

# GEF FINAL EVALUATION

## **Transfer of Environmentally Sound Technologies (TEST) to Reduce Transboundary Pollution in the Danube River Basin**



**PROJECT TITLE:** [Transfer of Environmentally Sound Technology \(Test\) to Reduce Transboundary Pollution In The Danube River Basin](#)

**PARTICIPATING COUNTRIES:** [Bulgaria, Croatia, Hungary, Romania and Slovak Republic](#)

**UNDP PROJECT NUMBER :** [RER/00/G35](#)

**GEF Project Number:** [867](#)

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David H. Vousden - GEF Project Design Specialist and Evaluator. March 2005.

## **Acronyms**

AB	Advisory Board
APR	Annual Progress Review
BAT	Best Available Technology
BOD	Biological Oxygen Demand
CEE	Central and Eastern Europe
CESD	Centre for Environmentally Sustainable Development
COD	Chemical Oxygen Demand
COMFAR	Computer Model for Feasibility Analysis and Reporting
CP	Cleaner Production
CPA	Cleaner Production Assessment
CPC	Cleaner Production Centre
DRP	Danube Regional Programme
EA	Executing Agency (of GEF)
EMA	Environmental Management Accounting
EMIS	Danube Regional Project's Expert Group on Emissions
EMS	Environmental Management System
EST	Environmentally Sound Technology
EU	European Union
GEF	Global Environment Facility
IA	Implementing Agency
ICPDR	International Convention for the Protection of the Danube River
IPPC	Integrated Pollution Prevention and Control
ISO	International Organisation for Standardisation
M&E	Monitoring and Evaluation
M&EB	Mass and Energy Balance
MSP	Medium-Sized Project
NCPC	National Centre for Pollution Control
NGO	Non-Governmental Organisation
NPO	Non-Product Output
OP	Operational Programme (of GEF)
PDF	Project Development Facility (of GEF)
POPS	Persistent Organic Pollutants
QMS	Quality Management System
REC	Regional Environmental Centre
SAP	Strategic Action Plan
SES	Sustainable Enterprise Strategy
SQA	Semi-Quantitative Score
TDA	Transboundary Diagnostic Analysis
TEST	Transfer of Environmentally Sound Technology
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organisation
USAID	United States Agency for International Development
VOC	Volatile Organic Compounds

## **1. EXECUTIVE SUMMARY**

The GEF Transfer of Environmentally Sound Technologies project was implemented by UNDP and Executed by UNIDO. In the three-year period of the MSP, the project successfully completed training and knowledge transfer related to capacity building and institutional strengthening at both the level of the selected demonstration enterprises and at the level of the national counterpart institutions (Cleaner Production Centres, Pollution Control Centres, etc). The actual demonstrations of the TEST approach in 17 enterprises was equally as successfully with considerable investment made by the selected companies into the adoption of cleaner production processes and environmentally sound technology.

There are some concerns related to Project Design, which should be noted for future consideration. Activities for replication and transfer of lessons from the Project's achievements to other beneficiaries and stakeholders within the countries and the Danube Basin as a whole were weak. These can be related to the absence of any specific transfer and replication mechanism or linkages, and the fact that the Project was constrained by its MSP modality and funding limitations (and, to some extent, 3-year time limitation). Furthermore, the total funding identified in the Project Document was not fully realised. The Project Document also has no reference to sustainability of the Project's objectives or of the GEF investment.

In this respect, it must be stated that the Project Management and the Execution Process achieved a very high level of success from the point-of-view of completion of the Project activities and delivery of intended outputs. Any criticism has to rest with the Project Design and not its Execution or Management.

The Terminal Evaluation finds this project to have been most notably successful and a very worthwhile example of a GEF MSP investment from which many valuable lessons and practices can be captured. The Evaluation provides a number of recommendations, including the proposal that serious consideration be given to further investment to transfer these lessons and best practices and to build on the substantial achievements of the TEST project. The Evaluator applauds the Executing Agency, the Project Coordinator and the in-country Coordinators and Project Teams for a praiseworthy achievement.

## **2. EVALUATION PROCESS (PURPOSE AND METHODOLOGY)**

The purpose of a GEF Independent Terminal Evaluation is to enable all of the direct stakeholders OF the project (Government, private sector, the Implementing Agency, the Executing Agency, GEF, NGOs, etc.) to review achievements and delivery, and to identify valuable lessons and practices that need to be captured and sustained. To this end it is important that such an evaluation gathers as much input and feedback as is possible from a broad spectrum of all project stakeholders and beneficiaries related to the project objectives.

The Evaluation attempts to determine, as systematically and objectively as possible, the relevance, efficiency, effectiveness, impact and sustainability of the project. The Evaluation will assess the achievements of the project against its objectives, including a re-examination of the relevance of the objectives and of the project design. It will also identify factors that have facilitated or impeded the achievement of the objectives. While a thorough review of the project design and implementation is in itself very important in order to explain or justify project trends and/or amendments, such an in-depth evaluation is ultimately an important tool for providing detailed recommendations with regard to the current project and its outputs, and for capturing best practices and lessons which can be used to structure and drive future initiatives.

The Evaluation places its emphasis on results and delivery, with reference to any measurable indicators as defined within the Project Document or subsequent Annual Project Reviews/Project Implementation Reviews. However, the evaluation also recognises that GEF Projects are, by nature, dynamic and constantly evolving, and that this requires flexibility and understanding when reviewing a project in the context of its original objectives and intended outputs.

It is important to see the Evaluation not merely as a monitoring process required by GEF but more as the final opportunity to scrutinise and review what the project has achieved and learned. The Evaluation is the instrument that helps all parties to identify valuable lessons, document successes (and failures) and best practices (as well as those to be avoided). It provides closure to a project while allocating a degree of achievement, but it should also identify any logical next steps and potentially valuable follow-up exercises. Of course, most importantly, it also provides guidance for similar GEF project design and implementation in the future.

Further details regarding the Monitoring and Evaluation requirements of UNDP/GEF and the Objectives and Purpose of this Evaluation can be found under the Terms of Reference for the Evaluation (Annex I). Annex II provides a list of the persons/agencies/bodies interviewed during the course of the evaluation. Annex III gives a list of the documents reviewed.

In looking at the achievements of any Project, it is necessary to review the Outputs against any measurable indicators provided by various Project documents. This often requires some level of rating or quantitative scoring. To this effect, the Evaluator has used a **Semi-Quantitative Assessment** approach which aims to assess the actual achievements of the project up to the time of completion against the anticipated achievements as defined in the Project Document and/or APR/PIR.

This SQA approach assigns a scale of achievement for each output (based on the expected delivery and the success criteria for measuring that delivery) This provides a useful and quite accurate guideline to which components were completed, which were not, and what the reason may be for any lack of delivery. This is not intended to be an exercise in criticism, but more importantly one whereby valuable lessons and practices can be identified and captured both for the sake of the current project and for future GEF projects.

This assessment uses a judgement of the percentage of achievement per activity or output against the original intention of the Project. To smooth-out the subjective nature of this approach, this percentage is then converted to a scale from 1-5 whereby:

- 0– 1.1 = Almost No Delivery –The Project has effectively failed in its objectives.
- 1.1-2.0 = Limited effective delivery - generally poor and unsustainable. Project unlikely to have secured its objectives.
- 2.1-3.0 = Borderline – Some notable achievements and delivery in specific areas but weak in others. Considerable additional effort necessary to secure intended objectives.
- 3.1-4.0 = Good, Effective Delivery – Most activities or outputs have delivered as expected. Project has met majority of its objectives and has produced benefits consistent with GEF operational strategy. Project could have benefited from some changes in design or realignment of priorities. Some possible areas of weakness that could be strengthened through follow-up activities.
- 4.1-5.0 = Excellent Delivery – All outputs delivered as planned. Full stakeholder support. Project undoubtedly successful and sustainable.

The SQA scores for Project Delivery, Management and Implementation are presented and discussed at the end of each section.

Section 5 (**Conclusions of Evaluation**) of this report presents the SQA scores for the overall objectives and components of the Project as defined both in the Project Document and subsequent APR/PIRs, as well as by the GEF criteria for Projects and discusses their implications. This includes an extrapolated composite score for the Project Outputs and Activities.

This Evaluation was conducted during the February-March 2005. The Evaluator conducted interviews and made observations in Bulgaria, Croatia and Slovakia as well as at UNIDO Headquarters in Vienna, Austria. This included field-trips to selected enterprises in Croatia and Slovakia as well as the opportunity to observe and ask questions at the final TEST National Dissemination Workshop in Sofia, Bulgaria. Further follow-up consultations were carried out in the 3 weeks following the Evaluation Mission in order to qualify any concerns and to fine-tune the Evaluation report.

### **3. PROJECT BACKGROUND AND LANDSCAPE**

#### **3.1. Objectives**

##### **Overall Project Objective and Description**

The UNDP/GEF Pollution Reduction Programme identified 130 major manufacturing enterprises of concern (known as hot spots) within the Danube River Basin; a significant number of these were contributing to transboundary pollution in the form of nutrients and/or persistent organic pollutants. In spite of the environmental problems they were causing, there was a lack of convincing evidence that it is possible to comply with environmental norms while still maintaining or perhaps enhancing their competitive position. This project set out to build capacity in existing cleaner production institutions in five Danubian countries to apply the UNIDO programme on Transfer of Environmentally Sound Technology (TEST) at selected pilot enterprises that were contributing to transboundary pollution in the Danube River Basin and the Black Sea. The aim of the assistance was to bring these pilot enterprises into compliance with environmental norms of the Danube River Protection Convention while at the same time taking into account their needs to remain competitive and to deal with the social consequences of major technology upgrading. The enhanced institutional capacity would then be available to assist other enterprises of concern in these countries as well as other Danubian countries.

##### **Development Objective –from the 2003 APR/PIR**

- To improve industrial environmental management by major industrial enterprises in the Danube River Basin, resulting in Major reductions in pollutant loading and consequently risk to the Danube River and Black Sea aquatic environments.
- To build capacity in networks of national cleaner production institutions to advise the enterprises in the five participating countries on how to implement the TEST approach.

#### **3.2. Justification for the Project (Taken from the Project Document)**

The Danube River basin is the heartland of central Europe. The main river is 2,857 km long and drains 817,000 sq. km including all of Hungary; most parts of Romania, Austria, Slovenia, Croatia, and Slovakia; and significant parts of Bulgaria, Germany, the Czech Republic, Moldova and Ukraine. Territories of FR Yugoslavia, Bosnia and Herzegovina and small parts of Italy, Switzerland, Albania and Poland are also included in the basin. The Danube River discharges into the Black Sea through a delta which is the second largest natural wetland area in Europe.

### *Water Quality Problems in the Danube*

The Transboundary Analysis (TDA) for the Danube River Basin (1999) identified the following main problems that affect water quality use: high load of nutrients and eutrophication; contamination with hazardous substances, including oils; microbiological contamination; contamination with substances causing heterotrophic growth and oxygen depletion and competition for available water. The human activities contributing significantly to these problems are human settlements, agriculture and industry.

Industry, atmospheric deposition, etc. cause about 20-30 per cent of the problem of excessive nitrogen and phosphorus in the Danube Basin. Old-fashioned fertilizer factories are major dischargers of nitrogen and their outdoor piles and lagoons of phosphor-gypsum are a special case of pollution by nutrients. Even if production on these sites is reduced or stopped, the gypsum stores will continue to be serious pollution sources in the future.

Industry and mining are responsible for most of the direct and indirect discharges of hazardous substances into the Danube Basin. Depending on the type of industry, the effluent might contain heavy metals (smelting, electroplating, chlorine production, tanneries, metal processing, etc.), organic micro-pollutants (pulp and paper, chemical, pharmaceuticals, etc.) or oil products and solvents (machine production, oil refineries, etc.). Mining activities result in drainage water from the mines, run off from tailings and from process water containing metals and sometimes organic solvents. Data on loadings of hazardous pollutants are available from only a few individual enterprises. Sewage is a main source of ammonia.

Organic materials discharged by human settlements and industry consume available dissolved oxygen. The impact is dependent on the total load, the type of organic substances, the water temperature, the dilution capacity and the initial oxygen concentration of the recipient. Serious oxygen deficiencies are most likely to occur in slow-flowing and stagnant waters. Downstream of major outlets, the oxygen concentration may drop below the level that can support aquatic life forms including fish populations and render the receiving waters unsuitable for drinking water supply and recreation. Such situations are occurring in the Danube tributaries: for example, the Vit River in Bulgaria is unable to support fish downstream of the city of Plevin, primarily due to discharges from a sugar factory, and discharges from the pulp and paper factory in Pietra Neamt have made one of the Siret tributaries unfit for most uses. The main stream of the Danube, however, has a very large dilution and oxygen mixing capacity that enables it to cope with heavy loads of organic materials.

### *Industrial Polluters*

In the frame of the UNDP/GEF Pollution Reduction Programme (PRP) in 1998/1999, country expert teams under the guidance of the respective country programme coordinators undertook a new, comprehensive review of the sources of pollution and their effects in the Danube River Basin and the Black Sea. Each national team developed a national review for their respective countries based on a common methodology. The results were then compiled and analysed at the regional



level in the TDA. Based on the TDA and the ICPDR Emission Expert Group, 130 industrial enterprises of concern (known as hot spots) were identified within the Danube River Basin.

The specifics of the transboundary pollution problems in the Danube River Basin and Black Sea originating from the industrial plants in the five countries selected to participate in the TEST programme can be briefly summarized: Bulgaria – 8 plants contributing to nutrient loadings of 50 tons/year or greater; Croatia-- 3 plants contributing to nutrient loadings of 50 tons/year or greater and 2 plants with other pollutant loading affecting a SIA in a neighbouring country; Hungary -- 4 plants contributing to nutrient loadings of 50 tons/year or greater and 2 plants with other pollutant loadings affecting a SIA in a neighbouring country; Romania--33 plants contributing to nutrient loadings of 50 tons/year and 5 plants with other pollutant loadings affecting a SIA in a neighbouring country and Slovakia-- 2 plants contributing to nutrient loadings of 50 tons/year or greater and 9 plants with other pollutant loadings affecting a SIA in a neighbouring country. Full details are available in the UNDP UNIDO GEF Project Document.

The major polluting industrial sub-sectors in terms of numbers of enterprises are food; paper, chemicals, and iron. Together these four sub-sectors account for about 75 per cent of the major industrial pollutant dischargers.

Thus despite the period of transition in most of Central and Eastern Europe that has led to serious changes in the level of industrial and agricultural activity, industrial pollution still remains a significant problem to be addressed by Danube Countries. Moreover, it can be expected that as economies in the region recover and industrial production increases, industrial pollution will also increase unless the source of pollution is adequately addressed.

### 3.3. Project Components and Outputs:

#### **COMPONENT I. Institutional Strengthening**

**Objective: To set up national focal points that would facilitate the transfer of ESTs to industrial enterprises in five Danubian countries**

The first step for successful implementation of the project is to strengthen national focal points that would facilitate the transfer of ESTs to industrial enterprises in five Danubian countries. The focal points will be working units within an already established NCPC or PCC. Success under this objective would be strengthened institutional capacity to apply the TEST approach. The availability of the strengthened capacity would be measured in terms of the availability of trained national team leaders and their deputies in the TEST approach, of operating information management systems and of boards of advisors actively involved in enterprises selection and oversight of activities.

#### **COMPONENT II. ENTREPRISE DEMONSTRATIONS**

**Objective: To apply the TEST approach to at least twenty enterprises located in the Danube River Basin**

The outputs and activities under this objective are the core of the project. Under this objective national teams will apply the TEST approach in the five countries in order to show 20 enterprises that it is possible to comply with environmental norms and still remain or perhaps enhance their competitive positions. Success under this objective would be enterprise application of the TEST approach, both individual components and of all seven components. Successful application would be measured in terms of at least 15 out of the 20 participating enterprises applying the full TEST

approach to their operations and a larger number of firms applying most of the seven components. In addition, there should be significant pollutant reduction (at least 30 per cent) by at least ten of the 20 enterprises and some pollutant reduction by the other ten enterprises at the end of the project. Full compliance with environmental norms will take additional years because of the need to install the EST packages at the enterprises.

### **COMPONENT III. Diffusion of Results**

#### **Objective: The diffusion of experience with the twenty pilot enterprises to other enterprises in the five participating countries and to other Danubian countries**

The ultimate aim of the project is to persuade other polluting enterprises in the Danube that national institutions are available and capable of assisting them to devise cost effective plans for compliance with environmental norms. Success under this objective would be wide spread awareness and demand for the TEST approach among the major industrial enterprises causing pollution of the Danube.

