



Tempus158989-Tempus-1-2009-1-BE-Tempus-JPHES  
Creation of university-enterprise cooperation networks for education on  
sustainable technologies

# EU expert's report BA and MK

May – June 2010



Tempus project -1-20009-1-BE-TEMPUS -JPHEs

## **VISIT TO ZVORNIC AND TUZLA**

Period: 31 May – 05 June 2010

Western partners:

Katrin Mueller-Hansen, Institute for Applied Material Flow Management, Environmental Campus Birkenfeld, Germany

Marc Van Acker, Katholieke Hogeschool Sint-Lieven, Gent, Belgium

Program and local partners, see application form: Joint project 2009

### **Visit of Alumina Factory ‘Birac’ in Zvornic**

Birac is located in the industrial zone of Zvornic, Republic of Srpska, Bosnia and Herzegovina and started its production in 1978.

The factory is producing alumina and alumina hydrate (with a capacity of 600.000 t/year), zeolite (150.000 t/year due to new investments) and water glass (200.00 t/year). A part of the factory are also: energy plant (a thermo-electric power plant), workshops for process equipment and techniques maintaining as well as research and control laboratories. The main raw materials - bauxite and quartz sand - are obtained from immediate surroundings areas or are imported from South America. The most important polluting processes are: the power plant, the crushing and wet milling plant of bauxite, the digestion plant and the solution processing plant. From 2002 to now over 40 million KM of investments were done; The biggest investment during 2006 is the construction of a vertical kiln combustion unit. The process of reorganization included the implementation of ISO 9001. During 2008 the process of restructuring of the factory started as well as a new organization, with the aim to obtain more efficient operation. At this moment the factory has approximately 1000 workers, which is ¼ of the totally employed citizens in Zvornic municipality. Constant efforts are done for improvement of technological processes and possible introduction of new alumina-silicate products for detergents.

During the meeting with staff engineers of the factory it was obvious that the younger generation became aware of the ecological damage caused by pollution (exhaust gases, solid waste and waste water) as a consequence for the environment and the citizens. Till now the wastewater and sludge (called ‘red mud’) is transported through pipe lines into a lake situated a few kilometres further.

Their priorities are very clear: communication of this ecological damage with everybody who is involved, training for employees (staff and workers) concerning environmental protection and sustainability as well as for safety precautions, to reach ISO 14001 certification; very important was also the call to the government to implement rules, standards and regulations in accordance with those of the European Union.

### **Spectar Drink (juice and fruit factory)**

This factory was started in 1991 as a private business. This visit was of no relevance in this project; during the visit all activities were yet finished for the day; almost nothing of the conducted tour of the factory contributed to the requirements of the project. Concentrated juice is diluted and bottled in plastic or glass bottles according to the quality. The processed products were: juices, marmalade, sugar in cubes, syrup and some vegetables like sour

cabbage. There shouldn't be water contamination and the main question of the owner of this factory was the possibility of getting subsidies for a pipe line to the river for the waste water because he intended to extend the company.

### **Meeting in Chamber of Commerce, Tuzla**

The employees of the Chamber of Commerce showed a high awareness of the existing problems of environmental pollution in Tuzla city and canton that are related to coal industry, salt industry and water pollution. They criticised that there is a lack of implementation of the existing environmental laws because of the current administrative structure of Bosnia and Herzegovina. Three administrative levels are involved: National government, Republic Srpska Government and Community government. Therefore, the law implementation is very slow. The university professors from Tuzla and the Western experts suggested to push the implementation through projects like TEMPUS.

The main resources of Kanton Tuzla are salt, coal and agriculture causing a number of environmental problems:

- 80 Mio. m<sup>2</sup> suspicious area under mines
- Fly ash from coal mining → water need
- Sinking problem of Tuzla because of salt mines
- Destruction of land for coal mining
- Air pollution (7% of the children younger than 6 years have respiratory problems)
- Water pollution (Modrac lake)
- Only one waste water treatment plant for 12.000 persons in Kanton Tuzla
- Land filling

Already one project was lanced in cooperation with the Environmental Ministry of Bosnia and Herzegovina on cleaner production in industry. This project identified the following problems:

- Obsolete technologies
- Energy efficiency to low
- No suitable regulations

### **Visit to 4 Companies in Tuzla and Lukavac**

Unfortunately the time for the company visits was too short to see the manufacturing process. Thus, the following conclusions are made based on the discussions with the company representatives.

