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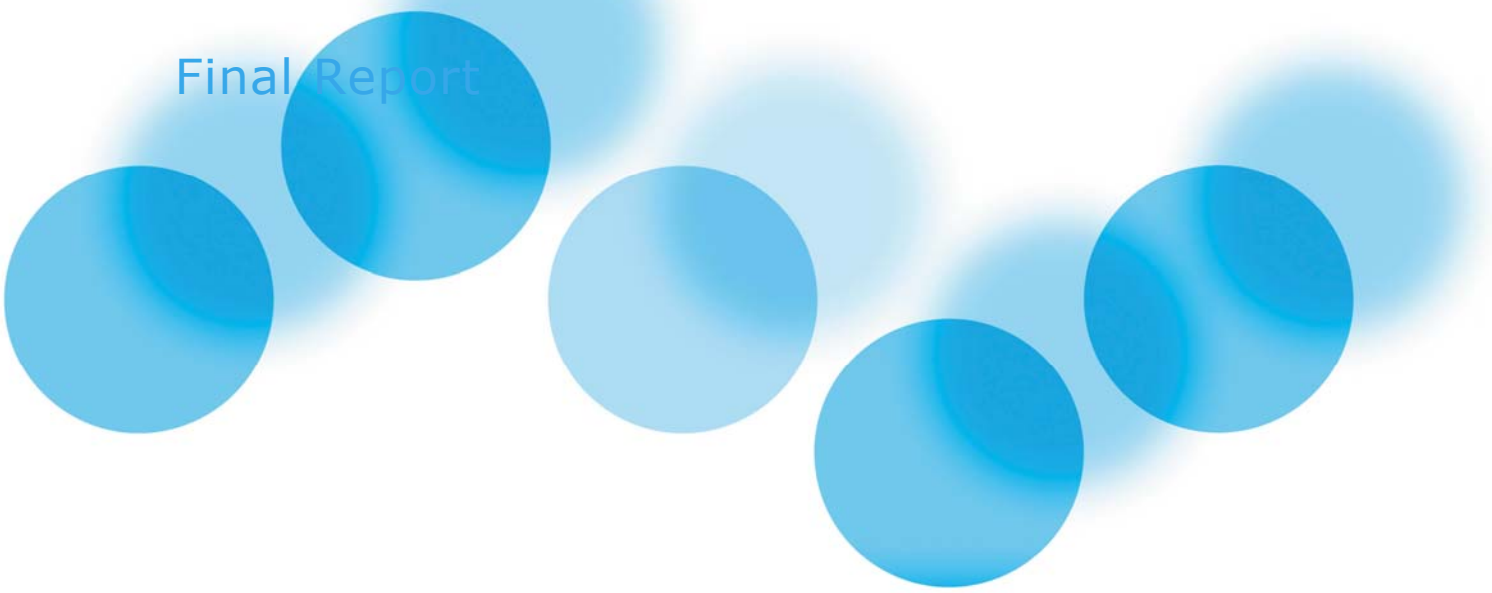
PROJECT

**March 2007**

# INDUSTRIAL REFORM AND DEVELOPMENT OF POLICIES AND LEGISLATION FOR APPLICATION OF BEST AVIALABLE TECHNICS TOWARDS REDUCTION OF NUTRIENTS AND DANGEROUS SUBSTANCES.

## Final Report



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## ABBREVIATIONS

| | |
|---|---|
| AT | Austria |
| BA | Bosnia-Herzegovina |
| BAT | Best Available Techniques |
| BG | Bulgaria |
| BREF | Best Available Techniques Reference Documents |
| CP | Contracting Parties of the Danube River Protection Convention |
| HR | Croatia |
| CZ | Czech Republic |
| DE | Germany |
| DRB | Danube River Basin |
| DRP | Danube Regional Project |
| DRPC | Danube River Protection Convention |
| DSD | the Dangerous Substances Directive 76/464/EEC |
| EC | European Commission |
| EMIS | Emission Inventory made by ICPDR |
| EMIS/EG | Emission Expert Group of ICPDR |
| ELVs | Emission Limit Values |
| EPER | the European Pollution Emission Register |
| EQS | Environmental Quality standards |
| EU | European Union |
| GEF | Global Environmental Facility |
| HU | Hungary |
| MD | Moldova |
| ICPDR | International Commission for the Protection of the Danube River |
| IPPC | Integrated Pollution Prevention and Control |
| MS | Member States |
| P&M EG | Pressures and Measures Expert Group of ICPDR |
| PRTR | Pollutant Release and Transfer Registers |
| RO | Romania |
| CS | Serbia and Montenegro |
| Sk | Slovakia |
| SI | Slovenia |
| UA | Ukraine |
| UNDP | United Nations Development Programme |
| UNIDO | United Nations Industrial Development Organisation |
| WFD | Water Framework Directive |

# EXECUTIVE SUMMARY

This is the final report on "Industrial Reform and the Development of Policies and Legislation Towards the Reduction of Nutrients and Dangerous Substances" of the UNDP-GEF the Danube Regional Project (DRP), Phase 2 - Component 1.5: Industrial Reforms and Policies. It reviews policies and identify gaps between EU and existing and future legislation for industrial pollution control and enforcement mechanisms at the country level for 11 of the 13 countries of the Danube River Basin (DRB). The remaining two, Austria and Germany, were already EU Member States at the time the project was initiated.

Taking into account the expected revitalization of industries in the Danube River Basin countries, the Project in Phase 1 focused on industrial policies and on a review of legislation in order to ensure that environmental considerations are adequately taken into account and that mechanisms for compliance are put in place. While Phase 1 of the Project also focused on the identification of gaps and opportunities for reforms and measures, Phase 2 was been oriented towards the development and implementation of targeted assistance programme to non-accession Danube countries on industrial pollution reduction policy and regulatory frameworks including necessary capacity building activities. Phase 2 also included analytical components to assess the impact of ICPDR BAT Recommendations and to estimate the potential impact of the EU Integrated Pollution Prevention and Control Directive on the Danube River Basin.

The Terms of Reference (ToR) included following tasks:

**Analysis of Policy, Legislation and Enforcement** - the objective of this activity is to obtain information from the Contracting Parties of the International Commission for the Protection of the Danube River (ICPDR) concerning new developments and progress achieved in the field of EU legislation transposition, policy, implementation and enforcement using the Phase 1 results. These are important tools for the reduction of industrial pollution in the Danube River Basin.

**Impact of the (ICPDR) BAT Recommendation** - the ICPDR Recommendations were developed for four industries; the chemical industry, the chemical pulping industry, the food industry, the paper making industry and the Recommendation on best available techniques (BAT) at Agricultural Point Sources. A desk top assessment of the use of national and local authorities and other beneficiaries of the recommendations was undertaken.

**Developing 'Road Map' for BAT Implementation** - This task involved assistance to the four non-accession countries with developing policies and procedures consistent with the requirements of the IPPC Directive for industrial pollution control and the development of a country specific 'road map' for each of the 4 countries to implementing BAT.

**Impact of the Integrated Prevention and Control Directive (IPPC) in the Danube River Basin** – This task focused on preparation a short discussion paper reviewing the likely pollution reduction (nutrients and dangerous substances) that would result with the implementation of the IPPC Directive. This pragmatic assessment carried out based on existing data from the ICPDR's inventories and other available data sources and identified emission reduction potentials within key industrial sectors in the DRB.

**Workshops and Dissemination** – Workshops oriented to BAT implementation in non-accession countries in the region were conducted during which the dissemination of examples of good practice of industrial pollution control throughout the DRB was provided. Particular attention was paid to the transfer of concepts on nutrient and hazardous substance reduction from industrial complexes to the four non-accession countries.

There are two project component reports which are appended to this final report; a Report on Review of Policy, Legislation and Enforcement and the Road Map Report for the Implementation of Best Available Techniques in Bosnia and Herzegovina, Moldova, Serbia and Ukraine which provides individual road maps for implementation of BAT in those DRB states which are not EU members. The Policy and Institutional Analysis Report was completed in February 2006 and reflects the situation in each of the countries as of that date. The Road Map Report was completed in August 2006. In addition more detail with respect to the BAT workshops is also contained in an appendix.

**FINDINGS**

**The Analysis of Policy, Legislation and Enforcement** was carried out using the Phase 1 results as a starting point and new information gained from the particular countries based on updated matrices. The structure of the matrices was developed on the basis of EU legislative requirements and implementation in the DRB taking into account the objectives of the Industrial Policy Project.

The analysis of the institutional structure shows that, all of the countries have permitting, inspection and monitoring in place, generally based upon the requirements of the EU IPPC Directive, however, the specifics differ on a country by country basis. Monitoring of industrial discharges and hazardous substances needs to be improved generally based upon the information gathered in the project.

The analysis of legislation resulted in the identification of three groups of countries. The first group had fully adopted the EU legislation by May 1st 2004; the second group had partially adopted it. For the third group it was not a major consideration in legislation development. The first group became Member States in May 2004; the second includes those in the accession process two of which will become Member States on January 1, 2007, and the third group is comprised of those not yet involved in the accession process. The majority of the Danube countries will be using the EU Directives in their national legislation and the remaining countries are being encouraged to follow a similar process to provide a consistent approach for the entire Danube River Basin through their commitment to the ICPDR to implement the Water Framework Directive. EU funding programmes also encourage legislative consistency in non EU countries.

The process of implementation of BAT varies among Member States. The Member States indicate that the BAT Reference Documents (BREFs) are taken into account generally and in specific cases when determining BAT. Some countries (HU, Sl, RO and BG) have established legal measures for the adoption of the national BAT guidelines related to specific industries, based upon the BREFs.

**The Impact of the ICPDR BAT recommendations** has been positive as evidenced by the Czech example which was the only example provided to the consultants for analysis by the ICPDR. However, circumstances have changed with the widespread implementation of the IPPC Directive to the extent that it may no longer be necessary for the ICPDR Recommendations to be used. It is therefore reasonable to conclude that the future of BAT application in the DRB will be largely based upon the IPPC BAT legal requirements.

**Road Maps** were provided for the four countries, Bosnia Herzegovina, Moldova, Serbia and Ukraine.

A road map was designed for each of the non-accession countries using the policy and institutional analysis of the project; a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis and applying the lessons learned from other DRB countries. The road maps used the Water Framework Directive timetable as a basis for scheduling future individual activities making the recommendations consistent with other related ICPDR activities.

The Road Maps reflect the existing situation in the countries and the Work Plans contain the recommended steps which would allow the countries to achieve the necessary conditions for BAT implementation including legislation, administration and enforcement.

The policy and institutional setting is unique to each country and therefore while each of the four road maps have had similarities, particularly in the external environment, for example, the influence of the EU WFD, they also reflect the individual circumstances of each of the countries.

In BA and Serbia the IPPC Directive has been transposed into national legislation and the BAT concept is in place. However further implementation of the integrated permission process including BAT reference documents still require improvement including additional capacity building. On the other hand Moldova and Ukraine still need to adopt new legislation which will ensure the further implementation of the integrated approach related to industrial pollution reduction and the introduction and implementation of the BAT concept.

Common problems in targeted counties are an insufficient level of information concerning discharges of dangerous substances and the lack of legally binding emission level values. Therefore comprehensive surveys of all discharges of substances regulated by the IPPC Directive and priority substances is recommended as the first step to be undertaken.

**Workshops and Dissemination**

Training workshops were held in Bosnia and Herzegovina, Moldova and Serbia. The workshop content was designed to reflect both process and content issues. The process issues included explicit recognition of the current situation with respect to BAT concept in each of the countries. The content focus was dependent upon the industrial base of the country and ranged from food processing to cement industries.

Secondary source analysis was used to identify the existing situation in each country followed by site visits. The information was also reviewed and verified at each of the BAT workshops. Local consultants were used to participate in the development of data and to organize and participate in workshops. The local consultants are instrumental in the knowledge transfer during the execution of the project and sustainability of project results beyond their specific contribution to the BAT workshops. It is interesting to note that in the two countries where the local consultants were members of consulting organizations other members of the organization also attended providing a broader basis for further dissemination of the information and approaches provided in the seminars.

The number of participants varied form 21 to 27 participants form local and central Environmental Authorities dealing with the issuing of permits and inspection, representatives of major industry and other relevant institutions. Participants were provided with training documents– Training Textbooks prepared specifically for each country. These materials contained information including a general introduction to IPPC, monitoring in the integrated approach and reporting obligations. Specifically with respect to BAT the BAT concept (objective, BAT related emission limit values), BREFs and their use, BAT in the specific industry sectors was discussed. The participation level was high both in the general sessions and the smaller working groups.

The overall quality of the workshops based upon participants evaluations ranged from good to excellent. The participants ranked the most valuable part of the workshop as the experience in using BREFs and BATs followed by the practical case studies and preparation of the application for an integrated permit.

**Impact of the Integrated Prevention and Control Directive (IPPC) in the Danube River Basin**

The estimate is based selected pilot IPPC installation case studies in two industrial sectors; chemical and pulp and paper. The pulp and paper industry was selected, in part, because it is the largest discharger of COD accounting for almost 50% of total discharges in the DRB (Emission Inventory 2002).

The detailed information gathered from the two case studies provided the basic data on the reduction of pollution and other impacts due to BAT implementation at the installation. This information was then projected to provide a sector estimate and then aggregated to provide a more general impact of impacts for the Danube River Basin as a whole.

The analysis shows clearly that the hypothesis of that BAT implementation will have a positive impact on pollution reduction in the DRB is correct. The reduction of 50% estimated for COD for the pulp and paper industry would result in an annual reduction of 26,653 t/a in that sector. Applying the same calculation to total industrial COD discharges of 133,950 t/a (excluding Austria and Germany) the reduction would be 66,975 t/a. As was mentioned in the introduction the estimates are very preliminary and based upon the data available in the two case studies so caution should be used in their use.

Results of these case studies were presented and discussed at a meeting of the Pressures and Measures Expert Group of ICPDR to be used for future policy, programme and project development.

**Policy, Institutional and Enforcement Summaries**

An industrial policy, institution and enforcement summary was produced for the 11 Danube River Basin countries which were not EU Member States when the DRP was initiated.

The summaries are in a common updateable format which allows the ICPDR to understand the similarities and differences among the countries in industrial policy implementation. Future ICPDR programmes and projects can be designed based upon this information and the ICPDR should use the summaries to monitor progress over time in the countries by requesting periodic updates from the countries.

**Preliminary Estimate of the Impact of the Implementation of BAT on Industrial Pollution Reduction**

A preliminary estimate of the potential for pollution reduction impact of the application of BAT was produced for the DRB. The estimate can be used by the ICPDR to show the magnitude of positive change which can be achieved through the application of BAT throughout the basin to encourage the full application in all countries including those countries which do not have a specific legal requirement to do so. The preliminary estimate should be monitored by the ICPDR against actual reductions over time and modified as more detailed information becomes available.

**Road Maps and BAT Implementation Work Plans for Bosnia Herzegovina, Moldova, Serbia and Ukraine**

The individual country road maps were developed using the existing, policy, institutional and enforcement situation in each of the countries. The Road Map for each country plots the necessary milestones and timelines along with actions to move the water protection and reduction of industrial pollution forward through the application of BAT. This approach creates opportunities for

non accession countries as a way to drive and structure the planning process with respect to BAT implementation. It allows them to identify the most important steps to improve environmental protection – to execute the tasks regarding the implementation of the Convention on Cooperation for the Protection and Sustainable Use of the River Danube (DRBC), create more favourable condition for investments in industry, and at the same time move closer to EU accession requirements.

An integral part of the proposed Work Plan is the development and subsequent implementation of the Pollution Reduction Programme which will contain measures focused on particular steps related to its implementation. Therefore the detailed country recommendations for implementation of BAT concept support and facilitate the ICPDR activities in the field of hazardous substances pollution reduction in the DRB .Implementation of the Work Plans will meet the short and medium- term objectives as required by DRBC and the WFD concerning the preparation of the Danube River Basin District Management Plan.

**Training**

The project provided training for more than 100 participants from Bosnia Herzegovina, Moldova, and Serbia. The training added to the existing knowledge base of the participants and focussed on practical approaches including how to conduct an initial environmental assessment and how to design an application form. The training examples were drawn from the industrial base of each country and therefore were both relevant and timely. The individuals who received the training will assist the further application of BAT in their individual countries as well as being available to the ICPDR as country based BAT experts.

**PROJECT OUTPUT SUMMARY**

The Phase 2 project produced four major outputs:

- Policy, institutional and enforcement summary relating to industrial policy reduction for 11 countries,
- Preliminary estimate of the impact of the implementation of BAT on industrial pollution reduction for 13 countries,
- Road Maps and Country Specific Work Plans for BAT implementation in four countries,
- Support materials and training for over 100 people in Bosnia Herzegovina, Moldova and Serbia.

# 1. INTRODUCTION

This is the final report on "Industrial Reform and the Development of Policies and Legislation Towards the Reduction of nutrients and Dangerous substances" of the UNDP-GEF Danube River Basin Project - the Phase 2, component 1.5. - Industrial Reforms and Policies.

## 1.1. Terms of Reference

The activities according to the Terms of Reference (ToR) included the following tasks:

**Analysis of Policy, Legislation and Enforcement** - the objective of this activity was to obtain information from the Contracting Parties of the International Commission for the Protection of the Danube River (ICPDR) concerning new developments and progress achieved in the field of EU legislation transposition, policy, implementation and enforcement using the Phase 1 results. These are important tools for the reduction of industrial pollution in the Danube River Basin.

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## 1.2. Project Context

The Phase 2 project, following on from the Phase 1 Industrial Reforms and Policies Project, had a number of interrelated objectives. First it updated the legislation, institution and policy review which was conducted in the first phase. This update was then used as the foundation for the development of targeted capacity building initiatives in those countries which would most benefit from these activities. One of the issues raised in the Phase 1 study was the lack of information and analysis to determine the potential impact of the introduction of BAT in the Danube River Basin. Phase 2 reviewed the potential impact of implementation of BAT in the DRB using available information in a case study approach. Prior to the introduction of the EU IPPC Directive the ICPDR

had produced sectoral recommendations for pollution reduction and this report also examines the influence of ICPDR BAT recommendations on implementation of pollution reduction programmes in the DRB based upon the information on the implementation in one country provided by the ICPDR Secretariat. Much of the focus of the introduction of BAT in the DRB is on those countries which have legal obligations either as Member States or Accession Countries to implement BAT as a component of the EU IPPC Directive. However, there also countries which are not bound by the IPPC Directive and the Phase 2 Project examined alternatives for the introduction of BAT with a special emphasis on those countries which are not either EU Member States or Candidate Countries.

The policy development process involves data collection and analysis, education and awareness and the implementation of the appropriate measures to deal with the issue being addressed. As the cross border nature of environmental issues becomes more apparent it is necessary for decision makers in several jurisdictions to make compatible policy decisions. Political boundaries do not always coincide with ecological systems. The Danube River Basin is an example of a situation where this occurs.

In the Danube River Basin, in addition to the Danube River Protection Convention (DRPC) there is also EU legislation. Initially only two countries in the DRB were EU Member States. However, as of May 1 2004, four more became Member States and an additional 2 became Member States as of January 1 2007. The majority of Danube countries therefore have very similar legal environmental management systems. This is important for the future industrial pollution reduction and prevention activities of the ICPDR. The IPPC Directive, for example, will be a key instrument with respect to industrial pollution. It will make the application of BAT mandatory for the majority of the Danube countries and result in the provision of the required data for the European Pollution Emission Registry (EPER). The IPPC Directive and other directives including the Water Framework Directive have information reporting requirements which need to be considered in future ICPDR data collection and analysis activities including EPER as well as forthcoming Pollutant Release and Transfer Registers (PRTR).

## 1.3. Component Reports

There are two project component reports which are appended to this final report; a Report on Review of Policy, Legislation and Enforcement including an analysis of BAT impact on pollution reduction and ICPDR recommendations impact components and the Road Maps for the Implementation of Best Available Techniques in Bosnia and Herzegovina, Moldova, Serbia and Ukraine report which provided individual road maps for implementation of BAT in those DRB states which are not EU members. The Review of Policy, Legislation and Enforcement Report was completed in February 2006. The Road Map Report was completed in August 2006. The information contained in the reports was accurate at the time the reports were completed; however, the institutional structure of the DRB continues to evolve. Two additional DRB countries Bulgaria and Romania became EU Member States as of January 1, 2007 following the completion of the report. These two new member states were already in the process of implementing BAT as part of the IPPC Directive requirements during the project period and this has been noted in the February 2006 Policy Report.

This report is organized as follows. The next chapter outlines the methodology used in the project followed by a summary of the findings of the Policy and Road Map components of the project. The final section of the report includes a description of the training activities of the project.

The contents of this report are the sole responsibility of the project consultants. However, these results would not be possible without the full cooperation of the DRB project staff, the Heads of

Delegation and the staff of the Secretariat of the ICPDR and the many individuals in each of the DRB countries who cooperated with the project consultants. The project team would like to thank all of the participants for their cooperation and support in conducting the project.

# 2. METHODOLOGY

As indicated in the introduction a number of methodologies were used in the project, each appropriate to the analysis being conducted for that particular component of the project. The methodologies used are described in the above mentioned reports. (see annex 1 and 2)

## 2.1. Legislation, institutional arrangements, implementation and enforcement

### 2.1.1. Legislation

The majority of Danube countries have similar legal environmental management systems as the result of the harmonization and transposition of the EU water related legislation in AT, BG, HR, CZ, DE, HU, SK, SI, RO .

All countries cooperating under the DRPC expressed their firm political commitment to support the implementation of the WFD and pledged to cooperate within the framework of the ICPDR to achieve a single; basin wide coordinated Danube River Basin Management Plan.

At the ICPDR Ministerial Meeting in December 2004 the Danube countries endorsed the Danube Declaration expressing their commitment to further reinforce transboundary cooperation for sustainable water resource management within the Danube Basin.

This has important implications for future industrial pollution reduction and prevention measures within the context of the Danube River Basin Management Plan, which will be developed by the end of 2009.

To provide the relevant information and an overview related to the legal requirements of EU legislation, a legal matrix has been created for each country. The structure of the matrices has been developed on the basis of EU legislative requirements and implementation in the DRB taking into account the objectives of the Industrial Policy Project.

The matrix includes selected information concerning transposition of EU legislation into national legislation including:

- terms and definitions (such as dangerous substances, priority substances, installations according to the IPPC Directive),
- setting emission limits,
- Environmental Quality Standards,
- the permitting process for industrial waste water discharges:
- authorization requirements,
- content of operators' applications (according to Art.6 the IPPC Directive),
- BAT requirement (Art. 3 the IPPC Directive),
- time limitation and changes in permit and
- accident prevention measures.

These matrices were developed for each of the countries using available ICPDR database information as well as the Phase 1 project results. The matrices were then sent to the country representatives of the P&M EG through the ICPDR Technical Expert for review and comment. Based upon the feedback the matrices have been revised and updated. All information summarised in

these matrices has been analysed from the point of view of current policy, legislation and enforcement depending on the status of the particular country (MS, accession country, or non-accession country). Special emphasis is given to the evaluation of dangerous substances, priority substances and emission limits as well as Environmental Quality Standards. The analysis includes implementation of the National Pollution Reduction Programmes and BAT developments.

The results and recommendations of this activity have been used as input for the Training Needs Analysis, development of the Road Map for BAT Implementation and other relevant components of the Phase 2 Industrial Policy Project.

### 2.1.2. Institutional Arrangements

Permitting, inspection, monitoring and inventorying of pollution sources are an integral part of policy implementation.

All waste water discharges into surface waters which are liable to contain any of the substances in List I and II require prior authorization by the competent authority which sets out the emission standards. Some aspects of this requirement are now covered by the Directive on Integrated Pollution Prevention and Control (96/61/EC - IPPC Directive). IPPC is concerned with an integrated operating permit system for specified installations (or industrial activities); controlling emissions to all three environmental media (air, water and soil) considering their impact on the environment as a whole. Under the IPPC Directive permits are issued setting out limit values based on Best Available Techniques (BAT). Although the control focus is on installations, the Directive also specifies the main polluting substances for which limits must be set for each medium. For water, these are broadly consistent with the substances specified under the DSD. Legislation has been passed in all Member States to control discharges to surface waters and sewers, requiring prior authorization of discharges containing List II substances

The responsibility for monitoring is generally divided between the competent authorities and the operators, although competent authorities usually rely to a large extent on "self monitoring" by the operator, and/or on third party contractors. It is very important that monitoring responsibilities are clearly assigned to all relevant parties (operators, authorities, third party contractors). It is also essential that all parties have the appropriate quality control requirements in place. Monitoring should be systematic, focusing on dangerous substances and priority substances and linked to Programmes of Measures as set out in River Basin Management Plans under the Water Framework Directive.

In addition, where appropriate legislation is in place, it must be supported by proper institutional arrangements. This includes the designation of the competent authorities with unambiguously defined responsibilities for the permitting process, compliance and enforcement. It also includes assigning responsibility for other activities which are supporting those processes such as monitoring, inventorying of pollution sources and recording of all related data.

These aspects all have been taken into consideration in developing the matrices. Therefore the information in the matrices is focused on information concerning the permitting of industrial polluters, inspection of industrial polluters, monitoring industrial pollution, inventorying pollution sources, and recording emissions.

### 2.1.3. Implementation and Enforcement

In order to reduce pollution by the substances in List II, Member States must establish Pollution Reduction Programmes (PRPs) by applying specific reduction methods in the implementation of these programmes.

The WFD requires the assessment of human impacts in the river basin and the identification of a programme of measures to meet the objectives (good chemical and ecological status) of the WFD within nine years of adoption of the WFD. In addition, monitoring programmes need to be set up within six years of the adoption of the WFD.

The elements of the Pollution Reduction Programmes under Article 7 of the DSD are parallel to those required under the WFD. A comparison of the requirements laid down in Article 7 of the DSD with those in the WFD, in particular those for the preparation of the River Basin Management Plans (RBMPs), shows that they are very similar. Thus instead of applying their own approaches to comply with the DSD Member States may want to use the procedures laid down in the WFD. Member States should therefore be encouraged to prepare their pollution reduction programmes in compliance with the DSD with a view toward complying also with the requirements of the WFD especially the obligation to prepare River Basin Management Plans by 2009. Some of the measures contained in the WFD (e.g. the combined approach, control of diffuse sources, monitoring requirements) may provide Member States with additional tools for the preparation and implementation of the reduction programmes. Special provisions require using all appropriate measures like BAT, BAP, and product controls to reduce emissions.

The implementation of the IPPC Directive should take into account other Community objectives such as the competitiveness of the Communitys' industry thereby contributing to sustainable development. More specifically, it provides for a permitting system for certain categories of industrial installations requiring both operators and regulators to take an integrated, overall look at the polluting and consuming potential of the installation. The overall aim of such an integrated approach is to improve the management and control of industrial processes so as to ensure a high level of protection for the environment. Central to this approach is the general principle (stated in Article 3) that operators should take all appropriate preventative measures against pollution, in particular through the application of BAT enabling them to improve their environmental performance. BAT reference documents - BREFs are guidance documents for Member State authorities in assisting them in issuing the permit. They are the result of the information exchange organised by the Commission in accordance with Art 16(2) of the IPPC Directive.This legal basis has been considered as an essential approach for development of the implementation and enforcement matrix.

The implementation and enforcement matrix provides information concerning the National Reduction Programmes, specific reduction programmes of operators, BAT developments and public involvement.

## 2.2. BAT Impact

The estimate of the impact of the implementation of BAT implementation in the DRB is based on selected pilot IPPC installations/case studies in two industrial sectors; chemical and pulp and paper. The pulp and paper industry was selected, in part, because it is the largest discharger of COD accounting for almost 50% of total discharges in the DRB (Emission Inventory 2002).

The detailed information gathered from the two installation case studies provided data on the reduction of pollution and other impacts due to BAT implementation at the installation. The order of magnitude of reduction for the DRB generally was confirmed by comparing average levels of concentration data from installations in Germany which have already implemented BAT with those from installations in Croatia and Romania which have not yet implemented BAT. The reduction in COD in the pulp and paper case study was then projected to the rest of the pulp and paper installations in the 2002 EMIS Inventory. This resulted in an estimate of the BAT implementation impact in that sector. The calculation was based on simple multiplication. The reductions in

pollutants in the pulp and paper sector were then applied on a percentage bases to the total COD discharges from industries in the DRB. This resulted in a general estimate which is consistent with the type and amount of data available. The estimate should be used with caution recognizing that it is preliminary estimate. However, even with these qualifications it is hoped that the estimate will be the starting point for further more detailed calculations as more installations implement BAT and more installation specific data become available.

## 2.3. BAT Implementation Road Maps

This section describes the approaches and the activities which have been carried out related to the development of Road Maps for the implementation of BAT in the non accession countries; Bosnia and Herzegovina, Moldova, Serbia and Ukraine.

The general approach adopted in this methodology consists of the following steps:

- Creation of an information compendium concerning legislation, institutional arrangements and enforcement of BAT implementation
- Strengthening Weakness Opportunities and Threats (SWOT) analysis in each country (for detail see annex 2.)
- Development of the country specific Road Map

**Information Compendium**

The compendium includes:

- The Review of Policy, Legislation and Enforcement activities results (Activity A. 1 of the Industry Policy Project). The Legislation, Institutional arrangements and Implementation and Enforcement matrices of targeted countries found in Annex 1;
- Additional relevant available information gathered, summarized and analyzed from the ICPDR and other relevant sources – updating Activity A. 1 of the Industry Policy Project for Bosnia and Herzegovina, Moldova, Serbia and Ukraine. The information in this report is based upon publicly available secondary sources. Substantial portions of this report were reproduced verbatim from sources including EC, OECD, UNECE publications and, Industrial Policy Project Reports.

**Development of the Road Map**

The Road Maps and the road mapping process generally serve as an excellent communication tool - an effective means to link strategic operations, collaborative ventures, and plans. However, to achieve success—Road Maps must target the right approach, involve the appropriate target groups, and provide sufficient level of detail. Road mapping in the case of the non-accession countries in the DRB has a high probability of success due to the related processes in similar countries under similar circumstances. Having said that the policy and institutional setting is unique to each country and therefore while each of the four road maps have similarities, particularly in the external environment, for example, the influence of the EU WFD, they also reflect the individual circumstances of each of the countries.

The objective of the Road Map is to identify the specific steps toward the implementation of BAT in Bosnia and Herzegovina, Moldova, Serbia and Ukraine. It is an output-oriented description of the

overall process which gives details regarding intermediate results. The Road Map is used to plot the necessary milestones and timelines along with actions to move the water protection forward through the application of BAT.

The Road Map however, does not define all underlying activities in detail. Further planning can be added including the development of criteria to monitor results, more concrete activities, risks and underlying assumptions. This framework could be used to describe, manage and administer the detailed activities.

The non accession countries can use the Road Map as a way to drive and structure the planning process in field of BAT implementation. It allows them to identify the most important opportunities to improve environmental protection – to fulfil tasks regarding implementation of the DRBC, create more favourable condition for investments in industry sectors, and at the same time get closer to EU accession requirements.

The Road Map consists of:

- an explanatory text component – summary of SWOT outputs,
- a corresponding Work Plan.

***Establishment of short and medium-term objectives***

The Contracting parties, of the Convention on Cooperation for the Protection and Sustainable Use of the River Danube committed to adopt the legal requirements required in the EU related to the implementation of the WFD. This has important implications for future industrial pollution reduction and prevention activities within the context of the Danube River Basin Management Plan. The Plan is to be developed by the end of 2009 and updated by end of 2015. However, all countries cooperating under the DRPC expressed their firm political commitment to support the implementation of the WFD in their countries and pledged to cooperate within the framework of the ICPDR to achieve a single; basin wide coordinated Danube River Basin Management Plan.

Establishment of short (by the end of 2008) and medium term objectives (by the end of 2015) in the Road Maps are proposed in line with the DRB Management Plan required time scale. The proposed Work Plan would assist the countries to develop a contribution to basin wide coordinated Danube River Basin Management Plan including an integrated Programme of Measures. By using the DRB Management Plan time scale the Road Maps and Work Plans can be used by the ICPDR to monitor individual country progress in meeting their WFD commitments.

Drafting of the Road Maps and Work Plans considered the differences among the countries in state organization, state administration, current legislation, industrial development and other circumstances related to the improvement of water protection through the implementation of BAT.

These objectives provide the responsible country representatives at the level of state administration with operational tasks aiming at undertaking the desirable actions in the field of BAT implementation and contributing to dangerous substances pollution reduction. Implementation of the recommended approach will lead those countries at the same time to move closer to EU accession requirements. Moreover fulfilling proposed objectives will create sufficient conditions for the support of the ICPDR activities. The ICPDR can also utilise this information in developing new programmes and projects.

## 2.4. Workshops and Dissemination

The training component was addresses at the outset of the project. During the Inception period the focus for the development of training activities was Serbia Montenegro followed by visits to Moldova and meetings with the representatives of Bosnia Herzegovina. The process applied in training development is described below and was used in each of the three countries. Unfortunately after repeated attempts failed, arrangements for training activities in Ukraine were not possible during the project period.

### 2.4.1. Training Needs Analysis

The first step in the process was a training needs analysis. The training needs analysis included the review of background documents with respect to the implementation of BAT and interviews with knowledgeable individuals. The individuals interviewed included senior policy and decision makers, members of research institutes and those directly responsible for the implementation of the existing or proposed IPPC legislation. They were asked both to describe the existing situation and to suggest the type of training which would be most useful. Based upon the findings of the needs analysis training programmes were developed to address implementation issues related to existing policies and legislation.

### 2.4.2. DRP Training Guidelines

In Phase I of the DRP a very useful set of guidelines for training for all DRP project components was developed. The training activities for the Phase 2 Industrial Reforms and Policies Project were based upon those guidelines. The planning for the training approach and implementation was based upon the cooperation with a local consultant in each of the countries. The local consultant contributed the following:

- Prepared local arrangements for the BAT seminar
- Translated the presentation and participated in the seminar,
- Participated in the seminar as appropriate and
- Contributed on the seminar report

**Definition of Training Objectives**

The general training objective was to provide participants with the knowledge to address the highest priority issues for the preparation or implementation of the existing legislation consistent with the principles and approaches of the EU Directive. In each case this was tailored to the specific circumstances in the target country.

The short term objectives were to provide participants with:

> an understanding of the philosophy and principles of the EU IPPC Directive

> the key concepts of the EU IPPC Directive

> the major BAT implementation issues be addressed

The Medium term objective was to:

> provide the participants with the knowledge necessary to understand and develop the BAT concept as BAT implementation proceeds in the country and.

The BAT concept involves either national or local officials therefore both levels need participate in the training. Participants included:

> senior decision makers
> national programme managers and professionals in related fields and ministries
> local officials
> industry representatives

**Training Workshop Methodology**

The workshops were organized and supported by the training specialists on the project team. Each of the trainers had previous experience with BAT training and or BAT concept implementation. The local consultants were fully involved in key training, preparation and delivery so that there is a local resource base for future training requirements beyond the scope of this specific project.

***Participation:***

> the workshops were designed to engage the participants in an interactive process with continuous participant feedback

> the training materials were user friendly and useful in actual legislative development e.g. sample clauses, system diagrams

> the local consultants involvement ensured that the materials were specifically relevant to the country situation

> the time to address specific issues raised by the participants was allocated in the training process

***Workshop size:***

The number of participants was between 20-25 people. The target ratio of trainer to participants was 1-10.

***Training methods*** was knowledge oriented therefore focusing on passing information from an expert to the participants as an initial starting point followed by an interactive process. Exercises and examples were used during the training process so that there were group discussions and projects in addition to the knowledge dissemination.

***Evaluation of Training Workshops, Reporting***

Each workshop was evaluated, applying a standardized methodology as required by the DRP. The participants were provided with a template at the end of the training workshop. Participants filled them in before leaving the workshop.

The results of participant evaluations for each country were used in the design and delivery of subsequent workshops.

# 3. THE PROJECT OUTPUTS

This section of the report outlines the activities and findings for each of the project components. The Review of Policy Legislation and Enforcement Update are followed by the BAT Impact Analysis and comments on the ICPDR Recommendations impact. The concluding sections address the Training, Road Map and Work Plan components of the project.

## 3.1. Review of policy, legislation and enforcement

The objective of this activity has been to obtain information from the Contracting Parties of the ICPDR (except for Austria and Germany) concerning new developments and progress achieved in the field of EU legislation transposition, policy and enforcement since the Phase 1 Report was completed in June 2004. These are important tools for the reduction of industrial pollution in the Danube River Basin which are evolving and improving over time.

This activity was executed in cooperation with the members of P&M EG and supported by the ICPDR Secretariat Experts.

All available information gathered in the Phase 1 matrices was reviewed, updated and verified and are presented in followed table.

**Table 1.: Danube River Basin Countries Legal, Institutional and Enforcement Summary, February 2006**

| Country | Legal framework for industrial pollution prevention and reduction | Institutional arrangements | | | Implementation and enforcement | | |
|---|---|---|---|---|---|---|---|
| | | Permitting | Monitoring | Inventory | PRP | BAT | PP |
| Bosnia Herzegovina | XX | PC+PR | √ | - | - | - | L |
| Bulgaria | XXX | PC | √√ | | - | N | F |
| Croatia | X | PR | √ | - | - | - | L |
| Czech Republic | XXX | PR | √√ | + | + | E | F |
| Hungary | XXX | PR | √√ | + | + | N | F |
| Moldova | X | PC | √ | - | - | - | F |
| Romania | XXX | PR | √√ | + | - | N | F |
| Serbia | XX | PC+ PR | √ | - | - | - | L |
| Slovakia | XXX | PR | √√ | + | + | E | F |
| Slovenia | XXX | PC | √√ | + | - | N | F |
| Ukraine | X | PR√ | √ | - | - | - | L |

**Notes**:

**Legal framework:**

**XXX** **–** legislation in compliance with EU Directives in place

**XX** **-** legislation in place and but not in compliance with EU Directives

**X** - limited legislation in place not in compliance with EU Directives

**Institutional arrangements:**

**PC** **-** permitting authorities on central level

**PR** - permitting authorities on regional level

√√ - complex monitoring of industrial pollution

√ - limited monitoring of industrial pollution

**+** industry pollution inventory in place

**-** industry pollution inventory not in place

**Implementation and enforcement**

**PRP:** Pollution Reduction Programmes in compliance with the Dangerous Substance Directive (+ in place, - not in place)

**BAT:** **N** - National guidelines in place

**E** - EU BAT documents used directly

**-** No guidelines

**PP** – Public Participation in the permitting process and public data availability

**F** – Full

**L** - Limited

An analysis of the updated legal, institutional, implementation and enforcement matrices indicates the following:

- The basic legal framework for industrial pollution prevention and reduction is in place in the Danube countries. Substantial progress has been recorded in the accession countries. On the other hand, more remains to be done in non-accession countries to complete the adoption of modern water legislation.
- In general all countries currently require industrial facilities to obtain waste water discharge permits. All countries have developed basic monitoring requirements carried out by polluters, however, monitoring of industrial discharges and hazardous substances by the competent authorities needs to be improved and in some countries a detailed inventory of sources and pollutants is not yet fully developed.
- Based upon the assessment of the institutional matrix, individual countries have different institutional settings with respect to permitting industrial polluters. These range from the central level (ministries) to the local level (water directorates at the county or district

level). The situation is further complicated with respect permitting of polluters that fall under the IPPC directive and other industrial installations.

- The degree of success in the implementation process of BAT implementation varies among Member States. Member States indicated that the BAT Reference Documents (BREFs) are taken into account generally and in specific cases when determining BAT. Some countries (HU, SI, RO and BG) have established legal measures for the adoption of the national BAT guidelines related to specific industries, based upon the BREFs.
- Public involvement in the integrated permitting process has been improved as well as the access to public to information concerning the monitoring results and sources of pollution.
- The progress made between the creation of the original matrices in Phase 1 and the updated situation as shown in the revised matrices shows that progress in implementing BAT continues to improve over time as countries have more experience and additional countries adopt additional legal, policy and institutional mechanisms for the implementation of BAT in the DRB.

## 3.2. Impact of the ICPDR BAT Sector Recommendations

In 2000 the ICPDR EMIS/EG produced Recommendations on Best Available Techniques for the heavily polluting sectors in the field of water (Food Industry, Chemical Pulping Industry, Paper Making Industry, Chemical Industry and monitoring of wastewater discharges). These recommendations were translated into the national languages of DRB countries with EU support and published on DANUBIS.

The EMIS/EG members were given the responsibility to report on how the national and local water authorities would make the most efficient use of these recommendations, with respect to enforcement, compliance and implementation, including:

(i) preparation of a list of the potential beneficiaries (water authorities, industries, industrial associations, etc.),

(ii) proposal for the development of other guidelines and recommendations and

(iii) ways on how best the information exchange can be maximised among the local authorities and local industrial beneficiaries.

The completion of the first reporting period according to the reporting formats of the ICPDR recommendations on the use of BAT for the selected four industries: chemical industry, chemical pulping industry, food industry, and paper making industry, was 30$^{th}$ of June 2004.

In 2003 EMIS/EG in addition, introduced the Recommendation on BAT at Agricultural Point Sources. The recommendation contains technical in-plant and end-of-pipe measures for the reduction of wastewater volumes and abatement of pollution loads. Additional measures are proposed to improve environmental compliance at the plant and enforcement of the permitting environmental authority.

According to Resolution of the 2nd Standing Working Group of ICPDR the contracting countries have agreed with the proposed recommendation and with implementation of the provisions of this document at the national level starting January 1$^{st}$. 2006.

The Terms of Reference of the Industrial Policy Project require a desk assessment of the use of national and local authorities and other beneficiaries of the recommendations. In addition, an analysis of the lessons learned from the ICPDR Recommendation experience may be used to further assess the application of BAT in the DRB. The EMIS EG expressed a concern that any

confusion between the ICPDR recommendations and the EU BREF notes be avoided. This has been taken into consideration in this section of the report. In part, for example, by using the correct title of the ICPDR work as recommendations and the EU material as guidelines.

In spite of repeated requests to the P&M EG Technical Expert only two country reports were received for the Czech Republic and Slovakia. Of these only the Czech Republic provided information to the ICPDR with respect to the implementation of the BAT recommendations (for details see annex 1).

From the limited results of the Czech Republic report it can be seen that voluntary recommendations may improve the process of pollution reduction prior to legally binding regulation at least in the case where such legislation is anticipated.

The ICPDR Recommendations are similar in approach to the IPPC BAT requirements. The ICPDR Recommendations were implemented prior to the IPPC legislation coming into place. The Czech Republic example suggests that having recommendations in advance, consistent with forthcoming legislative measures for pollution reduction measures may be useful. The fact that there were three sectors in which this took place means that the impact can be broadly based and not limited to one industrial sector. The role of the ICPDR is critical to the process. The ICPR has the credibility, expertise and the support mechanisms to disseminate and support the implementation of the Recommendations. By developing the Recommendations centrally the ICPDR contributed toward a consistent approach in all DRB countries and made it easier for the country which implemented the Recommendations to subsequently implement the EU IPPC Directive.

The Impact of the BAT recommendations has been positive as evidenced by the Czech example. However, circumstances have changed with the widespread implementation of the IPPC Directive to the extent that it may no longer be necessary for the ICPDR Recommendations to be used.

It is therefore reasonable to conclude that the future of BAT application in the DRB will be largely based upon the IPPC BAT legal requirements. Therefore, the EU, through the Seville Centre and other extensive supporting measures now in place for countries required or wishing to use BAT provides sufficient sources of information and guidance. Secondly, BAT must ultimately be implemented at the level of the installation. The detail for this level is developed in the form of BREFs from the EU which can be up to 1000 pages long far surpassing the detail of the ICPDR Recommendations. Thirdly, the EU has aid programmes which can encourage the use of BAT in non member countries.

It can be concluded that the ICPDR Recommendations played a useful role in anticipating the potential impact of BAT in pollution reduction in the DRB and providing information and guidance prior to the implementation of the EU IPPC Directive in Member States. However, the situation has now changed and the ICPDR should focus on other opportunities to reduce pollution in the DRB.

Results of these evaluation and findings were presented and discussed at a meeting of the Reassures and Measures Expert Group (P&M EG) of ICPDR.

## 3.3. Road Maps for BAT implementation

Road Maps for the Implementation of BAT were produced for Bosnia Herzegovina, Moldova, Serbia and Ukraine. The Road Maps provide those countries with concrete steps toward the implementation of BAT and can be used to plot the necessary milestones and timelines along with actions to expedite industrial pollution reduction in the DRB thereby improving the water quality.

Significant progress has been made on the implementation of the WFD in the DRB since the Contracting parties, of the Convention on Cooperation for the Protection and Sustainable Use of the

River Danube committed to adopt the legal requirements of the EU related to the implementation of the WFD. This has important implications for future industrial pollution reduction and prevention activities within the context of the Danube River Basin Management Plan. The Plan will be developed by the end of 2009 and updated by the end of 2015. The Road Maps have been developed to be consistent both in content and timing with the Danube River Basin Management Plan so that they can be used by the ICPDR to monitor progress in each of the countries.

The Road Maps and accompanying Work Plans have been developed based on SWOT analyses which consider the specific policy, legislative institutional and industrial situation in each of the countries.

The relevant required information and data for the development of the Road Maps has been taken from publicly available secondary sources including EC, OECD, UNECE publications and UNDP GEF DRB Phase 1 and Phase 2 Project Reports supplemented by information gathered in preparation of the training sessions for this project. Short and medium - term objectives for each of the countries have been proposed in line with the Road Map for the Danube River Basin District Management Plan and the corresponding Work Plan as well as the Strategic Paper for the Danube River Basin District Management Plan adopted by the ICPDR.

The Road Maps for implementation of BAT have shown the need to adopt new or updated legislation for integrated prevention and control in the specific countries. In addition, effective mechanisms for an integrated decision making process (including inspection and enforcement) should be created. Capacity building at all relevant levels of state administration as well as establishment of a body responsible for issues concerning BREFs and the future implementation of reporting obligation (PRTR) also need to be put in place.

Another major issue is the inventory and monitoring of industrial pollution sources. Currently available information related to the release of dangerous substances into aquatic environment is limited and of poor quality. The establishment of emission level values for pollutants discharged into aquatic environments has been identified as a common problem in each country.

The Road Map provides the general requirements for each country. Further planning should be based on an activity orientated logical framework, including explicit criteria to monitor results, concrete activities, risks and underlying assumptions. This framework could be used to further identify, manage and implement the detailed activities required in each country.

The countries can use the Road Map as a tool to drive and structure the planning process for BAT implementation. It allows them to identify the most important opportunities to improve environmental protection – to fulfil the tasks regarding implementation of the DRBC, create more favourable conditions for investments in industry sectors, and at the same time move closer to EU accession requirements.

It is anticipated that the recommendations for implementation of the Road Maps for Bosnia Herzegovina, Moldova, Serbia and Ukraine will assist the countries to fulfil their obligations to the ICPDR concerning the preparation of the Danube Basin Management Plan and the Programmes of measures according to the WFD.

Also, the findings of the Road Maps and the supplemental recommendations provide the ICPDR with important information to create the conditions to generally facilitate the improvement activities in the field of pollution reduction in the DRB, in the targeted countries. In this context the recommendations are also focused on the development of emission inventory data from industry using EPER II data or the EPER methodology and as well as the on forthcoming TRPR requirements.

