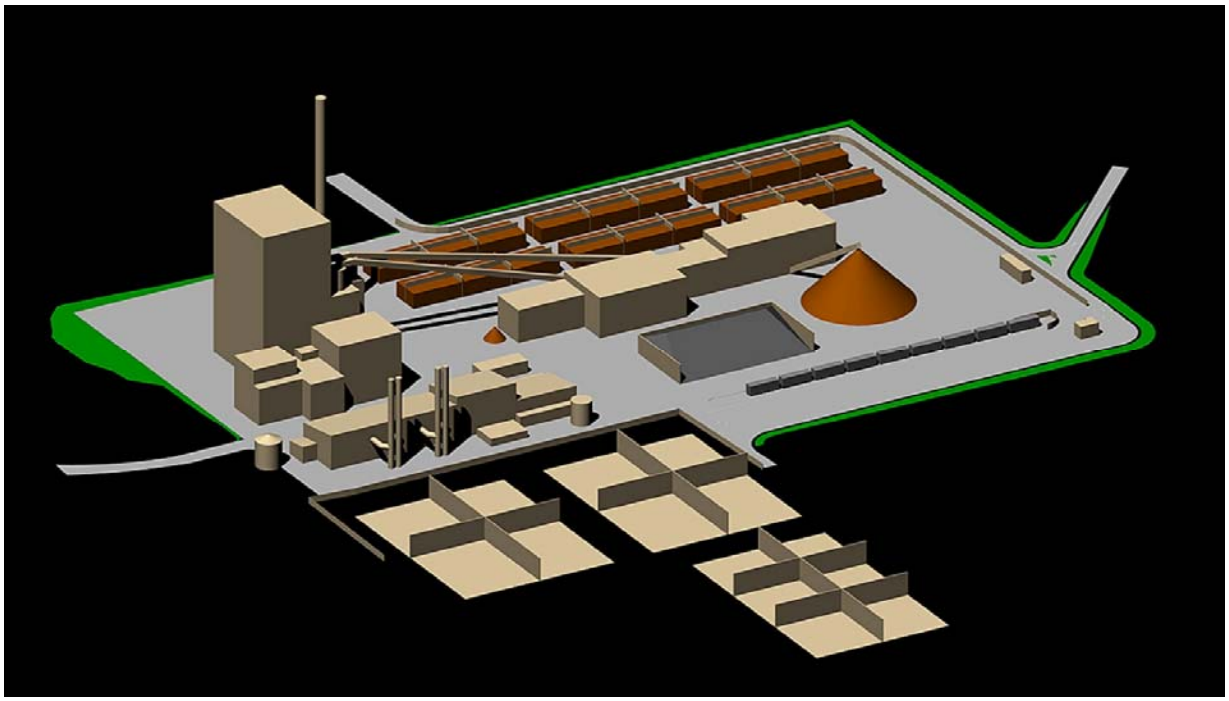
Detailed Environmental Assessment and Documentation for Integrated Permits for Use of the Environment by a Multi-fuel Power Plant

of the Hamburger Hungária Power Ltd. at Dunaújváros

Non Technical Summary



Compiled by:

Denkstatt Hungary Ltd.

Based on the following documents:

- Detailed Environmental Assessment and Documentation for Integrated Permits for Use of the Environment by a Multi-fuel Power Plant of Hamburger Hungária Ltd.'s Paper Mill at Dunaújváros Simplified public summary **[Progressio Ltd. 2006]**
- Detailed Environmental Assessment and Documentation for Integrated Permits for Use of the Environment by a Multi-fuel Power Plant of Hamburger Hungária Ltd.'s Paper Mill at Dunaújváros updated documentation **[Progressio Ltd. 2008]**
- Modifying resolutions of the environmental authority **[2009 and 2010]**
- Full-scale Environmental Survey of the Multi-fuel Power Plant of Hamburger Hungaria Power Ltd. **[IdeSol 2012]**

Dunaújváros
2012

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Annexes

- **Area of impact**
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1 INTRODUCTION

Hamburger Hungária Ltd., Dunaújváros, Hungary – a daughter company of W. Hamburger GmbH, Austria – produces annually 650 000 t paper and consumes in connection with that 730 000 MWh steam and 275 000 MWh power. The steam is produced from natural gas with boilers and the power is purchased from the market via the national grid at present. W. Hamburger GmbH has established another daughter company – Hamburger Hungária Power Ltd. – to produce the energy for the paper mill. This company intends to install a combined heat and power generation plant with the following main equipment:

- One circulating fluidized bed combustion boiler (CFB) with 172 MW firing capacity
- Four reserve steam boilers with 38.6 MW firing capacity each
- One extraction-type condensing steam turbine with 41 MW electricity output.

This size of power plant requires integrated permits to use the environment, under Government Decree 314/2005 (XII.25.) on environmental impact analyses and integrated permits to use the environment.

A permit has been given for Hamburger Hungária Ltd. earlier under no. 101356/2008 to erect a power plant of 220 MW firing and 49.9 MW electric capacity which will be transferred to HHP and adjusted to the present demand mentioned above.

2 SUMMARY OF THE PRELIMINARIES

2.1 APPLICANT'S DATA

Applicant's name:	Hamburger Hungária Power Ltd.
Address of its unit in Dunaújváros:	2400 Dunaújváros, Papírgyári út 42-46.
Environmental customer ID:	103037794

2.2 ELABORATION OF THE STUDY

This environmental impact analysis and IPPC documentation was compiled in the following manner:

- Consultation and agreement with the Central Transdanubian Environmental, Nature Conservation and Water Management Supervisory Board regarding the measuring plan;
- Performance and analysis of measurements (air emission measurements, soil and subsoil water analysis);
- Evaluation of the measuring results
- Detailed analysis of the technology
- Analysis of emissions
- Transmission modelling
- Determination of the impact areas, and evaluation of the results;
- Analysis of compliance with the best available techniques;
- Compilation of the documentation
- Application of the topics set out in the relevant statutory regulations
- Incorporation of the provisions of Resolutions
- Consultations with the competent authorities

2.3 REASONS FOR ESTABLISHING THE POWER PLANT

The selected technology uses solid fuels and allows the thermal utilisation of paper mill waste (reject and fibre sludge) generated.

Predominant considerations in the installation of the planned facility include selection of the suitable area and the least possible exploitation of the environment by the planned technology.

