TERMOELEKTRARNA TOPLARNA LJUBLJANA
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IX. SUMMARY OF REPORT AND FINAL ASSESSMENT OF ACCEPTIBILITY OF PLANNED ACTIVITIES

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Termoelektrarna toplarna Ljubljana (TE-TOL) (Power and Heating Plant) is situated in Toplarniška ulica, Moste, Ljubljana. TE-TOL produces thermal and electric energy and technological steam, provides the best possible utilization of fuel and represents the basis for favourable economic results. TE-TOL is the main source of the district heating system of the city of Ljubljana. Due to better utilization of fuel compared to individual fire places, the district heating system undeniably contributes to the reduction of emissions of hazardous substances and greenhouse gases into the atmosphere. TE-TOL uses different types of the high-quality imported coal and heavy oil. The average annual production of heating heat in recent years is around 1 million MWh.

TE-TOL is one of the facilities and industries which can cause major pollution and the operation of which is subject to the environmental consent.

TE-TOL plans the construction of a new gas steam unit (PPE), which will use natural gas as fuel. The gas steam unit consists of:

- gas turbine of approx. 70 MWe,
- heat steam recovery generator,
- steam condensing extraction turbine of 58 MWe, and
- two generators (gas turbine generator and steam turbine generator).

Apart from the main equipment, the following systems and devices will be incorporated: transformer block, gas turbine own consumption transformer, diesel aggregate, thermal water treatment plant of the supply tank and daily tank for heating gas oil.

The associated systems implemented within the framework of this investment are:

- heating gas oil supply (alteration of the heavy oil tank into heating gas oil tank),
- natural gas supply,
- pump station and fire water tank,
- building of platforms for industrial rail tracks and development of areas,
- traffic, site and power supply development.

The construction of the new gas steam unit represents the introduction of the latest technology in the field of simultaneous production of thermal and electrical energy. The decision on technology and equipment must comply with BAT (Best Available Techniques) guidelines. The planned gas steam unit will enable high yield of fuel transformation into thermal and electrical energy, which is one of the most significant criteria of BAT compliance.

The location of the planned gas steam unit is within the water protection area VVO III (broader protection area with less strict protection regime intended for the protection of the ground water flow towards pump stations in Hrastje). The risk of polluting water sources (waterworks Hrastje) by the current TE-TOL activity and the planned gas steam unit is minimal.

All activities will be performed within the existing complex of Termoelektrarna toplarna Ljubljana and oil management, mostly outdoors, and to a small extent also indoors (present turbine building). The most extensive activities will be in the area west of the present main plant and transformer platform.

In assessment of the present situation, the most significant stress element was noise. The remedy of the present situation in TE-TOL and implementation of all necessary measures for noise protection of planned installations, is the prerequisite for obtaining required noise imission values in front of the most exposed residential buildings.

Compared with the existing coal-based technology, the most positive impacts of the new gas steam unit on environment will be in the filed of air protection and crude waste.
The selected location of the new gas steam unit within the TE-TOL complex is the only possible micro location. The arrangement of facilities and installations and the orientation of the combustion air is appropriate regarding the close vicinity of residential buildings, and contribute considerably to the mitigation of negative noise impacts for the most exposed residential buildings.

Negative impacts during **construction works** (construction, installation, putting into operation):

- noise,
- local air pollution due to dust formation and exhaust gases of machines and lorries,
- possible pollution of the ground water in case of careless handling and disrespect of protective measures,
- possible pollution of surface waters in case of careless handling when the steam turbine condenser will be replaced,
- traffic disturbance in the Toplarna area,
- minor infrastructure disturbances at the time of water and power supply,
- visual disturbance due to cranes, hoists and other construction machinery,
- large quantities of construction waste.

These impacts are of temporary nature and will be limited only to the time of construction. If the proposed protection measures will be considered, the quality of air, soil and water in this area will not be endangered. With appropriate waste management, its impact on the environment will be moderate.

In the field of noise protection, the measures to reduce the present noise imissions to 45 dBA or even less shall be implemented first.

During **construction** the noise impact of the noisy construction machinery will we high for the neighbouring residential buildings. Additional noise-reducing measures shall be met as described in the previous Section (VIII), which will provide the legally acceptable noise levels. The impact of construction will be considerable, but still within the permitted limits – **acceptable (*)**. According to the attached table, the impact is rated with **rating 3**. An exception represent the sparging of the boiler, which will last for a limited period of time and which will require the acoustic expert report with instructions for the operators.

In the **operation** phase of the new gas steam unit, noise will be the main impact on environment. Calculations show that the closest residential buildings will not be exposed to excessive noise provided all noise reducing measures will be considered. The noise emission level in front of the nearest residential buildings, which are only some 70 m away from the planned facilities, will not exceed 45 dBA (Level III) and stressed tones will not be present in its spectrum. In this case, the peak levels will also be within the permitted limits due to inexpressive noise dynamics of the planned gas steam unit. With consideration of all measures, the noise impact level will be **rated 3**, still within the allowed limits – **acceptable (*)**.

The impact of the new gas steam unit on air quality has to be considered from two standpoints: from the standpoint of independent operation of the gas steam unit and prescribed concentration emissions, and from the standpoint of the production scope of the new unit and integration of the present coal-fuelled TE-TOL units. In stationary operating conditions (using gas), the output concentrations of NO_x and CO will be considerably lower that the ones prescribed. Also in times of starts and stops of the gas steam unit, the emission values will not exceed the limit values. Also the specific greenhouse gas CO_2 emission is considerably lower if natural gas is used as fuel instead of coal. From the standpoint of independent operation of the gas steam unit, which will replace the coal-fuelled units (blocks 1 and 3 and boiler 2), the impact on air quality is by all means **positive (+)**.

