



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

# Annual Quality Evaluation Report of External Expert

**1<sup>st</sup> year**  
Gyula Vatai



Tempus JPHS-159989-1-2009-1-BE

Creation of university-enterprise cooperation networks for education on sustainable technologies

Annual Quality Evaluation Report of External Expert  
First year

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The quality assessment was done according to the EFQM Model of Excellence

1. Leadership
2. Policy and strategy
3. People
4. People results
5. Processes
6. Customer results
7. Key performance results
8. Society results
9. Partnership resources

## 1. The quality assessment

### 1.1 Criteria "Key Performance Results" and "Policy and Strategy"

Outputs and Outcomes in correspondence of the objectives of the project

#### Output 1

Review and analyze the existing knowledge of the staff from industry on sustainable industry issue

#### Activity 1.1

*To invent and analyze the status of knowledge in industry regarding the topics of the courses*

As it has been planned for the first year of the project, the level of the knowledge of the staff from industry will be evaluated regarding the topics of the courses. The results will be analyzed in order to adopt the planned courses according to their knowledge. The evaluation will be done by means of tests and through communication with the staff from industry, with their management and on the base of the available data.

During the Workshop held in **Novi Sad 20 - 21 April, 2010**, according to the application the tests for the evaluation have been prepared.

In order to have objective information on the level of knowledge of the staff from the industry, 3 types of Questions have been created. The 1<sup>st</sup> Questionnaire covers the questions concerning the management system of the company. The 2<sup>nd</sup> one is a set of questions focusing on technical and technology details important for the production process. The 3<sup>rd</sup> - the most important one - consists of questions on sustainability. The latter was the basis for assessment of the level of knowledge. The proposed test:

1. The level of management in the company concerning sustainable technologies
  - Basic data of the company
  - HSEQ system (structure)
  - HSE system (structure)
  - Organisational structure of the company concerning environmental protection
  - HSEQ, HSE and other documents in the field of environmental protection

- Training courses in the field of environmental protection
  - Company strategy of education concerning environmental protection
  - Courses and certificates
  - Structure of the employees concerning environmental protection
  - ISO 14001
  - ISO 9001
  - OHSAS 18001
  - HACCP
  - Others
2. The existing level of staff knowledge concerning sustainability
    - List of questions for employees
  3. The level of existing technology in the company concerning sustainability
    - Technology scheme of the company
    - Total balance (raw materials, energy, water, others)
    - Outputs (products, wastes)
    - Processes
      - Capacity
      - Material balance (raw materials, package, products)
      - Energy
      - Water
    - Simplified technology scheme and process features
    - block diagrams of unit operations
    - Washing and maintenance
    - Tanks (reservoirs)
    - Energy units
    - Wastes
    - Monitoring
    - Accidents and risks

The review and analysis of the existing knowledge of the staff from industry on sustainable issue is the basis for further activities in the companies involved in this Tempus project focused on companies in Serbia, Bosnia and Herzegovina and The Former Yugoslav Republic Macedonia. In this period of the project the level of knowledge of the staff from industry has been analyzed in 13 companies in Serbia, Bosnia and Herzegovina and The Former Yugoslav Republic of Macedonia. The most of the companies cover food and pharmaceutical technology (4 + 5). Three (3) companies deal with inorganic technologies and metallurgy. One company deals with the production of lubricants and industrial oils. The mentioned companies have more than 10,000 employees. The analysis covers over 100 employees who are directly responsible for production, control and environmental protection. The objective of the Project is to enhance the level of knowledge of the staff from the industry related to sustainable industrial production. To achieve this goal special courses will be created on sustainable technologies, because in the near future, the tested staff will be responsible for the application of new attainments and technologies on environmental issues.

The results of the tests in the 13 companies show a wide variety of knowledge, from a very high to very low level. It was interesting that the level of general knowledge on environment is independent of the education level of the tested staff. It can be correlated with the level of environmental management system in the company. The companies with the achieved high level knowledge have a clear environment programme in practice. In some companies the relatively low level of knowledge (below 40%) indicates the need of Introductory course oriented to the basic knowledge on environment issues.

## Activity 1.2

SHORT VISIT OF EU EXPERTS TO WB PARTNER UNIVERSITIES

### *Short visit of EU experts to BA 31 May - 05 June 2010.*

The internal expert and the other participants visit has been accomplished in two parts: 31<sup>st</sup> May - 02<sup>nd</sup> June 2010 - meeting with the partners from the BA Universities UNIVERSITY OF EAST SARAJEVO, FACULTY OF TECHNOLOGY, ZVORNIK and 03<sup>rd</sup> - 05<sup>th</sup> June 2010 - meetings with the partners from UNIVERSITY OF TUZLA FACULTY OF TECHNOLOGY, TUZLA. At the time of the meetings the problems about the carrying out of the planned activities of the Tempus project has been discussed. The questions like - the level of existing technology in the company concerning sustainability, teaching materials, internal and external resources (university schedules, preliminary courses and modules, equipment, connections with industry, Tempus funds etc.) have been openly discussed at the time of the meetings and visits of the faculties, some companies as well as other institutions. Multimedia presentations about the outputs and outcomes from the first year of the project have been prepared and discussed.

During the visit to Bosnia and Herzegovina, 31<sup>st</sup> May - 05<sup>th</sup> June 2010 the experts visited UNIVERSITY OF EAST SARAJEVO, FACULTY OF TECHNOLOGY, ZVORNIK between 31<sup>st</sup> May - 02<sup>nd</sup> June 2010. On Tuesday 01<sup>st</sup> June 2010 Zvornik and Bijeljina they visited two factories related to different industries. GLINICA is an alumina factory in Zvornik and SPECTAR DRINK is a juice and fruit factory located in Bijeljina.

Few words from the internal EU experts report about the visit to Alumina Factory 'Birac' in Zvornik: "Birac is located in the industrial zone of Zvornik, 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 quarts 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.

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".

On the basis of this report there are few questions related to environmental impact of this factory, as well as economical feasibility of the production process:

- Transportation of the raw material from South America to Zvornik - is it economically feasible,
- What is the ratio of the imported and own raw material,
- What is the ratio of produced wastes and the main products,
- What happens with the lake filled with "red mud".