Two large industrial zones were built on the northern and southern outskirts of Dunaújváros, and the city has approved development plans for both. The Hamburger units are located in the southern industrial zone of the city. The current environmental load values of the area can be maintained with the planned technology.

When the technology was selected, the technological recommendations set out in the Reference Document on Best Available Techniques for Large Combustion Plants, published by the European Commission in May 2005 was analyzed.

The planned technology is an adaptation of a solution that is already operative in Europe (in Germany, Finland, Spain and Poland) to Hungarian conditions.

The planned activity will be installed at the indicated location for the following reasons:

- it is already an industrial zone;
- it is located within the site of Hamburger companies;
- a qualified staff is available;
- the flora is highly degraded;
- transport infrastructure is advanced.

In view of the industrial past of Dunaújváros it can be stated that the staff available in Dunaújváros has the required experience and expertise for the operation and maintenance of a solid fuel based plant operated under an up-to-date process control. For this reason, commissioning and start up of the new Multi-fuel power plant is likely to take place quickly and smoothly.

3 DESCRIPTION OF THE CORE ACTIVITY

3.1 DETERMINATION OF THE BASIC DATA AND CHANGES COMPARED TO THE VALID ENVIRONMENTAL PERMIT

3.1.1 DETAILED DESCRIPTION OF THE FACILITIES

The power plant will be implemented on property owned by Hamburger Hungária Power Ltd. in Dunaújváros and marked by plot numbers 3963 and 068/3 in the Land Registry.

The (gross) area affected by the investment project is approx. 82.000 m^2. The facilities to be erected during plant installations will occupy about 21 000 m^2.

The main data required for the implementation of the planned activity are summed up in the following table.

Table 1 Main facilities of the Multi-fuel power plant

Ser.	Item	Required area (m^2)
1.	Railway	400
2.	Road	6 000
3.	Log storage	4 300
4.	Wood chip storage	1 400

5.	Coal storage	1 200
6.	Fuel preparation system	1 800
7.	Conveyors	800
8.	CFB boiler house	1 200
9.	Flue gas cleaning	800
10.	Auxiliary boiler house	1 500
11.	Feed water preparation	200
12.	Turbine hall	500
13.	Cooling tower	300
14.	Electricity transmission switch building, control station and office	600
	TOTAL	21 000

3.1.2 FEATURES AND VOLUMES OF THE MATERIALS AND POWER USED OR GENERATED IN THE FACILITY AND BY THE TECHNOLOGY

3.1.2.1 Volume of the activity

The planned power plant will have one 172 MW firing capacity CFB boiler fuelled by different types of solid materials, biomass (60% of total heat input) and biogas and four 38.6 MW firing capacity reserve boilers fuelled by natural gas and bio-gas. The annual heat input of CFB boiler will be max. 1 500 GWh and will be composed of the following fuels:

Fuel	Amount, t/a	
	Average	Maximum
Biomass (mass as received)	250.000	300.000
Coal (mass as received)	40.000	200.000
Reject of paper mill (dry mass)	30.000	30.000
Fibre sludge of paper mill (dry mass)	16.000	18.000
Bio-sludge of paper mill (dry mass)	2.000	3.000

Peak production will be reached when the CFB boiler working at full load and one reserve boiler will operate simultaneously.

The following table presents the differences from the performance data recorded in the valid environmental permit:

Table 2 Changes in built-in heat input capacity in comparison to the valid Environmental Permit (EP)

Apparatus	Initial data set in the EP		Modified data	
	Quantity (units)	Capacity (MW)	Quantity (units)	Capacity (MW)
CFB steam boilers	1	220.0	1	172.0
Reserve steam boilers	4	38.6	4	38.6
TOTAL		374.4		326.4

The decrease in the built-in capacity represents 13%.

Table 3 Changes in electricity output comparison to the Preliminary Environmental Analysis

Apparatus	Initial data set in the EP		Modified data	
	Quantity (units)	Capacity (MW)	Quantity (units)	Capacity (MW)
Extraction-type condensing steam engine	1	49.9	1	40.6

As a result of modifications in the design data, electricity will be generated by the single 40.6 MW_e extraction-type condensing steam engine.

Change in the volume of the planned activity in comparison to the valid EP is 19%.

This documentation analyses the environmental impacts according to the modified plans.

3.1.2.2 Materials used and manufactured

The following table gives a summary of the materials used in the facilities and technologies of the coal plant.

Table 4 *Basic materials and additives used in the power plant*

INPUT	Annual volume (t/year)	OUTPUT	Annual volume (t/year)
Biomass (fire wood)	250 000		
Coal	40 000	Bed-ash	16 500
Fibre sludge	18 000	Fly ash	20 000
Reject	30 000	Combustion product	300 000 m^3/h
Limestone dust	2 000		
Sand	2 000		
Biogas	5,2 million m^3/y		
Natural gas (piped supply) (for reserve boilers)	6,0 million m^3/y		
Combustion air	235 000m^3/h		
Supplementary water	500 000	Waste of steam Technological water	250 000 250 000
		Electricity	320 000 MWh / y

The comprehensive flow of materials during the planned activity is depicted in the following chart:

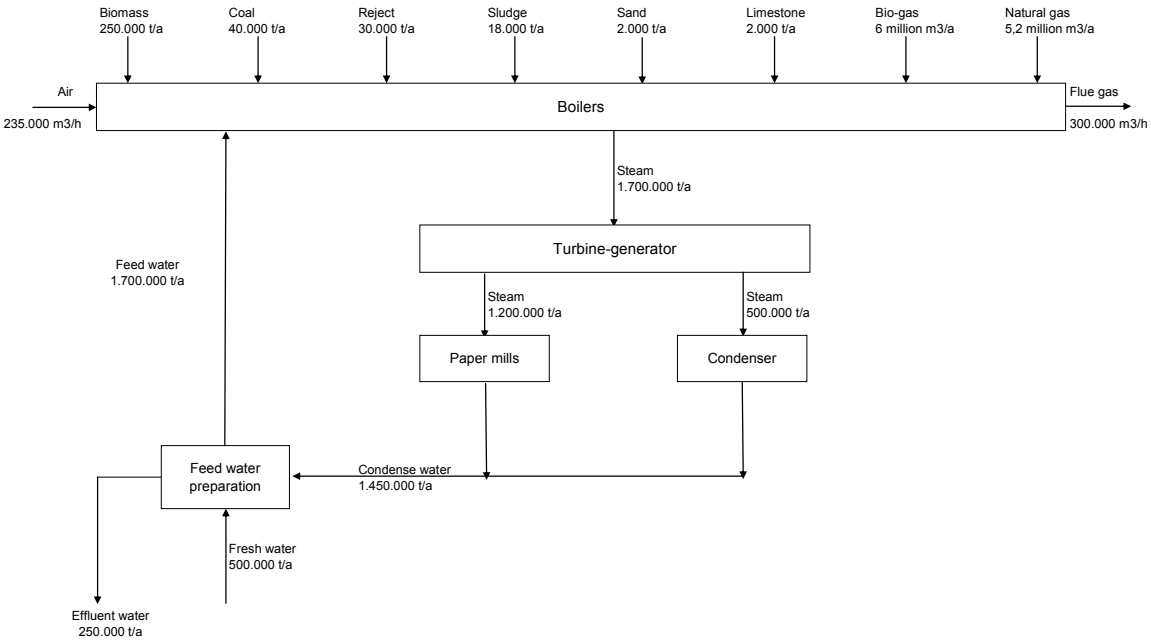

Chart 1 Planned flow of materials

3.2 TECHNOLOGICAL SPECIFICATIONS

The task of the planned power plant is the efficient generation of the industrial steam required for the technology used by the paper mill site and related electricity to cover the majority of the plant's electricity consumption.

The main technological units of the planned activity include the following:

- Fuel handling system
- CFB boiler
- Steam turbine, generator unit
- Reserve steam boilers

3.2.1 FUEL HANDLING SYSTEM

3.2.1.1 Biomass handling

The biomass (fire wood) will be sourced mainly from Hungary and according to expert opinions average 125 km transport distance can be expected. The fire wood is predominantly transported by trucks when the distance stays below 300-400 km, thus road transport is to be calculated. (The power plant will be well equipped also for the railway transport and its use will be encouraged.)

The majority (approx. 80%) of the wood will arrive in form of logs and will be chipped immediately or stored temporarely in log piles. Conveyor will forward the chips to intermediate open air chip pile and from there front loader equipped with bucket will transfer them into a metering hopper. From the hopper the chippes will be fed via screen and conveyors to the daily silo of boiler. The biomass arriving to the plant in form of chip will be dumped from truck directly to the chip pile.

3.2.1.2 Coal handling

Coal supply to the new power plant is expected mainly from the Czech Republic, Poland and the Ukraine.

Coal will arrive to the power plant in open wagons and will be moved from the wagons to the pile by mobile hydraulic excavator. Automated conveying system will transport the coal via screen to the daily silo of boiler. The over-size coal will be crushed.

3.2.1.3 Rejects of paper mill

The reject will be transported by truck from the adjacent mill to the power plant in uniform stream (storage in the power plant is not foreseen). The fuel preparation requires shredding into adequate size and removal of the particles (like metals, stones, chlorine containing materials) harmful for the combustion. The processed reject will be transported by conveyors to the boilers and the removed particles (approx. 5% of total amount of rejects) will be deposited.

3.2.1.4 Sludges of paper mills

The sludges will be transported in the same way as rejects to the power plant. The sludges do not require special treatment before combustion, only the metered feed in the combustion chamber is to be organized. For this purpose a silo of approx. 2 hours storing capacity equipped with controlled feeder will be used.

3.2.2 CFB BOILER

The overwhelming majority of the year the steam will be generated by one circulating fluidized bed combustion boiler of 225 t/h nominal output of steam, at a pressure of 113 bars and a temperature of 520 °C. Arising from the operating principle and configuration of CFB boilers, they are suitable for generating steam by burning solid fuels efficiently and with low emission values.

The CFB boiler comprises three units:

- the combustion chamber,
- the cyclone separating the solid particles (sand and unburnt fuel) from the flue gas flow and recirculating the separated material to the combustion chamber,
- the path including the heating surfaces of the boiler, where high pressure, superheated steam is generated.

The content of polluting materials in the flue gas will be on-line measured and controlled by the following way:

- SOx: by adding limestone in the combustion chamber and $Ca(OH)_2$ in the flue gas stream in front of the bag house filters
- NOx: by adding ammonia solution in the flue gas stream at the outlet of combustion chamber
- HCl: by adding activated carbon in the flue gas stream in front of the bag house filter
- dust: using bag house filter in front of the stack

3.2.3 STEAM TURBINE AND GENERATOR UNIT

The 520 °C steam under a pressure of 113 bars generated in the CFB boiler is set to the parameters required for the papermaking technology by the suitable extraction in the steam turbine. The turbine drives generator, which is producing power. The exhaust steam leaves the turbine with parameters (9 bars and 200 °C) corresponding to the requirements of papermaking.

The momentary fluctuations in process steam are tracked by the condensing part of the turbine, which converts via the generator any surplus steam into electricity.

3.2.4 RESERVE BOILERS

During maintenance of the CFB boiler and its eventual unexpected outages, as well as in the generation of peak steam demand, four alternative reserve boilers fuelled by gas and oil contribute. The steam output of these boilers is 55 t/h each. The pressure of the generated steam is 12 bars, its temperature is 210 °C, which are transformed to the level required by the paper mill.

The 4 reserve boilers emit the combustion gas to the air through 4 exhaust-pipes each of them 35 m high.

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4 EXPECTED CHANGES IN THE ENVIRONMENT

Changes in the environmental conditions during implementation are detailed reagrding air as an environmental element.

4.1 Pollution sources in the facility

4.1.1 POINT SOURCES

The technology to be installed, owing to its unique features, has 5 air-polluting point sources. Point source P1 indicates emission by CFBC boilers, while point sources P2-P5 are the locations where reserve boilers emit substances through a smoke-flue.

Under standard business conditions, only point source P1 will be in operation, however, in special cases (say, if peak demand is made), there will also be emission through point sources P2-P5. From among the expected operating conditions one was selected, that entails a predominant duration for the emission of air-polluting substances and the highest emission of air-polluting substances.

When emissions are determined, typical data reported for reference plants aboard were used as a basis.

The basic data of emission through the individual point sources are shown in the following table.