The major recommendations which apply to all countries are as follow:

- Development of a polluter and pollutant register,
- Analysis of industry sectors from the point of view of BAT implementation

- Set up emission limit values,
- Development of national BREFs
- Creation of an information system regarding BAT and BREFs
- Dissemination of information and training focussing on BREFs documents
- Monitoring the programme according to the reporting requirements EPR/ PRTR,
- Development of the pollution reduction programmes including measures as a contribution to the Danube Basin Management Plan and the Programmes of Measures

Existing know-how in other European Member States should be taken into account in the implementation of BAT; however full recognition of the unique situation in each of the countries is critical to the successful implementation of BAT. For each country the current techniques deployed in each industry sector and current levels of environmental performance, particularly in relation to existing emission standards, should be reviewed. The outcomes of this review should then be compared with those techniques defined as BAT in the EU, according to guidance and BAT reference documents (BREF Notes) provided by the European IPPC Bureau

The monitoring of release of pollutants is a key element of regulatory control which provides data to demonstrate compliance with permitted limits or evidence of the failure of pollution control methods.

It is recommended that before setting emission limit values an inventory of industry pollution sources should be carried out. In addition, the content of dangerous substances in relevant discharged industrial waste waters should be checked and surface water quality should be monitored.

When specifying a limit the methods of measurement used to determine compliance must be: clearly understood and reflect current best practice. Any inherent uncertainties in the measurement and data handling methods should be quantified and taken into account. Compliance monitoring programmes must also be designed to take full account of affordability and should be compared with the requirements for monitoring and enforcement set out in Council Decision 2000/479 on the implementation of a European Pollutant Emission Register.

An integral part of the proposed Work Plan is the development and subsequent implementation of the Reduction Pollution Programme which will contain measures focused on particular steps related to implementation. These measures are necessary to meet the short and medium- term objectives as required by the DRBC.

## 3.4. Impact of BAT implementation on DRB Pollution Reduction

The estimate is based on detailed knowledge of selected pilot IPPC installations/case studies in two industrial sectors; chemical and pulp and paper. The pulp and paper industry was selected, in part, because it is the largest discharger of COD accounting for almost 50% of total discharges in the DRB (Emission Inventory 2002).

The detailed information gathered from the two installation case studies provided the data on the reduction of pollution and other impacts due to BAT implementation at the installation. The order of magnitude of reduction was confirmed by comparing average levels of concentration data from installations in Germany which have already implemented BAT with those in installations in Croatia and Romania which have not yet implemented BAT. The reduction in COD in the pulp and paper case study was then projected to the rest of the pulp and paper installations in the 2002 EMIS

Inventory. This resulted in an estimate of the BAT implementation impact in that sector. The calculation was based on simple multiplication. The reductions in pollutants in the pulp and paper sector were then applied on a percentage bases to the total COD discharges. This resulted in a general estimate which is consistent with the type and amount of data available. The estimate should be used with caution recognizing that it is preliminary estimate. However, even with these qualifications it is hoped that the estimate will be the starting point for further more detailed calculations as more installations implement BAT and more installation specific data become available

The analysis shows clearly that the hypothesis of that BAT implementation will have a positive impact on pollution reduction in the DRB is correct. The reduction of 50% estimated for COD for the pulp and paper industry would result in an annual reduction of 26,653 t/a in that sector. Applying the same calculation to total industrial COD discharges of 133,950 t/a (excluding Austria and Germany) the reduction would be 66,975 t/a. As was mentioned in the introduction the estimates are very preliminary and based upon the data available so caution should be used in their use. Actual reductions may be higher or lower and are subject to a variety of factors which are not part of this analysis for example the closure of installations and new installations which may be built. Nevertheless, it is anticipated that these estimates will be only the first step in developing estimates for future pollution reductions due to the implementation of BAT and other measures in the DRB. The detailed information regarding this estimation is enclosed in Annex 4.

## 3.5. Workshops and Dissemination

The general training objective was to provide participants with the knowledge to address the highest priority issues for the implementation the existing legislation consistent with the principles and approaches of the IPPC Directive and the implementation of BAT. These were tailored to the specific circumstances in Bosnia and Herzegovina, Moldova and Serbia. Training packages for these countries were developed taking into account the Training Needs Analysis findings. Local consultants were fully involved in key training and preparation and delivery and remain a sustainable resource in each of the countries for future IPPC/Bat implementation. The training workshops were structured to balance a number of presentations from keynote speakers and consultants with the opportunity for discussion and feedback at a national level. There were two "break-out" sessions during the training workshops which provided for participant centred learning.

An overview of Training Workshops held in the targeted countries is shown bellow:

| Country - place | Date | Number of Participants |
|---|---|---|
| Bosnia Herzegovina - Sarajevo | January 25 – 26. 2007 | 27 |
| Moldova - Chisinau | March 30 – 31, 2006 | 22 |
| | December 5-6 2006 | 21 |
| Serbia - Belgrade | March 1. - 2. 2006 | 22 |
| | March 15. – 16. 2006 | 20 |

### 3.5.1. Serbia

The first training workshop took place in Belgrade - March 1 - 2, 2006.

The topics of the workshop included:

- Introduction to IPPC basic concepts
- IPPC process – Legislative framework in Serbia and the EU
- Examples from EU Countries
- The WFD (priority substances) and the Dangerous Substances Directive
- Permit content and form - examples of permits
- BAT- concept
- Content and limitations of BREFs

The second seminar, which was built upon the success of the first was geared to more detail tailored specifically to the Serbian cement sector, also took place in Belgrade on March 15 – 16, 2006.

The topics of the second training workshop included:

- Emission limit values – EU/Serbian/Slovak for air, water, noise, vibrations, odour
- Practical exercise – modelling in the air sector using the Slovak software MODIM (US EPA based) and emission data from Serbian installations
- Case work: Cement manufacture installation
- Monitoring and Reporting; Legislation requirements and guidance.

**Conclusions and Participant Evaluations from the Training Workshops**

Overall the quality of the workshop based upon participants' evaluation ranged from good to excellent. It is important to stress that prior to this project a number of workshops of IPPC had been held in Serbia, dealing only generally with the new IPPC Act. This was the first workshop on IPPC where from practical issues were discussed including implementation both from the point of view of industry and the permitting body. As the result there was a high level of participation and the training methods and were rated as appropriate to very appropriate, with the manual being rated as very good to excellent.

### 3.5.2. Moldova

In Moldova two Training Workshops took place. The general training objective was to provide participants with the knowledge to address the highest priority issues for the transposition and/or implementation the existing legislation consistent with the principles and approaches of the IPPC Directive tailored to the specific circumstances in Moldova. It focused on application of BAT in the food industry which is a major industry sector in Moldova.

The topics of the training workshops were similarly aimed at providing practical information to all groups of stakeholders. The project team prepared a training package, comprised of a Text Book and Working Group assignments. The Text book contained basic information and comments on the workshop topics.

Main topics:

- General introduction to IPPC
- Monitoring in the Integrated Approach
- Introduction to the BAT concept (objective, BAT related emission limit values)
- BREFs and their use
- BAT in the food industry (specifically in dairy, sugar and wine making industries)

- Working group assignments

**Conclusion and Participant Evaluations from the Training Workshops**

All participants considered the Training Workshops to have met the predefined objectives and overall quality of training was evaluated very positively both in terms of the training methods and the applicability of the training content to the participants work context. The atmosphere of the training was very positive with the active interest and involvement of participants particularly in the process of issuing IPPC permits, BREFs for food industry and ELVs. The participants' recommendations for future training were focused on the introduction of more examples of BAT/BREFs in connection with the application of new technologies. Suggestions were also oriented to the organization of such workshops in other parts of Moldova.

These training workshops were a key activity that brought together a unique cross-section of officials in industry and water quality from all Local and Central Environmental Authorities in Moldova dealing with permitting issues, Industries located in the Danube River Basin and Local Public Authorities (Regional Councils).

### 3.5.3. Bosnia Herzegovina

The general objective of the workshop was to provide participants with the knowledge to address the highest priority issues for the transposition and/or implementation of the existing legislation consistent with the principles and approaches of the EU Directive (IPPC) tailored to the specific circumstances in Bosnia and Herzegovina, focusing on the application of BAT. Participants were representatives of authorities responsible for environmental protection at different administrative levels i.e. entity, cantonal and municipal level. They included environmental inspectors and people responsible for environmental impact assessment procedures and environmental permitting.

**Conclusion and Participant Evaluations from the Training Workshops**

As the most important part of the training the participants highlighted the following: "exchange of experiences"; "presence of all people dealing with environment-related issues (entity, cantonal and local level)"; "practical examples from both entities"; "presentations on BAT and BREFs"; "work in groups"; "discussion about concrete problems in vegetable and fruit processing industry".

A large number of them gave comment that the entire workshop was very useful.

With regard to recommendations of what could be improved in future workshops, they the following suggestions were made: "more practical examples"; "more examples from B&H"; "invite more people in charge of environmental permitting and inspectors from smaller municipalities"; "more workshops like this one".

Almost all participants mentioned that it is necessary to have more concrete examples, and more examples from B&H – which means that the workshop should be more adapted to local conditions. This was interesting since one half day was devoted to a real case example which was brought to the seminar by one of the participants. However, it underlines the need to use local examples in the organisation of future workshops.

## 3.6. Project Output Summary

**PROJECT OUTPUTS**

The Phase 2 project produced four major outputs:

- Policy, institutional and enforcement summary relating to industrial policy reduction for 11 countries;
- Preliminary estimate of the impact of the implementation of BAT on industrial pollution reduction for 13 countries;
- Road Maps and Country Specific Work Plans for BAT implementation in four countries;
- Support materials and training for over 100 people in three countries.

**Policy, Institutional and Enforcement Summaries**

An industrial policy, institution and enforcement summary was produced for the 11 Danube River Basin countries which were not EU Member States when the DRP was initiated.

The summaries are in a common updateable format which allows the ICPDR to understand the similarities and differences among the countries in industrial policy implementation. Future ICPDR programmes and projects can be designed based upon this information and the ICPDR should use the summaries to monitor progress over time in the countries by requesting periodic updates from the countries.

**Preliminary Estimate of the Impact of the Implementation of BAT on Industrial Pollution Reduction**

A preliminary estimate of the potential for pollution reduction impact of the application of BAT was produced for the DRB. The estimate can be used by the ICPDR to show the magnitude of positive change which can be achieved through the application of BAT throughout the basin to encourage the full application in all countries including those countries which do not have a specific legal requirement to do so. The preliminary estimate should be monitored by the ICPDR against actual reductions over time and modified as more detailed information becomes available.

**Road Maps and BAT Implementation Work Plans for Bosnia Herzegovina, Moldova, Serbia and Ukraine**

The individual country road maps were developed using the existing, policy, institutional and enforcement situation in each of the countries. The Road Map for each country plots the necessary milestones and timelines along with actions to move the water protection and reduction of industrial pollution forward through the application of BAT. This approach creates opportunities for non accession countries as a way to drive and structure the planning process with respect to BAT implementation. It allows them to identify the most important steps to improve environmental protection – to execute the tasks regarding the implementation of the Convention on Cooperation for the Protection and Sustainable Use of the River Danube (DRBC), create more favourable condition for investments in industry, and at the same time move closer to EU accession requirements.

An integral part of the proposed Work Plan is the development and subsequent implementation of the Pollution Reduction Programme which will contain measures focused on particular steps related to its implementation. Therefore the detailed country recommendations for implementation of BAT concept support and facilitate the ICPDR activities in the field of hazardous substances pollution reduction in the DRB .Implementation of the Work Plans will meet the short and medium- term

objectives as required by DRBC and the WFD concerning the preparation of the Danube River Basin District Management Plan.

**Training**

The project provided training for more than 100 participants from Bosnia Herzegovina, Moldova, and Serbia. The training added to the existing knowledge base of the participants and focussed on practical approaches including how to conduct an initial environmental assessment and how to design an application form. The training examples were drawn from the industrial base of each country and therefore were both relevant and timely. The individuals who received the training will assist the further application of BAT in their individual countries as well as being available to the ICPDR as country based BAT experts.

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# ANNEXES

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# ANNEX 1

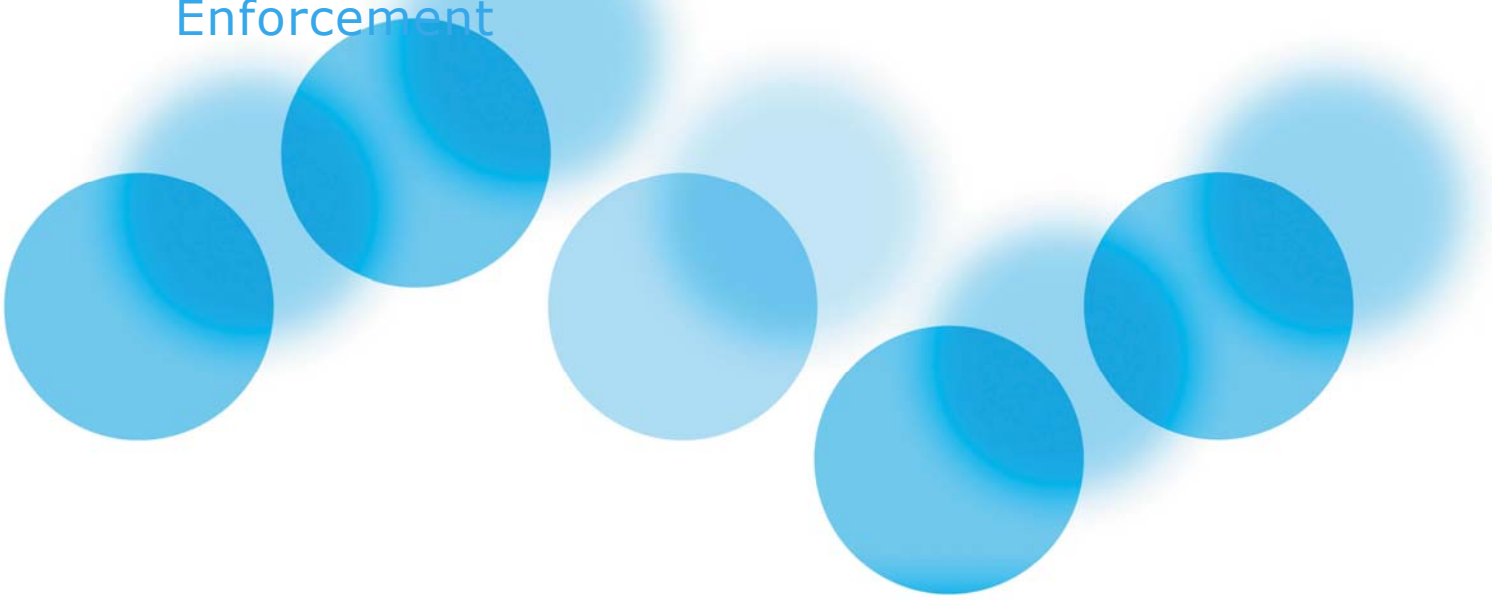
# REPORT ON REVIEW OF POLICY, LEGISLATION AND ENFORCEMENT

UNDP I GEF
DANUBE
REGIONAL
PROJECT

**February 2006**

# Industrial Reform and Development of Policies & Legislation for Application of BAT towards Reduction of Nutrients & Dangerous Substances

## Report on Review of Policy, Legislation and Enforcement



UNDP GEF

WORKING FOR THE DANUBE AND ITS PEOPLE

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# ABBREVIATIONS

| | |
|---|---|
| AT | Austria |
| BA | Bosnia-Herzegovina |
| BAT | Best Available Techniques |
| BG | Bulgaria |
| BREF | Best Available Techniques Reference Documents |
| CP | Contracting Parties of the Danube River Protection Convention |
| HR | Croatia |
| CZ | Czech Republic |
| DE | Germany |
| DRB | Danube River Basin |
| DRP | Danube Regional Project |
| DRPC | Convention on Cooperation for the Protection and Sustainable Use of the River Danube |
| EC | European Commission |
| EMIS | Emission Inventory made by ICPDR |
| EMIS/EG | Emission Expert Group of ICPDR |
| EQS | Environmental Quality standards |
| EU | European Union |
| GEF | Global Environmental Facility |
| HU | Hungary |
| MD | Moldova |
| ICPDR | International Commission for the Protection of the Danube River |
| IPPC | Integrated Pollution Prevention and Control |
| MS | Member States |
| P&M EG | Pressures and Measures Expert Group of ICPDR |
| PRTR | Protocol on Pollutant Release and Transfer Registers |
| RO | Romania |
| CS | Serbia and Montenegro |
| Sk | Slovakia |
| SI | Slovenia |
| UA | Ukraine |
| UNDP | United Nations Development Programme |
| UNIDO | United Nations Industrial Development Organisation |
| WFD | Water Framework Directive |

# 1. INTRODUCTION

This is the Report of the UNDP-GEF Danube Regional Project (DRP) Phase 2, component 1. 5 **Industrial Reform and the Development of Policies and Legislation towards the Reduction of Nutrients and Dangerous Substances** (hereafter "Industrial Policy Project).

**The Overall project objective** of component 1.5.is "Creation of sustainable ecological conditions for land use and water management".

Taking into account the expected revitalization of industries, the Phase 1 Project focused on industrial policies and legislation in order to ensure that environmental considerations are adequately taken into account and that mechanisms for compliance are put in place. In this context, the project output assists the DRB countries in the development of new industrial nutrient/toxics pollution control policies and legislation in line with existing and emerging (driven by the EU accession process) national legislation. While Phase 1 of the Project focused on the identification of gaps and opportunities for reforms and measures, Phase 2 is aimed at the development and implementation of targeted assistance programmes to non-accession Danube countries on industrial pollution reduction policy and regulatory frameworks including the necessary capacity building activities. The component includes legislation review, institutional development, technical assistance and training. The program is being developing in cooperation with the individual national governments and is tailored to the needs of each country.

The inception period of the Phase 2 Industrial Policy Project was completed in August 2005. The approved work plan contains the following project activities:

**A) Policy and legislative review tasks**:

All countries included in Phase 1

**B) Involving training and capacity development** in the four non-accession countries (Bosnia Herzegovina, Moldova, Serbia Montenegro and the Ukraine.

**C). Developing the Road map for BAT implementation** for the four non-accession countries - Bosnia Herzegovina, Moldova, Serbia Montenegro and Ukraine.

This report is for section A. It describes, analyzes and summarizes the activities undertaken to review policy, legislation and enforcement. Policy and legislative review tasks consist of three components :

**A.1. Review of policy, legislation and enforcement**

**A.2 Impact of ICPDR BAT Recommendations**

**A.3 Case Studies BAT/IPPC Implementation in the Danube River Basin**

# 2. A.1.REVIEW OF POLICY, LEGISLATION AND ENFORCEMENT

## 2.1. Introduction

During Phase 1 of the Industrial Policy Project a matrix was developed to document the policy, legislation and enforcement situation in each country. Since that report was written, new or amended legislation focused on industrial pollution has been implemented in the four new EU Member States in the DRB (Czech Republic, Hungary, Slovakia and Slovenia) as a requirement of accession on May 1, 2004. Other countries which are accession countries Bulgaria, Croatia and Romania are also in the process of implementing IPPC legislation. Therefore, a new more detailed updated matrix relating to legislation, institutional arrangements, implementation and enforcement was developed during Phase 2 of the project.

The report results are being used as an input for the Training Needs Analysis, development of the Road Map for BAT Implementation and other relevant components of the Industrial Policy Project.

## 2.2. Methodology

This chapter describes the approaches and the activities which have been carried out related to the review of legislation, policy and enforcement in the field of industrial pollution reduction.

The structure of the matrices has been developed on the basis of EU legislative requirements and implementation in the DRB taking into account the objectives of the Industrial Policy Project.

These matrices have been developed for each of the countries using available ICPDR database information as well as Phase 1 project results. They were then sent to the country representatives of the P&M EG through the ICPDR Technical Expert for review and comment. Based on the feedback the matrices have been revised and updated.

All information summarised in these matrices has been analysed from the point of view of current policy, legislation and enforcement depending on the status of the particular country (MS, accession country, or non-accession country). Special emphasis is given to the evaluation of dangerous substances, priority substances and emission limits as well as Environmental Quality Standards. The analysis includes implementation of the National Pollution Reduction Programmes and BAT developments.

The results and recommendations of this activity will be used as an input for the Training Needs Analysis, development of the Road Map for BAT Implementation and other relevant assignments of the Industrial Policy Project.

### 2.2.1. Legislation

The majority of Danube countries have similar legal environmental management systemsas the result of the harmonization and transposition of the EU water related legislation in AT, BG, HR, CZ, DE, HU, SK, SI, and RO. Also, the rest of the countries as the Contracting Parties, of the Convention on Cooperation for the Protection and Sustainable Use of the River Danube are committed to adopt same legal requirements as those valid in the EU. This has important implications for future industrial pollution reduction and prevention measures within the context of the Danube River Basin Management Plan, which will be developed by the end of 2009.

With respect to industrial pollution control, the Dangerous Substances Directive 76/464/EEC (DSD) and the Integrated Pollution Prevention and Control Directive (IPPC) 96/61/EC are the most

relevant. Also, the Water Framework Directive (WFD) 2000/60/EC provides for the regulation of industrial pollution released into the aquatic environment.

While the IPPC Directive focuses on the control of emissions from large installations into the environment (air, soil and water), the Water Framework Directive focus is on the achievement of good status of water bodies. Similarly, while the Water Framework Directive clearly requires the control of point and diffuse sources of pollutants, the DSD is mainly targeted to the control of point sources. However, there are some provisions under the DSD for the control of multiple sources (e.g. Art.5 in 86/280/EEC and Art.4 in 84/156/EEC).

The DSD regulates direct discharges of dangerous substances (specifically those in List I and List II). The priority list of substances adopted under Article 16 of the Water Framework Directive (Annex X) will replace the list of dangerous substances in the Commission Communication to the Council of 22 June 1982. For the priority substances the Commission will identify measures for control and will establish Environmental Quality Standards. The WFD also requires the identification of any relevant pollutant in a river basin, in addition to the priority substances, which impacts on good chemical/ecological status. In practice Member States have to select the substances, which impact on the good ecological/chemical status of the river basin. Selection of substances must be part of the analysis of pressures and impacts.

With the adoption of the WFD, the requirements stipulated in the DSD are subject to transitional provisions. Article 6 relates to the right of the Council, on proposal of the Commission, to set limit values for List I substances. All the other parts of the DSD remain in force for another 13 years. In particular Article 7 of the DSD concerning the establishment of the Pollution Reduction Programmes will remain a key element for the control of dangerous substances in the aquatic environment.

To provide the relevant information and an overview related to the above mentioned legal requirements of EU legislation, a legal matrix has been created. The matrix includes the selected information concerning transposition of EU legislation into national legislation including:

- terms and definitions (such as dangerous substances, priority substances, installations according to the IPPC Directive),
- setting emission limits,
- Environmental Quality Standards,
- the permitting process for industrial waste water discharges:
    - authorization requirements,
    - content of operators' applications (according to Art.6 the IPPC Directive),
    - BAT requirement (Art. 3 the IPPC Directive),
    - time limitation and changes in permit and
    - accident prevention measures.

### 2.2.2. Institutional Arrangements

Permitting, inspection, monitoring and inventorying of pollution sources are an integral part of policy implementation.

All waste water discharges into surface waters which are liable to contain any of the substances in List II l require prior authorisation by the competent authority which sets out the emission standards. Some aspects of this requirement are now covered by the Directive on Integrated Pollution Prevention and Control (96/61/EC - IPPC Directive). IPPC is concerned with an integrated operating permit system for specified installations (or industrial activities), controlling emissions to all three environmental media (air, water and soil) considering their impact on the environment as a whole. Under the IPPC Directive permits are issued setting out limit values based on Best Available Techniques (BAT). Although the control focus is on installations, the Directive also

specifies the main polluting substances for which limits must be set for each medium. For water, these are broadly consistent with the substances specified under the DSD. Legislation has been passed in all Member States to control discharges to surface waters and sewers, requiring prior authorisation of discharges containing List II substances.

The responsibility for monitoring is generally divided between the competent authorities and the operators, although competent authorities usually rely to a large extent on "self monitoring" by the operator, and/or on third party contractors. It is highly important that monitoring responsibilities are clearly assigned to all relevant parties (operators, authorities, third party contractors). It is also essential that all parties have the appropriate quality requirements in place. Monitoring should be systematic, focusing on dangerous substances and priority substances and linked to Programmes of Measures as set out in River Basin Management Plans under the Water Framework Directive.

However, where appropriate legislation is in place, it must be supported by proper institutional arrangements. This includes the designation of the competent authorities with unambiguously defined responsibilities for the permitting process, compliance and enforcement. It also includes assigning responsibility for other activities which are supporting those processes such as monitoring, inventorying of pollution sources and recording of all related data

These aspects all have been taken into consideration. Therefore the information in the matrices is focused on information concerning the permitting of industrial polluters, inspection of industrial polluters, monitoring industrial pollution, inventorying pollution sources, and recording emissions.

### 2.2.3. Implementation and Enforcement

In order to reduce pollution by the substances in List II, Member States must establish Pollution Reduction Programmes (PRPs) by applying specific reduction methods in the implementation of these programmes.

The WFD requires the assessment of human impacts in the river basin and the identification of a programme of measures to meet the objectives (good chemical and ecological status) of the WFD within nine years of adoption of the WFD. In addition, monitoring programmes need to be set up within six years of the adoption of the WFD.

The elements of the Pollution Reduction Programmes under Article 7 of the DSD are similar to those required under the WFD. A comparison of the requirements laid down in Article 7 of the DSD with those in the WFD, in particular those for the preparation of the River Basin Management Plans (RBMPs), shows that they are very similar. Thus instead of applying their own approaches to comply with the DSD Member States may want to use the procedures laid down in the WFD. Member States should therefore be encouraged to prepare their pollution reduction programmes in compliance with the DSD with a view toward complying also with the requirements of the WFD especially the obligation to prepare River Basin Management Plans, which need to be completed by 2009. Some of the measures contained in the WFD (e.g. the combined approach, control of diffuse sources, monitoring requirements) may provide Member States with additional tools for the preparation and implementation of the reduction programmes. Special provisions require using all appropriate measures like BAT, BEP, and product controls to reduce emissions.

The implementation of the IPPC Directive should take into account other Community objectives such as the competitiveness of the Community's industry thereby contributing to sustainable development. More specifically, it provides for a permitting system for certain categories of industrial installations requiring both operators and regulators to take an integrated, overall look at the polluting and consuming potential of the installation. The overall aim of such an integrated approach is to improve the management and control of industrial processes so as to ensure a high level of protection for the environment. Central to this approach is the general principle (given in Article 3) that operators should take all appropriate preventative measures against pollution, in particular through the application of BAT enabling them to improve their environmental

performance. BAT reference documents - BREFs are guidance documents for Member State authorities in assisting them in issuing the permit. They are the result of the information exchange organised by the Commission in accordance with Art 16(2) of the IPPC Directive.This legal basis has been considered as an essential approach for development of the implementation and enforcement matrix.

The implementation and enforcement matrix provides information concerning the National Reduction Programmes, specific reduction programmes of operators, BAT developments and public involvement.

## 2.3. Analysis of Matrices

### 2.3.1. Legal matrix

The legal assessment dealt with the core legal instruments of the EU: the DSD and the IPPC Directive which relate to discharges of industrial waste water into receiving waters and with the Water Framework Directive (WFD) 2000/60/EC that provides for the regulation of industrial pollution releases into the aquatic environment.

The Contracting parties, of the Convention on Cooperation for the Protection and Sustainable Use of the River Danube committed to adopt the legal requirements valid in the EU related to implementation of the WFD. This has important implications for future industrial pollution reduction and prevention activities within the context of the Danube River Basin Management Plan, which will be developed by the end of 2009 However, all countries cooperating under the DRPC expressed their firm political commitment to support the implementation of the WFD in their countries and pledged to cooperate within the framework of the ICPDR to achieve a single, basin wide coordinated Danube River Basin Management Plan.

The legal matrix illustrates the progress in harmonization of legal requirements of the EU, namely, those related to the DSD and the IPPC Directive.

Comparison of the legal requirements of the DSD and the IPPC Directives clearly indicates that new Member States (CZ, HU SK, and SI) have fully transposed all water related directives. These countries have the same framework with respect to basic terms and definitions of priority substances and categorization of specific polluters (including types and size of installations).

Two other countries of the Danube region (BG, RO) have shown substantial political will to join the EU. This is documented in the adoption of national water legislation that is comparable with the water related directives of the EU. Also, the IPPC Directive is harmonized and legally transposed.

In Croatia there is a special situation. Significant progress has been achieved at the political level and the HR government has declared willingness to meet strict EU requirements. HR is in the process of development of legislation with respect to industrial pollution reduction and it is anticipated that legal changes will be completed by the end of 2006.

A very different situation exists in non-accession countries (BA, CS, MD and UA). These countries are in different stages of making the legal adjustments. In addition, these countries have difficult political and economic situations and the water agenda is not necessarily the highest priority. On the other hand a legal water management framework is in place or being established which provides the basis for these countries to participate in the ambitious pollution reduction programme of the ICPDR. For example, CS adopted a framework Environmental Protection Act and an IPPC Act in 2004.

### 2.3.2. Institutional matrix

The institutional matrix summarizes how the existing legal framework is supported by an institutional setting. Although the EU directives require certain institutional arrangements, these are implemented at the level of the individual country. There are several reasons for this: the first is the historical development and tradition in the field of water management differs among countries; the second relates to capacities (human and financial) to support the legislation. Overall organizational performance and functioning capabilities are a prerequisite to successful implementation of the water protection initiatives.

All new EU Member States have focused on the administrative restructuring in the water sector in order to meet strict institutional requirements dealing with monitoring, recording and reporting on the implementation of the EU water related legislation. For example, different administrative bodies were established in the Czech Republic and in Slovakia where the new responsibilities related to the IPPC Directive were given to the environmental inspectorates (SK) or Agencies (CZ) and special departments have been created dealing with integrated issues at the regional level. In Romania the current environmental authorities serve as the competent authorities for integrated pollution and prevention control permitting process.

In contrast, in Bulgaria, Serbia and Montenegro and Slovenia permitting institutions are centralized (one permitting organization for all dischargers).

In non-accession countries, institutions are either "traditional" water management bodies or "newly" established water management bodies. However, in all countries, institutional systems are very dynamic, and sensitive to integration and coordination at the Danube basin level.

Based upon the assessment of the institutional matrix, it is obvious that individual countries have different institutional settings with respect to permitting industrial polluters. These range from the central level (ministries) to the local level (water directorates at the county or district level). The situation is further complicated with respect to permitting of polluters that fall under the IPPC directive and other industrial installations.

All countries have clearly defined responsibilities for the inspection of industrial polluters. However, the structure of institutional arrangements appears fragmented with several bodies involved in implementing water and integrated prevention and pollution control legislation. On the other hand it is obvious that inspection of discharged pollutants depend on the capabilities of the competent authorities (personnel capacity, financial sources) and level of legally binding emission limits (see Annex 1, Legal matrix – definitions of Priority/ dangerous substances according to the WFD and the DSD). Therefore the efficiency of inspection is not uniform among the countries due to the different overall institutional arrangements and legislation related to emission limits.

The new MS as well as accession countries including CS have established the conditions for an integrated permitting system. However in HR this system will be established after transposition of the IPPC Directive. In Bosnia & Herzegovina, Moldova and Ukraine there is a permitting system for industrial waste water discharges in place, but it is not based on the integrated approach.

The responsibility for monitoring is generally divided between the competent authorities and the operators.The monitoring of waste water discharges by operators is obligatory according to the IPPC Directive and the DSD and these requirements are included in the permit conditions.. In all countries with the exception of Bosnia & Herzegovina monitoring of industrial waste water discharges is carried out by operators. Data is then collected by the responsible institutions.

Regular monitoring of industrial waste waters discharges is ensured by the competent authorities, inspectorates or environmental agencies in HU, MD, RO and Sl. In some cases there is no regular monitoring and these activities are usually a part of the inspection process for compliance with the permit conditions (CZ, SK).

The Danube basin countries, except Bosnia Herzegovina and the Ukraine, have designated a responsible institution for monitoring of surface water quality. Although the monitoring (frequency and scale) depends on financial resources, it is in place.

Based upon the assessment of the institutional matrix related to the inventory of pollution sources it is clear that the inventory data are not available in Bosnia & Herzegovina, Bulgaria, Serbia and Montenegro and Ukraine. In Croatia some data are available in the national database. The first inventory of the installations covered by the IPPC Directive will be carried out by the Croatian Center for Cleaner Production under the supervision of Ministry of Environmental Protection, Physical Planning and Construction. Information concerning inventory of pollution sources is concentrated at the relevant ministries or at special institutions such as VITUKY in Hungary, the National Agency for Environmental Protection (for IPPC installations) in Romania and the Hydrometeorological institutes in the Czech Republic and Slovakia. In practice all these institutions are also responsible for emission recording.

### 2.3.3. Enforcement and Implementation Matrix

The following features of enforcement and implementation were investigated in frame of this task:

- pollution reduction programmes at the national level
- pollution reduction programmes at the operator level
- BAT developments
- public involvement

Enforcement of these issues represents activities associated with promoting compliance and obedience to those binding state rules that have been promulgated in generally to safeguard ecological integrity, preserve natural resources and protect human health. The results of then institutional arrangements matrix analysis show that the main tool for enforcement is inspection focused on assessment of compliance with conditions laid down in industrial waste waters discharges permits. Inspection is carried out in all the CP by environmental inspectorates and in some cases (Czech Republic, Slovakia, Serbia and Montenegro) by water management authorities which are issuing permits for those sources of pollution that are not subject to integrated permits.

Enforcement programmes with suitably trained staff and resources are important to ensure the continued adherence of dischargers to their permit conditions, and to assess compliance of quality of discharged waste water with emission limits and environmental quality objectives.

New EU Member States and RO utilize both emission standards and the quality objective approach. In HU, the EQS are being developed. In BA, HR, CS, MD and UA, emission limits are set; however, these are not in compliance with the DSD. EQS are not defined in BG, MD and UA.

All new EU Member States, legally require t industrial polluters to develop and implement accident prevention measures. A gap exists in non-accession countries, Water legislation does not include the prevention of industrial accidents by appropriate measures and polluters are not required to develop Accident Prevention Plans.

In summary, each of the Danube basin countries has legally established the requirement of prior authorization for a polluter to discharge waste water into the recipient waters. This authorization is given in a permit that stipulates emission limits and other conditions of operation. Specific details of the legal requirements vary among countries. Time limited permits and changes in permits as a consequence of changes in operation of the installation are in place in all countries, however, the time limitation varies from 1 year to 10 years. In the case of Croatia there is maximum time limitation of 15 years and in Bosnia Herzegovina 30 years

All EU Member States and Romania have adopted pollution reduction programmes at the national level, but responsibilities for the implementation and enforcement of pollution reduction

programmes varies from country to country. For example, in the Czech Republic and Slovakia these programmes have been approved by the governments and responsibilities for implementation have been delegated to the relevant national ministries and to the state administration on the regional level. The permits include measures focused on pollution reduction and deadlines for implementation.

In Romania, there is an implementation plan for the IPPC Directive which contains information on the straightening of administrative capacity, cost assessment and financial resources. All new installations and those with substantial changes will operate according to the IPPC Directive requirements until the EU joining date, but not later than at the time of coming into operation if this date is after the date of EU accession. 716 existing installation have been identified under the IPPC Directive and for 195 of this installations, Romania has obtained transition period, between 2 and 9 years.During September 2004 – May 2005, 6 integrated environmental permits were issued and 80 application integrated environmental permits have been submitted; they are during the analysis process.

Slovenia is in the process of issuing IPPC permits for the installations. The operators reported on their installations to the Ministry for the Environment and Spatial Planning prior to April 30, 2005. It was concluded that there are approximately 190 existing IPPC installations. For fifteen of them a transitional period was endorsed during the accession negotiations. They have to be harmonized by 2015.

Bulgaria and Croatia and non-accession countries do not have pollution reduction programmes at the national level. This has very important implications in the area of intervention at the level of the ICDPR with regard to the preparation of the Danube River Basin Management Plan and Programme of measures as required by the WFD.

The same is valid for operator programmes. The pollution reduction programmes of operators are, according to the IPPC Directive, an essential part of the permit application. Therefore, the operators are obliged to develop individual reduction programmes and these are subject to inspection. Non- accession countries do not have these requirements.

The situation with respect to BAT varies among Member States The majority of Member States indicate that the BAT Reference Documents (BREFs) published by the Commission pursuant to Article 16(2) of the Directive on the exchange of information on BAT are taken into account generally and in specific cases when determining BAT. Some BREFs are being translated into national languages (CZ, SK).

Hungary is preparing national BAT guidance documents based on the BAT reference documents issued by the EU Commission. Seven of these guidance documents are currently completed (for cement and lime sector, intensive rearing of pigs, plastic production, production of simple hydrocarbons, pharmaceutical sector, milk production and sugar production) and another 11 are being prepared. In Romania the regulation for the approval of the Reference Documents on BAT has been issued in some industry categories.. The National Centre for coordination, information and up-dating of BAT guides has also been established. The National BAT guides will be in line with the reference documents issued by the EC. In Bulgaria Sector Guidelines on the implementation of BAT in the chemical industry, cement industry, surface treatment of metals and large combustion plants are developed. This matrix is also focused on availability of information for the public concerning:

- pollution sources,
- monitoring results for compliance assessment
- monitoring results for the environmental reporting of industrial emissions and
- public involvement in the permitting process.

There is a common approach in the member states concerning public information on ***pollution sources and monitoring results.*** These data are available to the public in annual reports that are available on the web pages of relevant ministries, institutions and agencies. This kind of information is limited in non-accession countries.

***Reporting obligation according to the IPPC Directive*** were laid down in Commission Decision 2000/479/EC on the establishment of a European Pollutant Emission Register( EPER) which covers large and medium-sized industrial plants which are listed in Annex I of the IPPC Directive and which exceed specified emission thresholds. EPER aims to provide scientists, local authorities and policy makers with a consistent, Europe-wide emissions database. The first set of emission data, covering the year 2001, was published in February 2004. EPER contains data on the main pollutant emissions (50 substances emitted to air and water from 56 industrial activities) reported by around 10,000 large and medium-sized industrial facilities in the 15 EU Member States, Hungary and Norway. The second set of data for EPER, covering 2004, will be reported in 2006 and all new EU Member States will take part.

There has been a high level of transposition of the EU Directives into national legislation of the Danube countries in DE, AT, CZ, SK, HU, SI, RO, BG, and HR. Also, the rest of the countries as Contracting Parties committed to adopt the legal requirements to those valid in the EU. This has important implications for future industrial pollution reduction and prevention activities within the context of the Danube River Basin Management Plan, one of the main challenges of the ICPDR.

However these issues are complex and the CPs have made an effort to fulfil their obligations. For example:

***In Bulgaria*** according to the Environmental Protection Act the Executive Environment Agency will maintain a public register of the results of emission monitoring provided for in the integrated permits and transmit this data to the European Register of Noxious Substance Emissions. The information provided should be assimilated into databases that allow Bulgaria to meet its commitments under the IPPC Directive, the European Pollution Emission Register Decision and the Protocol on Pollution Release and Transfer Registers.

The Ministry of Environmental Protection, Physical Planning and Construction of ***Croatia*** will be responsible for establishing a reporting system regarding emissions to air and the Ministry of Agriculture, Forestry and Water Management will be responsible for establishing a reporting system regarding emissions to water. The register will collate all individual reports and will be established by the Ministry of Environmental Protection, Physical Planning and Construction on the basis of a governmental order

***Hungary*** took part in the first EPER reporting on a voluntary basis, as the first representative of the new Member States. Hungary is already preparing for the second reporting of EPER data for the reporting year 2004 in June 2006.

The 2004 emission data was reported by the facilities in the first quarter of 2005 and they are checked and recorded in the databases by the responsible authorities. The quality assessment of the data starts in the autumn of 2005.

Difficulties still exist concerning data collection. A software tool for data on emissions to surface water currently does not exist. New software tools querying data for EPER purposes are in the testing phase. Problems also occur with the determination of diffuse emissions coming from agricultural facilities.

The EPER Decision was transposed ***Romanian*** law by the Order of the Minister of Waters and Environment Protection no. 1144/2002. The National EPER Implementation Guide includes forms and examples of reporting, including interpretation of definitions, data quality and management, reference to emission estimation methods and lists of pollutants specifically for each sector of activity, per source categories, as well as code systems related to activities in Appendix 1 of the Directive. The annual report concerning pollutant emissions will be published on the Ministry of

Environment and Water Management web site, ensuring public access to environmental information, according to the provisions of the applicable laws. Also, the data from EPER is transmitted to the European Agency for Environment Protection.

***Slovenia*** will submit the first report to the EPER register in June 2006. Facilities which will be part of the EPER Report have been identified from mandatory emission reporting obligations. Data on emissions are available in the databases of the Environmental Agency of the Republic of Slovenia.

***The Slovak*** Hydrometeorological Institute is preparing the database "Integrated Register of Pollution" which will serve for the deposit and handling of information as required by IPPC and EPER (emissions into air and water). At present it is in the testing stage. Data from operators are already in this database and are being verified and accumulated consistent with the EPER requirements.

The European Community and its Member States signed, a **Protocol on Pollutant Release and Transfer Registers** (PRTRs) with the UN-ECE at the fifth Ministerial Conference "Environment for Europe" in Kiev, in May 2003.

In order to ratify the UN-ECE Protocol, the limited existing European Pollutant Emission Register (EPER), has to be replaced by a comprehensive European PRTR. The European PRTR will fully succeed the existing EPER In order to simplify and streamline reporting requirements, Council Directive 91/689/EEC on hazardous waste and Council Directive 96/61/EC concerning integrated pollution prevention and control are to be amended.

These legal acts are also designed to ensure the Community's full compliance with the provisions of Article 5(9) of the Århus Convention which the Commission adopted on October 7$^{th}$, 2004.

The PRTR should go online in 2009 and will then replace EPER. Its first reporting year will be 2007. AS EPER, the European PRTR will provide information about releases of pollutants from specific industrial facilities and activities, on a country by country basis.

The PRTR will report on more than 91 substances released to air, water and land from 65 activities. It will also have information on what industrial installations do with their waste and waste water. The reporting cycle will be annual instead of every three years. Also, the European PRTR will also compile reports of pollution from diffuse sources such as road traffic, aviation, shipping and agriculture. Following its establishment, citizens will have a say in how it should be further developed.

***Slovenia*** was active in the process of adopting the European PRTR regulation and is acquainted with the obligations of reporting which have to be fulfilled. The activities to complete (harmonize) Slovenian national legislation for the European PRTR reporting obligations have already started.

***Hungarian*** legislation relating to this regulation has to be reviewed and the necessary modifications made. The databases concerning waste transfers and emissions to land already exist but they have to be slightly modified and included in the integrated software system. The whole system will be established taking into consideration the fact that 2007 is the first year of reporting.

In ***Romania*** the information/data on pollutant emissions are to be assimilated into databases in order to meet the requirements of the IPPC Directive, the European Pollution Emission Register Decision and the Protocol on Pollution Release and Transfer Register.

A mechanism for ***public*** involvement ***in the permitting process*** is in place in all Member States and accession countries and they have legal provisions to ensure the availability of information and participation of the public in the integrated permitting procedure. However there are some differences among countries mainly in those cases of permitting procedures, dealing with industrial waste water discharges which are not subject of the IPPC Directive. Public involvement is not yet developed in non-accession countries.

## 2.4. Summary

The Review of policy, legislation and enforcement is an integral part of the activities carried out in accordance with the Terms of Reference of the Industrial Policy Project. The objective of this activity has been to obtain information from the Contracting Parties of the ICPDR (except for Austria and Germany) concerning new developments and progress achieved in the field of EU legislation transposition, policy and enforcement. These are important tools for the reduction of industrial pollution in the Danube River Basin.

This activity has been executed in cooperation with the members of P&M EG and supported by the ICPDR Secretariat Experts.

All available information gathered from the ICPDR Database and from the Danube Countries has been summarized in matrices. An analysis of the legal, institutional, implementation and enforcement matrices indicates the following:

- The basic legal framework is in place in the Danube countries. Substantial progress has been recorded in the accession countries. On the other hand, more remains to be done in non-accession countries to complete the adoption of modern water legislation.
- In general all countries require waste water discharge permits. All countries have well developed basic monitoring requirements carried out by polluters, however, monitoring of industrial discharges and hazardous substances executed by the competent authorities needs to be improved.
- Based upon the assessment of the institutional matrix, individual countries have different institutional settings with respect to permitting industrial polluters. These range from the central level (ministries) to the local level (water directorates at the county or district level). The situation is further complicated with respect permitting of polluters that fall under the IPPC directive and other industrial installations.
- The degree of success in the implementation process of BAT implementation varies among Member States. The Member States indicate that the BAT Reference Documents (BREFs) are taken into account generally and in specific cases when determining BAT. Some countries (HU, Sl, RO and BG) have established legal measures for the adoption of the national BAT guidelines related to specific industries, based upon the BREFs.
- Public involvement in integrated permitting process has been improved as well as the access of public to information concerning the monitoring results and sources of pollution.

# 3. A.2. IMPACT OF ICPDR BAT RECOMMENDATIONS

## 3.1. Introduction

In 2000 the ICPDR EMIS/EG produced Recommendations on Best Available Techniques for the heavily polluting sectors in the field of water (Food Industry, Chemical Pulping Industry, Paper Making Industry, Chemical Industry and monitoring of wastewater discharges). These recommendations were translated into the national languages of DRB countries with EU support and published on DANUBIS.

The EMIS/EG members were given the responsibility to report on how the national and local water authorities would make the most efficient use of these recommendations, with respect to enforcement, compliance and implementation, including:

(i) preparation of a list of the potential beneficiaries (water authorities, industries, industrial associations, etc.),

(ii) proposal for the development of other guidelines and recommendations and

(iii) ways on how best the information exchange can be maximised among the local authorities and local industrial beneficiaries.

The completion of the first reporting period according to the reporting formats of the ICPDR recommendations on the use of BAT for the selected four industries: chemical industry, chemical pulping industry, food industry, and paper making industry, was 30$^{th}$ of June 2004.

In 2003 EMIS/EG in addition, introduced the Recommendation on BAT at Agricultural Point Sources. The recommendation contains technical in-plant and end-of-pipe measures for the reduction of wastewater volumes and abatement of pollution loads. Additional measures are proposed to improve environmental compliance at the plant and enforcement of the permitting environmental authority.

According to Resolution of the 2nd Standing Working Group of ICPDR the contracting countries have agreed with the proposed recommendation and with implementation of the provisions of this document at the national level starting January 1$^{st}$. 2006.

The Terms of Reference of the Industrial Policy Project require an assessment of the use of national and local authorities and other beneficiaries of the recommendations. In addition, an analysis of the lessons learned from the ICPDR Recommendation experience may be used to further assess the application of BAT in the DRB. The EMIS EG expressed a concern that any confusion between the ICPDR recommendations and the EU BREF notes be avoided. This has been taken into consideration in this section of the report. In part, for example, by using the correct title of the ICPDR work as recommendations and the EU material as guidelines.

## 3.2. Methodology

The methodology involved the review of the ICPDR country reports on the use of the Recommendations and an analysis of the potential future use of the ICPDR Recommendations to implement BAT in the DRB based upon the lessons learned.

