes a marginal part of the total waste amount.

The main items in the category "waste other than hazardous ones" constitute furnace waste (code 10 01 80) , in amount of 22 000 Mg/year, as well as furnace linings (16 11 06), iron, steel and other waste of demolitions and repairs, and soil and diggings, but it is known that the amounts recorded in the permission contents are the maximum yearly values that, in any given calendar year may not occur at all. Within that scope, as a result from the investment project, no significant changes in the operation phase of the installation consisting of the new CHP unit and the existing Heating Station should be expected. The furnace waste balance and its composition will change significantly.

The execution of the investment project will decrease the amount of slag generated in the stocker boilers, while the amount of volatile ashes will increase. It follows from an increase in the demand for fuel and from an increase in the de-dusting efficiency.

The amount of furnace waste in the operating alternative with lower additional cooling , wherein the fuel demand amounts to:

coal: 133 000 Mg
biomass: 101 000 Mg , has been defined
as 13 000 + 19 400 = 32 400 Mg/year.

For the Alternative with the maximum cooling (in order that production of electrical power (energy)), wherein the fuel demand amounts to:

coal: 226 000 Mg
biomass: 101 000 Mg

the amounts of furnace waste have not been defined in the design assumptions (at the present stage of the assumptions). It may be stated that the total amount of the waste, originated almost totally in coal, will amount to circa 22 100 + 33 000 = 55 100 Mg/year, i.e. it will increase proportionally to coal consumption.

The composition of ash will be dependent on the waste rock composition (in coal) as well as on the sand addition (fluidized bed material), with addition of calcium salt from the desulphurisation process and ammonium compounds of the technology NSCR (nitrogen oxide removal). Calcium salts will constitute, primarily, a mixture of carbonates, oxides and sulphates.

5.6.2 WASTE CHARACTERISATION AND UTILISATION

The waste water characterisation and utilisation have been covered in the integrated permission (Appendix 3). It is to be expected that, within the waste management scope, the changes will not cover most of the items specified therein since the waste of the groups 07, 08, 13, 15, 16, 17 and 19 are produced mainly in connection with the Works activity and not with a specific coal combustion technology (processes).

The change of character and composition of furnace waste means that, in addition to the item "ash/slug mixes of wet disposal of furnace waste" of code 10 01 80, a part of which will undergo significant decrease, there will appear ashes from the fluidised bed boiler wherein hard coal will be burned or hard coal and biomass will be co-burned. In the boiler, there will be conducted the desulphurisation by the lime method; therefore, the waste produced should be qualified as **„mixes of volatile ashes and solid waste of lime desulphurisation methods for outlet gases *the dry and semi-dry methods of flue gas desulphurisation, and combustion in the fluidized bed).** Waste code: 10 01 82.

The second category of waste from the fluidized bed boiler , that may be produced in connection of the boiler operation, are **„sands from the fluidized beds (except of 10 01 82)"** of code 10 01 24. Creation of that waste follows from the necessity of periodical boiler stoppage ; in such case, after burning fuel, it must be emptied of the inert bed material and the material will constitute waste of the code 10 01 24, provided that it will be not used repeatedly after completion of the work (since, in such case, it will be not classified among waste materials). Therefore, this waste may be created sporadically, once per several years.

In addition to the waste species specified in the integrated permission and the new waste from the fluidized bed boiler, there will be generated waste of the communal waste character.

Mixed communal waste (20 03 01) – they are of the character of waste similar to the communal one since it will include in its composition the typical living waste , such as organic residuals , paper, etc, but also waste species incoming e.g. from hall cleaning, that may be polluted with substances that are not found, normally, in communal waste. In order to maintain adequate sanitary conditions, appropriate number of waste container and regular disposal of their contents into the dumb area should be provided.

5.6.3 Summary

1. The investment project under planning will be a facility (plant) of a low arduousness for the environment with respect to the waste management.
2. It should be aimed towards economic utilisation of furnace waste at a maximum degree.
3. Hazardous waste produced due to the activity of the investment project under planning should be neutralised in full or utilised. There is no need to dump hazardous waste produced as a result of the activity of the investment project planned.
4. For taking off any hazard waste, relevant contracts should be concluded with companies possessing permissions for management of such waste species or, possibly, concluded contracts should be corrected.