#### **1. Solana Tuzla**

The salt industry is a clean industry and therefore not causing any mentionable environmental harm. As Solana is depending to a large part on the export (export rate of 70%) of its salt to foreign countries (5 countries like Germany, Austria, Switzerland) it is certified by ISO 9001:2000. Yet, the salt mines are causing the sinking of some parts of Tuzla city.

Suggested course contents:

- How to implement ISO 14000 and other state of the art standards?
- What is ecology? – Measures for raising the awareness and understanding of employees

#### **2. Zada Pharmaceutical Company Lukavac**

Zada is not yet producing. The company is still in the phase of development/ authorization which started in 2008. The mother company started its business in 1996. Zada employs 50 persons in Tuzla. The company is supposed to produce drugs (30 generics) as well as food

supplements. They appointed a representative to work on an ISO 14001 certification. Furthermore, there is a quality management representative in the company.

Suggested course contents:

- European legislation for drug registration
- Nano-technology
- Legislation for waste management (Up to now, the wastes of Zada are picked up by a hired waste management company and exported to surrounding countries.)

### **3. Cementara Lukavac**

This concrete factory has a German owner. The factory is fulfilling the EU legislation. It is running a closed water cycle. Ashes and water from Tuzla power plant are an input material for the manufacturing process.

Suggested course contents:

- EU environmental legislation in the field of concrete industry
- How to apply for EU funds for projects on optimising the manufacturing process with its current problems?

### **4. Fabrika Sode Lukavac**

The soda company has a Turkish owner. It is very active in the field of environmental management and gave a very detailed presentation about the progress made in the field of energy efficiency and environmental protection. Soda has 600 employees and a history of 110 years of soda production with a current capacity of 300.000 t/year. Over the last few years the company invested 37 Mio. € including 2,5 Mio. € for environmental protection. Soda company is fulfilling the relevant EU regulations and is therefore one of the first soda companies holding an environmental licence. The company will implement ISO 9001 certification as well as safety regulations until the end of 2010. Furthermore, it wants to reach an ISO14001 certification.

Examples for the various enhancements in the field of environmental protection:

- Originally, the production of 1 t of soda needed 100 m<sup>3</sup> water. Currently just 20 m<sup>3</sup> are needed and until the end of 2010 12 – 15 m<sup>3</sup>. This is reached with new filters.
- Closed ventilation system
- CO<sub>2</sub> elimination
- Closed cooling system
- Minimum amount of waste
- Energy efficiency measures
- The emissions of the company are measured once a year by a national control organization.

Suggested course contents:

- Industrial/ toxic waste treatment
- Maintenance of facilities and equipment related to environmental protection
- Possibilities of using waste from industry
- Best available technologies worldwide
- Influence of investment to decrease environmental pollution

### **Conferences and dissemination**

According to the program, the aim of the project was explained to the target group which consisted of staff from industry, professors of universities and the press. As a conclusion it

might be stressed that almost everybody in the audience agreed that one of the primary activities of engineers in the field of sustainability is the protection of the environment and that this includes the implementation of 'green' methods of design and process control. Rigorous standards (legislation) in the field of environmental protection are requested stronger in the industry (chemical and food) today. There is a need for cleaner processes and for 'end of pipe systems' to clean the waste water and the exhaust gases. But let start with the cleanup of the enormous inheritance of pollution from the past.