The priorities of the factory 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.

The opinion of the internal EU expert about 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".

**Result of factories visit:** *Review and analyze the existing knowledge of the staff from industry on sustainable industry issue:* rating the level of knowledge in the field of sustainable and zero waste technologies.

WORKSHOP on "*Screening and analyzing knowledge transfer from university to industry and formulation of the course scheme*" held at Faculty of Technology Zvornik. The AGENDA was as follows:

-Review and analyse the existing knowledge of the staff from industry on sustainable industry issue

-Results of the test

-Knowledge in Bosnia and Herzegovina on sustainable industry issue especially the level of knowledge of industry for which the courses will be held

-Sustainable technologies defining the first course scheme

DISSEMINATION CONFERENCE on "*Screening and analyzing knowledge transfer from university to industry and formulation of the course scheme*" organized also at Faculty of Technology Zvornik, with the following schedule:

*Part I: Sustainable technologies and focus problems on education*

-Presentation of the Project, "Creation of university-enterprise cooperation networks for education on sustainable technologies"

-Life Long Learning in the field of sustainable technologies

-Evaluation of current level education in the field of sustainable technologies,

-The development of chemical, and food industries and the need for education in sustainable technologies,

*Part II: SWOT situational analysis*

-Introduction to SWOT situational analysis of training needs for education in the field of Sustainable Technology

-Conducting analysis and discussion of participants, defining training needs, vision and strategic objectives in the field of education,

-Conclusions of workshop and evaluation of dissemination: Required education; Defining the course scheme.

The second part of the visit to BA was organized to visit UNIVERSITY OF TUZLA, FACULTY OF TECHNOLOGY, TUZLA and some factories in the surrounding, from 03<sup>rd</sup> - 05<sup>th</sup> June 2010, as well as Chamber of Commerce of Tuzla. The topics discussed was "Review and analyse the existing knowledge of the staff from industry on sustainable industry issue. In the frame of this program, Visit to Factories: Solana Tuzla, Zada pharmaceutical Lukavac, Cement factory Lukavac and Fabrika sode Lukavac was organized.

The opinion of the visitors from the Meeting in Chamber of Commerce, Tuzla are that 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 (respiratory problems for the citizens especially for children)

- Water pollution (Modrac lake)
- Only one waste water treatment plant for 12.000 persons in Kanton Tuzla
- Land filling

Already one project was generated in cooperation with the Environmental Ministry of Bosnia and Herzegovina on cleaner production in industry. This project identified the following problems: Very old and high energy consumer technologies, energy efficiency is too low and no suitable regulations.

In the report about the "Visit to 4 Companies in Tuzla and Lukavac" it was mentioned that it was short time for the company visits to see the manufacturing process. Thus, the conclusions are made based on the discussions with the company representatives, which are much more optimistic than the real state of the art related to environmental impact and sustainability.

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. The suggested course contents are well defined:

- 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?

What are the current problems in manufacturing, it can be specified in details. How old is the factory? They are using the up to date technology? What is the environmental impact of the technology comparing with the German ones?

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 (BAT) worldwide
- Influence of investment to decrease environmental pollution

### ***Result of the visits to factories***

*Review and analyse the existing knowledge of the staff from industry on sustainable industry issue: rating level of knowledge in the field of sustainable and zero waste technologies.*

WORKSHOP AND DISSEMINATION CONFERENCE Friday 04<sup>th</sup> June 2010 Tuzla „ Screening and analysing knowledge transfer from university to industry and formulation of the course scheme“ organized by Faculty of Technology Tuzla

*Meeting was attended by:*

Representatives of the chemical, food and farmaceutske industry

Representatives of the Municipality of Tuzla and the Tuzla Canton s responsinle for development and ecology

Senior students of Faculty of Technology Tuzla

Professors and assistants of the Faculty of Technology Tuzla

Professors of other faculties and universities.

### ***Part I : Sustainable technologies and focus problems on education***

- Presentation of the Project, Creation of university-enterprise cooperation networks for education on sustainable technologies
- Distance Learning in the field of sustainable technologies
- Zero Waste sustainable technologies - Example from Velenje
- Evaluation of current level education in the field of sustainable technologies
- The development of chemical, pharmaceutical and food industriy and the need for education in sustainable technologies
- Sustainable technologies in the industry Tuzla canton, the assessment on required education

### ***Part II: SWOT situational analysis***

- Introduction to SWOT situational analysis of training needs for education in the field of Sustainable Technology
- Conducting analysis and discussion of participants, defining training needs, vision and strategic objectives in the field of education
- Conclusions of workshop and evaluation of dissemination: Required education; Defining the course scheme

### ***Part III: Dissemination conference***

- Conclusions
- The needs for staff education in the industry in the area of sustainable technology
- Required education
- Defining the course scheme

### ***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 the Former Yugoslav Republic of Macedonia in period of 21<sup>st</sup> - 25<sup>th</sup> June 2010.***

During the visit in the first part of the the project participants visited UNIVERSITY OF CYRIL AND METHODIUS, FACULTY OF TECHNOLOGY AND METALLURGY, SKOPJE from 21<sup>st</sup> - 23<sup>rd</sup> June 2010.

On Tuesday 22<sup>nd</sup> June 2010 the participants of the project visited factory BOMEX in Pehcevo.

From the report of the EU expert Katrin Mueller-Hansen "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 and homogenization), production lines, control and storage." the main problems in the factory are: Dust, SO<sub>2</sub> and NO<sub>2</sub> emissions.

The advantages of the factory is that the company maintains the laws for environmental protection (waste, water, ambient air and noise) which are close to the European Union Standards. 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.

On Wednesday 23<sup>rd</sup> June 2010 a WORKSHOP "Screening and analyzing knowledge transfer from university to industry and formulation of the course scheme" organized at Faculty of Technology and Metallurgy, Skopje. The presentation of the Project "Creation of university-enterprise cooperation networks for education on sustainable technologies" by Emilija Findancevska the participant of the project discussion concerning the environmental issues for Macedonia was conducted.