## **4. FINDINGS AND EVALUATION**

### **4.1. Project Delivery**

The overall objective of the Project was to build capacity in existing cleaner production institutions to apply the UNIDO Transfer of Environmentally Sound Technology (TEST) procedure to technology transfer to 17 enterprises that are contributing to transboundary pollution, and primarily nutrients, in the Danube River Basin and the Black Sea.

Existing CPCs were functional within 3 of the Project countries (Croatia, Hungary and Slovakia) at the start of the Project. Other pertinent institutions had to be identified for the other two countries (Bulgaria and Romania). The institutes initially proposed at the national level within these latter two countries were found to be inappropriate once the project was under way and new counterpart institutes had to be identified. In the case of Romania this change was almost immediate and did not cause any significant delays in project activities and delivery. In Bulgaria however, the situation was much more complicated and the project went through two inappropriate counterpart institutions before finally identifying the necessary capacity and effective project ownership within the Technical University of Sofia. In this respect, a preparatory phase would have been helpful (in this case a PDF A which is the only option available for an MSP) during which the counterpart institutions could have been identified after working closely with one or two national potential candidate institutes as part of the process of stakeholder involvement in project preparation. This would have allowed the Executing Agency and Project Coordinator to 'get to know' the institutes and personalities first before committing the project to a particular counterpart. A more elongated project preparation phase would have been possible with a Full GEF Project and raises the question of whether a Full project would have been more appropriate to such a detailed multi-country demonstration approach. This will be discussed further.

The following statement from the Evaluation Terms of Reference provides some useful guidance for the evaluation process in this respect:

### **TEST Project Implementation Strategy**

The project implementation strategy has been adjusted during project implementation, as indicated in the UNDP/GEF Project Implementation Report (PIR<sup>1</sup>) June 2003 (section 3) in order to reflect country specific conditions and to achieve the project objectives in a timely and cost-effective way. By replacing the original step-by-step approach with the integrated approach, the revised TEST project implementation strategy promotes synergies between different and complementary environmental management tools supporting top management decision-making processes in medium and long-term planning toward environmental compliance and eco-efficiency.

The TEST integrated approach to industrial environmental management developed by UNIDO, has been designed to assist enterprises in the developing and transitional countries to effectively adopt Environmentally Sound Technology (EST). The application of the TEST integrated approach and its tools, leads to continuous improvement of the economic and environmental profiles of companies.

The integrated TEST approach is based on three basic principles:

First, it gives priority to the preventive approach of Cleaner Production (systematic preventive actions based on pollution prevention techniques within the production process) and it considers the transfer of additional technologies for pollution control (end-of-pipe) only after the cleaner production solutions have been explored. This leads to a transfer of technologies aimed at optimizing environmentally and financially optimized elements transfer of technologies: a win-win solution for both areas.

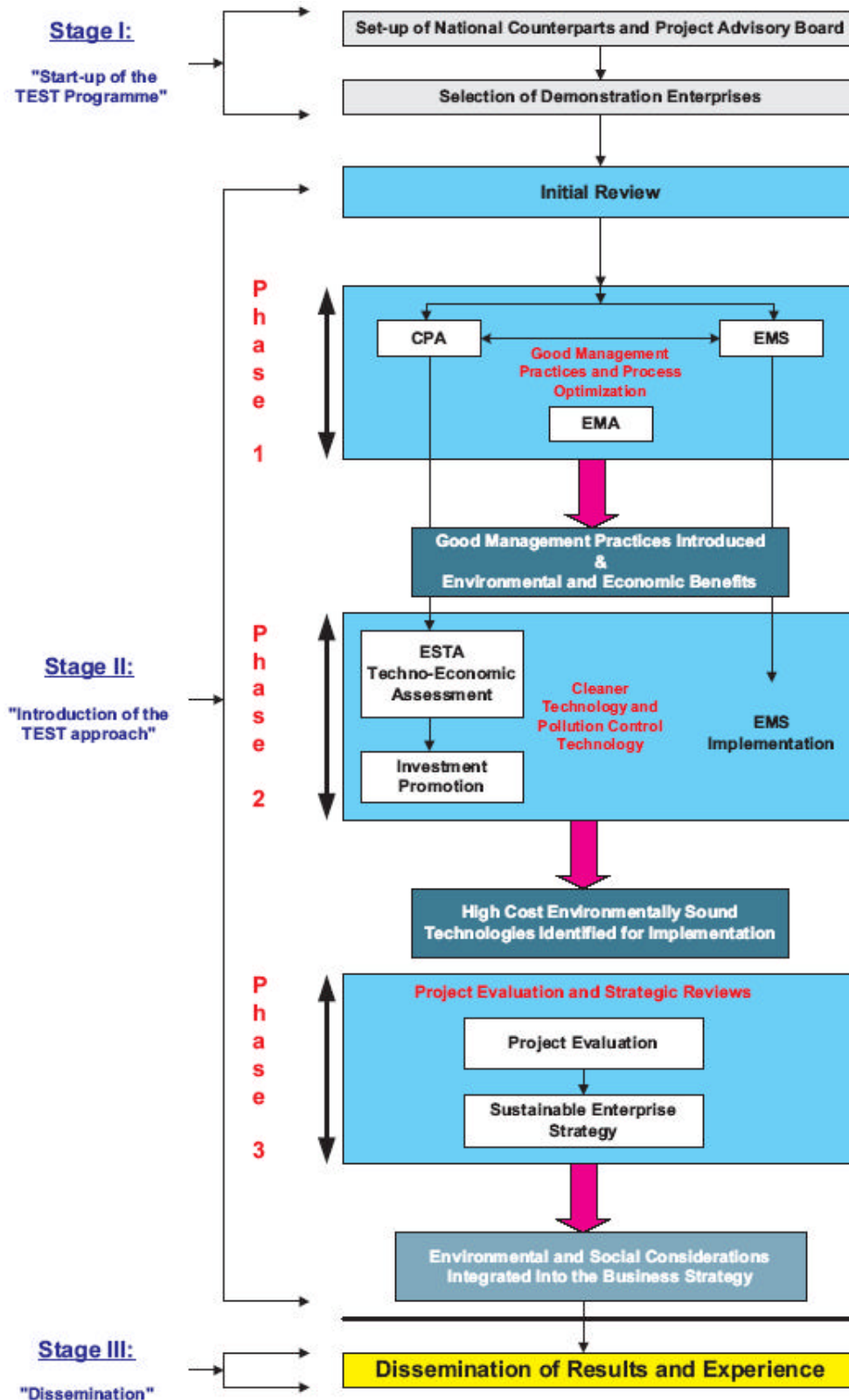
Second, the integrated TEST approach addresses the managerial aspects of environmental management as well as its technological aspects, by introducing tools like such as Environmental Management System (EMS) and Environmental Management Accounting (EMA).

Third, it puts environmental management within the broader strategy of environmental and social business responsibilities, by leading companies towards the adoption of sustainable enterprise strategies (SES).

The schematic diagram below shows the stages of the revised TEST implementation strategy.

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<sup>1</sup> For additional details on the revised implementation strategy see the related PIR - June 2003



Consequently, it should be noted that the original Project Document had proposed to use a stepwise approach to promoting EST, CP and an EMS. However, once the project started implementation, the stakeholders discussed the actual merits of this approach versus other options and agreed that a

more integrated parallel development approach was necessary rather than the intended A->B->C serial approach

As a result of these modifications, the project then realigned itself to build capacity and expertise within the CPCs and related institutes to be able to deliver this new integrated approach, and to demonstrate the approach through the project implementation and through the individual industrial enterprise demonstrations. The original approach was defined within the Project Document as a series of steps through the selection, training and re-education process whereby the industrial enterprises either met the requirements of the project or dropped out of the demonstration. The original TEST approach was expensive (requiring almost continuous assessment of many potential enterprises) and would not capture the investment by GEF and the stakeholders efficiently. It allowed too many chances for enterprises to drop out or opt out of the demonstration process even once considerable time and investment had been made in support of those enterprises. This modification of the project approach was pragmatic and necessary particularly in view of the shortage of available budget within the constraints of a GEF MSP. Furthermore, the stepwise approach was technically inefficient. Instead, enterprises were pre-selected on the basis of existing, published information. Once the enterprises realised that they would also need to contribute time, financial and human resources to the project aims there was a natural selection process through attrition and lack of 'ownership' for the project concepts and outcomes. In the end 17 enterprises volunteered for the demonstration process.

The Project was effectively providing capacity building, training and delivery in the following TEST tools (definitions derived from descriptions in *'Increasing Productivity and Environmental Performance: An Integrated Approach. Know-how and experience from the UNIDO project - Transfer of Environmentally Sound Technology (TEST) in the Danube river basin'* (Authors: Roberta De Palma, Vladimir Dobes):

**Cleaner Production (CP):** The continuous application of an integrated preventive environmental strategy applied to industrial processes, products and services to increase overall efficiency and reduce risk to humans and the environment. The process includes conservation of raw materials, water and energy, the elimination of toxic and dangerous raw materials, and the reduction of the quantity and toxicity of all emissions and wastes. CP generates financial as well as environmental benefits by encouraging companies to use processes that are more productive and cost-effective.

**Environmental Management System** This is partly evolved from the Quality Management Systems that are commonly developed within companies. It can be defined as that part of the overall management system that includes the organised structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy. It should be an integral part of the existing management system and should be harmonised with any existing quality management system in the company.

**Environmental Management Accounting:** Monetary EMA is a sub-system of environmental accounting that deals only with the financial impacts of a company's environmental performance. It allows management to better evaluate the monetary aspects of products and projects when making business decisions. EMA assists business managers in making capital investment decisions, costing determinations, process/product design decisions, performance evaluation and a host of other forward-looking business decisions. As such, EMA has an internal company-level function and focus, as opposed to being a tool for reporting environmental costs to external stakeholders. This gives EMA the flexibility to take into consideration the special needs and conditions of the company. EMA tends to focus more on materials, energy flow, and environmental cost considerations.

**Environmentally Sound Technology:** This is a combination of best available techniques and best available practices. In most cases the introduction of good management practices alone are insufficient to solve a company's environmental problems and to bring it into compliance with environmental norms, or to greatly improve environmental performance. Investments in technological changes or end-of-pipe solutions are also usually necessary. The concept of EST also builds on the concept of BAT (Best Available Practices) where 'Best' refers to best environmental performance while 'available' refers to economic feasibility as well as availability of the technology on the market.

**Sustainable Enterprise Strategy:** The purpose of the SES is to assist management of the company to turn the core strategic environmental/social success factors (as identified during the implementation of the TEST approach) into formal performance objectives aligned with the objectives of the company's business strategies (financial, marketing and operational). This means that the environmental and social objectives of the company are not 'stand-alone' objectives, but are connected to the other objectives of the company and ultimately contribute to achieving the financial goals of the business. Integration of the added dimensions of environmental and social considerations should therefore demonstrate a clear competitive advantage within the business plan.

**COMFAR:** A Computer Model for Feasibility Analysis and Reporting. This is a software tool developed by UNIDO and intended as an aid in the analysis of investment projects. The program is applicable for the analysis of investment in new projects, and for the expansion or rehabilitation of existing enterprises.

The above tools cannot, however, be treated in isolation and should be seen as a series of overlapping and even interwoven modules that can be plugged in or omitted depending on the conditions prevailing within the company, and on the assessment and investment needs of that company. The adopted procedure for TEST within each enterprise would be decided through the Initial Review prior to initiation of the CPA, but also through the outcomes and recommendations of the CPA itself.

So, the procedure for building improved production linked to environmentally sound processes was re-structured prior to its implementation to be a more phased approach. Enterprises were now expected to complete a logical series of integrated activities before moving onto the next phase. For example, the first phase focussed on introducing management tools in support of cleaner production and more environmentally sound approaches, and demonstrating their use and value. The next phase addressed the need to change the technology through investment in new technology where appropriate, coupled with on-going changes to company policy and management through improved awareness. The final phase was to deliver the final outcome of the demonstration package which was the EST assessment linked into a business plan which effectively constituted a Sustainable Enterprise Strategy (SES) for the company.

To this effect, the project itself acted now as an overall demonstration exercise for a new integrated and phased approach to improving productivity while increasing environmental performance and for evolving an effect mechanism for the adoption of environmental management accounting at the industrial enterprise level. This resulted in a set of concrete project outputs in the form of two UNIDO-funded publications:

1. Increasing Productivity and Environmental Performance: An Integrated Approach. Know-how and experience from the UNIDO project "Transfer of Environmentally Sound Technology (TEST) in the Danube river basin" (Authors: Roberta De Palma, Vladimir Dobes)

2. Introducing Environmental Management Accounting at Enterprise Level. Methodology and Case Studies from Central and Eastern Europe. (Authors: Roberta de Palma, Maria Csutora).

These two publications carry most of the pertinent information and explanation of the revised TEST process and methodology, how it should be applied, along with a selection of case studies which demonstrate its effective application. This information has been shared with all of the countries of the Danube basin along with the national TEST publications. These national publications identify achievements at each national enterprise by way of economic improvements, reduced emissions and discharges, low raw material costs, and proposed longer-term TEST-related investments.

Undoubtedly the project has succeeded in its role of institutional strengthening and capacity building as is discussed in further detail below. All of the counterpart CPCs and institutes have received significant training in the TEST procedure both at the desk-top level and through actual experience in assisting the enterprises themselves. At the end of the MSP this has left all of the counterpart agencies in a strong position to provide a significant level of national and regional support to industry in cleaner production assessment and techniques, environmental systems and environmental management accounting, right through the modular TEST process to the identification of environmentally sound technologies and the development of long-term sustainable enterprise strategies. Of course, this capacity building has also been established within the enterprises that have served as demonstrations. All of the enterprises now have a raised level of awareness and understanding of the TEST process and associated improvements, not only in cleaner production, but also in more cost-effective management of resources and wastes. Generally speaking, the concepts demonstrated to the enterprises by the TEST project have now become adopted into company policy on a day-to-day basis.

Furthermore, the overall objective of demonstrating reductions in discharges, and more efficient use of water resources in industrial processes, whilst maintaining economic sustainability and market competitiveness has been clearly demonstrated. There are still many improvements that can be made at the individual level of each enterprise that could improve discharge reductions and water use efficiency, but these are now mostly long-term changes in technology and will require reconstruction and consequent high investment costs. Serious consideration is necessary as to the next steps in this respect if GEF's investment to date is to be consolidated and improved. Within the context of a Medium Sized Project the achievements are considerable and noteworthy. It should also be noted that the TEST MSP went somewhat beyond its remit at a number of enterprises and considered the issue of energy efficiency and its implications to the Danube environment. This was a logical and sensible move as the concepts of energy efficiency dovetail well into the TEST process and can significantly effect both cleaner production as well as the overall cost-effective nature of a company's sustainable enterprise strategy.

The diffusion of results has been somewhat less successful at the regional level, although some significant steps have been taken at the national level. Clearly each country has undertaken dissemination activities and there has been at least one regional dissemination exercise but there is a need for a more effective replication and transfer mechanism for lessons and best practices. However, this should be seen in the context of financial constraints imposed on the project by the design and modality and does not deter from the significant achievements made in the implementation of the TEST demonstrations. This is discussed further under the relevant sections below.

#### **4.1.1 Outputs and Activities**

**Component 1: Institutional Strengthening.** Component Outcome - Establishment of Test Focal Points in each Country

TEST National Focal Points were effectively established for each country either within National Cleaner Production Centres or in other relevant Pollution Control Centres/Institutes. Three countries had existing CPCs (Croatia, Hungary and Slovakia).

In Romania, there was a CPC which had been established by USAID. However, the Executing Agency and Project Management had no knowledge of their capacity and skills. The Project decided to review several possible candidate institutions and finally settled with ECOIND (Industrial Ecology Institute) which was considered to be best suited to the requirements of a National Counterpart Institute and had some of the necessary expertise already in place.

In Bulgaria, the project had an unfortunate start as the original counterpart proved to be inappropriate and had to be replaced. This regrettable situation was repeated a second time until the Executing Agency and the Project Coordinator managed to identify an efficient source of expertise (both for a national counterpart person and for other technical support to the Project) within the Technical University of Sofia. This caused a delay for Bulgaria of around one year as far as project implementation was concerned.

One lesson that can be captured here is the need for a more careful and drawn-out process of selection of national counterparts. In hindsight, a period of preparatory stakeholder input and assessment (such as a PDF phase of several months) would have been advantageous. This raises a concern as to whether the MSP (GEF Medium Size Project) modality was appropriate to a regional project of this nature. Although intended as a 'fast-track' mechanism for releasing GEF funds more efficiently, the MSP modality has two drawbacks that are relevant to the TEST project. One is the financial limitation (with a ceiling of \$1 million in GEF funds). The other is the lack of a prolonged PDF B phase (MSPs may only access PDF A preparatory funding). This latter concern was somewhat academic in the case of the TEST project as the MSP actually underwent no formal PDF phase. This concern regarding the MSP modality is discussed further under the section on **Project Design** below.

