ENVIRONMENTAL MANAGEMENT PLAN
FOR DISTRICT HEATING NETWORK REPLACEMENT
AND DH REVITALISATION AND LOCAL BOILERS
CONNECTION TO DHS IN OSIJEK

Zagreb, January 2006.
Client: HEP – Toplinarstvo, d.o.o., Zagreb, Miševečka 15 a

Contract/Order: I-02-305

Heading:

Environmental Management Plan for district heating network replacement and DH revitalisation and local boilers connection to DHS in Osijek

Offprint
Revision 1

Authors: M. Sc. Zlatko Komerički - Project Manager
B. Sc. Dean Vidak
B. Sc. Mato Papić
Ranko Blažičko

Manager of Energy Department: B. Sc. Bojan Abramović
General Manager: M. Sc. Zdravko Mužek

Zagreb, January 2006.
Preamble to Revision 1

This document is an offprint of the Short feasibility study of district heating network replacement and DH revitalisation and local boilers connection to DHS in Osijek, Final Report. The Environmental Management Plan has been publicly announced on web site of Hrvatska elektroprivreda d.d., and public consultations regarding the plan were held in Osijek on 7th of December 2005. Summary meeting minutes from the public consultations including comments, questions and response by presenters are given in the attachment. Revised document shown hereafter (Revision 1) includes all amendments which came out of the public consultations and suggestions of the World Bank representatives.
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1. INTRODUCTION

Environmental management plan (EMP) is an important part of the environmental assessment (EA) analysis report which is necessary to be done for the projects which are financed by World Bank loans. According to the general definition, EMP can be described as set of measures to eliminate, offset or reduce adverse environmental and social impacts of certain intervention in environment during construction, service or decommission. Intervention in environment can be described as permanent or temporary act of man which can disturb ecological stability or biological diversity of environment or any other adverse environmental impact. By this plan, certain acts must be defined in order to implement all planned measures.

Before environmental assessment (and EMP also), World Bank undertakes environmental screening of each proposed project to determine the appropriate extent and type of EA. The Bank classifies the proposed project into one of four categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts, /L 1-1/:

- Category A projects: A proposed project is classified as Category A if it is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works. EA for a Category A project examines the project’s potential negative and positive environmental impacts, compares them with those of feasible alternatives (including the “without project” situation), and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance.

- Category B projects: A proposed project is classified as Category B if its potential adverse environmental impacts on human populations or environmentally important areas - including wetlands, forests, grasslands, and other natural habitats - are less adverse than those of Category A projects. The scope of EA for a Category B project may vary from project to project, but it is narrower than that of Category A EA.

- Category C projects: A proposed project is classified as Category C if it is likely to have minimal or no adverse environmental impacts. Beyond screening, no further EA action is required for a Category C project.

- Category FI projects: A proposed project is classified as Category FI if it involves investment of Bank funds through a financial intermediary, in subprojects that may result in adverse environmental impacts. For a financial intermediary (FI) operation, the Bank requires that each FI screen proposed subprojects and ensure that subborrowers carry out appropriate EA for each subproject. Before approving a subproject, the FI verifies that the subproject meets the environmental requirements of appropriate national and local authorities and is consistent with applicable environmental policies of the Bank.

District heating network replacement and DH revitalisation and local boilers connection to DHS in Osijek is classified as Category B project, so Environmental Management Plan is obligatory. According to the /L 1-1/, for projects involving rehabilitation, upgrading, expansion, or privatization of existing facilities, remediation of existing environmental problems may be more important than mitigation and monitoring of expected impacts. For such projects, the management plan focuses on cost-effective measures to remediate and manage these problems. This EMP has been made in accordance with the World Bank environmental policies and Croatian national regulatory rules.
Environmental Management Plan for district heating network replacement and DH revitalisation and local boilers connection to DHS in Osijek. (Offprint) EKONERG

Extended version of the Environmental Management Plan is Croatian legislation appears in the form of Environmental Impact Study. According to the environmental legislation, there is an obligation to estimate the environmental impact for interventions defined by Bylaw on environmental impact assessment (Official Gazette No. 59/00, 136/04), /L 1-2/. Scientific basis for environmental impact assessment is Environmental Impact Study which has to be done for eight types of environmental interventions: construction of traffic, energy, water supply, production and sport buildings, buildings for waste treatment, building complexes (trading centres, etc.) and for mining extraction. Interventions on hot water network rehabilitation do not subject to this provisions.
2. PROJECT DESCRIPTION, PURPOSE AND ENVIRONMENTAL IMPACT

2.1. CITY OF OSIJEK

Osijek is the biggest town of the eastern part of Croatia, located on the right bank of river Drava, twenty kilometres of its confluence into the Danube. It has continental climate with warm summers and cold winters. The City of Osijek is a centre of Osječko-baranjska county. Administrative and judicial bodies of the county are situated in it, as well as regional chamber of commerce. Osijek is also educational, scientific, university and health centre of this region, as well as important historical and cultural city with the largest river port for bulk freight and two airports /L 2-1/. According to the census from 2001, in Osijek (in the town) have lived 114 616 inhabitants.

During 1991 and 1992, as a result of much hard war destruction, its economy was confronted with a great number of difficulties, but until now, a great number of economy subjects was reconstructed or completely rebuilt. Osijek is a powerful industrial centre with developed food, chemical, metalworking, graphic and building material industry.

Position of the City of Osijek on the map of the Republic of Croatia is given in the Appendix App. VI, (Fig. VI-1).

2.2. DISTRICT HEATING SYSTEM IN OSIJEK

Osijek is one of the Croatian cities with long tradition of district heating (more than 40 years). Besides district heating system (DHS), heat supply in Osijek is based on many small local boiler plants (for heating of whole blocks or just single buildings) and other types of heating (gas apartment-contained and other). Out of total number of flats in Osijek, approx. 25 %, or 8 934 flats and 1 133 other customers (business and social) are connected to the DHS. Additional value of DHS in Osijek is that most of the heat is produced from cogeneration plants in Osijek thermal power plant (TE-TO Osijek).