Table 5 Basic emission data in case of coal combustion

Ser.#	EOV X	Exhaust-pipe	Exhaust-pipe	Exit gas temp. (K)	Flow rate [Nm^3/h]	Comp.	Conc. [mg/Nm^3]	Mass flow [kg/h]
P1	175182 641832	90	5.31	424	288000	Solid substance	20	5,76
						CO	90	25,92
						NO_X (as NO_2)	180	51,84
						HCl	27	7,78
						HF	4,5	1,30
						SO_X (as SO_2)	180	51,84
P1*	175182 641832	90	5.31	424	288000	Solid substance	20	5,76
						CO	90	25,92
						NO_X (as NO_2)	180	51,84
						HCl	23	6,62
						HF	4,5	1,41
						SO_X (as SO_2)	28	8,06

P2	175328 641780	32	2,00	393	44800	CO	50	2.39
						NO_X (as NO_2)	120	5.74
P3	175330 641783	32	2,00	393	44800	CO	50	2.39
						NO_X (as NO_2)	120	5.74
P4	175336 641794	32	2,00	393	44800	CO	50	2.39
						NO_X (as NO_2)	120	5.74
P5	175338 641796	32	2,00	393	44800	CO	50	2.39
						NO_X (as NO_2)	120	5.74

* in case of biomass combustion

The emission of air-polluting substances by black coal fuelled CFBC boilers is regulated in Decree 10/2003.(VII.11.) KvVM of the Minister of Environment and Water Management on the operating conditions of heating installations with nominal heat input of or above 50 MWth and the emission limits of air pollutants. Compliance of emissions with the relevant statutory regulations is shown in the following table.

Table 6 Emission limits

Pollutant	CFBC Boiler	Emission limit [mg/Nm^3]
Solid substance	27	29.7
NO_X (as NO_2)	90	246
CO	180	200
HCl	27	97
HF	4,5	14.6
SO_X (as SO_2)	180	195.7

Based on the data given in the table it can be established that the pollutant emission of the planned CFBC steam boiler will not exceed the emission limits, and is fully compliant with them.

The emission of air pollutants by natural gas and fuel oil fuelled boilers is regulated in Decree 23/2001.(XI.13.) of the Minister for the Environment on the technological limits for the emission of air pollutants by heat installations with nominal heat inputs of or exceeding 140 kWth but below 50 MWth.

Annex 3 to the decree sets the following emission limits for boilers operated by gaseous fuels:

Table 7 Emissions by gas fuelled boilers

Pollutant	Reserve boiler	Emission limit [mg/Nm^3]
Carbonic oxide	50	100
Nitrogen-oxides (expressed in NO_2)	120	350

According to the provisions of Article 4 (3) of the decree, sulphur-dioxide and solids do not need to be measured in the case of boilers exclusively fuelled by natural gas.

Based on the data of the analysis it can be established that the air pollutant emission of the reserve steam boiler will not exceed the emission limit.

Line sources

In the course of operation, air pollutants are emitted by the motor vehicles transporting goods to and from the site. Transportation processes are analysed in a breakdown of fuel supply - including coal, papermaking reject and inert substances, and cinder and dust-ash removal.

Supply

Coal supply: The planned railway traffic may be estimated at 4 cars per day.

Biomass supply: Biomass is planned to be transported via road, the expected traffic is 45 trucks/day.

Supply of additives (sand, limestone dust): The expected turnover is 2 vehicles per day.

Papermaking reject and sludge used as fuel is also delivered to the power plant from the adjacent mill.

Removal

Fuel waste, cinder and dust-ash are removed in an earth-wet condition, on public road, by lorries. 50 tons are removed per day.

The transportation data clearly show that one locomotive and 3 lorries run simultaneously. In any selected one-hour period, the effective running time is 15 minutes for a locomotive.

Table 8 Fluctuations in the immission peak concentration relating to transportation required for power plant operation (µg/m^3)

Component	Load	Limit[1]
CO	7.4	10 000
Floating dust (particle)	0.7	200
SO_x	0.7	250

Based on the calculations shown above, it is clear that the impact of transportation is insignificant even if overestimated.

4.1.1.1 Impacts of radioactive particles

The radiological effects of emissions were analysed with assistance from the University of Veszprém, within the framework of a thesis. An evaluation of the measuring method and the measuring results are given below.

Measuring method

As several of the isotopes subject to measuring are gamma radiating, the method of semiconducting detector gamma spectroscopy was used for measuring, which provides sufficient information in addition to high selectivity and appropriate measuring geometry.

Having split and dried the coal samples, the pots were then sealed airtight. In order to set the appropriate radium emanation equilibrium, a 30-day rest was allowed, and then their radionuclide composition was determined by a HPGe semiconducting detector.

The meter was power-calibrated in order to determine the volume and quality of the samples.

Measuring method

The radiation detector is linked to a charge-sensitive amplifier which has an output voltage amplitude that is proportionate to the charge volume released in the detector during the interaction. Settings were made and the spectrums were displayed with the help of the Oxford PCAMR 2.41 software tool. The net area of the peak energies of the samples that can be determined with the help of the software,

[1] Pursuant to Annex 1 to joint Decree No. 4/2011. (I.14.) VM.

which is background-adjusted, and using the standard of the known activity, the activity concentration of the analysed radio-isotopes can be calculated.

When the appropriate amplification and the energy range are set, ^{60}Co, ^{137}isotopes and uranium standard are applied.

In order to perform calibrated measuring, the radium-radon equilibrium must be set at least at 99.5%, and this is why the 30-day sample preparation time is required.

The samples were analysed with a 60 000 sec measuring time.

Measuring results

In order to determine the radiological load that may eventually be encountered during power plant activity, several coal samples need to be analysed. From among the various coal samples, in this power plant low sulphur content coal from Silesia is burnt.

Table 9 Activity concentrations of the analysed carbons

Sample name	Activity concentration (Bq/kg)						
	^{214}Pb	^{214}Bi	^{228}Ac	^{40}K	^{226}Ra	^{232}Tl	^{232}Th
Ledvice (Poland)	7.37	5.27	10.04	8.9	6.32	11.08	10.56
Sokol Uhelna (Czech Rep.)	21.44	19.77	8.54	0.88	20.6	7.52	8.03
Katowice (Poland)	7.88	7.56	11.24	12.19	7.72	13.48	12.36
Wisla22 (Czech Rep.)	7.94	6.93	9.8	14.02	7.44	8.66	9.23
Armada (Czech Rep.)	10.48	9.7	10.8	39.41	10.09	10.68	10.74
Sibir (Russia)	18.16	16.72	18.77	29.15	17.44	16.36	17.57
Krasunoarmenskaza (Ukraine)	9.39	12.07	12.13	92.82	10.37	12.16	12.14
Darkov (Czech Rep.)	28.05	26.59	14.62	31.99	27.32	13.82	14.22
Alpha (USA)	20.39	19.23	17.75	34.85	19.81	16.52	17.13
Natural background radiation	15.7		17	370	33	28	

Radiological analyses suggest that in terms of scale, the radiation exposure caused by the operation of this plant is comparable to background radiation, in other words, their effects on humans is insignificant.