In the final analysis, strong project management and the selection (ultimately) of appropriate and committed national counterpart personnel and institutions allowed the TEST Project to implement an effective programme of capacity building and training for the TEST process which remains firmly embedded within those personnel and institutions at the closure of the project, and can be seen as a national and regional asset for further promotion and replication of the TEST process. The Counterpart institutions have already demonstrated their ability (as well as market demand) to sell their new expertise and services. A number of the CPCs have already been approached by both the original demonstration enterprises and those outside of the project to provide further assistance which the companies are prepared to pay for themselves. Also, a strong level of networking has been developed between the national counterpart agencies, with countries providing special expertise to each other and assisting each other in the development of further TEST-related initiatives. Examples of this include close cooperation between Slovakia and Bulgaria, Hungarian assistance and funding towards a Croatian project initiative for joint implementation and dissemination of an Environmental Management Accounting module, and assistance beyond the TEST countries to non-TEST Danubian partners. The CPC's themselves saw this as a very effective and important result of the TEST project. Although UNIDO has established such a CPC network in principle, this was the first time that the CPCs saw it work in action. They were very complimentary regarding the training and the coordination meetings associated with this



networking process. Capacity building is discussed in further detail below under the relevant section of this report.

The lack of a formal information management system was noted as this was an original output cited in the Project Document for this Component. However, the project did have an active website that provided useful information but this could have been improved with links to ICPDR and other TEST-related initiatives. It was noticeable that there were also no direct links back from the ICPDR website to TEST.

**TABLE 1: SQA SCORES FOR COMPONENT 1 DELIVERY**

<b>COMPONENT 1: Institutional Strengthening</b>	<b>Verifiable Indicators</b>	<b>%ge Delivery</b>
TEST Focal Point and counterpart institute identified and initiated	All 5 Counterpart Institutes engaged and actively delivering TEST products	100
Adoption of TEST Advisory Board	ABs functional with at least 2 meetings per year	100
Training of TEST Counterpart Team and Consultants in TEST procedures	Intended Number of trainees = 50. Actual = 90. Intended number of man-days of training =300. Actual = 369	100
Information Management System and networking established	Internet linkages to relevant databases (including EU, ICPDR, etc). Effective networking established between CPCs/Institutes and Coordinator and active sharing of lessons and expertise between all parties	80
<b>Total for Component</b>		<b>95</b>

Table 1 shows the allocated SQA score for Component 1 delivery as being 95 which is equivalent to a rating of **4.75 – Excellent Delivery**. All outputs have been fully successful and have achieved maximum or very high SQAs. The Information Management System has delivered effectively as far as the establishment of networks between the CPCs/Institutes and the project is concerned. A substantial number of Internet linkages have been identified, and the sharing of lessons and expertise has been very effective. The only missing activity indicator is internet linkage to ICPDR and the Danube Regional Programme which would have been valuable. The Component has met its main objectives (institutional strengthening, training of counterparts, establishment of Advisory Boards, networking and sharing of information, etc) very successfully.

**Component 2: Enterprise Demonstrations.** Component Outcome - Application of the TEST Procedure at Demonstration Enterprises within Danube River Basin.

Under the Project Document it had originally been intended to apply TEST to a total of 20 enterprises. However, in the final analysis 17 projects were selected as being suitable and viable and, in view of the time-constraints imposed by the GEF MSP modality, it was decided to move ahead with these 17. This is not construed as a shortfall or failure on the part of the Project as the overall concept of enterprise selection necessitates elimination of non-viable companies. Furthermore, there was no real basis or justification given within the Project Document for the selection of 20 companies and this was presumably an arbitrary figures based on 4 demonstrations per country. It should also be noted that in Slovakia (the only one of the five participating countries

to have only two selected enterprises) the official number of hotspots at the start of the project (2001) was half of the original number included in the SAP (1997). As is discussed later, many of the hotspots identified by the original SAP were no longer relevant or in existence by the time the TEST project came to implementation. This situation inevitably affected the enterprise selection process in some countries, and was unsurprisingly most evident in those countries that first joined the EU (i.e. Slovakia and Hungary).

The criteria for selecting the enterprises, along with some of the inherent problems in the selection process, were clearly defined in the 2003 APR/PIR as follows:

*Selection of enterprises was a difficult step due to the fact that the participating countries are characterized by lack of enforcement of environmental legislation and by limited understanding of environmental concerns. Financial viability of companies was not easy to assess on a preliminary basis, due to lack of reliable data. Moreover many companies do not have formal medium-long term strategies, which further complicated the identification of focus areas for project implementation. This is a common situation in transition economies where companies are rushing to produce what is requested; and their focus on near-term survival may overcome that of building a medium-long-term strategy.*

*In order to properly select the participating enterprises, local counterparts, in cooperation with the UNIDO project manager, had to identify the right combination of tools for marketing the project concept to local enterprises trying, on the one hand, to present the expected benefits for the company and at the same time clarifying the level of commitment and necessary internal resources. Being a hot spot was never sufficient reason for a company to join the project and as it happened in several cases, not all hot spots were suitable for the TEST project (most of the hot spot companies are in very difficult financial circumstances at the moment). Nevertheless given the difficult situation and the lack of enforcement of environmental legislation, the required number of enterprises was successfully identified. It seems then that economic drivers are much stronger than the environmental ones and are pushing companies in the direction of improving the efficiency of their operations and in acquiring EMS certification.*

The 2003 APR/PIR recognises that appropriate marketing tools need to be used to properly select the demonstration industrial enterprises. The APR/PIR also notes that medium to large size enterprises fitted the TEST project requirements best (smaller enterprises generally do not have the human resources necessary to successfully implement TEST procedures), and that the criteria for selection of the most representative enterprises related to their willingness to cooperate, along with the influence of regulators, market and community pressures. The Advisory Boards adopted guidelines on which enterprises should be considered for invitation to take part in TEST. Discussions were held with relevant government agencies to ensure the shortlist included the best companies for the demonstrations, and to ensure that every company had been considered and reviewed.

It is important to note that the changes in the TEST process itself resulted in alterations to the procedure for CPA and TEST assessment. It has already been mentioned earlier that the project revised the TEST implementation process in the early stages based on discussion and approval with all national counterparts and Advisory Boards. This led to a more modular approach to TEST using an integrated approach to assessment and management rather than a stepwise approach as had been initially proposed in the Project Document. The original step-by-step approach was considered to be too linear and time-consuming (as well as generalised and inflexible) with more opportunities for enterprises to fall out of the process along the way. The modular, integrated approach allowed TEST to be fine-tuned for the needs of each enterprise. It also included the addition of the Environmental Management Accounting concept, which all of the counterpart teams and agencies

were strongly in favour of adopting into the TEST approach. One noticeable effect that this new approach had was to alter the emphasis on and within the Sustainable Enterprise Strategy. The original idea of the SES was to include the business plan for the EST investments (the main output from the EST assessment), a social action plan, and a negotiated compliance scheme based on the implementation of the EST solution identified. The EST assessment is the critical component of the SES. However, it became clear during project implementation that the other two components of the SES (the social plan and compliance scheme) were not feasible for certain companies.

The social action plan was not always applicable since a) the new technology did not necessarily imply any redundancy of workers and b) some companies were already undergoing severe downsizing as a result of the transitional dynamics and associated economics symptomatic within the CEE (new owners, division of companies, etc). The companies were therefore dealing with these issues on a larger and more general level with local labour unions.

The environmental compliance plan was already subject to a well-established mechanism for negotiation between the companies and the local environmental inspectorates on an annual basis.

So, based on these considerations the SES concept was refocused and broadened so that the new SES tool included elements of strategic management (as well as the EST business plan). This new SES strategy was implemented in 10 of the 17 enterprises. It was not possible to apply SES to all of the enterprises. The main reasons for exclusion included a) companies with public ownership where it was difficult to address top management directly b) lack of a formal business plan c) lack of interest by top management, often due to on-going restructuring of the company and its assets, and d) limited resources and time-constraints within the Project. However, it is important to note that while the SES tool was re-focused, the business plan for the EST investments (the most important part of the original SES concept) was implemented in all companies.

In effect, this modification of the process gave a much stronger emphasis to identification and adoption of Environmentally Sound Technologies rather than to the concept of Sustainable Enterprise Strategy as an end-product of the GEF project. SES was now seen as more of a logical next step, and in the company's interests as a conclusion to TEST in order to capture the cost-effective components of the TEST process. All of the enterprises went through the modular process, and EST options were developed for all 17 enterprises. This is an important change from the original Project outputs as it presents a proactive and conceptual alteration of the TEST process. This modification is explained and justified within the 2003 APR/PIR and was clearly supported by all stakeholders. It does have certain implications for the Evaluation in that some original indicators needed to be revised also. This requirement for revised indicators is not clearly captured in either the 2003 or 2004 APR/PIR although it is to some extent implied within the text. The need to address this oversight in the APR/PIR format is discussed further under the section on **Monitoring and Evaluation**.

The concrete delivery from this component were the various options for cleaner production and for environmentally sound technologies. These were referred to as Type A, B and C options and these can be defined as follows:

**Type A options** : Good management practices and process optimisation – no cost or low cost.

**Type B options** : Introduction of cleaner technologies – low cost and short-term payback period

**Type C options** : Larger-scale environmentally sound technologies – high cost and long-term payback period.

A good example of how the TEST process was implemented for Croatia is given below under **4.1.3 National Delivery – The Demonstrations**.

The Project performed extremely well as far as the demonstration of the TEST process is concerned. Despite some shortcomings in the selection process (related more to project design and time constraint), all of the enterprises identified valuable CP and EST options, and nearly all of them implemented a significant number of these, with a clear intention to implement more as and when investment funding becomes available.

**TABLE 2: SQA SCORES FOR COMPONENT 2 DELIVERY**

<b>COMPONENT 2: Enterprise Demonstrations</b>	<b>Verifiable Indicators</b>	<b>%ge Delivery</b>
Selection of enterprises and viability asses sment	Original intention to select 20 enterprises. Actual selection of 17.	80
Training of the Test Teams in enterprises in TEST procedures	intended number of enterprise staff trained = 500. Actual = 622. Intended man-days of training = 1500. Actual = 1673	100
Application of the TEST procedures at selected enterprises	TEST modules selected and implemented at each enterprise. All 17 enterprises undertaken at least IR, CPA and EST. EMA and EMS at selected enterprises.	100
Identification of Type A, B and C improvements	Type A,B and C options specified through CPA and TEST process, approved by enterprises and included in Action Plan	100
Implementation of Type A options for improvements	One or more CP/Housekeeping measures adopted per enterprise	100
Adoption/implementation of Type B options for improvement	One or more Type B low -cost, early payback small investments made for CPA and EST per enterprise	100
Adoption of Type C options for improvement	Type C high-cost, longer payback measures adopted by company as part of business strategy, and investment being actively sort (or, in some cases, under implementation)	100
Noticeable improvement to identified environmental threat at each enterprise.	Measurable reduction in discharge volume and/or toxicity, water usage, or general waste production for each enterprise	70
<b>Total for Component</b>		<b>94</b>

Table 2 Shows the SQA scores for this Component. Delivery of outputs has been very high, equivalent to a rating of **4.5 – Excellent Delivery**. There could have been improvements in the enterprise selection process to ensure that CPA and EST options were directly addressing IW concerns at the level of water pollution, water use efficiency and wastewater management. It is fair to remember that for the Project Management process, two of the pre-conditions for enterprise selection were A) Their financial viability and sustainability and B) Their voluntary commitment to the project. This suggests that the selection procedures should have been more clearly defined in the project design. Although the actually delivery on the TEST procedure at most enterprises was commendable, these did not always address real threats at the river basin level. This is further reflected in the output addressing improvements to identified environmental threats. Furthermore,

there is a need for each enterprise to keep more detailed records of improvements, reductions in pollution and waste discharges, toxicity levels, etc if the data presented to the Project is to be fully credible. Otherwise, the training of the in-house TEST teams, the application of the TEST procedures, and the identification and adoption of Type A-C improvements has been remarkable within the constraints of the time period for the project.

**Component 3: Diffusion of Results.** Component Outcome - Disseminating Results to other Enterprises and Countries.

The primary objective of this component was to raise awareness among other industrial enterprises in the Danube region regarding the TEST process, and to further ensure that they were aware of the presence of national institutions that could assist them in using the process to develop cost-effective business plans and Sustainable Enterprise Strategies that would help them to comply with new environmental directives and regulations.

To this end, every country hosted a National Dissemination Seminar to which at least 10 industrial companies were invited to review the results of TEST in the Demonstration enterprises. Furthermore, in certain countries some of the enterprises that attended these seminars and showed a strong interest were given a demonstration two-day in-plant assessment (4 in Romania and 3 in Croatia). A regional seminar was also organised in cooperation with ICPDR, and the results of the TEST Project were disseminated at the national level through many different conference and workshops.

UNIDO supported the distribution of TEST methodologies and result through the development of two publications on 'Increasing Productivity and Environmental Performance' and on 'Environmental Management Accounting' (as discussed above under **Project Delivery**). A project web-page has also been created by UNIDO where the two publications can be downloaded for free ([www.unido.org/doc/26190](http://www.unido.org/doc/26190)).

The original Project Design had intended that teams in 4 other Danube countries would be trained in using the TEST Approach. This was successful in one country (Bosnia) but proved unfeasible for other countries due to a general lack of project resources along with the difficulties in identifying national counterparts as there are no CP institutions within the remaining countries of the Danube. It should be noted that the activities undertaken in Bosnia relating to this component went much further than was proposed or intended in the original Project Document. As well as the workshop held in Bosnia which included the participation of several companies and national institutions, a full project document for the replication of TEST in Bosnia was prepared by UNIDO in cooperation with the CP centre of Croatia, and the Centre for Sustainable Development (CESD) in Sarajevo. This project proposal is currently with UNDP for review and funding is being actively sought to support its implementation. In reality, and considering the constraints of funding and lack of effective institutional capacity, it would seem that the Project Design has been somewhat ambitious and optimistic in this respect. A more structured and planned approach to building further capacity for TEST within the other Danube countries would have been appropriate, and almost certainly beyond the financial and time constraints of an MSP of this nature.

This Component is the weaker of the 3 project components in that a lot more transfer of information, lessons and practices could have been done and a more effective replication process initiated. However, the Evaluator is inclined to see this as a fault in the project design coupled to the constraints of inadequate funding, and not as a management or implementation fault as such. So much was achieved in the relatively short project lifecycle that shortfalls in this component should not be allowed to cloud these achievements. Having said that, there is a risk in losing GEF's investment here if the lessons and practices are not captured and if the TEST demonstration is not

replicated effectively throughout the Danube region. This will be the subject of further discussion under **Conclusions** and **Recommendations**.

**TABLE 3: SQA SCORES FOR COMPONENT 3 DELIVERY**

<b>COMPONENT 3: Diffusion of Results</b>	<b>Verifiable Indicators</b>	<b>%ge Delivery</b>
National Dissemination Seminars to share results	Dissemination seminars completed for all 5 TEST Project countries. National reports published	100
TEST training materials and case studies	Test Manual and Case Studies published and disseminated	100
Introduction of TEST approach to 25 other enterprises in 5 TEST participating countries	Other (non-demonstration) enterprises engaging the CPCs and Institutes to undertake TEST process	40
Regional dissemination to other Danube countries	Regional Workshop/seminar (e.g. on BAT, Industrial Pollution Control, TEST processes) plus dissemination of published materials to relevant institutes in other DRB countries	80
Introduction of TEST approach to other enterprises in Danube River Basin	Teams from other Danube countries trained in TEST approach	35
	<b>Component Total</b>	<b>71</b>

Table 3 presents the SQA scores for Component 3 which is equivalent to a rating of **3.5** which is within the **Good, Effective Delivery** category. Dissemination at the national level has been good as far as sharing the results of the enterprise demonstrations with the national stakeholders is concerned. This component has been weaker on delivery than the other 2 components in that a lot more was expected and intended as far as the transfer of results and lessons and the replication of the TEST process. The two publications relating to the TEST process are comprehensive and valuable but there is still a need for a summary report for the entire project which captures all of the lessons from the 17 enterprises as an overall case study for TEST. Also, there is still a need to disseminate the overall success and value of the TEST process to more enterprises within the project Countries. The original Project Document Output identifies the following activities:

- Hold regional seminar for nine countries (including the five participating countries) to present results and determine interest/capacity building needs for undertaking TEST programme in other Danubian countries. This has been achieved through the ICPDR two-day regional workshop.
- Prepare requests for technical assistance as needed (this has been done in the case of Bosnia).