The ICPDR Recommendations were developed for four industries; the chemical industry, the chemical pulping industry, the food industry and the paper making industry. The Recommendations were made at the sectoral level and therefore were general in nature.

In spite of repeated requests to the P&M EG Technical Expert only two country reports were received for the Czech Republic and Slovakia. Of these only the Czech Republic provided information the to the ICPDR with respect to the implementation of the BAT recommendations. The report is for three sectors papermaking, food industry and the chemical industry in the Morava River Basin. A total of 20 enterprises 9 papermaking, 6 food industry and 5 from the food industry sector were reported on and can be summarized as follows:

**a) Papermaking**

The Czech report for the papermaking industry indicates that all of the installations have implemented multiple use of waste and service waters. In the year 2002 7 of the 9 installations exceeded the limits for BOD. In 2003 several improvements including the construction of a biological WWTP at one installation; another made a change in the biological treatment process and other installations substituted less harmful substances. The cumulative result is that the pollution emissions were reduced to meet both the ICPDR and Czech requirements

**b) Food Industry**

In the food industry 6 installations were reported.

Approximately half of the ICPDR Recommended measures have been implemented and all installations have their own WWT plant.

**c) Chemical Industry**

With respect to the Chemical Industry all 5 of the monitored plants have their own WWTP and most of the ICPDR Recommendations have been implemented.

## 3.3. Summary

From these results it can be seen that voluntary recommendations may improve the process of pollution reduction prior to legally binding regulation at least in the case where such legislation is anticipated.

## 3.4. Lessons Learned

The ICPDR Recommendations are similar in approach to the IPPC BAT requirements. The ICPDR Recommendations were implemented prior to the IPPC legislation coming into place. The Czech Republic example suggests that having recommendations in advance, consistent with forthcoming legislative measures for pollution reduction measures may be useful. The fact that there were three sectors in which this took place means that the impact can be broadly based and not limited to one industrial sector. The role of the ICPDR is critical to the process. The ICPR has the credibility, expertise and the support mechanisms to disseminate and support the implementation of the Recommendations. By developing the Recommendations centrally the ICPDR contributed toward a consistent approach in all DRB countries and made it easier for the country which implemented the Recommendations to subsequently implement the EU IPPC Directive.

## 3.5. Concluding Comments

The Impact of the BAT recommendations has been positive as evidenced by the Czech example. However, circumstances have changed with the widespread implementation of the IPPC Directive to the extent that it may no longer be necessary for the ICPDR Recommendations to be used.

It is therefore reasonable to conclude that the future of BAT application in the DRB will be largely based upon the IPPC BAT legal requirements. Therefore, the EU, through the Seville Centre and other extensive supporting measures now in place for countries required or wishing to use BAT provides sufficient sources of information and guidance. Secondly, BAT must ultimately be implemented at the level of the installation. The detail for this level is developed in the form of BREFs from the EU which can be up to 1000 pages long far surpassing the detail of the ICPDR Recommendations. Thirdly, the EU has aid programmes which can encourage the use of BAT in non member countries.

It can be concluded that the ICPDR Recommendations played a useful role in anticipating the potential impact of BAT in pollution reduction in the DRB and providing information and guidance prior to the implementation of the EU IPPC Directive in Member States. However, the situation has now changed and the ICPDR should focus on other opportunities to reduce pollution in the DRB.

# 4. A.3. CASE STUDIES ON IMPACT OF BAT/IPPC IMPLEMENTATION IN THE DANUBE RIVER BASIN

## 4.1. Introduction

It is anticipated that the introduction of the use of BAT by industries and agriculture would result in a positive impact on surface water pollution in the DRB. The use of modern technologies which produce lower pollution and the introduction of more stringent emission limit values reduce discharges. The application of the BAT concept also leads to more efficient prevention for, by example stressing the use of less dangerous substances as well changing behavior which is also an important BAT factor.

While the benefits of the application of BAT are logical, the quantitative assessment of BAT implementation impact is extremely difficult. It requires very detailed knowledge of the data in each installation because the permitting process is installation specific. The data required for impact calculation includes both the knowledge of technology status as well as current emissions. Such data is not currently generally available and it can not be expected to be available in near future. This means that only very broad estimates can be made with the limited data. The ICPDR Draft Emission Inventory 2002 provides a good overview of discharges from the majority of installations in the region which can be used for the estimation of BAT implementation impact.

## 4.2. Methodology

The estimate is based on more detailed knowledge of selected pilot IPPC installations/case studies in two industrial sectors; chemical and pulp and paper. The pulp and paper industry was selected, in part, because it is the largest discharger of COD accounting for almost 50% of total discharges in the DRB (Emission Inventory 2002).

The detailed information gathered from the two installation case studies provided the data on the reduction of pollution and other impacts due to BAT implementation at the installation. The order of magnitude of reduction was confirmed by comparing average levels of concentration data from installations in Germany which have already implemented BAT with those in installations in Croatia and Romania which have not yet implemented BAT. The reduction in COD in the pulp and paper case study was then projected to the rest of the pulp and paper installations in the 2002 EMIS Inventory. This resulted in an estimate of the BAT implementation impact in that sector. The calculation was based on simple multiplication. The reductions in pollutants in the pulp and paper sector were then applied on a percentage bases to the total COD discharges. This resulted in a general estimate which is consistent with the type and amount of data available. The estimate should be used with caution recognizing that it is preliminary estimate. However, even with these qualifications it is hoped that the estimate will be the starting point for further more detailed calculations as more installations implement BAT and more installation specific data become available.

## 4.3. Impact analysis and estimation

### 4.3.1. Pulp and paper sector

The pilot installation **Kappa Sturovo** is a Slovak pulp and paper company which discharges waste water into the Danube River The EMIS 2000 and 2002 inventory data were supplemented by 2005 data which were obtained during a site visit to the company. The company is in the process of obtaining an integrated permit for the pulp and paper installation and an integrated permit for its large combustion plant has already been issued. The following table shows the emission data for 2000, 2002 and 2005.

Table 1. Emissions in the pilot installation Kappa Sturovo in 2000, 2002 and 2005

| Pollutant | Unit | Total load discharged | | |
|---|---|---|---|---|
| | | Year 2000 | Year 2002 | Year 2005 |
| Waste water volume | Thousand $m^3$/year | 12823 | 12600 | 9700 |
| COD | t/year | 7489 | 6310 | 3000 |
| BOD | t/year | 2963 | 2140 | 970 |
| TOT-N | t/year | 84,6 | 4,3 | 19 |
| TOT-P | t/year | 498 | 96 | 39 |
| SS | t/year | 2411 | 2430 | 1500 |
| Non polar extractable substances | t/year | - | 14 | 5,5 |
| Dissolved inorganic substances | t/year | 6180 | 5500 | 4300 |

The 2005 data show a reduction of waste water volume as well as total load of pollutants discharged as a result of technology and waste water treatment changes. In 2004 the company introduced a change of pulp production technology to non-sulphur technology and changed the mechanical treatment of waste water to anaerobic and aerobic treatment. As seen from Table 1 the technology and waste water treatment resulted in significant reduction of waste water volume and all substantial pollutants while the production capacity has not changed. The changes resulted in a more than 50 % reduction in some pollutants (BOD, COD).

Additional calculations based on average concentration of pollutants in wastewater were done for installations which indicated the use of BAT (Germany) and companies which use out of date technologies (Romania, Croatia). The results confirm an almost 50 % difference in those companies which use BAT. Unfortunately the specific BAT parameters can not be calculated as the production capacities are not known.

In conclusion it can be seen that the use of BAT in non-EU countries can result in significant reduction of industrial pollution which can reach more than 50% in the case of COD. The total annual COD emission in the pulp and paper sector in 2002 (excluding Austria and Germany where BAT was already in place) was 53,306 t/a. Therefore applying the estimate of a 50% reduction would result in a reduction in pulp and paper industrial COD discharges of 26,653 t/a.

The total number of pulp and paper installations in the DRB excluding Austria and Germany is 21 and their distribution by country is seen in Table 2. Non-EU countries have 12 installations with potential reduction of pollutants similar to the pilot installation.

Table 2. Pulp and paper installations in DRB countries

| | |
|---|---|
| Bosnia i Herzegovina | 1 |
| Bulgaria | 1 |
| Croatia | 1 |
| Czech Republic | 3 |
| Hungary | 3 |
| Romania | 5 |
| Slovakia | 1 |
| Slovenia | 2 |
| Ukraine | 4 |
| COD total | 53306,86 t/year |

### 4.3.2. Chemical sector

The Novaky Chemical Plant was selected as a pilot installation. The company produces a large volume of inorganic and organic chemicals. The company is very complex. It has 12 IPPC installations and three IPPC permits have already been issued (ethylene chloral hydrine, dichlorl-ethane and poly-vinyl alcohol/poly-vinyl acetate).

Table 3. Emissions in the pilot installation Novaky Chemical Plant in 2000 and 2002

| Pollutant | Unit | Total load discharged | |
|---|---|---|---|
| | | Year 2000 | Year 2002 |
| waste water volume | Thousand $m^3$ /year | 4853 | 5890 |
| COD (chemical oxygen demand) | t/year | 1391 | 1990 |
| BOD5 (biological oxygen demand) | t/year | 282 | 545 |
| SS (suspended solids) | t/year | - | 101 |
| Hg (mercury) | t/year | - | .2 |
| non polar extractable substances | t/year | - | 3.5 |
| dissolved inorganic substances | t/year | - | 31500 |

Discussions with representatives of Nováky Chemical Plant during the site visit showed the very high complexity of the problem and therefore it is not realistic to come with any quantitative estimates.

Nevertheless, the discussions also confirmed that technological changes and the use of BATs have already resulted in reduction of pollutants in the three IPPC installations which received integrated permits. The company is undergoing further technological changes which will result in significant reduction in mercury discharge (de-mercurisation) as the emission limit values exceed almost 100 times the BAT required values.

### 4.3.3. Food sector

Simple calculations of average concentrations of some pollutants in discharges in installations in EU member countries and those in non-EU countries have shown significant differences in favor of EU countries. The differences in average concentrations were up to 50 % higher in non-EU country installations. Unfortunately, the lack of more detailed data makes more reliable estimates for this group of industries impossible.

## 4.4. Conclusion

The above analysis shows clearly that the hypothesis of that BAT implementation will have a positive impact on pollution reduction in the DRB is correct. The reduction of 50% estimated for COD for the pulp and paper industry would result in an annual reduction of 26,653 t/a in that sector. Applying the same calculation to total industrial COD discharges of 133,950 t/a (excluding Austria and Germany) the reduction would be 66,975 t/a. As was mentioned in the introduction the estimates are very preliminary and based upon the data available so caution should be used in their use. Actual reductions may be higher or lower and are subject to a variety of factors which are not part of this analysis for example the closure of installations and new installations which may be built. Nevertheless, it is anticipated that these estimates will be only the first step in developing estimates for future pollution reductions due to the implementation of BAT and other measures in the DRB.

# ANNEXES

ANNEX 1 Legislation, institutional and implementation and enforcement matrices

## Legal Matrix

| Country | Terms/definitions reflected into the national legislation | | Limits through permits reflected into the national legislation (dangerous substances) | | Requirements of the permitting process of industrial waste water discharges (direct and indirect) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **Priority/dangerous substances according to WFD and DSD** | **Industrial installations according to IPPC Directive** | **Emission limits (EL)** | **Environmental Quality Standards (EQS)** | **Authorization requirements** | **Content of operator` application[1]** | **BAT requirement[2]** | **Time limitation and changes in permit** | **Accident measures requirements** |
| Bosna i Herzegovina | Not defined according WFD or DSD | Not defined | Book of regula-tion on condition of realising waste waters into surface waters (Official Gazette Republic of Srpska, No. 44/01 | Book of regulation on condition of realising waste waters into surface waters (Official Gazette Republic of Srpska, No. 44/01 | Authorization required at federal and cantonal levels, overlapping competencies | Applications not in compliance with Art. 6 | BAT not specifically defined and not required by law | Time limited between 1 to 30 years | Accident plans of operators not required |
| Bulgaria | Defined in Regulation 6/2000 on Emission Limit Values of Dangerous Substances | Defined in Act on Environmental Protection Act adopted in 2002 and IPPC Regulation adopted in 2003, setting out the conditions and procedure for the issuing of Integrated Pollution Prevention and | Defined in Regulation 6/2000 on Emission Limit Values of Dangerous Substances | Regulation7/08. 08.1986 - parameters and norms for the quality of Surface water bodies<br><br>Ministerial Order 272/2001 on the categorization of the water quality | Authorization to discharge more than 10 m3/day required,<br>In case if IPPC installation the water discharge permit is replaced by IPPC permit.<br>Regulation (Ministerial | IPPC Regulation (Ministerial Decree 67/2003, amended 2005) setting out the conditions and procedure for the issuing of IPPC permits;<br><br>Methodology on the requirements | BAT required according to Water Act and IPPC Regulation (Ministerial Decree 67/2003, amended 2005, article 3. - i criteria for determination | Permits are time limited | Accident plans of operators required |

[1] according to Art. 6 (IPPC)

[2] (Art. 3 IPPC, and/or Art. 4 86/280/EEC best technical means DSD

| Country | Terms/definitions reflected into the national legislation | | Limits through permits reflected into the national legislation (dangerous substances) | | Requirements of the permitting process of industrial waste water discharges (direct and indirect) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **Priority/dangerous substances according to WFD and DSD** | **Industrial installations according to IPPC Directive** | **Emission limits (EL)** | **Environmental Quality Standards (EQS)** | **Authorization requirements** | **Content of operator` application[1]** | **BAT requirement[2]** | **Time limitation and changes in permit** | **Accident measures requirements** |
| | | Control (IPPC) permits for the construction and operation of new and the operation of existing industrial installations | | in the surface water bodies | Decree 67/2003, amended 2005) setting out the conditions and procedure for the issuing of IPPC permits; Guideline with requirements on the scope of the conditions in the IPPC permit | for the scope and format of the Application forms. | of BAT. | | |
| Croatia | Not defined according WFD or DSD | A first inventory under preparation by the Croatian Center for Cleaner Production during 2005, although the timing of full implementation of the obligation to identify all relevant installations has not been determined yet. A draft timetable for the technical assessment of installations covered will be prepared during 2005/2006. | Highest permissible concentrations available for inland waters and sea for 45 substances identified as hazardous. Permissible concentrations for other 77 "other hazardous substances" are available as well. | For the inland waters one concentration limit is given for classes I-II and another for classes III-V. | Authorization required It is tentatively planned that permitting for existing installations will be phased in several years. A time schedule for implementation has not been determined yet. | Applications not in compliance with Art. 6 | BAT not defined and not required by law | Time limited, max. for 15 years | Accident plans of operators required. |

| Country | Terms/definitions reflected into the national legislation | | Limits through permits reflected into the national legislation (dangerous substances) | | Requirements of the permitting process of industrial waste water discharges (direct and indirect) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Priority/dangerous substances according to WFD and DSD | Industrial installations according to IPPC Directive | Emission limits (EL) | Environmental Quality Standards (EQS) | Authorization requirements | Content of operator` application[1] | BAT requirement[2] | Time limitation and changes in permit | Accident measures requirements |
| Hungary | Defined in Environmental Act LIII/1995 and Governmental Decree 220/2004 | Defined in Governmental Decree No. 193/2001 (X.19) | Defined by the Ministerial Decree 28/2004 | Under elaboration in an ministerial decree | Authorization required according to Governmental Decree 20/2004 on water quality protection | Applications of operators contain requirements according to Art. 6 | BAT required according to Environmental Act and IPPC Governmental Decree No.193/2001 (X.19) | Permits are time limited | Requirement to develop Accident plan |
| Moldova | Not defined | Not defined | The Act on emission, Water Code | Standards available – for human health, (hygiene) for the fisheries, irrigation, 40% of the Danube list covered | Authorization required | Applications not in compliance with Art. 6 | BAT not defined and not required by law | Time limited from 1 to 5 years | Accident measures are required, Regulation on accident situation (Hydromet services are responsible for solving accident situations) |
| Romania | Defined in the Water Law 107/1996 amended and completed by the Law 310/2004 (transposes the WFD) and in Government Decision 351/2005 (transposes the DSD) | Government Emergency Ordinance 34/2002 concerning pollution prevention, reduction and integrated control", approved by Law 645/2002 | Annex B, table 1 of Government Decision 351/2005 | Annex B, table 1, 2 and 3 of Government Decision 351/2005 | Authorization required | Ministry Order 277/1997 (concerning the procedure of issuing water permits). Ordinance 34/2002 approved by Law 645/2002; and Ministry Order 818/2003 setting | Ordinance 34/2002 approved by Law 645/2002 | Permits are time limited at max. 5 years | Accident plans of operators required |

| Country | Terms/definitions reflected into the national legislation | | Limits through permits reflected into the national legislation (dangerous substances) | | Requirements of the permitting process of industrial waste water discharges (direct and indirect) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **Priority/dangerous substances according to WFD and DSD** | **Industrial installations according to IPPC Directive** | **Emission limits (EL)** | **Environmental Quality Standards (EQS)** | **Authorization requirements** | **Content of operator` application[1]** | **BAT requirement[2]** | **Time limitation and changes in permit** | **Accident measures requirements** |
| | | | | | | up the procedure for issuing environmental integrated permits | | | |
| Serbia – Monte-negro | Dangerous substances are defined by the Law on Env. Protection (2004) but there is no Regulation Act with the list of DS according to DSD/WFD. The existing Regulation on Dangerous substances in waters (1982) include the list of substances with MAC. Priority substances are not defined according to WFD or in any other way. The new Law on water is prepared now in process of adoption | Law on IPPC has been adopted in Dec. 2004<br>Industrial installations are defined in both the IPPC Law and Environmental protection Law (2004). Providing the list of activities carried on in the installations in a separate Regulation Act has not been adopted yet. | Emission limit values for wastewaters only<br>ELs for DS are not defined. Presently ELs exist only for effluent discharged in the municipal sewer system (1975) not including all the DS | By the new IPPC Law authoriza-tion is necessary by the Ministry of env. protection.<br>Presently it is done by the Directorate for water | Law on IPPC has been adopted in December 2004. It defines what a permit should contain. | Law on IPPC has been adopted in December 2004. It specifies all necessary documents for the application. | Law on IPPC has been adopted in December 2004. It defines what a permit should contain, including requirements regarding BAT | According to IPPC Law Permit is issued for the maximum time period of 10 years and changes in permit are also possible under specified conditions. Not in practice yet | The new Law specifies necessary documents in permit application which include planned accident measures |

| Country | Terms/definitions reflected into the national legislation | | Limits through permits reflected into the national legislation (dangerous substances) | | Requirements of the permitting process of industrial waste water discharges (direct and indirect) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **Priority/dangerous substances according to WFD and DSD** | **Industrial installations according to IPPC Directive** | **Emission limits (EL)** | **Environmental Quality Standards (EQS)** | **Authorization requirements** | **Content of operator` application[1]** | **BAT requirement[2]** | **Time limitation and changes in permit** | **Accident measures requirements** |
| Slovakia | Defined in Water Act 364/2004 Annex 1 and Regulation 296/2005 | Defined in IPPC Act 245/2003 Annex 1, as amended by Act No. 532/2005 | ELS are defined according to operations as the max. mean daily and monthly concentrations and the max. amount of subst. dischar-ged per unit of industrial activity per day and per months | Defined in Regulation 296/2005, Annex 1 and 7 EQS available for about 85% of the substances from the Danube list plus five additional substances | Authorization required according to IPPC Act and Water Act. Everybody discharging waste water is obliged to apply for the authorization. The discharge without authorization is not allowed. The authorization is required for handling with dangerous substances. | Details of application are defined in IPPC Act 245/2003, as amended by Act No. 532/2005 and are in compliance with the Art. 6 | BAT required according to IPPC Act 245/2003, as amended by Act No. 532/2005 and Water Act 364/2004 | Time limited permit up to 10 years max., in case that waste water contains dangerous substances up to 4 years<br><br>Any significant change in operation requires a new permit | Details on accident measures are defined in IPPC Act<br><br>Industrial operator must develop the Accident plan |
| Slovenia | Defined in Regulation on emission of substances and heat in wastewater into water and sewage system, No. 47/2005 | IPPC Regulation No. 97/2004 defines types of economic activities and installations that fall under IPPC directive | EL are set in 29 different regulations on emission of waste water regarding different economic activities | EQS are set in Regulation on chemical status of surface waters No. 11/2002 | Authorization prior to discharge required | Defined in IPPC Regulation. Applications of operators contain requirements according to Art. 6 | BAT required according to IPPC Regulation and in Environment Protection Act No. 41/2004 | Permits are time limited: for IPPC installations permits last 10 years. Any significant change in operation requires a new permit | Requirement for operator to make a description of danger and risk for environment and to define measures for preventing the accidents and to limit their consequences |

| Country | Terms/definitions reflected into the national legislation | | Limits through permits reflected into the national legislation (dangerous substances) | | Requirements of the permitting process of industrial waste water discharges (direct and indirect) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **Priority/dangerous substances according to WFD and DSD** | **Industrial installations according to IPPC Directive** | **Emission limits (EL)** | **Environmental Quality Standards (EQS)** | **Authorization requirements** | **Content of operator` application[1]** | **BAT requirement[2]** | **Time limitation and changes in permit** | **Accident measures requirements** |
| Ukraine | Not defined according to WFD and DS. Resolution of the Cabinet of Ministers "On the approval of the Rules of the protection of surface waters against pollution by return waters" (25.03.1999 N 465-99 | Not defined | Resolution of the Cabinet of Ministers "On the procedure of development and approval of norms maxi-mum allowable discharge of polluting substances and list of substances to be regulated during discharge" (11.09.1996 N 1100-96); | Not defined | Authorization required. Resolution of the Cabinet of Ministers "On the approval of the Rules of the protection of surface waters against pollution by return waters" (25.03.1999 N 465-99 | Not in compliance | BAT not defined and not required by law | Time limited up to 3 or 25 years | Not required |

## Institutional matrix

| Country | Permitting of industrial polluters | Inspection of industrial polluters | Monitoring of industrial pollution | | Inventory/ recording | |
|---|---|---|---|---|---|---|
| | | | Waste water discharges | Receiving waters | Sources of pollution | Emissions |
| Bosna i Herzegovina | By cantonal and federal M of Water Management at F BA<br>By M of Environment in Rep. Srpska | By M of WM randomly | Not required?? | Not uniform monitoring system in place | Not kept | Not kept |
| Bulgaria | By M of Environment and Water | By environmental inspectorates or municipalities randomly | Self monitoring of operators | National Institute of Metrology and Hydrology, by Environmental Agency and Regional Inspectorates | Not known | Not known |
| Croatia | By environmental inspectorates<br>By county environmental offices<br>By Hrvatske Vode | By State Water Management Inspection regularly? | No information | Hrvatske Vode | Some data are readily available in national database. A first inventory of the installations covered by the IPPC Directive will be carried out by the Croatian Center for Cleaner Production under supervision of Ministry of Environmental Protection, Physical Planning and Construction during 2005, although the timing of full implementation of the obligation to identify all relevant installations has not been determined yet. | Hrvatske Vode |
| Czech Republic | By municipal and regional offices<br>By regional offices and IPPC Agency in case of IPPC installations | By environmental inspectorates randomly<br>By municipalities randomly | Self monitoring of operators | CHMI based upon data from River basin management authorities | CHMI based upon.. | CHMI based upon monitoring results |
| Hungary | By regional environmental inspectorates | By regional environmental inspectorates regularly | Self-monitoring of operators or by the laboratories of the envir. inspectorates | Laboratories of regional inspectorates | VITUKI | VITUKI |

| Country | Permitting of industrial polluters | Inspection of industrial polluters | Monitoring of industrial pollution | | Inventory/ recording | |
|---|---|---|---|---|---|---|
| | | | Waste water discharges | Receiving waters | Sources of pollution | Emissions |
| Moldova | By M of Ecology and Natural Resources and Hygienic services | By State Ecological Inspectorate | Self-monitoring of operators, Environmental Inspectorates, Epidemiologic services | Pollution control centre, Apele Moldovei, Water Supply Companies and ecological inspectorates | Ecological Inspectorate, polluters, Hygienic Centre | Ecological Inspectorate |
| Romania | By water management authorities (the level of competences are set up by the Order 1141/2002.<br>By Regional Environmental Protection Agencies in case of IPPC installations | By territorial Water Inspection<br>By Environmental Protection Inspectorates | Self-monitoring of operator<br>Apele Romane carries out the monitoring of control | Apele Romane | Apele Romane.<br>Ministry of Environment and Water Management - National Agency for Environmental Protection (for IPPC installations) | Apele Romane<br>Ministry of Environment and Water Management - National Agency for Environmental Protection (for IPPC installations) |
| Serbia – Montenegro | Serbia: By M of Protection of Natural Resources and Environment<br>By municipalities in case of small installations connected to a sewer system<br>Montenegro: By M of Environmental Protection and Physical Planning | By Water Management Inspectorate (Serbia) and M of Environment (Montenegro) | Self-monitoring by operator | Serbian HMI and Montenegro HMI and Centre for Ecotoxicology Research (Montenegro) | Not known | Not known |
| Slovakia | By water authority at district or regional levels<br>By Inspectorate in case of IPPC installation | By Inspectorate randomly<br>By water authority randomly | Self-monitoring of operator | Slovak Water Management Enterprise monitors and submits monitoring data to the SHMI | SHMI based upon questionnaires and submitted permits from water authorities and environmental inspectorates<br>Ad hoc inventory based upon screening | SHMI based upon monitoring results |
| Slovenia | By M of Environment and Spatial Planning and by Environmental Agency | By Environmental Inspectorate | By authorized laboratories that have permission given by Environmental Agency of the Republic of Slovenia | Environmental Agency of the Republic of Slovenia | Environmental Agency of the Republic of Slovenia | Environmental Agency of the Republic of Slovenia |
| Ukraine | By local water authorities | By state ecological inspectorate | Self-monitoring | Various entities, not clear | Not known | Not known |

## Implementation and Enforcement matrix

| Country | National pollution reduction programs (PRP) | Specific reduction programs of operators | | | BAT developments | | Public involvement | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Pre-treatment at source | Quality objectives and target horizon | Economic incentives | Guidelines | Training of authorities | Data on pollution sources availability | Monitoring results | Permitting process |
| Bosna i Hercegovina | Does not exist | Does not exist | Does not exist | Does not exist | None at federal level | None | Limited | Not available | Not clear |
| Bulgaria | Does not exist | Required and set in the permit | Required and set in the permit | Does not exist | Sector Guidelines on the implementation of BAT in the Chemical industry, Cement industry, Surface treatment of metals and Large combustion plants. | None or ad hoc in conferences | Based upon the written request | Published annually | Not clear |
| Croatia | Does not exist | Does not exist | Does not exist | Does not exist | None | None | Limited | Not available | |
| Czech republic | Resolution of the Czech Government outlines PRP (April 2004) | Required and set in the permit | Required and set in the permit and Regulation 61/2003 | Resolution of the Czech Government outlines PRP | Regulation 63/2003 concerning exchange of information related to BAT<br>Reference to BREF of the EU | Regularly | Annual report on the state of the environment | Published annually | ? |
| Hungary | National PRP was elaborated in 2003 | Required and set in the permit | Under elaboration | Discount in pollution charges in case of implementation of the pollution reduction plan of operator | 8 national BAT guidance docs are elaborated, some are under elaboration.<br>11 Hungarian short translation versions of the EU BREFs are available | Regularly | Annual report | Published annually | Defined in the EIA and in the IPPC governmental decrees |

| Country | National pollution reduction programs (PRP) | Specific reduction programs of operators | | | BAT developments | | Public involvement | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Pre-treatment at source | Quality objectives and target horizon | Economic incentives | Guidelines | Training of authorities | Data on pollution sources availability | Monitoring results | Permitting process |
| Moldova | Does not exist only, as a part of the Danube Pollution Reduction Program. | Does not exist | Does not exist only as a part of SAP | Does not exist | none | None | Limited | Are available | Poor involvement |
| Romania | The national PRP exists and a Ministry Order will be issued in 2006 | Required and set in the permit | Required and set in the permit | According to the specific economic mechanism in the water field (Water Law) | Orders (566/2003 and 169/2004) for the approval of the Reference Documents on the BATs in some industry categories/types | Regularly (in the frame of PHARE projects) | Annual report | Published annually | According to the Water Law and Ministry Order 1012/2005 (Proceeding concerning access mechanism on water management information), and the Ministry Order 1044/2005 (proceeding concerning participation of water users, riparian and public on consultation process)<br>According to the Ministry Order 818/2003 setting up the procedure for issuing environmental integrated permits (based on Aarhus Convention) |
| Serbia – Montenegro | Does not exist | Does not exist | Does not exist | Does not exist | None | None | Limited | Not available | Provided the new law gets into force, none at present |
| Slovakia | Resolution of the Slovak Government outlines PRP (June 2004) | Required and set in the permit | Required and set in the permit | Discount in pollution charges in case of upgrading and innovation investments | None at national level<br>Reference to BREF of the EU | None or ad hoc in conferences | Limited<br>Annual report on the state of the environment available | Published annually | Public is a stakeholder in the IPPC permit process<br>Limited participation according Water Act |

| Country | National pollution reduction programs (PRP) | Specific reduction programs of operators | | | BAT developments | | Public involvement | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Pre-treatment at source | Quality objectives and target horizon | Economic incentives | Guidelines | Training of authorities | Data on pollution sources availability | Monitoring results | Permitting process |
| Slovenia | 1. PRP (dangerous chlorinated hydrocarbons from diffuse sources)<br>2. PRP (mercury from diffuse sources)<br>3. PRP (priority and other dangerous substances) | Required and set in the permit | Required and set in the permit | None | None at national level.<br>Reference to the EU BREF | National experts/authorities participate in conferences regarding BAT/BREF issues | Data on pollution sources available at the web site of the Environmental Agency of the Republic of Slovenia | Quality assessed annually monitoring results available at the web site of the Environmental Agency of the Republic of Slovenia.<br>At least every 4 years Report on the environment is published | During the public discussion, the public has a chance to review the application for the permit and draft of the permit and also to give remarks and opinions |
| Ukraine | Does not exist | Does not exist | Does not exist | Does not exist | None | None | Limited | Not available | |

# ANNEX 2

# ROAD MAP FOR IMPLEMENTATION OF BEST AVAILABLE TECHNIQUES IN BOSNIA HERZEGOVINA MOLDOVA, SERBIA AND UKRAINE

UNDP I GEF
DANUBE
REGIONAL
PROJECT

**August 2006**

# Industrial Reform and Development of Policies & Legislation for Application of BAT towards Reduction of Nutrients & Dangerous Substances

## Road Maps for the Implementation of Best Available Techniques in Bosnia and Herzegovina, Moldova, Serbia and Ukraine

## Report

UNDP GEF

WORKING FOR THE DANUBE AND ITS PEOPLE

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# ABBREVIATIONS

| | |
|---|---|
| AT | Austria |
| BA | Bosnia-Herzegovina |
| BAT | Best Available Techniques |
| BG | Bulgaria |
| BREF | Best Available Techniques Reference Documents |
| CP | Contracting Parties of the Danube River Protection Convention |
| HR | Croatia |
| CZ | Czech Republic |
| DE | Germany |
| DRB | Danube River Basin |
| DRP | Danube Regional Project |
| DRPC | Danube River Protection Convention |
| EC | European Commission |
| EMIS | Emission Inventory made by ICPDR |
| EMIS/EG | Emission Expert Group of ICPDR |
| EQS | Environmental Quality standards |
| EU | European Union |
| FBA | the Federation of Bosnia and Herzegovina |
| GEF | Global Environmental Facility |
| HU | Hungary |
| MD | Moldova |
| ICPDR | International Commission for the Protection of the Danube River |
| IPPC | Integrated Pollution Prevention and Control |
| MS | Member States |
| OECD | Organisation for Economic Co-operation and Development |
| P&M EG | Pressures and Measures Expert Group of ICPDR |
| PRTR | Protocol on Pollutant Release and Transfer Registers |
| RO | Romania |
| RS | the Republic Srpska |
| CS | Serbia and Montenegro |
| SK | Slovakia |
| SI | Slovenia |
| UA | Ukraine |
| UNDP | United Nations Development Programme |
| UNECE | United Nations Economic Commission for Europe |
| UNIDO | United Nations Industrial Development Organisation |
| WFD | Water Framework Directive |

# Executive Summary

The report on the Road Maps for the Implementation of the Best Available Techniques (BAT) in Bosnia and Herzegovina, Moldova, Serbia and Ukraine was carried as a component of the UNDP-GEF Danube Regional Project (DRP) Phase 2, component 1. 5. **Industrial Reform and the Development of Policies and Legislation towards the Reduction of Nutrients and Dangerous Substances** (hereafter "Industrial Policy Project). The overall project objective of the DRP concerning component 1.5.is "Creation of sustainable ecological conditions for land use and water management".

Phase 2 of the Industrial Policy Project is aimed at the development and implementation of a targeted assistance programme to non-accession Danube countries on industrial pollution reduction policy and regulatory frameworks including the necessary capacity building activities related to the implementation of BAT.

The overall context of the Road Maps for the Implementation of BAT in the targeted counties is focused on the reduction of industrial pollution in line with DRP objectives. The Road Maps provide those countries with concrete steps toward the implementation of BAT and can be used to plot the necessary milestones and timelines along with actions to move forward industrial pollution reduction in the DRB thereby improving the water quality.

Significant progress has been made on the implementation of the WFD in the DRB since the Contracting parties, of the Convention on Cooperation for the Protection and Sustainable Use of the River Danube committed to adopt the legal requirements of the EU related to the implementation of the WFD. This has important implications for future industrial pollution reduction and prevention activities within the context of the Danube River Basin Management Plan, to be developed by the end of 2009 and updated by end of 2015. The Road Maps have been developed to be consistent both in content and timing with the Danube River Basin Management Plan.

The Road Maps and accompanying Work Plans have been developed based on SWOT analyses which consider the specific policy, legislative institutional and industrial situation in each of the countries.

The relevant required information and data for the development of the Road Maps has been taken from publicly available secondary sources including EC, OECD, UNECE publications and UNDP GEF DRB Phase 1 and Phase 2 Project Reports supplemented by information gathered in preparation of the training sessions for this project. Short and medium - term objectives for each of the countries have been proposed in line with the Road Map for the Danube River Basin District Management Plan and the corresponding Work Plan as well as the Strategic Paper for the Danube River Basin District Management Plan adopted by the ICPDR.

The Road Maps for implementation of BAT have shown the need to adopt new or to update the current legislation for integrated prevention and control in the specific countries. Additionally effective mechanisms for an integrated decision making process (including inspection and enforcement) should be created. Capacity building at all relevant levels of state administration as well as establishment of a body responsible for issues concerning BREFs and the future implementation of reporting obligation (PRTR) also need to be put in place.

Another main issue is the inventory and monitoring of industrial pollution sources. Currently available information related to the release of dangerous substances into aquatic environment is limited and of poor quality.

The establishment of emission level values for pollutants discharged into aquatic environments has been identified as common problem in each country.

The Road Map provides the general requirements for each country. Further planning should be based on an activity orientated logical framework, including explicit criteria to monitor results, concrete activities, risks and underlying assumptions. This framework could be used to further identify, manage and implement the detailed activities required in each country.

The countries can use the Road Map as a tool to drive and structure the planning process for BAT implementation. It allows them to identify the most important opportunities to improve environmental protection – to fulfil the tasks regarding implementation of the DRBC, create more favourable conditions for investments in industry sectors, and at the same time move closer to EU accession requirements.

It is anticipated that the recommendations for implementation of the Road Maps for Bosnia Herzegovina, Moldova, Serbia and Ukraine will assist the countries to fulfil their obligations to the ICPDR concerning the preparation of the Danube Basin Management Plan and the Programmes of measures according to the WFD.

Also, the findings of the Road Maps and the supplemental recommendations provide the ICPDR with important information to create the conditions to generally facilitate in the improvement activities in the field of pollution reduction in the DRB, in the targeted countries. In this context the recommendations are also focused on the development of emission inventory data from industry using EPER II data or the EPER methodology and as well as the on forthcoming TRPR requirements.

# 1. INTRODUCTION

This is a Report of the UNDP-GEF Danube Regional Project (DRP) Phase 2, component 1. 5 **Industrial Reform and the Development of Policies and Legislation towards the Reduction of Nutrients and Dangerous Substances** (hereafter "Industrial Policy Project).

**The overall project objective** of the DRP concerning component 1.5.is "Creation of sustainable ecological conditions for land use and water management".

Recognizing the expected revitalization of industries in the DRB, in Phase 1 the project focused on industrial policies and legislation in order to ensure that the necessary framework for environmental considerations is adequately taken into account and that mechanisms for compliance are put in place. In this context, the project output assists the DRB countries in the development of new industrial nutrient/toxics pollution control policies and legislation in line with existing and emerging national legislation which are generally driven by the EU accession process. While Phase 1 of the Project focused on the identification of gaps and opportunities for reforms and measures, Phase 2 is aimed at the development and implementation of a targeted assistance programme to non-accession Danube countries on an industrial pollution reduction policy and regulatory framework including necessary capacity building activities. This component includes a legislation review, institutional development analysis, technical assistance and BAT training. The program has been developed in cooperation with the individual national governments and tailored to the needs of each country. The Members of the Pressures and Measures Expert Group were consulted and provided useful input to the project.

The inception period of the Phase 2 Industrial Policy Project was completed in August 2005. The following section shows progress to date of the approved work plan activities. This report should be reviewed in the context of these other activities:

**A) Policy and legislative review tasks**:

Activities related to policy and legislative review tasks were completed in February 2006 and are documented in the Report on Review of Policy, Legislation and Enforcement.

**B) Training and capacity development** in the four non-accession countries. The activities are based in Bosnia Herzegovina, Moldova, Serbia Montenegro and Ukraine. Training has now been held in Serbia and Moldova and plans are in place to complete the remaining training by Nov. 30, 2006

**C). Developing the Road map for Best Available Techniques (BAT) implementation for the four non-accession countries - Bosnia Herzegovina, Moldova, Serbia Montenegro and Ukraine.**

This report is for this activity. The report describes, analyzes and summarizes the activities related to the development of country specific recommendations based on Strengths, Weaknesses, Opportunities and Threats (SWOT) Analysis and contains the next steps for implementation of BAT in Bosnia Herzegovina, Moldova, Serbia Montenegro and Ukraine. It also contains useful information on the economic impact of BAT implementation at the level of the firm and the impact of BAT on competitiveness.

# 2. BACKGROUND

## 2.1. Summary of the Review of Policy, Legislation and Enforcement

The Report on the Review of Policy, Legislation and Enforcement provides the relevant information related to the legal requirements of EU legislation and includes selected information concerning the transposition of EU legislation into national legislation including terms and definitions (such as dangerous substances, priority substances, installations according to the IPPC Directive, BAT requirements), setting emission limits, Environmental Quality Standards, the permitting process for industrial waste water discharges, inspection of industrial polluters, monitoring industrial pollution, inventorying pollution sources, and recording emissions. The report also contains information concerning pollution reduction programmes at the national and individual operator level, BAT developments and public involvement.

An analysis of this information indicates that generally the basic legal framework is in place in the Danube countries. Substantial progress has been achieved in the accession countries. On the other hand, more remains to be done in non-accession countries to complete the adoption and implementation of water legislation generally and BAT specifically.

In general all countries require waste water discharge permits. All countries have well developed basic self monitoring requirements; however, monitoring of industrial discharges and hazardous substances independently by the competent authorities needs to be improved.

Based upon the assessment of the institutional arrangements, individual countries have different institutional settings with respect to permitting industrial installations. These range from central level (ministries) to the local level (water directorates at the county or district level). The situation is further complicated with respect to permitting installations that fall under the IPPC directive and other industrial installations

The degree of success in the implementation process of BAT varies among EU Member States the Member States indicate that the BAT Reference Documents (BREFs) are taken into account generally and in specific cases when determining BAT. Some countries (HU, SI, RO and BG) have established legal measures for the adoption of the national BAT guidelines related to specific industries, based upon the BREFs.

Public involvement in the integrated permitting process has been improved as well as access of public to information concerning monitoring and sources of pollution.

## 2.2. The Concept of Best Available Techniques

The purpose of the Integrated Pollution Protection and Control Directive is to achieve integrated prevention and control of pollution arising from the activities listed in Annex I of the Directive, leading to a high level of protection of the environment as a whole. The legal basis of the Directive relates to environmental protection. Implementation should also take into account other Community objectives such as the competitiveness of industry thereby contributing to sustainable development.

More specifically, the IPPC Directive provides for a permitting system for certain categories of industrial installations requiring both operators and regulators to take an integrated, overall look at the pollution and consumption potential of the installation. The overall aim of such an integrated

approach is to improve the management and control of industrial processes to ensure a high level of protection for the environment as a whole. Central to this approach is the general principle in Article 3 that operators should take all appropriate preventative measures against pollution, in particular through the application of ***best available techniques*** enabling them to improve their environmental performance.

The term "best available techniques" is defined in Article 2(11) of the Directive as "the most effective and advanced stage in the development of activities and their methods of operation which indicate the practical suitability of particular techniques for providing in principle the basis for emission limit values designed to prevent and, where that is not practicable, generally to reduce emissions and the impact on the environment as a whole." Article 2(11) goes on to clarify further the definition as follows:

"techniques" includes both the technology used and the way in which the installation is designed, built, maintained, operated and decommissioned;

"available" techniques are those developed on a scale which allows implementation in the relevant industrial sector, under economically and technically viable conditions, taking into consideration the costs and advantages, whether or not the techniques are used or produced inside the Member State in question, as long as they are reasonably accessible to the operator;

"best" means most effective in achieving a high general level of protection of the environment as a whole.

### 2.2.1. The role of BAT as a promoter of innovation in Europe

The concept of Best Available Techniques (BAT) is the fundamental element of integrated pollution prevention and control (IPPC). For all point sources covered by the Directive, appropriate preventive measures must be taken, in particular through application of BAT. However, in order to ensure flexibility and to encourage technological and operational innovation, the Directive expressly forbids authorities to prescribe the use of any specific BAT in permits issued to operators. Instead, permits must contain conditions, such as emission limit values, which are sufficient to ensure that BAT requirements are met taking account of the particular characteristics and circumstances of the installation. This flexible approach recognises the fact that different techniques can be combined to achieve equivalent environmental performance. One of the purposes of IPPC is thus to promote innovation in Europe, thereby contributing to technological and economic development. The starting point of the IPPC approach is that a continuous process innovation, in combination with resource management and enforcement of environmental quality standards, will lead to both sustainable development and economic growth.

The directive is however only a procedural directive that refrains from implementing its general objectives in harmonised limits or to define other instruments of environmental policy. The implementation of the directive is performed decentrally. Member states have to enact emission limit values that are based on the BAT, and also take into account the technical aspects of the business, its geographical location and local environmental aspects. This integrated, decentralised, flexible approach strongly aligned with local environmental conditions.

Furthermore, Annex IV of the Directive contains a list of "considerations to be taken into account generally or in specific cases when determining best available techniques bearing in mind the likely costs and benefits of a measure and the principles of precaution and prevention". These considerations include the information published by the Commission pursuant to Article 16(2).

Competent authorities responsible for issuing permits are required to take account the general principles set out in Article 3 when determining the conditions of the permit. These conditions must include emission limit values, supplemented or replaced where appropriate by equivalent

parameters or technical measures. According to Article 9(4) of the Directive, these emission limit values, equivalent parameters and technical measures must, without prejudice to compliance with environmental quality standards, be based on the best available techniques, without prescribing the use of any technique or specific technology, but taking into account the technical characteristics of the installation concerned, its geographical location and the local environmental conditions. In all circumstances, the conditions of the permit must include provisions on the minimisation of long-distance or transboundary pollution and must ensure a high level of protection for the environment as a whole.

Member States have the obligation, according to Article 11 of the Directive, to ensure that competent authorities follow or are informed of developments in best available techniques.

BAT is on the one hand, the subject of an attempt at clarification of a comprehensive definition. On the other hand it is intended to specifically identify the BAT in the context of a process of information exchange between the governments and industry for all key industrial sectors. The objective of this information exchange process is the documentation of suitable techniques with their related environmental performance for 30 industrial sectors. The result of the process of information exchange is recorded in so-called "BREFS" (Best Available Technique Reference Documents) and is intended to be used by the national approval authorities as the information base for the definition of standards in their respective approvals.

A key feature of the IPPC Directive is to stimulate an exchange of information on Best Available Techniques between European Member States and the industries falling within the scope of the Directive. The European IPPC-Bureau organises this exchange of information and produces BAT reference documents (BREFs). The Bureau carries out its work through Technical Working Groups (TWGs) comprising nominated experts from EU member states, industry, and environmental NGOs. At the moment, the exchange process has resulted in twelve finalised BREFs, while another twenty BREFs are in progress.

BREFs bring together technical and economic information and are not legally binding. However, in accordance with the Directive, Member States and their authorities are obliged to take account of the BREF based standards when setting permit conditions

Some member states and the industries involved expect a diffuse result from the information exchange process with a large range of recommended techniques and emission limits. The environmental orientated interested parties on the other hand expect an ambitious European standard for innovative techniques.

### 2.2.2. Standard introduction to BAT and BREFs

The techniques and associated emission and/or consumption levels, or ranges of levels have been assessed through an iterative process involving the following steps:

- identification of the key environmental issues for the sector;
- examination of the techniques most relevant to address those key issues;
- identification of the best environmental performance levels, on the basis of the available data in the European Union and world-wide;
- examination of the conditions under which these performance levels were achieved; such as costs, cross-media effects, main driving forces involved in implementation of the techniques;
- selection of the best available techniques (BAT) and the associated emission and/or consumption levels for this sector in a general sense all according to Article 2(11) and Annex IV of the Directive.

Expert judgement by the European IPPC Bureau and the relevant Technical Working Group (TWG) has played a key role in each of these steps and in the way in which the information is presented.

On the basis of this assessment, techniques, and as far as possible emission and consumption levels associated with the use of BAT, are considered to be appropriate to the sector as a whole. In many cases they reflect the current performance of some installations within the sector. Where emission or consumption levels "associated with best available techniques" are presented, this is to be understood as meaning that those levels represent the environmental performance that could be anticipated as a result of the application, in this sector, of the techniques described, bearing in mind the balance of costs and advantages inherent within the definition of BAT. However, they are neither emission nor consumption limit values and should not be understood as such. In some cases it may be technically possible to achieve better emission or consumption levels but due to the costs involved or cross media considerations, they are not considered to be appropriate as BAT for the sector as a whole. However, such levels may be considered to be justified in more specific cases where there are special driving forces.

The emission and consumption levels associated with the use of BAT have to be seen together with any specified reference conditions (e.g. averaging periods).

The concept of "levels associated with BAT" described above is to be distinguished from the term "achievable level". Where a level is described as "achievable" using a particular technique or combination of techniques, this should be understood to mean that the level may be expected to be achieved over a substantial period of time in a well maintained and operated installation or process using those techniques.

Where available, data concerning costs have been given together with the description of the techniques, these give a rough indication about the magnitude of costs involved. However, the actual cost of applying a technique depends strongly on the specific situation regarding, for example, taxes, fees, and the technical characteristics of the installation concerned. In the absence of data concerning costs, conclusions on economic viability of techniques are drawn from observations in existing installations.