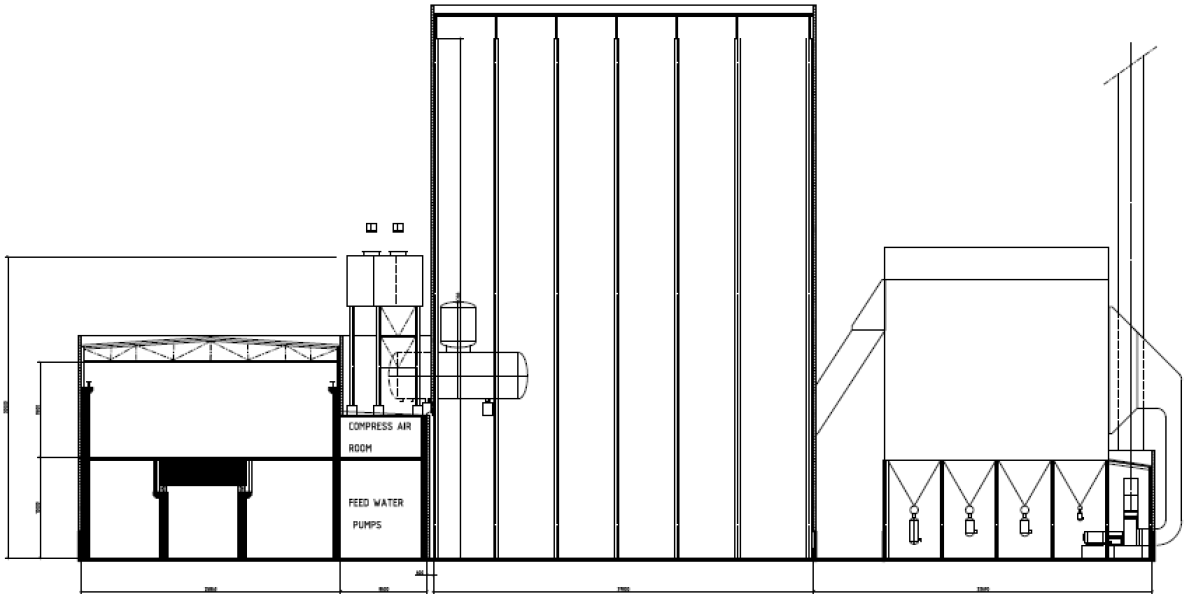
5.7 IMPACT OF INVESTMENT PROJECT UNDER PLANNING UPON LANDSCAPE AND PEOPLE

The landscape is a visual aspect of the environment, being a synthesis of all natural components and those following from human activity. It is strongly connected with the flora world and development.

The investment project under planning will be executed on the terrain (site) developed and, for years, interconnected with industrial activities. The new installation should be designed

with the aesthetic values taken into consideration. From this aspect, the investment project should not been evaluated as worsening the landscape aesthetic values. It is foreseen that the main building including the fluidized bed boiler will be ca. 55 m high, therefore, it will be visible from a high distance. The only one component higher than the building will be the stack of height ca. 70 m.

Drawing 38. Solid of main fluidized bed boiler building, complete with electro filters and stack (lower part)



6 POTENTIALLY SIGNIFICANT IMPACTS OF PROJECT UNDER PLANNING UPON ENVIRONMENT, FORECASTING METHODS

The detailed description of impacts of the project being planned upon the environment and of the forecasting (predicting) methods have been presented in sequential points of **Section 4 and 5.**

7 ASSUMED ACTIONS AIMED TOWARDS AVOIDANCE, DECREASE OR COMPENSATION OF HARMFUL ACTIONS UPON ENVIRONMENT

The detailed description of impacts of the project being planned upon the environment and of the forecasting (predicting) methods have been presented in **point 4.3** andsequential points of **Section 5.**

8 LIMITED USE AREA

In conformity with Art. 135 ust. (passage) 1 of the Act , dated 27 April 2001 *Prawo ochrony srodowiska (The Environment Protection Act)* in the following wording:
If, from the proceeding concerning environmental impacts, there follows that – in spite of application of the available technical, technological and organizational solutions – there may not be met the environment quality standards outside the terrain (site) or another facility (plant), then for the purposes of a waste water treatment plant, communal waste dump areas, composting plant, communication route, airport and electric power station, and radio-communication , radio-navigation and radio-location installation, a limited use area is created.,
For the investment project under analysis, there is no need of establishing any limited use area.

9 PRESENTATION OF PROBLEMI IN GRAPHIC FORM

Environmental impacts of the investment project under planning is presented in the graphic form in sequential points of **Section 5.**

10 ANALYSIS OF POSSIBLE SOCIAL CONFLICTS

The investment project under planning will be situated on an industrial terrain (site).

On the stage of construction and possible liquidation (modernisation), the scope and character of work conducted will not cause arduousness for neighbouring citizens. Occurrence of some inconveniencies for neighbouring citizens is possible on the construction stage. They are connected, mainly, with material transportation and handling. This impact is of a transitory character only. However, actions that could generate noise in night-time should be avoided.