At the same day in the afternoon a CONFERENCE OF DISSEMINATION "Screening and analysing knowledge transfer from university to industry and formulation of the course scheme" at Faculty of Technology and Metallurgy, Skopje was organized:

***Part I: Sustainable technology and focus problems of education***

- Presentation of the Project: "Creation of university-enterprise cooperation networks for education on sustainable technologies"
- Sustainable technologies
- Zero emission
- Sustainable technologies in the industries in Macedonia, estimated need for education
- Life Long Learning in the field of sustainable technologies

***Part II: SWOT situational analysis***

- Introduction to SWOT situational analysis of training needs for education in the field of Sustainable Technology
- Conducting analysis and discussion of participants, defining training needs, vision and strategic objectives in the field of education
- Conclusions of workshop and evaluation of dissemination. Required education Defining the course scheme

Also in same day a meeting in Chamber of Commerce, Skopje was organized. The representatives of the Chamber of Commerce in Skopje stated that environmental legislation is already quite good in Macedonia. The only problem is the implementation of



the existing legislation. For example the waste management regulations are close to EU waste management regulations, but 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.

The another two days the participants visited UNIVERSITY GOCE DELCEV, FACULTY OF TECHNOLOGY STIP, from 24<sup>th</sup> - 25<sup>th</sup> June 2010, and a factory in the surrounding of Stip. On Thursday 24<sup>th</sup> June 2010 a WORKSHOP "Screening and analyzing knowledge transfer from university to industry and formulation of the course scheme" at Faculty of Technology, STIP. After presentation of the project by the participant of the project Vineta Srebrenkoska the project planes related to Macedonia has been discussed by the participants of the Workshop.

In the afternoon a CONFERENCE OF DISSEMINATION "Creation of university-enterprise cooperation networks for education on sustainable technologies" was also organized:

#### *Part I: Sustainable technology and focus problems of education*

- Life Long Learning in the field of sustainable technologies
- Sustainable technologies in industries in Macedonia, estimated need for education
- The development of textile industries in R. Macedonia and the need for education in sustainable technologies
  1. General classification of solid wastes from textile industry
  2. Management of solid waste in the textile industry in R. Macedonia
  3. Influence of the strategy for waste management of R. Macedonia from 2008 - 2020 years on the textile industry

#### *Part II: SWOT situational analysis*

- Introduction to SWOT situational analysis of training needs for education in the field of Sustainable Technology
- Conducting analysis and discussion of participants, defining training needs, vision and strategic objectives in the field of education
- Conclusions of workshop and evaluation of dissemination.
- Required education
- Defining the course scheme

#### *Conferences and disseminations*

From the report of the internal Eu expert Katrin Müller Hansen it is obvious that 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.

On Friday 25<sup>th</sup> June 2010 the participants visited Factory EUROKOMPOZIT Prilep. On the basis of the report of internal EU expert "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 fulfils 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".

The Environmental Problems caused by the company are - air pollution: There is a filter system in the production halls to clean the air that is in accordance with the respective Macedonian regulations, but the company realized that the air pollution is still too high. On the basis of this the suggested course contents is "Air pollution control".

### ***Short visit of EU experts to RS 04<sup>th</sup> - 08<sup>th</sup> July 2010.***

The host institution in the first period of the visit was UNIVERSITY OF NIŠ, FACULTY OF TECHNOLOGY, LESKOVAC from 04<sup>th</sup> - 06<sup>th</sup> July 2010. On Monday 05<sup>th</sup> July 2010 a visit and discussion in the Regional Chamber of Commerce and Industry Leskovac has been organized.

In the same day a WORKSHOP related to the Tempus project has been organized at the Faculty. The topics of the Workshop was:

- Presentation of the Faculty of Technical Chemistry
- Presentation of the Institute of Applied Material Flow Management
- Presentation of the Project „Creation of university-enterprise cooperation networks for education on sustainable technologies“
- Lifelong learning in the field of sustainable technologies
- Integrated Management Systems in the Pharmaceutical Company Zdravlje-Activas
- Situational analysis and the need for education in sustainable technologies in Region of South
- Conclusions and defining the course scheme

During the stay in Leskovac the participant visited DCP Hemigal. The company is located in the industrial zone of Leskovac, Serbia. Founder and owner Živorad Denić started the production in Leskovac on March 22<sup>nd</sup>, 1995 with its prime activity being the development and the production of cosmetics. Until June 2006, the company performed its activities in rented locations in Leskovac. Nowadays, the entire production line, the development and quality control laboratories along with the stock moved to the current location in the industrial zone of Leskovac.

As it pointed out in the report of the internal EU expert "The company has high quality and environmental standards enforced, which could be observed during the company visit. The management systems that have been certified according to ISO 9001 and ISO 14001 have led to continuous improvement in recent years. During the discussions with the executive manager, interest in energy and carbon management has been signalled, wherefore additional material has been provided. Here, further University-Enterprise Cooperation could yield in increasing energy efficiency as well as decreasing product-specific Greenhouse Gas Emissions. This could be communicated via a Carbon Footprint for e.g. Baby Care Products so that responsible production may increase sales and thereby improve the competitiveness of DCP Hemigal.

During the visit to Serbia, in the second part of the visit the participants hosted by UNIVERSITY OF NOVI SAD, FACULTY OF TECHNOLOGY, NOVI SAD, in period of 06<sup>th</sup> - 08<sup>th</sup> July 2010. In the first day of staying (Tuesday 06<sup>th</sup> July 2010) in Novi Sad a visit to the Health and Safety Institute in Novi Sad was organized. During this meeting a short Presentation of the Health and Safety Institute was shown by the director of the Institute. The Activities of The Chamber of Commerce East-Flanders was presented by Katrien Moens. After the Discussion a Visiting tour of Institution was organized.

On the next day visit of the participants in the project was organized to Alltech-Fermin, Senta. Alltech Serbia AD Senta employs 242 people and its core activity is the production of yeast and other foodstuffs, including fresh baker's yeast, instant dry baker's yeast, special active yeast for frozen dough, special active dry yeast, yeast extract in a variety of forms, and dietary products for human consumption. The topics presented and discussed during the meeting with the representatives were:

Presentation the Factory, Activities of Factory on environmental protection and sustainable technologies, Waste water treatment in Alltech-Fermin, Zero emission. Discussion about the presented topics were organized which resulted in the Proposals of topics for the

courses

The Alltech-Fermin company is very interested to have courses on proposed issues. Especially, The Company is interested in energy reduction and environmental protection issues.