## **VISIT TO SKOPJE AND STIP**

Period: 21 June – 25 June 2010

Western partners:

Katrin Mueller-Hansen, Institute for Applied Material Flow Management, Environmental Campus Birkenfeld, Germany

Marc Van Acker, Katholieke hogeschool Sint-Lieven, Gent, Belgium

Program and local partners, see application form: Joint project 2009

### **Visit to Bomex Refractory Factory**

Founded in 1949; 1996-2001: complete privatisation; 2004: member of Bomex Holding Group. The installed capacity for the refractory bricks amounts to 50 000 tons; the realised amount in 2009 was 19 000 tons because of the crisis.

The scheme of the technological process is as follows: the receipt of raw materials in a warehouse, handling of those materials (crushing, milling, separation en homogenization), production lines, control and storage. There are tree types of energy consumption: electricity, petroleum and heating oil.

### **Waste streams:**

- The oil from the mechanical workroom is collected and sailed.
- The waste from the technological process is stored and returned back in the industrial process.
- Emitted gases from the furnaces (petroleum) and from the boiler room (heating oil) are O<sub>2</sub>, CO, SO<sub>2</sub>, NO<sub>2</sub>, CO<sub>2</sub>.
- Particulate matter (dust) from the boiler room, the ball mills and the crushers.
- No transparencies concerning the water flows; the consumption of water (communal, drinking water) amounts to 3000 m<sup>3</sup>/month; mostly evaporated.

### **Monitoring (two times in a year):**

Technolab is the certificated laboratory for controlling the emissions.

### **Legislation:**

According to what the company maintains there are laws (close to the European Union Standards) for environmental protection (waste, water, ambient air and noise).

### **Main problems:**

Dust, SO<sub>2</sub> and NO<sub>2</sub> emissions.

### Conclusion:

The problems appropriate to pollution are in accordance to the low production capacity in the process. A great effort was made to produce in closed cycle (in situ); also waste was used in the process from the used refractories and porcelains (recycling). It was clearly visible that the dust problem in the working places was really a problem. The need for education in sustainable industry is necessarily related to the refractory technology.

### **Meeting in Chamber of Commerce, Skopje**

The representatives of the Chamber of Commerce in Skopje stated that environmental legislation is already quite good in Macedonia. Yet, the problem is the implementation of the existing legislation. For example the waste management regulations are close to EU waste management regulations. Yet, there is not enough financial capacity to build up a waste management system. The separation of Municipal Solid Waste just started recently. Up to now all the wastes are land filled. The Chamber of Commerce is currently looking for project funding to help the companies building up a more advanced environmental management system.

### **Visit to Eurokompozit Company, Prilep**

Eurokompozit was established in 1952. It produces electro-insulating materials and since 1978 composite materials (like filament-wound tubes and pipes, laminates etc.) and special purpose products (like ballistic products – e.g. safety helmets, hand-held rocket launchers, ballistic protective equipment etc. - and spare parts for agricultural machinery). It is state owned and has 460 employees. Eurokompozit is certified by ISO 9001 and has various business contacts with different European countries. A large part of the waste of the production process is reused in the company.

Eurokompozit fulfills the regulations for waste and waste water treatment. A municipal company is taking care of waste and waste water treatment. Special wastes are land filled. Waste water is neutralised and then discharged to the city canalization of Prilep.

### Technologies:

Impregnation, lamination, filament winding, molding compounds production, open/closed mold molding, machining, CNC machining, water-jet cutting of composites

### Raw materials:

Phenolic resins, silicone resins, thermoplastics, glass, polyamide, aramid, HPPE, carbon, cotton

### Environmental Problems:

- Air pollution: There is a filter system in the production halls to clean the air that is in accordance with the respective Makedonian regulations. Yet, the company realizes that the air pollution is still to high.
- Waste Management: Security of landfilling of special wastes?

### Suggested course contents:

- Air pollution control

### **Conferences and dissemination.**

According to the program there were presentations about sustainable technologies, zero emission, life long learning and SWOT analysis. The audience consisted of representatives from industry, universities, administration, Chambers of Commerce and press. The result of

the discussions can be summarised in the entire wish for collaboration of universities and enterprises. The knowledge from the partners from the European Union can be of great value to industry to make their industries more sustainable.