The useful operation stage will not be a source of over-standard impacts upon the environment. For neighbouring citizens, the emission into air will be unnoticeable and the noise emission should be not higher than in useful operation of the existing Heating Station.

Arduousness related with transportation of fuels and other raw materials and disposal of waste (ash and other species) will be limited by elimination of traffic in night – time. The travel route running on the public road, along the Polontexu premises and the railway tracks should not induce conflicts.

Therefore, there are no rational reasons for which the Works modernisation planned would induce social conflicts, especially that the citizens will use in masses of heat generated in the installation.

11 PLANNED PROJECT MONITORING PROPOSALS

On the stage of construction and possible liquidation of the facilities, all work should be subject to reporting, in conformity with the constructional law. This refers, first of all, to demolition work that should be done under supervision of authorised persons

On the stage of useful operation of the installation, there is required condition of monitoring from the viewpoint of environmental impacts.

The requirements cover:

- Continuous monitoring of emission into air, for SO_2, NOx and dust from the fluidized bed boiler of the power value exceeding 100 MW,
- Periodical monitoring of emission into air, from other sources, if such duty is imposed in the new integrated permission or in the "sectored" permission,
- Monitoring of water intake and waste water management, on the rules defined in the new sector permission – most probably, not differing too much from the present obligations of the Works.

The permission within the scope of the water management, waste management, emission into air and noise emission for the installation under discussion is substituted by an integrated permission, acquisition of which is a prerequisite for undertaking the activity. In the integrated permission, there will be defined the detailed conditions of monitoring for the production processes, material management as well as for the characteristics describing the environmental impacts.

After being granted the permission, there will be taken the control measurements – in conformity with the valid legal status that may be different at the instant that the permission id issued. Currently, within that scope, there are valid a series of ordinances, the first of which defines the scope and methodology of the measurements within the scope of emission into air and noise emission.

- Ordinance of the Environment Minister, dated 23 December 2004 , concerning *requirements within the scope of taking emission volume measurements* (Official Gazette Dz. U. 2004.283.2842)
- Ordinance of the Environment Minister , dated 27 February 2003 , concerning *kinds of measurement results, taken in connection with useful operation of an installation or a device, transferred to the competent environment protection bodies and due date as well as the ways of presentation of the results* (Official Gazette Dz. U. 2003.59.529).

To enable taking emission measurements, the emitter conduits should be provided with standardized stub pipes installed on straight sections, in a big distance from any flow disturbing components. Hints concerning proper location of the stub pipes are included in the Polish Standard Polska Norma PN-Z-04030-7.

Within the scope of waste management: the waste owner is obliged to record waste (art. 36 of the Act , dated 27 April 2001, concerning *waste),* that covers the two documents:

- Waste record card,
- Waste hand-over card.

Of the duty of the full records, there are excluded some waste sorts produced in minute amounts, in conformity with the Ordinance of the Environment Minister (MS) , dated 11 December 2001 concerning *the issue of waste sorts and amounts, for which there is no duty to keep the waste records and of the category of small and medium enterprises that are allowed to maintain simplified waste records* (Official Gazette Dz. U. Nr 152, poz. (item) 1735).

The documentation within the scope of the waste management should be maintained in conformity with the templates defined in the Ordinance of the Environment Minister, dated 14 February 2006 , concerning *the issue of templates of documents applied for the purposes of waste records* (Official Gazette Dz. U. Nr 30, poz. (item) 213).

Monitoring of water volume taken from the network will be executed within the framework of the settlement system for the installation owner and water supplier.

The volumes and quality of waste water disposed into the treatment plant will be

monitored on the conditions and terms settled in the contract. The Ordinance of Minister of the Building Industry, dated 14 July 2006, concerning *the way of obeying the duties of an industrial waste water duties and the conditions of waste water discharge into sewerage devices* (Official Gazette Dz. U. Nr 136, poz. (item) 964) indicates, in §16, at the reference methodologies of analysis, such as those defined in the Ordinance of the Environment Minister, dated 24 July 2006 , concerning *the conditions to be observed when introducing waste water into water or earth, and concerning substances especially harmful for the water environment* (Official Gazette Dz. U. Nr 137 poz. (item) 984).

12 DIFFICULTIES FOLLOWING FROM SHORTAGES OF TECHNOLOGY OR GAPS IN CONTEMPORARY KNOWLEDGE, FOUND WHEN WORKING OUT THIS REPORT

The investment project under planning assumes the expansion of the production Works. The investment projects of this kind do not procure special difficulties in evaluation due to the lack of the knowledge concerning the technical solutions. Modern boilers of various manufacturers represent similar technical level in the environment impact aspect.