During the company presentation, the representatives introduced some of the investments made in recent years that have led to increased capacity and a significant increase in the quality of the products produced. Furthermore, numerous certifications indicate the well-managed operation of the company. Parts of the lately installed state-of-the-art wastewater treatment, however, have been introduced as not functional due to problems with the anaerobic fermentation unit. Here, further process optimisation could be the topic for a close University-Enterprise Cooperation. Furthermore, a Material Flow Analysis for the entire region could yield in substantial energy potentials due to the close range to the neighbouring sugar factory.

In the same day the participants also visited Sugar factory Senta. Akcionarsko Društvo Fabrika Šećera TE-TO Senta is the local sugar company, which is in direct neighbourhood to Alltech Serbia AD Senta. The company can process a maximum of 7.000 t sugar beet per day. The average production capacity, however, is 5.859 t per day. Due to the production, about 25.000 t of Molasses result every year.

The program was similar as in the nearby yeast factory. In the presentation of the company special target was emphasized on Activities on environmental protection and sustainable technologies and Zero emission. After discussion the Proposals for topics for the courses were proposed. The topics of the main interest for the Sugar factory are: energy savings and environmental protection.

During the meeting with the General Director and further employees anaerobic fermentation has been mentioned as a promising alternative for the treatment of the molasses. However, a lack of information has been mentioned, wherefore a University-Enterprise Cooperation should be envisaged in the field of Material Flow Analysis as well as regenerative anaerobic fermentation and process integration.

On Wednesday 07<sup>th</sup> July 2010 a Workshop at the Chamber of Economy of Vojvodina in Novi Sad was organized where in the program of the meeting the Presentation of the Project "Creation of university-enterprise cooperation networks for education on sustainable technologies" was organized, as well as lecture about Zero emission by Philipp Rosenthal, and Clean air production as well as Air pollution Control Techniques for Dust- and Aerosol emissions by Wilhelm Hoeflinger were presented. The presentation "NIS a.d. and the main environmental issues" was shown by Dedovec Stanislav. Activities of Chamber of commerce East-Flanders related to energy/environment Learning networks and seminars was introduced by Katrien Moens, followed by presentation "Lifelong Learning in Serbia delivered by Pere Tumbas. A Review and analyze the existing knowledge of the staff from industry on sustainable industry issue was done by Slobodan Sokolović. At the end of the meeting the "Presentation the first Course scheme" was shown by Zoltan Zavargo.

Moreover, the review and the analysis of the existing knowledge of the staff from industry on sustainability issue has been presented as well as the first course scheme and the Professors that will go on retraining sessions. Afterwards, several discussions have indicated the high awareness of the participants concerning sustainability, wherefore the suitability of the Tempus project can be underlined.

On Thursday 08<sup>th</sup> July 2010 the participants visited NIS a.d. company Department for HSE Novi Sad. The participants of the Workshop and Dissemination Conference were informed about the general outline of the project "Creation of University-Enterprise Cooperation Networks for education on sustainable technologies". Furthermore, they got an impression what is meant by the Zero Emission Concepts as practiced in Germany, as well as activities of the Chamber of Commerce East-Flanders in the field of Learning Networks and Seminars for Energy and Environment.

## Output 2

## Retraining the staff from WB partner universities in BE, DE and AT

### Activity 2.1

#### *Retraining and updating of PC universities staff in BE 12<sup>th</sup> - 18<sup>th</sup> September 2010.*

The training course was organized for 18 participants from WB PC. All of the participant countries, faculties and Chamber of Commerce/Economy and/or Industry had 1-2 representatives also. My opinion is that the organization and management of the project in the former 1 year period was excellent, as well as this retraining event. In the first day the Flemish Regulation Concerning Environmental Permits case study was introduced to the participants. VLAREM is the Flemish Regulation Concerning Environmental Permits. Two types of legislation have been discussed: VLAREM I, Permits and VLAREM II, Standards. At the present environmental license valid for 5 to 20 years. CASE STUDY about Paint company De Ruiters. The company is located in industrial area, hired from city. The activities of the company are: production of paint and glues as well as distribution of the wall paper. The effluent of the company are: domestic and factory effluents The Factory has it's own physical-chemical purification installation.

As an another case study Sustainable building at KaHo Sint-Lieven has been presented. The link of education, research and society related service in sustainable building was the main objective of the presentation. An idea of European wide approach in low energy sustainable building was concisely presented and the impulse for dissemination in the Balkan region was activated trough discussion.

In the same day Tour with visit to the laboratory of environmental technology, This visit was in the defined activities in TEMPUS project. The laboratory is developed for deposition of metal coatings and treatment of waste water generated in the process of Kaho Sint-Lieven HOGESSCHOOL. Wastewater generated in the process of galvanization is purify in the membrane process and in the ions exchange process, where it removes most of the cations and anions of metals from wastewater. Then the water is treated electrochemically so it removes metals of very low concentrations. The complete process is monitored, the concentration of metal cations and anions in wastewater are controlled.

On *Tuesday 14<sup>th</sup> September 2010* Company visits were organized for the participants. The Visits were attended by Katholieke Hogeschool Sint-Lieven, Gent, Belgium Marc Van Acker VOKA-Chamber of Commerce East-Flanders, Dendermonde, Belgium Katrien Moens and 18 participants from WB PC. The first company visited was **Volvo Cars Gent**. Volvo assembles cars in Ghent, Belgium, since 1965. Here it operates an up to date facility, one of its two main assembly plants (the other being Volvo Cars Torslanda in Gothenburg, Sweden). Volvo Cars Gent undertakes to maintain an eco-management system which meets the requirements of the Volvo Car Corporation's general management system and ISO 14001 in order to ensure that its environmental policy and corresponding environmental objectives are complied with and to facilitate management supervision of its environmental aspects.