HEP-Toplinarstvo (member of the HEP Group) in Osijek performs energy services of heat distribution and supply from DHS and heat production, distribution and supply from three local boiler plants (block type) in local communities Vladimir Nazor, Stanko Vraz and Jug III. Heat supply from DHS includes heat for space heating (without preparation of warm tap water) and steam for technology. Heat for space heating is distributed via hot water. Length of hot water network is approx. 40 km, and steam network 12 km.

2.3. PROJECT DESCRIPTION AND PURPOSE

Parts of hot water network of Osijek district heating system are old and worn out and the damages are becoming more frequent every day, which decreases energy efficiency of the system and its maintenance costs. Recent data regarding energy efficiency of heat distribution from heat sources to the customers showed that the total volume of the water in the network is changed 12 times in only one season, while the heat losses are at the level of 18 %. In other words, in only one heating season, amount of water which is 12 times bigger than total volume of the network leaks out of the network. Part of this water loss (which is mainly due to pipe bursts) is also a result of leakages on pipe connections. So, after the analyses and discovering the parts of the network with the highest rate of damages hot water network rehabilitation plan has been created. This means that the most critical pipelines will be replaced.
Besides rehabilitation, but also in order to increase energy efficiency of the district heating system, part of the steam system will be substituted with hot water. In fact, some steam customers use steam for space heating which is ineffective because the temperature level of the steam exceeds significantly needs for space heating. Having in mind that the steam is also produced from the cogeneration plants, it is obvious that the substitution of steam with hot water will use the potential for additional production of electricity which is now unfortunately lost. Besides, heat losses in steam network are much higher than in hot water network so additional benefit will be achieved through decreased heat losses in heat distribution.

Heat from the local boiler plants is produced directly in boilers by firing of gas which is relatively expensive to HEP-Toplinarstvo due to the fact that it's supplied by local gas distributor. That's why HEP-Toplinarstvo plans to disconnect the customers in those local communities from local boiler plants and connect them to the DHS. Additional benefit will be achieved through additional production of electricity from cogeneration.

Rehabilitation plan covers approx. 9 km of pipelines traces, from which 3 km of main pipelines and 6 km of network in local communities. Pipelines which are planned to be reconstructed represent the oldest part of the hot water network in Osijek, which was built mostly in the local communities such as Donji grad, Tvrđa, Vijenac Ivana Meštrovića, Sjenjak, Blok Centar I. Traces of the pipelines to be rehabilitated are partly going under the main roads such as Zvonimirova ulica and others. Planned rehabilitation period is 4 years, i.e. from 2006 to 2009. Area of intervention is shown in the Appendix App. I, (Fig. I-1).

Total of 7 steam customers are planned to be disconnected from steam system and connected to the hot water system. List of these customers is given in the Appendix (App. II). For that purpose approx. 1.5 km of new hot water network connection have to be built, and heating substation has to be reconstructed. Connection will last from 2007 to 2010.

For connecton of local boiler plant Vladimir Nazor, 800 m and for connection of local boiler plant Stanko Vraz 1.1 km of new connection pipeline has to be built. Since the existing distribution (warm water) network in these communities is old and worn out, it has to be rehabilitated also. Heating substations will also be rehabilitated. Local boiler plant Stanko Vraz is planned to be connected in 2006 and local boiler plant Vladimir Nazor two (2) years later.

According to the previously said, it can be concluded that the most of the interventions regarding Osijek DHS rehabilitation, reconstruction and development will take place on existing hot water network traces, which have already got the approval by local authorities (location permit). Only a little part of these interventions has yet to be approved, and they must comply with existing regulation in the area of physical planning, construction and environmental protection.

2.4. TECHNOLOGY

Existing hot water network is mostly channel laid, with pipelines laid in concrete channels, pipes made of steel, with insulation of mineral wool, and covering made of bituminous paper. As the rehabilitation will go on, old pipes will be replaced with new ones using technology of preinsulated pipes. Preinsulated pipe consists of steel pipe, polyurethane foam as a heat insulator, and outer pipe made of high density polyethylene (HDPE). Outer pipe is also covering which shields the inner pipe from outer influence of moisture and water.

If it is installed properly, the preinsulated pipe technology is more qualitative technical solution then the classic channel laid technology regarding energy efficiency, durability and environmental acceptability also. If such system is properly designed and built in compliance
with procedures of manufacturer of pipes and joints, declared lifetime can be up to 50 years and what's more important it doesn't need any significant maintenance.

In preinsulated pipes special leakages detection systems are built inside PUR insulation foam which enable precise detection of leakage spot on pipe itself, or breakthrough of rainfall cause of damage of outer pipe made HDPE. /L 2-2/

It is has to be mentioned that HEP-Toplinarstvo demands that workers who are installing the preinsulated pipes go through the tests by which they will be approved for installing the elements of hot water pipelines. Special attention is focused on installation of joints, so that these activities are entrusted only to those, approved by authorised supplier of preinsulation equipment. A machine for filling the joints with insulation has to be approved also. Besides that in cooperation with EKONERG, HEP-Toplinarstvo has made special instructions (Quality Assurance Manuals) which include in detail all the segments of production and installation of equipment in compliance with the instructions of the equipment supplier. For individual elements of the system (preinsulated equipment), special instructions has been developed, starting with ordering, takeover control (input control), storage and installation on the field with special accent on joints installation /L 2-3, L 2-4, L 2-5/.

2.5. ENVIRONMENTAL IMPACT

In general, and regarding the lifetime of intervention, environmental impact can be analysed during the installation process, but also during the service process. Regarding the distance of environmental impact area from the installation area, there are two different approaches to the environmental impact analysis: direct (local) and indirect (dislocated). Direct impact can be seen at the installation site, while the indirect impact is usually seen far away from the installation site. Total (global) impact on the environment comprises all direct and indirect environmental impact of the intervention.

Basic question in the area of environmental protection are arranged through the Croatian environmental protection legislation. However, the environmental protection is multidisciplinary and inseparable part of the building & installation process, and service process especially in energy objects. So, the existing legislation in the area of construction and energy also covers these questions. The main law from these areas are Law on environmental protection (Official Gazette No. 82/94, 128/99), Law on construction (Official Gazette No. 175/03) and Law on energy (Official Gazette No. 68/01, 177/04), /L 1-2/.