The authors met no difficulties following from the shortages of the technology or gaps in the contemporary knowledge, when working out the present report The unknown, obvious for that investment project type, is the actual scale of production that depends on the order portfolio size and on the weather conditions. Due to obvious reasons, some data characterising the devices (e.g. the noise level generated by the devices) has been defined with an uncertainty margin. The useful operation practice will prove at what extent the assumptions taken verify during operation of the facility. Therefore, within the forecasts (predictions) , it was attempted to maintain some necessary safety margin in defining the input data.

13 SUMMARY

1. The planned investment project consists in construction, on the terrain (site) of „Rejtana" Heating Plant, the CHP system, i.e. a fluidized bed boiler of the power value ca. 200 MW , complete with the turbo-generator and the auxiliary devices, operating in the combined mode: in addition to production of heat (in the form of hot network water), there will be generated steam driving the turbine. The steam circulation of the turbine will be cooled down during a decreased heat demand period, with use of a water system cooled with air.
2. The new installation will not act in an over-standard degree on the soil/water environment, atmospheric air and within the scope of noise, water/waste water management and waste management.
3. Emission of sulphur dioxide and dust (total emission of the Works) will be decreased significantly; the decrease in the dust emission is especially important due to the poor condition of air in the town.
4. The emission calculations carried out and the gas and dust propagation simulations for air showed observance of the permissible values for all substances under analysis out of the investment project terrain (site) (with a big reserve).
5. The computer simulation carried out showed that the facility in operation will not have over-standard impacts on the acoustic climate in the surrounding of the investment project under planning; however, it is recommended that due acoustic insulation is provided on technological (process) building walls, especially on the Eastern side (single-family houses) and location of noisy devices and air intake on this side of buildings is avoided.
6. It is recommended also that the fuel handling devices are chosen taking into consideration their acoustic power and that, on a future stage of work, adequate protective means are designed, such as acoustic screens (this refers, in particular, to the flue gas exhaust fan).
7. It is recommended that, after the Works are commissioned, measurements are taken within the scope of the noise emission (determination of the actual acoustic power of the sound sources) and determination of their impacts upon the acoustic climate on the protected terrains (sites).

8. Where needed, the Investor should update the contract with the specialised enterprise coping with utilisation of waste classified in the category of hazardous for the environment, concerning taking off the waste.
9. The waste classified in the hazardous waste category should be stored in separate containers, at places adapted for such purposes.
10. **The investment project under planning will operate without any over-standard impacts upon the natural environment, provided that the accepted technological (process), technical solutions and protection systems are applied.**

14 SUMMARY IN NON SPECIALISTIC LANGUAGE

The investment project under planning consists in construction, on the terrain (site) of the „Rejtana" Heating Station, of the CHP system, i.e. the fluidized bed boiler of the power value of ca. 200 MW, complete with the turbo-generator and auxiliary devices , operating in combination: in addition to production of heat (in the form of hot network water), there will be generated steam driving the turbine. The steam circulation of the turbine will be cooled down during the period of decreased heat demand, with use of a closed water system cooled by air.

In individual Sections of this study, the terrain (site) of the planned location of the investment project has been described and the closest surrounding of the site, from the viewpoint of the environment quality. The functions to be fulfilled by the investment project have been analysed next. The purpose of this analysis was to find the places that could possibly be of adverse impacts upon the environment and people. After they were identified, there were determined, with use of available mathematical tools, quantitatively and it was verified that it did not exceeded the permissible standards defined in the Polish law regulations related with the environment protection.

The calculation results and the analysis of gas and dust propagation in atmospheric air showed meeting the allowable values for all analysed substances on the terrain level on the whole area and in the region of the dwelling development on the development levels.

Similarly, the calculations of the noise level showed that the investment project under planning will not have over-standard impacts upon the acoustic climate on the protected areas (dwelling development). Here, however, the nearness of the dwelling development requires that several conditions are met on the design stage (selection of devices , intake location and situation of other noise sources, acoustic insulation of walls on the side of the dwelling development, i.e. on the Eastern side, construction of acoustic screens at the flue gas exhaust fan and covering, at least on the near dwelling development side , the wagon unloading station).

A result of the actions was the finding **that the investment project under planning will produce no significant impacts upon the natural environment, including the living conditions of neighbouring citizens, provided that the technological and technical solutions and protection systems planned are applied.**

15 APPENDICES

Appendix 1 – Results of calculations of substance propagation in atmospheric air
Appendix 2 – Noise propagation calculation results
Appendix 3 – Waste management - fragment of Integrated Permission (decision of Town President, dated 19-10-2005, ref. OSR.I.7681-5/04/05)
Appendix 4 – Decision of Czestochowa Town President, dated 13 March 2007, concerning defining location for a public goal (textual part).

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