Less has been achieved at the level of those Danube countries outside of the project. The Project Document had intended the following activities to occur:

- Identify team members in four other countries with input from country programme coordinators, NCPC/PPC, UNIDO national focal points and UNIDO staff. This was achieved in Bosnia

- Hold one week training course on TEST approach using selected national experts from the five participating countries. Croatian CPC experts undertook this training in Bosnia
- Match one team from each participating country with new team from another country.
- Mission to each country to advise on enterprise selection and application of TEST approach. The Project Coordinator confirmed that this had been addressed during the ICPDR workshop.
- Provide limited technical advice as requested by new teams from the teams in the five participating countries.

It is the opinion of the Evaluator that this Component was somewhat optimistic within the timeframe and funding of the original project design, and in view of the need to complete TEST procedures at 17 enterprises first before the lessons and best practices could be consolidated into results for dissemination and training. To this effect, a somewhat lower score and rating for this component is a reflection of over-ambitious project design rather than an implied criticism of project management and implementation, or of stakeholder commitment and effort. This is reflected in the rating which falls just within Good, Effective Delivery rather than Borderline.

The accumulative SQA score for the Project Outputs and Activities comes to **87.6%** or a rating equivalent of **4.5** which amounts to **Excellent Delivery** for the Outputs and Activities.

#### **4.1.2. National Delivery – The Demonstrations**

The Evaluator visited three of the 5 countries involved in the TEST Project. Selected stakeholders from the other two countries were asked to respond to a questionnaire (see Annex IV). The following descriptions and comments relate to the enterprises in the 3 countries visited during the mission:

##### BULGARIA:

There were 3 demonstration enterprises selected for Bulgaria, in alcohol production, fish processing and textile production. The primary incentive for the alcohol production enterprise was the demand from government to clean up their wastewater discharge which has been a cause of concern for some 25 years. The other two enterprises were conscious of the need to get ISO 14000 accreditation as Bulgaria expects to sign the pre-accession agreement to the EU in early 2007.

In Bulgaria, the project had a poor start due to selection of an inappropriate counterpart. The project only started to delivery effectively when the Technical University of Sofia was selected as the counterpart. This institute was chosen because of its staff capabilities and expertise in industrial production and engineering. The evaluator was unable to visit any of the enterprises in Bulgaria but did manage to attend the final dissemination workshop where presentations were given on each enterprise, and was then able to meet with company representatives. The Evaluator also spoke in detail with the National Counterpart team at the Technical University.

The selection of the companies followed a step-by-step approach. In the first place the project was advertised among the local industries in order to illustrate the main objective, the methodology, as well as the expected benefits and the requirements for participation. Secondly, enterprises that expressed an interest were contacted and visited by the local counterpart. During these visits a more detailed explanation was given of the TEST Project targets, objectives and expected results. Finally, enterprises were selected on the basis of their financial viability, magnitude of environmental problems and management commitment.

The Counterpart Institute decided to include energy efficiency and energy auditing into the TEST process as they had a recognised level of expertise in that field. The Institute staff received several seminars from outside experts who explained the process of CPA, EST, EMA and SES, etc and provided general technical assistance and training. The teams from each of the enterprises were introduced and mixed with each other to exchange ideas and share thoughts. For the EMS module (carried out at the textile plant) they had assistance from the CPC in Slovakia and for the EMA they were assisted by the Hungarian CPC experts.

Zaharnia Zavodi AD, a sugar and alcohol production company, carried out all of the TEST modules except the Environmental Management System module. The company was established in 1913 and is the biggest sugar and alcohol production company in Bulgaria. Prior to their involvement in the TEST Project they were unable to sell their alcohol products throughout Europe due to quality constraints. Furthermore, they had been threatened with closure by the government unless they cleaned up their waste discharges. The TEST Project was therefore a very timely piece of assistance for them and the attention within the TEST project was concentrated on the alcohol production unit which had the greatest environmental problems. The main waste from the process was the slop from the beer production which was discharged directly into the river, plus liquid wastes from the distillation process. The energy (thermal) losses were found to be enormous, especial from the slop and the cooling water. These losses were also going directly into the river. The Company had no recycling for cooling water, which also went directly into the river.

Through the CP Assessment it was possible to identify the aim of the TEST process at this enterprises as a) a decreases in organic pollution though reduction of the slop water flow and its high COD load in to the Yantra river, b) reduction in thermal pollution and re-use of wasted heat energy, c) reduction of water losses through re-cycling and re-use of cooling water. Various options to clean up the discharge process were studied including thermal, membrane, biological and combined processes.

The EST Assessment looked at the investment plans and priorities of the company and its owners, taking into consideration the results and recommendations from the CPA. This led the EST to focus on changes to raw materials along with appropriate changes in pure alcohol production technology. As a consequence the project identified a viable option for the reduction of organic pollution as being the replacement of molasses with grain in the alcohol production process. As a consequence of the TEST project, the company made a decision to change from sugar-based to cereal-based alcohol production which reduced the chemical oxygen demand in the slop and produced a much higher quality of alcoholic product. These changes also create a value-added by-product, as the slop could now be used as animal feed. The water used in the process is also recyclable. Step by step the company has gradually introduced these more cost-effective and environmentally appropriate changes in process and technology, and is looking for funding to make further improvements. The total cost for the modifications and reconstruction are estimated to be around \$6 million (As of 2003). The company is hoping to introduce more TEST approaches. They have 6 such plants in total and are planning to build the TEST process into their new construction plans.

The EMA process undertaken at Zaharnia Zavodi AD, was of considerable value to the company and as a demonstration of hidden losses. Prior to the project, the non-product output (NPO) costs (effectively the cost to the company to produce waste products) were not considered by the company in their environmental and financial auditing. In reality, having identified these costs it is their magnitude and the enormous losses to the company of these 'hidden' production costs which are the greatest incentives to improvement in cleaner production and elimination of waste by-products. This is discussed further below under the dissemination workshop results.



Another enterprises, Slavianka JSC was established in 1948 and is one of the biggest fish processing companies in Bulgaria and is situated in the town of Bourgas. The production process is divided into sterilisation and metal packaging. The sterilisation department is equipped with a production line for the processing of frozen and fresh fish. A second department provides the necessary metal cans for packaging. The steam boiler house, providing the steam for the production processes, and the wastewater treatment installation are also part of the facilities. The equipment in all sections is old and needs replacing and modernising in order to reduce the energy expenses and to meet the growing requirements related to the treatment of organic matter in the wastewater. Slavianka also followed all of the TEST procedures except the EMS. This helped them to identify the extent of their pollution problems. The main problem was fish waste from cleaning, washing and defrosting, as well as the cleaning of the packing cans, along with an excessively high consumption of water and energy. The development of the CP and Energy Efficiency opportunities under the TEST Project therefore focused on three main directions a) water consumption and related wastewater flows, b) reduction of pollution load and the volume of effluent generated, and c) improvement of energy efficiency.

The CPA at Slavianka gave rise to two specific requirements 1. the need for a new de-frosting mechanism and technology ( a major source of wastewater pollution) and 2. The need for a more efficient energy production unit and boiler house for steam production. The most significant CP measure that has already been implemented is the installation of the new defroster (a type C option). This has reduced the electricity, water and steam consumption significantly (the last two by 60%), which has also led to a decrease in the wastewater from the defrosting process. It is important to note that before TEST they had no idea how big their waste problem was. After TEST they had reliable figures as well as options for mitigation.

The EST Assessment for Slavianka focused on the reconstruction and modernisation of the basic production line. Some innovative solutions were used to adapt the old equipment to decrease its environmental impact. The company is considering the construction of a new boiler house with up-to-date equipment and greater energy efficiency. Implementation of this measure will give a significant reduction in hazardous emissions, a reduction in transfer heat losses and reduced fuel consumption.

The third enterprise selected in Bulgaria was the textile industry, Yuta JSC, which was established in 1929 and specialised in non-woven textiles. The company uses a large number of technological methods for textile production. The TEST project concentrated on three production lines 1) thermo-bonding of non-woven material, 2) adhesive bonded non-woven materials, and 3) anti-dust masks. The three distinct processes with this area of textile production included thermal bonding, adhesive bonding and cutting. These processes produce various types of waste including textile fibres with adhesive bonding substance, waste from cleaning of vessels and other various water discharges to do with cleaning, cooling and chemical production. The main environmental impacts associated with the production of non-woven materials at Yuta JSC are the solid wastes and wastewater discharges. Their biggest problem is latex waste which has been traditionally discharged into the river. Furthermore, the energy audit of the energy facility revealed significant losses of heat and electricity resulting from boiler house operations, the distribution pipelines, and the equipment in the production units.

The CP Assessment set as its goals a) the reduction of solid wastes leaving the plant, b) the reduction of wastewater released into the Russenski Lom river, c) an increase in energy efficiency in the generation and distribution of heat and electricity, d) reduction in emissions for the boiler house, and e) an overall increase in operational efficiency.

The EST Assessment identified four EST modifications, two related to material flows (a new rolling system and a new waste press) and two related to energy conservation measures (a new de-aerator and a new steam boiler). The new 'S' shaped rolling system that reduced solid waste in the production line was implemented in 2003. The rest were all being considered for a more detailed assessment including technological appraisal and costs evaluation.

Under the EMA module, the following goals were set at YUTA JSC:

- Training in the field of management accounting
- Development and implementation of a simplified EMA system
- Training for investment project appraisal (including environmental projects)
- Integration of Discounted Cash Flow project appraisal tools into the management practices of the company along with on-site consultancy assistance for the appraisal of proposed environmental investments

As the value of the non-product output was the main environmental cost of the enterprise, the effort of the consultants was directed toward identification and proper calculation of these costs. As with the alcohol production factory, it was clear that reduction in non-product costs was the primary incentive for CP and EST improvements.

The EMS module was introduced in Yuta JSC for the entire company and was integrated with the existing QMS (Quality Management System). The results of the development of the EMS system can be summarised as follows:

- All elements of an EMS were developed and many of the procedures and instruction were amended and extended from the ones available in the existing QMS
- Environmental policy was developed, approved and distributed
- EMS training was provided for top management, internal auditors and a certain number of other relevant employees
- A register of legal and other requirements was filled in accordance with a newly developed procedure
- A new procedure for internal and external exchange of information was developed

The integration of the CP and EMS modules was an important part of the demonstration of the TEST Project. CP was viewed as an integral component of EMS and the CP action plan as part of the EMS. While EMS tended to focus on legal compliance however, CP went further than that and added efficiency and substance to the environmental performance of the enterprise. EMS added value by putting formal procedures in place for continual improvement and sustainability.

So, this company undertook all of the TEST procedures including completion of the EMS. This decision was made based on the fact that this was the only company out of the 3 selected Bulgarian enterprises that already had ISO 9000 Quality certification and therefore had a quality management strategy in place already. The EMS was integrated into the company's existing procedures for quality management. The company is now awaiting further auditing and certification. The company wants to integrate the quality, environment and health/safety certifications (as a cost-saving exercise) and get all ISO certifications at once. This is expected to happen later in 2005. It was mentioned to the Evaluator that cross-communications within the company and between the Quality Control and the EMS teams could have been better.

All of the Bulgarian demonstration enterprises have made significant improvements under type A, B and C. Slavianka (Fish processing plant) has undertaken all type A, B and C improvements, while Zaharni Zavodi (alcohol production) has achieved all type A, most type B and 1 of 3 proposed type C improvements. Yuta (the textile factory) has undertaken most A, all of B and 50% of type C.

The experts at the University feel that the whole TEST process and the project implementation has been enormously educational for all involved.. They have all gained new and valuable knowledge and have developed a network of colleagues and consultants within the region which they will maintain and build on.

One recommendation from the Bulgarian CP team was the need for an end-of-pipe technology and methodology manual. TEST does not really address the need for end-of-pipe technology, yet sometimes end-of-pipe solutions are the only practical ones both from the point-of-view of cost but also because the pollutant cannot be removed anywhere else within the process. An example where this applies is in the case of coal. Bulgarian coal is high in sulphur content and the only options for reducing pollution emissions is to deal with the actual flue gases (end-of-pipe). Bulgaria cannot afford to ignore its own coal resources in preference to imported coal but there is no way of reducing the sulphur content and end-of-pipe technology is the only solution. So, they would like to see Best Available Technology (BAT) options for end-of-pipe treatment included under TEST. They also wanted to emphasise that companies need independent and impartial advice on any TEST products. Commercial companies with innovative techniques will always maintain that their product is the best. The companies need a source of reliable advice which is where the CPCs and similar institutes have another important role to play.

The Team at the University also noted that the only way the TEST process would get implemented in the region was in direct response to the EU directives and IPPC (Integrated Pollution Prevention and Control) requirements. Penalties for wastewater discharges are far too small to act as a disincentive (it is cheaper to pay the penalty than to change the process). In view of the obvious success of the TEST MSP, they would like to see further assistance from GEF in the development of type A and B improvements, and to assist in identifying realistic loans for investing in type C improvements.

The National Counterpart noted that during the EMS process they had assistance from the Slovakian CPC. They undertook a mini-audit of the company's production process. The recommendations from this audit were passed on to the management who were so impressed that they adopted them with the result that company production efficiency improved significantly (including waste reduction etc.). The company was very proud of this.

Although there is currently no CPC as such in Bulgaria, there is interest from the Swiss Government to finance the creation of a CPC. Obviously it would make sense to try and include the expertise available at the University in such an enterprise.

As next steps, the Bulgarian team felt that there was a need for greater dissemination of results and that effective presentation to other companies would attract a lot of interest in the TEST process. They also felt that there is a need to identify investment capital for type C (as well as some of the more expensive type B) improvements. They were very keen on the possibility of exploring soft loan options and suggested that evidence of type A and B improvements could be used as criteria for gaining access to soft loans for type C. They agreed that it would help a lot if GEF funds could be used to develop the proposals for soft loans as it takes quite a lot of detail to be able to satisfy lenders of the feasibility of the proposal and that there loans are secure.

All companies in Bulgaria are now required to do energy audits every 3 years as a new government requirement. It would be fairly easy to expand these into TEST procedures. The team felt that there is a need to raise awareness and support within the government regarding TEST and its national benefits as well as the benefits at the company level.

One criticism of the project focussed on the funding and the problems experienced in the exchange rate. Because of changes in the exchange rates between signing the Project Document and disbursement of funds, Bulgaria lost nearly 30% of its expected financial support. This would not have happened if the original figure had been in Euros rather than Dollars as Bulgarian currency (and most of the European currencies) are now fixed to the Euro. Generally the felt that the funding was a constraint in view of the large number of workshops and seminars required. The timing (as per the workplan) was sufficient however. They did feel that a longer preparatory phase would have helped in allowing more time for selection of companies and for the initial review.

Whilst in Sofia, the Evaluator was able to attend the final project national dissemination meeting. The Dissemination meeting was attended by over 30 people consisting of representatives from the national counterpart institute and consultancy team, the participating demonstration enterprises, 7 non-participating enterprises, 3 ministry representatives and 4 academic representatives from technical departments of different Universities. The meeting was given an overview of the aims and objectives of the TEST project by the Project Coordinator which gave a strong emphasis on increased productivity and revenues through reduction in waste products, improved competitiveness and general reduction in production costs, all with the added benefit of reduced discharges in line with EU and IPPC directives. The presentation finished with a concise summary of what every country had achieved. It was clear that very few industries were aware of the IPPC requirements and BAT potential at the beginning of the Project, but that awareness had been raised significantly as a result of the GEF initiative.

Following presentations dealt more specifically with how the TEST tools were used in Bulgaria. This explained the process from Initial Review, through Cleaner Production Assessment (and Energy Audit), Environmental Management Systems, Environmental Management Accounting, Environmentally Sound Technology Assessment and Sustainable Enterprise Strategy. It was noted that one of the significant outputs from the EMA module was the change in management attitude and culture, with a shift away from intuition driven investment more toward a proper investment study and appraisal including evaluation of environmental impacts in monetary terms.