4.1.1.2 Spread modelling

It follows from the previous chapters that the effects of the power plant on air are caused by emission from point sources P1, P2, P3, P4 and P5.

Hourly and annual average spread calculations were made for all major and significant components of the power plant following implementation of the planned project. A comparison of the resulting spread pictures allowed us to evaluate the impact of the analysed site on air quality.

The uninterrupted operation of the point sources was presumed. We considered the area as homogeneous on the basis of the surface irregularity parameter, estimated at 2.0. As a result of the configuration of the ground, no relief correction was taken into consideration.

The locations of point sources were taken into consideration with their own Single National Projection parameters, and the charts of the spread concentration contour dispersion are depicted in the Single National Projection system.

In determining the air quality impact area, the provisions of Government Decree 306/2010. (XII.23.) as amended by Government Decree 47/2004. (III.18.) were taken into consideration.

The said statutory regulation uses three different definitions to determine the area directly affected by an air pollution point source. In each case the largest of the defined areas is considered as the impact area.

In the course of making the calculations, all the three conditions have been analysed to define the impact area, which is:

a) the area determined by the concentration values exceeding 10% of the one-hour air pollution limit,

b) the area determined by the concentration values exceeding 20% of the load capacity (load capacity: is the difference of the air pollution limit and the basic air pollution).

As immission measurement results are not available for every component, the background load index was taken into consideration in the case of hydrochloric acid and hydrogen fluoride, which was considered as 20% in the case of the components on a consolidated basis arising from the industrial nature of the neighbourhood.

Based on the transmission calculations it can be established that under the planned operating conditions the highest calculable immission concentration is expected to evolve in nitrogen-oxides, which also follows, of course, from the emission values and the characteristic features of point sources, in comparison to the emission values of the other components.

The impact area was determined according to definition a.) and the largest area is determined by the SO_2, HCl, HF and dust components. The impact area defined this way is the area of a circle around the geometrical centre of the point sources with a radius **R = 2770 m.**

5 IMPACT AREA

The impact area is the largest in the case of air as an element of the environment.

The definition of impact areas was performed on the basis of the spread models, in compliance with the statutory regulations.

5.1 Meteorology

In the planning area the annual number of sunshine hours is 2000 in the north and 2050 hours in the south. The southern parts are also sunnier in the summer quarter. In the north 800 hours is the expected amount. In the winter quarter the duration of sunshine hours is expected to slightly exceed 200.

The annual mean temperature is 10.2-10.3 °C in the south and 9.8-9.9 °C in the north. The mean temperature in the vegetation period is between 16.1-17.0 °C in the same territorial distribution. The number of days with a mean temperature above 10 °C is 188-189, slightly higher in the southern part. Frost free periods amount to 186-190 days in the north-west, 203 in the middle, and more than 207 days along the River Danube. The average of the annual absolute peak temperatures falls between 34.0-34.2 °C in the southern parts and between 33.6-33.8 °C elsewhere. The average of winter absolute minimum temperatures is -16.0 °C.

The annual rainfall remains below 550 mm. In the growing season 320-340 mm rain is likely. The highest amount of rain in a single day was 113 mm in Dunaújváros. The average number of days with snow covering the soil is between 30 and 32, and the average snow height is 20-22 cm.

The aridity index is 1.17-1.21.

The most frequent direction of the wind is from the north-west, and the average wind speed is slightly above 2.5 m/s. During the spring soil cultivation work, and before the plants grow large enough to form a continuous cover, the north-western wind whips the fine loess up to high altitudes in dry periods.

The following chart depicts the distribution of wind direction and wind speed (wind rose).

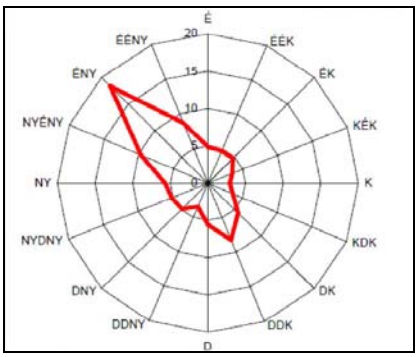


Chart 2 Wind speed distribution in the region of the planning area

5.1.1.1 Initial immission condition

Pursuant to Annex 1 to Decree 4/2002. (X. 7.) KvVM, Dunaújváros is classified in air pollution zone 5.

The characteristic features of the zone groups and the identification of the effects of the Multi-fuel power plant planned for the individual components are given in the following table.

Table 10 Air quality classification of the Dunaújváros zone

Component	Sulphur-dioxide	Nitrogen-dioxide	Carbonic oxide	Solid (PM_{10})	Benzene	Ground ozone
Classification	F	C	D	B	F	B
Emission by the power plant	yes	yes	yes	yes	no	no

The classification codes included in the previous table are given below in compliance with Annex 4 to the joint decree 14/2001. (V. 9.) KöM-EüM-FVM:

Group B: an area where, in respect of one or more air pollutants, air pollution exceeds the air pollution limit and the tolerance limit. If no tolerance limit has been set for an air pollutant, but air pollution exceeds the limit on this area in respect of the air pollutant, the area must be classified in this category.

Group C: an area where in respect of one or more air pollutants air pollution is between the air pollution limit and the tolerance limit.

Group D: an area where in respect of one or more air pollutants, air pollution falls between the upper test limit and the air pollution limit.

Group F: an area where air pollution does not exceed the lower test limit.

Pursuant to Article 7 (1) of Government Decree No. 306/2010. (XII. 23.):

"No new air-polluting point sources can be installed for the purpose of performing activities subject to environmental impact analysis or integrated permits to use the environment if in the direct impact area of the air-polluting point source the basic air pollution value already exceeds or, as a result of commissioning the new point source, may exceed the annual air pollution limit, unless [...]

c) the air-polluter proves in a way prescribed in law that in the direct impact area of the air pollution point source the basic air pollution established by local measurements does not exceed the annual air pollution limit even if increased by the emission of the new air-polluting point source."