It is intended that the general BAT be a reference point against which to judge the current performance of an existing installation or to judge a proposal for a new installation. In this way they assists in the determination of appropriate "BAT-based" conditions for the installation or in the establishment of general binding rules under Article 9(8). It is foreseen that new installations can be designed to perform at or even better than the general BAT levels. It is also considered that existing installations could move towards the general BAT levels or do better, subject to the technical and economic applicability of the techniques in each case.

While the BAT reference documents do not set legally binding standards, they are meant to give information for the guidance of industry, Member States and the public on achievable emission and consumption levels when using specified techniques. The appropriate limit values for any specific case will need to be determined taking into account the objectives of the IPPC Directive and the local considerations.

### 2.2.3. The Economic evaluation of BAT

The Economic evaluation of BAT has proved to be a difficult task for policy-makers, industry and the regulators responsible for the IPPC permitting process. This is why DG Enterprise, in co-operation with DG Environment, the European IPPC Bureau, the Institute for Prospective Technologies, and the Flemish research institute VITO, organised a workshop on " The Economic Consequences of Integrated Pollution Prevention and Control Directive" (Brussels, 2002).

Experts reviewed criteria for measuring the impact of BAT on the competitiveness of various industrial sectors, and the tools available attended the workshop from the EU member states and candidate countries, industry and environmental NGOs.

The workshop concluded that the IPPC Directive is a driver for sustainable development and aims to improve the environmental performance of companies. Through its very design it creates a strong need for a balanced approach which takes into account the economic as well as the environmental impact of the implementation of the Directive.

There seems to be no magic, one size-fits-all formula to assess the impact of BAT on the economic viability of industry. Nevertheless, there are a number of economic factors which could assist industry and the authorities involved in the implementation of the IPPC Directive to make a more consistent and more transparent assessment of the economic consequences of the introduction of BAT.

The ***sector level approach*** needs to be applied to make the assessment of the impact of BAT on the economic viability of the sector. Not only is this specified in the directive under the definition of Best Available Techniques, but it is also clear these trade-off judgements must be at the sector level to guarantee against unfair competition.

***Five key economic criteria*** have been identified by the Economic and Cross-Media Issues Technical Working Group which could to be applied where it is necessary to undertake an in-depth economic assessment of an industrial sector: Market structure, industry structure, resilience, BAT costs of total costs and speed of implementation.

***Timing and investment cycles*** are a key factor. This is one of the main conclusions from the IPTS study on the impact of BAT on the competitiveness of industry and also highlighted by several workshop experts. It is clear that a substantial renewal of plant machinery is an "optimal" moment in time to embody environmental investments, e.g. in BAT. Industries characterized by a relatively long investment cycle have less flexibility in 'combining' these investments compared to industries with shorter investment cycles.

***Small and medium sized companies*** are potentially vulnerable. They typically lack capital stock and have limited R&D to respond to new regulation with innovations/adaptations, so the implementation of BAT will often present a particular challenge for theses businesses.

***The availability of data is crucial to underpin decisions***: major efforts are needed to collect up to date and credible data to underpin better the decisions on what constitutes Best Available Techniques and to answer such questions as: what are the costs of BAT in relation to total costs and how are the costs related to the strength or the vulnerability of the industry.

An economic analysis of whether techniques are economically acceptable or not should only needs to be carried out when there is lack of consensus and uncertainty of the impact of the BAT options. Pressures of time and the availability of data and expertise will present a challenge for the authorities.

***Expert judgement*** will still be needed to interpret the results of assessments and to make the final decision regarding the permit conditions. But the aim should be to use accepted benchmark criteria and to ensure transparency and consistency of decision-making.

### 2.2.4. The Impact of BAT on the Competitiveness of European Industry

The Impact of BAT on the Competitiveness of European Industry carried out by the Institute of Prospective Technological Studies on behalf of the Enterprise Directorate-General, European Commission, is currently the most detailed assessment of the economic impact of BAT. The study "road tested" the impact of BAT standards on three industries: cement, pulp and paper and non-ferrous metals and investigated the impact of the implementation of BAT on the competitiveness of existing plants in the medium and long term.

The study found no evidence that BAT prevented those companies using BAT and achieving good environmental standards from remaining competitive both nationally and internationally. Plants

that have adopted BAT tend to be large and already highly competitive, with above average input of R&D, etc. These advantages influence the costs of investment in and compliance with BAT. It cannot therefore be said that early adaptation of BAT in remaining, non-BAT firms will yield similar results with respect to competitiveness. There are plants that would have technical difficulties in adopting all BAT, and there are plants for which prudent implementation is necessary in order to achieve sustainable environmental and economic performance, thereby avoiding closure.

In the industries investigated implementation of BAT was found to reduce emissions. In the case of cement, small, old and independent kilns have particular difficulty adjusting to BAT investment requirements while remaining competitive. For non-ferrous metals, there are several poor performers in terms of BAT application which also perform poorly economically. Adjustment to BAT may lead to closure of such companies. With respect to paper mills, 15-20% may find implementation of the IPPC guidelines problematical.

The study concludes that primary (or process-related) BAT measures generally have a positive impact on competitiveness, whereas secondary (end-of-pipe) measures have a mixed impact (positive, neutral or negative effect). The evidence also shows that strong environmental performers, for example those, who adopted BAT early, are not competitively disadvantaged and are viable in the long run. However, there are plants which would have technical difficulties in adopting BAT, and there are plants for which prudent implementation is necessary to achieve a sustainable environmental and economic performance, thereby avoiding closure. Market loss to companies located outside EU, as a direct consequence of IPPC, is considered unlikely small.

In conclusion: it is important to implement BAT competitively. This means that environmental initiatives must be carefully prioritised and timed and that there must be time to properly implement them. It is also important that the economic knowledge of the parties involved in implementing IPPC and developing BREFs is improved.

# 3. METHODOLOGY

This chapter describes the approaches and the activities which have been carried out related to the development of Road Maps for the implementation of BAT in the non accession countries; Bosnia and Herzegovina, Moldova, Serbia and Ukraine. The general approach adopted in this methodology consists of the following steps:

1. Creation the information compendium of concerning legislation, institutional arrangements and enforcement of BAT implementation
2. SWOT analysis
3. Development of the Road Map for each country

## 3.1. Creation the Information Compendium

The compendium includes:

- The Review of Policy, Legislation and Enforcement activities results (Activity A. 1 of the Industry Policy Project). The Legislation, Institutional arrangements and Implementation and Enforcement matrices of targeting countries are attached to this Report (Annex 1);
- Additional relevant available information gathered, summarised and analysed from the ICPDR and other relevant sources – updating of Activity A. 1 of the Industry Policy Project for Bosnia and Herzegovina, Moldova, Serbia and Ukraine. The information in this report is based upon publicly available secondary sources. Substantial portions of this report are reproduced verbatim in this report from sources including EC, OECD, UNECE publications and, Industrial Policy Project Reports.
- Training workshop results in selected countries.

## 3.2. SWOT Analysis

SWOT analysis is a basic, straightforward often used approach that provides the basis for the development of various strategic plans. It goes beyond the purely descriptive information and provides more dynamic input into future options. This approach has been applied to the development of the Road Maps for the implementation of BAT in the individual countries. The role of SWOT analysis generally is to take the information from the environmental analysis and separate it into internal issues (strengths and weaknesses) and external issues (opportunities and threats) to provide a better basis for identifying and choosing options for decisions and future actions.

With respect to the implementation of the BAT in particular countries the SWOT analysis is focussed on:

- Current state of environmental legislation and compliance with the EU legislation, primarily the IPPC Directive and BAT;
- Institutional arrangements – state administration, decision making processes, monitoring, compliance and enforcement;

- Emission inventory;
- Industrial development;

Examples of the basic aspects which have been taken into consideration for SWOT analysis are summarized in the following table:

Table 3.2.1.

| | **Strengths** | **Weaknesses** |
|---|---|---|
| **INTERNAL** | Internal positive aspects which may be capitalized on in road mapping:<br>- Nationally recognized programmes.<br>- Knowledge and experience with IPPC, BAT.<br>- Specific transferable skills (e.g., inspection, information system, physical parameter monitoring).<br>- Good contacts/existing networking<br>- Interaction with state and professional organizations and industry, public involvement.<br>- Capabilities of state administration, its organizations and industry.<br>- Accreditations, qualifications, certifications.<br>- Commercial advantages of BAT | Internal negative aspects that may need to improve:<br>- Inadequate legislation and state administration.<br>- Gaps in capacity.<br>- Lack of knowledge and experience.<br>- Lack of goals in field of industry pollution reduction and programmes.<br>- Insufficient technical knowledge.<br>- Lack of skills ( BAT, monitoring, public involvement) |
| | **Opportunities** | **Threats** |
| **EXTERNAL** | - Positive conditions that state organisations and other stakeholders do not control but which they can take advantage.<br>- Positive trends that will create conditions for improvement of industry pollution reduction (e.g. market driven production technology improvements with improved environmental performance).<br>- Enhancement of relevant knowledge and experience.<br>- Opportunities for professional development in industry.<br>- Technology development and innovation.<br>- Global influences. | - Negative external conditions that are not controlled by the state or stakeholders but the effect of which may be to make BAT implementation more difficult.<br>- Political effects.<br>- Legislative effects<br>- Market demand.<br>- New technologies, services, ideas.<br>- Vital contracts and partners.<br>- Lack of sustainable internal capabilities.<br>- Lack of sustainable financial backing?<br>- Economic performance - domestic, international. |

It is necessary to minimize or avoid both weaknesses and threats. The possible weaknesses should be addressed in order to convert them into strengths. Likewise, threats should be converted into opportunities. Finally, strengths and opportunities should be matched to optimize the potential development of Road Map. Strategic issues and goals are identified in the SWOT analysis and are used of input for development of Road Map.

Identification of those issues is carried out addressing questions such as:

- "What external changes could effect the current situation in countries?"
- "What could be the effects of these changes in terms of threats or opportunities?"
- "What changes must we make to address the threats?"
- "What strengths can be building on to take advantage of the opportunities?"

Upon completion of SWOT analysis, short and medium term goals will emerge. These specific goals will help ensure that the countries efforts are in proper alignment with the general objectives of Road map – reduction of industrial pollution by force implementation of BAT. In the case of the countries being analyzed in this report there is the benefit of the experience of other countries in the DRB which have similarities to them and have already implemented BAT.

## 3.3. Development of the Road Map

The Road Maps and the road mapping process generally serve as an excellent communication tool - an effective means to link strategic operations, collaborative ventures, and plans. However, to achieve success—Road Maps must target the right approach, involve the appropriate target groups, and provide sufficient level of detail. Road mapping in the case of the non-accession countries in the DRB has a high probability of success due to the related processes in similar countries under similar circumstances. Having said that the policy and institutional setting is unique to each country and therefore while each of the four road maps will have similarities, particularly in the external environment, for example, the influence of the EU WFD, they will also reflect the individual circumstances of each of the countries.

The objective of the Road Map is to identify the different steps toward the implementation of BAT in Bosnia and Herzegovina, Moldova, Serbia and Ukraine. It is an output-oriented description of the overall process which gives details regarding intermediate results. The Road Map is used to plot the necessary milestones and timelines along with actions to move the water protection forward through the application of BAT.

The Road Map however, does not define the different underlying activities in detail. Further planning can be based on an activity orientated logical framework, stating criteria to monitor the results, concrete activities, risks and underlying assumptions. This framework could be used to describe, manage and administrate the detailed activities.

The non accession countries can use the Road Map as a way to drive and structure the planning process in field of BAT implementation. It allows them to identify the most important opportunities to improve environmental protection – to fulfil tasks regarding implementation of the DRBC, create more favourable condition for investments in industry sectors, and at the same time get closer to EU accession requirements.

The Road Map consists of:

- an explanatory text part – summary of SWOT outputs,
- a corresponding Work Plan.

***Establishment of short and medium-term objectives***

The Contracting parties, of the Convention on Cooperation for the Protection and Sustainable Use of the River Danube committed to adopt the legal requirements valid in the EU related to the

implementation of the WFD. This has important implications for future industrial pollution reduction and prevention activities within the context of the Danube River Basin Management Plan, to be developed by the end of 2009 and updated by end of 2015. However, all countries cooperating under the DRPC expressed their firm political commitment to support the implementation of the WFD in their countries and pledged to cooperate within the framework of the ICPDR to achieve a single; basin wide coordinated Danube River Basin Management Plan.

Establishment of short and medium term objectives in the Road Maps are proposed in line with the DRB Management Plan required time scale. The proposed Work Plan would facilitate the countries to develop a contribution to basin wide coordinated Danube River Basin Management Plan including an integrated Programme of Measures.

Drafting of the Road Maps and work plans considered the differences among the countries in state organisation regarding the state administration, current legislation, industry development and other circumstances related to the improvement of water protection through the implementation of BAT.

**Short- term objectives by the end 2008:**

The short term objectives which are common to all of the countries as a result of the development of the Danube River Management Plan as required by the WFD are summarized below:

| Issues related to | Operational tasks |
|---|---|
| **Improvement of legislation** | - work out a detailed legislation gap analysis<br>- propose a new legislation or update the legislation in force |
| **State administration** | - detailed review of state administration and responsibilities<br>- identification of needs including costs<br>- propose if necessary a new structure and responsibilities<br>- analysis of capabilities<br>- creation of information system regarding BAT and BREFs<br>- improvement of cooperation with state organization and other stakeholders<br>- monitoring and gathering information<br>- reporting requirements<br>- an integrated decision making process<br>- inspection and enforcement |
| **Capacity building** | - capacity building needs analysis<br>- proposal for capacity building development |
| **Industry pollution reduction** | - inventory of an industrial pollution sources<br>- gathering information<br>- reporting requirements<br>- cooperation with operators<br>- development of the pollution reduction programmes including measures as a contribution to the Danube Basin Management Plan and the Programmes of measures |

**Medium term objectives by end of 2015**

| Issues related to | Operational tasks |
|---|---|
| **Improvement of legislation** | - Implementation of new legislation |
| **State administration** | - Improvement of state administration<br>- Proposal for new development |
| **Capacity building** | - Revision, identification of new requirements |
| **Industry pollution reduction** | - Implementation of pollution reduction programmes including measures contributing to the Danube Basin Management Plan- updated |

# 4. COUNTRY SPECIFIC ROAD MAPS FOR THE IMPLEMENTATION OF BAT

## 4.1. Bosnia and Herzegovina

### 4.1.1. Background

According to the Constitution, Bosnia and Herzegovina consists of two highly autonomous entities, the Federation of Bosnia and Herzegovina (FBA), the Republic Srpska (RS) and the District Brcko, which is under direct jurisdiction of the administration of the State. Under this constitutional arrangement BA is a sovereign state with a decentralised political and administrative structure.

The environment is not specifically mentioned in the Constitution, therefore responsibility for environmental functions are not assigned in the Constitution. However, functions and powers not expressly assigned to the institutions of BA under the Constitution are assigned to the Entities. Thus, environmental issues are the responsibility of the Entities. This means that the Entities regulate environmental issues through their laws, regulations and standards.

The FBA is decentralized entity and consists of ten cantons, each being a governmental entity, with a high degree of discretion in establishing and carrying out fundamental functions. Regarding the environment, all of the cantonal Constitutions also state that both the Federation and the cantons are responsible for environment policy, in accordance with the Federal Constitution. The Cantons have the possibility to transfer their responsibility regarding the environment to the municipalities or the Federation.

The RS comprises from 64 municipalities, without cantons. Local administration exists only at the municipal level. The Republic is responsible for ensuring environmental protection and the municipalities, in accordance with the law, take care of meeting specific needs of citizens regarding environmental protection.

### 4.1.2. Policies, strategies, legislative and institutional framework

#### 4.1.2.1. The institutional framework

***Set/up at the state level of Bosnia and Herzegovina***

The Act on Ministries and Other Administrative Bodies of Bosnia and Herzegovina (2003), assigns certain responsibilities for environmental protection to the state **Ministry of Foreign Trade and Economic Relations.** Specifically**,** it defines "operations and tasks within the jurisdiction of Bosnia and Herzegovina relating to the definition of policy, fundamental principles, coordination of activities and harmonizing the plans of the entities governmental bodies and institutions at the international level" in the sectors of agriculture, energy, environmental protection, and the development and exploitation of natural resources. Three Departments of the Ministry are generally dealing with natural resources, energy and environment, without a detailed definition of their role and responsibilities. These departments are under-staffed.

The state Ministry of Foreign Affairs is responsible for the ratification and signing of international agreements and conventions, including those related to the environment, while the Directorate for European Integration is responsible for coordination and implementation of plans for accession to the EU. In addition, some independent institutions, such as the Institute for Standardization,

Metrology and Intellectual Property and the Agency for Statistics, gather and publish environmental information.

By decision of the Council of Ministers of 16 May 2002, the National Steering Committee for Environment and Sustainable Development was established at the state level. It has 54 members, including non/governmental organizations, scientists, universities and other stakeholders in addition to representatives from the two entities and the Brčko District. Its secretariat is located in the Ministry of Foreign Trade and Economic Relations Ministry and its work is largely carried out through eight subcommittees. The main purpose of the National Steering Committee is to facilitate work on projects and international agreements.

***The institutional framework at the entity level***

The organization and responsibilities of the environmental ministries in the two entities are similar and are prescribed by the Act on Federal Ministries and Other Administrative Bodies in the FBA and by the Act on Ministries in the RS.

## Federation of Bosnia and Herzegovina

Since the Dayton Peace Accord, environmental issues in the FBA have been under the responsibility of the Federal Ministry of Physical Planning and Environment. In February 2006, this Ministry was reorganized into two separate ministries, the ***Ministry of Physical Planning*** and the ***Ministry of Environment and Tourism***. The Ministry of Environment and Tourism is now responsible for environmental issues – protection of air, water and soil, preparation of the environmental policy, strategies, and quality standards for air, water and soil, environmental monitoring as well as supervision of the relevant environmental institutions and environmental inspection. The Ministry is, according to the Act on Environment Protection, the competent authority for environmental permitting procedures for large and medium installations above the threshold defined in the „Rulebook for the industrial plants and installations which require environmental impact assessment and installations which can be built and put in operation only when an environmental license is obtained" and for installations falling under the major accident provisions.

The principal responsibility for the water sector in the FBA is with ***the Ministry of Agriculture, Water Management and Forestry,*** which is responsible for Federal water strategy and policy, the issuing of agreements and permits, setting standards and regulations; and the maintenance of compliance with laws and regulations through licensing and inspections.

Under the Federation Ministry of Agriculture, Water Management and Forestry two public enterprises have been established, one for the Sava River Basin and one for the Adriatic Sea Basin. The enterprises are responsible for the management of rivers and the nearby zones and for the protection of water and water sources to ensure that enough good-quality water is available for the water supply. They also monitor water quality and collect fees for water abstraction and discharges

***The Ministry of Health*** is responsible for safeguarding of the quality of potable water and organizing water quality monitoring.

***Specialized organizations:***

- Institute of Public Health of the Federation of BA
- Federal Meteorological institute

***The environmental authorities in Cantons*** are the respective ministries of civil engineering, physical planning and environmental protection, which are also directly responsible for environmental protection as defined by relevant federal environmental acts. One of their

responsibilities is environmental permitting for installations that are under the threshold limits defined in the relevant federal rulebook.

The Cantons are responsible for providing drinking water to municipalities that do not have adequate resources themselves by ensuring the construction of water-supply systems to the border of these municipalities. The municipalities themselves are responsible for further distribution to the consumers. The cantons are also responsible for ensuring the construction of installations and equipment needed for waste-water treatment to protect drinking water resources.

### Republika Srpska

***The Ministry of Urbanism, Civil Engineering and Ecology*** is responsible for environmental protection including policy aspects related to overall environmental protection, planning, monitoring and inspection. According to the Act on Environment Protection the Ministry is the responsible body for environmental permitting procedures for large and medium installations above the threshold defined in „Decrees on projects that are subject to environmental impact assessment and criteria for decision making on necessity and scope of EIA and installations which can be built and put in operation only when the environmental license is obtained" and for installations falling under the major accident provisions.

Administration is more centralized in this entity, although there are also local administrations in the 64 municipalities which are responsible for environmental protection as defined by the republic environmental legislation. Larger municipalities have units for control of building and construction, water and waste management and more recently environmental inspection. They are also the responsible authority for environmental permitting for smaller installations below the threshold or not included in the Decrees.

Some other ministries and independent administrative offices and institutions have environmental responsibilities. Certain aspects are also under the responsibility of other ministries for water, agriculture, forestry, public health, energy and development etc.

## 4.1.2.2. The policy framework

The National Environmental Action Plan (NEAP) of March 2003, drawn up by the entities in cooperation with the World Bank, has a brief chapter on integrated water resources management that sets goals and measures for the water sector. Its main goals are to provide sufficient quantities of high-quality water for water supply and other needs; to protect water resources and preserve surface and groundwater quality; and to protect from flooding. The Mid-term Development Strategy (2004-2007), adopted by the Council of Ministers on 5 February 2004, notes that the sustainable development of water management requires more attention to be paid to: the protection against water-related hazards, the planned use of water resources, and water conservation and protection. The emphasis is on integrated river-basin water management. The Mid-term Development Strategy also identifies nine development priorities for water:

1. Repairing flood-control facilities along the Sava and Neretva rivers;
2. Regulating the river beds and torrential watercourses in the most vulnerable areas;
3. Ensuring an adequate supply of clean water to inhabited areas;
4. Improving the quality of water supplied to the rural population;
5. Creating the right conditions for the restoration of navigation on the river Sava in cooperation with Croatia, Slovenia, and Serbia and Montenegro;
6. Repairing and renovating sewerage systems and rehabilitating water treatment plants for urban waste water, as well as building new ones;

7. Introducing measures to protect existing and potential sources of drinking water;
8. Ensuring a sufficient volume of water to irrigate cultivated land for intensive farming;
9. Increasing the level of exploitation of hydroenergy by building multipurpose water management facilities not only for power generation but also for the development of tourism and recreation, flood control, irrigation and fish farming, among other activities.

Almost all the main rivers in Bosnia and Herzegovina cross the entities' borders, and there is a considerable need for cooperation and coordination of actions and instruments between the two entities. The Inter-Entity Commission for Water was therefore established in 1998 with four members from each entity. The Commission is responsible for the cooperation between the relevant ministries in both entities for all water management issues, including harmonization of regulations and water quality. So far it has been a useful body for sharing information and initiating action of mutual interest. However, if the entities' interests are contradictory, it is difficult for the Commission to make the necessary decisions, and in such cases there is little or no progress.

Many of these issues of coordination and responsibility are addressed in the draft memorandum of understanding with the European Communities. In the existing draft, it is agreed that the Council of Ministers would establish an environment agency at the State level, which would, inter alia, bear responsibilities in the water sector for fulfilling the following main obligations:

- Address all international issues dealing with water;
- All matters of common interest that the entities want to bring at the State level;
- Harmonize data collection/dissemination (IS Standardization/training);
- Assessment of technical performance of river authorities and water boards;
- National public awareness campaign;
- Coordination of the planning and management of all international and inter-entity flood control projects."

As a part of the memorandum of understanding, the Parties also "pledge" that they will establish river authorities in the entities which will enjoy legal and financial autonomy. The river authorities will, among other things, plan all water and water related environmental projects within their jurisdiction; collect and process data and maintain the water database; license water abstraction, discharge and water regime changes; and control and monitor floods and flood defence.

Bosnia and Herzegovina has already established water agencies for the river basin Bosna and the river basin Vrbas as pilot projects. The intention is to have water authorities for all river sub-basins, including, as defined in the Laws on Waters, the Una-Sana, Sava, Vrbas, Bosna, Drina, Trebišnjica, Neretva and Cetina.

A memorandum of understanding between the Council of Ministers of Bosnia and Herzegovina, the Government of the Federation of Bosnia and Herzegovina, the Government of Republika Srpska and the Commission of the European Communities was signed in September 2004. In it, the Parties agree to reorganize the water sector and to use the EU Water Framework Directive for the purpose of establishing a new water policy.

### 4.1.2.3. The legislative framework

In recent years significant progress has been achieved in the development of the environmental legislation in both entities. This new legislation was prepared with the financial and technical assistance of the EC PHARE Programme with the aim to develop the environmental legislation that would be in compliance with relevant EU directives and harmonized for both entities.

The basic legal documents is **the Act on Environmental Protection** that was adopted in the RS in 2002 (amended in 2005) and in the FBA in 2003. The Act contains principal requirements of the EIA, IPPC and SEVESO Directives.

Regarding integrated permits according to the IPPC Directive the Act includes provisions concerning "environmental permits" which shall aim at a high level of environmental protection through protection of air, water and soil. Plants and installations listed in the implementing regulation may only be constructed and operated after obtaining an environmental permit. An environmental permit is also necessary in cases when significant changes occur in the operation of an installation that might negatively impact on the environment and all permits have to be updated regularly every five years. Existing installations have an obligation to undertake all required activities to obtain an environmental permit before the year 2008.

The environmental permit according to the Act should contain: emission limit values for pollutants, requirements for protection of air, soil, water, flora and fauna, measures concerning the management of waste generated by the plants and installations, measures for minimization of long-distance or transboundary pollution, self-monitoring system, measures relating to conditions other than operating conditions. Emission limit values, equivalent parameters or technical measures are based on BAT taking into account the technical characteristics of installations, its geographical location and the local conditions.

***Republika Srpska's*** the Act on Water Protection (Official Gazette RS 53/2002) establishes river basins (Danube and Adriatic Sea), river sub-basins (Una-Sana, Sava, Drina, Bosna, Vrbas and Trebišnjica) and parts of river sub-basins as the territorial basis for water protection, planning and implementation. The Act calls for the development of a minimum ten-year water protection strategy and protection plans for the Republika Srpska, to be an integral part of the National Environmental Action Plan unless an inter-entity agreement provides otherwise. The Law further stipulates that "water protection consent" is required before other permits (e.g. environmental, construction) and establishes an inspection system.

The Act on Water Protection of ***the Federation of Bosnia and Herzegovina*** (Official Gazette F BiH 33/2003) was adopted in 2003, is almost identical, and also establishes a regime based on river basin district bodies (Danube and Adriatic Sea) and sub-basins (Una, Sana, Sava, Vrbas, Bosna, Drina, Trebišnjic a, Neretva and Cetina). The Act contains provisions regarding the adoption of a ten-year water protection strategy for the Federation, which may be part of the National Environmental Protection Programme, and also establishes consent and inspection systems.

Both acts intend to ensure that water protection in Bosnia and Herzegovina is in line with EU policy, directives, regulations and standards.

The Federation's cantons also have water laws. In addition, the Federation's Ministry of Agriculture, Water Management and Forestry is finalizing a new water act to address water management.

### 4.1.3. Water management

The Danube River Basin covers 75% of Bosnia and Herzegovina through the Sava River basin. The main rivers in the Sava basin are the Una-Sana, Vrbas, Bosna, Drina and Sava. Few rivers, notably the Neretva (218 km), flow toward the Adriatic Sea.

River lakes and mountain lakes in Bosnia and Herzegovina are important for recreation and tourism, but less so for other water uses. Flooding of karsts areas causes periodical lakes in or near the rivers in the Adriatic Sea catchment area, i.e. the Cetina, Neretva and Trebišnjica river basins. There are also 28 artificial reservoirs in Bosnia and Herzegovina with a volume of about 3.6 million

m3, 13 of which are in the Neretva and Trebišnjica river basins; three on the river Drina. The reservoirs are constructed for power generation, but are also important for regulating river flow.

The surface water in Bosnia and Herzegovina is, in general, of poor quality and bacteriologically unsafe due to extensive pollution from numerous sources. The main threats to the quality of water are the discharge of municipal or industrial waste water directly into the nearest rivers or springs, the direct disposal of waste in rivers or along riverbanks and run-off from agricultural areas where pesticides and fertilizers are used. The quality of groundwater is in general considered to be good; the data show few examples of groundwater contamination. The lack of reliable data about the quality of surface and groundwater resources is, however, striking, and groundwater contamination may be more widespread.

***Monitoring***

From 1965, data for both water quality and quantity were collected from monitoring stations all over the country. However during the war, all monitoring stations were destroyed, and there are no data available for the period 1992-97. Since the end of the war the monitoring network has been gradually re-established, partly with financial contributions from donors. Still, the number of monitoring stations remains low, and few automatically measure both water levels and water-quality parameters. At the other monitoring sites, water quality is measured only occasionally, when funding is available.

***Drinking-water supply***

About half the population, mainly in urban areas has access to public water-supply systems. The rest use private wells, small village water-supply systems or local systems which are not under national control. Water supply is mainly based on the use of groundwater (89%), 10.2% comes from rivers and 0.8% from natural lakes and artificial reservoirs. The extracted water is of varying quality, some is drinkable without any kind of treatment but in other cases the quality is totally unacceptable, especially during the dry season. Water treatment is in many cases inadequate, often just chlorination even when the water needs full treatment. Old and leaking pipelines and insufficient pressure may also pollute water before it reaches the consumers.

***Urban waste water***

In the former Socialist Republic of Bosnia and Herzegovina, the construction and maintenance of sewerage systems and treatment facilities for municipal waste water got limited attention and few resources. The result was that not all towns and cities had sewer systems, and even in the cities where they did exist they often served only part of the population. Today about 30% of the population has access to sewerage systems. In urban areas the connection rate for households is 56%, but in villages and rural areas a maximum of 10% of the households are connected. Due to the lack of resources the sewerage systems are on the whole poorly maintained. In many cases they have not even been completed, often only partially designed and constructed. In some locations the capacity is insufficient for receiving storm waters, and the systems overflow during the rainy season, affecting around 65% of the municipal centres. At the outbreak of the war, (1992-95) only seven municipal waste-water treatment plants were built and in operation. Except for one plant, the treatment included biological treatment. The treatment plants were located in Sarajevo, Trebinje, Trnovo, Ljubuski, Grude, Celinac and Gradacac. These plants treated waste water from about 4,000 inhabitants of a total population of about 4.4 million. The treatment plant in Sarajevo was considerably bigger than the others and received waste water from about 454,000 inhabitants (94% of the people with access to waste -water treatment plant before the war) compared to 30,000 inhabitants for all of the other plants combined [6].

During the war, five of the seven plants were closed due to war damage, stripping of equipment and installations, and lack of maintenance or shortage of electricity. After the war all the plants were put into operation again, except the plants in Sarajevo and Trnovo, and a new treatment

plant has been built in Srebrenik. The plants in operation today are, however, all very small, and more than 95% of the municipal waste water is discharged directly into water bodies without treatment.

### 4.1.4. Industry

Prior to the war heavy industry was the main polluter of watercourses. The weak implementation of environmental measures combined with the use of obsolete, polluting technologies meant that the industrial impact on water quality was devastating. In 1991 the industrial wastewater load was equivalent to a population of 6.8 million people. By comparison the municipal wastewater load was equivalent to a population of 2.7 million.

The huge discharges of waste water polluted almost all rivers, especially the Bosna and Vrbas. Most of the industrial waste water was, like municipal waste water, discharged to the nearest watercourse with little or no treatment. For instance, there were 122 plants for the treatment of industrial waste water before the war, but only 40% of them worked properly. As many industrial plants have shut down and many others have reduced their capacity, the discharge of pollutants to air and water from industry has been substantially reduced and is today approximately 30-35% of its pre-war level. The big reduction in discharges of industrial waste water has led to a significant improvement in water quality. However, the industrial waste-water load is disproportionately high because there are few treatment facilities for industrial waste water in operation, and the negative pressure on water resources is still very high. Mining and ore processing are an important sector in Bosnia and Herzegovina. The most important mineral deposits are those of coal, lead, zinc, iron and bauxite; more than 100 coal deposits are registered. The significant reduction in industrial operating capacity has led to a similar reduction in activity within the mining and ore sector. The production rate for mining and ore processing has declined to about 33% of its pre-war level. Coal and other ore and stone production have been reduced to 40% and 23%, respectively.

When rocks containing sulphuric minerals are exposed to water and air, the ongoing oxidation and acidification will accelerate, and trace metals leach out into the environment. The environmental impact of mining activities on water resources arises at almost all stages of the production phase, and does not end with the completion of mining activity. On the contrary, the environmental impact can last for centuries after the closure of the mine through seepage from waste rock piles, tailing dams and seepage water from abandoned pits and quarries.

Acid mine water containing heavy metals represents a serious threat to the environment and to human health in Bosnia and Herzegovina. The problem with mine water pollution is, however, not recognized or regulated, and today there is no treatment of seepage water at all.

***Uncontrolled dumping of waste*** (fly-tipping) directly into or close to watercourses is a widespread problem and a major threat to water quality, especially in the Bosna, Drina and Una river basins. Hazardous waste from mining and industry is usually dumped at landfills close to the plants or at nearby municipal landfills with poor standards, often directly into the ground without underground sealing or collection and treatment of seepage water. Coal power plants, the wood and paper industry, the chemical industry and mineral oil processing, the textile and leather processing industry and the metal finishing industry are, in addition to the mining sector, the largest producers of hazardous waste in Bosnia and Herzegovina. The result is that significant environmental problems have been identified in several locations, for instance in the Samac, Sava river alluvium (where the spring sources for the drinking-water supply are located), Bijeljina, Modrica and Gorazde.

A more serious effect on the environment is probably that the waste is a significant source of hazardous chemicals river pollution. Household waste is also adding to the overall pollution with organic matter, but its contribution is assumed to be rather small compared to other sources.

At the same time, most of the large industries in BA, dating from the pre-war period, are characterized by high consumption of raw materials, water and energy, the generation of significant quantities of solid waste and wastewaters, as well as emissions into the air.

Industrial companies in Bosnia and Herzegovina are faced with the requirement to implement the provisions of new sets of environmental laws, enacted in both entities, and based on the principles of sustainable development. The new Act on Environmental Protection, anticipates "special control regime" for "activities or facilities and plants that endanger or may endanger the environment or that have or may have the negative impact on the environment", as well as prescribes "the principle of an integrated approach", the purpose of which is "prevention or reduction to minimum possible extent the risks of damage for the environment as a whole". By that, the law imposes, as an imperative, the inclusion of the environmental component into the business policy.

### 4.1.5. SWOT Analysis

| | **Strengths** | **Weaknesses** |
|---|---|---|
| **INTERNAL** | - The Inter-Entity Steering Committee for the Environment<br>- The National Steering Committee for Environment and Sustainable Development established in 2002<br>- The Inter-Entity Commission for Water Management - responsible for cooperation on all water management issues among the relevant ministries of both entities<br>- The National Environmental Action Plan (NEAP) of March 2003, drawn up by the entities in cooperation with the World Bank.<br>- The Mid-term Development Strategy (2004-2007), adopted by the Council of Ministers<br>- A Memorandum of Understanding between the Council of Ministers of Bosnia and Herzegovina, the Government of the Federation of Bosnia and Herzegovina, the Government of Republika Srpska and the Commission of the European Communities.<br>- The Act on Water Protection (Republika Srpska's the Act on Water Protection and the Federation's Act on Water Protection and the Law on Environmental Protection reflect European practice. Both Laws intend to ensure that water protection in Bosnia and Herzegovina is in line with EU policy, directives, regulations and standards.<br>- Water permits granted by water management authorities at the Ministry of Agriculture, Forestry and Water Management in both entities.<br>- The Environment inspection - the two entities have recently recruited environmental inspectors (one person) at their Environment Ministries.<br>- Legal strategy for approximation of EU legislation on EIA and IPPC | - Insufficient implementation of adopted policies, strategies and plans.<br>- Very complicated institutional base for the administration of environmental issues.<br>- The lack of a regulatory framework that specifies the functions of the various bodies with environmental responsibilities to avoid the potential for overlap and duplication.<br>- An unclear division of responsibilities between different authorities.<br>- Luck of environmental standards for emission discharges into the aquatic environment.<br>- Insufficient legislation and state administration.<br>- Gaps in capabilities.<br>- Lack of knowledge and experience.<br>- Lack of goals in field of industry pollution redaction and programmes.<br>- Weak skills and technical knowledge ( BAT, monitoring, public involvement) |

| | | |
|---|---|---|
| **EXTERNAL** | **Opportunities**<br>- State's emphasis on water management issues<br>- Cooperation between the State and the entities in environmental matters is being strengthened.<br>- The State and the entities discussion about the possibility of establishing an environment agency (no firm decision has been made).<br>- It is expected that the IPPC regulations will bring clarity to the environmental permitting of large installations.<br>- Both entities are preparing laws related to inspections.<br>- Environmental inspectors will be centralized in each of the entities to strengthen enforcement.<br>- Value market places on challenging programs supports enhancing quality industrial technologies<br>- Capacity to respond to state and national needs to encourage water protection.<br>- Increased demand for development of industry and BAT | **Threats**<br>- The State Constitution contains no provisions for the environmental law, it is a responsibility of the entities (RS, FBA)<br>- A complicated state administration.<br>- The lack of State institutions to handle water issues<br>- Difficulties in field of obtaining financial and technical assistance to improve water management and monitor international procedures or standards.<br>- Unclear situation with respect to industrial development and ownership |

### 4.1.6. Road Map for implementation of BAT

The results of the SWOT analysis point out that the current situation in BA concerning environmental protection and water management is very complicated and unfavourable. It is obvious because BA has been faced with and other problems primarily due to the war. Regarding industrial pollution reduction the crucial obstacles have been identified in the field of legislation, institutional arrangements, implementation and enforcement. The current practice of industrial companies concerning environmental protection is at the level of the 50ies and 60ies of the last century. The progress achieved regarding the treatment of industrial waste water, by the construction of a significant number of treatment plants in BA, during the 80s, has been practically annulled due to the malfunction of these facilities.

In terms of laying the ground for the better management of the environment, BA has made significant progress with the adoption of a National Environment Action Plan (NEAP) in 2003, associated environmental legislation and international conventions that entitle BA to assistance from the Global Environmental Fund. The challenge facing BA now is to develop the necessary institutional capacities to significantly improve environmental management.

The analysis shows the following strengths:

- adoption of the strategic documents:
  - the National Environmental Action Plan,
  - the Mid-term Development Strategy (2004-2007),
  - a Memorandum of understanding between the Council of Ministers of Bosnia and Herzegovina, the Government of the Federation of Bosnia and Herzegovina, the Government of Republika Srpska and the Commission of the European Communities
- creation of the responsible bodies, the National Steering Committee for Environment and Sustainable Development, for implementation of the strategies; however it is limited to making recommendations,
- the adoption of new legislation intended to ensure that water protection in Bosnia and Herzegovina is in line with EU policy, directives, regulations and standards. The Act calls for the

development of a minimum ten-year water protection strategy and protection plans to be an integral part of the National Environmental Action Plan unless an inter-entity agreement dictates otherwise. The Law further stipulates that "water protection consent" is required before other permits (e.g. environmental, construction) will be issued, and it establishes an inspection system.

Although these approaches are a good start, the current situation indicates that the development concerning the improvement of environmental policy, water protection and water management has made slow progress.

Specifically with respect to, industrial pollution reduction, the integrated approach and implementation of BAT, the SWOT analysis identifies imperfections in legislation, state administration – responsibilities, in decision making and permitting processes, inspection, enforcement and capacity building. There is a lack of information concerning industrial pollution sources including the quality of waste water discharges (dangerous substances content). The principles of the IPPC Directive have been transposed into the Act on Environmental Protection; however, there are some inaccuracies and a lack of clarity concerning the operators' obligations as well as the integrated permitting process. The Act provisions and rulebooks have been prepared in a way to mix EIA, IPPC and SEVESO requirements in one procedure which has resulted in a complicated procedure.

The environmental permit should contain emission limit values for pollutants. Emission limit values, equivalent parameters and technical measures which are based on BAT taking into account the technical characteristics of the installation, its geographical location and the local conditions. However, recognizing that BREF documents are not available in BA, that emission limits for waste water are out dated or do not exist, and that only emission limits for air are available, this aspect of the permit is currently not very well covered. Most of the permits issued are focused on pollution prevention however they do not contain emission limits.

According to the Act on Environmental Protection responsibilities for issuing the environmental permit are divided between the Federation and the Cantons in FBA and the Republica and municipalities in RS. Since this procedure has started to be implemented just recently, capacity in the Cantons and municipalities has not been developed and the permitting procedure at the lower level is not implemented in a satisfactory way. In municipalities in the RS this process is not yet implemented. In addition to the lack of knowledge and experience there are also problems related to the capacity of state administration staff to deal with all existing and new obligations

Industrial experts and industry managers generally have had limited knowledge and experience related to the integrated permitting process and BAT. However some activities were carried out. For example the Project "Capacity Building in Cleaner Production in BA, LIFE Third Countries Programme, 2002-2005 [4] that has provided nine companies with basic information regarding environmental management systems and cleaner production through a number of activities directed to raising awareness, information dissemination, marketing and training.

BA industry is facing or will very soon face new environmental legislation. The majority of industrial plants date back to the pre war era and they are unable to comply with the existing standards so it is likely that they will not be able to comply with future environmental standards relying on European policies and practices. However, after adoption of regulations, the industries will be forced to implement them, i.e. they will have to introduce measures in order to prevent, mitigate and control pollution.

Implementation of the concept of Best Available Techniques (BAT) is the fundamental element of integrated pollution prevention and control (IPPC) and is closely connected with legislation, institutional arrangements, decision making processes, enforcement and other issues like capacity building and public involvement. Therefore the Road Map and proposed work plan is focused on these aspect which have to be taken into consideration for successful implementation of BAT. The

Work plan also takes into account to the fulfilment of the requirements related to the development of the DRMP by the end 2008 and it's updating in 2015.

**Work Plan – short term objectives by the end 2008:**

| Issues related to | Operational tasks | Outputs |
|---|---|---|
| **Improvement of legislation** | - conduct a detailed legislation gap analysis of the Act on Environmental Protection concerning IPPC<br>- develop emission limit values for specific pollutants release into water bodies | - new legislation or updated legislation in force<br>- legally binding ELVs |
| **State administration** | - detailed review of state administration and responsibilities including inspection<br>- identification of needs and cost demands<br>- improvement of cooperation with state organizations and other stakeholders | - a new effective organizational structure and clearly defined responsibilities<br>- clear definition of responsibilities at all levels of competent authorities |
| | - development of monitoring and gathering information<br>- reporting obligation analysis | - monitoring programme focused on compliance with permits and reporting requirements –EPER/ PRTR |
| | - revision of an integrated decision making process inspection and enforcement as an input for improvement of legislation | - emission and product controls and the application of the "combined approach": BAT or relevant emission limit values for control of point sources |
| **Capacity building** | - capacity building needs analysis | - proposal for capacity building development |
| **Industry pollution reduction** | - inventory of industrial pollution sources in cooperation with operators | - polluter register and specific pollutant register-EPER/PRTR |
| | - screening of dangerous substances in waste water and receiving water | - assessment of screening results as input for monitoring programme |
| | - implement the List of Measures to reduce hazardous substances - a comprehensive set of measures addressing hazardous substances pollution<br>- development of the pollution reduction programmes including measures as a contribution to the Danube Basin Management Plan and the Programmes of measures | - Programmes of measures contribution to the Danube Basin Management Plan |
| **Implementation of BAT** | - Introduce to the relevant stakeholders the process of integrated environmental permitting and use of BAT<br>- analysis of industry sectors from the point of view of BAT implementation<br>- translation of BREFs and/or proposal for preparation national BREFs<br>- creation of BAT and BREFs information system and dissemination of information and trainings | - the national BREFs |

**Medium term objectives by end of 2015**

| Issues related to | Operational tasks | Outputs |
|---|---|---|
| **Improvement of legislation** | - Implementation of new legislation and monitoring | - Compliance of the legislation with EU requirements |
| **State administration** | - Improvement of state administration<br>- Proposal for new developments | - Functioning state administration |
| **Capacity building** | - Implementation of capacity building strengthening | - Proposal for meeting emerging needs |
| **Industry pollution reduction** | - Implementation of the pollution reduction programmes including measures to contribute to the Danube Basin Management Plan- updated<br>- Update the pollution reduction programme | - Updated pollution reduction programme and programme of measures as an integrated part of the Danube Basin Management Plan |

### 4.1.7. Recommendations

In order to achieve the result of successful implementation of the BAT concept in Bosnia and Herzegovina it would be appropriate to apply a "top-down" approach. The recommendations emerge from the need to ensure the continuing common advancement of the State and the entities in the field of industry pollution reduction. This approach would also contribute and enhance the credibility of the State. In this context it means executing the measures regarding the legislation at the State level, which will create the very clear responsibilities in the field of integrated water management (the WFD Directive) including integrated pollution and prevention control and responsibilities for the implementation of BAT. It is obvious that relevant measures have to be taken at the entities level regarding state administration. The intention of these measures would also have the added advantage of facilitating the fulfilment of the international obligation of the State concerning the implementation of the DRBC as well as meeting EU accession requirements.

This approach to the improvement of legislation, state administration, capacity building and other related issues out lined in work plan of Road Map should establish conditions for the introduction and implementation of BAT.

In addition to the creation or updating of the basic relevant legislation it is critical to gather the missing information concerning industrial pollution sources and the impact on aquatic environment. The results of these activities will serve as a base for the implementation of BAT which includes:

- Development of a polluters register,
- Analysis of industry sectors in point of view of BAT implementation
- Set up emission limit values,
- Development the national BREFs
- Creation of information system regarding BAT and BREFs
- Dissemination of information and trainings focus on BREFs documents
- Monitoring programme according to reporting requirements – PRTR,
- Development of the pollution reduction programmes including measures as a contribution to the Danube Basin Management Plan and the Programmes of measures

An integral part of proposed Work Plan is the development and consequent implementation of the Reduction Pollution Programme which will contain measures focused on particular steps related to its implementation according to short and long- term objectives.

These measures will help BA to fulfill obligations to the ICPDR concerning preparation of the Danube Basin Management Plan and the Programmes of measures.

## 4.2. The Republic of Moldova

### 4.2.1. Background

The Republic of Moldova (MD) is a transition economy, located in southeast Europe, between Ukraine and Romania. The entire territory of Moldova (33, 7 sq km) lies in the Black Sea Basin. About 34% of the county belongs to the Prut River Basin, which is a sub-river basin of the Danube River Basin; approximately 60% is part of the Nistru (Dniester) River Basin and the rest into a series of small rivers that empty directly into the Black Sea.

Since 2001, the country has been divided into 32 local districts (rayons), two administrative units (Gagauz Yeri and Transnistria) and three urban municipalities (Chisinau, Balti and Bender). This restructuring reduced the financial autonomy of the municipalities and affected the environmental protection institutions. Some environmental responsibilities, previously at the municipal level (e.g., solid waste management, drinking water supply and wastewater management) were recentralized into the territorial administrative structures of the Ministry of Ecology and Natural Resources.

Another important development that will affect environmental management is the Republic of Moldova's intention to join the European Union (EU). With Romania's forthcoming accession to the EU, the country will become an EU neighbour, and as such is entitled to benefit from the EU Neighbourhood Policy. The joint EU-Moldova Action Plan (2005) contains environmental and sustainable development objectives and prepares the Republic of Moldova for the introduction of EU requirements.