One of the final summary presentations gave an excellent explanation of the Environmental Management Accounting process and the understanding of cost-effectiveness and incentives arising from the TEST process. EMA is about finding the hidden 'factory' within the production process. EMA demonstrated that 60% of the costs of production at the Zaharnia Zavodi AD, the alcohol factory, was going into producing wastes which were not of value and not re-used and in fact required more investment to deal with them as a problem. Only 30% of the production costs were actually realised as alcoholic product. This is very important concept to get across to the company as this clearly demonstrates an incentive. They need to reduce their production costs that are going into non-product outputs (i.e. wastes). Only 1.5% of the company's costs was in fines and penalties so there was no incentive there for change and these fines and penalties would have to be raised enormously in order to generate such an incentive.. But there is a massive incentive for the company to reduce the non-product output. 72% of this non-product output was slop so this was the obvious area to target first under TEST. The presentation then demonstrated the same 'hidden factory' producing non-product outputs (NPO) within the textile enterprise, and identified this NPO as being primarily wastes. So EMA demonstrates to the companies that they are actually paying huge sums of money to produce waste products of no value and of significant concern, rather than valuable product. EMA uses TEST to show how this can be resolved through investments that are substantially less than what the company throws away on NPOs.

So, the company incentives that are highlighted by EMA are:

- A reduced amount of investment and cost to the company in producing waste products
- Change of loss to profit if can find way of using or recycling wastes

- Improved quality of product
- Increased potential for market as higher quality linked to environmentally -friendly products
- Consequent avoidance of fines and penalties
- Improved company profile

And the disincentives are:

- Only the initial investment (often small at the outset for CPA type A and even type B investments) but even this is balanced by the returns over time

In reality, this can be seen as one of the most important demonstrations of this Project.

Details of the presentations are available in the joint UNIDO/Technical University of Sofia publication 'An Integrated Approach to Environmental Management in Bulgarian Enterprises – The Experience from the Implementation of the UNIDO TEST Project in Bulgaria'.

## CROATIA

Four demonstration enterprises were selected for Croatia specialising in meat rendering, meat processing, pesticide production and sugar production.

The CPC in Zagreb, Croatia provided a useful example of how the TEST process was implemented within a country and within the enterprises. Once suitable enterprises had been identified, the standard process for involving enterprises was for the relevant Ministry to approach the company and for the company to agree to sign a contractual letter that committed them to the TEST process, and to make their resources available (particularly human resources) for the duration of the project. The next step was introductory training for top management to explain the project, provide an overview of the TEST methodology, to discuss how it related to IPPC and ISO 14000, and to summarise the benefits of the TEST process to the company. Following this, an initial review of the company's production process was undertaken and a TEST team was identified within the company for further training. Standard CP module training was first given to the Project Team within the enterprises (these were usually people from the production process such as technical directors or engineers, and occasionally people from the finance department of the company). The methodology for the standard CP training included 3 collective training sessions in Zagreb for all of the companies lasting between 2-3 days each time. In between these sessions the CPC worked with the in-company project team on their specific concerns and needs, undertake an analysis of production, material use, energy balance, option generation, etc). This process took between 6-7 months. At the end of this interactive training process, the project team and the CPC prepared a final report on the proposed methods for cleaner production improvements. This was then presented to the top management, and then an overall presentation was given to a stakeholder workshop of company representatives (from all national demonstration enterprises), ministries, the Advisory Board members and the Project Coordinator. While this CP process was underway, and in parallel with it, additional analysis was undertaken to see which staff and which areas of the company would be appropriate for Environmental Management Accounting. CPC staff and Lead Consultants were given training in COMFAR (Computer Model for Feasibility Analysis and Reporting - UNIDO's software for company financial appraisal and analysis of investment projects) at UNIDO Headquarters in Vienna along with training on EMA and EMS. The all of the CPCs from each country and the demonstration enterprises selected for EMA undertook 2 days EMA training in Budapest and a further 2 days in Hungary as the CPC in this country has considerable experience with EMA procedures. Not all enterprises were selected for EMA as this was a fairly innovative addition to TEST. One company per country was selected to demonstrate the EMA procedure.

In Croatia, the CPC then started to work with the company chosen to demonstrate the EMA process (in this case Herbos, a pesticide producing plant). Throughout this process the Croatian CPC had constant dialogue with and support from the Hungarian CPC. An EMA expert from the Hungarian CPC visited Zagreb to provide on-site assistance at the request of the Croatian CPC. The end result of undertaking the EMA module was a final report prepared jointly by Herbos and the CPC. This was also used as a case study in TEST Project publications.

While the EMA demonstration at Herbos was underway, an EMA module was being implemented at Gavrilovic (a meat processing plant) which had made a commitment to undertake this module following many discussions regarding the process and methodology. An introductory session was carried out for the top management. The CPC used a Lead Consultant who was experienced in EMS. At the same time as these EMA and EMS modules were being implemented in various companies, the EST module was initiated as part of the integrated package of modules. The CPCs received training on EST (at UNIDO Vienna) and how it related to IPPC and BAT (as all of the EST recommendations have to be in accordance with IPPC and BAT). The process in-company was similar to the EMA and EMS modules. Workshops were held for top management and then for the in-house project team. These were not necessarily the same people who were involved in the other modules, but generally the CP team participated in the EMA and EMS also (some of the results from the CP were necessary to feed into the EMA, and were also important for the EMS).

So every enterprise went through the Initial Review process, the Cleaner Production Assessment and the Environmental Sound Technology review. Selected companies also did the Environmental Management System and/or the Environmental Management Accounting modules, and the Sustainable Enterprise Strategy. The CPC stressed the fact that it was important to bear in mind that all of these modules are integrated and related to each other. The final module that ties everything together is the SES which integrates all of the environmental assessments and reviews and the various modules into one overall management and business strategy for the companies. All of the National Counterparts attend a workshop on SES in Vienna with training given by UNIDO.

In the case of Croatia, the CPC felt that the selection procedure for the enterprises was one of the weaker links in the TEST process and they would have preferred to see a more detailed analysis stage before selection although they recognised that time was a constraint. Again, this reflects the need for a preparatory phase. However, in Croatia they were impressed with the overall TEST methodology and the design of the approach. Everything that needed to be done (Project activities) was clearly defined by the Project Management and there was always a fast and detailed response to any requests for clarification.

The CPC is now finding that instead of having to be proactive in selling CP and TEST to companies they are now being approached to assist. They feel the modular approach is important in this respect as not every company needs the entire TEST process and it needs to be flexible to meet each individual company's requirements.

The Evaluator was able to visit Gavrilovic, a Croatian company specialising in meat processing and packaging. Gavrilovic lies some 100 km southwest of Zagreb in an area that suffered fairly badly during recent conflicts (1991-1995) over the splitting up of Yugoslavia. The company has a long history (over 300 years) that has seen many changes over the last 80 or so years due to alterations in the political climate. The company specialises in pig and cattle breeding, slaughtering, and meat processing and has several brand names that are well known on the international market. The original owners (who were forced into exile when Yugoslavia became a communist state) are now back in ownership and running the company very successfully. The company employs over 2,000 people and is responsible for 30% of the domestic budget for the region of Petrinja. The company aims to produce its own energy on site through a process of co-generation.

The company's production levels were severely crippled by the conflicts of 1991-1995 and production fell from a daily capacity of 200 tonnes to only a few tonnes in 1996. Now they are back up to 70 tonnes daily with hopes to expand again.

The company became involved when they were approached by the State Directorate for Waters, the Ministry of Economic Affairs and the CPC. Even before the TEST project came along there had been a working relationship between Gavrilovic and CPC and some earlier participation in cleaner production. So, to some extent, part of the selection process was that the company was a known entity and was willing to work with CPC.

The TEST project has helped Gavrilovic to assess its production approach and its waste treatment and to come up with a modular and sequential strategy for improvement. TEST has assisted Gavrilovic in introducing type A housekeeping approaches within its production process. It has also defined a modular structure for waste treatment units projected over the next 15-20 years for a daily capacity of not less than 200 tonnes of processed meat. The intention is to introduce these modular units as they are required and to plan investment around these projections. Each unit had to be defined in such a way that would enable the company to make a qualified unit investment decision at the proper time (i.e. increased waste treatment needs as a result of increased production, unit operational cost, unit investment cost, time of unit construction, and time of introduction into operation). In addition to the CP training, the company has also installed water meters around the production plant and the staff have to record water usage in each area. This has raised the awareness of resource efficiency and waste control on the production floor. Now they can calculate every month the quantity of water saved per quantity of product. Working with the TEST team and the Lead Consultant, Gavrilovic has succeeded in reducing its water consumption by 14%.

As a result of the TEST assessment process, Gavrilovic is concentrating now on an integrated waste treatment facility. Production wastes come from agriculture (Gavrilovic raises some of its own animals), cattle and pig breeding, the slaughterhouse, meat processing, and general on-site wastes. The overall waste treatment concept for the company involves energy production (steam and electricity co-generation). Energy is produced within the incineration unit by burning animal waste and sludge from waste pre-treatment and biological treatment facilities. This allows for energy production from renewable resource and efficient treatment of potentially harmful animal wastes.

The EST module has focused on this option of using biogas for the co-generation plant at a total investment of US\$5.2 million. This would allow for some treatment of wastes at the production site along with a source of renewable energy. The company has already been talking to suppliers about EST, particularly for biogas, prior to TEST but the costs involved were proving to be very high so they felt they needed some independent assistance and were therefore able to turn to TEST and the CPC for advice. The concept of biogas had been available for some years, but TEST had expanded this concept to one of integrated water treatment. The introduction of co-generation of steam and electricity revolutionised the company according to the Production Manager. He is constantly trying to raise awareness of the cost-efficiency and waste reduction potential of co-generation and the use of biogas with other companies and with government. Other companies are starting to give serious consideration to co-generation and are looking at the biogas options also. It is a very simple process to switch from natural gas as fuel, across to biogas. This system has been pioneered as a workable strategy by Gavrilovic in cooperation with TEST. The Project provided the incentive and the tools for the co-generation and biogas technology to become part of the company's new business sustainability strategy. Although the necessary investments have not been made as yet, a business plan has been prepared and the investment will pursue a step-by-step logical approach as and when investment funding can be identified.

Every new employee at Gavrilovic has to have an awareness and training session with the company's own in-house environmental specialist and is instructed in company policy on environmental issues. Basic training on environmental concerns and TEST has been given to all production managers. Furthermore, the company has developed an internal training policy for awareness at all levels (e.g. the Director of the agricultural sector has recently done a Master's degree in Environmental Management).

The management at Gavrilovic were very supportive of TEST and called it a 'win-win' situation as it helps to resolve their resource use and waste production inefficiencies whilst making savings for the company overall. A major result for both Gavrilovic and the Project is that now the company has a water permit that meets the IPPC Directives even though this is not currently required by Croatian law. The company management was a little concerned about the lack of involvement and input from certain pertinent government Ministries, particularly in relation to environmental protection. They felt that not all government departments were supportive, nor did they appreciate or recognise the benefits of TEST. On the positive side, cleaner production is now mentioned in the new Croatian laws on waste management (2004) which will become obligatory for all companies.

Generally, Gavrilovic were very pleased with the support that received from both the CPC, the Project Coordinator and other consultants. They felt that their main incentive for getting involved was to reduce their wastewater discharge load, to produce biogas for co-generation and to thereby minimise operational costs. A very real financial incentive was, of course, the fact that GEF was covering 80% of the costs of the TEST process as part of the demonstration.

Originally, the work schedule for the evaluation had planned for the Evaluator to also visit a sugar processing company (IPK Tvornica Secera Osijek) but weather conditions and the distances involved were a cause for concern. Instead it was decided to interview the Lead Consultant in Zagreb who had worked with the enterprise on behalf of the CPC. The consultant (a chemical engineer) was from Slovenia but had previous experience of working with and advising sugar companies and had undertaken an energy audit in this particular company. Therefore he was familiar with their problems regarding waste and emissions. Initially the consultant visited the company with the Head of the CPC to meet with the staff. The company had already undertaken some cleaner production improvements (machines to clean the sugar beet while reducing water usage and managing soil wastes). The company's first need was identified to be a mass and energy balance assessment. This represents a detailed study of the industrial process. The results were then discussed with the company. From this M&EB assessment it was possible to determine where waste was being generated and in what quantities.

The assessment identified two main problems, 1) from the wastewater and transportation of the beet cleaning process and, 2) from the consumption of water and production of condensate during process. The Lead Consultant then looked at proposed solutions and came up with a technical and economic evaluation. The recommendations to the company include first minimising consumption of raw materials and energy, and then undertaking some end-of-pipe solutions using settling lagoons. The water used for washing the beet ends up with a very high soil and sediment content. If this can be placed in holding basins then the water can be treated and the sediments settled out.

There were two sources of water input identified from the process. From the river and from the sugar beet processing itself (condensate from the high water content of the plant). By recycling the water from the cleaning process and condenser, and using it in the cleaning process instead of freshwater it was estimated that it would be possible to cut down significantly on water abstraction from the river (by 60%). The benefits of reducing the freshwater intake could be seen to be 1) reduced pumping costs and water fees, 2) reduction in use of chemicals (which are necessary to treat the freshwater before it can enter the process but are not necessary for the condensate and



recycled water), 3) a higher water temperature can be maintained using recycled water which improves the cleaning process, 4) an overall reduction in wastewater discharges due to recycling. The company now has all the information that it needs on equipment suppliers and costs, along with details of savings and benefits to the company. They now need to go ahead in order to comply with the new environmental regulations. They are seeking a policy decision at the top management level, and are also looking for funding to make the investment. One key problem that they also still have to resolve is formal company privatisation and ownership. They also need permits for construction.

There are other opportunities for improving processes to achieve cleaner production and more environmental sound technology within the company. As yet they have not looked at the utilities side of the company's process (steam plant, freshwater treatment plant, compressor, etc). All of this produce pollution and could be improved and cleaned up.

The consultant could see clear options to transfer the lessons for this demonstration to other sugar beet processing companies in Croatia (3) and throughout the Danube river basin. The consultant emphasised that it is important to undertake the mass and energy balance studies first.

The consultant noted that the CPC in Croatia was doing a good job and that Croatia was fortunate in having such a Centre to provide guidance to industry in these matters. One big problem he sees is the lack of investors for the high-cost technological upgrades necessary in some countries to meet new EU Directive requirements. One important function of the CPC is to identify the benefits (through the TEST process) and to bring the investors and the enterprises together.

## SLOVAKIA

The Evaluator visited ZOS TRNAVA, a Slovakian Company specialising in repair and re-conditioning of railway rolling stock and currently celebrating its 80<sup>th</sup> Anniversary in business. They were originally the largest workshop for Czechoslovakia undertaking 48% of repair work for all railway wagons. This constituted 17,000 wagons repaired per year. When Czechoslovakia was split into 2 separate countries ZOS lost a lot of the market and the number of wagons on the railway system fell significantly by one-third. In 1994 the company was privatised and had to re-think its marketing approach and production methods. Today the company specialises in the repair and refurbishment of wagons for customers throughout Europe, with the majority of customers being from the private sector. ZOS estimates that it now has 50% of the European market. They also specialise in building and re-designing wagons to suit specialist purposes and to fit specialised trailers and bogeys. They have managed to become certified and approved for work on railway stock for Austria, Switzerland, France, Poland and the Czech railways. This certification is a complex process but they now have official trust of these countries and railway lines to produce reliable wagons (this even extends to the US market). In 2004 the company repaired over 2000 wagons for foreign companies (each with their own requirements and standards). The total repairs for 2004 came to over 5,000 including Slovak rolling stock.

The company employs around 1,200 personnel with an average monthly salary of Sk20,900 (US\$743). This is in fact about 25% higher than the average national salary. The company is generally optimistic for the future. There is currently a dramatic expansion and development of industry in Slovakia and the economy is booming. Furthermore, as railways in the region become more liberal and privatised then the company's competitive prices will start to give them a keener edge on the market.

The company has taken a policy decision to invest a substantial amount into improved environmental practices. With the opportunities offered by the TEST project the company has been

able to jointly develop improved policies on both environment and product quality. The great advantage and incentive provided by the TEST demonstration has been the opportunity to comply with the ISO 14000 directives from the EU. The Company recognises that as part of its overall production process it is a 'waste-producer' and that the nature of the repair and refurbishment work on wagons produces pollution. Last year the company logged the production of 32,000 tonnes of waste, 24,000 of which (3/4) was recycled. Most of the company's waste is metal scrap. Until recently the environmental record of the company was a disaster (photographs of the processes shown to the Evaluator confirmed this!). All of the wagons and rolling stock that come into the factory are cleaned first. This includes the cleaning of tanks that carry chemicals. This used to be done by hand with enormous waste and discharges and inevitable health implications. Recently this has been cleaned up by installing an new semi-automatic washing facility at a cost to the company of Kr 22 million (US\$782,000). This included a lot of additional modifications and extra technology to ensure environmental compliance. The company noted that in order to make such environmental improvements cost-effective it is a rule-of-thumb that it is necessary to double overall production at the same time.