In the afternoon of the same day a visit to **Breydel, Antonio Vleeswaren bvba**. The Factory Breydel Gent is a meat processing plant, primarily for production two types of products HAM and SPEK. In addition, the factory make other kind of meat products from cut meat pieces obtained during two major products production. From pieces of meat they make lunch meat and pastes. Waste products are separately collecting: paper, plastics, fat and bones, ink cartridges and other (remains in production), than silt of fat from the well, fat from the sieve, salted water (from production process) and sludge from the waste water installation. All of them are collected by recognised firms, registered in files and reported to the government. In the factory is installed Cycle wastewater, from cleaning and cooking process to purifying aerobic plant. WASTEWATER is refined (purification) in one cycle.

On *Wednesday 15<sup>th</sup> September 2010* the participants had a meeting at Katholieke Hogeschool Sint-Lieven, Gent, Belgium, where they were informed about organization of Lifelong learning. The mission of the Service for advanced courses (SAC). The purpose of SAC is to develop educations which respond to the demands of the society, to support

developing and organizing postgraduate courses, as well those from the SAC itself as those from the departments, to be open to cooperate with external organizations in order to develop and organize (professionally and socially) relevant educations. The main activities of the SAC are: Symposia (update courses), Postgraduate courses (< 20 credits), Postgraduate study programme (>20 credits) and Continued education (60 credits).

On *Thursday 16<sup>th</sup> September 2010* participant visited Kaho Sint-Lieven campus Dirk Martens, Aalst, Belgium. The Meeting was attended by the all participants from PC and it was related to Trainings about renewable energy. It was introduced by Energy expert type A Peter De Coster. The target was: Training for people who can help firms, organizations and private families to save energy and money on their energy cost. An energy coordinator can indicate those things which waste a lot of energy, can advise firms, organisations and families to decrease the energy cost. The training lasts 1 semester, 1 day/week; the teachers are mostly professionals of the industry, at the end of the training the student has to make a thesis. 30 students graduate per year as "energy coordinator". People who graduate this course may write EPC-certificates and became Energy expert type A. They know a lot about insulation, heating and cooling a house and they can recognize the different materials.

The participants were informed about **efficient energy use at the Campus** by Peter De Coster. The campus Dirk Martens did the following energy saving investments: the rooftop of the main building was additionally insulated (+18cm), equipment for energy consumption recording was bought. The heat energy is produce the near the point where it is needed. It was detected that the Ventilation is a major cause of energy loss. In order to minimize this energy loss the amount of fresh outdoor air was minimized.

on the next day the participant visited a Waste water treatment Company AQUAFIN. In the wastewater treatment plant AQUAFIN wastewater from the houses is transported and treated in this plant. Treated water is discharged to recipient. By-product from wastewater treatment plant is sludge which is reused, recovered or incinerated with energy recovery. Biogas produced by sludge digestion is used to produce green power.

Visit to the IVAGO company in Ghent was realized on *Friday 17/Sep/2010*, from 10 to 12 hours, according to programme. The presentation was made by the company's general manager, Mr Paul Dobbelaere. IVAGO represents inter-communal co-operation for waste management in Gent and Destelbergen. The main activities of IVAGO are collection of household waste, cleansing services city of Gent, marketing of collected waste fractions, waste communication and education programs, refuse waste incineration with energy recovery. Sustainable waste management of IVAGO follows waste hierarchy including prevention, reuse, recycling, incineration with energy recovery and no landfill disposal of untreated waste.

The gained experience in retraining program on sustainable industry will help the participants to create and develop new curricula for the staff from the industry of RS, BA and MK.

## **Activity 2.2**

### ***Retraining and updating of PC universities staff in DE 10<sup>th</sup> - 16<sup>th</sup> October 2010.***

On *Monday 11<sup>th</sup> October 2010* the participants from WB countries visited Zero-Emission Campus Birkenfeld (ECB), Institute for Applied Material flow Management (IfaS). The Meeting was attended by the stuff from the host institution, Institute for Applied Material flow Management Katrin Mueller-Hansen, Michael Knaus, Katharina Schlegel and the 24 participants from WB PC.

Zero emission campus Birkenfeld, **material flow management (MFM)**, circular economy and sustainable development as well as several case studies selected from IfaS projects were the main topics of this presentation. **Ecological campus Birkenfeld** was presented as a concept of: zero-emission heat and energy, active and passive utilization of solar energy, energy efficient building concept. A new approach of zero-emission water concept was introduced. The projects in the frame of the IFaS were mainly oriented to the MFM and

it was presented as a tool for green business development. *Circular economy* with MFM approach allows the activation of potentials i.e. the regional added value follows by activation of regional resources. So, *MFM* enhance regional added value. The MFM methodology was explained through the definition of material and energy flows in a system which has to be analyzed and optimized; material flow analysis; identification of the major efficiency, sufficiency and optimization potentials; identification of regional key stakeholders and decision makers, etc. The vision for low-energy house, sustainable buildings as energy producer of the future and circular economy city planning were discussed as topics particularly interesting for the future sustainable development.

In the same afternoon a company visit to **Biomass CHP Plant of OIE in Neubruecke** was organized for the participants from WB. With base in Idar-Oberstein and its field offices in the region, OIE AG maintains an extensive network of service facilities. In essence, OIE AG limits itself to its traditional territory and therefore the individual needs of region are most responsive, too. The liberalization of the electricity market has put the new challenges onto OIE AG as the company in energy industry. Competition, efficiency and future-oriented actions in the interests of consumers are the goals which they are focused on. Biomass heat and power plant (Biomass CHP) located in Neubrücke, has the development concept based on the regenerative use of wood fuels and biogas in cogeneration plant (wood chips: 29 MW thermal and 8.3 MW electric energy; biogas from anaerobic digestion: 430 kW thermal and 2 X 310 kW electric). The investment was completed in 2003 and the cost was 15 million euros.

On **Tuesday 12<sup>th</sup> October 2010** a half day Meeting was organized in Institute for Applied Material flow Management attended by all of the 24 participants from WB PC. A presentation about Industrial Material Flow Management was held by Michael Knaus. He focused the presentation to The Global Experiences from a leading German Non-Profit Research Institute. The zero emission approach was explained and its development through the end-of-pipe as well as the cleaner production. The following topics were in the focus of the training: Different System Borders for Material Flow Management (MFM) and the General Goals of Enterprises, core elements of Industrial MFM where particular attention was paid to the Life Cycle Analysis, Eco-Efficiency. Cleaner Production and ECO-Profit as well as Environmental Management BASF sustainability tools: Eco-Efficiency Analysis and SEEBALANCE were presented as a sample for sustainability approaches. Also, the key elements of eco-efficiency: re-engineer processes, re-valorize by-products, re-design products and re-think markets were discussed.