In the interest of analysing zone classification and whether new point sources can be installed, we analysed the initial immission conditions in detail.

Measuring air pollution

In May 2012 Fővárosi Levegőtisztaság-védelmi Kft. performed air pollution measurements.

The duty of the company was to determine the concentration of air pollutants CO, NOx, SO2 and floating dust (TSPM: total floating dust content).

The test was performed at three sampling points for three days, eight hours a day (on 9, 10 and 11 May between 8 and 16 hours.

In the course of evaluation the air pollutant concentration values were determined by averaging hourly and 8-hour values.

Test point 1 was set on an agricultural area south-east of the envisaged project, in the northern border area of the village Kisapostag.

Test point 2 was located along the plant road, 200 m from an industrial railway crossing near the industrial plant. North of the measuring point, at a distance of approximately 300 m runs the location line of motorway M6.

Test point 3 was set at about 400 m from the bridge being built in the area of the village Dunavecse, on the other side of the River Danube. The representative of the local council was previously consulted about the measuring place.

Evaluation of the measuring results

In addition to the measurement performed, the following data were also used for the detailed analysis of the initial immission:

- hourly and 24-hour average OML data for 2011; (RIV)
- hourly OML data for the period between 09 May 2012 and 16 May 2012; (RIV)

The following table gives a summary of the measured data:

NAME	**EOV X**	**EOV Y**	CO	NO_X	TSPM NO_2		PM_{10}	SO_2	Type
			[µg/m^3]						
Kisapostag	**173 371**	**641 091**	213	23,9	26,3	19,1	17	<4,0	FLÁ
DUNAÚJVÁROS	**176 767**	**641 274**	352,7	32,5	36,1	26,7	27,4	<4,0	FLÁ
Dunavecse	**173 603**	**643 637**	252,3	25,7	31,5	21,4	21,3	<4,0	FLÁ
Automatic station on Köztársaság Street	**181395**	**640110**	312,4	-	-	19,78	29,5-	13,98	OLM
Hourly limit			*10 000*	*200*	*200*	*100*	-	*250*	
Annual limit			*3 000*	*70*	*50*	*40*	-	*50*	

The table includes the maximum values of FLÁ Kft.'s one-hour measurement results and the averages of the data measured on OLM's automatic station and at RIV measurement points.

The following charts depict the immission dispersion map prepared on the basis of the available immission measuring results.