Their biggest environmental problem was the paint-shop. New legislation imposed by the EU regarding VOCs (Volatile Organic Compounds) required them not only to clean-up the paint-shop operations but to start using non-VOC paints. The cost of building one new paint-shop to comply with the new standards was Kr 5.5 million (\$195,500). Previously, old paint was dumped or buried but now it is put through a thermal oven for cleaner incineration. This oven system cost kr 5 million (\$178,000). In 2007, yet new regulations come into force which will require the company to upgrade their paint-shops again. They estimate that the cost to upgrade the entire paint line in 2007 to meet the new laws will be in the order of Kr 250 million (\$8.9 million).

The company also had to upgrade its HydroMat system which is used for cleaning and degreasing oily equipment. They contracted a company to explore best available technology with an emphasis on cleaner production and environmental efficiency as well as water efficiency. At the time BATs were not defined for this particular process as it is too specialised, so the company urgently needed external assistance

Over the last 5 years, the company estimates that it has spent some kr550 million (\$19.5 million) on upgrading and replacing processes and technologies to comply with EU IPPC directives and ISO 14000. Unfortunately, ZOS does not qualify for EU subsidy to assist in this process due to its size. The company finds it unreasonable that foreign companies (such as car manufacturers) can come to Slovakia and immediately become eligible for Slovakian government funding and subsidy but a local company is not entitled to any such funding.

So, TEST was very important to ZOS in providing them with an affordable mechanism to meet the ISO 14000 requirements and to deal more efficiently with their waste products (this included general small-scale factory floor waste for which they contracted a smaller company to handle). TEST has helped them to update their policies on waste treatment and discharges and to make necessary organisational improvements within the company structure. The new processes being adopted have the added and distinct advantage (and attraction) of being much more efficient and cost-effective as well as cleaner. The company also now has a waste and water monitoring laboratory. The company also addressed energy efficiency issues with the assistance of the CPC and upgraded heating and lighting processes which gave a 40% improvement in energy efficiency.

The management at ZOS was keen to emphasise that the TEST process was not just about buying or upgrading equipment but also importantly about changing people's attitudes and understanding. A very recent management review of the EMS system had focused on the need to further improve waste management and increase individual awareness. One of the important TEST Project

contributions was that the company sent all its shop-managers on a cleaner production training course for 5 days run by the national CPC. The fact that the company allowed its management team away for 5 days training shows the commitment from the company and the trust in TEST and the CPC. Furthermore, TEST undertook training of lower management on-site and a further 1 day training of top management at their own request. Middle management received several days training in total and line management were also trained on site.

The company felt it was important to stress that it was not enough to implement technical changes but it was equally as important to adopt a systematic and integrated approach to TEST that linked into the company's existing Quality Management system. However, the QMS was originally a process approach whereas EMS has more emphasis on technical knowledge and improvement. Clearly a more integrated and holistic modular approach was necessary which TEST provided. ZOS was finally certified for EMS in 2003.

The company noted that throughout the process there was no obvious input or involvement from the government side. The government adopted new legislation but provided no real support or guidance to industry. This support and guidance effectively came from TEST. ZOS felt that other companies are probably aware of the requirement for cleaner production and improvements in environmental compliance but they do not know what action to take or what tools are available to assist them.

The company noted that the presence of the TEST project and the direct involvement of the CPC was important in expediting decisions and speeding up the overall process of cleaner production. The Project actively persuaded the company directors to move ahead with changes. In fact, the company was very enthusiastic at an early stage as the offer of assistance from the Project was too good and too tempting to ignore under the existing climate of EU regulations and directives. They admit that the 80% contribution by the donor to the project activities was a catalyst in volunteering themselves as a demonstration enterprise. If they hadn't jumped at this opportunity when offered they would now be facing more serious problems and time-constraints. The TEST project speeded up their conversion to cleaner production by some 2-3 years. The management had not originally been aware of the extent of the environmental problem, the pressing need for cleaner production and compliance with directives, or the availability of support from GEF. Once this was made clear they were immediately keen to take part. Now no-one in management regrets this decision and they have no hesitation in promoting TEST to other enterprises.

Now that the project is completed the company intends to maintain its compliance with directives for obvious reasons of cost-effectiveness and market competition within Europe. The original incentive therefore was GEF funding plus the need to meet the EU directives. A new incentive has been created since in that the shareholders see a significant improvement in company production and a cleaner image. Furthermore, the company owner is so impressed with what has been achieved he has made it his policy that ZOS should be a model of cleaner production in Slovakia and the region. Such personal interest and full engagement by top management is very important to the continued success of TEST and the company.

As far as next steps within ZOS are concerned, they have identified longer-term higher cost technological improvements but these require a high level of investment. In this respect, some assistance with identifying investment possibilities and soft-loans would have been helpful. If they could find some way to attract low interest investment then it would be much easier for them to persuade their shareholders to take the next steps (Type C) in cleaner production.

#### **4.1.3 Summary of Demonstration Enterprise Delivery**

Tables 5-9 provide a summary of the project delivery for each enterprise.

Table 5 presents the list of type A and type B options identified for each enterprise along with the status of their implementation. As a result of the TEST project, 91% of company-approved Type A options and 88% of Type B options have already been implemented at the 17 enterprises. A further \$3 million worth of Type B improvements were approved for future investment through company's business or action plans and policies and similarly over \$45 million worth of Type C investments have been approved. Of the \$3 million approved approximately \$2.2 million have already been implemented. This demonstrates that the TEST project has successfully leveraged more than twice as much co-financing from the private sector as was originally provided as GEF funding.

Table 6 shows the water-related improvements created through the adoption of type A and B options. Reductions in water consumption vary from as little as 1% to over 50% with actual volumetric reductions reaching as high as 1.39 million cubic metres per year for one company. Similarly, wastewater discharge reductions range from 50 cubic meters per year to nearly 2 million cubic meters per year. The actual reduction in pollution loads in wastewater are highly variable and dependent on the type of industrial process and the type of pollution (BOD, COD, nutrients, heavy metals, TSS, etc). In some cases the reduction of load has been as high as 100%.

Table 7 present figures for reduction in non-water related areas (e.g. raw materials, air emissions, solid waste generation) through the adoption of type A and B options that may still reduce indirect pollution to the river basin. Again the figures are variable due to the diverse nature of the processes and pollutants. There are some significant reductions in the use of raw materials and in volatile and harmful emissions. Reductions in solid waste generation vary from minimal (<1%) to significant >90%.

Table 8 shows the water-related improvements that can be expected through the adoption of type C improvements. Some of these are already under implementation and some are planned for future investment (see Table 5 for estimated dates of implementation). Anticipated reductions in water consumption and wastewater discharges as a result of the TEST process run as high as 5.5 million cubic meters per year. Reductions in pollution loads are, as with type A and B options, highly variable.

Table 9 gives the figures for reduction in non-water related areas as a result of proposed type C options (again, some of which are already under implementation).

It is not the purpose of this evaluation to go into specific detail, review or discussion regarding these figures. The improvements speak for themselves and the overall conclusion is that the TEST process is very effective and the demonstration enterprises have been provided with a powerful tool with which they can meet the requirements of impending regulations while achieving a more cost-effective level of productivity and cutting down on the hidden costs of non-products.

**TABLE 5: TYPE A,B AND C OPTIONS IDENTIFIED FOR EACH ENTERPRISE AND STATUS OF IMPLEMENTATION**

COUNTRY AND ENTERPRISE	IMPLEMENTATION OF CLEANER PRODUCTION MEASURES AT DEMONSTRATION ENTERPRISES						IMPLEMENTATION OF EST MEASURES AT ENTERPRISES			Approved for Investment (US\$)		
	Feasible Type A Options Identified	Type A Options approved	Status of Implementation of approved Type A Options	Feasible Type B Options Identified	Type B Options approved	Status of Implementation of approved Type B Options	Feasible Type C Options Identified	Type C Options approved	Estimated Implementation Date for Type C (EST) large investment	Type B Options	Type C Options	
<b>BULGARIA</b>												
Yuta JSC	55	17	88%	28	10	100%	9	2	1 implemented	\$32,000	\$233,000	
Slavanka JSC	12	5	100%	7	3	100%	6	2	2 implemented	\$52,000	\$222,000	
Zahani Zavodi AD	8	5	100%	11	3	67%	17	3	By Oct 2005	\$1,500,000	\$4,700,000	
<b>CROATIA</b>												
Agroprotenka	3	1	100%	5	5	80%	7	4	April 2007	\$13,500	\$7,500,000	
Gavrilovic	2	2	100%	5	2	100%	1	1	Sep 2006	\$23,000	\$3,500,000	
Herbos	1	0	N/A	4	3	100%	6	2	Mid 2006	\$14,375	\$800,000	
IPK Tvornica Secera Osijek	1	1	100%	3	3	100%	1	1	Implementation delayed	\$12,466	\$800,000	
<b>HUNGARY</b>												
Gunter-Tata Kft.	7	5	60%	18	14	92%	1	1	2007	\$81,751	\$900,000	
Indukcios es Vedogazos	6	4	100%	15	10	100%	1	1	2005	\$36,710	\$18,560	
Videoton Audio Company	6	5	70%	8	3	80%	4	3	2007	\$2,577	\$35,783	
Nitrokemia 2000	0	0	N/A	0	0	N/A	2	1	2006	N/A	\$266,500	
<b>ROMANIA</b>												
Astra Romania	53	21	100%	11	4	85%	12	2	\$100,000 by Dec 2004.	\$36,000	\$3,200,000	
Rulmentul	8	8	100%	5	5	65%	6	1	\$86,000 in 2004	\$29,300	\$400,000	
Chimcomplex	13	13	50%	13	13	80%	16	4	\$40,000 in 2004	\$40,100	\$27,000	
Somes	8	8	100%	24	14	90%	15	1	\$200,000 in 2004	\$42,800	\$11,500,000	
<b>SLOVAKIA</b>												
AssiDoman Sturov	23	23	96%	22	21	66%	31	2	\$21.7 Mill to date	\$1,100,000	\$4,050,000	
Zos Trnava	30	10	100%	81	8	100%	6	6	30% Investment completed	\$22,500	\$7,200,000	
<b>IMPLEMENTED</b>			<b>91%</b>	<b>IMPLEMENTED</b>			<b>88%</b>	<b>APPROVED</b>			<b>\$3,039,079</b>	<b>\$45,352,843</b>

**TABLE 6: TYPE A AND B WATER RELATED IMPROVEMENTS FOR EACH ENTERPRISE**

COUNTRY AND ENTERPRISE	REDUCTION IN WATER CONSUMPTION		REDUCTION OF WASTEWATER DISCHARGE (Cu M./Year)	REDUCTION OF POLLUTION LOAD IN WASTEWATER (BOD, COD, NUTRIENTS ETC)	
	%ge Reduction	Cu. Metres per Year		%ge Reduction	Total load Reduction (tonnes/year unless otherwise stated)
<b>BULGARIA</b>					
Yuta JSC	No Data	No Data	No Data	N/A	N/A
Slavianka JSC	Type C Only	Type C Only	Type C Only	N/A	N/A
Zaharni Zavodi AD	Type C Only	Type C Only	Type C Only	Included in Type C	Included in Type C
<b>CROATIA</b>					
Agroprotienka	20%	6,200	62,000	Significant, non-quantified	Significant, non-quantified
Gavrilovic	19%	85,725	85,725	34%	30 (organic load)
Herbos	11%	6,000	6,000	90%	14 (organic load)
IPK Tvornica Secera Osijek	1%	23,177	23,000	3%	305 (organic load)
<b>HUNGARY</b>					
Gunter-Tata Kft.	14%	3,064	2,339	No Data	16 m <sup>3</sup> /y oil
Indukcios es Vedogazos	52%	10.37	10,370	No Data	No Data
Videoton Audio Company	1%	50	50	No Data	No Data
Nitrokemia 2000	No Data	No Data	No Data	No Data	No Data
<b>ROMANIA</b>					
Astra Romania	17%	13,200	13,200	98.5% oily products	2,450 oily products
Rulmentul	N/A	N/A	N/A	12% COD; 23% BOD; 30% heavy metals	5.1 COD; 1.1 BOD; 0.1 heavy metals
Chimcomplex	47%	7,440	10,725	28% COD; 32% Ammonia	275 COD; 71.5 Ammonia
Somes	11%	1.39 Mill	1.89 Mill	7.5% COD; 6% BOD; 7% TSS; 8.6% AOX	554 COD; 147 BOD; 92 TSS; 20 AOX
<b>SLOVAKIA</b>					
AssiDoman Sturov	3.80%	1.13 Mill	1.76 Mill	12%	No Data
Zos Trnava	4%	20	20	100% (oily products)	28.2 (oily products)

**TABLE 7: TYPE A AND B NON-WATER RELATED IMPROVEMENTS FOR EACH ENTERPRISE**

COUNTRY AND ENTERPRISE	RAW MATERIAL USE		EMISSIONS OF CO <sub>2</sub> /H <sub>2</sub> S/VOC+AC11 EQUIVALENT (tonnes/year)	WASTE GENERATION		ENERGY SAVINGS Specific Reduction
	%ge Reduction in consumption	Total reduction (tonnes/yr unless otherwise stated)		%ge Reduction	Total Reduction (tonnes/yr)	
<b>BULGARIA</b>						
Yuta JSC	fibres 10% fuel 15%	fibres 18.8 fuel 111 m <sup>3</sup> /y	80	10%	18.8	
Slavianka JSC			255			
Zaharni Zavodi AD	fuel 7%	fuel (coal) 36				
<b>CROATIA</b>						
Agroprotienka	N/A	N/A	None	20%	6,250	
Gavrilovic	None	None	914	<1%	2	
Herbos	0.27%	8	None	11%	6,000	
IPK Tvornica Secera Osijek	0.1%	2,142	1	0.01%	305	
<b>HUNGARY</b>						
Gunter-Tata Kft.	100%	3.3 solvent	0.03	95%	4 oily textiles 3.3 solvents	80 kWh/yr
Indukcios es Vedogazos			124			196,502 kWh/yr 21,007 m <sup>3</sup> /yr gas
Videoton Audio Company	30%	67 pallets/yr	1.58 CO <sub>2</sub> equiv	30% 50% 90%	67 wood pallets/y 1.5 kg neon tubes 1,343 m <sup>3</sup> /y sawdust	4,880 kWh/yr
Nitrokemia 2000						
<b>ROMANIA</b>						
Astra Romania	0.5%	N/A	961	50%	594	
Rulmentul	N/A	N/A	N/A	9%	45.4	
Chimcomplex	2.7%	77	2200	N/A	N/A	
Somes	12.8%	475	N/A	50%	42 (lost fibre)	
<b>SLOVAKIA</b>						
AssiDoman Sturov	10%			No Data	1000	
Zos Tmava	5% oil 2% paint	2.2 oil 8.4 paint	0.3%	10%	100	

**TABLE 8: TYPE C WATER RELATED IMPROVEMENTS FOR EACH ENTERPRISE**

COUNTRY AND ENTERPRISE	REDUCTION IN WATER CONSUMPTION		REDUCTION OF WASTEWATER DISCHARGE (Cu M./Year)	REDUCTION OF POLLUTION LOAD IN WASTEWATER (BOD, COD, NUTRIENTS ETC)	
	%ge Reduction	Cu. Metres per Year		%ge Reduction	Total load Reduction (tonnes/year)
<b>BULGARIA</b>					
Yuta JSC	N/A	N/A	N/A	N/A	N/A
Slavianka JSC	60%	1,260	1,260	25% COD	No Data
Zahani Zavodi AD	80%	725,000	95,000	100% COD	No Data
<b>CROATIA</b>					
Agroprotienka	None	None	None	95%	600 BOD
Gavrilovic	56%	250,280	168,000	77%	53 BOD
Herbos	None	None	None	10%	1.5 organic load
IPK Tvornica Secera Osijek	62%	1.68 Mill	1.79 Mill	N/A	N/A
<b>HUNGARY</b>					
Gunter-Tata Kft.	N/A	N/A	N/A	N/A	N/A
Indukcios es Vedogazos	N/A	N/A	N/A	N/A	N/A
Videoton Audio Company	N/A	N/A	N/A	Below Legal Limits	Below Legal Limits
Nitrokemia 2000	39%	5,322	5,322	31% salt content	472 salt
<b>ROMANIA</b>					
Astra Romania	89%	180,000	160,000	N/A	N/A
Rulmentul	N/A	N/A	N/A	N/A	N/A
Chimcomplex	41%	3,888	4,950	23% COD; 58% Ammonia	165 COD; 38.5 Ammonia
Somes	65%	5.5 Mill	5.5 Mill	22% COD; 17.7% BOD; 19.5% TSS; 91% AOX	1,770 COD; 486 BOD; 282 TSS; 284 AOX
<b>SLOVAKIA</b>					
AssiDoman Sturov	14.70%	4.42 Mill	261,000	No Data	3,660
Zos Trnava	50%	250	250	100%	53