In the afternoon **Juwi, a Zero-Emission Company** was shown to the participants. During the visit to "JUWI" company, the participants were introduced with the concept of zero-emission technology. The company's business strategy is based mainly on the utilization of solar and wind power energy. We visited the areas where they installed solar panels and windmills to generate electricity. In Germany, among others, this company has installed over 400 wind turbines that produce over 600 MW of energy. They use solar energy with 1,400 PV installations, and installed capacity more than 600 megawatts. This means, that annual CO<sub>2</sub> savings is approximately 325,000 tons. They also produce biogas and biomass from dried pellets and apply it for heat energies production as well as electricity power generation.

On **Wednesday 13<sup>th</sup> October 2010** in the Institute for Applied Material flow Management a *lecture of Financing of R&D projects in the Clean Technologies Sector* the company LEE sàrl CFO had the presentation about their business services, success and future plans. This company was founded in 2000 with the number of 12 employees. This company is a service-oriented with high core competence in the fields of planning, development, construction and support for agricultural and industrial biogas plants which are deployed within a wider concept. With experience in 100 projects in Europe, Canada and China, they offer a global and energetic business view of region all over the world. Today they extend their competences in the area of solid biomasses. The company L.e.e. s.à r.l presented some of their projects.

In the continuation of the session a lecture about **Carbon Foot printing** by Angel Avadi and Thomas Keller. In the lecture of Carbon Footprint the participants from WB PC got knowledge about the most powerful software tool for modeling, calculating and analyzing carbon footprint of products and companies. Carbon foot printing (CFP) is a term used to describe the amount of greenhouse gas emissions caused by a particular activity or entity. It relates to the amount of greenhouse gases produced in our day-to-day lives through burning fossil fuels for electricity, heating, transportation etc. New 'Umberto for Carbon Footprint' uses the latest software for material and energy flow analysis and life cycle assessment (LCA). Carbon footprint helps to introduce first life cycle thinking, better understanding of own processes, possibility to optimize processes or chose among alternative processes, give a possibility to optimize sourcing, providers, supply chain, etc.

On **Thursday 14<sup>th</sup> October 2010** the Experience with enterprise-university cooperation was presented in Areal Company by Dr. Bruch for 24 participants from WB PC. Areal is a corporation for sustainable water management. Areal has a long experience and is at the forefront of science and technology in the area of: decentralized, natural waste water treatment (reed bed filters) for household and community sewage, commercial and special burdened waste water (e.g. vini-cultural waste water), research concerning sustainable water management concepts (part of material flow management).

In the same day a Site - visit to **Energy Landscape Morbach** was organized also. Energy landscape Morbach is an example of shaping a future. Biomass, wind power and photovoltaic are here for business, research and citizens. The energy landscape Morbach is a unique concept for the intelligent use of local resources to save costs and resources in the region Morbach. On the grounds of the former U.S. army depot Rappaerath/Morbach the park for producing renewable energy was built. The produced electricity is fed into a grid; the produced heat is used to supply heat demands. Biogas and wood pellets are produced. The electricity is produced from wind power and photovoltaic.

On **October 15, 2010**, the TEMPUS participants visited the Waste Management Centre ZAK, Kaiserslautern - Mehlingen, a joint venture of the city and county (Landkreis) of Kaiserslautern. All kinds of waste from the neighbor area (about 250.000 habitants) are sorted, recovered and treated. The waste is subjected to 200 bar pressure to remove any liquids and to compress the remaining solid trash into compact blocks. ZAK uses about half of the trash to produce electricity via an incineration process, while the remaining half sends to another heating & power plant for processing. In ZAK's Environmental Education Center more than 500 children and young people have been taught through environmental experience every year since 1998.

### **Activity 2.3**

#### ***Retraining and updating of PC universities staff in AT 14<sup>th</sup> - 20<sup>th</sup> November 2010***

On **Monday 15<sup>th</sup> November 2010** at the University of Technology, Institute of Chemical Engineering a Workshop related to **Environmental Protection** was organized for the 14 participants from WB PC. A lecture Dust separation from air and gases was presented by Prof. Wilhelm Höflinger. The presentation was focused on the definitions and European regulations. The differences of dust (100µm) and aerosol (10µm) as well as the definition of aerodynamic diameter were defined. EU- Council Directive 1999/30 EC, PM10 and EU - Council Directive 2008/50EC, PM2.5 were briefly explained as environment regulations for Imission. Also, dust regulation for working place EN 481, ISO 778 was summarized. Imission and emission sampling was described in the frame of dust sampling and measuring methods.

The second presentation was about Separation of gaseous pollutants from air and gases by Gerd Mauschwitz. The presentation was focused on dust separators. The attention was paid on the explanation of different kinds of dust separators like: settling chamber, cyclone, bag house filter, wet scrubber and electrostatic precipitator. The scientific approach for filter mediums relating to the pore depth distribution and surface porosity was discussed.

On *Tuesday 16<sup>th</sup> November 2010* the program was continued at the same place. As a part of retraining seminar in Vienna Mr. Tobias Proll from Vienna University of technology presented his lecture "Chemical looping combustion for CO<sub>2</sub> ready steam generation". First of all Mr. Tobias Proll introduced us with organization scheme of Vienna university of technology and its department for Future energy technology. This department is divided in three parts; zero emission technologies, biomass gasification and gas cleaning and second generation biofuels. In each group they approximately have ten people. One of their basic research activities now is chemical looping combustion (CLC).

After the short presentation the Lab-tour was organized at the Institute of Chemical Engineering where we had opportunity to see pilot plants for CLC and biomass gasification and some other equipment, too.