For example, in Law on construction in the part dealing with organisation of construction site, there are several measures which are obligatory:

- Construction site has to be enclosed in order to stop uncontrolled approach of people to the site

- Parts of the construction sites which are going through big areas (for example railroads, trunks, etc.), have to be enclosed and marked with special traffic signs

- By enclosing the construction site it is not allowed to endanger passengers.

- In case of temporary occupation of public transport areas for the purposes of the construction site, the investor or the contractor has to provide the permission by the local authorities

- Temporary objects built for the purposes of the construction site, equipment, unused building material, and waste have to be disposed and the ground at the area of construction site brought to the condition as it was before the construction
At the construction site, there should predict and implement necessary measures for air protection, noise protection, soil protection and underground water protection, safety at work and other set measures for health protection of people.

Besides, since in the process of construction (and rehabilitation also) one of the important conditions which has to be fulfilled is hygiene, health and environmental protection, construction products and equipment which is planned to be built-in has to be chosen, installed and maintain so that due to its chemical, physical and other influences cannot result in danger, obstacle, injury or damage in use.

Having in mind all previously said, it can be assumed that in the phase of rehabilitation of hot water network small temporary and short-time negative environmental impacts will occur. These impacts do not differ from environmental impacts which occur during interventions on communal infrastructure or any other interventions which include some kind of field works. So, it can be assumed that during construction phase, following environmental impacts could appear:

- minor traffic disturbances,
- increased pollution of air with dust,
- increased silt run-off and sedimentation
- increased noise pollution, and
- additional production of waste.

Certain disturbances in traffic are looking from the perspective of today's traffic situation in Croatian cities are almost will appear. In case of traffic disturbances besides traffic safety will have influence on local air pollution due to enlarged emission of gases from the vehicles and local noise pollution.

During the ground works and especially during the dry weather it can be assumed that the local dust concentration in air could be increased. Construction vehicles could track sediment (soil and sand) from the construction site into the road, or it could even reach a storm drain.

Replacement of old pipes could result also in soil and water pollution by increased production of waste in form of old pipes and insulation.

Since the parts of the hot water network which will be rehabilitated are in the poor condition in the service time, i.e. after the rehabilitation works will be finished, following positive direct and indirect effects should be expected:

- decreased thermal pollution
- decreased traffic disturbances
- decreased water resources exploitation
- decreased emission of pollutants into air from the plants

After the rehabilitation has been done, in the replaced pipelines there should be less heat and water losses. Due to that fact, since the hot water is at the higher temperature level than the ground, heat pollution of the environment will decrease.
It can be assumed that after the quality installation in the new pipelines there will be no damages for a long time, so there will be no need for interventions for repair. Less repair interventions in case of pipelines under the main roads will result in less traffic disturbances.

During the service time, there should be positive indirect influences on environment also. Due to decreased water losses, the need for water added to the system, and therefore exploitation of water resources will be reduced. Decreased heat losses will result in decreased consumption of fuel in the plants. Decreased fuel consumption and in case of the same combustion quality and fuel consumption structure will finally result in decreased emission of harmful substances into air from the plants (CO₂, SO₂, NOₓ).
3. MITIGATION PLAN

As previously said, there are several possible environmental impacts which could appear in form of traffic disturbances, air pollution with harmful gases and dust in case of traffic jams and during the ground works, noise pollution, and soil and water pollution. Organisation of the construction site and control measures has to contribute that these influences stay local and temporary with acceptable intensity.

Preinsulated pipes technology is relatively new in Osijek, but certain experience in this technology exists in Zagreb, so there are no obstacles to use it in Osijek. Using valuable knowledge contained inside existing Quality Assurance Manuals for preinsulated pipes production and installation is necessary.

In order to avoid bigger traffic disturbances, works have to be done in time with minimum traffic. Regarding the traffic safety there is a legal obligation to mark the part of the road where the works have to be done, with equivalent traffic signs, and that the traffic participants are secured with fences. If because of the works alternating by-passing of the vehicles has to be done, it should be done with temporary traffic lights. Before such action special permission has to be provided by the local authorities and police should be informed (Law on traffic safety, Official Gazette No. 105/04), /L 1-2/.

Surfaces where ground works will be performed should previously be sprinkled with water in order to prevent high air pollution with dust.

It is necessary to prevent sediment or silt run-off. Sediment should never be rinsed off the site, instead it must be cleaned up in a manner that does not allow it to reach a storm drain or waterway. Equipment tires must be rinsed before leaving the site if necessary to avoid tracking sediment into the roadway or off the site.

Since the works will be performed in the populated areas, and in order to prevent high noise pollution measures according to the current legislation (Law on noise protection, Official Gazette No. 20/03), /L 1-2/, should be applied. Regarding the highest allowed noise levels during the day, night works should be avoided so that night silence and satisfying conditions for rest and work could be achieved. Use only construction machines, transportation vehicles and equipment in compliance with the set technical regulations, which refer to the maximum allowed noise level which they produce.

Waste which will appear at the construction site should be disposed in compliance with appropriate legislation (Law on waste, Official Gazette No. 178/04), /L 1-2/.

After the construction, the ground at the area of construction site brought to the condition as it was before the construction.

Responsibility for the implementation of the Mitigation plan lays on the managers of the construction and installation and HEP-Toplinarstvo. Contracts should stipulate these measures together with the penalty schemes in case of not implementing them, and HEP-Toplinarstvo as investor, should supervise the implementation of the environmental measures included in this plan.

Mitigation plan is shown in Appendix App. III, (Tab. III-1).
4. MONITORING PLAN

Monitoring plan represents an important aspect of implementation process of the intervention. Its purpose is to secure the application of the environmental protection standards which are stated in the legislation. Besides, in that way, environmental impact is monitored and the effect of the mitigation measures is checked. According to the Law on environmental protection (Official Gazette No. 82/94, 128/99), which is the basic law in the area of environmental protection, monitoring plan is defined as substantial measuring of emissions, air quality, natural and other phenomena, and changes in environment.