**TABLE 9: TYPE C NON-WATER RELATED IMPROVEMENTS FOR EACH ENTERPRISE**

COUNTRY AND ENTERPRISE	RAW MATERIAL USE		EMISSIONS OF CO <sub>2</sub> /H <sub>2</sub> S/VOC+AC11 EQUIVALENT (tonnes/year)	WASTE GENERATION		ENERGY SAVINGS Total Reduction
	%ge Reduction in consumption	Total reduction (tonnes/yr)		%ge Reduction	Total Reduction (tonnes/yr)	
<b>BULGARIA</b>						
Yuta JSC	20% fibres 1% fuel	16.8 fibres 4.2 m <sup>3</sup> fuel	135	10%	11.3	
Slavianka JSC	30% fuel	94 fuel	234		400 m <sup>3</sup> /y water	1,066 Mwh
Zaharni Zavodi AD			1187.5	100% Slop	95,000 m <sup>3</sup> /y	
<b>CROATIA</b>						
Agroprotienka	N/A	N/A	none	95%	13,250	
Gavrilovic	2%	302	none	85%	7,020	
Herbos	0.03%	0.9	none	<1%	2	
IPK Tvornica Secera Osijek	none	none	none	55%	1.8 mill	
<b>HUNGARY</b>						
Gunter-Tata Kft.						
Indukcios es Vedogazos						
Videoton Audio Company						
Nitrokemia 2000	26% Fe <sub>2</sub> SO <sub>4</sub> +Na <sub>2</sub> CO <sub>3</sub> 17% phtalic anhydride+carbamide	495 Na <sub>2</sub> CO <sub>3</sub> 679 carbamide	673-1000 kg CO <sub>2</sub>	28%	1.9 dangerous waste 13,483 pieces PE sack	756.1 mill kJ/yr ('cool energy' from Ammonia evaporation)
<b>ROMANIA</b>						
Astra Romania	0.68%	N/A	N/A			
Rulmentul	100% PCE	30	N/A	100% (waste PCE)	13.5	
Chimcomplex	4.75%	214.5	770	N/A	N/A	
Somes	20%	3,100	N/A	31.3%	243	
<b>SLOVAKIA</b>						
AssiDoman Sturov	N/A	N/A	641			
Zos Trnava	5%	24.5	21.76 VOC	10	100	

#### **4.1.4 Threats and Root Causes – Effective Resolution**

The primary threats and root causes have been noted under the Project Background and Landscape. The Project has addressed these concerns in two ways. Firstly at the specific level of 17 enterprises by reducing their discharges of organic and toxic pollutants, and secondly by providing transferable demonstrations of the TEST process (with its associated improvements to company management, cleaner production policy, factory-floor awareness and technological improvements) that can be replicated throughout other industrial enterprises within the Danubian countries.

One important point that needs to be highlighted is that not every demonstration enterprise has directly addressed water-related pollution issues. A review of Tables 5-9 shows that, in one or two cases, a reduction in raw materials (use of toxic products), waste generation, VOCs or air polluting emissions were the main achievement of the TEST process. Undoubtedly such improvements can still be linked to a holistic and integrated approach to cleaning up the Danube River Basin and have added valuable case studies to the TEST approach. The inclusion of these parameters is also directly consistent with the overall requirements of CPA and EST as defined by UNIDO.

The Project has developed a detailed matrix of indicators (See Tables 5-9) which effectively follow the TEST process within each enterprise and quantify the changes, improvements and benefits gained through the various project activities and the TEST modules. These constitute both Process and Stress Reduction indicators and are considerably more specific than those included in the original Project Document, providing a more measurable detail of what has been achieved. The Evaluation gave specific attention to the Process indicators (training, capacity building, improvements in cleaner production, adoption of other TEST processes, etc) and to the Stress Reduction indicators (physical changes to handling procedures, construction of waste handling and reduction facilities, end-of-pipe treatments, etc) identified for each enterprise to ascertain the accuracy of the indicators. In all cases that were reviewed the measurable indications were seen to be accurate. These have been discussed further under **4.1.3 – Summary of Demonstration Deliveries**.

There are no real Environmental Status indicators for the Project and these would be very difficult to evaluate and confirm in any case. However, it is the Evaluator's opinion that these would not in themselves be relevant to this particular demonstration project and are more appropriate to the larger Danube Regional Project that is following on from the GEF Pollution Reduction Project. The inclusion of Environmental Status Indicators would have required a fairly large investment in independent physical monitoring of water quality, water use reduction, etc. In the event, this information was provided by the enterprises and must be accepted at face value. It is the State Water Authorities that set the standards for permitted emissions associated with operating licences for industrial enterprises. Each industry has a specific set of parameters to adhere to and is self-monitoring although the Authority or Inspectorate may also undertake spot-checks. Financial penalties are now generally increasing in line with the need to meet the new EU directives.

Industrial enterprises of this nature would be very reluctant to allow outside technical expertise to collect data from their facilities. However, there is a certain logical assumption that can be made that would strongly support the argument that confirmed changes at the Process and Stress Reduction level must result in quantifiable changes at the Environmental Status level. Furthermore, this needs to be viewed in the context of the objectives of the TEST project which is primarily to demonstrate how a particular process can achieve cost-effective and sustainable improvements in cleaner production and environmental management within selected companies in such a manner as the companies themselves can identify and adopt the benefits. The reality of this situation is that a

particular enterprise (as was in fact the case) may actually be reducing its discharge load of a certain substance below the immediate background measurements a few metres upstream so that Environmental Status indicator measurements in the actual river environment would hardly be relevant or appropriate. In most of the Danube countries, government inspectorates are charged with the responsibility for setting and checking discharge levels. However, the capacity to do this varies considerably from country to country both at the human resource and at the equipment level.

One consultant that had been closely involved in the development and implementation of the TEST process did stress the need for the enterprises to develop effective in-house data gathering and information systems at the earliest stages of the TEST procedure, but noted that this would require additional resources and investment (particularly for monitoring equipment).

The cost-effective element of the TEST process also works to the Project's advantage as far as actual discharges and improvements to the Environmental Status of the Danube in proximity to each enterprise. The TEST process sets out to demonstrate to each enterprise that certain measures are cost-effective in that a certain level of investment can result in a significant improvement in their water usage and in their discharge levels. It is therefore not in the company's interest to falsify the data as they would only be fooling themselves into thinking that their adoption of new processes and technologies are achieving a significant and cost-effective improvement to their discharges and water efficiency.

A strong link to other Danube initiatives such as the ICPDR and DRP, which have more involvement in actual physical monitoring and data handling, would be a valuable improvement to the TEST process within the region.

It should be noted that the original Project process indicators were revised and rationalised somewhat in the 2004 PIR following a revision and improvement of the TEST procedure so as to apply a more integrated approach. The revised indicators are an improvement on the rather generalised indicators that the project started with. It would have been useful from the Evaluations' point-of-view if the PIR format used by GEF made allowance for such changes under section 4. Adjustments to Original Project Strategy. A pertinent question to include in this section in future would be in reference to any changes in Project indicators as this has a significant bearing on the evaluation process.

The overall SQA for the Resolution of Threats and Root Causes has been allocated at **80%** equivalent to a **Rating of 4**. The demonstrations have been fairly effective at showing mechanisms for addressing threat and causes at the individual enterprise level. The Project could have adopted more effective indicators for this aspect and these should have been formally revised at the APR/PIR stage. Also, as previously mentioned, future selection of enterprises could focus fully on IW related water improvements as well as other issues, which are indirectly related to water quality.

#### **4.1.5 Global and National Benefits**

The Project Document notes that the Executing Agency will assist national institutions and independent experts (counterparts) to enhance their understanding of the need for, and their abilities to provide, enterprises with the integrated package of services that constitute the TEST programme. It further notes that perhaps the most important skill developed will be the realization of the necessity to work in teams to be able to provide the diverse services needed by enterprises to be able to incorporate ESTs in their production operations.

The immediate national target beneficiaries are identified as the 17 enterprises that will be advised on how to reduce their pollutant discharge at the same time as they improve their production efficiency. These beneficiaries also include the workers in the enterprises who would have the prospects of a more secure economic future.

The enterprises used in the TEST project were selected based on the priority hotspots identified through the Danube Basin Pollution Reduction Programme and SAP and were reconfirmed at the national level prior to adoption. In this respect, it can be confirmed that the project is addressing national priorities for developing environmentally sound technologies and for pollution reduction. These national priorities were well-defined within the Project Brief and the Project Document with major manufacturing discharges being identified for each country by sector (taken from information provided by the Danube Pollution Reduction Programme's TDA Report. This shows a clear linkage and sequence of GEF investment through the TDA and SAP, to the TEST demonstrations as grass-root delivery of remediation techniques.

It should be further noted that national priorities within the Danube region now extend to the need to conform to EU directives (as most of the countries are in pre-accession or accession status). The main goal under these EU directives will be for the countries to develop Integrated Permitting Procedures and to introduce Best Practices and Technologies. These requirements are all embraced within the TEST integrated modular procedure.

The ultimate beneficiaries will be those who are adversely affected by the national as well as transboundary pollution in the Danube River. The Danube River as well as the Black Sea, which is the ultimate sink for wastes discharged in the Danube, provides vital services such as drinking water supply and recreation, as well as sustaining aquatic life forms that can survive only in a clean environment.

Although not mentioned in the Project Document, the Project Brief identifies the target GEF Operational Programmes to be OP8 (waterbody-based) and OP10 (contaminant-based).

As one of its goals, the waterbody based OP8 includes assistance to countries in making changes in the ways that human activities are conducted in a number of sectors so a particular waterbody and its multi-country drainage basin can sustainably support such human activities. Characteristic interventions listed under OP8 include supporting the incremental cost of technical assistance, capacity building, limited demonstrations, and certain investments needed to address the priority transboundary concerns, and to encourage the use of sound science and technological innovation.

The long-term objectives of the contaminant-based OP10 is defined as the development and implementation of International Waters projects that demonstrate ways of overcoming barriers to the use of best practices for limiting releases of contaminants causing priority concerns in the International Waters focal area, and to involve the private sector in utilising technological advances for resolving these transboundary priority concerns. Listed under the OP10 project outputs are those that work to implement a number of fast-track demonstration projects of approaches, techniques, pilot projects, innovative technologies, institutional arrangements, and the use of economic instruments. Also listed are projects that demonstrate the development of interim best practices for minimising risk, phase-out of the use of a particular contaminant or of a process that generates a contaminant, pollution prevent strategies, the development of new technologies to neutralise priority contaminants and the development of economic instruments to illustrate the feasibility of measures to abate/prevent priority contaminant release.

One of the objectives of the original Danube SAP was the reduction of point-sources of pollution and hence overall reduction of pollution load into the Danube. In demonstrating cost-effective and viable processes and technologies to achieve this aim as identified by the SAP, the project is directly addressing the requirements and priorities of the Danube River Protection Convention and the recommendations from the Danube River Pollution Reduction Programme.

Based on the Operational Programme guidance and the requirements of the SAP, it is clear that the TEST Project is directly meeting the needs of the countries and the Danube region as a whole as well as conforming to the Operational Strategy for International Waters as set out by GEF, and therefore providing effective global benefits.

The SQA score for Global Benefits is **100%**. Undoubtedly the lessons and best practices generated by the project are of enormous value at the national, regional and global levels.

#### **4.1.6 Stakeholder Participation and Public Involvement**

In the opinion of all parties interviewed by the Evaluator, stakeholder involvement in the Project Design and the Project Implementation was both adequate and effective. The Project Coordinator confirmed this assessment and noted that there had been no complaints from any party of lack of dialogue with any potential stakeholders. All Government agencies that were questioned on this felt there had been appropriate input from their side. Certainly every opportunity seems to have been offered for full participation by relevant bodies. However, in the opinion of the Evaluator, such opportunity was not always seized in the case of the Government sectors. In at least one case there was an evident lack of involvement or understanding of the project from a crucial sector (the Ministry responsible for Environment). To balance this lack of ownership from one important Government sector it should be noted that in the same country, the Ministry for Economic Affairs was a close partner to the project instead. A lack of human resources coupled with a fairly consistent turn-over of middle to upper management staff within the Ministries of some countries may partly explain this lack of effective participation in project activities and lack of awareness of project delivery.

Ordinarily this lack of Government ownership could have created a real problem for the project at the level of at least one country. However, the unique nature of the TEST project was that the EA was dealing directly with the private sector through the national counterpart, and not through a Government agency. It is always difficult to maintain full involvement in project steering and awareness by government agencies and the level of commitment will always vary from country to country. In the TEST project, the Upper Danube countries demonstrated a greater level of internal cooperation and overall stakeholder input. This may be a reflection of the more rapid transition process within these countries away from the old practice of centralised and dictatorial government.

In any GEF project, it is essential that every effort be made to ensure that government agencies are always kept abreast of developments and are always invited to appropriate meetings and workshops even though Project Management may feel that such effort is a waste of time. These are often the very same agencies that will be the first to complain if they were left off the invitation list or were not included in shared information. However, this categorically does not appear to be the case with the TEST project and all evidence suggest that every effort was made to include all appropriate stakeholders and that any inadequacies in awareness or involvement lie with the government agencies themselves and not the Project. Most importantly for the TEST project, the level of commitment from the private sector was clearly significant and consistent. Sustaining this

commitment to project objectives and to the TEST process beyond the project will be the defining proof for TEST.

As identified in the 2004 APR/PIR, one of the major challenges to implementing the TEST programme was the identification and selection of the demonstration enterprises. Although the previous GEF project (Pollution Reduction Programme) had identified many hotspots, being within one of those hotspots was not in itself considered to be sufficient justification for selection. Financial viability was a critical selection criteria as only those companies that had long-term financial viability could be expected to remain with the TEST programme for 3 years, and would have available funding for investment in TEST processes and technology. Involvement by enterprises was voluntary and one significant lesson learned from the project was that the enterprises needed to be convinced that there would be significant economic benefits to themselves (as well as environmental benefits) as a result of their participation. This undoubtedly provided the motivation and incentive for their agreement to be involved. Even the environmental aspects were directly linked to economic consequences (i.e. being able to compete in a European and global market that demands and legislates for environmentally sound practices).

Although though the TEST process was predominantly funded by the project, the enterprises were required to make some token financial contributions and this became a further strategy for strengthening commitment to the project to be used as part of the selection process. In the final analysis, the enterprises made a substantial contribution to the Project, both in manpower terms and in the cost of improvements to their processes, policies and technologies.

The Evaluator has an opportunity to meet with the Technical Expert for Water Management and Pollution Control at the International Commission for the Protection of the Danube River. The representative noted that the TEST project had been very beneficial in providing some real examples of processes and technologies that could be used for pollution reduction and water use efficiency. The benefit to the Commission and its member's was the actual demonstration of how to convert hotspots into viable cleaner enterprises and to reduce discharges at specific point-sources. TEST has taken specific conclusions and recommendations from the Danube Pollution Reduction Programme (GEF Project) and actually implemented these to demonstrate potential for real progress in the protection of the Danube River through mitigation of threats and impacts. The Danube Pollution Reduction Programme's Transboundary Diagnostic Analysis (TDA) and Strategic Action Plan (SAP) helped to identify the original Hotspots along the Danube river basin. In this respect, the TEST project is a direct result of, and logical follow-up to, the SAP process. Now, following on from the Danube Pollution Reduction Programme is the UNDP GEF Danube Regional Project. One of the activities within this larger regional project is to review and initiate reform for industrial policy in the region (including identifying Best Available Technologies – BAT) and to assist in strengthening capacity to reduce pollution. Clearly there are direct links here to the lessons and practices developed through TEST and the case-studies arising from the MSP. The representative of ICPDR felt that it would be important to follow-up on the TEST project and to undertake a post-project assessment at a specified date after project closure to ascertain how effectively the TEST processes and concepts were still being implemented within the 17 selected enterprises, and how many other enterprises in the region had replicated the TEST process. The ICPDR representative felt that the incentives for the participating enterprises within the TEST project were strong and included recognition of the need to comply with EU requirements (ISO 14000 and IPPC), and the competitive advantage that this and a general company policy of cleaner production would give them within the European and global markets.