In the same day Company visits were organized for 14 participants from WB PC to Waste water treatment plant EBS Vienna. *Entsorgungsbetriebe Simmering GmbH (EbS)* was founded in 1976. The city of Vienna is the sole proprietor of EbS, the *Simmering Waste Disposal Facilities*. Vienna's main wastewater treatment plant and the city's animal disposal plant have formed part of EbS since 2000. In Simmering, at Vienna's lowest point, where the Danube Canal meets the Danube, lies Vienna's main wastewater treatment plant. Here around 98 % of Vienna's wastewaters are purified. On dry-weather days this is more than 500,000 cubic meters, which corresponds to a flow of a medium-size river. It takes about twenty hours for the wastewater to pass through the mechanical and the two biological purification stages before it is purified and discharged into the Danube Canal.

About the *Incineration Plant MVA Pfaffenau in Vienna* a multimedia informative presentation was presented to the Tempus participants. In the presentation the participants were informed about how waste collection is carried out in Vienna, the processes involved in efficient partial separation, recycling and incineration of waste, and, in particular, the high-tech Pfaffenau waste incineration / combined heat and power electricity generating and district heating plant. Afterwards, the visitors were given a guided tour through the Pfaffenau plant - one of the most modern in Europe.

On *Wednesday 17<sup>th</sup> November 2010* a Company visit to *Sugar factory Tulln* was organized. Sugar factory in Tulln, in Austria, belongs to food company AGRANA; which has three sectors, and Sugar factory Tulln, with other Sugar factory in Leopoldsdorf, is part of company sector for sugar production (AGRANA Zucker GmbH). Sugar factory Tulln (in further text: Factory) is a large plant, in last campaign it processed about 1.5 million tons of sugar beet, and produced about 400 000 tons of sugar. Factory is founded in the year 1937; and the major improvement was installing a plant for obtaining sugar and betaine from molasses, which is in operation since 2002. About half of sugar beet, 47% is received directly from farmers (from distances shorter than 40 km), and another half, 53% from longer distances, is transported to the Factory by railroad. For the purposes of the participants from WB PC in Tempus program, the most important were energy and environmental aspects of sugar production. During the visit to Factory, following data were obtained: (i) consumption of ~ 1100 kWh energy per ton of sugar; (ii) cogeneration (combined heat and power): 140 tones of steam and 15 MW of electricity; (iii) two-steps biological treatment of wastewater from lagoons: ~ 5000 m<sup>3</sup>/day of treated wastewater into Danube.

Visit of the *Bioethanol plant in Tulln* was organized in the same day, because the Sugar factory Tulln (Zuckerforschung Tulln Ges.m.b.H.) is also active in the preparation, processing and application of agricultural products, not only in the foodstuffs area, but also in the area of renewable fuels. The bioethanol plant annually processes up to 620,000 tons of cereals to produce up to 190,000 tons of bioethanol as well as up to 190,000 tons of the high-quality, GMO-free, protein-rich animal feed Actiprot. During a recent research and development project concerning bioethanol production Sugar factory Tulln has found that the process can be significantly enhanced through the incorporation of commercially available cellulose enzymes to the fermentation process. Up to 55% of the cellulose



fraction within the fermentation substrate can be converted to produce an approximate 2.5% additional increase in BioEtOH per kg of raw material.

On *Thursday 18<sup>th</sup> November 2010* the participants of the retraining had an opportunity to visit *Scheuch Company Austria*. Fugitive dust emissions, (by Jorg Faschingleitner) gave us a clear presentation on danger of long-term exposure to fugitive dust, dust definitions and kinds, EU guidelines as well as methods of dust minimization.

The next topic was *Metalworking mist separation* delivered by Thomas Laminger. Metalworking fluids play very important role in different field of application like: Cutting processes such as drilling, turning, milling, broaching, honing, grinding. But, metalworking fluids (MWFs) have been clearly documented as causing severe health problems due to workers coming in contact with these metalworking fluids such as contaminated toxic solvents, oil mists, coolant mists and oil containing smoke. Millions of workers who are employed in the manufacture of automobiles, farm equipment, aircraft, heavy machinery, and other hardware are exposed to machining fluid mists and smoke on a constant basis. The basic idea of performed presentation was to explain the development of a standardized test procedure for metal working fluid mist separators (filtering separators) with emulsion as test substance. For MWF-mist separators no standards or norms exist, as they are available for cleanable dust filters or particulate air filters. The presentation: Dust separation at biomass combustion plants was presented by Dominik Steiner from the company "Scheuch" during the retraining session in Vienna, Austria. He presented about innovative technologies and processes for clean air in the company "Scheuch". The company have developed own product line-up, which includes centrifugal separators, fabric filters, wet and dry electrostatic precipitators, biological exhaust gas scrubbers, a variety of cooling and heat extraction systems, etc.

In the continuation a *Lab - tour at the Institute Dust separation research* was organized. During lab-tour the participants from WB PC had possibility to see laboratory filter test equipment with the following main components: Aerosol generator; Ageing nozzle; Filter holder and CYCLE-FID measurement device. This lab apparatus give possibility to measure: pressure drop, drainage flow, oil concentration, raw gas and clean gas concentration, stored emulsion and oil inside the filter as well as separation efficiency. It was presented that balancing of liquid mass flows of a filter medium allows the calculation of the total holdup, water holdup and oil holdup by Mr. Laminger.

## **Output 8**

### **Dissemination**

#### **Activity 8.1**

##### ***Development of the project website***

The web site of the project has been created in the web area of Faculty of Technology Novi Sad. (see web site: <http://www.tf.uns.ac.rs/tempusIV/project/project.html>). The quality of the web site is good, the used symbols are clear and the content of the web site is very useful. It has two parts: the first part can be used by the visitors without registration. The second, non-public part needs registration, user name and password. All of the documents related to project can be find on the web site. To improve the quality of the communications between the participant's links from the project web page to the participant's institution/department web page has to be developed in the near future. Also the links from the partner's web page to project web site has to be updated.