During the construction, on a daily basis there should be monitored traffic situation and dust concentration. On each construction site during the construction noise level should be measured according to the specific regulations, and at least once a year. Measurements should be done by authorised company registered for noise level measurement. Once a month, waste disposal has to be checked.

During the service lifetime, with the existing measurement equipment (calorimeters), in the plants and at the customers, heat losses have to be measured. Also, filling the system with water in the plants has to be measured in order to monitor the water losses in the network. In replaced pipelines, network should be continuously supervised by installed leakage detection system in order to act promptly in case of leakage.

Emission of pollutants into air from the plants, besides heat production depends upon lots of other factors, such as type and quality of fuel, quality of combustion, etc. When calculating global impact of rehabilitation of the network on total emission of pollutants into air in Croatia, it is necessary to also take into account an impact of heat production on electricity production (since it's mostly from the cogeneration) and consequences which derive from it. Monitoring of global impact of network rehabilitation on pollutants emission in practice would be very complex and complicated and it would comprise a number of different measurements and calculations. Besides, lots of factors which have influence on emission of pollutants are out of reach of HEP-Toplinarstvo as a bearer of the rehabilitation. Thereby, the Environmental Management Plan stipulates only the measures for compliance of heat producer with accepted environmental standards. These standards are comprised inside Act on maximum allowed emission of pollutants into air from the stationary sources (Official Gazette No. 140/97, 105/02, 108/03, 100/04, 98/05). Emission monitoring has to be performed in the plants with the existing systems for continuous emission measurement.

Most of these measures for monitoring are already incorporated in regular activities of HEP-Toplinarstvo (and HEP-Proizvodnja), so there will be no additional cost for implementing them. Estimated costs of noise level measurement (acoustic measurement) are approx. 2 500 EUR per year. Total estimated costs of noise level measurement in Osijek (complete rehabilitation program), for which HEP-Toplinarstvo will have to provide additional resources is 10 000 EUR.

Responsibility for the implementation of the Monitoring plan during construction period lays on the managers of the construction and installation and HEP-Toplinarstvo. Contracts should stipulate these measures together with the penalty schemes in case of not implementing them, and HEP-Toplinarstvo as investor, should supervise the implementation of the environmental measures included in this plan.

Monitoring of heat and water losses is an obligation of HEP-Toplinarstvo, while HEP-Proizvodnja is responsible for monitoring of emission of pollutants into air from the plants.
Proper documentation of the monitoring data including values of the monitored parameters, time and place of the monitoring needs to be maintained in compliance with the World Bank procedures. HEP-Toplinarstvo will have to make these data available to the World Bank, in order to verify that monitoring measures were routinely taken.

Monitoring plan is shown in the Appendix App. III, (Tab. III-2).
5. INSTITUTIONAL ARRANGEMENTS

5.1. GENERAL

According to the basic law in the area of environmental protection, Law on environmental protection (Official Gazette No. 82/94, 128/99), efficiency of state environmental protection is provided by Croatian Parliament, Government of the Republic of Croatia, and local representative and executive authorities by adoption of Environmental Protection Strategy, Environmental Protection Programme and other documents important for environmental protection. Professional work in environmental protection services and environmental protection measures is provided by state and local authorities authorised for environmental protection and legal entities registered for professional work in the area of environmental protection services. Local authorities arrange, organise, finance and improve environmental protection services which are of regional or local significance. Citizens, as individuals or organised for the purpose of environmental protection in unions, professional associations, and other non-governmental organisations, contribute to achievement of environmental protection objectives and enforcement of effective environmental protection. List of basic laws in the area of environmental protection is given in the Appendix (App. IV).

Environmental protection in Croatia is provided by: adoption of environmental quality standards, environmental impact estimation, adoption of measures for environmental protection within physical plans, environmental condition monitoring, making of environmental polluters register, implementation of information system for environmental protection, making of intervention plans in environmental protection, public announcement of environment data, etc. /L 1-2/

Financial assets for environmental protection are provided in national budget, local budgets and other sources.

5.1.1. STATE ADMINISTRATION, REGIONAL AND LOCAL SELF-GOVERNMENT

Ministry of environmental protection, physical planning and construction (MoEP) is responsible for environmental protection in Croatia. For legal and professional work in environmental protection services Environmental Protection Office is responsible. In first stage, supervisory work is done by environmental inspectors in regional offices of the Division for Environmental Protection Supervisory within Supervisory Office. In the second stage, implementation of the environmental measures is supervised by the inspectors at the central office of the Division for Environmental Protection Supervisory within Supervisory Office.

Environmental Protection Office provides administrative and professional services connected to the implementation of measures for waste management, air quality protection, climate and ozone layer protection, estimation of environmental impact of interventions, environmental protection intervention plans connected to sudden environmental pollution, sea and shore quality protection, and other services for taking action in order to decrease and stop pollution of environment.

Division for Environmental Protection Supervisory (Supervisory Department) provides services of inspection supervision of implementation of regulation in environmental protection, air protection, waste management, sea and shore protection, supervision of implementation of international contracts in the field of environmental protection, monitors implementation of environmental protection measures, and implementation of measures in inspection procedures, participate in making of drafts of proposed regulations in environmental protection, air protection and waste management, provides services of preparation and making of reports and programs for improvements of environmental protection regulations, making reports of supervision and
measures taken, and participate in complex procedures for inspection measures implementation.

Recommendation and monitoring of the measures for environmental protection at the local level in Osijek is provided by the City District Councils. City District is a form of local self-government by which the citizens participate in decisions regarding self-government issues and local issues which directly and constantly influence on people's life and work. City Districts are established for city areas of Osijek which act as an urban, economical and social entirety and which connect common interests of the citizens.