Regarding the target CO_2 emissions prescribed for power and heating plants in the Operational program for the greenhouse gas emission reduction, the foreseen scenario of production of the thermal and electrical energy in TE-TOL with CO_2 emissions deviates from the planned scope of the greenhouse gas emission (expected annual emission approx. 1 million tons of CO_2 instead of 749,000 t CO_2 of the Operational program).

It shall be stressed that the contribution of the planned gas steam unit, which is the subject matter of this Environmental impact report, amounts to 302,279 t CO_2 (expected gas steam unit emission in 2009). The remaining quantities of CO_2 of the total 1 million tons of CO_2 refer to the operation of the present units 1, 2 and 3, which use coal. The measures to reduce CO_2 emissions in TE-TOL consist of the limitation of production of the present coal fuelled units or limitation of the cogeneration mode of operation (heating plant operation mode). In cogeneration mode, the expected CO_2 emission from TE-TOL for 2009–2011 is approx. 677,000 t CO_2 per annum.

If in addition to the above said, the planned production increase in TE-TOL is considered, expressed in increased NO_x and CO_2 emissions (operation of the gas steam unit + coal-fuelled unit), the impact on air quality is assessed as **moderate (2)**.

No significant impacts on surface waters or environmental stress due to waste water, accumulation of crude waste or electromagnetic radiation during operation of the gas steam unit are expected.

From the psycho-social point of view, the planned activity will take place in the already degraded environment, which is already overburdened with noise in spite of the vicinity of residential buildings. The planned activities include facilities, which generate noise. The planned protection measures will not only reduce its impact but also reduce present noise. Regarding the expressed wish of the affected residents to come to an agreement with TE-TOL, we think that the planned protection measures and successful agreement with residents can avoid serious opposition against this plan. For broader community, the plan is acceptable because it will provide the necessary power supply for the city. If the project will be implemented as planned, the quality of life of the affected residents will even improve.

During construction and later operation of the planned unit, no environmental impact was evaluated as ***unacceptable (4)***.

The impact on individual elements of the environment in the field of noise and settlement was evaluated as ***severe (3)***.

Moderate impact (2) will develop for soil, surface waters, ground water, climate and air (in case of operation of present units), biotopes / ecosystem, water protection areas and water sources, industry and trade (only during construction), infrastructure, visual environment, cultural heritage, crude waste and psycho-social aspect (2-3).

Negligible impact (1) will develop for geology, fauna, recreation and tourism. With consistent consideration of mitigation aspects, there will be negligible impact also on natural values (indirect impact).

There will be ***no (0)*** impact on relief, vegetation, forestry, agriculture and erosion.

Thanks to the latest technology, high yield and lower specific emissions into air, the impact on air quality is estimated as ***positive (+)*** (operation of gas steam unit independently from the present coal-fuelled units). Also the impact on industry and trade is estimated as ***positive (+)*** after the new gas steam unit will be put into operation.

The impact on environmental noise and electromagnetic radiation are both estimated as ***acceptable (*)*** because the required values will not be exceeded.

All covered environmental impacts remain within legal limitations, therefore the audited activities for the construction of the new gas steam unit with accompanying facilities and installations within the TE-TOL complex**,** are ***acceptable from the standpoint of impact on environment provided that all standards applicable for the field of design, construction and operation of the planned facilities in this area will be considered.***

With consideration of the mitigation measures described in Section VIII of this report – Recommendations for improvements and mitigation of impacts on environment - negative impacts can be even further reduced.

Table IX-1 below shows the evaluation of impacts on individual segments of environment.

Table IX-1: Evaluation of impacts on individual segments

Environment	*Env. group*	*Environmental segments*	*Rating*
Natural	geosphere	geology	1
		relief	0
		soil	2
	hydrosphere	surface waters	2
		ground water	2
	atmosphere	climate	2
		air	+ ; 2 (#)
	biosphere	flora	0
		fauna	1
		biotopes / ecosystem	2
Socially determined	utilization of soil	water protection areas and water sources	2
		forestry	0
		agriculture	0
		industry and trade	+ ; 2 º
		infrastructure	2
		settlement	3
		recreation and tourism	1
	cultural environment	visual environment	2
		natural values	1
		cultural heritage	2
	residential environment	noise	* (3)
		waste	2
		electromagnetic radiation	*
		erosion	0
		psycho-social aspect	2-3

Notes:
(#): impact of the operation of the gas steam unit independently from coal-fuelled units
(º): impact in construction phase

Ratings of the impacts on environment:
0 – no impact;
1 – negligible impact; there is some minor impact but it is negligible because of small scope of change or small importance of the changed segment;
2 - moderate impact; impact is considerable but the regeneration potential of the segment is sufficiently large to substitute the loss, or it is not estimated as large due to small scope of physical change;
3 - severe impact; large impact but still within the limits; the changed segment can still be recovered with large financial support;
4 - unacceptable impact; the impact exceeds legal limitations, or the intervention will ruin the irreplaceable environmental segment.

Positive impact is marked +.

If the change of environment can be measured and there is the statutory limit, the rating of environment is defined by appropriate classification (0 = present situation, up to 4 = new situation exceeds the allowed limit).

* The impact does not exceed the statutory limit; classification to the rating table used for other impacts cannot be considered because the equivalent stress classes are not defined (noise).