#### **Activity 8.2**

##### ***Organization of the dissemination conferences***

As it was planned in the proposal during the visits of EU experts in each 6 partner universities workshop will be organized. After the Workshops, at each PCU Dissemination conferences will organized. Dissemination conferences will be organisad in order to present the results of *"Screening and analyzing the status of knowledge in industry concerning sustainability and formulation the first course scheme"*. The dissemination of the results on this stage of the project was at high level and corresponded to the

expected and planned in the project work plan. A well functioning web site informed about the developments in the project. For good dissemination contributed the several broadcasts by the radio with environmental topics as well as with information about the purposes and project developments. Also dissemination meetings were organized after every workshop organized in WB countries. For the dissemination of results the role played and good contacts of the academic staff, participating in the training and upgrading sessions with industry. On this stage the sustainability of the project results was guaranteed by the stability of participating institutions. The expert ascertained that the knowledge and skills received at the time of the training sessions were stable and will be good base for the future development of courses and teaching materials (multimedia presentations, brochures, CD etc.). In the same time constructed teams that will work on the project, high motivation of university staff and engineers from the industry are good base for the future stable results.

### **Activity 8.3**

#### ***Publications and presentations of the project results***

As it was planned during whole project period the results will be published and presented. The aim is to reach the results to larger audience. In the first year of the project the publications and presentations were:

- Lectures
- Articles
- interviews/ for newspapers, radio and TV
- Leaflets and promotional material printing.

Part of the project results were published directly on the web page of the project. It should be improved graphically in next period of the project during the development of the project. (see Dissemination:

<http://www.tf.uns.ac.rs/tempusIV/dissimination/dissimination.html>)

### **Output 10**

#### ***Quality control and monitoring***

### **Activity 10.1**

#### ***Elaboration of internal quality report***

The internal quality evaluation report for the first year of the project was presented by Katrin Mueller-Hansen and was accepted at Coordination meeting in Vienna, 6<sup>th</sup> July 2011.

### **Activity 10.2**

#### ***Elaboration of external quality evaluation reports***

The external quality evaluation report for the first year of the project was presented by the external experts Adam Pavelchik and Gyula Vatai and was accepted at Coordination meeting in Vienna, 6<sup>th</sup> July 2011.

### **Output 11**

#### ***Management of the project***

### **Activity 11.1**

#### ***General project management***

As it was planned in the application, KaHo Sint-Lieven will act as "grant applicant institution". The University from Novi Sad will do part of the job as co-coordinator. The two universities cooperated very well during the previous Tempus project 19020. In project management it is also very important to have in each consortium partner a subcoordinator who takes care not only of contents follow-up, but also of all administrative and financial issues. A critical success factor in project management is the organisation at regular base of planning and evaluation meetings. From the presented results of the project it is

obvious that the project is running very well. All the activities planned for the first year are managed very well on high professional level.

## **Activity 11.2**

### ***Planning and evaluation meetings***

Starting meeting was organized in Gent from 17 - 20 March 2010, few months after starting date of the project, where the participants of the project meet each other. The starting activities were done very well which resulted in the first activities in data collection, workshop planning. All of these were discussed during the first Coordination meeting in Novi Sad 07 - 09 July 2010, where the participants met the external experts of the project also.

#### **1.2 Criteria "People" and "Leadership"**

The teams for teaching and for training were constructed professionally. The inventory visits have been accomplished by EU professors and practicing engineers with large experience in teaching; expertise and solutions of lot various environmental problems. The teams for training were constructed on the base of their involvement in Environmental courses, modules, or on the base of their experience in environmental technologies. Experienced professors, engineers as well as young researchers have been included in the groups of training. The grant applicant, grant coordinator and local coordinators of the partner countries showed high organization skills and possibilities to be high level leaders in their institution.

#### **1.3 Criterion "Processes"**

The workplan for the first project year is totally carried out. The necessary good strategy organization is established. The coordinators of the project have been made the necessary for stable control of the fulfillment of the work plan for the first project year and for the ensuring of high quality of the results of the planed activities.

#### **1.4 Criteria "Customer results" and "Society results"**

The quality of courses was at high professional level. Every training session had been organized with specific topics related to the interest of the participants of the workshops at the WB Universities, Chambers, Companies, etc. In that way very broad circle interdisciplinary environmental problems and their rational solutions have been discussed and included in the courses and in the teaching materials. The acceptance of the knowledge from the trainees was specific according to their personal and professional features, but as a whole the level of the intangible results was high. The participants in the retraining and updating sessions in the EU countries (BE? DE, AT) received good base as a knowledge, skills, ideas for the developing of programs and teaching materials adapted to the environmental level and needs for every partner country.

#### **1.5 Criterion "Partnership resources"**

The consortium has long and constructive partnership. Several Tempus projects finished have been realized in the partner universities:

- Project Tempus-Phare JEP 13299-1998 "Development of new study profile in Food Technology"
- Project Tempus-Phare JEP15046-00 - "Balkan ASF (Agriculture an Food Science Network" 1998-2000
- Project Tempus-Phare IB\_JEP-16140-2002 "EU Food Law - Bridge among University and Industry" 2002-2006

The project consortium declared their motivation to improve the partnership in order to enrich the purposes of the project as well as to create stable, good working Cooperation Centre. All this will create good preliminary base for: establishing closer contacts between

EU environmental management organizations on the one hand and similar institutions in WB countries, stimulation of transition process towards EU.

## **2. Recommendations and possible difficulties**

As a result of expert visit and above made report can be made the next recommendations. Some possible difficulties can be predicted.

In the first year of the project a great job on monitoring and analysis of the existing knowledge of the staff from industry on sustainable issue is the basis for further activities in the companies involved in this Tempus project focused on companies in Serbia, Bosnia and Herzegovina and The Former Yugoslav Republic Macedonia. In this period of the project the level of knowledge of the staff from industry has been analyzed in 13 companies in Serbia, Bosnia and Herzegovina and The Former Yugoslav Republic of Macedonia.

The another good work was that the retraining courses were organized for 18 - 24 participants from WB PC in Belgium, Austria and Germany. All of the participant countries, faculties and Chamber of Commerce/Economy and/or Industry had 1-2 representatives also. My opinion is that the organization and management of the project in the former 1 year period was excellent, as well as this retraining event.

The task for the next two year of the project is to keep the interest of the companies included into the project for learning about sustainable technologies, tools for improvement of the exploited technology. For these purposes powerful activities of the Chamber of Commerce or Economy is needed for changing the regulations related to retraining of the practicing engineers every certain period related to environmental issues, sustainable development, etc.