5.1.2. PROFESSIONAL INSTITUTIONS AND NON-GOVERNMENTAL ORGANISATIONS

In the Republic of Croatia, many administrative and professional institutions deal with environmental protection, lots of data about sea, air, water and soil have been collected. The main problem is that these data are not connected, sometimes incomplete, often mutually incompatible and what's most important - hardly available to other participants. That is why the Government of Republic of Croatia established public institution, Agency for environmental protection (Agency) in order to from the number of existing data basis with data about state and quality of sea, air, water, soil, landscape diversity, waste, influence of traffic, economy and tourism, constitute unique compatible information system, consolidate all available data, based on these data make quality information and in the end what's important make it easily available. It is an obligation that the Agency analyses and interprets gathered data of environmental protection and assures all necessary information to state authorities, Government and Parliament for efficient implementation of environmental policies. Agency headquarters are in Zagreb.

List of legal entities which are authorised by MoEP for professional work in the area of environmental protection is available on web pages of MoEP and comprises following professional work:

- monitoring
- environmental protection reports
- environmental protection studies
- environmental protection education
- air quality and pollutants emission monitoring

In Croatia, there are over 250 various non-governmental organisations registered for environmental protection. List of these organisations is available on web pages of Ministry of environmental protection, physical planning and construction.

5.2. SUPERVISION OF ENVIRONMENTAL PROTECTION MEASURES IMPLEMENTATION FOR DISTRICT HEATING NETWORK REPLACEMENT AND DH REVITALISATION AND LOCAL BOILERS CONNECTION TO DHS IN OSIJEK

Supervision of environmental protection measures taken during district heating network replacement and DH revitalisation and local boilers connection to DHS in Osijek will be done by environmental inspectors from the regional office of the Division for Environmental Protection Supervisory in Osijek, which is authorised for the Osječko-baranjska County. During the construction special care should be taken to cooperate with local self-government. Above all,
this refers to early informing of the citizens about planned interventions in their district, possible direct environmental impacts and measures which will be taken in order to mitigate them and to monitor the environment.
6. CONSULTATION WITH PUBLIC

The Environmental Management Plan was presented to the public, and public consultations were held in Osijek on 7th of December 2005. Minutes from the public consultations with the list of participants is given Appendix (App. V).
App. I  Intervention area in the hot water network of district heating system in Osijek

Fig. I-1: Intervention area in the hot water network of district heating system in Osijek (Parts of the network which are planned to be rehabilitated are marked with purple colour)
App. II  List of steam customers which are planned to be connected to the hot water system

1. City Transportation Company
2. Military Camp Drava
3. School for Medicine and Technology
4. School for Civil Engineering
5. Elementary School Jagoda Truhelka
6. Department for Skin and Venereal Diseases
7. Baker Industry "IPK Croatia mlin"
### Tab. III-1: Mitigation plan

<table>
<thead>
<tr>
<th>Stage</th>
<th>Impact</th>
<th>Remediation measures</th>
<th>Additional cost</th>
<th>Responsible institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>Traffic disturbance</td>
<td>In order to avoid bigger traffic disturbances, works have to be done in time with minimum traffic. Regarding the traffic safety there is a legal obligation to mark the part of the road where the works have to be done, with equivalent traffic signs, and that the traffic participants are secured with fences. If because of the works alternating by-passing of the vehicles has to be done, it should be done with temporary traffic lights. Before such action special permission has to be provided by the local authorities and police should be informed (Law on traffic safety, Official Gazette No 105/04).</td>
<td>1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Air pollution (increased dust concentration)</td>
<td>Surfaces where ground works will be performed should previously be sprinkled with water in order to prevent high air pollution with dust.</td>
<td>1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Silt run-off and sedimentation</td>
<td>It is necessary to prevent sediment or silt run-off. Sediment should never be rinsed off the site, instead it must be cleaned up in a manner that does not allow it to reach a storm drain or waterway. Equipment tires must be rinsed before leaving the site if necessary to avoid tracking sediment into the roadway or off the site.</td>
<td>2)</td>
<td>Construction and installation companies and HEP-Toplinarstvo</td>
</tr>
<tr>
<td></td>
<td>Noise pollution</td>
<td>Since the works will be performed in the inhabited areas, and in order to prevent high noise pollution measures according to the current legislation (Law on noise protection, Official Gazette No 20/03, /L 1-2/, should be applied. Regarding the highest allowed noise levels during the day, night works should be avoided so that night silence and satisfying conditions for rest and work could be achieved. Use only construction machines, transportation vehicles and equipment in compliance with the set technical regulations, which refer to the maximum allowed noise level which they produce.</td>
<td>1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Soil and water pollution by waste</td>
<td>Waste which will appear at the construction site should be disposed in compliance with appropriate legislation (Law on waste, Official Gazette No 178/04).</td>
<td>1)</td>
<td></td>
</tr>
</tbody>
</table>

### Note:

1) Responsibility of the contractor, costs included in the costs of work.
2) HEP-Toplinarstvo as investor, should also supervise contractor.

### Service

**Increased negative impact on environment**
### Tab. III-2: Monitoring plan

<table>
<thead>
<tr>
<th>Stage</th>
<th>Parameter to be monitored</th>
<th>Location of monitoring</th>
<th>Method of monitoring</th>
<th>Time of monitoring</th>
<th>Additional cost</th>
<th>Responsible institution</th>
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<tr>
<td>Construction</td>
<td>Traffic</td>
<td>At construction and installation sites</td>
<td>Visually</td>
<td>Continuous</td>
<td>1)</td>
<td>Construction and installation companies and HEP-Toplinarstvo</td>
</tr>
<tr>
<td></td>
<td>Air quality (regarding dust concentration)</td>
<td>At construction and installation sites</td>
<td>Visually</td>
<td>During construction, in dry weather</td>
<td>1)</td>
<td>Regional office of the Division for Environmental Protection Supervisory (MoEP)</td>
</tr>
<tr>
<td></td>
<td>Noise level</td>
<td>At construction and installation sites</td>
<td>With equivalent noise measuring instruments</td>
<td>On each construction site during the construction noise level should be measured according to the specific regulations, and at least once a year. Measurements should be done by authorised company registered for noise level measurement.</td>
<td>10 000 EUR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Waste disposal</td>
<td>At construction, installation and disposal sites</td>
<td>Reviewing the performance of constractor</td>
<td>Once a month</td>
<td>1)</td>
<td>HEP-Toplinarstvo2)</td>
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<tr>
<td>Service</td>
<td>Heat losses in the network</td>
<td>In the plants and heating substations</td>
<td>Heat metering</td>
<td>Once a year</td>
<td>3)</td>
<td>Regional office of the Division for Environmental Protection Supervisory (MoEP)</td>
</tr>
<tr>
<td></td>
<td>Water losses in the network</td>
<td>In the plants and heating substations</td>
<td>Water filling metering</td>
<td>Once a year</td>
<td>3)</td>
<td>HEP-Toplinarstvo2)</td>
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<tr>
<td></td>
<td></td>
<td>In the network</td>
<td>In replaced pipelines, network should be continuously supervised by installed leakage detection system in order to act promptly in case of leakage.</td>
<td>Continuous</td>
<td>3)</td>
<td>Regional office of the Division for Environmental Protection Supervisory (MoEP)</td>
</tr>
<tr>
<td></td>
<td>Emission of pollutants into air</td>
<td>In the plants and heating substations</td>
<td>Emission monitoring</td>
<td>Continuous</td>
<td>3)</td>
<td>HEP-Proizvodnja</td>
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</table>