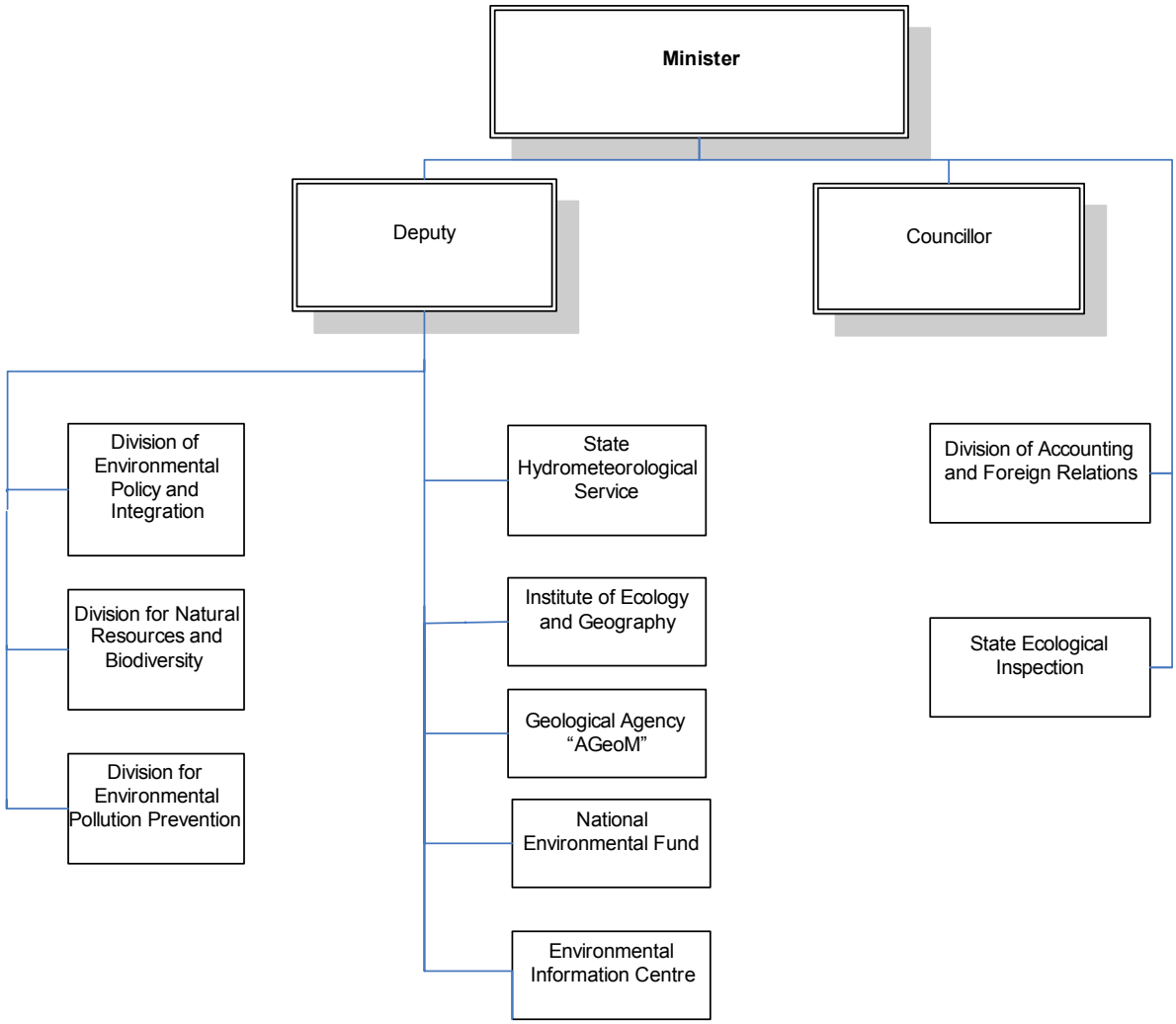
### 4.2.2. Policies, strategies, legislative and institutional framework

#### 4.2.2.1. The institutional framework

The responsibility concerning the environmental protection issues after substantial changes lead to the establishment of the **Ministry of Ecology and Natural resources (MENR)** in 2004. In October 2005, the MENR was reduced to 25 staff and is responsible for most of the elements constituting the corpus of environmental law. It has one executive authority; the State Ecological Inspectorate (SEI).The structure of the MENR is provided in figure 4.2.1 and is described as follows:

- The Division of Environmental Policy and European Integration – development and implementation of the State policy on environmental protection. It also has the task of coordinating the improvement of national environmental legislation and for the approximation to European Union (EU) legislation.
- The Division on Natural Resources and Biodiversity develops and promotes State policy on conservation and sustainable use of natural resources. It develops the legislation on forest protection, hunting, fishing and land resources and implements programmes and plans on protection and conservation of natural heritage. It coordinates the activities connected with biological diversity conservation and protected areas management, and also develops related legislation.
- The Division for Environmental Pollution Prevention deals with the issues of pollution prevention and waste management, and also with the implementation of State ecological expertise plans, programmes, schemes and strategies. It develops related legislation.
- The Division of Accounting and Foreign Relations deals with staff management, legal services, accounting and international agreements.

**Figure 4.2.1 Organizational structure of the Ministry of Ecology and Natural Resources**




**Source:** Ministry of Ecology and Natural Resources, 2005

***The State Environmental Inspectorate (SEI)*** is the environmental enforcement agency responsible for compliance with the country's legislation in the field of environmental protection and use of natural resources. SEI is an autonomous division of the Ministry of Ecology and Natural Resources (MENR) with the status of a legal entity. The Inspectorate is headed by a Chief Inspector who reports directly to the Minister.

The SEI's jurisdiction includes the protection of air, water and soil, and ensuring the rational use of mineral and biological resources. According to the "Statute of the State Ecological Inspectorate," the principal responsibilities of the SEI and its territorial units include:

- State Environmental Expertise (SEE) of new and changing economic development projects;
- Regulation of environmental impacts by issuing permits for air emissions, water use, wastewater discharges, waste disposal, and logging;
- Monitoring of compliance with environmental requirements; and

- Imposition of administrative sanctions for the violation of environmental legislation, including termination or suspension of any economic activity undertaken in violation of environmental requirements, claims for compensation for damage caused by environmental violations, and fines.

The SEI has a central office with divisions covering major environmental protection sectors and management functions and four territorial ecological agencies (TEAs): the Central TEA in Chisinau, the Northern one in Balti, the Southern one in Cahul, and a TEA for the Autonomous Territory of Gagauzi in Comrat whose organizational structure roughly follows that of the central office.

The SEI central office regulates large industrial installations and supervises the TEAs that carry out environmental assessments, permitting, monitoring and inspection activities with the help of their *rayons* (district units) (there are 16 such units in the Central TEA, the largest of the four). The district units work closely with local public authorities which since 2001 no longer have their own environmental officials. The division of responsibilities between these, effectively, three levels of environmental enforcement agencies are not always clear. In addition, there are six border environmental control posts that collect, in cooperation with the customs authorities, charges on imported fuel and environmentally harmful products and control vehicle emissions. The Fishery Service (formerly, the Inspectorate for Fish Protection) is also an institutional part of the SEI. It is responsible for monitoring fish populations.

The SEI currently issues permits for "specialized water use" (water abstraction and wastewater discharges into water bodies), Water permits for installations with wastewater discharges over 400 m3/day or with groundwater abstraction over 1 million m3/year are issued by the central SEI, while the respective departments of TEAs regulate installations with smaller effluent volumes.

There are other specialized institutions, which are ancillary to the MENR, providing a supportive role in research and information gathering and dissemination:

- ***The State Environmental Inspection*** (SEI) including the Central Ecological Laboratory, is an executing authority which helps MENR to implement the environmental policies and laws.
- ***The Geological Agency*** "AGeoM" provides control for the safeguarding of groundwater from pollution and reduction and keeps the State balance of mineral stocks. They participate in the issuing of permits for water abstraction.
- ***The State Hydrometeorological Service*** (HMS) - has 415 staff and a meteorological observation centre. Consequently air and water monitoring responsibilities are key functions. The biggest problem negatively affecting their operations is a lack of the required technical base,
- ***The Institute of Ecology and Geography*** created in 1990, is in charge of carrying out scientific research on ecology in coordination with the Academy of Sciences. Their tasks also include consultancy on environmental impact assessment (EIA) and the development of national reports on the State of the Environment. Furthermore they carry out expert evaluation of foreign or new technologies from an environmental point of view on the basis of their own experience without using data from the European Integrated Pollution Prevention and Control (IPPC) Bureau.
- ***The Environmental Information Centre,*** created in 2000, is responsible for the gathering and updating of environmental information (air, water, monitoring, information and other areas) and for making it publicly available.
- ***The Central Ecological Laboratory*** carries out the sampling and analysis of water, soil. The technical base for their functioning is quite limited. Quality control and quality assurance systems are not at the level of internationally recognized standards. There is a need to

establish a national reference laboratory for environment quality measurements, which should be accredited by an international accreditation body.

The last three organizations cover functions that are overlapping and need to be co-ordinated with each other. In many EU countries, these functions are carried out by a single institution, such as an environmental agency.

In general, management and implementation structures are simple, with each policy - permitting, compliance procedure, monitoring and reporting - managed by distinct institutions for each sector. The strength of the institutional system is that the tasks of permitting and assuring compliance with permitting conditions (through inspection) are performed in two separate departments. Since both departments are within the SEI the information can be freely exchanged; and having two departments avoids the possibility of conflict of interest.

Thus the principal responsibilities for the implementation of environmental protection requirements are shared between:

- The relevant division of the Ministry dealing with policy formulation and planning;
- The specialized divisions responsible for the preparation of legislation;
- The SEI, which is responsible for permitting;
- The relevant territorial environmental agencies (TEAs) responsible for inspection and control of the environmental performance of installations, which can appeal to the national inspectorate;
- The operator (if required by authorities) for emission monitoring, and the relevant MENR institution for ambient monitoring; and
- The Environmental Information Centre and the National Institute of Ecology for reporting.

The General Division for Environmental Strategies and Policies coordinates the National Environmental Fund (NEF), set up in 1993. The NEF is managed by a steering committee that includes representatives from the MENR, Parliament, the Governmental Apparatus and environmental NGOs. The Minister of Ecology and Natural Resources is the president of the NEF.

In certain fields, State companies exercise important management functions in the field of environment. These include the State Water Concern "Apele Moldovei", which is under the Ministry of Agriculture and Food Industry, and, ancillary to the Government, the Agency for Forestry "Moldsilva" that deals with forest management and identifies the areas, type and amount of cutting in coordination with the State Ecological Inspectorate.

The 1998 the *Act on Local Public Administration enlarged* the functions of local authorities in natural-resources management and environmental protection. Environmental departments were created in local councils to deal with these issues. As a result, the designation of functions between these local authorities and the regional environmental agencies is sometimes unclear. The local administrations tried to assume the functions of environmental control, i.e., to duplicate the activity of territorial branches of the Ministry of Ecology and Natural resources. The main tasks of the environmental departments created within the local governments were to prioritize local environmental matters, to develop local environmental action plans and to raise the environmental awareness of the public. The provision of environmental services such as municipal solid waste management, drinking water supply and wastewater collection and treatment were the responsibility of the municipalities but due to the re-centralisation started in 2001 these functions are now being removed from the municipalities to the regional and local structures of the Ministries. In some local councils the environmental departments continue to be active, although the financial autonomy of local administrations has been reduced by the 2001 amendments to the Law.

By decision of the President of the Republic of Moldova, the National Council on Sustainable Development and Poverty Reduction was established in 2004 in order to coordinate activities related to strategic planning on socio-economic policy, oriented towards sustainable development and improvement of the population's quality of life.

### 4.2.2.2. The policy framework

The foundations for the environmental policy were set out in the Act *on Environmental Protection (*1993), the 1995 *Concept of Environmental Protection*, the 1995 *National Strategic Environmental Protection Action Programme*, the 1996 *National Environmental Action Plan* and the *2001 National Action Plan for Environmental Health.* At the same time a number of sector specific strategy documents have been elaborated, including a series of provisions relating to environmental protection. In the period 1995 to 2000, the "Environment for Europe" process drew particular attention to countries in Eastern Europe, the Caucasus and Central Asia (EECCA) region and to South-East European countries. The Republic of Moldova has participated actively in this process, being represented at the highest level in international environmental activities. It has also signed and ratified a number of international agreements. Implementation of these agreements has become a constituent part of environmental activities at the national and regional levels. (See chapter 4 on International Agreements.) A series of legal instruments programmes and strategies have been adopted relating to other sectors of the Moldovan economy. A series of changes have occurred in Moldovan society and in the structure of the national economy during recent years. The need to implement a unified policy on environmental protection and the use of natural resources, which integrates environmental requirements into the national economic reforms along with the political desire for integration into the EU, has resulted in the revision of the existing environmental policy and the development of a new policy concept. The 2001 *Concept of Environmental Policy* replaced the action plans and concepts that have been in force since the middle of the 1990s. It covers the adjustment of the ecological policy's major objectives to take account of the social and economic changes in the country, and incorporate regional and global programmes and trends in order to prevent further deterioration of the environment. Its main objectives for environmental policy are:

• To prevent and mitigate the negative impact of economic activities upon the environment, natural resources and public health in the context of sustainable national development; and

• To ensure a safe environment for the country.

According to the Concept, the current environmental policy priorities are capacity building and cross-sectoral collaboration, including the use of "economy through ecology" and "cost benefit" principles, regulation of environmental impacts, pollution prevention and rehabilitation of the environment. The Concept covers the issues of financing environmental activities, and public participation in the decision-making process in the context of environmental protection and rational use of natural resources. It calls for an extension of the Environmental Information Centre activities and the creation of environmental information centres at the local level. International collaboration activities in environment are driven by the development of a concept for international relations on environment and the political desire for European integration, with an emphasis on approximation, strategies and programmes.

***EU-Moldova Action Plan for Neighbourhood Policy***

In September 2003 the country presented the *Concept for the Integration of the Republic of Moldova into the European Union*. In the Concept it welcomed the European Neighbourhood Policy and expressed its wish to be included in the Stabilisation and Association Process of the Western Balkan countries. In March 2004 the country recognized the importance of the Neighbourhood

Policy for internal reform and considered it as a way to move closer to the EU. A joint EU-Moldova Action Plan prepared for 2005-2008 was signed in February 2005. According to the Action Plan the country is invited to enter into intensified political, security, economic and cultural relations with the EU. The EU acknowledges Moldova's European aspirations and Moldova's wish to integrate with the EU. The Action Plan covers the issues of sustainable development and requests steps are taken to better integrate environmental considerations into other policy sectors, particularly industry, energy, transport, regional development and agriculture. It also asks for steps to be taken towards strengthening environmental administrative structures and establishing procedures regarding access to environmental information and public participation. It covers issues of the implementation of the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, EIA and environmental education. The need for the adoption of additional legal acts for key environmental sectors is also specified. The possible participation in European Environment Agency activities is also mentioned.

*Other Strategies, Plans and Programmes*

A large number of other strategies, plans and programmes related to the environment, have been developed since 1998.

The most important are:

The 2001 *National Strategy and Action Plan for Protection of Biodiversity*

The 2003 *Concept of National Water* Resource *Policy for 2003-2010* covers the purposes and tasks of water policy including the rational use and protection of water resources, water quality improvement, meeting population and national economic needs, and protecting the aquatic ecosystem.

In order to increase the population's access to good quality drinking water, the 2000 *Programme of Water Supply and Sanitation for Localities until 2006* was developed in 2002 and is being implemented. It is financed from State and local budgets, the NEF and credits and grants from international financial institutions and foreign countries.

No less than 26 strategies and programmes have been developed for the industrial sector since 1998.In most of them environmental issues are addressed. The most important are the following programmes, which integrate environmental objectives in industrial policies:

- The *Programme "Quality and implementation of quality management system according to the requirements of ISO 9000"* was implemented in 2004 by introducing quality management systems in 10 enterprises and creating preconditions for implementation in 22 other enterprises;
- Industrial policy in the context of integration into the EU. This policy is based on the *EU Moldova Action Plan* in the framework of the European Neighbourhood Policy of the EU;
- The *Sectoral Strategy for Industry Development for the short-term period up to 2006,* foresees a four-fold increase of industrial output, maintaining an annual industrial growth of 17-20 per cent, and the creation of 25,000 new jobs. The Strategy was updated for 2004-2008 and harmonized targets and those of the industry policy for integration into the EU with the EGPRSP. It predicts an annual growth of industrial production of 18 per cent. It served as a basis for the elaboration of programmes for industrial sub-sector development;
- The 2004 *Programme for the Implementation of New Technologies in Industries* anticipates the enhancement of cooperation between scientific institutions and enterprises in the field of technological innovations and the creation of industrial parks and industrial clusters; and
- The 2003 *Programme for Energy Efficiency Improvement in Industry for 2004-2008*, which integrates energy conservation objectives into industrial sector policies.

### 4.2.2.3. The legislative framework

The Constitution of the Republic of Moldova refers several times to the environment and to the principle of sustainable development. It requires this and all other policies to be managed through laws. The laws must stipulate the regulations that should be elaborated to make these laws operational, and set a timetable for their adoption. Legal requirements are uniform for the entire country except Transnistria. Laws and their subsidiary ordinances tend to be prescriptive (Command and Control) and make detailed provisions for the organization and implementation of the matter being regulated, setting out control practices or giving the location of offices established to implement them. Environmental laws and their subsidiary ordinances are similarly single-media in character. Voluntary approaches for environmental compliance are not integrated into legal requirements

The basic legislation that covers environmental protection was developed between 1995 and 1999.

The 1993 *Law on Environmental Protection* imposes general obligations on so-called economic agents, requiring them to introduce technologies that minimize waste generation, to keep a register of generated wastes and to process recyclable waste on site or in specialized enterprises. The current definition and categorization of waste is still based on classifications adopted under the Soviet system. International waste categorization has not yet been introduced. The Act provides for the establishment of taxes for the storage and treatment of industrial and domestic waste, and technical standards for transport, surface storage, incineration and landfill of the non recyclable components of waste. The *Law on Environmental Protection* covers three main waste classes: solid and non-hazardous waste, toxic (hazardous) waste and nuclear waste. No list of wastes falling within these categories has been developed. There is no definition of hazardous waste corresponding to EU legislation. The *Law on Environmental Protection* forbids all import and transit of nuclear waste on the territory of the Republic of Moldova

The 1996 *Law on Ecological Expertise and Environmental Impact Assessment* gives citizens the right to request information on new economic developments/projects and on the results of the evaluation of their design. The Constitution gives every citizen the right to take actions to the courts but there are no examples of people who have exercised this legal right yet. The main reasons for this may be that people do not often realize that the right for a clean environment is one of their fundamental constitutional rights and that the public has limited access to timely and intelligible environmental information. However, citizen actions are starting to take place, and citizens are starting to make use of environmental NGOs to initiate actions.

The 1997 *Law on Atmospheric Air Protection* states that a permit is required for facilities emitting substances into the air. Emission standards and the way they are calculated are based on dispersion calculations. The aim is to guarantee that ambient air quality standards are not exceeded. Air quality standards are still those of the Soviet times and have not been approximated to EU standards. There are no emission standards for certain industries (e.g., large combustion plants) and all standards are calculated on a case-by-case basis. The principle of best available techniques is not applied in the country and the existing legislation does not give any grounds for it.

The *Law on Atmospheric Air Protection* also regulates emissions from mobile sources but again, the limit values used are those established for old Soviet cars and the number of components regulated is very limited - carbon monoxide, hydrocarbons for gasoline engines, and smoke density (relative indicator for PM content in exhaust gases) for diesel engines.

The basic water legislation is the 1993 *Water Code*, which gives grounds for similar concerns as those described above on air quality management. The authorized discharge levels are based on ambient standards. The methodology for calculating discharge limits from ambient standards is based on the principle of a dilution calculation and dates from former Soviet Union times. The main

criterion for the calculation of emission limit values is that pollutants discharged into the watercourse should not exceed the maximum permissible concentrations in the receiving waters of designated use (fishery management limit values are being used by default). The ambient water quality standards are extremely stringent as they are based upon the concept of zero risk. As a result they are unrealistically strict which leads to a general acceptance that it is not possible to meet the legal requirements. Also, sometimes natural components in groundwater (e.g., sulphides) may have a higher concentration than the authorized limit value in the receiving water body, so it is impossible to follow the requirements. There is a need for a realistic linkage between ambient standards and discharge standards with both preferably being established directly by legislation.

There is no legal obligation in the country for companies working with certain quantities of dangerous substances to develop accident prevention and safety management plans. The principles of EU legislation on the control of major accident hazards involving dangerous substances are not yet included in the national law. The provisions that require installations to develop a policy for major accident prevention as well as safety management systems, including preparation of external emergency plans and a safety report, are missing. There is also no formal requirement for the testing and notification of dangerous substances.

The 1997 *Law on Industrial and Domestic Waste* requires the Government to develop a National Waste Management Plan. Under the Law on Environmental Protection local Governments are obliged to develop local Environmental Protection Plans that, where they have been developed, may include plans for local waste management. No waste management plans have yet been developed at the *rayon* level in addition to the National Waste Management Plan.

The 1998 *Law on Payments on Environmental Pollution* implements these principles in detail.

The country is beginning to introduce the concept of environmental management to industrial companies. There is no legislative support to promote the introduction of environmental management systems. There are no existing environmental management and audit schemes that industries can subscribe to for environmental management in enterprises. However, companies are not showing any interest in implementing such schemes. Economic resources are limited and there is not much incentive to improve their environmental performance. There have been companies that have set up a system in accordance with ISO 14000 requirements but they are not accredited by any national body. There is a tendency to approach such issues as environmental management in enterprises by developing obligatory standards rather than by setting up a voluntary scheme and programme to promote the idea and involve companies.

The most important piece of national legislation covering the field of nature protection, biodiversity and forest management is t he 1998 *Law on the Fund of Natural Areas protected by the State* and the *Law on Environmental Protection* designate the MENR as the authority responsible for regulating nature protection. The responsibility for the management of nature and forest areas has been delegated to the Agency for Forestry “Moldsilva”. Local authorities also have the responsibility for nature protection, mainly for the management of natural monuments. The Law on Protected Areas gives a legal base for the designation of State-owned protected areas. It includes a list of protected areas and a list of protected species and requires the MENR to develop the related secondary legislation. Only one regulation, which designates wetland areas as scientific reserves, has been developed so far.

The Act *on the Ecological Expertise and Environmental Impact Assessment* includes the obligation that the impact of new projects on protected areas must be taken into account. With regard to habitats, the national legislation is not yet in compliance with the EU habitat protection requirements. Habitats have not been identified as such and the resources and mechanisms for the management of habitats are so far quite limited.

### 4.2.3. Water management

The surface water quality varies. According to the Water Pollution Index (WPI) the main rivers Dniester and Prut are moderately polluted (category III-IV) while smaller rivers like Reut and Bicu are more polluted (category IV-VI), on a scale where I is the least and VI the most polluted. Dniester's water quality is important, since it is the main surface water body in the country, providing water for 82 per cent of the population of Chisinau and being the source of 56 per cent of the total abstracted water. The majority of underground water does not meet the quality standards and requirements for potable water because of the excessive concentrations of chemical substances (fluorine, iron, hydrogen sulphide, chlorides, sulphates and excessive mineralization).

According to the 2004 State of Environment Report, pollution in underground aquifers is widespread and the poorly managed underground water is subject to continuous deterioration. In rural areas, where most of the population draw their drinking water from the substandard underground sources and where only 17 per cent of families use central supply sources, bad water quality has a direct impact on the population's health, causing increased morbidity and generating additional health-related expenditures for the state budget and economy.

In the 1990s the water usage pattern changed significantly towards a drastic reduction in consumption. The groundwater abstraction was halved from the 277 million m3 in 1991 to 132 million m3 in 2001. The reduction of the use of water for agricultural irrigation was even more dramatic. Irrigation water consumption dropped from 898,000 m3 in 1990 to 92,000 m3 in 1998 and to 46,000 m3 in 2002.

The wastewater discharged from residential or industrial areas is a major pollution contributor to surface waters as most of the wastewater treatment plants (WWTP) are no longer operational. Out of the 580 WWTPs built before the early 1990s, only 104 were still in use in 2003. The total capacity of these plants is 614,000m3/day but only 32 per cent of the capacity or 198,000 m3/day is effectively used, most of the plants being out of order. As a result, the quantity of untreated or insufficiently treated wastewater has dramatically risen since 2000. Another big pollution source is individual domestic discharges because 70 per cent of the housing does not have a proper connection to the sewer system.

***Water quality monitoring***

Since 1998, *the State Hydrometeorological Service* (HMS) has increased its observation network for surface water quality by four points on four different rivers and by five points on water reservoirs. Overall, it currently consists of 49 observation points located on 16 of the largest rivers, six major water reservoirs and one estuary.

The observation points are located near large urban areas. Diffuse pollution of surface waters is not monitored in the Republic of Moldova. Samples are taken monthly to measure up to 42 hydro-chemical parameters and up to six hydro-biological parameters depending on the observation point. In 2004, the HMS started monitoring heavy metals and POPs (organo-chlorinated pesticides, including DDT and HCH) in sediments in the Prut and Bîc Rivers and all water reservoirs. In 2005, it took samples for PCB at five water-monitoring posts near electric energy installations.

The HMS implements a joint sampling programme with the Iasi Environmental Protection Agency (Romania) on the Prut River. Four automated monitoring stations were installed on Prut (2) and Dniester (2) Rivers in 2004, thanks to a NAT funded project. The stations had been providing real-time data on pH, temperature, water level, conductivity, turbidity and dissolved oxygen until they ceased to operate because of inconsistencies between the stations' equipment and local telecommunication networks. The HMS expects that the project-implementing agency will fix the problem soon and that it might be also possible to upgrade the stations to monitor pollution by chemicals and oil products. According to an assessment made jointly by Danish and Moldovan

experts under a Danish-funded project in 2002, to comply with monitoring requirements of the EU Framework Water Directive, the Republic of Moldova should create an additional eight river and 18 lake observation posts.

To strengthen its water-quality observation network including transboundary water monitoring, the HMS prepared proposals for unspecified donor financing (some € 290,000) to install four supplementary automated monitoring stations as follows: two stations on the Răut River upstream and downstream of Balti city, one station on the Bîc River downstream of Chisinau city and one station on the Prut River at the confluence with Danube River. The HMS considers it necessary to also start observations at Telenesti on the Ciulucul Mic River, at Cupcini on the Ciuhur River, as well as at Floresti and Ghidesti at the Răut River, where important point-pollution sources are located.

The groundwater-monitoring network of the Agency for Geology of Moldova "AGeoM" consists of 186 acting observation boreholes located on 33 fields. Since 1998 the total number of observation boreholes has decreased by 36. Groundwater analysis is made on 20 physicochemical parameters and five heavy metals (instead of 13 required by standards). The frequency of water samples varies from one to ten per month depending on the borehole observation purpose. In large water intakes samples for hydro-chemical parameters are taken twice a year and once every 2 or 3 years for heavy metals. The network needs to be expanded as it does not cover, for instance, aquifers under filtration fields belonging to sugar refineries in Drochia, Hiroveti, Ocnita, Dondusenj, Alexandreni and Singerei and aquifers affected by sewage from 35 big cattle-breeding farms. These pollution sources pose a significant threat to human health today. Territorial centres of preventive medicine monitor the drinking water quality of 3,550 underground wells in rural areas and 11 surface water bodies. 12 production laboratories monitor drinking water quality at water purification plants. There is no monitoring of biological parameters of surface water sources of drinking water supply in the country. Waters for bathing are monitored in urban areas only (at seven posts at the Dniester River and eight posts at the Prut River). In rural areas bathing waters are not monitored, as responsible public authorities have not been designated.

### 4.2.4. Industry

From 1990 to 1999 industrial production dramatically declined but picked up steadily afterwards. It grew 8% in 2000, 14 % in 2001 and 16 % in 2003. During the 1990s the country's economic structure changed significantly. The industrial sector's share declined markedly and in 2003 supplied 18 % of GDP. In 2003 the processing industry's share of GDP was 5.7 % and accounted for 9.4 per cent of total employment. More than half of this is due to food, beverage and tobacco production which is a strategic sub-sector for the country. In the Republic of Moldova, the main industries are food processing (55 per cent of industrial production), paper and cardboard, furniture, leather, and heavy machinery. Construction materials are also an active sector. A major share of industry is private. Out of 674 big enterprises in 2003 just 64, i.e., less than 10 per cent, were public. Foreign companies or joint ventures account for 26 % of industrial production. In general, the situation in the sector remains complicated. Most industries did not reach the production level of the pre-transition period and industrial capacities are far from being fully used. Lack of investments led to a degradation of fixed assets. Industrial equipment has a high level of depreciation and huge investment is necessary for modernization.

The structure of industrial production is not sufficiently diversified. The investments in food and beverage enterprises accounted for the bulk of investment in the processing industry at around 62% of the total in 2002. Machinery and equipment accounted for 3 per cent of investment, with a share of 6% in industrial production. Sixty per cent of industrial activity is concentrated in Chisinau.

Data on industrial pollution are incomplete. Most often the emissions reported by enterprises are calculated on the basis of the input and technology process data instead of being directly measured. There is a lack of integrated indicators of the industrial impact on the environment. Emissions of pollutants into the atmosphere and surface waters from industry are not reported in any official statistical data source. Industrial pollution is not being analysed and reduction targets are not established in industrial development programmes or environmental documents. Though enterprises must report annually on their air emissions, wastewater discharges and waste generation, industry is not always fulfilling its obligations. Only waste generated by industries is reported on a regular basis in official information sources. The lack of environmental indicators to monitor pollution in industry is related to the environmental standards inherited from the Soviet past. A gradual implementation of the Integrated Pollution Prevention and Control (IPPC) Directive (96/61/EC) would help improve the situation. The few existing data on industrial pollution, water and energy use show a slight increase in environmental efficiency from the decrease in air polluting emissions and industrial waste generation being sharper than the decrease of the total industrial output. The decrease in energy demand and the replacement of solid and liquid fuels in combustion units by natural gas also contributed to lower emissions.

As traditionally done in the former USSR countries, industrial facilities discharge their wastewater into municipal treatment plants. In 2003, 123 million $m^3$ of a mix of domestic and industrial wastewaters from municipal wastewater treatment plants were discharged into the receiving water bodies. Since 1999, there has been a relative reduction in the volume of wastewaters discharged, while industrial production has been increasing; but this is being offset by the increased concentrations of the pollutants contained in these wastewaters. The data on concentrations of pollutants after treatment presented by Apa Canal Chisinau (Apa Canal Chisinau: the public water supply company owned by the municipality of Chisinau) indicate an increase in all major compounds since 1998. Many of the industrial wastewater stations that are pre-treating (i.e., detoxifying) their effluents before discharging them into the municipal sewerage network are malfunctioning or do not function at all, and subsequently insufficiently pre-treated wastewater flows into the municipal sewerage system and badly affects the performance of the biological step of the waste water treatment plant (WWTP). Moreover, of the 580 WWTPs with a biological stage those were built by the early 1990s with a total capacity of 650 million $m^3$/year, only half of them were still functioning in 1995 and 104 in 2003 [11]. In these plants, the biological step does not always function, so their performance is even more drastically reduced. Therefore the situation, which was already bad in 1998, has further deteriorated because of the lack of investments needed to maintain or improve these obsolete wastewater treatment infrastructures.

Other potential major industrial pollution sources are the filtration beds of sugar factories. The environmental impacts of all these pollution sources are not monitored. The lack of data on water pollution indicators hampers the sound assessment of the situation and therefore makes it impossible to take adequate pollution mitigation measures to prevent further degradation of surface and ground waters by the industrial sector. According to the current legislation, water users must operate according to requirements set out in the water use permits. These requirements stipulate the volume of water that can be used and set limit values for the discharge of pollutants contained in the wastewater. During the last decade, the number of water users decreased dramatically, following the general drop in economic activity (1,692 water users had permits in 1992, 600 in 1998 and 322 in 2003) [11].

So far there are no companies that have environmental management systems complying with ISO 14000 or eco-management and audit schemes (EMAS). The situation in this field is slightly improving because of activities of the Cleaner Production and Energy Efficiency (CPEE). Centre within the framework of the Moldovan- Norwegian long-term collaboration programme on "Cleaner Production and Energy Efficiency".

### 4.2.5. The SWOT Analysis

| | | |
|---|---|---|
| **INTERNAL** | **Strengths**<br>- The institutional system for permitting and assuring compliance with permitting conditions (through inspection)<br>- Concept for the Integration of the Republic of Moldova into the European Union.<br>- Adoption of the strategies and programmes in field of environmental protection such as:<br>  - the Act on Environmental Protection (1993),<br>  - Concept of Environmental Protection,<br>  - National Strategic Environmental Protection Action Programme, National Environmental Action Plan<br>  - National Action Plan for Environmental Health<br>- Water quality monitoring is in the place<br>- Environmental legislation | **Weaknesses**<br>- Inadequate implementation of adopted policies, strategies and plans.<br>- The environmental legislation is not in compliance with EU legislation<br>- Lack of legislation concerning Integrated Prevention and Control including BAT requirements, permitting authority and inspection.<br>- An unclear division of responsibilities between specialized ministerial institutions (the Environmental Information Centre, the National Institute of ecology and the Central ecological Laboratory).<br>- Lack of environmental standards for emission discharges into the aquatic environment<br>- Lack of the Environmental Quality Objectives<br>- Inadequate legislation and state administration.<br>- Gaps in capabilities.<br>- Lack of knowledge and experience.<br>- Lack of goals in field of industry, inventory of pollution sources and pollution reduction and programmes.<br>- Insufficient information related to pollution sources and pollution releases into aquatic environment.<br>- Weak skills and technical knowledge of decision makers and operators ( BAT, monitoring, public involvement)<br>- Insufficient treatment of urban and industrial waste water<br>- Obsolete waste water treatment technologies<br>- Obsolete environmentally damaging industry technologies |
| **EXTERNAL** | **Opportunities**<br>- State's emphasis on water management issues and an integrated approach<br>- Implementation of Concept for the Integration of the Republic of Moldova into the European Union<br>- It is expected that the IPPC regulations will enhance surface water quality.<br>- Value market places on challenging programs supports enhancing quality industrial technologies<br>- Capacity to respond to state and national needs to encourage water protection.<br>- Increased demand for development of industry and BAT | **Threats**<br>- The lack of State institutions to handle integrated water management<br>- Difficulties in field of obtaining a financial and technical assistance to improve water management and monitor international procedures or standards.<br>- Lack of financial sources for improvement of situation in Industry development |

### 4.2.6. Road Map for implementation of BAT

The environmental management system has acquired real strengths during recent years. The policy base was developed extensively by the introduction of a number of new environmental laws, strategies, programmes and plans. The establishment of the Ministry of Ecology and Natural Resources improved the structure and standards of environmental institutions. A number of recent policy concepts and action plans have called for new or adjusted environmental legislation. While the organizational principles for environmental management are rational, the excessively narrow scope of the legislation, which deals separately with each environmental media (air, water, soil) is of concern. Each law tends to specify its own implementation regime, which makes it difficult to move forward to an integrated management approach. Measures need to be taken to ensure equivalence of practice across all media and to promote a holistic approach to environmental management.

The 2005 EU-Moldova Action Plan envisages the adoption of additional legal acts for key environmental sectors, based on the EU environmental *acquis*. To that end, emissions limit values should be revised and streamlined gradually, and technical and performance requirements considered at the project design stage. As a first step, the main principles should be established and enterprises should be given time to implement these new measures. Also, there is very little common approach across sectors between environmental management and the management of other economic sectors. This common approach will need to be improved and developed further.

There is a need for sufficient, competent and professional staffing in environmental administration. Currently the level of staff is critically low and is far too limited to cope with these new tasks or to acquire the knowledge and advanced competencies that are necessary for dealing with integrated and crosscutting issues. Therefore, to enable the country to fully implement the adopted environmental policies and strategies and to further develop related legislation, it is necessary to strengthen institutions and improve the administrative capacity. Staff training will also be necessary as part of this approach.

Environmental permits cover all environmental areas (air, water, waste, soil) separately. They regulate too many substances through permitting rules that are the same for all polluters, irrespective of their size and environmental impact. This makes it difficult for the small number of inspectors to monitor and enforce permit compliance effectively. It also places a heavy administrative burden on environmental agencies and enterprises. An integrated permit limited to industrial installations with significant environmental effects would be more efficient.

The Republic of Moldova has made progress in terms of greater transparency in environmental assessment. However, more emphasis could be put on the use of environmental assessment instruments, i.e., Environmental Impact Assessment (EIA), State Ecological Expertise (SEE) and Public Ecological Expertise (PEE), especially for those projects with significant environmental impact.

Industrial enterprises are not attaining a sufficient level of compliance with their environmental obligations, and compliance should be monitored and promoted. In addition, inspectors are not using feedback from their inspection findings for the improvement of the overall enforcement process.

The State Environment Inspectorate (SEI) possesses a variety of enforcement tools, but it cannot impose sanctions directly. Penalties and fines for administrative violations go through a court procedure (except for water-related violations), which takes a long time and results in negligible penalties for the violator. Courts are not competent enough to deal with environmental offences and the rate of fines is too low to have any deterrent effect. The percentage of penalties paid is very low. All actions related to sanctions should be carried out with increased SEI transparency and accountability.

The observation network for surveying the quality of the environment has been enlarged, covering more territory, additional media and new chemical components. However this is still not enough to meet national legislation requirements and international obligations. Monitoring does not fully cover groundwater pollution, diffuse pollution of surface waters or background pollution. There is no comprehensive nationwide monitoring programme and the integrated environmental monitoring system is not operational.

With the exception of drinking water, lists of ambient quality parameters have not been revised since independence. Due to an excessively large number of regulated pollutants, unrealistic monitoring and enforcement requirements are imposed on public authorities. Yet, at the same time, some hazardous substances remain unregulated. A number of standards are below the threshold of analytical detection.

Some institutions have increased the number of indicators in their environmental databases and have improved their management and reporting of environmental information. However, modern information technologies have not been introduced into all sectors and information is not easily accessible to decision-makers and the public.

The Ministry of Ecology and Natural Resources (MENR) uses plans and programmes to invite the public to participate in decision-making on policies. Nevertheless, the legal and regulatory framework needs to be elaborated further to implement more effectively the public participation requirements of the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (which the country ratified).

The Republic of Moldova has ratified most environmental agreements of regional and global importance and is implementing them by preparing national contributions and adjusting existing or drafting new national policies on various environmental subjects. At the same time, implementation of the ratified agreements and commitments remains rather weak and poorly coordinated. International support is often donor-driven and does not always address the real needs of the country.

**Work Plan short- term objectives by the end 2008:**

| Issues related to | Operational tasks | Outputs |
|---|---|---|
| **Improvement of legislation** | - conduct a detailed legislation gap analysis of the environmental legislation (Law on Environmental Protection) particularly water legislation (Water Code and supplemental legislation)<br>- prepare a draft of a new law or update legislation in force aiming at the transposition of the IPPC Directive and related water legislation | - draft of legislation in compliance with EU requirements as base for adoption |
| | - develop emission limit values and EQS | - draft legally binding ELVs and EQS |
| **State administration** | - detailed review of state administration and responsibilities including inspection<br>- identification of needs including costs<br>- propose, if necessary, a new structure and responsibilities<br>- improvement of cooperation with state organization and other stakeholders | - a new effective organizational structure and clearly defined responsibilities<br>- clear definition of responsibilities at all levels of competent authorities |

| Issues related to | Operational tasks | Outputs |
|---|---|---|
| | - a gap analysis of monitoring and gathering information taking into account requirements of the ICPDR agreement as an minimum<br>- an analysis of reporting obligations s in line with the ICPDR setting up requirements | - monitoring programme focused on compliance with permits and reporting requirements – EPER/PRTR |
| | - an analysis of current decision making process in point of view the IPPC Directive<br>- inspection and enforcement | - emission and product controls and the application of the "combined approach": BAT or relevant emission limit values for control of point sources |
| **Capacity building** | - capacity building needs analysis | - proposal for capacity building development |
| **Industry pollution reduction** | - inventory of all industrial pollution sources and hazardous substances in cooperation with operators<br>- screening of dangerous substances in waste water and receiving water | - polluter register and specific pollutant register<br>- assessment of screening results as input for monitoring programme |
| | - implement the *List of Measures* to reduce hazardous substances - a comprehensive set of measures addressing hazardous substances pollution<br>- development of pollution reduction programmes including measures as a contribution to the Danube Basin Management Plan and the Programmes of measures | - Programmes of measures contribution to the Danube Basin Management Plan |
| **Implementation of BAT** | - Introduce the relevant stakeholders to the process of integrated environmental permitting and use of BAT<br>- analysis of industry sectors from the point of view of BAT implementation<br>- translation of BREFs and/or proposal for preparation national BREFs<br>- develop national BREFs<br>- creation of an information system regarding BAT and BREFs<br>- dissemination of information and training focussed on BREFs documents | - the national BREFs |

**Work Plan medium - term objectives by the end 2015:**

| Issues related to | Operational tasks | Outputs |
|---|---|---|
| **Improvement of legislation** | - Implementation of new legislation and monitoring | - Compliance of the legislation with EU requirements |
| **State administration** | - Improvement of state administration<br>- Proposal for new developments | - Functioning state administration |
| **Capacity building** | - Implementation of capacity building strengthening | - Proposal for meeting emerging needs |
| **Industry pollution reduction** | - Implementation of the pollution reduction programmes including measures to contribute to the Danube Basin Management Plan- updated<br>- Update the pollution reduction programme | - Updated pollution reduction programme and programme of measures as an integrated part of the Danube Basin Management Plan |

### 4.2.7. Recommendations

The proposed work plan provides the Ministry of Ecology and Natural Resources with the consideration of the following key IPPC and BAT implementation and enforcement aspects:

- Improvement of legislation - transposition of IPPC Directive;
- permitting process and emission/discharge limits;
- Best Available Techniques;
- mitigation of existing environmental problems;
- institutional arrangements;
- monitoring of compliance and enforcement;
- Likely effects of IPPC on national energy policy/strategy.

In this scope it is recommended beside adoption of a new legislation to take following steps:

- Development of polluter register,
- Analysis of industry sectors in point of view of BAT implementation
- Set up emission limit values,
- Development of national BREFs
- Creation of an information system regarding BAT and BREFs
- Dissemination of information and training focussing on BREFs documents
- Monitoring programme according to reporting requirements – PRTR,
- Development of the pollution reduction programmes including measures as a contribution to the Danube Basin Management Plan and the Programmes of measures

In identifying BAT, of existing know-how in other European Member States should be taken into account, but, crucially, full recognition of the Moldovan situation should also be made. For example, what may be considered as BAT in the MS may be neither available nor affordable in Moldova. Current techniques deployed in the Moldavians industry sector and current levels of environmental performance, particularly in relation to existing emission standards, should be reviewed. The outcomes of this review should then be compared with those techniques defined as BAT in the EU first of all for the main sector – food industry, according to guidance and BAT reference documents (BREF Notes) provided by the European IPPC Bureau

The monitoring of releases of pollutants is generally a key element of regulatory control which provides data to demonstrate compliance with permitted limits or evidence of failure of pollution control. Limits set within environmental permits should be:

- Consistent - for credibility the approaches used to determine limits should be consistent and reflect current best practice
- Applicable - the approaches to limit setting should take regard of the characteristics of the process being regulated, the available monitoring techniques and applicable Directive requirements and the extent to which the improvements are affordable.
- Enforceable – there is no point in having limit values that cannot be enforced.

It is recommended that before setting emission limit values an inventory of industry pollution sources should be carried out and the monitoring of quality of surface water as well as content of dangerous substances in relevant discharged industrial waste waters should be checked.

Consequently, when specifying a limit the methods of measurement used to determine compliance must be: clearly understood; reflect current best practice and the inherent uncertainties in the measurement and data handling methods should be quantified and taken into account. Compliance monitoring programmes must also be designed to take full account of affordability.

The approach in Moldova should be compared with the requirements for monitoring and enforcement set out in Council Decision 2000/479 on the implementation of a European Pollutant Emission Register and the relevant guidance prepared by the Commission services.

An integral part of the proposed Work Plan is the development and subsequent implementation of the Reduction Pollution Programme which will contain measures focused on particular steps related to its implementation according to short and long- term objectives.

These measures will help Moldova to fulfil its obligations to the ICPDR concerning preparation of the Danube Basin Management Plan and the Programmes of measures.

## 4.3. The Republic of Serbia

### 4.3.1. Background

Following the independence of Montenegro, on 5 June 2006 the Republic of Serbia has been the legal successor of the State Union of Serbia and Montenegro.

The total area of the Republic of Serbia is 88,361 km², apart from Serbia Proper there are two autonomous provinces: Vojvodina (21,506 km$^2$) in the north and Kosovo and Metohia (10,887 km$^2$) in the south. The province Kosovo and Metohia is currently under provisional administration of the United Nations according to UN Security Council Resolution 1244 and consequently it is not covered by the Road Map.

Practically the whole territory of Serbia drains into the Black Sea and belongs to the Danube River Basin. The Danube River flows for 588 km within Serbia and crosses the Vojvodina region through the Pannonian Plain. It runs through the capital Belgrade through the Balkan Mountains, and exits the country at the Iron Gate. The main river rivers are the Sava (length 206 km), the Drina (length 220 km) the Morava (length 308 km) and the Tisza River.

### 4.3.2. Policies, strategies, legislative and institutional framework

#### 4.3.2.1. The institutional framework

***The Ministry of Science and Environmental Protection*** – Directorate for Environmental Protection (DEP) has the key responsibility in environmental protection. *The Directorate for Environmental Protection (DEP)* is a division within the Ministry for Science and Environment and has a wide range of responsibilities identified in the Law on Ministries.

*The Environmental Protection Agency (EPA)* was established in 2004 as an institution within the Ministry for Science and Environment. The main functions of the EPA include:

- Development, harmonisation and management of the national environmental information system (especially regarding conditions of environmental media) and development of the registry of polluters;

- Collection and organization of environmental data, reporting on environmental conditions and the implementation of environmental policy.
- Development of procedures for the processing and assessment of environmental data;
- Updating data on the Best Available Technologies and practices;
- Cooperation with and reporting to the European Environmental Agency and the EIONET.

*The Directorate for Water* being part of ***the Ministry of Agriculture, Water Management and Forestry***, is specifically responsible for the development of water management policy, rational consumption of water resources, provision of drinking water supply (excluding distribution), flood protection, issuing permits for water abstraction and discharges, and collection of charges for water use and discharges to water bodies.

The public water management enterprises 'Srbijavode' and 'Vode Vojvodine' were set up to manage water resources in Serbia and Vojvodina respectively.

Other ministries with responsibilities for the environment include: the Ministry of Agriculture, Forestry and Water Management – Directorate for Forests, Directorate for Water (water, forests, livestock farm waste, etc.), Directorate for Plant Protection (control of production, import, trade, storage and application of plant protection agents), Veterinary Directorate, Ministry of the Economy (industry); Ministry of Health (enforcement of sanitary regulations relevant to the environment); Ministry for Capital Investments (urban planning and construction and use permits, road, air, rail and water traffic); Ministry for Mining and Energy (energy efficiency, permits for extraction of mineral resources, except for ground waters, renewable energy sources); Ministry of Trade, Tourism and Services, etc.