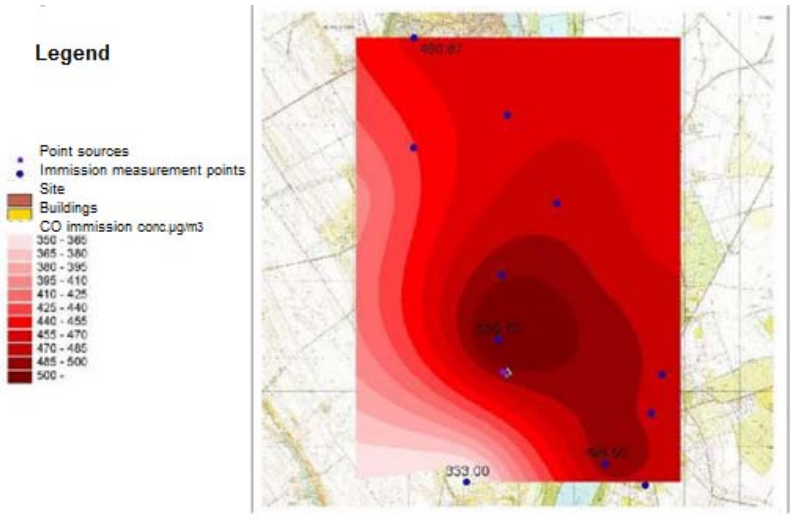


Chart 3 Map of carbonic monoxide immission dispersion

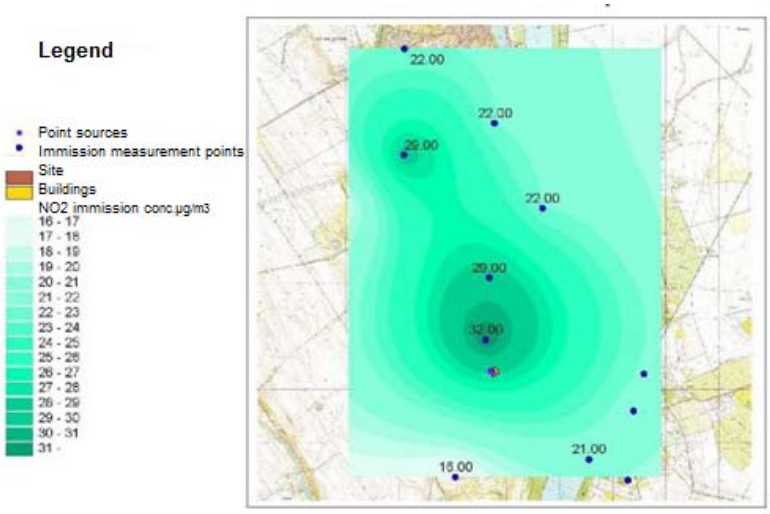


Chart 4 Map of nitrogen-dioxide immission dispersion

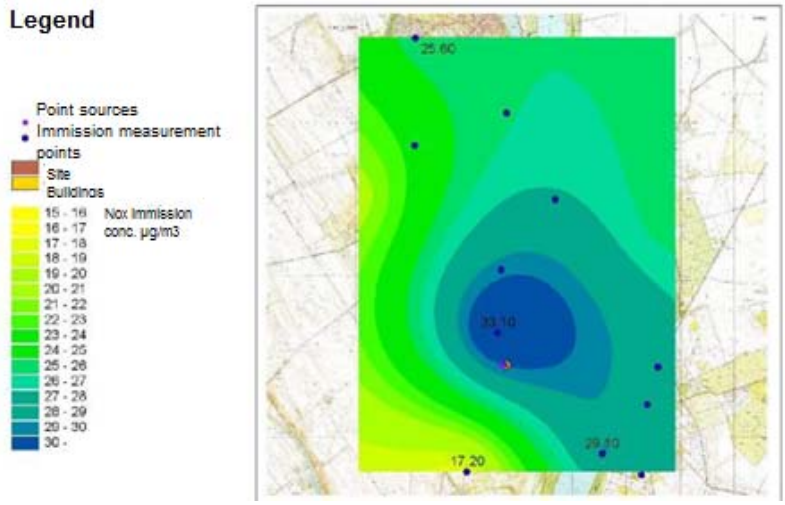


Chart 5 Map of nitrogen-oxide (expressed as NO_2) immission dispersion

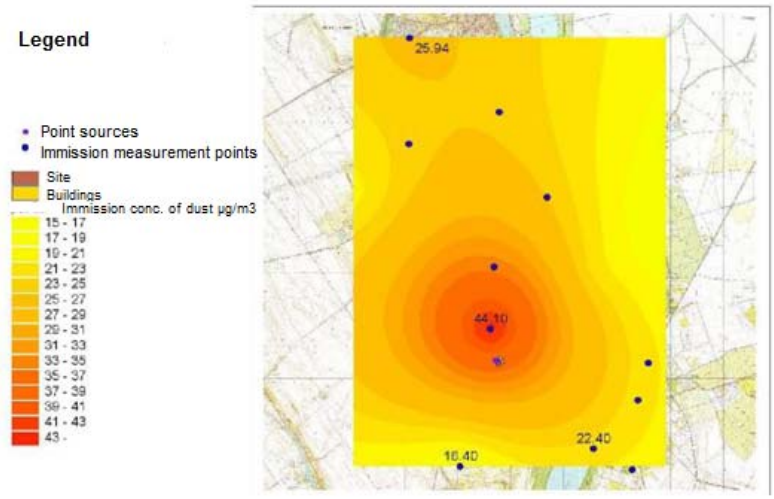


Chart 6 Map of dust immission dispersion

Based on the analyses performed, it can be ascertained that in zone 5 (Dunaújváros and neighbourhood) the immission limit was not exceeded in the case of the analysed components and pursuant to the relevant statutory regulations, the installation of a new point source can be permitted, provided that all other requirements are met.

6 EVALUATION OF ENVIRONMENTAL IMPACTS

The impacts affecting the environment must be rated in consideration of the fulfilment of the requirements of Act LIII of 1995 on the general rules of environment protection, as amended, which stipulates that:

Pursuant to the provisions of Article 6 (1), The use of the environment shall be organized and performed in such a manner that it shall result in the lowest level of environmental load and utilization of the environment, it shall prevent environmental pollution; and it shall preclude the damaging of the environment.

The initial condition of the environment is the benchmark of comparison with the qualitative and quantitative features of the expected situation, followed by an evaluation and rating of the outcomes. The evaluation and rating of the difference between the initial condition of the environment and the situation expected as a result of the installations made to enable planned activity yield an objective point of consideration for the evaluation of the environmental impacts.

The expected effects were rated on the basis of the first table in the technical directive MI-10-504-1:1992, described below.

Table 11 Rating expected environmental impacts

Rating category sign	Rating category name	Characterisation of change in comparison to the initial state	Characterisation of the situation relative to the limits
J	**Corrective**	**Measurable or noticeable improvement**	**Below limit**
V	**Restoring**	**The original state of the environment is - measurably or noticeably - restored.**	**Below limit**
S	**Neutral**	**No measurable or noticeable change**	**Below limit**
Z	**Disturbing**	**No change can be measured, but it has psychological effects.**	**Below limit**
E	**Tolerable**	**The change remains far below the limit or the professionally expected value**	**Below limit**
T	**Straining**	**The effect does not cause significant symptoms if it is felt for a short time but does if lasts a long time. The environmental impact is significant but ceases when the effect stops.**	**Temporarily exceeds or approximates the limit.**
P	**Threatening**	**A short-term effect causes a significant change which does not cease when the effect stops.**	**Near or at the limit**
C	**Damaging**	**An effect that exceeds a standards or a professional expectation for a short or long time.**	**Exceeding limit**

Based on the description of the Multi-fuel power plant technology, the active coefficients of the planned activity are determined and classified in advance according to the individual phases of

installation, implementation, abandonment in the table below.
The intensity and spatial coverage of the individual coefficients are characterised in the next chapter.

Table 12 Estimated expected environmental load

Environmental elements	Implementation phase[2]	Active coefficients	Duration of effect	Rating category
Air	Installation	Emission of air-polluting materials by motor vehicles	Temporary	Tolerable
	Implementation	Emission of the combustion gases of the power plant, and the air pollutant emissions of motor vehicles	Continuous	Tolerable
	Abandonment	Emission of air-polluting materials by motor vehicles	Temporary	Tolerable
Waters	Installation	-	-	-
	Implementation	Waste water generation	Continuous	Tolerable
	Abandonment	-	-	-
Soil	Installation	Earthworks	Temporary	Tolerable
	Implementation	-	-	-
	Abandonment	Earthworks	Temporary	Restoring
Waste	Installation	Waste generation	Temporary	Tolerable
	Implementation	Generation of dust-ash and cinder	Continuous	Tolerable
	Abandonment	Waste generation	Temporary	Tolerable
Noise	Installation	Noise made by machines	Temporary	Tolerable
	Implementation	Noise from technological equipment and lorries	Continuous	Tolerable
	Abandonment	Noise made by machines	Temporary	Tolerable
Fauna and flora	Installation	-	-	-
	Implementation			
	Abandonment			
Landscape	Installation	-	-	-
	Implementation			
	Abandonment			
Built environment	Installation	-	-	-
	Implementation			
	Abandonment			
Disaster	*Installation*	*Oil leakage*	*Temporary*	*Straining*
	Implementation	*Impacts of an accident, fire or abnormal operations*	*Temporary*	*Straining*
	Abandonment	*Oil leakage*	*Temporary*	*Straining*

[2] The planned lifetime of the facilities to be built within the framework of the project is 25 years.

7 CHANGES IN THE LIFE QUALITY OF THE AFFECTED POPULATION

7.1 Characterisation of the changes in the condition of the environment according to the affected environmental elements and systems

7.1.1 INTENSITY, PERMANENCE, REVERSIBILITY, EXTENT AND DURATION OF THE IMPACT, ITS BENEFITS AND DRAWBACKS

The power plant has the largest impact on the environment in terms of air as an element of the environment. The environmental impact of pollutants emitted during operation was calculated by spread modelling. Emissions are uninterrupted during plant operation, however, the evolving air pollution remains below the hourly and annual health immission limit. The damages caused are reversible, when the emission stops, the air load is terminated.