**Note:**

1) Responsibility of the contractor, costs included in the costs of work
2) HEP-Toplinarstvo as investor, should also supervise contractor
3) Regular activities, which don't require significant additional costs
App. IV  List of basic environmental laws and regulations in Croatia

- Law on environmental protection (Official Gazette No. 82/94, 128/99)
- Bylaw on environmental impact assessment (Official Gazette No. 59/00, 136/04)
- Law on air protection (Official Gazette No. 178/04)
- Act on boundary values of concentration of air pollutants emission from the stationary sources (Official Gazette No. 140/97, 105/02, 108/03, 100/04, 98/05)
- Act on boundary values of air pollutants in the air (Official Gazette No. 133/05)
- Act on determination of locations for air quality measurement stations in state network for permanent monitoring of air quality (Official Gazette No. 4/02)
- Law on waste (Official Gazette No. 178/04)
- Act on category, type and classification of waste with waste catalogue and list of hazardous waste (Official Gazette No. 50/05)
- Law on noise protection (Official Gazette No. 20/03)
- Act on highest permitted levels of noise in the working and living areas (Official Gazette No. 145/04)
App. V  Minutes from the public consultations on the Environmental Management Plan for district heating network replacement and DH revitalisation and local boilers connection to DHS in Osijek

HEP – Toplinarstvo
Operating Division Osijek
Cara Hadrijana 3
31000 Osijek

MINUTES

FROM THE PUBLIC CONSULTATIONS ON THE ENVIRONMENTAL MANAGEMENT PLAN (EMP) FOR DISTRICT HEATING NETWORK REPLACEMENT AND DH REVITALISATION AND LOCAL BOILERS CONNECTION TO DHS IN OSIJEK

held at 1 p.m. on December 7, 2005 in Hotel Osijek in Osijek

The public consultations were attended by around 50 persons. Besides the representatives of HEP-Toplinarstvo as the organizer, EKONERG as the author of the study, and the World Bank, there were also the representatives of:

- the Department for Environmental Protection of the City of Osijek
- the Department for Environmental Protection of the Osječko-baranjska County
- the Development Agency of the Osijek County
- the Department of State Administration – the Office for Physical Planning
- the Ministry of Environmental Protection, Physical Planning and Construction, Department for Environmental Protection – Osijek
- the J. J. Strossmayer University in Osijek
- "Potrošač" – the Association for Consumer Protection
- the Osijek Tenants' Association
- building managers
- major buyers of thermal energy
- architectural firms
- building contractors and engineers
- equipment suppliers
- other organizational units of HEP (HEP Proizvodnja d.o.o. and HEP Plin d.o.o.)
– media (Slavonska TV, HTV – Studio Osijek, HRT – Radio Osijek, Gradski radio, Slavonski radio, Glas Slavonije, Osječki dom, Jutarnji list, Vjesnik, HEP-ov vjesnik).

The list of the participants of the public consultations can be found in the annex to the Minutes.

The summary of the most important activities within the Environmental Management Plan (enclosed in the annex) was distributed to all the attendants.

The public consultations were opened by Ivica Mihaljević, Manager of Operating Division Osijek within HEP-Toplinarstvo, who proposed the following agenda:

1. Welcoming speech – Mijo Marović, B.Sc. (Manager of Operating Division District Heating Network Zagreb, within HEP-Toplinarstvo)

2. Introduction to the District Heating in Croatia – Ivica Mihaljević, M.Sc. (HEP Toplinarstvo, Operating Division Osijek)

3. Rehabilitation of District Heating System in Osijek - Zlatko Komerički, M.Sc. (EKONERG - Energy and Environmental Protection Institute, Zagreb)

4. Environmental Management Plan – Dean Vidak, B.Sc. (EKONERG - Energy and Environmental Protection Institute, Zagreb)

5. Public consultations

There were no objections to the proposed agenda.

Item 1

In his welcoming speech, Mr. Marović thanked all present for coming and greeted them in the name of B. Poljak, General Manager of HEP-Toplinarstvo, who was unable to attend the public consultations.

Item 2

In his introduction to the district heating in Croatia, Mr. Mihaljević acquainted the participants with the situation and problems of the district heating in Croatia, with special reference to the position of Osijek in this system. He presented the most important plans of HEP-Toplinarstvo's Operating Division Osijek: rehabilitation of the hot water network; connection of local boiler plants Stanko Vraz and Vladimir Nazor to the District Heating System; substitution of steam with hot water for the those customers in the steam network who use the heat only for space heating; connection of new customers (Euro dom and Gradski vrt); modalities of the rehabilitation; and the new technology which is to be used for laying of the pipes.

Item 3

Mr. Z. Komerički touched base on the Short feasibility study of district heating network replacement and DH revitalisation and local boilers connection to DHS in Osijek. He informed the participants about the purpose and contents of the study, the methodology of comparing the observed and reference variants, the methodology of financial-economic analysis, and the results of the analysis.
Item 4

Mr. D. Vidak acquainted the participants with the Environmental Management Plan for district heating network replacement and DH revitalisation and local boilers connection to DHS in Osijek and explained the environmental impacts in the construction phase (the replacement of the pipelines) and in the operating phase after the replacement; he also explained how to reduce or alleviate undesired impacts during the construction and how to monitor the condition of the environment during the construction and later during the operation.