There are several institutions responsible for environmental monitoring:

- *The Hydro- Meteorological Institute* (Hydromet) is the designated organization in charge of hydrometeorological services including ambient environmental quality monitoring. Hydromet runs a national network of monitoring stations including stations for measuring surface and groundwater levels, monitoring stations for measuring suspended solids, water flow and water temperature. Water quality is continuously monitored in a network of stations for surface and groundwater. The Hydromet deals with the state hydrometeorological and hydrological monitoring system and the system of state laboratories. Hydromet also manages the network of air quality monitoring stations in larger towns.
- *The Public Health Institutes* monitor local air quality in large urban areas, surface water quality in urban areas, drinking water quality and noise.
- *The Environmental Inspectorate* covers compliance and emission monitoring but these tasks are inadequately addressed. There is no self monitoring by industry or other polluters.
- *The Recycling Agency*, which is a government institution not subordinated to the Ministry for Science and Environment, has responsibilities for waste management – especially recycling and the recovery of waste. It monitors the use of secondary waste materials and issues the waste category certificates.

At the level of the autonomous provinces, the key responsibility lies with the Provincial Directorate for Environmental Protection and Sustainable Development. In 2002 certain environmental responsibilities were transferred to the Autonomous Province of Vojvodina under the Law on Competencies of the Autonomous Province of Vojvodina. The Provincial Secretariat for Environmental Protection and Sustainable Development provides for the execution of functions concerning: development of environmental and sustainable development programmes for the autonomous province and provides measures for implementation, monitoring and information sub-system, approval of EIA, approval of environmental protection programmes and programs for the

enhancement of the flora and fauna, forests, water, construction and agricultural land, and approvals of urban plans for national parks in the territory; inspection services for all environmental media except hazardous substances and bio-diversity, as well as other issues of interest for the province, in line with the law. The Province is also in charge of strategic assessment of plans and programs and issuing of integrated permits for facilities and activities in its territory. Municipalities/cities have responsibilities in the field of urban planning, environmental protection and improvement of the environment and public utilities. At the local level, Secretariats for Environmental protection have limited responsibility for environmental management including air quality protection, noise protection, management of communal waste, urban planning, construction permits for smaller facilities, and strategic assessment of plans and programmes, EIA and integrated permits.

The Water Supply and Sewerage Public Utilities are the current operators of communal water supply and sewerage systems. The water supply is under the jurisdiction of the local self-government. For purposes of water supply, the municipalities, cities, or groups of municipalities may set up public utilities. Assets available to these companies are generally state-owned.

#### 4.3.2.2. The policy framework

The *Constitution of the Republic of Serbia* stipulates the right to a healthy environment and the duty of all, in line with the law, to protect and enhance the environment. The Republic of Serbia prescribes and provides a system of environmental protection and enhancement, the protection and enhancement of flora and fauna by adopting laws which enable sustainable management of natural values and protection and enhancement of the environment and provide a healthy environment.

In 2001, the Government of Serbia approved its first State-of-the-Environment report and the National Assembly adopted the following priorities based upon that report:

- The building and reinforcing of environmental protection institutions and services. This includes cooperation between the environment and other sectors;
- The adoption of a framework law on environmental protection and the design and implementation of new environmental strategies, e.g. a waste management strategy, a national environmental action plan, local environmental action plans and strategies for the sustainable use of natural resources and protected areas;
- Development of an Accident response system;
- The cleaning-up of environmental hot spot;
- A commitment to regional cooperation and environmental legal reform (EU accession, economic reform); and
- The development of an integrated environmental information system (public awareness, civil society building, environmental education).

There is no legal obligation for municipalities to develop local environmental action plans (LEAP).

To date, no new environmental policy has been adopted however in October 2005 a draft National Environmental Strategy was developed and submitted for inter-ministerial consultation.

Other strategic and planning documents are*: the Water Management Master Plan of the Republic of Serbia* and Spatial Management Master Plan of the Republic of Serbia adopted in 2002

In July 2003 the Government of the Republic of Serbia adopted *the Action Plan for harmonization of draft legislation with the legislation of the EU*, identifying the scope of laws that need to be adopted in line with the EU regulations. This Action Plan includes also justification of the need to

adopt a specific law, the institution in charge of implementation, and other elements of significance for the harmonization of the national legal system with the EU *acquis.*

### 4.3.2.3. The legislative framework

The set of environmental legislation in Serbia consists of a large number of laws and regulations (over 100). Legislative, executive and judicial powers are generally implemented through the legally prescribed scope of competencies of republic authorities. According to the law, certain responsibilities are delegated to the autonomous provinces and local governments.

Environmental legislation includes laws and regulations on: planning and construction, mining, geological survey, water, soil and forest protection, flora and fauna, national parks, fisheries, hunting, waste management, production and trade of chemicals, trade and transport of explosive and hazardous materials, protection of ionizing and non ionizing radiation and nuclear safety etc.

The new legal framework for environmental protection was introduced in 2004 in the Republic of Serbia by the Law on Environmental Protection, Law on Strategic Environmental Assessment, Law on Environmental Impact Assessment and Law on Integrated Prevention and Pollution Control. The most significant issues covered by the Law on Environmental Protection include: fundamental principles of environmental protection, management and protection of natural resources, measures and conditions of environmental protection, environmental programs and plans, industrial accidents, public participation, monitoring and information system, clearly identified competences of the Environmental Protection Agency, reporting, financing environmental protection, inspection services and fines. The new laws are harmonized with the EU Directives on environmental Impact Assessment (85/337/EEC), strategic impact assessment (2001/43/EC), IPPC (96/61/EC) and public participation (2003/35/EC).

The Law on Environmental Protection (The Official Gazette RS No. 135/04) regulates the following:

- Criteria and conditions for sustainable use and protection of natural resources and values.
- Environmental protection (air, water, land, soil, forests, protected natural areas and national parks, waste, hazardous substances, ionizing radiation, noise and vibration).
- Measures and conditions for environmental protection (prevention), in terms of:
    - Spatial planning and construction;
    - Conditions for operation of facilities and installations;
    - Environmental quality standards and emission standards (ambient and emission limit values);
    - Bans and limitations;
    - Environmental management systems;
    - Standards for technologies, products, processes and services;
    - Environmental labelling.
- Remediation measures.
- Systems of permits and approvals.
- Hazardous substances protection measures (production, transport and handling).
- Environmental monitoring (monitoring and information system).
- Public awareness and participation in decision-making.

- Economic instruments for environmental protection.
- Liability for pollution.
- Administrative supervision.
- Fines policy.

*The Law on Water Management* (Official Gazette 46/91, 53/93, 67/93, 48/94 and 54/96) specifies provisions regarding the water regime, water management areas, responsibilities for the issuance of water management acts, water management activities, limitation of owner's or beneficiary rights, water co-operatives, financing water management activities, as well as administrative inspection, i.e. the supervision of the enforcement of the law.

The environmental protection system includes also special laws which need to be harmonized with the EU legislation: preservation of nature, introduction of GMOs, protection of air, water, land, soil, forests, geological resources, management of chemicals, waste management, ionizing and non-ionizing radiation, noise and vibration, etc.

The control of use and protection of natural resources and values is provided especially in the planning and construction stage; by enforcement of standards, norms and regulations relevant to the use and protection of natural resources and values; strategic environmental assessment, environmental impact assessment, integrated pollution prevention and control, a coordinated system of permits and approvals, maintaining registers of exploitation of natural resources and values, establishing monitoring over the use of natural resources and environmental monitoring.

Preventive measures are developed with the aim of remedying damage and reducing risks of damage. Integration of these measures and environmental conditions is implemented during the planning process through SEA, EIA and IPPC systems. The most frequently used regulatory instruments are ambient and emission standards.

Construction and operation of facilities and activities is possible only if ambient and emission standards and emission abatement technologies are met. Ambient standards are better regulated and more frequently applied than emission standards. The ambient air standards exist for PM, soot, SO2, NO2, HCl, ammonia, heavy metals and other pollutants. The ambient limit values for surface water are in place. The ambient standards for soil and irrigation water cover a range of heavy metals. Ambient standards also exist for noise. Limit values for bathing waters, and fishing waters have not been introduced. Most of the existing ambient limit values are not harmonised with the relevant EU directives.

*Emission standards* are set for air pollution (though these are not harmonised with the relevant directives such as the Large Combustion Plant Directive 2001/80/EC or the VOC Directive 1999/13/EC). The air emission limit values regulate combustion plants, processing of mineral raw materials, cement kilns, coke production, metallurgy, inorganic chemistry, organic chemistry, and vehicles (cars, trucks, motorcycles). Emission standards have not been adopted for wastewater discharges. A system of bans or restrictions is in force for certain trade and other activities including:

• Import, export and transit of technologies, processes, products, semi-finished products, raw materials that may be harmful to the environment and human health;

• Pollution of soil by excessive use of fertilizers or pesticides and hazardous substances;

• Discharge of excessive amounts of hazardous substances into surface and groundwater;

• Discharge of certain hazardous substances into water;

• Production, import and export of ozone-depleting substances, or products containing these substances, whose trade is banned (subject to permitting);

• Import, export and transit of endangered and protected species of wild flora and fauna and their reproductive forms and parts (subject to permitting);

• Import of hazardous and radioactive waste;

• Import, export and transit of waste (subject to permitting);

• Specific activities within the territory of national parks;

• Destruction of forests.

Product standards are introduced for certain products (petrol, diesel fuels, and emissions from vehicles) but these are often not in compliance with the EU legislation.

The law provides for the participation of physical and legal entities in the process of environmental management systems (EMS) in compliance with EU requirements, approvals and cancellation of environmental labelling of products, processes and services with reduced environmental impact.

Remediation measures include the adoption of remediation plans at the level of Government, autonomous province and units of local government, for a period of five years, in line with the law.

The key permitting procedures include: land use permits, construction permits (accompanied by the EIA procedure), water use permits and permits for use of other natural resources (fish, medicinal herbs, timber, hunting etc). There are no emission permits for wastewater discharges. The permit issuing authorities are the respective ministries, autonomous province, municipalities or appointed institutions. Enforcement is usually carried out by the same institution which issues the permits.

Strategic environmental assessment was introduced by the *Law on Strategic Environmental Assessment* (Official Gazette RS No. 135/04) in compliance with the EU Directive 2001/43/EC. It applies to state plans and programs as well as municipal spatial and land use plans. Public participation is envisaged in all stages of strategic assessment. The Law is implemented directly without the adoption of separate regulation.

The EIA procedure is implemented in Serbia according to *the Law on EIA* (Official Gazette RS No. 135/04). The list of projects is different from that required by the EU directive (85/337/EEC, as amended by 97/11/EC). The procedure consists of assessment in three stages for existing and future facilities and projects: making a decision concerning the need to carry out the assessment; determining the scope and content of the assessment study, and decision to give the approval of the study. Public participation is envisaged in all stages of impact assessment. Full implementation of the law will be achieved after adoption of relevant by-laws.

The IPPC system was introduced by *the Law on Integrated Pollution Prevention and Control* (Official Gazette RS No. 135/04) in compliance with the EU Directive (96/61/EC). This system provides: an integrated approach to pollution control by issuing integrated permits stipulating the obligation of the operator and conditions for the operation of facility or performance of an activity; full coordination between relevant authorities in the permitting process; public access to information and public participation before permit decision-making. Full implementation of the law will be achieved after adoption of relevant by-laws.

Measures for protection against hazardous substances include bans and limitations regarding the production and trade of ozone depleting substances, or products containing such substances and the export, import and transit of waste. Handling of hazardous substances is regulated in line with requirements of the EU Seveso Directive on industrial accidents.

Public information and public participation in decision-making has been introduced in line with the EU Directive (2003/35/EC). Capacity building for relevant organizations is necessary in order to achieve full practical implementation.

The question of environmental liabilities of polluters for environmental damage is regulated by the law. However, the question of environmental liabilities of polluters for past pollution by privatised companies is not fully regulated by the privatisation law. The proceeds from privatisation sales go to the state budget.

The recently adopted laws have, in some fields, delegated the administrative supervision to the bodies of the autonomous province and the units of local government, which creates the need for further capacity building of the relevant authorities.

### 4.3.3. Water management

The Republic of Serbia has access to sufficient quantities of water to meet its needs, provided the water is economically used, protected from pollution, and necessary facilities exist for the reduction of uneven flows over the course of the year.

Of all the available water resources less than 8% (or about 500 $m^3 .s^{-1}$) originates within the state territory. The remaining 92% are transit waters entering the country through the Danube, Sava, Tisza, and other watercourses [13].

Surface and groundwater is used for public water supply. Surface water is abstracted from the water courses and artificial reservoirs (with the total capacity of 250 million $m^3/y$). The groundwater resources are of great importance for Serbia. About 820 million m3/y of water is abstracted to satisfy the needs of households and industry [13]. It should be emphasised that about 28% of water for industrial purposes in Vojvodina, and about 18% of water for industrial purposes in Central Serbia is abstracted from the groundwater aquifer.

The quality of water courses in Serbia is generally low and is further deteriorating. Examples of very clean water - Class I and I/II - are very rare, and are found in mountainous regions, for example along the Djetinja, Rzav, Studenica, Moravica and Mlava rivers in Central Serbia. The most polluted rivers (with quality beyond the classification system) include the Stari and Plovni Begej, Vrbas-Bečej canal, Topolica, Veliki Lug, Lugomir, Crni Timok and the Bor River. The water quality suffers especially from eutrophication caused by nutrients and organic pollutants (due to the discharge of untreated sewage and agricultural run-off) and heavy metals. Increased bacteriological pollution is found in large rivers (the Danube, Sava, Tisza and Morava), downstream of large cities (Belgrade, Novi Sad, etc.). The deterioration of water quantity is partially attributed to transboundary pollution of the waters entering Serbia. The Tisza and Sava enter the territory of Serbia as class III rivers, and the Begej River is class IV upon entering Serbia. The Transboundary Rivers are contaminated with nutrients, hydrocarbons, heavy metals, and organic components.

Despite a large pollution load, the quality of the Danube remains in class II-III mainly due to a large dilution capacity. The construction of the Djerdap hydroelectric system, and the dam on the Danube caused a range of adverse environmental impacts such as siltation and sedimentation in the artificial reservoirs. Tributaries bring about 20 million $m^3$ of sediment each year into the reservoirs. Toxic pollutants discharged from large industrial centres (Novi Sad, Pancevo, Smederevo, and Belgrade) and wastewaters from the upstream countries loaded both with organic pollution and heavy metals are trapped in the Djerdap artificial lake.

The Danube-Tisza-Danube Canal and the secondary irrigation and transportation canals in Vojvodina are highly polluted and cause contamination of agricultural soil.

The quality of drinking water in Serbia is generally unsatisfactory. According to the findings of the Public Health Institute of the Republic of Serbia, in 2001, 29% of samples from the water supply systems did not satisfy physical, chemical or bacteriological standards. There are significant regional differences in drinking water quality between Central Serbia and Vojvodina. The main

problem in central Serbia is that more than 40% of the samples were bacteriologically contaminated and did not satisfy the Serbian quality criteria.

In Vojvodina the primary problems with physical and chemical water quality parameters are turbidity, and the presence of iron, arsenic, nitrates and manganese, the level of which is naturally higher. In many areas, the groundwater cannot be used for drinking purposes without prior treatment. Most drinking water sources are not sufficiently protected from point and non-point pollution; hence there is a significant risk of epidemic outbreaks.

There are 153 public water supply systems serving about 60% of the country's population, while an additional 15% of the population have some sort of water supply. Although the coverage is high, many systems are not always properly functioning, resulting in water losses in the distribution networks which are higher than acceptable; and in low, unsatisfactory level of service.

Untreated industrial and municipal wastewater, agricultural run-off, as well as pollution related to river navigation and thermal power stations are the key sources of water pollution in Serbia. Only 13% of municipal sewage is treated prior to discharge. The Sava River Basin receives about 80% of the country's industrial wastewater. Non-point source pollution contributes to more than 50% of the total water pollution. These sources produce over 80% of total nitrogen, 50% of total phosphorus, and 90% of faecal and coliform bacteria.

According to the data from the Water Master Plan of the Republic of Serbia, it is estimated that the total quantity of suspended solids in the water courses amounted to 1,549,531 kg/day, while the population equivalent was 12,301,223 [14].

*Monitoring and reporting* requirements are regulated by law and include the scope and manner of monitoring, authorized organizations, reporting, information system and register of polluters. There are obligations to carry out measurements and to report the data to the competent authorities exists for of air polluting installations (emission measurements), and producers of wastewaters (measurements of COD, BOD5, insoluble matter, pH, coliform bacteria, N, P).

*Water monitoring* is the responsibility of the Republic Hydro-Meteorological Institute, the Institute of Public Health and other specialized organizations and institutes. Surface and groundwater quality, aquifers and reservoirs are monitored by the Republic Hydro-Meteorological Institute based on a two-year programme adopted by the Government of the Republic of Serbia. The principal network of measuring stations, established during the 1960's, has been enlarged both in terms of number of stations and in terms of frequency of sampling and analysis.

In 2005, the state-owned hydrological monitoring system in the Republic of Serbia (Kosovo and Metohia excluded) included 187 surface-water hydrological stations. 400 stations monitor the level of ground water on average 3-6 times a month **[14]**.

The water quality is continuously monitored by a network of surface-water stations that includes 133 measuring profiles, with a sampling frequency 12-24 times a year, and analysis of 36-63 water-quality parameters. Daily control of water quality is carried out in 12 water quality stations on 8-10 parameters (complete analysis of water quality is carried out twice a month). Ground-water quality monitoring is carried out in 68 stations (30 parameters in average with the sampling frequency twice a year).

The analysis of water quality and sediments is carried out in all the main water reservoirs in Serbia. The programme includes 36 measuring points with a sampling frequency of twice a year (testing 36-63 parameters of water quality). Sediments are tested once a year on 33 profiles in water reservoirs and 33 profiles in river courses.

Organizations performing monitoring of surface and groundwater and effluent quality are obliged to report the results of the monitoring to the Republic Hydro-Meteorological Institute and the public utilities for water supply on a monthly basis according to the Law on Water Management. Accident

reporting is required the same day. The quality of drinking water in distribution networks and groundwater used by water supply companies is monitored regularly.

*The monitoring of wastewater discharges* is a legal obligation, which is poorly implemented in Serbia and hence wastewater discharges are not systematically monitored. The number of parameters measured is too limited and usually not linked to hydrological measurements. There is no accessible registry of wastewater discharges and lack of available current data on discharge of wastewaters. However, a number of local registers of river polluters have been established. Polluters are obliged to measure the quantity of wastewater, and monitor the operation of wastewater treatment installations (this obligation is inadequately implemented). Compliance monitoring of wastewater is hampered by the lack of effluent standards.

### 4.3.4. Industry

Serbia's large heavy industries are primarily linked with mining. Consequently, there were industries such as melting, refining, metallurgical industries, chemical industries, machinery and vehicle production. Other important industrial production includes cement and other building materials, fertilizers, electrical equipment, sawmills, wooden furniture, paper products, leather and fur products, yarns and fabrics, rubber, textiles, food products and beverages. A major decline in production and domestic product occurred in the1990s (market disintegration, economic sanctions, impoverishment of the population, high unemployment, bombing of some major infrastructure and industrial facilities, etc.). Per capita GDP in the year 2000 was only about 50 % of its 1989 level.

According to the data for industrial products for 2003, the main branches of the processing industry include food processing and beverages, chemicals and chemical products, metal processing, oil derivatives, products of non-metal minerals, machines and devices, electrical devices and apparatus, etc.

There is a generally poor state of industrial facilities. Old technologies, low energy and raw material efficiency, low technological discipline and a high level of waste generation are contributing factors to industrial pollution. There is a general lack of industrial pollution abatement facilities (particularly sewage treatment plants, scrubbers and flue gas desulphurisation plants). Some industrial plants (heavy industries, for example steelworks, metallurgical industries, chemical industries) operated previously basic pollution abatement installations but most of these have been out of operation in the past fifteen years. Consequently, nearly 90% of industrial wastewater is discharged untreated.

Water pollution in mining basins most frequently result from erosion of uncontrolled tailings. There have been cases when over 100 million tones of flotation tailings flooded the area due to failure of flotation dams.

Chemicals are used in many branches of the economy (chemical, pharmaceutical and food industry, lumber industry, metallurgy, leather industry, etc.). They are necessary in the production of fuel, plastic, dye and polish, rubber, insulating material, laundry and plant protection means, artificial fertilizers, etc.

There is no comprehensive data on all chemical management activities in the Republic of Serbia therefore most information is anecdotal. An initial register of dangerous substances was prepared in 2000. There is no national information network (including data bases concerning the characteristics of chemicals) establishing the links among authorities relevant for specific components of chemical management.

### 4.3.5. Analysis

| | | |
|---|---|---|
| **INTERNAL** | **Strengths**<br>- Commitment of environmental institutions to environmental protection<br>- the Action Plan for harmonization of draft legislation with the legislation of the EU,<br>- The new legislation harmonized with the EU Directives on environmental Impact Assessment (85/337/EEC), strategic impact assessment (2001/43/EC), IPPC (96/61/EC) and public participation (2003/35/EC).<br>- The institutional system for permitting and assuring compliance with permitting conditions<br>- Water quality monitoring is in the place<br>- A comparative analysis of BAT implementation costs to the total costs of some enterprises | **Weaknesses**<br>- Inadequate implementation of adopted policies, strategies and planes.<br>- Lack of a National Environmental Strategy and River Management Plan<br>- Poor integration of environmental policy with economic and other sectoral policies<br>- The Water Act is not in compliance with EU water legislation<br>- Inefficient environmental enforcement resulting from legal gaps and inconsistencies,<br>- Inconsistencies with respect to responsibilities and functioning of relevant bodies organizations in field of water management<br>- Ineffective system of monitoring and reporting. Lack of relevant monitoring criteria and indicators.<br>- Lack of environmental standards for emission discharges into aquatic environment<br>- Lack of Environmental Quality Objectives<br>- Insufficient institutional capacity, lack of inspection supervision and low level of fines as well as long court procedures.<br>- Lack of goals in industry, inventory of pollution sources and pollution reduction and programmes.<br>- Insufficient information related to pollution sources and pollution releases into aquatic environment.<br>- Weak skills and technical knowledge of decision makers and operators ( BAT, monitoring, public involvement)<br>- Insufficient treatment of urban and industrial waste water<br>- Obsolete industry technologies and industrial waste water treatment technologies |
| **EXTERNAL** | **Opportunities**<br>- Approximation with EU legislative norms providing for improved quality of the environment<br>- Strong political commitment to implement legal reforms in environmental protection<br>- Access to EU funds during the pre accession process and commitment of other donors<br>- Modernisation and privatisation of industry<br>- State's emphasis on water management issues and an integrated approach<br>- Capacity to respond to state and national needs to encourage water protection.<br>- Increased demand for development of industry and BAT<br>- Enhanced economic competitiveness in industry<br>- Enhanced economic competitiveness | **Threats**<br>- Poverty, indebtedness and slow economic growth,<br>- Lack of political will to implement legal environmental reforms<br>- Poor implementation of laws, programs and plans<br>- Slow pace of institutional strengthening<br>- Insufficient institutional coordination<br>- Low level of environmental awareness<br>- Environmental funds not used for the specified ear-marked purpose |

### 4.3.6. Road Map for implementation of BAT

The overview of the current situation concerning the overall conditions in the field of environmental protection in the Republic of Serbia shows considerable progress recently. The main progress has been achieved regarding transposition of EU legislation into national laws including: the Law on Environmental Protection, Law on Strategic Environmental Assessment, Law on Environmental Impact Assessment and Law on Integrated Prevention and Pollution Control.

Implementation of the WFD in Serbia has already begun, since the former state Serbia and Montenegro signed the Sofia Convention, and became a full member of the ICPDR. On a national scale, the new Act on Water which would be harmonized with the EU WFD has been prepared and is in Parliament.

These facts have created the necessary conditions for the implementation of the IPPC Directive through the implementation of BAT. In spite of that, the SWOT analysis indicates that in addition to the strengths some weaknesses also exist in this process specifically with respect to: legislation, the state administration as well as in field of implementation and enforcement.

Responsibilities with respect to water management are divided among different authorities, while cooperation and contacts are quite limited. This significantly prevents the application of the integrated management principle in river basins. In many sectors of the economy, one of the most significant causes of water pollution is inadequate sewerage infrastructure, especially for wastewater treatment and collection of sewage. Much of the sewerage infrastructure has deteriorated over recent years due to the lack of maintenance and upgrading (especially, sewage pumping stations are vulnerable to defects often resulting in nuisance and a public health hazard due to spilling of raw sewage).

BAT definition, relevant requirements as well as the content of operators' application for the issuing integrated permits are included in the Act on IPPC, but BAT (BREF) guidelines do not exist in Serbia. Therefore a BREF database is not available in Serbia. The Act on Environment Protection appoints the Serbian Environment Protection Agency as responsible institutions to develop the BREF database; however, work has not started yet.

Knowledge about BAT is very poor at the level of policy makers and also operators' are not well informed. There are only a few permits which have been issued. Knowledge about BAT has increased recently via workshops and seminars including those carried out under the DRB UNDP GEF Industrial Policy Project. The deadline for issuing an integrated permit for all industries is 2015. This creates an opportunity to follow the provisions of the Act on IPPC to develop a comprehensive plan for ensuring a proper condition for issuing the integrated permits.

The capacity of the competent authorities is very limited; on the central level there are only two employees at the MSEP who deal with IPPC and at the province level and municipality level there is no staffs who deal with the IPPC procedure. There are however inspection staff who are familiar with IPPC requirements.

The National Environmental Strategy, which defines the pollution reduction requirement, is before the Parliament but the Pollution Reduction Programme and specific reduction and prevention programs of operators have not been developed.

On the other hand some comparative analysis regarding BAT implementation costs to the total costs of enterprise are available for the new installations in cement plants, some pharmaceutical plants and other mainly chemical industries. Also the refineries have prepared some costs analysis. Nevertheless, all of them are concerned with the high costs to implement the IPPC legislation.

Recently a dialogue between operators and regulators has been initiated but the results of this process are still unsatisfactory. The lack of emission limit values is a major problem. The prevailing standards are based on ambient water quality, which is difficult to monitor and control.

The systematic monitoring of water quality for surface waters is not efficient, while monitoring of groundwater quality is limited both in terms of time and number of samples. The programme of systematic monitoring is approved by the government of the Republic of Serbia, and implemented by the Republic Hydro-Meteorological Institute. There is no system for early warning of industrial accidents. There are plans of action in the event of pollution due to industrial breakdowns, and the procurement of relevant equipment is under way (the JVP Srbijavode is in charge of the above activities).

Over the past decade very little investment was made in the modernization of the existing sampling and laboratory analysis equipment, especially for analyses of specific parameters. Obsolete legislative regulations (the existing decree concerning the categorization and classification of surface water was adopted in 1978) and does not enable fulfil he PRTR requirements.

**Work Plan short- term objectives by the end 2008:**

| Issues related to | Operational tasks | Outputs |
|---|---|---|
| **Improvement of legislation** | - conduct a detailed legislation gap analysis of the environmental legislation particularly water legislation - *The Law on Water Management (Official Gazette 46/91, 53/93, 67/93, 48/94 and 54/96)*<br>- prepare new water legislation including emission limit values and environmental quality objectives | - new water legislation in compliance with the WFD<br>- legally binding ELVs and EQS |
| **State administration** | - detailed review of state administration and responsibilities including inspection<br>- revision of integrated decision making process, inspection and enforcement as an input for improvement of legislation<br>- identification of needs including costs<br>- propose a new structure and responsibilities<br>- improvement of cooperation with state organizations and other stakeholders | - strengthening of an integrated decision making process, inspection and enforcement |
| | - development of dangerous substances monitoring programme and information gathering system<br>- reporting obligation analysis | - monitoring programme focused on compliance with permits and reporting requirements –EPER/ PRTR |
| **Capacity building** | - capacity building needs analysis | - proposal for capacity building development |
| **Industry pollution reduction and** | - inventory of industrial pollution sources in cooperation with operators<br>- screening of dangerous substances in waste water and receiving water<br>- development of a polluter registers and a specific pollutants register<br>- development of the pollution reduction programmes including measures as a contribution to the Danube Basin Management Plan and the Programmes of measures | - assessment of screening results as an input for monitoring programme<br>- the pollution reduction programmes including measures as a contribution to the Danube Basin Management Plan and the Programmes of measures |

| Issues related to | Operational tasks | Outputs |
|---|---|---|
| **Implementation of BAT** | - development of a detailed work plan for the introduction, and implementation of BAT<br>- introduce the relevant stakeholders to the process of integrated environmental permitting and the use of BAT<br>- translation of BREFs and/or proposal for development of the national BREFs<br>- creation of information system regarding BAT and<br>dissemination of information and trainings | - the national BREFs |

**Work Plan medium term objectives by the end 2015:**

| Issues related to | Operational tasks | Outputs |
|---|---|---|
| **Improvement of legislation** | - Implementation of new legislation and monitoring | - Compliance of the legislation with EU requirements |
| **State administration** | - Improvement of state administration<br>- Proposal for permitting of new developments | - Functioning state administration |
| **Capacity building** | - Proposal for meeting emerging needs | - Proposal for meeting emerging needs |
| **Industry pollution reduction** | - Implementation of the pollution reduction programmes including measures to contribute to the Danube Basin Management Plan- updated<br>- Update the pollution reduction programme | - Updated pollution reduction programme and programme of measures as an integrated part of the Danube Basin Management Plan |
| **Implementation of BAT** | - Monitoring of implemented BAT<br>- Revision of the national BREFs | - Proposal on a new national BREFs development |

### 4.3.7. Recommendations

The Republic of Serbia has achieved significant progress in the transposition of the Integrated Pollution Prevention and Control Directive and has introduced the BAT concept. However, the improvement of the implementation of these activities is demanding. The Proposed Work Plan for the implementation of BAT and related issues is focused on particular steps, which would facilitate this process.

In line with results of the SWOT analysis and the information gathered as an out put of the UNDPGEF DRB Industrial Training Project Component training workshops it is recommended that the relevant competent authorities streamline their efforts to implement and enforce the Act on IPPC with the adoption of the following short term measures:

- revision and analysis of the Act on IPPC from the point of view of the relevant authorities' responsibilities for issuing integrated permits, and, as necessary adopt appropriate measures for institutional arrangements,
- development of new water legislation which will be in compliance wit the Water Framework Directive,
- create an inventory of industrial pollution sources and develop a register as an input for the development of the pollution reduction programmes,

- focus on an analysis of industry sectors related to BAT implementation,
- develop the national BREFs ,
- create an information system regarding BAT and BREFs.
- disseminate information and training focus on BREFs documents,
- develop a monitoring programme according to the reporting requirements – PRTR,
- develop Pollution Reduction Programmes including measures as a contribution to the Danube Basin Management Plan and the Programme of Measures.

These recommendations would create the condition for the implementation of long-term objectives which are in line with the requirements of the Act on IPPC to ensure issuing of integrated permits by the end of 2015. It also would allow the Serbian authorities to provide the required information and measures in the field of industrial pollution reduction for the Danube River Basin Management Plan.

Long-term tasks proposed in Work Plan are generally focused on the implementation and /or revision of the short-term tasks. This approach will be useful for the gradual implementation of BAT and as well as for updating of the Danube RBMP in 2015.

## 4.4. The Republic of Ukraine

### 4.4.1. Background

Ukraine is the second largest country (total area 603,700 $km^2$) in Europe, with seven neighbouring countries. Administratively Ukraine is divided into 24 oblasts (regions), two special-status cities, Kyiv (Kiev) and Sevastopol, and the Autonomous Republic of Crimea. Oblasts are divided into smaller administrative units – rayons (districts). Each oblast and rayon has its own elected Council of Deputies and a parallel state administration, the heads of which are appointed by the President. Local councils and city mayors are popularly elected every four years and exercise control over local budgets, being responsible for their jurisdiction's taxes, schools, roads, utilities, and public health. A governor appointed by the President leads the state administration in each oblast and rayon. The governments of the cities of Kyiv and Sevastopol operate independently of oblast authority and are responsible only to Ukraine's central government. The Autonomous Republic of Crimea has its own constitution, legislature and Cabinet of Ministers but is prohibited from implementing policies that would contradict the constitution of Ukraine.

The Ukrainian part of the Danube basin covers 4 oblasts of Ukraine: Zakarpatska, Ivano-Frankivsk, Chernivtsi and Odessa.

Within Ukraine almost all the rivers drain southward toward the Azov and Black seas; only a few drain northward into the Baltic Sea Basin.

The Danube River Basin portion of the territory of Ukraine is 32,350 $km^2$, or 5,4% of the total area. The basins of the Lower Danube (from Reni-city to the Delta) together with the Prut River Basin and the Tisza River Basin occupy 1,4%, 1,6% and 2,3% respectively. The largest area in relation to the Danube basin in Ukraine is the Tisza River Basin - 44,6%. Next is Prut - 31%, the Danube riverbed - 20%, Siret - 6,7%.

The main water courses of the basin are:

- Danube River and the adjoining lakes (Kahul, Yalpuh, Katlabuh, Kytai);
- Tisza River and its tributaries (Tersva, Tereblya, Rika, Borzhava);
- Latoritsa River;
- Uzh River;
- Prut with its tributary Cheremosh;
- Siret River.

The Danube Delta in the southwest forms part of Ukraine's border with Romania. In addition, Ukraine has 2,782 kilometres of Black Sea coastline.

Since there is no available information directly related to that of Ukraine which is in the Danube River Basin the following overview of relevant issues is based upon data at the national level.

### 4.4.2. Policies, strategies, legislative and institutional framework

#### 4.4.2.1. The institutional framework

The Ministry of Environmental Protection (MEP) has the key role in developing and co-ordinating the implementation of environmental policies in Ukraine. The following are the main responsibilities and tasks of the Ministry:

- Formulates and implements state environmental policy
- Develops national environmental programmes and implements uniform research and technology policy in the area;
- Coordination of the activities of central and local authorities;
- Organizes and carries out ecological expertise;
- Organizes environmental monitoring within its competency;
- Ensures the maintenance of state registers;
- Approves or coordinates environmental rules, requirements, standards, limits and quotas; and monitors compliance;
- Issues permits, limits, and quotas for the special use of natural resources (except forests), and emission of pollutants; ensures compliance with permit conditions;
- Issues permits for waste management; assures compliance with conditions;
- Develops user charges and pollution charges;
- Participates in international co-operation.

In performing environmental management the Ministry of Environmental Protection and other agencies interact with the Parliament (Verkhovna Rada) and in particular with the Committee on Environmental Policy, Use of Natural Resources and Mitigation of the Consequences of the Chernobyl Accident. The Committee's principal task, among many others, is to oversee the development of the environmental policy and regulatory framework, prepare draft laws and regulations for the consideration of the Parliament and assess implementation, which includes public consultations and parliamentary hearings. The Committee also devotes significant attention

to addressing the impacts of the Chernobyl disaster and preventing and managing other environmental emergency situations.

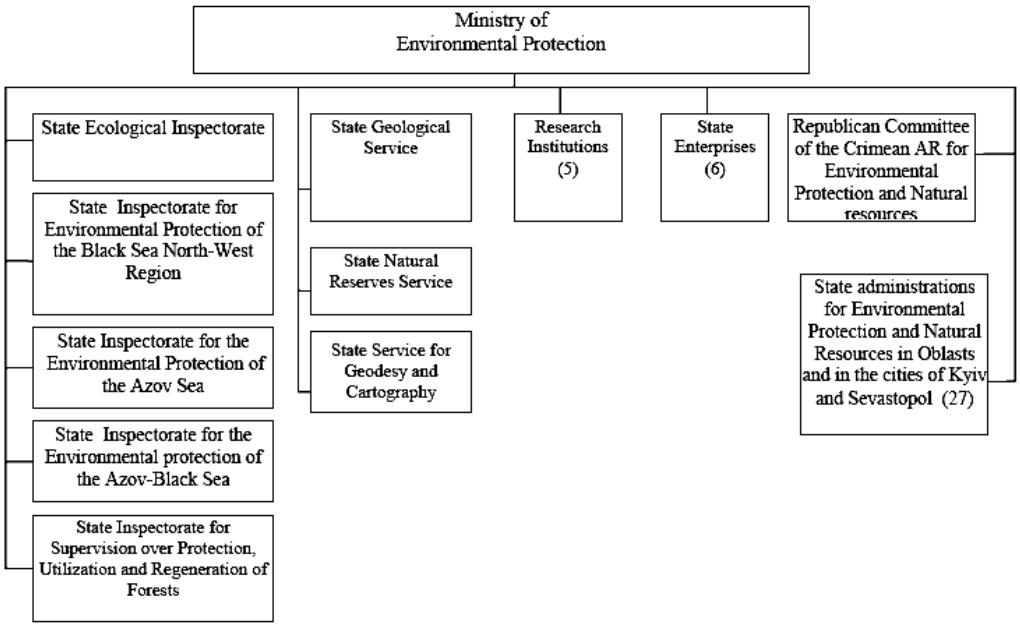
In late 2005 new plans were considered to restructure the Ministry internally, in particular to strengthen the departments responsible for communication with the public and mass-media, strategic planning and economic environmental integration, as well as European integration and international cooperation.

The central apparatus of the Ministry performs its duties directly and through special authorized executive bodies. The Ministry supervises the activities of five inspections (environment, forest, and three sea inspections). The Ministry also oversees the work of three State Services (Geological, Nature Reserves and Geodesy and Cartography), 5 research institutes and 6 state enterprises.

The structures and responsibilities within the institutional framework (Figure 4.4.2.1) have been undergoing significant and continuous changes over the last five years. These changes have particularly affected the key environmental authority: the Ministry of Environmental Protection.

**Figure 4.4.2.1.**

**Structure of the subordinated agencies of the Ministry of Environmental Protection (2005)**




*The State Ecological Inspectorate (SEI)* under the MEP, with its oblast and rayon offices under *the State Departments for Environmental Protection (SDEP)* in the oblasts. There are three special inspectorates for the environmental protection of the seas: the Azov Sea State Inspection, the Azov-Black Sea State Inspection and the North West region of the Black Sea State Inspection. In addition to the State Inspectorate under the MEP there are also independent inspection institutions for fisheries, land resources, forestry, agriculture, and hunting.

The national inspectorate bases its work on presidential orders and decisions by the parliament according to proposals from the Council of Ministers (CM). Their work areas in addition to the usual tasks can also include other issues like emergencies, epidemics or phasing out of products like pesticides.

In addition to the units at the national level, the environmental policy is implemented by the offices of state administration for environmental protection and natural resources in 24 oblasts, the cities of Kyiv and Sevastopol and of the Republican Committee of the Autonomous Republic of Crimea**.** These offices are formally subordinated to the Ministry of Environmental Protection but are also coordinated with the regional administration. At the lowest level of public administration, every *rayon* has at least one environmental inspector.

*The oblast inspectorates* partly support the ministry inspectors in their inspection work, but the bulk of their work is based on their own planning. A yearly plan is prepared and submitted to the oblast administration for approval. The oblast inspectorates are not subordinated to the oblast administrations but see a value in having agreement from the oblast authorities since the State Departments for Environmental Protection (SDEP) cooperate on several issues with the oblast administration. The oblast inspectorates normally make one or two inspections at major pollution sources per year.

Beside the SEI authority, Ukraine uses so-called "Public Inspectors". The public inspectors are not paid and work on a voluntary basis together with the SEI inspectors. At present there are roughly 1980 public inspectors of which about 50 work with the national inspectorate at the Ministry. Public inspectors are nominated by national or regional state authorities and interviewed before getting a special certificate as a proof of their status. The public inspectors can only make inspections together with the authorities and need to report on their inspections as well. Inactive public inspectors can be dismissed.

### 4.4.2.2. The policy framework

Several strategic documents adopted by the highest authorities of Ukraine acknowledge a broad range of serious environmental problems faced by Ukraine. Documents, such as the 2004-2015 Strategy of Economic and Social Development of Ukraine "On the Way towards the European Integration" (2004) and the Action Programme of the Cabinet of Ministers "Towards People" (2005) provide a basis to individual ministries for developing actions on environmental issues that they consider as priority. As other government agencies, the Ministry of Environmental Protection have selected key priorities for its operations in 2005:

•Ensuring environmental safety of nuclear power objects and radiation protection of population and the environment, minimisation of consequences of the Chernobyl Nuclear Power Plant accident;

• Improving the environmental situation of rivers, especially the Dnepr River Basin, and upgrading drinking water quality;

• Improving the environmental situation of the Black and the Azov Seas and preventing further pollution;

• Establishing a balanced system for sustainable use of natural resources and upgrading to environmentally sounder technologies in industry, power engineering, construction, agriculture, transport;

• Preserving bio-diversity and landscape diversity, and improving nature protection.

Environmental objectives and targets are also included in the government programme to implement Ukraine's Millennium Development Goals (MDGs) that relate to the Millennium Declaration adopted by the UN member states in 2002. In particular, Goal 7 on sustainable

environmental development contains targets and indicators related to: i) increasing the proportion of population with access to clean drinking water, ii) reducing harmful emissions into atmosphere from stationary sources and iii) increasing the area of natural reserves and parks. The implementation of MDGs is coordinated and monitored by the Secretariat of the President and the Ministry of Economy. Annual reports on progress with achieving Ukraine's MGDs are produced by the Ministry of Economy.

Other documents with priorities in the field of environment include those prepared to promote closer cooperation with the European Union and harmonize the regulatory framework with the EU "acquis communautaire". These include the Partnership and Co-operation Agreement between Ukraine and the EU and it's Member States which was ratified in 1994 and entered into force in 1998 for an initial period of ten years. In 2004, as a consequence of the enlargement of the European Union to nine new countries, a European Neighbourhood Policy (ENP) Action Plan with Ukraine was developed and endorsed by the Ukraine. This document, along with a set of implementation measures adopted by the Cabinet of Ministers in 2005, has become the most important instrument in the relations between the EU and Ukraine. However, environment is not given high priority in this Action Plan.

The EU-Ukraine European Neighbourhood Policy (ENP) Action Plan sets out a comprehensive set of priorities in areas (such as Environment) within and beyond the scope of the EU Ukraine Partnership and Cooperation Agreement. The Commission has prepared in cooperation with the European Council an "Implementation Tool" to support the implementation of the Action Plan. Such a tool provides benchmarks for assessing progress and assists Ukraine in reaching realistic and measurable results on the ground. The ENP Action Plan includes several areas for enhanced cooperation, transport, energy, information society and environment being regrouped in one of them altogether.

Currently, there are 300 annual state targeted programmes which are implemented by various government agencies and serve as tools to implement national strategies. These programmes, which support the development of environmental policies and regulations, include:

- 11 environmental programmes administered directly by the Ministry of Environmental Protection They mainly aim at improving air and water quality, developing national nature protection reserves, and introducing a sustainable development agenda.
- In addition, there are 20 targeted "environmentally-related" programmes that are managed by other government bodies in cooperation with the Ministry of Environmental Protection.

Nevertheless, at the regional and local level, a number of oblasts, cities and local communities have prepared strategic documents to guide their environmental protection activities.

### 4.4.2.3. The legislative framework

The regulatory framework for the protection of the environment is already very comprehensive in Ukraine. In 2005, the environmental legislation comprised over 200 laws and by-laws. A large number of laws, President's orders and Government acts were adopted in the period of 1996-2000. In the last five years some basic environmental legislation has been enacted, including for example:

- the Act on Animals (2001),
- a new edition of the Act on Air Protection (2001),
- the regulation on the Red Book of Ukraine (2002),
- the Drinking Water and Drinking Water Supply Act (2002),

- State Control on Use and Protection of Land (2003),
- Land Protection (2003),
- Environmental Audits (2004),
- the Network of Nature Protected Areas (2004).

The Act on Ecological Expertise of 1995 is the basis for a procedure similar to the Environmental Impact Assessment used in other countries. This Act is applicable to 22 different types of activities which covers almost everything, except agriculture. With the exception of cattle breeding, there is no size limitation specified for which an Ecological Expertise is not needed, a major difference with the EIA EU-Directive. This is causing excessive use of the instrument compared with what is required in the EU. Whether an Ecological Expertise is needed or not for a specific project or installation is decided on a case by case basis by the MEP based on an application containing a declaration of intention. About 6000 environmental expertises are performed every year in Ukraine, a huge number compared to most EU countries

Some important sectoral legal acts, such as the Water Code and Land have been introduced which included provisions affecting the environment or influence policies for environmental protection and management of natural resources.

Following the political decision to harmonize Ukraine's environmental legal framework with that of the EU, all new drafts of regulations undergo a procedure of verification of their compatibility with the EU "acquis communautaire". This procedure is coordinated by the Ministry of Justice but a number of problems are encountered in the Ministry of Environmental Protection in this context. Information about the EU requirements and their transposition into the national regulations (through the Ministry of Justice and informal channels) is available, but no special resources, human or financial, have been allocated to the Ministry of Environmental Protection to ensure the quality of the harmonization, and working contacts between the Ukrainian and EU experts have only been sporadic.

An integrated permitting system has not yet been launched. A presidential decree to introduce integrated permitting consistent with the EU legislation has so far had only limited effect. Also, at the end of 2005, a new law on a "one-window-permit" was adopted which aims at centralizing the procedures for getting a permit into a single location, thus greatly facilitating steps for permit applicants; the law will take effect in October 2006.

### 4.4.3. Water management

The Ukrainian water management system is fairly complex as main responsibilities for water management are shared between two government institutions, namely the Ministry of Environment Protection (MEP) and the State Committee for Water Management (SCWM) that operate extensively on both national and regional levels. Each of them has numerous functions: MEP is a regulatory body and is also involved in monitoring, while the oblast branch of SCWM executes regulatory, hydrochemical and radiological monitoring, development and engineering functions. The main responsibility for water management lies with SCWM, which is responsible for construction and maintenance of irrigation, water and flood protection infrastructure, thus acting as a water utility. It is also responsible for keeping records of state water usage and for the state water register of surface waters. Records and water register for underground waters is the responsibility of the State Geological Service.

The quality of waters is a concern for Ukraine. In 2005, national data showed that 25–30 % of the water bodies did not meet sanitary standards. In 2004, 30 % of analysed samples of surface water

for agricultural use showed contamination by nitrates, and more than 1 % by pesticides. Both figures are well above permissible norms. In many areas, surface and ground water are also contaminated by bacteria.

Access to clean water is a priority issue in the Millennium Development Goals for Ukraine. According to estimates made before the World Summit on Sustainable Development in 2002, 12,5 % of drinking water samples in Ukraine did not meet sanitary standards. Several national strategic programmes, such as Drinking Water of Ukraine (2005), the Comprehensive Programme on Top-priority Provisions for Centralized Water Supply in Rural Areas That Utilize Imported Water for 2001–2005 (and forecast until 2010) and the State Programme on Water Management Development for 2002–2010 have been developed to improve the quality and availability of water. Lack of financing has all but stalled these programmes. During 2001–2004 only 10 per cent of the necessary funds were allocated, and none of the planned water supply systems for rural communities was built. Although total combined industrial and household wastewater discharges decreased from 9.972 billion $m^3$ in 2000 to 7.734 billion $m^3$ in 2004 **[16]**, the inefficient treatment of industrial and municipal waste water is causing eutrophication and bacterial and chemical pollution of the country's main rivers. The sewer network extends for 46,000 km, of which 30,300 km are in cities and urban areas. In rural areas the lack of sewage networks leads to the disposal of waste water without prior treatment. In urban areas the insufficient capacity and poor technical condition of treatment plants result in inefficient, inadequate treatment of wastewater.