7.1.2 IS THE IMPACT ADDED TO THE EFFECTS OF OTHER ACTIVITIES?

In the case of impacts on air, addition to other impacts is conceivable. The impact of emissions resulting from the industrial activities performed in the region were determined by measuring immission and processing data from immission measuring stations.
Subsequently, spread modelling was performed to determine the additional load of the planned activity. When the immission limits were analysed, we considered the impact of the industrial facilities operating in the region (based on the evaluation of the data from measuring the initial immission condition), and the additional load put on the environment by the planned power plant (spread modelling).

7.1.3 PROTECTION OF THE ENVIRONMENTAL ELEMENT OR SYSTEM, CHANGES IN THE ENVIRONMENTAL, NATURAL OR LANDSCAPE PROTECTION FUNCTIONS

The planned activity **will not cause** change in the protection of the environmental systems or in the environmental, natural or landscape protection functions.

7.1.4 LANDSCAPE, LANDSCAPE USE AND LANDSCAPE STRUCTURE

The planned activity will be performed on an industrial area. The facilities that will be built fit into the current land use, and **will not cause** considerable changes in the landscape, landscape use and landscape structure.

7.1.5 REPLACEABILITY OF NATURAL RESOURCES JEOPARDISED OR EXPECTED TO BE DAMAGED OR DESTROYED

The planned project **will not jeopardise or damage** natural resources.

7.1.6 HOW TO PREVENT OR MODERATE DAMAGE TO THE ENVIRONMENT?

The prevention of causing damage to the environment was taken into consideration already during the selection of the applicable technology. The planned power plant operation technology meets the requirements of the best available technique and the applicable statutory regulations. Based on the requirements and analysis of the planned technology, it can be established that the measures taken to prevent causing damage to the environment **meet** the relevant requirements.

8 ENVIRONMENTAL MEASURES TO BE ADOPTED IN ORDER TO PROTECT THE ENVIRONMENT AND HUMAN HEALTH

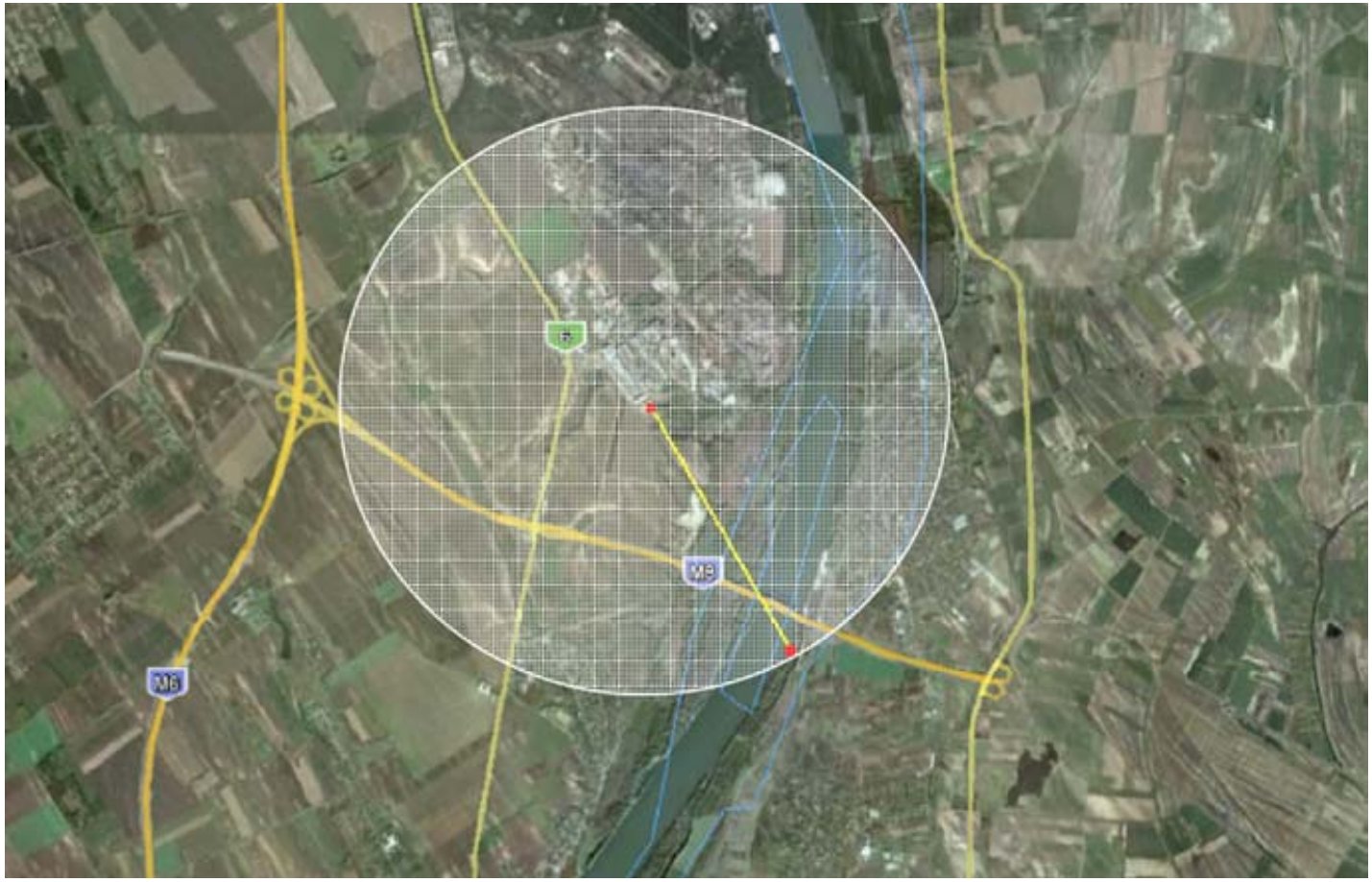
Emission by the planned power plant was evaluated on the basis of the health care limits set in Annex 1.1 to Decree 4/2011. (I. 14.) VM. As a result of the additional air pollution and spread modelling performed in the analysed impact area, concentration does not increase in an extent that would justify abandonment of the planned project on account of its impacts on the environment and human health.

The emission prevention and cutting measures planned in the course of operating the technology do not require additional environmental measures.

Annexes

- **Area of impact**
- **Impact area of noise pollution**

Area of impact



Impact area of noise pollution