Item 5

After presentation of the project, the public consultations started around 2 p.m. During the public consultations, Mr. Predrag Šibalić (Head of the Ministry of Environmental Protection, Physical planning and Construction, Department for Environmental Protection of the City of Osijek) asked whether the Environmental Protection Plan comprised parks and the areas of cultural and historical importance that the heating pipe network is going through.

Messrs Komerički and Vidak replied:

- that the replacement pipeline will be using the route of the existing pipeline (the existing reinforced concrete channels) for which building permits and inspection certificates have already been issued and no additional permits are required;

- as for the construction of new pipelines, the priority within the preparation of necessary building documents will be to obtain all the permits required; in the process of obtaining of such permits, attention will certainly be paid to the problem (if necessary, i.e. if the heating pipeline routes would pass through such areas) and special conditions of relevant authorities for environmental protection will be met in order to preserve the cultural and historical heritage of Osijek.

The public consultations and the project presentation finished at 2.30 p.m., after which Mr. Mihaljević invited all the participants to a party.

In Osijek, December 13, 2005

Enclosed:

- List of the participants of the public consultations

- Summary of the Environmental Management Plan (EMP), distributed to the attendants of the public consultations
Tab. V-1: List of the participants of the public consultations (Enclosed to the Minutes)

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Company/Organisation</th>
<th>Position</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Tihomir Antunović</td>
<td>HEP-Proizvodnja Thermal Power Plants Sector TE-TO Osijek</td>
<td>Manager</td>
<td>+385 31 243 022</td>
</tr>
<tr>
<td>2.</td>
<td>Zlatko Baban</td>
<td>HEP-Toplinarstvo Operating Division Osijek</td>
<td>Manager of Heat Production</td>
<td>+385 31 244 749</td>
</tr>
<tr>
<td>3.</td>
<td>Ivan Baličević</td>
<td>Non-government organisation Osječki zeleni</td>
<td>Member</td>
<td>+385 31 580 585</td>
</tr>
<tr>
<td>4.</td>
<td>Damir Blažević</td>
<td>Faculty of electrical engineering, Osijek</td>
<td>Assistant</td>
<td>+385 98 9834 427</td>
</tr>
<tr>
<td>5.</td>
<td>Božo Boduljak</td>
<td>INSTOS, Osijek</td>
<td>General Manager</td>
<td>+385 91 2977 770</td>
</tr>
<tr>
<td>6.</td>
<td>Antun Čagali</td>
<td>HEP-Toplinarstvo Operating Division Osijek</td>
<td>Headman of Maintenance</td>
<td>+385 31 207 137</td>
</tr>
<tr>
<td>7.</td>
<td>Gabriela Ćurković</td>
<td>Agency for Development of Osječko-baranjska County</td>
<td>Consultant for Legal Issues</td>
<td>+385 31 200 677</td>
</tr>
<tr>
<td>8.</td>
<td>Damir Delalič</td>
<td>Institut for urban planning and construction, Osijek</td>
<td>Supervisory and design engineer</td>
<td>+385 31 225 200</td>
</tr>
<tr>
<td>9.</td>
<td>Branko Dimitrijevi</td>
<td>ESTATE, Osijek</td>
<td>Supervisory and design engineer</td>
<td>+385 31 201 113</td>
</tr>
<tr>
<td>10.</td>
<td>Josip Derić</td>
<td>Office of State Administration in Osječko-baranjska County Division for Physical Planning, Environmental Protection, Construction and Property-Legal Issues</td>
<td>Committee for Technical Inspection</td>
<td>+385 31 221 120</td>
</tr>
<tr>
<td>11.</td>
<td>Zvonko Ercegovac</td>
<td>HEP-Plin, Osijek</td>
<td>Sales Manager</td>
<td>+385 98 372 720</td>
</tr>
<tr>
<td>12.</td>
<td>Sandra Filipović</td>
<td>Agency for Development of Osječko-baranjska County</td>
<td>Assistant to Manager</td>
<td>+385 31 200 677</td>
</tr>
<tr>
<td>13.</td>
<td>Miloš Filipović</td>
<td>HEP-Toplinarstvo Operating Division Osijek</td>
<td>Head of Economy Department</td>
<td>+385 31 244 753</td>
</tr>
<tr>
<td>14.</td>
<td>Ruxandra Floroiu</td>
<td>The World Bank</td>
<td>Environmental Engineer</td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>Jasna Gorupić</td>
<td>Office of State Administration in Osječko-baranjska County Division for Physical Planning, Environmental Protection, Construction and Property-Legal Issues</td>
<td>Environmental Protection</td>
<td>+385 31 221 136</td>
</tr>
<tr>
<td>16.</td>
<td>Vlado Grepo</td>
<td>LAINER, Osijek</td>
<td>Owner</td>
<td>+385 98 210 895</td>
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<tr>
<td>17.</td>
<td>Davor Grubišić</td>
<td>HEP-Proizvodnja Thermal Power Plants Sector TE-TO Osijek</td>
<td>Head of the Department for Technical Services</td>
<td>+385 31 501 038</td>
</tr>
<tr>
<td>18.</td>
<td>Hana Huzjak</td>
<td>The World Bank</td>
<td>Team Assistant</td>
<td>+385 1 2357 222</td>
</tr>
<tr>
<td>19.</td>
<td>Marko Jurabišić</td>
<td>Vodovod Osijek</td>
<td>Design Engineer</td>
<td>+385 31 330 208</td>
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<tr>
<td>20.</td>
<td>Zorislav Kollar</td>
<td>HEP-Toplinarstvo Operating Division Osijek</td>
<td>Head of the Electrical Maintenance and Instrumentation</td>
<td>+385 31 244 764</td>
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<td>21.</td>
<td>Zlatko Komenički</td>
<td>EKONERG, Zagreb</td>
<td>Consultant</td>
<td>+385 1 6000 129</td>
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<tr>
<td>22.</td>
<td>Zvonimir Kovačić</td>
<td>GEA, Zagreb</td>
<td>Commercial Services</td>
<td>+385 91 2421 684</td>
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<td>23.</td>
<td>Katarina Kuterovac</td>
<td>Private</td>
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<td>+385 31 373 623</td>
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<td>Vladimir Lakič</td>
<td>HEP-Toplinarstvo Operating Division Osijek</td>
<td>Construction Engineer</td>
<td>+385 98 9807 500</td>
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<td>25.</td>
<td>Tomislav Levak</td>
<td>Jutarnji list</td>
<td>Journalist</td>
<td>+385 31 200 616</td>
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<td>26.</td>
<td>Božo Madunić</td>
<td>HEP-Toplinarstvo Operating Division Osijek</td>
<td>Trainee</td>
<td>+385 91 5135 625</td>
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<td>27.</td>
<td>Jasna Madura</td>
<td>Office of State Administration in Osječko-baranjska County Division for Physical Planning, Environmental Protection, Construction and Property-Legal Issues Department for Reconstruction</td>
<td>Head of the Department</td>
<td>+385 98 877 848</td>
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<td>28.</td>
<td>Ivan Majsen</td>
<td>AGRIA, Osijek</td>
<td>Head of the Commercial Services</td>
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<td>HEP-Toplinarstvo Operating Division Osijek</td>
<td>Head of the Operating Division</td>
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<td>30.</td>
<td>Ivica Mihaljević</td>
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<td>+385 31 244 745</td>
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<tr>
<td>31.</td>
<td>Josip Müller</td>
<td>Vodovod Osijek</td>
<td>Expert Associate</td>
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<td>32.</td>
<td>Ivica Paić</td>
<td>Vodovod Osijek</td>
<td>Head of the Department</td>
<td>+385 31 330 200</td>
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Tab. V-1:  List of the participants of the public consultations (Enclosed to the Minutes)