Overall, industrial waste water is not sufficiently treated before being discharged into surface waters. In 2004, metallurgy, the biggest wastewater producer, discharged 1,545 million $m^3$ of waste water. It was followed by the coal industry with 581 million $m^3$ and the chemical and petrochemical industrial sub sectors with 218 million $m^3$ of discharge. Almost all of the coal industry's discharges (89% of the total) are either untreated or insufficiently treated, while 70 % and 60 % of waste water from the metallurgical and petrochemical industries respectively are untreated or insufficiently treated **[16].** Waste water from these industrial processes is typically contaminated with heavy metals, phenols, oil products and other hazardous substances.

During recent decades, the economic infrastructure of the Zakarpatya area which is in generally part of the DRB has changed considerably; anthropogenic stress on the river ecosystem has increased causing water quality deterioration and erosion of river-banks and slopes. The water quality of the upstream rivers of Zakarpatya remains rather good in general. However, absence of sewage works and treatment facilities in the majority of settlements and industrial enterprises has resulted in pollution of several rivers within the Zakarpatya lowland and a water quality not always meeting actual requirements. Another hazard is caused by erosion as a result of a significant reduction of the mature forest area.

*The environmental permitting*, based on the use of Maximum Allowable Concentrations (MACs) of a large number of pollutants, is unchanged since 1999, with one important exception, the new law on air protection that came into force in 2001. A new approach is now used for air pollution in existing and new installations. Conditions in the air permits are no longer based on MACs in ambient air but on technology-based emission standards. The former system caused problems when applied in areas with several pollution sources, since the former system calculated the allowed emissions from each source, based on the MACs and mathematical models.

In Ukraine, a permit is only valid for three years, which is considered too short by the SDEPs. This means that the SDEPs need to start the discussion on the conditions for the next permit with an industry soon after the previous one has been issued. This is the case even if no changes have been made at the industrial facility. The SDEP consider this as overly bureaucratic and would prefer longer permitting periods. That would allow them to use their resources for improving the situation at the major pollution sources and in those industries where new investments are made or planned.

Ukraine still has no emission standards for water, only a large number of ambient standards (MAC), while a limited number of water quality standards are used in the EU as well as some discharge standards. But the BAT-based requirements in the IPPC Directive and provisions in the Water Framework Directive, like the requirement to eliminate priority hazardous substances are preponderant for the resulting discharges.

Therefore a direct comparison between EU and Ukrainian emissions standards is therefore neither possible nor appropriate for the time being. Introduction of the integrated permitting system will bring serious changes in the Ukrainian approach.

*Water quality monitoring* is carried out by Hydromet at 240 points at 374 gauges in 151 water bodies. Since 1999 this network has expanded by 25 observation points and 14 water bodies. Today hydrobiological observations are conducted at 82 points at 159 gauges in 39 water bodies. Both networks provide data on a total of 46 parameters and help to assess chemical composition, biogenic parameters, and the presence of suspended and organic matter, main pollutants, heavy metals and pesticides. Samples are taken manually 4 to 12 times a year. Chronic water toxicity is monitored in 13 water bodies.

Hydromet also monitors transboundary water pollution at 15 points at 29 gauges. Although the numbers of observation points conform to the applicable water monitoring regulations, the monitoring network needs to be reviewed and updated. Today the observation points are located only on big rivers, large reservoirs and lakes near key urban areas. Diffuse pollution of surface waters is not monitored. There is no single background observation point on inland waters in Ukraine. The SEI has increased the number of monitored gauges in water bodies by 99 since 2000. Today it takes sporadic water samples at 2,159 gauges. Over the same period the number of measured parameters has increased from 56 to 60.

There are other institutions involved in surface inland water monitoring. For instance, the State Committee for Water Management monitors water supply sources, transboundary watercourses and water abstraction by nuclear power plants. The Ministry of Health monitors sources of drinking water supply and recreational water sites along rivers and reservoirs.

The MEP developed and implemented recommendations on comparability of water monitoring data (2002). However there is no harmonized methodology for use by all institutions involved in surface water monitoring. Each governmental body uses its own software and databases. As a result, the monitoring data are distributed among various sources, disintegrated and not comparable.

Ukraine has expanded cooperation with its neighbours on monitoring of water quality in transboundary waters. With Romania it takes joint water samples from the Prut and Syrets rivers and exchanges bulletins concerning their water quality. Ukraine and Hungary take yearly joint water samples at 4 boundary gauges along the Tisza River. The two riparian States also exchange data on the results of another 20 samples that are taken individually.

The trend in groundwater monitoring has been towards a decrease in the number of observation sites – from 1,400 in 1996 to 1,148 in 2005. The network has been optimized since 2002 and today is operated by 17 field missions and 8 state (regional) enterprises, all subordinated to the State Geological Service, as well as by 25 oblast administrations and by enterprises pumping groundwater for specific uses. Groundwater monitoring sites are primarily intended to assess groundwater levels (availability) and natural geochemistry.

Chemical parameters (22 in total) are measured manually once or twice a year, instead of quarterly as required by national monitoring regulations. There is generally no monitoring of anthropogenic impacts on groundwater. Occasional monitoring is done of levels of heavy metals and pesticides. The sanitary and epidemiological service of the Ministry of Health performs chemical analyses of groundwater intended for drinking water.

### 4.4.4. Industry

Industrial restructuring has been delayed by the slow pace of market reforms. The country's main challenge has been to diversify from many of the industries that relied on government subsidies, are big environmental polluters and became even less viable after traditional export markets collapsed. Privatization and foreign investment have proceeded more slowly in Ukraine than in CEE countries. Major industrialized zones of the country are also environmental "hot spots" not only due to the past and current pollution of air, soils, surface and ground waters, but also because of the risk of industrial accidents. In addition, impact is caused by production and processing of metals, mining and chemical industries. The most polluted oblasts are Donetsk, Dnipropetrovsk, Zaporizhia and Luhansk. Mariupol and Kiev are the country's most polluted cities.

Total waste water discharges (industrial and household) in Ukraine have decreased during the past 7 years. However, industrial processes still result in high levels of waste water discharges. Often waste water is not sufficiently treated before discharge. Discharges of toxic chemicals from industrial processes and accidents, and sludge from waste water treatment plants, often contaminated with heavy metals, phenols, oil products and other hazardous substances, directly impact on the quality of surface water.

The main industrial sectors of the Ukrainian part of the Danube River Basin include forestry and wood working industry (production of furniture, sawn timber), wood-chemical industry (wood working products), food industry (production of wine, brandy, canned fruit and vegetables), machine building (metal-cutting instruments, electric engines, pipeline valves, etc.), production of building materials (crushed rock, facing materials), light industry (footwear, hats, ready-made garments, and knitwear).

The largest enterprises of the Zakarpatya oblast are as follows:

- In the food industry: agro-industrial integrated plant "Uzhgorodskyi", CSC "Gelios", OSC "Svalyava Mineral Waters", rental enterprise "Uzhgorod Cognac Plant", small private enterprise "Alex", "Vital-Plus Ltd.", etc.;
- in forestry and wood working: CSC "Mukachiv Forest Integrated Plant", SC "Victoria", CSC "Dovhe Forest Integrated Plant", CSC "Mukachiv Furniture Integrated Plant", CSC "Rakhiv Cardboard Factory", CSC "Yasinia Forest Integrated Plants", CSC "Volovets Forest Integrated Plants", SC "Firm Yavirnyk", etc.;
- in machine building and metal working: Uzhgorod State Production and Trade Enterprise "Turbogaz", Zakarpattya Helicopter Production Association, OSC "Irshava Abrasive Plant", OSC "Valve Plant", OSC "Beregove Research and Experimental Plant of Diagnostic and Garage Equipment", OSC "Uzhgorod Plant "Electrodvygun" (Electric Motor), plant "Tochprylad", OSC "Mukachiv Plant of Complete Laboratories".

*Emissions monitoring and reporting* is mandatory for big polluting installations, which are required to monitor their air emissions and water discharges. A series of by-laws are in place to that end, but the specific requirements, such as monitoring frequency, are decided on a case-by-case basis. As a part of the permitting process, emissions are regularly monitored by the industries themselves and sporadically checked by an independent accredited laboratory. The industry labs that perform the regular monitoring also need to be accredited. But the industries also have an option to use independent laboratories for regular monitoring. Monitoring performed by industries is limited to a few parameters and most of the time analyzed with old classical methods not allowing for immediate results, even when they are ISO 14000 certified. More sophisticated analysis is made by

external accredited laboratories. The use of continuous on-line monitoring is not common in Ukraine, even at large power plants; by comparison, it is compulsory in the EU.

A normal frequency for emission reporting to the authorities is through monthly and annual reports. These reports are the basis for payment of the emission charges within the established limits.

Smaller industries are normally not required to monitor their emissions. Reporting of their emissions is based on the use of emission factors calculations.

In Ukraine, only a limited number of industries perform monitoring of environmental quality in the surroundings. Ambient environmental monitoring by industries is voluntary and often linked to ISO 14000 certification.

Environmental Management Standards (EMS) has been introduced in Ukraine. The following standards have been approved by the Ukrainian parliament as Ukrainian standards (DSTU): ISO

14001-97, ISO 14004-97, ISO 14010- 97, ISO 14011-97, ISO 14012-97. At present about 20 experts have been certified to issue ISO 14001 certificates. As of October 2005, nine industries or installations have been certified as part of a Tacis project by foreign experts. There has been a steady increase in the number of certificates issued by national experts (10 in 2003, 16 in 2004, and 21 by 1 October 2005) **[16].** Companies in the gas and oil, pharmaceutical, mining, metallurgical, and textile industries are among those that have received certificates. Other companies that have been certified include a wine producer, poultry farms, and an international airport. Companies find it costly to get an ISO certificate and consider it as a problem. The Institute on Quality Management for ISO 14000 has been created to promote certification

### 4.4.5. The SWOT Analysis

| | | |
|---|---|---|
| **INTERNAL** | **Strengths**<br>- The EU-Ukraine European Neighbourhood Policy (ENP) Action Plan<br>- The government programme to implement Ukraine's Millennium Development Goals<br>- The Action Programme of the Cabinet of Ministers "Towards People" (2005)<br>- The Environmental programmes administered directly by the Ministry of Environmental Protection<br>- The regulatory legislative framework for the protection of the environment<br>- A presidential decree to introduce integrated permitting consistent with the EU legislation<br>- a new law on a "one-window-permit"<br>- The institutional system for permitting and assuring compliance with permitting conditions (through inspection)<br>- Water quality monitoring is in the place<br>. | **Weaknesses**<br>- Inadequate implementation of adopted policies, strategies and planes.<br>- The environmental legislation in field of integrated water management is not in compliance with EU legislation<br>- Lack of legislation concerning Integrated Prevention and Control including BAT requirements, permitting authority and inspection.<br>- An unclear division of responsibilities between specialized ministerial authorities and institutions<br>- Lack of environmental standards for emission discharges into aquatic environment<br>- Lack of Environmental Quality Objectives<br>- Insufficient and state administration.<br>- Lack of goals in the field of industry, inventory of pollution sources and pollution reduction and programmes.<br>- Insufficient information related to pollution sources and pollution releases into aquatic environment.<br>- Weak skills and technical knowledge of decision makers and operators ( BAT, monitoring, public involvement)<br>- Insufficient treatment of urban and industrial waste water<br>- Obsolete waste water treatment technologies<br>- Obsolete industry technologies |
| **EXTERNAL** | **Opportunities**<br>- State's emphasis on water management issues and an integrated approach<br>- The EU-Ukraine European Neighbourhood Policy (ENP) Action Plan is implemented<br>- Implementation of the Government programme to implement Ukraine's Millennium Development Goals<br>- Fulfilment of the Action Programme of the Cabinet of Ministers "Towards People" (2005) objectives.<br>- It is expected that the IPPC regulations will enhance surface water quality.<br>- Value market places on challenging programs supports enhancing quality industrial technologies<br>- Capacity to respond to state and national needs to encourage water protection.<br>- Increased demand for development of industry and BAT<br>- The international technical assistance and investments in field of implementation of IPPC approached<br>- An International Development Fund grant has been secured for preparing a legal framework for integrated permitting | **Threats**<br>- The lack of State institutions to handle integrated water management<br>- Difficulties in field of obtaining a financial and technical assistance to improve water management and monitor international procedures or standards.<br>- Lack of financial sources for improvement of situation in Industry development<br>- |

### 4.4.6. Road Map for implementation of BAT

The current regulatory framework in Ukraine has been developed over the last 10 years. Such an extensive period of law development has resulted in a system that has become complicated to interpret, internally inconsistent and incompatible, and therefore difficult to follow and enforce.

There are several examples of contradictions between existing laws and regulations, for example between the Land Code and the Water and Forestry Codes over the status of the protected zones along rivers or around forests. The recent accumulation of contradictions and the complexity of environmental legislation have stimulated discussions about "codification" of the environmental law. This has, in particular, taken place in light of the discussions about harmonization of the Ukrainian laws and regulative by-laws with the European legislation. Various drafts of an Environmental Code have been developed in parallel by different informal groups with no significant progress as these groups are working in isolation from each other with no exchange of information and consensus building. An additional obstacle to the possible codification of environmental laws is the lack of deeper analysis of the effectiveness and efficiency of existing regulations, administrative and compliance costs and impacts, as well as possible regulatory gaps or inconsistencies. To date no Regulatory Impact Analysis which is applied in a number of the CP to the CDRP has been carried out in the field of environmental regulations. If introduced, such a procedure could better identify priorities for changing existing requirements and could provide directions for the codification work.

The presidential decree to introduce integrated permitting consistent with the EU legislation has been adopted; however, it has so far had only limited effect. Also, at the end of 2005, a new law on a "one-window-permit" was adopted which aims at centralizing the procedures for getting a permit into a single location, thus greatly facilitating steps for permit applicants; the law will take effect in October 2006. In spite of these steps which should lead towards implementation of the IPPC, implementation of BAT approach is unsatisfactory and there is very limited information available concerning BREFs documents.

Enforcement tools and compliance assistance and promotion tools need to be interrelated. The Ukrainian system is especially weak on compliance assistance and promotion. A proactive approach including information campaigns, seminars and training activities to inform the regulated community on new laws or new developments is rarely used by the Ministry of Environmental Protection. Laws are rather considered as instruments that local authorities can use at their own convenience similarly, the charges on emissions and discharges within the established emissions are issued on a discretionary basis. However, most stakeholders consider that those charges are too low to influence the behaviour of polluters in any case.

The inspectors have at their disposal different legislative tools to enforce the regulations, such as sending a notice to a company to limit, suspend or cease its operations. In practice, harder tools like suspend or cease operations can be used. However, the use of economic instruments as sanction is generally preferred. An inspector who sends a notice to a company in violation of the laws will, at the same time, charge for the excessive emissions as a sanction. Above limits, the charge is 5 times the normal rate for emissions within established limits (Decree N°303, CM, 1999) In addition, a fine for compensation of the damage has to be paid to the city/municipality where the company is registered, which is not always the municipality affected. The damage compensation instrument is complicated to use since it is based on a large number of factors as type of emission, type of area affected, size of the area, duration of the violation, period of violation, (holidays or workdays), etc. If a company pleads guilty and agrees to the sum calculated by the authorities, it just pays; if not a court decision is made, which may be appealed.

Some initial actions in direction of the IPPC approach have been taken through a small grant from the World Bank in 2003 to test the idea of integrated permitting, by preparing integrated permit

applications and permits, and further efforts are under way. In 2004, a study by the Organisation for Economic Co-operation and Development (OECD), prepared and discussed with Ukraine, proposed sectors and installation types to be covered by the integrated permitting system. An International Development Fund grant as been secured for preparing the legal framework for integrated permitting. The project is split into sub-components which will be launched in 2005-2006. The World Bank sub-component is named Reform of legal framework and enhancing institutional capacity for environmental permitting in Ukraine. Sweden will perform and support several pilot projects resulting in integrated permits. Many stakeholders such as SDEPs, the Ukrainian League of Industrialists and Entrepreneurs, individual industries, and members of National Academy of Science have a positive attitude toward integrated permitting.

Despite some improvements Ukraine still faces considerable barriers in developing its industry in a sustainable way. Progress in crucial structural reforms remains slow and many industrial sectors, such as coal mining, are in poor shape. Progress in the implementation of strategies and programmes regarding industrial development are slow. Furthermore, integration of environmental sustainability issues into industrial policy is lacking. A law for environmental insurance exists for high risk installations that should be enlarged to cover all industrial activities posing potential risks to the environment.

Emissions monitoring and reporting is mandatory for large polluting installations, which are required to monitor their air emissions and water discharges. A series of by-laws are in place to that end, but the specific requirements, such as monitoring frequency, are decided on a case-by-case basis.

**Work Plan short- term objectives by the end 2008:**

| Issues related to | Operational tasks | Outputs |
|---|---|---|
| **Improvement of legislation** | - conduct a detailed legislation gap analysis of the environmental legislation particularly water legislation<br>- prepare a draft of a new or updated legislation aiming at the transposition of the IPPC Directive<br>- develop emission limit values | - draft of legislation in compliance with EU requirements (the WFD and the IPPC Directive) as base for it further adoption<br>- draft of legally binding ELVs and EQS |
| **State administration** | - detailed review of state administration and responsibilities including inspection<br>- identification of needs including costs<br>- propose if necessary a new structure and responsibilities<br>- improvement of cooperation with state organizations and other stakeholders<br>- develop of an integrated decision making process including inspection and enforcement | - a new effective organizational structure and clearly defined responsibilities<br>- emission and product controls and the application of the "combined approach": BAT or relevant emission limit values for control of point sources |
| | - monitoring and gathering information and analysis<br>- reporting requirements | - monitoring programme focused on compliance with permits and reporting requirements – EPER/PRTR |
| **Capacity building** | - capacity building needs analysis | - proposal for capacity building development |
| **Industry pollution reduction and** | - inventory of industrial pollution sources in cooperation with operators<br>- screening of dangerous substances in waste water and receiving water | - assessment of screening results as an input for monitoring programme<br>- the pollution reduction |

| | | |
|---|---|---|
| | - propose monitoring programme according to reporting requirements - PRTR<br>- development of polluter register<br>- | programmes including measures as a contribution to the Danube Basin Management Plan and the Programmes of measures |
| **Implementation of BAT** | - Introduce the relevant stakeholders to the process of integrated environmental permitting and the use of BAT<br>- analysis of industry sectors from the point of view of BAT implementation<br>- translation of BREFs and/or proposal for preparation national BREFs<br>- develop national BREFs<br>- creation of information system regarding BAT and BREFs<br>- dissemination of information and training focus on BREFs documents | - the national BREFs |

**Work Plan medium - term objectives by the end 2015:**

| Issues related to | Operational tasks | Outputs |
|---|---|---|
| **Improvement of legislation** | - Adoption and Implementation of new legislation and monitoring | - Compliance of the legislation with EU requirements |
| **State administration** | - Improvement of state administration<br>- Proposal for new developments | - Functioning state administration |
| **Capacity building** | - Implementation of capacity building strengthening | - Proposal for meeting emerging needs |
| **Industry pollution reduction** | - Implementation of the pollution reduction programmes including measures to contribute to the Danube Basin Management Plan- updated<br>- Update the pollution reduction programme | - Updated pollution reduction programme and programme of measures as an integrated part of the Danube Basin Management Plan |

### 4.4.7. Recommendations

The proposed work plan provides the Ministry of Environment of Ukraine with the following key IPPC and BAT implementation and enforcement aspects:

- Improvement of legislation - transposition of IPPC Directive;
- permitting process and emission/discharge limits;
- Best Available Techniques implementation;
- mitigation of existing environmental problems
- institutional arrangements;
- monitoring of compliance and enforcement;
- likely effects of IPPC on national energy policy/strategy

The following steps are recommended:

- Analyze the organisation of the inspection services and review the legal framework with the objective to increase effectiveness and efficiency of the inspection services and clarify and

avoid overlapping responsibilities. Based on the results of this analysis, the structure of the State inspections for environmental protection should be streamlined.

- The Law on Environmental Expertise should be revised with the objective to introduce reasonable threshold for mandatory requirements of an EE and exclude its application to minor environmental issues. A Committee with representatives of the Ministry, its regional offices and local authorities should be given the task to revise the law and propose reasonable threshold values for the regulated industrial activities. A reference group of relevant stakeholders should be created to provide advice to the Committee.

- The Law on Environmental Audits should be changed so that decisions based on the results of the audit are taken by the authorities, on an appropriate level, in a transparent process allowing for stakeholder involvement.

- The MEP should take the lead to introduce an integrated permitting regime based on the use of BAT and case-by-case considerations similar to the EU IPPC-directive for the major pollution sources. For minor sources, simplified permits, based to a large extent on general binding rules or technical standards, should be considered. Regional offices of MEP, local authorities, industry and NGOs should be involved as well as relevant Ministries. MEP should welcome international assistance, support and experiences of such issues.

Above out lined recommendations should included following activities:

- Development of a polluter register,
- Analysis of industry sectors from the point of view of BAT implementation
- Establish emission limit values,
- Development of national BREFs
- Creation of an information system regarding BAT and BREFs
- Dissemination of information and training focussing on BREFs documents
- Monitoring programme according to reporting requirements – PRTR,
- Development of the pollution reduction programmes including measures as a contribution to the Danube Basin Management Plan.

In identifying BAT, existing know-how in European Member States should be taken into account but, crucially, full account of the Ukraine situation should be also accommodated. For example, what may be considered as BAT in the MS may be neither available nor affordable in Ukraine. Current techniques deployed in the Ukraine industry sector and current levels of environmental performance, particularly in relation to existing emission standards, should be reviewed. The outcome of this review should then be compared with those techniques defined as BAT in the EU. The monitoring of releases of pollutants is generally a key element of regulatory control which provides data to demonstrate compliance with permitted limits or evidence of failure of pollution control. Limits set within environmental permits should be:

- Consistent - for credibility the approaches used to determine limits should be consistent and reflect current best practice
- Applicable - the approaches to limit setting should take into account the characteristics of the process being regulated, the available monitoring techniques and applicable Directive requirements and the extent to which the improvements are affordable.
- Enforceable – there is no point in having limit values that cannot be enforced.

It is necessary before setting of emission limit values to carry out an inventory of industry pollution sources and to check monitoring of the quality of surface water as well as content of dangerous substances in relevant discharged industrial waste waters.

Consequently, when specifying a limit the methods of measurement used to determine compliance must be: clearly understood; reflect current best practice and the inherent uncertainties in the measurement and data handling methods should be quantified and taken into account. Compliance monitoring programmes must also be designed to take full account of affordability.

The approach in Ukraine has to be compared with the requirements for monitoring and enforcement set out in Council Decision 2000/479 on the implementation of a European Pollutant Emission Register and the relevant guidance prepared by the Commission services.

An integral part of proposed Work Plan is the development and consequent implementation of the Reduction Pollution Programme which will contain measures focused on particular steps related to its implementation according to short and long- term objectives.

These measures will help Ukraine to fulfil obligations to the ICPDR concerning preparation of the Danube Basin Management Plan and the Programmes of measures.

# 5. CONCLUDING RECOMMENDATIONS

The Road Maps and Work Plans provide an overall strategy and guidance on how to address the implementation of BAT in the targeted countries – Bosnia &Herzegovina, Moldova, Serbia and Ukraine.

The objective of each Road Map is to identify the different steps toward the implementation of BAT in the country. It is an output-oriented description of the overall process which gives details regarding intermediate results. The Road Map is used to plot the necessary milestones and timelines along with actions to move the water protection and reduction of industrial pollution forward through the application of BAT. This approach creates opportunities for non accession countries as a way to drive and structure the planning process with respect to BAT implementation. It allows them to identify the most important steps to improve environmental protection – to execute the tasks regarding the implementation of the DRBC, create more favourable condition for investments in industry, and at the same time move closer to EU accession requirements.

The information and analysis regarding the current status of legislation, administration arrangements and enforcement which has been undertaken for each country during project implementation refer to these basic considerations putting the implementation of BAT in the context of the implementation of the DRBC.

Having said that the policy and institutional setting is unique to each country and therefore while each of the four road maps have had similarities, particularly in the external environment, for example, the influence of the EU WFD, they also reflected the individual circumstances of each of the countries.

In BA and Serbia the IPPC Directive has been transposed into national legislation and the BAT concept is in place. However further implementation of the integrated permission process including BAT reference documents still require improvement including additional capacity building.

On the other hand Moldova and Ukraine still need to adopt new legislation which will ensure the further implementation of the integrated approach related to industrial pollution reduction and the introduction and implementation of the BAT concept.

Common problems in targeted counties are the insufficient level of information concerning discharges of dangerous substances and the lack of legally binding emission level values. Therefore comprehensive surveys of all discharges of substances regulated by the IPPC Directive should be undertaken as the first step.

The Road Maps reflect the existing situation in the countries and the Work Plans contain the recommended steps which would allow the countries to achieve the necessary conditions for BAT implementation including legislation, administration and enforcement.

Therefore, in addition to the adoption of legislation it is recommended that each country legislation take the following steps:

- Development of a polluter and pollutant register,
- Analysis of industry sectors from the point of view of BAT implementation
- Set up emission limit values,
- Development of national BREFs
- Creation of an information system regarding BAT and BREFs
- Dissemination of information and training focussing on BREFs documents

- Monitoring the programme according to the reporting requirements EPR/ PRTR,
- Development of the pollution reduction programmes including measures as a contribution to the Danube Basin Management Plan and the Programmes of Measures

Existing know-how in other European Member States should be taken into account in the implementation of BAT; however full recognition of the unique situation in each of the countries should is critical to the successful implementation of BAT. For each country the current techniques deployed in each industry sector and current levels of environmental performance, particularly in relation to existing emission standards, should be reviewed. The outcomes of this review should then be compared with those techniques defined as BAT in the EU, according to guidance and BAT reference documents (BREF Notes) provided by the European IPPC Bureau

The monitoring of release of pollutants is a key element of regulatory control which provides data to demonstrate compliance with permitted limits or evidence of the failure of pollution control methods.

It is recommended that before setting emission limit values an inventory of industry pollution sources should be carried out. In addition, the content of dangerous substances in relevant discharged industrial waste waters should be checked and surface water quality should be monitored.

When specifying a limit the methods of measurement used to determine compliance must be: clearly understood; reflect current best practice. Any inherent uncertainties in the measurement and data handling methods should be quantified and taken into account. Compliance monitoring programmes must also be designed to take full account of affordability and should be compared with the requirements for monitoring and enforcement set out in Council Decision 2000/479 on the implementation of a European Pollutant Emission Register.

An integral part of the proposed Work Plan is the development and subsequent implementation of the Reduction Pollution Programme which will contain measures focused on particular steps related to implementation. These measures are necessary to meet the short and medium- term objectives as required by the DRBC.

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WORKING FOR THE DANUBE AND ITS PEOPLE

# ANNEX 3
# TRAINING DOCUMENTATION

## SERBIA

### IPPC TRAINING WORKSHOP

### Date: March 1 - 2, 2006 and March 15 – 16 2006

**Place: Ministry of Science and Environment protection**

Two training workshops were delivered in Serbia. The local consulting company FIDECO, hired after approval of the Head of CS delegation, proved to be an excellent local partner for both sessions.

The first training workshop took place in Belgrade - March 1 - 2, 2006.

The topics of the workshop included:

- Introduction to IPPC basic concepts
- IPPC process – Legislative framework in Serbia and the EU
- Examples from EU Countries
- The WFD (priority substances) and the Dangerous Substances Directive
- Permit content and form - examples of permits
- BAT- concept
- Content and limitations of BREFs

There were 22 participants from the following organizations:

| | |
|---|---|
| 1. Environmental Directorate | 11 |
| 2. Water Directorate | 1 |
| 3. Regional Environmental Secretariat | 2 |
| 4. Belgrade Environmental Secretariat | 3 |
| 5. EPA | 1 |
| 6. Faculty of Machine Engineering | 1 |
| 7. Cement factory | 2 |
| 8. Oil refinery | 1 |

There were three trainers supported by three local consultants. The evaluation at the conclusion of the seminar showed that participants found the objectives spelled out in the beginning of the workshop were clear, and that they were fully met during the seminar.

The second seminar, which was built upon the success of the first was geared to more detail tailored to specific Serbian industrial sectors, also took place in Belgrade on March 15 – 16, 2006.

The topics of the second training workshop included:

- Emission limit values – EU/Serbian/Slovak for air, water, noise, vibrations, odour
- Practical exercise – modelling in the air sector using the Slovak software MODIM (US EPA based) and emission data from Serbian installations
- Case work: Cement manufacture installation
- Monitoring and Reporting; Legislation requirements and guidance.

There were 20 participants present and the structure form the following organizations:

| | |
|---|---|
| 1. Environmental Directorate | 11 |
| 3. Regional Environmental Secretariat | 2 |
| 4. Belgrade Environmental Secretariat | 2 |
| 5. EPA | 1 |
| 6. Faculty of Machine Engineering | 1 |
| 7. Cement factory | 3 |

**Conclusions and Participant Evaluations from the Training Workshops**

Overall the quality of the workshop based upon participants evaluation has ranged from good to excellent. It is important to stress that prior to this project a number of workshops of IPPC had been held in Serbia, but mainly dealing with new IPPC Act in a descriptive way. This was the first workshop on IPPC where it was possible to learn from practical issues and discuss the implementation both from the side of industry and the permitting body. As the result there was a high level of participation and the training methods and were rated as appropriate to very appropriate, with the manual being rated as very good to excellent.

The applicability of the workshop was generally evaluated as applicable or very applicable. Some participants (5) considered the workshop too short; while the majority (14) thought it was just about right.

The most valuable part of the workshop was experience in using BREFs and BATs followed by the practical case studies and preparation of the application.

The general atmosphere of both of the training workshops was very positive, with active participation, but not consistent among all participants. Discussions were livelier among the participants then between the participants and trainers. It was obvious that there was need for more frequent meetings between the permitting authority and industry representatives.

Discussions during second training workshop were much more focused on practical issues, when compared to the first workshop.

The main result of the discussion is reflected in the need for the laws and by-laws, and in conclusion that more training is needed, focused on specific industries, and capacities of permitting bodies.

The final training workshop agenda and list of participants are enclosed with this report (Annex 3).

## Summary of the Training Workshops presentations

The following presentations were made at the workshops:

- Industrial Reform and Development of Policies & Legislation for Application of BAT towards Reduction of Nutrients & Dangerous.

- Introduction to the UNDP- GEF Danube Regional Project RP and objectives and activities other Industry Policy Project.

- Introduction to IPPC basic notions - integrated approach, BAT, dialogue between permitting authority and operators, public participation.

**Introduction to IPPC basic notions - integrated approach, BAT, dialogue between permitting authority and operators, public participation**

Environmental regulation in many countries in the EU as well as in Central and Eastern Europe, originally dealt with the different environmental media (air, water and land) under distinct sets of rules, enforced by separate regulators. This meant that industries barred from releasing hazardous pollutants into one environmental medium (such as water in the nearest river) might be able to divert them into another medium where perhaps less stringent rules applied (for example to the air by burning or to the land by burying them). Under this approach there was no means of ensuring that industry acted in a way that caused the least possible harm to the environment as a whole.

In an attempt to better co-ordinate the control of industrial pollution, the EU Member States in 1996 adopted the Integrated Pollution Prevention and Control (IPPC) Directive. The IPPC Directive offers a single approach, where the underlying principle is that all potential environmental impacts from an organisation's industrial operations will be reviewed at the same time and reduction and control strategies will be implemented to reduce the overall burden on the environment.

The IPPC Directive covers installations where one or more of the following categories of activities are carried out:

1. Energy industries – e.g. power stations, oil and gas refineries
2. Production and processing of metals – ferrous and non-ferrous
3. Mineral industry – e.g. cement works, glass works
4. Chemical industry – organic, inorganic, pharmaceuticals
5. Waste management – e.g. landfill sites, incinerators
6. Other activities such as paper and pulp manufacture, fabric treatment and tanning plants, slaughterhouses, food and milk processing and treatment installations, intensive livestock rearing units and installations handling organic solvents.

The aim of the IPPC Directive is to achieve a high level of protection for the environment as a whole. The Directive sets out to achieve this by better co-ordinating the process of environmental permitting. Whereas in the past, controls were only made on certain substances at industrial operations, or on certain environmental mediums such as water use, IPPC has integrated these control activities into one process covered by a single permit.

Thus operators are required to show that they will run their installations in a way that prevents emissions to the air, land, water or, where that is not practicable, reduces them to a minimum. In doing this, operators must apply the following principles:

- use Best Available Techniques to minimise and recycle emissions and waste and conserve energy,

- prevent accidents and limit their environmental consequences,
- return the site to a satisfactory state after operations cease.

The operator must apply for (and obtain) an IPPC permit which will include conditions on:

- operation of the plant
- emission limits values for certain substances to air, land and water
- annual reporting of pollutant releases.

Emission limit values are the mass/concentration and/or level of an emission, which may not be exceeded during one or more periods of time. The emission limit values are based on the pollution reductions that are achievable through the use of Best Available Techniques (BAT). Furthermore, the IPPC environmental permits are based on the Environmental Quality Standards (i.e. the maximum concentration of a substance, which is permissible in the receiving medium). Emission limit values must be evaluated in order to achieve compliance with Environmental Quality Standards for area where the plant is situated.

Communication with authorities and the public is more intense and specific under the IPPC Directive. The operator shall:

- Report all changes in the technology that are likely to have an impact on the environment
- Be aware that the IPPC application, the IPPC permit and ongoing pollution monitoring results shall be made available to the general public. For example, prior to the awarding of an environmental permit the public should have access to the non-confidential data from the application and have the right to comment
- Be aware that affected citizens in neighbouring countries have the right to see non-confidential parts of the applications for environmental permits in the case of a new operation or extension of existing activities, in cases where there is transboundary pollution.

The public (neighbours, NGOs citizens and others) will have the opportunity to study the IPPC application and provide their comments in writing or in public hearings. They will also have the opportunity to comment on the draft permit before the final permit is issued. The public will also have access to monitoring results of the company to see if the permit conditions are being met.

Parts of the application and permit can be confidential. This could include, for example, the list of raw materials used now and in the future and parts of the technical description particularly where these involve trade secrets. The enterprise should present a good and objective explanation of why the data should be considered confidential. The Competent Authority will consider this explanation and if they agree the confidentiality shall be kept. If the Competent Authority does not agree, they will be able to make a decision to release the data to the public.

**IPPC process – Legislative framework EU Examples from the other EU Countries**

The „Report of the Commission on the implementation of Directive 96/61/EC concerning integrated pollution prevention and control" (COM (2005) 540 final) summarises the results of the first comprehensive survey made in the "old" 15 Member States for 2000-2002.

The Directive has been transposed in all Member States but there were serious delays in the EU 15 and not all of its measures have been properly transposed in some Member States. Infringement cases have been launched against 8 old Member States.

The IPPC Directive entered into effect in October 1999 for new installations but total implementation is scheduled for 30 October 2007 by which date full compliance should be

achieved, unless an installation is subject to a "substantial change" before that date. The report states that the full implementation by October 2007 remains a challenge for a large majority of Member States.

About 45000 large industrial installations across the EU 15 fall under the scope of the IPPC Directive. 5545 installations were granted permits for substantial changes 4750 existing and as 795 new installations.

Nevertheless, full implementation by October 2007 needs acceleration in the permitting process to provide sufficient time for the operators to cope with the requirements in the permit. According to Article 9(4) of the Directive, all installations should operate complying with conditions fixed in a permit based on BAT, taking into account the technical characteristics of the installation concerned, its geographical location and the local environmental conditions.

Coordination between authorities during the permitting procedure is more complex in certain Member States, e.g. Germany and the Netherlands, which continue, in certain circumstances, to have separate water permits. All Member States have indicated that national or regional legal acts transpose the obligation to require additional conditions in IPPC permits where an environmental quality standard requires stricter conditions than those achievable by the use of BAT. Some Member States designate a single authority, while others rely on different competent authorities. For example in Portugal several authorities have been designated and are each responsible for coordination, consultation and issuing of permits.

Most Member States have established procedures to check compliance with permit conditions, generally through on-site inspections. The frequency for such inspections, the use of "self-monitoring" carried out by the operators or by non-administrative bodies (e.g. accredited laboratories), as well as the number of enforcement actions, vary among Member States.

Certain Member have developed guidance documents to assist competent authorities, others have established sectoral legislation based on BAT. The large majority of Member States indicate that the BAT Reference Documents (BREFs) are taken into account generally and in specific cases when determining BAT.

All Member States reported legal provisions to ensure the availability of information to and participation of the public in the permit procedure. A period of approximately one month is typically allowed for public consultation on permit applications.

**Permit content and form; Examples of permits from various countries were used to illustrate the role of the technical commission in Serbia IPPC process**

First of all, the environmental permit should be seen as a negotiation – a dialogue between the authority and the company. Other stakeholders (e.g. neighbours, NGO's and public bodies) will contribute to the dialogue as well, but basically the two main partners are authorities and industry.

Secondly, the concept of BAT itself supports a flexible approach to the permitting process. It is important to secure development of environmentally sound practices and this development must start in realistic changes of the present production practices.

In the application for an IPPC permit the industrial installation has to describe its location, its equipment, operations and processes, how it effects the environment, and the means the company will use to restrict its pollution levels, information on control systems and safety precautions. The company must use the application form found in annex to the IPPC regulation.

The company should also demonstrate the initiatives that it has taken to use the least polluting technology.

The authorities will review the applications forwarded by the companies and prepare permits. The authorities will also inspect the companies on a regular basis to ensure that the companies comply with the terms set out in the permits.

When reviewing a company's application for an IPPC permit, the authorities focus on the pollution levels that the company could achieve if it were using the Best Available Techniques in its industrial processes. This means that the authorities will need to follow the developments in BAT closely through the EU information exchange and through reports on cleaner technology published within the relevant industrial sectors. The authorities will set the final timeframes for implementing BAT after negotiation with the companies who applies for permit.

When preparing permits the authorities also have to take into account the Environmental Quality Standards set in the legislation and International obligations like the Convention for the Protection and Sustainable Use of the Danube River (DRPC), the Basel Convention etc.

**BAT- concept**

The legal basis of the Directive relates to environmental protection that is perfectly in line with its purpose to take measures leading to a high level of protection of the environment as a whole. Its implementation should also take account other Community objectives such as the competitiveness of the Community's industry thereby contributing to sustainable development. Central to this approach is the general principle given in Article 3 that operators should take all appropriate preventative measures against pollution, in particular through the application of best available techniques enabling them to improve their environmental performance.

The term "best available techniques" is defined in Article 2(11) of the Directive as "the most effective and advanced stage in the development of activities and their methods of operation which indicate the practical suitability of particular techniques for providing, in principle, the basis for emission limit values designed to prevent and, where that is not practicable, generally to reduce emissions and the impact on the environment as a whole." Article 2(11) goes on to clarify further this definition as follows:

Furthermore, Annex IV of the Directive contains a list of "considerations to be taken into account generally or in specific cases when determining best available techniques ... bearing in mind the likely costs and benefits of a measure and the principles of precaution and prevention".

**IPPC and Water Framework Directive and Dangerous Substances**

The techniques and associated emission and/or consumption levels, or ranges of levels, have been assessed through an iterative process involving the following steps:

- identification of the key environmental issues for the sector;
- examination of the techniques most relevant to address those key issues;
- identification of the best environmental performance levels, on the basis of the available data in the European Union and world-wide;
- examination of the conditions under which these performance levels were achieved; such as costs, cross-media effects, main driving forces involved in the implementation of the techniques;
- selection of the best available techniques (BAT) and the associated emission and/or consumption levels for this sector in a general sense all according to Article 2(11) and Annex IV of the Directive.

Expert judgment by the European IPPC Bureau and the relevant Technical Working Group (TWG) has played a key role in each of these steps and in the way in which the information is presented.

On the basis of this assessment, techniques, and as far as possible emission and consumption levels associated with the use of BAT, are considered to be appropriate to the sector as a whole and in many cases reflect current performance of some installations within the sector. Where emission or consumption levels "associated with best available techniques" are presented, this is to be understood as meaning that those levels represent the environmental performance that could be anticipated as a result of the application, in this sector, of the techniques described, bearing in mind the balance of costs and advantages inherent within the definition of BAT. However, they are neither emission nor consumption limit values and should not be understood as such. In some cases it may be technically possible to achieve better emission or consumption levels but due to the costs involved or cross media considerations, they are not considered to be appropriate as BAT for the sector as a whole. However, such levels may be considered to be justified in more specific cases where there are special driving forces.

The emission and consumption levels associated with the use of BAT have to be seen together with any specified reference conditions (e.g. averaging periods).

The concept of "levels associated with BAT" described above is to be distinguished from the term "achievable level" used elsewhere in this document. Where a level is described as "achievable" using a particular technique or combination of techniques, this should be understood to mean that the level may be expected to be achieved over a substantial period of time in a well maintained and operated installation or process using those techniques.

Where available, data concerning costs have been given together with the description of the techniques presented in the previous chapter. These give a rough indication about the magnitude of costs involved. However, the actual cost of applying a technique will depend strongly on the specific situation regarding, for example, taxes, fees, and the technical characteristics of the installation concerned. It is not possible to evaluate such site-specific factors fully in this document. In the absence of data concerning costs, conclusions on economic viability of techniques are drawn from observations on existing installations.

While the BAT reference documents do not set legally binding standards, they are meant to give information for the guidance of industry, Member States and the public on achievable emission and consumption levels when using specified techniques. The appropriate limit values for any specific case will need to be determined taking into account the objectives of the IPPC Directive and the local considerations."

The Directive provides for the setting of Community emission limit values by means of Directives when "the need for Community action has been identified". This identification should be based in particular on the exchange of information on best available techniques and representative limit values applied in the Member States.

When analysing the need for Community emission limit values in priority sectors and for priority pollutants, the Commission will not only consider the reports on representative limit values in the Member States and the results of the exchange of information on best available techniques but also information submitted for the European Pollutant Emission Register. As usual, the principle of subsidiarity will guide the Commission.

Prime candidates for Community emission limit values are dioxins and furans, in line with the Council's conclusions on the Commission's dioxin strategy, as well as the priority substances under the Water Framework Directive and other pollutants with transboundary impacts.

***The Water Framework Directive*** - 2000/60/EC of the European Parliament and of the Council establishing a framework for Community action in the field of water policy, OJ L 327, 22/12/2000, p. 1-72

Among other things, this Directive aims to protect and enhance the status of aquatic ecosystems. A key component is its "combined approach", i.e. addressing emission sources at the same time as effects on recipients through water quality standards.

On the source side, it sets out a plan for developing further the control measures laid down in the IPPC Directive and other source-based Directives. This comprises the establishment of a list of priority substances for action at EU level, prioritised on the basis of risk, and the design of the most cost-effective set of measures to achieve load reduction of those substances, taking into account both product and process sources.

The list of priority substances was adopted in November 2001 and it covers 33 substances or groups of substances. Decision No 2455/2001/EC of the European Parliament and of the Council establishing the list of priority substances in the field of water policy and amending Directive 2000/60/EC, OJ L 331, 15/12/2001, p. 1-5.

The European Commission adopted a proposal for a new Directive to protect surface water from pollution on 17 July 2006 (COM (2006)397 final). The proposed Directive, which is required to support the Water Framework Directive, will set limits on concentrations in surface waters of 41 dangerous chemical substances (including 33 priority substances and 8 other pollutants) that pose a particular risk to animal and plant life in the aquatic environment and to human health.

In summary the key components of the proposed Directive are:

- establishment of environmental quality standards as required by Article 16.7 WFD including the introduction of a transitional area of exceedance,

- establishment of an inventory of discharges, emissions and losses to check whether the objectives of reduction or cessation are met;

- repeal of and transitional provisions for the existing "daughter Directives" listed in annex IX WFD as suggested by Article 16.10 WFD,

- identification of priority hazardous substances (PHS) out of the 14 substances under review as required by Decision 2455/2001/EC.

**Monitoring and Reporting. Legislation requirements and guidance**

The horizontal BREF on monitoring provides brief information to guide IPPC permit writers and operators of IPPC installations in meeting their obligations under the Directive with regard to monitoring requirements of industrial emissions at source.

Permit writers are recommended to take into account the following seven considerations when establishing optimised permit monitoring conditions:

1. "Why" monitor? There are two main reasons why monitoring is included in IPPC requirements: (1) for compliance assessment, and (2) for the environmental reporting of industrial emissions.

2. "Who" carries out the monitoring? The responsibility for monitoring is generally divided between the competent authorities and the operators, although competent authorities usually rely to a large extent on “self monitoring” by the operator, and/or third party contractors. It is highly important that monitoring responsibilities are clearly assigned to all relevant parties (operators, authorities, third party contractors). It is also essential that all parties have appropriate quality requirements in place.

3. "What" and "How" to monitor. The parameters to be monitored depend on the production processes, raw materials and chemicals used in the installation. A risk-based approach can be used to match various levels of potential risk of environmental damage with an appropriate monitoring

regime. To determine the risk the main elements to assess are the likelihood of exceeding the emission limit value (ELV) and the severity of the consequences (i.e. harm to the environment).

4. How to express ELVs and monitoring results. The way ELVs, or equivalent parameters, are expressed depends on the objective for monitoring these emissions. Different types of units can be applied: concentration units, units of load over time, etc. In all cases, the units to be used for compliance monitoring purposes should be clearly stated, they should preferably be internationally recognised and they should match the relevant parameter, application and context.

5. Monitoring timing considerations. Several timing considerations are relevant for setting monitoring requirements in permits, including the time when samples and/or measurements are taken, the averaging time, and the frequency to avoid ambiguity.

6. How to deal with uncertainties. When monitoring is applied for compliance checking it is particularly important to be aware of measurement uncertainties during the whole monitoring process.

7. Monitoring requirements to be included with ELVs in permits. These requirements should cover all relevant aspects of the ELV. To this end it is good practice to take into account the issues i.e. with regard to the:

- legal and enforceable status of the monitoring requirement
- pollutant or parameter being limited
- location for sampling and measurements
- timing requirements of sampling and measurements
- feasibility of limits with regard to available measurement methods
- general approach to the monitoring available for relevant needs
- technical details of particular measurement methods
- self-monitoring arrangements
- operational conditions under which the monitoring is to be performed
- compliance assessment procedures
- reporting requirements
- quality assurance and control requirements
- arrangements for the assessment and reporting of exceptional emissions.

The production of monitoring data follows several consecutive steps that all need to be performed according to either standards or method-specific instructions to ensure good quality results and harmonisation between different laboratories and measurers. This data production chain consists of the following seven steps:

1. Flow measurement.
2. Sampling.
3. Storage, transport and preservation of the sample.
4. Sample treatment.
5. Sample analysis.
6. Data processing.
7. Reporting of data.

**BREFs: What can be found in BREFs and what are the limitations:**

BREFs are guidance documents for Member State authorities in assisting them in issuing the permit. They are result of the information exchange organised by the Commission in accordance to Art 16(2) of the IPPC Directive.

Article 16 (2) of the Directive says: „(2) The Commission shall organise an exchange of information between Member States and the industries concerned on best available techniques, associated monitoring, and developments in them. Every three years the Commission shall publish the results of the exchanges of information."

The European IPPC Bureau organises this exchange of information and produces BAT reference documents (BREFs) which Member States are required to take into account when determining best available techniques generally or in specific cases. The Bureau carries on its work through Technical Working Groups (TWGs) comprising nominated experts from EU Member States, EFTA countries, Accession countries, industry and environmental NGOs. These experts provide information and data and then review the draft documents the Bureau produces.