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<td>33.</td>
<td>Aleksandar Paradinovi</td>
<td>HEP-Proizvodnja</td>
<td>Maintenance Engineer</td>
<td>+385 31 243 448</td>
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<tr>
<td>34.</td>
<td>Zvonimir Pavešić</td>
<td>ETO, Osijek</td>
<td>Manager</td>
<td>+385 31 284 511</td>
</tr>
<tr>
<td>35.</td>
<td>Ranko Radaković</td>
<td>&quot;Potrošač&quot; - Association for Protection of Customers</td>
<td>Customers Representative in the Committee for Complaints in HEP-Toplinarstvo, Operating Division Osijek</td>
<td>+385 91 3528 765</td>
</tr>
<tr>
<td>36.</td>
<td>Ivica Sarić</td>
<td>Zavod za stanovanje, Osijek</td>
<td>Maintenance Correspondent</td>
<td>+385 1 31 209 700</td>
</tr>
<tr>
<td>37.</td>
<td>Vladimir Stanić</td>
<td>Udruženje stanara grada Osijeka, Osijek</td>
<td>President</td>
<td>+385 31 369 069</td>
</tr>
<tr>
<td>38.</td>
<td>Predrag Šibalić</td>
<td>Ministry of Environmental Protection, Physical Planning and Construction Division for Environmental Protection Department for Soil Protection in Osijek</td>
<td>Head of the Department</td>
<td>+385 31 201 211</td>
</tr>
<tr>
<td>39.</td>
<td>Davor Škarić</td>
<td>HEP-Proizvodnja</td>
<td>Production Engineer</td>
<td>+385 31 243 433</td>
</tr>
<tr>
<td>40.</td>
<td>Slobodan Špehal</td>
<td>HEP-Toplinarstvo Operating Division Osijek</td>
<td>Headman of the Electrical Maintenance and Instrumentation</td>
<td>+385 31 244 766</td>
</tr>
<tr>
<td>41.</td>
<td>Zdenko Švenda</td>
<td>Gradnja, Osijek</td>
<td>Chief Engineer</td>
<td>+385 31 235 000</td>
</tr>
<tr>
<td>42.</td>
<td>Damir Tomić</td>
<td>Gradnja, Osijek</td>
<td>Chief Engineer</td>
<td>+385 31 235 034</td>
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<tr>
<td>43.</td>
<td>Zlatko Tonković</td>
<td>HEP-Plin, Osijek</td>
<td>Manager of Osijek Division</td>
<td>+385 98 213 867</td>
</tr>
<tr>
<td>44.</td>
<td>Lidija Trepšić Bašić</td>
<td>ETO d.d., Osijek</td>
<td>Design Engineer</td>
<td>+385 31 284 519</td>
</tr>
<tr>
<td>45.</td>
<td>Dean Vidak</td>
<td>EKONERG, Zagreb</td>
<td>Expert Associate</td>
<td>+385 1 6000 129</td>
</tr>
<tr>
<td>46.</td>
<td>Ozren Zelić</td>
<td>Osijek-Koteks, Osijek</td>
<td>Manager of Maintenance Sector</td>
<td>385 91 2831 016</td>
</tr>
<tr>
<td>47.</td>
<td>Mijo Zglavnik</td>
<td>TEHNOKOM, Zagreb</td>
<td>Manager of Energy Department</td>
<td>+385 1 4686 210</td>
</tr>
<tr>
<td>48.</td>
<td>Josip Zubaj</td>
<td>Zubaj services, Osijek</td>
<td>Owner</td>
<td>+385 31 271 769</td>
</tr>
</tbody>
</table>
Fig. V-1: Summary of the Environmental Management Plan (EMP), distributed to the attendants of the public consultations (Enclosed to the Minutes)
App. VI  Position of the city of Osijek on the map of Republic of Croatia

Fig. VI-1: Position of the city of Osijek on the map of Republic of Croatia
Literature:


L 1-2 Official Gazzete, URL: http://www.nn.hr (November 2005.)


L 2-2 Vuk Robert: Maintenance of important components of District Heating System (DHS), EGE 5 (November-December)/2003., Page 120-123

L 2-3 Brnas Jurica: Maintenance of District Heating System (DHS) in Zagreb, EGE 5 (November-December)/2003., Page 118-120