The objectives of the whole information exchange exercise are to accomplish a comprehensive exchange of information and views and through the publication of reference documents to help to redress any technological imbalances in the European Community, to promote the worldwide dissemination of limit values and techniques used in the Community and assist Member States in the efficient implementation of this Directive.

Finalisation of the first round of BREFs and start of their review BREFs are important tools for the implementation of the Directive. All efforts are being made by the Commission to ensure that the first round of BREFs (comprising 32 BREFs) is finalised. For the time being 17 BREFs have been formally adopted, further 9 (including Food, Drink and Milk BREF) have been finalised. The remaining 6 are in the stage of finalisation, and the second draft of them has been published 7-11 months ago. In addition, the review process of certain existing BREFs, where key new information and knowledge resulting from research is available, is being discussed with Member States and the industries concerned. The first of them, the revision Cement and Lime BREF started in September 2005 and the elaboration of a new horizontal BREF on energy efficiency started almost a year ago.

Reference documents are produced following a set BREF outlines and guides as agreed with DG Environment and the Information Exchange Forum (IEF).

Chapters 1 and 2 provide general information on the industrial sector concerned and on the industrial processes used within the sector. Chapter 3 provides data and information concerning current emission and consumption levels reflecting the situation in existing installations at the time of writing. Chapter 4 describes in more detail the emission reduction and other techniques that are considered to be most relevant for determining BAT and BAT-based permit conditions. This information includes the consumption and emission levels considered achievable by using the technique, some idea of the costs and the cross-media issues associated with the technique, and the extent to which the technique is applicable to the range of installations requiring IPPC permits, for example new, existing, large or small installations. Techniques that are generally seen as obsolete are not included. Chapter 5 presents the techniques and the emission and consumption levels that are considered to be compatible with BAT in a general sense. It should be stressed, however, that this document does not propose emission limit values.

The outline refers to some standard pieces of text already translated into most European languages.

**BREF for cement manufacturing**

This BREF reflects an information exchange carried out according to Article 16(2) of Council Directive 96/61/EC and has two parts, one for the cement industry and one for the lime industry, which each have 7 chapters according to the general outline.

The activity for the cement and lime industry addressed in Annex I (Section 3.1) to the

IPPC Directive as described in the Directive was the following:

"3.1. Installations for the production of cement clinker in rotary kilns with a production capacity exceeding 500 tonnes per day or lime in rotary kilns with a production capacity exceeding 50 tonnes per day or in other furnaces with a production capacity exceeding 50 tonnes per day."

BREF covers the processes involved in the production of cement and lime. The main operations covered by the descriptions are:

- Raw materials storage and preparation.

- Fuels storage and preparation.

- The kiln systems.

- Products preparation and storage.

- Packing and dispatch.

Quarrying and shaft kilns for cement clinker production are not covered.

***Best available techniques for the cement industry***

The techniques and associated emission and/or consumption levels, or ranges of levels, have been assessed through an iterative process involving the following steps:

- identification of the key environmental issues for the sector; for the manufacture of cement these are energy use and emissions to air. The emissions to air from cement plants include nitrogen oxides (NOx), sulphur dioxide (SO2) and dust;

- examination of the techniques most relevant to address those key issues;

- identification of the best environmental performance levels, on the basis of the available data in the European Union and world-wide;

- examination of the conditions under which these performance levels were achieved; such as costs, cross-media effects, main driving forces involved in implementation of this techniques;

- selection of the best available techniques (BAT) and the associated emission and/or consumption levels for this sector in a general sense all according to Article 2(11) and Annex IV of the Directive.

***General primary measures***

The best available techniques for the manufacturing of cement include the following general primary measures:

- A smooth and stable kiln process, operating close to the process parameter set points, is beneficial for all kiln emissions as well as the energy use. This can be obtained by applying:
- Process control optimisation, including computer-based automatic control systems.
- The use of modern, gravimetric solid fuel feed systems.

- Minimising fuel energy use by means of:
- Preheating and precalcination to the extent possible, considering the existing kiln system configuration.
- The use of modern clinker coolers enabling maximum heat recovery.
- Heat recovery from waste gas.
- Minimising electrical energy use by means of:
- Power management systems.
- Grinding equipment and other electricity based equipment with high energy efficiency.
- Careful selection and control of substances entering the kiln can reduce emissions.
- When practicable selection of raw materials and fuels with low contents of sulphur, nitrogen, chlorine, metals and volatile organic compounds.

**Conclusions and Participant Evaluations from the Training Workshops**

Overall the quality of the workshop based upon participants evaluation has ranged from good to excellent. It is important to stress that prior to this project a number of workshops of IPPC had been held in Serbia, but mainly dealing with new IPPC Act in a descriptive way. This was the first workshop on IPPC where it was possible to learn from practical issues and discuss the implementation both from the side of industry and the permitting body. As the result there was a high level of participation and the training methods and were rated as appropriate to very appropriate, with the manual being rated as very good to excellent.

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The most valuable part of the workshop was experience in using BREFs and BATs followed by the practical case studies and preparation of the application.

The general atmosphere of both of the training workshops was very positive, with active participation, but not consistent among all participants. Discussions were livelier among the participants then between the participants and trainers. It was obvious that there was need for more frequent meetings between the permitting authority and industry representatives.

Discussions during second training workshop were much more focused on practical issues, when compared to the first workshop.

The main result of the discussion is reflected in the need for the laws and by-laws, and in conclusion that more training is needed, focused on specific industries, and capacities of permitting bodies.

## IPPC WORKSHOP PROGRAMME

**Date: March 1, 2006 – Day1**

**Place: Ministry of Science and Environment protection**

| Time | Topics | Speaker |
|---|---|---|
| **9.00** | Participants welcome | Stevo Tubic |
| **9.10** | Industrial Reform and Development of Policies & Legislation for Application of BAT towards Reduction of Nutrients & Dangerous | Tom Owen/Project Director |
| **9.20** | Introduction to IPPC basic notions - integrated approach, BAT, dialogue between permitting authority and operators, public participation…. | Stanislav Kosina/Ramboll |
| **9.50** | IPPC process – Legislative framework in Serbia and EU<br>Examples from Other EU Countries | Stanislav Kosina/Ramboll |
| **10.20** | **Coffee Break** | |
| **10.50** | IPPC and Water Framework Directive and Dangerous Substances | Norika Bartkova /Ramboll |
| **11.30** | Discussion | Participants |
| **12.00** | **Lunch** | |
| **13.00** | Permit content and form; Examples of permits from various countries | Stanislav Kosina/Ramboll |
| **13.30** | The role of technical commission in Serbia IPPC process | Participants in Groups |
| **14.30** | **Coffee break** | |
| **15.00** | Presentation of discussion results | Participants |
| **15.30** | Conclusions and suggestions<br>Comments to content of coming training and workshops | Project team/Participants |
| **16.00** | End of the Day 1 | |

**Date: March 2, 2006 – Day2**

**Place: Ministry of Science and Environment protection**

| Time | Topics | Speaker |
|---|---|---|
| **8.30** | IPPC Application – Content and completeness<br>Examples of applications from various countries | Stanislav Kosina/Ramboll |
| **9.15** | Case study:<br>Cement manufacture installation<br>Check list<br>Application guideline | Stanislav Kosina/Ramboll<br>Participants in Groups |
| **10.00** | **Coffee Break** | |
| **10.30** | BAT- concept<br>What is BAT<br>Expectations/outputs from BAT;<br>Environmental Quality Standards and BAT<br>New and existing installation with respect BAT-concept<br>BAT in transitional countries | Stanislav Kosina/Ramboll |
| **11.00** | BAT in cement manufacturing<br>Group Work | Project team/Participants |
| **11.45** | Presentation of group work | Participants |
| **12.00** | **Lunch** | |
| **13.00** | BREFs<br>What can be found in BREFs and what are the limitations?<br>BREF sources | Stanislav Kosina/Ramboll |
| **13.45** | BREF for cement manufacturing<br>Group work | Participants in Groups |
| **14.30** | **Coffee break** | |
| **15.00** | Presentation of group work | Participants |
| **15.30** | Conclusions and suggestions for next workshops<br>Quality assurance/Questionnaires | Project team/Participant |
| **16.00** | End of the Day 2 | |

# IPPC WORKSHOP PROGRAMME

**Date: March 15, 2006 – Day3**

**Place: Ministry of Science and Environment protection**

| Time | Topics | Speaker |
|---|---|---|
| **9.00** | Participants welcome | Nebojsa Pokimica |
| **9.05** | Group speakers presentations on two Serbian cement manufacturing installations - application data relevant to case work on permits | Group speakers |
| **9.45** | Emission limit values – EU/Serbian/Slovak for air, water, noise, vibrations, odour | Stanislav Kosina/EKOPEN |
| **10.15** | **Coffee Break** | |
| **10.45** | Environmental Quality Standards (EQS) | Stanislav Kosina |
| **11.15** | Group work on EQS | Participants |
| **11.45** | Presentation of group work results | Participants |
| **12.00** | **Lunch** | |
| **13.00** | Modelling in the air and water sector | Stanislav Kosina |
| **13.30** | Practical exercise – modelling in the air sector using the Slovak software MODIM (US EPA based) and emission data from Serbian installations | Stanislav Kosina/Participants |
| **14.45** | **Coffee break** | |
| **15.15** | Discussion | Participants |
| **15.30** | Conclusions and suggestions | Stanislav Kosina/Participants |
| **16.00** | End of the Day 1 | |

**Date: March 16, 2006 – Day4**

**Place: Ministry of Science and Environment protection**

| Time | Topics | Speaker |
|---|---|---|
| **8.30** | Permits and conditions. Good and bad conditions. Dialogue with operator. | Stanislav Kosina (SK)/Ekopen |
| **9.15** | Case work: Cement manufacture installation | Participants in Groups/ SK |
| **10.15** | **Coffee Break** | |
| **10.45** | Case work: Cement manufacture installation – Cont'd | Participants in Groups/ SK |
| **11.30** | Presentation of conditions and discussion | Participants in Groups/ SK |
| **12.00** | **Lunch** | |
| **13.00** | Monitoring and Reporting. Legislation requirements and guidance. | SK/EKOPEN |
| **13.45** | Discussion | Participants in Groups |
| **14.00** | **Coffee break** | |
| **14.30** | Discussion/Suggestion for further workshops | SK/Participants |
| **15.00** | QA questionnaires | Participants |
| **15.30** | End of the Workshop | |

## List of Participants

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# MOLDOVA

**Summary of the Training Workshop Presentations**

The Training Workshops presentation related to background information including a general introduction to IPPC, BAT, ELVs, and the permitting process, monitoring very similar to that presented earlier in Serbia translated into Moldavian language. Specific presentations were prepared according to the training needs analysis results focusing on food industry BREFs.

**Food, Drink and Milk BREF**

The Food, drink and milk (FDM) BREF includes the results of the information exchange about the activities listed in Annex 1 parts 6.4. (b) and (c) of Council Directive 96/61/EC of 24 September 1996 on integrated pollution prevention and control (IPPC Directive), i.e.

"6.4. (b) Treatment and processing intended for the production of food products from:

- animal raw materials (other than milk) with a finished product production capacity greater than 75 tonnes per day

- vegetable raw materials with a finished product production capacity greater than 300 tonnes per day (average value on a quarterly basis)

(c) Treatment and processing of milk, the quantity of milk received being greater than 200 tonnes per day (average value on an annual basis)"

The information exchange started in 2001 and ended 4 years later, however, the formal adoption has been made this year. The 638 page long final draft can be downloaded from the EIPPCB Website.

The FDM sector is diverse in terms of the size and nature of the companies, the wide range of raw materials, products and processes as well as the production of homogenised global products and numerous specialist or traditional products on a regional, national or local scale. The sector is spread over all of Europe, both in urbanised and rural areas. Elements of cultural specificity are still preserved across Europe; consumers demand their choice of traditional products. Another peculiarity when defining BAT is that food safety laws have primacy over environmental considerations.

The most significant environmental issues are water consumption and pollution, energy consumption and waste management.

Some sectors within the food industry use large quantities of water and overall the food industry is a large consumer of drinking quality water. Water is needed as a raw material (with higher proportions needed in the manufacturing of drinks, beer, etc.), as process water (e.g. for washing raw materials, intermediates and products, cooking, dissolving, cleaning, etc.), as cooling water, as transportation water, as auxiliary water (production of vapour, vacuum, etc.), and as sanitary water, etc. The quality of water needed depends on the needs of the specific use. In general, about two thirds of the water used is of drinking water quality.

Large food processing installations can use several hundred cubic metres of water a day. Most of the water not used as an ingredient ultimately appears in the waste water stream. In the fruit and vegetable sub-sector, for example, in the order of 10 m3 of waste water is generated for every tonne of raw material processed.

Although the food, drink and milk industry is an extremely diverse sector, certain sources of waste water are common to many installations. These include:

- washing of the raw material
- steeping of raw material
- water used for transporting (fluming) raw material or waste
- cleaning of plant, process lines, equipment and process areas
- washing of product containers
- blowdown from steam boilers
- once-through cooling water or bleed from closed loop cooling water systems
- backwash from regeneration of water treatment plant
- freezer defrosts water
- storm-water run-off.

The untreated waste water is high both in COD and BOD. Levels can easily be10-100 times higher than in domestic waste water. The suspended solid content varies from negligible up to 120 g/l. Some sectors, such as meat, fish, dairy, etc. may produce waste waters high in fat/oil (FOG) content. Cleaning and some specific production processes, e.g. vegetable oil de-gumming may result in high concentration of phosphorous. On the other hand, FDM industrial waste waters are normally biodegradable and non-toxic therefore easy to treat biologically.

The industry is dependent on energy for the processes required for food freshness and safety. Thermal processing and dehydration are the most commonly used techniques for food preservation, both requiring significant amounts of energy. Process heating uses approximately 29 % of the total energy used in the food industry, while process cooling and refrigeration demands about 16 % of the total energy inputs.

Over 370 techniques are described in Chapter 4 of Techniques to Consider in the Determination of BAT. The food, drink and milk industry is so diverse that it is impossible to detail every technique that can be considered in the determination of BAT for every activity and under every circumstance. However, it is evident that there are various good techniques that are used in one sector that may also be applicable in other sectors. The descriptions of general measures are supplemented by specific techniques, which are also described and characterised. Each technique is well documented and includes information on consumption and emission levels considered achievable by using the technique, some idea of the costs and the cross-media issues associated with the technique. The extent to which the technique is applicable is also given, for example new, existing, large or small installation, type of activity. When possible, the information provided gives the context in which the technique can be used effectively.

This Chapter includes both "process integrated" and "end-of-pipe" techniques. Many address the issues of minimising water and energy consumption, water pollution and waste production while maximising the efficiency of raw material use. Cross-media effects and cost/benefit implications are included wherever data were available. However, if a technique is used on industrial scale it is in itself an evidence of its economic viability.

The BAT conclusions are presented in two tiers. The first tier is about general BAT conclusions that are techniques that may be used for all FDM sector installations. The second tier is about some additional BAT that is just applicable for one or a few sectors. Consumption and emission level could not be attributed to these techniques because missing data – and consensus. However, achievable levels are presented for the guidance of industry, authorities and public.

**Conclusion and Participant Evaluations from the Training Workshops**

This chapter is prepared based on participants' evaluation of the workshops summarising the responses from the two training workshops.

All participants considered the Training Workshops to have met the predefined objectives and overall quality of training has been evaluated very positively as well as training methods and the applicability of the training content to their work context. The atmosphere of the training was very positive with active interest and involvement of participants particularly in the process of issuing IPPC permits, BREFs for food industry and ELVs. The participants' recommendations for future training were focused on the introduction of more examples of BAT/BREFs in connection with the application of new technologies. Suggestions were also oriented to organization of such workshops in other parts of Moldova.

These training workshops were a key activity that brought together a unique cross-section of officials in industry and water quality from all Local and Central Environmental Authorities dealing with the permitting issues, Industries located in the Danube River Basin and Local Public Authority (Regional Council).

**Training Workshop on Integrated Pollution Prevention and Control (IPPC) and on Best Available Techniques (BAT)**
**UNDP/GEF Industrial policy project**
**March 30 – 31, 2006**

## PROGRAMME

**Place: Chisinau, the Tourist Hotel**

**Date: March 30, 2006 – Day 1**

| Time | Topics | Speaker |
|---|---|---|
| **9.00** | Welcome and introduction to the seminar | Dumitru Drumea |
| | UNDP/GEF Danube Regional Project, component Industrial Policy as a part of the ICPDR activities – introduction | Eleonóra Bartková Project Manager Ramboll |
| **9.15** | General introduction to IPPC – philosophy, procedure, stakeholders | Eleonóra Bartková |
| **10.15** | Workshop Tex Book Presentation | Eleonóra Bartková |
| **10.40** | ***Coffee Break*** | |
| **11.00** | Monitoring in Integrated Approach | Eleonóra Bartková |
| **11.30** | Discussion | Project team/ Participants |
| **12.00** | ***Lunch*** | |
| **13.00** | Introduction to BAT concept (objective, BAT related emission limit values and environmental quality standards | Katalin Gara/ Ramboll |
| **13.45** | Discussion | Project team/Participants |

| Time | Topics | Speaker |
|---|---|---|
| **14.00** | BREFs and its use | Katalin Gara/ Ramboll |
| **15.00** | ***Coffee Break*** | |
| **15.20** | Emission limit values and environmental quality standards, existing and new facilities | Katalin Gara/ Ramboll |
| **16.05** | Discussion about the BATs and the use of gained knowledge | Project team/Participants |
| **16.20** | Working Groups Assignment 1 | Participants/Facilitators |
| **17.20** | Working Groups Presentations of Assignment 1 | Working Group Reporters |
| **18.00** | The end of the first day | |

**Date: March 31, 2006 – Day 2**

**Place: Chisinau, the Tourist Hotel**

| Time | Topics | Speaker |
|---|---|---|
| **8.30** | BAT in food industry (specially in dairy, sugar and wine making industries) | Katalin Gara/ Ramboll |
| **9.30** | Questions and Discussion | Project team/Participants |
| **10.00** | ***Coffee Break*** | |
| **10.30** | Working Groups Assignment 2 | Participants/Facilitators |
| **11.30** | Working Groups Presentation of Assignment 2 | Working Group Reporters |
| **11.50** | Final Seminar Discussion and Wrap up | Project team/Participants |
| **12.30** | ***Lunch*** | |
| **13.30** | The end of Training Workshop | |

## List of Participants

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# Training Workshop
# on Integrated Pollution Prevention and Control (IPPC) and on Best Available Techniques (BAT)
# UNDP/GEF Industrial policy project
# December 5th – 6th, 2006

## PROGRAMME

**Place: Chisinau, the Tourist Hotel**

**Date: 5 December, 2006 – Day 1**

| Time | Topics | Speaker |
|---|---|---|
| **10.00** | Welcome and introduction to the seminar | Dumitru Drumea |
| | UNDP/GEF Danube Regional Project, component Industrial Policy as a part of the ICPDR activities – introduction | Thomas Owen<br>Project Director Ekopen |
| **10.15** | General introduction to IPPC | Thomas Owen |
| | - philosophy / procedure / - stakeholders | Project Director Ekopen |
| **11.15** | Workshop Tex Book Presentation | Eleonóra Bartková Project Manager<br>Ekopen |
| **11.40** | Monitoring in Integrated Approach | Eleonóra Bartková Project Manager Ekopen |
| **12.10** | ***Lunch*** | |
| **13.00** | Discussions | Project team/Participants |
| **13.15** | Introduction to BAT concept (objective, BAT related emission limit values | Eleonóra Bartková Project Manager Ekopen |
| **14.00** | Emission limit values and environmental quality standards, existing and new facilities | Eleonóra Bartková Project Manager Ekopen |
| **14.30** | Discussion | Project team/Participants |
| **14.45** | ***Coffee Break*** | |
| **15.05** | BREFs and its use | Anne Louise Niemann – Ramboll |
| **16.05** | Discussion about the BATs and the use of gained knowledge | Project team/Participants |
| **16.20** | Working Groups Assignment 1 | Participants/Facilitators |
| **17.20** | Working Groups Presentations of Assignment 1 | Working Group Reporters |
| **18.00** | The end of the first day | |

**Date: 6 December, 2006 – Day 2**

**Place: Chisinau, the Tourist Hotel**

| Time | Topics | Speaker |
|---|---|---|
| **8.30** | BAT in food industry (specially in dairy, sugar and wine making industries) | Anne Louise Niemann – Ramboll |
| **9.30** | Questions and Discussion | Project team/Participants |
| **10.00** | ***Coffee Break*** | |
| **10.30** | Working Groups Assignment 2 | Participants/Facilitators |
| **11.30** | Working Groups Presentation of Assignment 2 | Working Group Reporters |
| **11.50** | Final Seminar Discussion and Wrap up | Project team/Participants |
| **12.30** | ***Lunch*** | |
| **13.30** | The end of Training Workshop | |

# List of Participants

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# BOSNIA HERZEGOVINA

**Training Workshop on Integrated Pollution Prevention and Control (IPPC) and on Best Available Techniques (BAT) took place in Sarajevo, January 25 – 26, 2007**

The general objective of this workshop was to provide participants with the knowledge to address the highest priority issues for the transposition and/or implementation of the existing legislation consistent with the principles and approaches of the EU Directive (IPPC) tailored to the specific circumstances in Bosnia and Herzegovina, and focusing on application of BAT.

In total, 27 people attended this workshop. Participants were representatives of authorities responsible for environmental protection at different administrative levels i.e. entity, cantonal and municipal level. They included environmental inspectors and people responsible for environmental impact assessment procedures and environmental permitting.

During the workshop, participants were given the material containing:

- Training Workshop Textbook
- Introductory presentation "Integrated Pollution Prevention and Best Available Techniques"
- Presentation "General Introduction to Integrated Pollution Prevention and Control"
- Presentation "Introduction to BAT Concept"
- Presentation "Monitoring in Integrated Approach"
- Presentation "Use of BREFs"
- Presentation "BAT in Cement Industry and Large Combustion Plants"

**Summary of the Training Workshop Presentations**

Reference Document on BAT for Large Combustion Plants (May 2005)

This BREF covers, in general, combustion installations with a rated thermal input exceeding 50 MW. This includes the power generation industry and those industries where 'conventional' (commercially available and specified) fuels are used and where the combustion units are not covered within another sector BREF. Coal, lignite, biomass, peat, liquid and gaseous fuels (including hydrogen and biogas) are regarded as conventional fuels. Incineration of waste is not covered, but co-combustion of waste and recovered fuel in large combustion plants is addressed. The BREF covers not only the combustion unit, but also upstream and downstream activities that are directly associated to the combustion process. Combustion installations which use process-related residues or by-products as fuel, or fuels that cannot be sold as specified fuels on the market as well as combustion processes which is an integrated part of a specific production process are not covered by this BREF.

***Structure of the document***

Electricity (power) and/or heat generation in Europe is a diverse sector. Energy generation is based on a variety of fuels, which can generally be classified by their aggregate state into solid, liquid or gaseous fuels. This document has, therefore, been written vertically, fuel by fuel, but with common aspects and techniques described together in the three introductory chapters.

***Technologies used***

Power generation in general utilises a variety of combustion technologies. For the combustion of solid fuels, pulverised combustion, fluidised bed combustion as well as grate firing are all

considered to be BAT under the conditions described in this document. For liquid and gaseous fuels, boilers, engines and gas turbines are BAT under the conditions described in this document.

The choice of system employed at a facility is based on economic, technical, environmental and local considerations, such as the availability of fuels, the operational requirements, market conditions, network requirements. Electricity is mainly generated by producing steam in a boiler fired by the selected fuel and the steam is used to power a turbine which drives a generator to produce electricity. The steam cycle has an inherent efficiency limited by the need to condense the steam after the turbine.

Some liquid and gas fuels can be directly fired to drive turbines with the combustion gas or they can be used in internal combustion engines which can then drive generators. Each technology offers certain advantages to the operator especially in the ability to be operated according to variable power demand.

***Environmental Issues***

Most combustion installations use fuel and other raw materials taken from the earth's natural resources, converting them into useful energy. Fossil fuels are the most abundant energy source used today. However, their burning results in a relevant and, at times, significant impact on the environment as a whole. The combustion process leads to the generation of emissions to air, water and soil, of which emissions to the air are considered to be one of the main environmental concerns.

The most important emissions to air from the combustion of fossil fuels are $SO_2$, $NO_X$, CO, particulate matter ($PM_{10}$) and greenhouse gases, such as $N_2O$ and $CO_2$. Other substances such as heavy metals, halide compounds, and dioxins are emitted in smaller quantities.

***Conditions***

The BAT associated emission levels are based on daily average, standard conditions and an $O_2$ level of 6 % / 3 % / 15 % (solid fuels / liquid and gasous fuels / gas turbines) which represents a typical load situation. For peak loads, start up and shut down periods as well as for operational problems of the flue-gas cleaning systems, short-term peak values, which could be higher, have to be considered.

***Unloading, storage and handling of fuel and additives***

Some BAT for preventing releases from the unloading, storage and handling of fuels, and also for additives such as lime, limestone, ammonia, etc. is summarised below.

Table 1: Some BAT for storage and handling of fuel and additives

| | **BAT** |
|---|---|
| **Particulate matter** | • the use of loading and unloading equipment that minimises the height of fuel drop to the stockpile, to reduce the generation of fugitive dust (solid fuels)<br>• in countries where freezing does not occur, using water spray systems to reduce the formation of fugitive dust from solid fuel storage (solid fuels)<br>• placing transfer conveyors in safe, open areas aboveground so that damage from vehicles and other equipment can be prevented (solid fuels)<br>• using enclosed conveyors with well designed, robust extraction and filtration equipment on conveyor transfer points to prevent the emission of dust (solid fuels)<br>• rationalising transport systems to minimise the generation and transport of dust on site (solid fuels)<br>• the use of good design and construction practices and adequate maintenance (all fuels)<br>• storage of lime or limestone in silos with well designed, robust extraction and filtration equipment (all fuels) |
| **Water contamination** | • having storage on sealed surfaces with drainage, drain collection and water treatment for settling out (solid fuels)<br>• the use of liquid fuel storage systems that are contained in impervious bunds that have a capacity capable of containing 75 % of the maximum capacity of all tanks or at least the maximum volume of the largest tank. Tank contents should be displayed and associated alarms used and automatic control systems can be applied to prevent the overfilling of storage tanks (solid fuels)<br>• pipelines placed in safe, open areas aboveground so that leaks can be detected quickly and damage from vehicles and other equipment can be prevented. For non-accessible pipes, double walled type pipes with automatic control of the spacing can be applied (liquid and gaseous fuels)<br>• collecting surface run-off (rainwater) from fuel storage areas that washes fuel away and treating this collected stream (settling out or waste water treatment plant) before discharge (solid fuels) |
| **Fire prevention** | • surveying storage areas for solid fuels with automatic systems, to detect fires, caused by self-ignition and to identify risk points (solid fuels) |
| **Fugitive emissions** | • using fuel gas leak detection systems and alarms (liquid and gaseous fuels) |
| **Efficient use of natural resources** | • using expansion turbines to recover the energy content of the pressurised fuel gases (natural gas delivered via pressure pipelines) (liquid and gaseous fuels)<br>• preheating the fuel gas by using waste heat from the boiler or gas turbine (liquid and gaseous fuels). |
| **Health and safety risk regarding ammonia** | • for handling and storage of pure liquified ammonia: pressure reservoirs for pure liquified ammonia >100 $m^3$ should be constructed as double wall and should be located subterraneously; reservoirs of 100 $m^3$ and smaller should be manufactured including annealing processes (all fuels)<br>• from a safety point of view, the use of an ammonia-water solution is less risky than the storage and handling of pure liquefied ammonia (all fuels). |

***Fuel pre-treatment*** of solid fuel mainly means blending and mixing in order to ensure stable combustion conditions and to reduce peak emissions. To reduce the amount of water in peat and biomass, drying of fuel is also considered to be part of BAT. For liquid fuels, the use of pre-treatment devices, such as diesel oil cleaning units used in gas turbines and engines, are BAT. Heavy fuel oil (HFO) treatment comprises devices such as electrical or steam coil type heaters, de-emulsifier dosing systems, etc.

***Thermal efficiency***

Prudent management of natural resources and the efficient use of energy are two of the major requirements of the IPPC Directive. In this sense, the efficiency with which energy can be generated is an important indicator of the emission of the climate relevant gas $CO_2$. One way to reduce the emission of $CO_2$ per unit of energy generated is the optimisation of the energy utilisation and the energy generating process. Increasing the thermal efficiency has implications on load conditions, cooling system, emissions, use of type of fuel and so on.

Cogeneration (CHP) is considered as the most effective option to reduce the overall amount of $CO_2$ released and is relevant for any new build power plant whenever the local heat demand is high enough to warrant the construction of the more expensive cogeneration plant instead of the simpler heat or electricity only plant. The BAT conclusion to increase efficiency and the BAT associated levels are summarised in Tables 3 to 5. In this sense, it should be noted that HFO fired plants are considered to have similar efficiencies than coal fired plants.

No specific thermal efficiency values were concluded when using liquid fuels in boilers and engines. However, some techniques to consider are available in the respective BAT sections.

***Particulate matter (dust) emissions***

Particulate matter (dust) emitted during the combustion of solid or liquid fuels arise almost entirely from their mineral fraction. By combustion of liquid fuels, poor combustion conditions lead to the formation of soot. Combustion of natural gas is not a significant source of dust emissions. The emission levels of dust, in this case, are normally well below 5 mg/$Nm^3$ without any additional technical measures being applied.

For dedusting off-gases from new and existing combustion plants, BAT is considered to be the use of an electrostatic precipitator (ESP) or a fabric filter (FF), where a fabric filter normally achieves emission levels below 5 mg/$Nm^3$. Cyclones and mechanical collectors alone are not BAT, but they can be used as a pre-cleaning stage in the flue-gas path.

***Heavy metals***

The emission of heavy metals results from their presence as a natural component in fossil fuels. Most of the heavy metals considered (As, Cd, Cr, Cu, Hg, Ni, Pb, Se, V, and Zn) are normally released as compounds (e.g. oxides, chlorides) in association with particulates. Therefore, BAT to reduce the emissions of heavy metals is generally the application of high performance dedusting devices such as ESPs or FFs.

Only Hg and Se are at least partly present in the vapour phase. Mercury has a high vapour pressure at the typical control device operating temperatures, and its collection by particulate matter control devices, is highly variable. For ESPs or FFs operated in combination with FGD techniques, such as wet limestone scrubbers, spray dryer scrubbers or dry sorbent injection, an average removal rate of Hg is 75 % (50 % in ESP and 50 % in FGD) and 90 % in the additional presence of a high dust SCR can be obtained.

***$SO_2$ emissions***

Emissions of sulphur oxides mainly result from the presence of sulphur in the fuel. Natural gas is generally considered free from sulphur. This is not the case for certain industrial gases and desulphurisation of the gaseous fuel might then be necessary.

In general, for solid and liquid-fuel-fired combustion plants, the use of low sulphur fuel and/or desulphurisation is considered to be BAT. However, the use of low sulphur fuel for plants over 100 $MW_{th}$ can, in most cases, only be seen as a supplementary measure to reduce $SO_2$ emissions in combination with other measures.

Besides the use of low sulphur fuel, the techniques that are considered to be BAT are mainly the wet scrubber (reduction rate 92 – 98 %), and the spray dry scrubber desulphurisation (reduction rate 85 – 92 %), which already has a market share of more than 90 %. Dry FGD techniques such as dry sorbent injection are used mainly for plants with a thermal capacity of less than 300 $MW_{th}$. The wet scrubber has the advantage of also reducing emissions of HCl, HF, dust and heavy metals. Because of the high costs, the wet scrubbing process is not considered as BAT for plants with a capacity of less than 100 $MW_{th}$.

***$NO_X$ emissions***

The principal oxides of nitrogen emitted during the combustion are nitric oxide (NO) and nitrogen dioxide ($NO_2$), referred as $NO_x$.

For pulverised coal combustion plants, the reduction of $NO_X$ emissions by primary and secondary measures, such as SCR, is BAT, where the reduction rate of the SCR system ranges between 80 and 95 %. The use of SCR or SNCR has the disadvantage of a possible emission of unreacted ammonia ('ammonia slip'). For small solid fuel-fired plants without high load variations and with a stable fuel quality, the SNCR technique is also regarded as BAT in order to reduce $NO_X$ emissions.

For pulverised lignite and peat-fired combustion plants, the combination of different primary measures is considered as BAT. This means, for instance, the use of advanced low $NO_x$ burners in combination with other primary measures such as flue-gas recirculation, staged combustion (air-staging), reburning, etc. The use of primary measures tends to cause incomplete combustion, resulting in a higher level of unburned carbon in the fly ash and some carbon monoxide emissions.

In FBC boilers burning solid fuel, BAT is the reduction of $NO_X$ emissions achieved by air distribution or by flue-gas recirculation. There is a small difference in the $NO_X$ emissions from BFBC and CFBC combustion.

For new gas turbines, dry low NOX premix burners (DLN) are BAT. For existing gas turbines, water and steam injection or conversion to the DLN technique is BAT. For gas-fired stationary engine plants, the lean-burn approach is BAT analogous to the dry low NOX technique used in gas turbines.

For most gas turbines and gas engines, SCR is also considered to be BAT. Retrofitting of an SCR system to a CCGT is technically feasible but is not economically justified for existing plants. This is because the required space in the HRSG was not foreseen in the project and is, therefore, not available.

***CO emissions***

Carbon monoxide (CO) always appears as an intermediate product of the combustion process, BAT for the minimisation of CO emissions is complete combustion, which goes along with good furnace design, the use of high performance monitoring and process control techniques, and maintenance of the combustion system. Some emission levels associated to the use of BAT for different fuels are present in the BAT sections, however in this executive summary only the ones from gas-fired combustion plants are reported.

***Water contamination***

Besides the generation of air pollution, large combustion plants are also a significant source of water discharge (cooling and waste water) into rivers, lakes and the marine environment.

Any surface run-off (rainwater) from the storage areas that washes fuel particles away should be collected and treated (settling out) before being discharged. Small amounts of oil contaminated (washing) water cannot be prevented from occurring occasionally at a power plant. Oil separation wells are BAT to avoid any environmental damage.

The BAT conclusion for wet scrubbing desulphurisation is related to the application of a waste water treatment plant. The waste water treatment plant consists of different chemical treatments to remove heavy metals and to decrease the amount of solid matter from entering the water. The treatment plant includes an adjustment of the pH level, the precipitation of heavy metals and removal of the solid matter. The full document contains some emission levels.

***Waste and residues***

A lot of attention has already been paid by the sector to the utilisation of combustion residues and by-products, instead of just depositing them in landfills. Utilisation and re-use is, therefore, the best available option and has priority. There are many different utilisation possibilities for different by-products such as ashes. Each different utilisation option has different specific criteria. It has not been possible to cover all these criteria in this BREF. The quality criteria are usually connected to the structural properties of the residue and the content of harmful substances, such as the amount of unburned fuel or the solubility of heavy metals, etc.

The end-product of the wet scrubbing technique is gypsum, which is a commercial product for the plant in most EU countries. It can be sold and used instead of natural gypsum. Practically most of the gypsum produced in power plants is utilised in the plasterboard industry. The purity of gypsum limits the amount of limestone that can be fed into the process.

***Co-combustion of waste and recovered fuel***

Large combustion plants, designed and operated according to BAT, operate effective techniques and measures for the removal of dust (including partly heavy metals), $SO_2$ $NO_x$, HCl, HF and other pollutants as well as techniques to prevent water and soil contamination. In general, these techniques can be seen as sufficient and are, therefore, also considered as BAT for the co-combustion of secondary fuel. The basis for this is that the BAT conclusions and, in particular, the emission levels associated with the use of BAT as defined in the fuel specific chapters. A higher input of pollutants into the firing system can be balanced within certain limits by adaptation of the flue-gas cleaning system or by limitation of the percentage of secondary fuel that can be co-combusted.

**PROGRAMME**
**Training Workshop on Integrated Pollution Prevention and Control (IPPC) and on Best Available Techniques (BAT)**

**Sarajevo January 25 – 26, 2007**

**Date: January 25, 2007 – Day 1**

| Time | Topics | Speaker |
|---|---|---|
| **9.00** | Welcome and introduction to the seminar<br>UNDP/GEF Danube Regional Project, component Industrial Policy as a part of the ICPDR activities – introduction | John Adams<br>Head Corporate Director Ramboll |
| **9.15** | General introduction to IPPC<br>- philosophy / procedure / - stakeholders<br>implementation of the directive in EU member states | Thomas H. Owen PhD. Managing Director Ekopen |
| **10.15** | Workshop Textbook Presentation | Eleonóra Bartková Project Manager |
| **10.30** | ***Coffee Break*** | |
| **11.00** | Introduction to BAT concept (objectives, BAT related Emission Limit Values and Environmental Quality Standards | Eleonóra Bartková Project Manager |
| **11.30** | Discussion | Project team/ Participants |
| **12.00** | ***Lunch*** | |
| **13.00** | Monitoring in Integrated Approach | Eleonóra Bartková Project Manager |
| **13.45** | Discussion | Project team/Participants |
| **14.00** | Use of BREFs | Eleonóra Bartková Project Manager |
| **15.00** | ***Coffee Break*** | |
| **15.30** | Discussion about the BATs and the use of gained knowledge | Project team/Participants |
| **16.00** | Working Groups Assignment 1 | John Adams<br>Head Corporate Director Ramboll<br>Participants/Facilitators |
| **17.00** | Working Groups Presentations of Assignment 1 | Working Group Reporters |
| **17.30** | The end of the first day | |

**Date: January 26, 2007 – Day 2**

| Time | Topics | Speaker |
|---|---|---|
| **8.30** | BAT in selected industry (specially in cement industry) | Thomas H. Owen PhD. Managing Director Ekopen |
| **9.30** | Questions and Discussion | Project team/Participants |
| **10.00** | ***Coffee Break*** | |
| **11.30** | Working Groups Presentation of Assignment 2 | Working Group Reporters |
| **12.00** | ***Lunch*** | |
| **13.00** | The end of Training Workshop | |

**EVALUATION OF THE WORKSHOP**

Twenty evaluation forms were filled out by participants of the workshop. Based on these evaluation forms, it can be concluded that the workshop was highly successful, since most of the participants answered with marks 5 and 4 to the questions asked.

All the participants confirmed that they received the invitation on time, as well as the agenda and the workshop objectives.

Of twenty evaluation forms that were filled out, in seventeen of them it is stated that the workshop fulfilled its objectives, while in only three of them it is said that objectives have been fulfilled partially.

**Marks given to each question are presented in the following table**:

| Question | No. of participants who gave mark 5 | No. of participants who gave mark 4 | No.of participants who gave mark 3 | No.of participants who gave mark 2 | No.of participants who gave mark 1 |
|---|---|---|---|---|---|
| Overall quality of the training | 10 | 9 | 1 | | |
| How was the level of participation? | 13 | 6 | 1 | | |
| Were the training methods appropriate? | 8 | 11 | 1 | | |
| What is the applicability of the training content to your working context? | 3 | 13 | 4 | | |

As most important part of the training content the participants mentioned the following: "exchange of experiences"; "presence of all people dealing with environment-related issues (entity, cantonal and local level)"; "practical examples from both entities"; "presentations on BAT and BREFs"; "work

in groups”; “discussion about concrete problems in vegetable and fruit processing industry” and the like.

A large number of them gave comment that the entire workshop was very useful.

With regard to recommendations of what could be improved in future workshops, they gave the following comments: “more practical examples”; “more examples from B&H“; “invite more people in charge of environmental permitting and inspectors from smaller municipalities”; “more workshops like this one”.

Almost all participants mentioned that it is necessary to have more concrete examples, and more examples from B&H – which means that workshop, should be more adapted to local conditions. Hence, this should be taken into account during organisation of future workshops.

# ANNEX 4
# THE IMPACT OF BAT IMPLEMENTATION ANALYSIS

## A.3. CASE STUDIES ON IMPACT OF BAT/IPPC IMPLEMENTATION IN THE DANUBE RIVER BASIN

### Introduction

It is anticipated that the introduction of the use of BAT by industries and agriculture would result in a positive impact on surface water pollution in the DRB. The use of modern technologies which produce lower pollution and the introduction of more stringent emission limit values reduce discharges. The application of the BAT concept also leads to more efficient prevention for, by example stressing the use of less dangerous substances as well changing behavior which is also an important BAT factor.

While the benefits of the application of BAT are logical, the quantitative assessment of BAT implementation impact is extremely difficult. It requires very detailed knowledge of the data in each installation because the permitting process is installation specific. The data required for impact calculation includes both the knowledge of technology status as well as current emissions. Such data is not currently generally available and it can not be expected to be available in near future. This means that only very broad estimates can be made with the limited data. The ICPDR Draft Emission Inventory 2002 provides a good overview of discharges from the majority of installations in the region which can be used for the estimation of BAT implementation impact.

### Methodology

The estimate is based on more detailed knowledge of selected pilot IPPC installations/case studies in two industrial sectors; chemical and pulp and paper. The pulp and paper industry was selected, in part, because it is the largest discharger of COD accounting for almost 50% of total discharges in the DRB (Emission Inventory 2002).

The detailed information gathered from the two installation case studies provided the data on the reduction of pollution and other impacts due to BAT implementation at the installation. The order of magnitude of reduction was confirmed by comparing average levels of concentration data from installations in Germany which have already implemented BAT with those in installations in Croatia and Romania which have not yet implemented BAT. The reduction in COD in the pulp and paper case study was then projected to the rest of the pulp and paper installations in the 2002 EMIS Inventory. This resulted in an estimate of the BAT implementation impact in that sector. The calculation was based on simple multiplication. The reductions in pollutants in the pulp and paper sector were then applied on a percentage bases to the total COD discharges. This resulted in a general estimate which is consistent with the type and amount of data available. The estimate should be used with caution recognizing that it is preliminary estimate. However, even with these qualifications it is hoped that the estimate will be the starting point for further more detailed calculations as more installations implement BAT and more installation specific data become available.

## Impact analysis and estimation

### Pulp and paper sector

The pilot installation **Kappa Sturovo** is a Slovak pulp and paper company which discharges waste water into the Danube River The EMIS 2000 and 2002 inventory data were supplemented by 2005 data which were obtained during a site visit to the company. The company is in the process of obtaining an integrated permit for the pulp and paper installation and an integrated permit for its large combustion plant has already been issued. The following table shows the emission data for 2000, 2002 and 2005.

Table 1. Emissions in the pilot installation Kappa Sturovo in 2000, 2002 and 2005

| Pollutant | Unit | Total load discharged | | |
|---|---|---|---|---|
| | | Year 2000 | Year 2002 | Year 2005 |
| Waste water volume | Thousand $m^3$ /year | 12823 | 12600 | 9700 |
| COD | t/year | 7489 | 6310 | 3000 |
| BOD | t/year | 2963 | 2140 | 970 |
| TOT-N | t/year | 84,6 | 4,3 | 19 |
| TOT-P | t/year | 498 | 96 | 39 |
| SS | t/year | 2411 | 2430 | 1500 |
| Non polar extractable substances | t/year | - | 14 | 5,5 |
| Dissolved inorganic substances | t/year | 6180 | 5500 | 4300 |

The 2005 data show a reduction of waste water volume as well as total load of pollutants discharged as a result of technology and waste water treatment changes. In 2004 the company introduced a change of pulp production technology to non-sulphur technology and changed the mechanical treatment of waste water to anaerobic and aerobic treatment. As seen from Table 1 the technology and waste water treatment resulted in significant reduction of waste water volume and all substantial pollutants while the production capacity has not changed. The changes resulted in a more than 50 % reduction in some pollutants (BOD, COD).

Additional calculations based on average concentration of pollutants in wastewater were done for installations which indicated the use of BAT (Germany) and companies which use out of date technologies (Romania, Croatia). The results confirm an almost 50 % difference in those companies which use BAT. Unfortunately the specific BAT parameters can not be calculated as the production capacities are not known.

In conclusion it can be seen that the use of BAT in non-EU countries can result in significant reduction of industrial pollution which can reach more than 50% in the case of COD. The total annual COD emission in the pulp and paper sector in 2002 (excluding Austria and Germany where

BAT was already in place) was 53,306 t/a. Therefore applying the estimate of a 50% reduction would result in a reduction in pulp and paper industrial COD discharges of 26,653 t/a.

The total number of pulp and paper installations in the DRB excluding Austria and Germany is 21 and their distribution by country is seen in Table 2. Non-EU countries have 12 installations with potential reduction of pollutants similar to the pilot installation.

Table 2. Pulp and paper installations in DRB countries

| | |
|---|---|
| Bosnia i Herzegovina | 1 |
| Bulgaria | 1 |
| Croatia | 1 |
| Czech Republic | 3 |
| Hungary | 3 |
| Romania | 5 |
| Slovakia | 1 |
| Slovenia | 2 |
| Ukraine | 4 |
| COD total | 53306,86 t/year |

**Chemical sector**

The Novaky Chemical Plant was selected as a pilot installation. The company produces a large volume of inorganic and organic chemicals. The company is very complex. It has 12 IPPC installations and three IPPC permits have already been issued (ethylene chloral hydrine, dichlorl-ethane and poly-vinyl alcohol/poly-vinyl acetate).

Table 3. Emissions in the pilot installation Novaky Chemical Plant in 2000 and 2002

| Pollutant | Unit | Total load discharged | |
|---|---|---|---|
| | | Year 2000 | Year 2002 |
| waste water volume | Thousand $m^3$ /year | 4853 | 5890 |
| COD (chemical oxygen demand) | t/year | 1391 | 1990 |
| BOD5 (biological oxygen demand) | t/year | 282 | 545 |
| SS (suspended solids) | t/year | - | 101 |
| Hg (mercury) | t/year | - | .2 |
| non polar extractable substances | t/year | - | 3.5 |
| dissolved inorganic substances | t/year | - | 31500 |

Discussions with representatives of Nováky Chemical Plant during the site visit showed the very high complexity of the problem and therefore it is not realistic to come with any quantitative estimates.

Nevertheless, the discussions also confirmed that technological changes and the use of BATs have already resulted in reduction of pollutants in the three IPPC installations which received integrated permits. The company is undergoing further technological changes which will result in significant

reduction in mercury discharge (de-mercurisation) as the emission limit values exceed almost 100 times the BAT required values.

**Food sector**

Simple calculations of average concentrations of some pollutants in discharges in installations in EU member countries and those in non-EU countries have shown significant differences in favor of EU countries. The differences in average concentrations were up to 50 % higher in non-EU country installations. Unfortunately, the lack of more detailed data makes more reliable estimates for this group of industries impossible.

## Conclusion

The above analysis shows clearly that the hypothesis of that BAT implementation will have a positive impact on pollution reduction in the DRB is correct. The reduction of 50% estimated for COD for the pulp and paper industry would result in an annual reduction of 26,653 t/a in that sector. Applying the same calculation to total industrial COD discharges of 133,950 t/a (excluding Austria and Germany) the reduction would be 66,975 t/a. As was mentioned in the introduction the estimates are very preliminary and based upon the data available so caution should be used in their use. Actual reductions may be higher or lower and are subject to a variety of factors which are not part of this analysis for example the closure of installations and new installations which may be built. Nevertheless, it is anticipated that these estimates will be only the first step in developing estimates for future pollution reductions due to the implementation of BAT and other measures in the DRB.

WORKING FOR THE DANUBE AND ITS PEOPLE