The Evaluator was also able to communicate with the UNDP GEF Danube Regional Project regarding mutual dialogue and communications between the two projects. The DRP stated that it was well aware of the objectives of the TEST project and, to a certain extent, its activities within the selected Danube countries. DRP noted that it had cooperated with the TEST Project on several workshops and results dissemination exercises. Relationships had been developed between the two projects mainly in the area of capacity building. DRP has a component on nutrient pollution control policies from industrial sources as well as for the promotion of BAT (Best Available Technologies). The CPC partners in the TEST Project were also cooperating with the DRP Industrial component and the intention was to continue with this cooperative partnership within the DRP Project. DRP has been using the case studies developed in cooperation with the TEST Project. In the opinion of the DRP Project, the dialogue between consultants from both the TEST project countries and the other Danube countries has been quite intensive. With regard to further follow-up to the TEST project, DRP would like to see the development of more targeted policies and legal frameworks focusing on enforcement and the adoption of BAT. They feel that the EU IPPC provides the framework for such policies and legal reforms.

Where training was provided within the Project activities, the policy was to use experts from within the region that understood the regional context and needs, and who were therefore true national or regional stakeholders in their own right. Training needs were identified based on open discussion with national project teams and at the regional workshops. One CPC noted that this project was excellent in its involvement of stakeholders as it was “tailor-made for participation”.

One area relating to stakeholder participation that the Project Coordinator felt could have been strengthened was the involvement of more enterprises beyond the selected 17 with regard to enhancing awareness of the TEST process. Some simple training could have been provided on a workshop basis, and possibly some opportunities offered for non-demonstration enterprises to observe at on-ground training sessions. Non-demonstration enterprises were, however, invited to the dissemination workshops and attendance was generally good. Clearly, more could have been done with a healthier budget, and it seems that the constraints imposed by an MSP sized budget coupled with poor delivery of co-financing (see **Workplan and Budget** section) has caused constraints on potential project delivery. Also, this involvement of non-demonstration enterprises could have been assisted through a stronger incentive and ownership throughout all pertinent government sectors to design national programmes to improve industry incentive. It would also have been beneficial to project sustainability and government commitment if local Inspectorates responsible for licensing and enforcement could have been more closely involved in understanding the objectives and requirements of the project.

The evaluator also had the chance to meet national representatives from the Regional Environment Centres. These RECs took an active role in the project and sat on the Advisory Boards. They were involved in project design also. The RECs were consistently supportive of the Project and felt that the TEST had achieved the best possible end-product that could have been achieved in view of the constraints. One criticism of project design and implementation was that there should have been much more time available for project inception and for ‘preparation of the ground’ and sensitisation of the companies (especially top management). Again, this seemed to be a criticism of the timeframe and the lack of a proper Preparatory phase for the project. Another suggestion from the RECs was that it would have been beneficial for them to have been included in the training process.

In general, overall stakeholder participation in the project at the country level has been highly satisfactory, especially in relation to National Counterpart participation (both the actual counterpart person, and the associated Institution/Centre). One country felt that more involvement of the

industrial branch associations would have been valuable. However, there has been limited participation in the project by other Danube Countries outside of the 5 project participants. There was some dissemination of results through the ICPDR but this was fairly minor. There is now an opportunity and a requirement to actively transfer lessons and best practices across to other Danube countries in order to capture the true replicability of the TEST process. It is now urgent to find a way to bring Government, the CPCs/Test Institutes, and the private sector together to address the replication needs for TEST.

The SQA score allocated to this aspect of the Project is **80%** with a consequent rating of **4**. The score is slightly less than perfect as the stakeholder participation by the government is deemed to be somewhat lacking and the participation outside of the Project countries could have been improved. The score still remains very high, as the participation within the countries by those directly involved in the Project aims and objectives was excellent.

#### **4.1.7 Capacity Building**

The Project Document and subsequent activities accurately identified and addressed both capacity building and institutional strengthening. In fact, it is reasonable to say that the Project went beyond expectations and has provided the NCPCs and other national institutions with sufficient foundation and capacity that they can now sell their services professionally and offer very effective packages to industry for Cleaner Production and all of the TEST modules. Tables 10 & 11 provide details of the capacity building efforts and achievements at both the enterprise level and at the level of the CPCs and Counterpart Institutes. Most of this capacity building was in process and training, with the only equipment procurements associated with the counterparts being a single computer for each.

The important lesson will be whether such capacity building is seen to be sustainable. This applies to both capacity building at the CPC/Institute level, and capacity building at the enterprise level. At the CPC/Institute level there is significant evidence of sustainability in that further enterprises are now contacting the CPCs and institutes with a view to contracting them to carry out various levels and stages of TEST within their companies in order to meet ISO 14000 and IPPC requirements. At the enterprise level it would be valuable to see how ingrained and sustainable the TEST process has become in future years. Again evidence is positive with some trained team members from the enterprises having been promoted within the company, even at Chief Accountant and Director level. Some trained personnel have left their posts to take other jobs in other enterprises. It is hoped that they will carry their new experience and knowledge with them and disseminate it into the new company policy. In this respect it would be useful to review the TEST project, the CPCs/Institutes and the demonstration enterprises at a later date to see how sustainable the process has really been.

Table 10 shows the level of capacity building at the demonstration enterprises and Table 11 presents the institutional strengthening and capacity building for the national counterpart institutions and staff.

At the enterprise level, the number of project modules completed for each enterprise is impressive, as is the number of employees trained and the amount of man-days dedicated to training and to undertaking the TEST activities.

At the level of the counterpart institutions, training and therefore associated capacity building has also been impressive and each country's counterpart institute has benefited significantly from the new tools and skills that they have developed.



Delivery at the capacity-building level of the project has been exemplary and well beyond the expectations cited in the Project Document. This aspect therefore receives a well-deserved SQA score of **100%**.



**TABLE 10: CAPACITY BUILDING, TRAINING AND IMPLEMENTED MODULES AT THE SELECTED TEST ENTERPRISES**

COUNTRY	ENTERPRISE	INDUSTRIAL SECTOR	Number of Employees Trained	Number of man-days of training	Number of enterprise man-days in TEST activities	Projects Modules undertaken by enterprise					
						IR	CPA	EMS	EMA	EST	SES
Bulgaria	Yuta JSC	Non-Woven Textiles	14	64	140	X	X	X	X	X	X
	Slavianka JSC	Fish Processing/Canning	3	5	70	X	X			X	X
	Zaharni Zavodi AD	Sugar/Alcohol Production	14	56	210	X	X		X	X	X
Croatia	Agroprotienka	Meat Rendering	6	33	136	X	X			X	X
	Gavrilovic	Meat Processing	9	54	290	X	X	X		X	
	Herbos	Pesticide Plant	6	35	146	X	X		X	X	
	IPK Tvornica Secera Osijek	Sugar production	3	37	190	X	X			X	X
Hungary	Gunter-Tata Kft.	Heat Exchange Manufacture	5	35	205	X	X	X		X	X
	Indukcios es Vedogazos	Steel Heat Treatment	3	30	90	X	X	X		X	
	Videoton Audio Company	Electronic Products	2	20	100	X	X	X		X	
	Nitrokemia 2000	Chemical Production	15	59	243	X	X	X	X	X	X
Romania	Astra Romania	Petrochemical Refinery	26	162	1460	X	X	X		X	X
	Rulmentul	Bearing Production	50	318	1218	X	X	X		X	
	Chimcomplex	Chemical Production	52	270	523	X	X	X		X	
	Somes	Pulp and Paper Bleaching	35	260	770	X	X	X	X	X	
Slovakia	AssiDoman Sturov	Pulp and Paper Products	55	81	560	X	X		X	X	X
	Zos Trnava	Rolling Stock Repairs	82	172	1400	X	X	X		X	X
Project Totals			380	1691	7751						

**TABLE 11: CAPACITY BUILDING, TRAINING AND NEWS TOOLS/SKILLS DEVELOPED BY COUNTERPART INSTITUTIONS**

COUNTRY	Number of people trained in TEST Tools	Number of man-days of training	Number of total days of training	Additional jobs created to support TEST	New tools/skills developed by counterpart to support TEST					
					CPA	EMS	EMA	EST	COMFAR	Social Audit
Bulgaria	9	121	83	1	X	X	X	X	X	
Croatia	13	92	26	1		X	X	X	X	X
Hungary	5	89	22	2			X	X	X	X
Romania	40	160	31	2	X		X	X	X	
Slovakia	23	160	27	2			X		X	X
<b>Project Total</b>	<b>90</b>	<b>622</b>	<b>189</b>	<b>8</b>						

#### 4.1.8 Policy and Legislative Reform and Improvement

The TEST Project has been unusual in that rather than relying on policy and legislative reform as an integral part of its delivery and outcome it has actually been driven by parallel needs for policy and legislative changes vis-à-vis EU requirements for meeting set environmental standards within industry. In this respect there has been no actual project component or activities directly addressing such reforms. Instead the entire project is responding to the need for such reforms by demonstrating how these can be manifested at the individual company/enterprise level. It would be reasonable to state that the TEST project has provided a working platform to demonstrate such industrial response and to clarify that such national reforms can be met at the industrial level without compromising a company's economic viability or jeopardising its place in the market. On the contrary, TEST demonstrates that such improvements are directly beneficial to both company economic stability and to market competitiveness. It is expected also that TEST will help to raise awareness of discharge and emission standards relevant to the new EU legislative requirements at the enterprise level across all participating countries.

One very important success driver for the TEST Project has been the need to comply with EU directives on water quality, discharges and air emissions. The EU requirements are very strict as is the need for compliance and therefore monitoring. A company has to use an accredited agency to take measurements and report to the government and data can be compared with the hydrological institutes and other agencies. This means that there are limited opportunities for fraudulent reporting, and little chance of corruption for those countries that fall within the EU framework. Obviously some of the less-developed lower Danube countries may need improvement to enforcement capacity and reporting, and their internal assessment and reporting procedures need streamlining. Lots of funding is currently being provided for such technical capacity building through various donor programmes.

One problem experienced by the countries is the 'importation' of laws that are more applicable to countries such as Austria and Germany, but are not really tailor-made for the transition countries. Also, enforcement is weak in the transition countries. Hopefully, these concerns can be addressed under the GEF Danube Regional Programme which has a component that specifically deals with industrial policy reform.

Of interest here to GEF is the fact that this project has partnered the donor (GEF) and its counterparts at the national level directly with the private sector which is somewhat unique within a GEF initiative. From this point-of-view it may well be that industry will be providing some of the standards as far as meeting EU ISO and IPPC directives, and that the public sector will take their lead from this. In other words, TEST could and should provide the platform from which government takes the initiative to develop its policies and reform its legislation with respect to industrial practices and control/compliance on emissions and discharges. It is therefore important that the Danube Regional Programme reviews the case studies and best practices/lessons from this TEST project in the context of its industrial policy reform component. If used effectively, the results of the TEST Project can have a very positive effect on such reforms.

With this consideration in mind it is felt that the TEST project has made a very valuable contribution to potential Policy and Legislative Reform and is awarded an SQA score of **100%**.

#### 4.1.9 Replicability

The lessons learned from the TEST project have been shared with the GEF UNDP Danube Regional Project and with the Emission Inventory group (EMIS) of the International Commission for the Protection of the Danube River Basin (ICPDR). The TEST project results were presented during the *Workshop on Best Available Technologies and Industrial Pollution Control* organised by the Danube Regional Project in Bratislava in December 2003. However, there is currently a weakness here that needs to be resolved. Neither the ICPDR nor the DRP websites have direct links to the TEST website. It took some time to find references to TEST on the DPR site and the Evaluator was not able to find a direct link to a TEST reference on the ICPDR site. The TEST project was discussed in the DRP Final Report on Project Component 1.5: Industrial Reform and the Development of Policies and Legislation towards the Reduction of Nutrients and Dangerous Substances - June 2004. This report mentions strong support for the development of a website link between DRP and the main sources of Best Available Technology. There does appear to be a need for a mechanism at the level of the ICPDR to assist in the provision of the latest data and information on BAT and TEST-related processes. ICPDR, through its EMIS (the Emissions Group) component, could provide one strong possibility for encouraging replication. EMIS recognises 4 different kinds of industry (with related emission problems) and has developed a list of stakeholders for such at both the industrial level and the government level. Certainly, discussions with representatives from ICPDR (past and present) suggested that dissemination of the TEST results and encouragement of replication throughout CEE companies was not a high priority. At present there are no real tools to push companies to replicate TEST. In this respect the incentive must still be seen as economic. But this can only be effective if companies/enterprises are aware of the economic advantages of adopting the TEST process. Some stakeholders felt that this demonstrated a need for stronger involvement in the Project of those Ministries responsible for national economies. These Ministries should now be targeted with information on the TEST process.

Lessons learned were also shared at the national level through national dissemination workshops. The 2004 APR/PIR also notes in particular that there was an intensive exchange of information with on-going EU-funded twinning programmes for the implementation of IPPC in Romania, with the Regional Activity Centre based in Hungary, and with USAID funded ECOLINK programmes in Bulgaria and Croatia.

The Project Management did note that they would have preferred to see a larger dissemination phase at the national level, but that funding was constrained both by the MSP modality and by the shortfall in expected co-financing. Similarly, several countries felt that a replication mechanism should have been more clearly defined in the Project Design, or that a replication phase should have been planned to follow the MSP.

Representatives from the RECs found the project to be very worthwhile despite being very optimistic in its intended achievements and timeframe. They mentioned that although the COMFAR process is a very good one, for a lot of the companies it may have been too optimistic and required more time than was available to adapt COMFAR to each company's needs. They felt that the process should be continued in some way and that now is not the time to close the door on support to the TEST process. They felt that the best way to raise awareness of the achievements of the Project and of the TEST process generally within the public sector would be to arrange for representatives of the demonstration enterprises to present their results at national seminars (or possibly local seminars within different national regions) and to discuss cleaner production and

wastewater. Although this has been done to some extent by the dissemination seminars, a wider audience is necessary. The RECs would like to play a larger role in this process.

Further TEST projects are already planned in the Mediterranean region and in some of the other CEE countries such as Bosnia-Herzegovina. In the latter case, plans are under development for Croatia to provide assistance based on its new expertise in TEST. There are fairly strong cultural, historic and linguistic linkages between the two countries. The Croatian CPC would provide assistance to the Centre for Environmentally Sustainable Development in Bosnia-Herzegovina which has some existing abilities and has already participated in some cleaner production training, but would benefit greatly from learning more of the TEST process and mechanism.

The CPC in Slovakia is providing bilateral aid to Uzbekistan as part of the Slovakian national commitment to aid (to address EU requirements) through the Ministry of Food and Agriculture with assistance from UNDP and UNIDO. In this respect, the CEE states are gradually altering from being recipient countries to donor countries providing multilateral assistance through the EU. It is possible that this transition may also provide further opportunities for bilateral assistance within the region for replication of TEST and to assist in the development of capacity through training.

There is no doubt that the lessons and practices identified through the TEST Project are highly replicable throughout the region and, indeed, on a global basis. Furthermore, there is a strong need and urgency for their transfer and replication. However, it appears that there were insufficient funds within the MSP TEST Project to really undertake an effective replication mechanism for either the Danube countries or to capture these valuable lessons for GEF and other funding initiatives. The TEST Manuals and Cases Studies developed by the Project are very valuable commodities and should be shared with all appropriate institutions and agencies.

There are certain incentives that could help to promote and replicate TEST. In Denmark, for example, having ISO 14000 accreditation means that licensing fees for that company are cut by 40%. In this respect, government does need to be more involved so as to provide financial incentives to companies for cleaner production and compliance with EU directives, all of which are in the national interest. At the level of the industrial support institutes (CPCs), such institutes could develop a programme focusing on clusters of related industries with similar needs and technological requirements. Training and support could be pooled and made more cost-effective while also being specific to those needs. Experiences would be shared and lessons transferred between cluster members. To support this cluster approach, one CPC suggested that TEST Toolkits could be customised to suit individual company/cluster needs.

One approach for transferring the lessons and for further replication of TEST that was suggested by the Project Coordinator would be to undertake a further phase of TEST but with an altered balance of subsidy and some small funding input. In the TEST Project, 90% of activities were subsidised by GEF to prove the demonstration process. A second phase could reduce this to 50% support to a new set of enterprises, which can now see the market advantages of TEST. Some of this 50% should represent matched funding from national governments (e.g. national environmental funds) so that 25% would be from GEF and 25% from governments. One major advantage would be that in-country capacity is already established and ready to assist.

As a next step, now that type A (No investment – operational control improvements and housekeeping) and type B (Low to moderate investment- short payback) implementation measures have been carried out in most of the enterprises, all stakeholders felt that there was a need to assist companies in finding realistic investment opportunities to move on to type C measures (Large

investment – longer term payback). If soft loan agreements could be established with development banks these could be made conditional to the companies having reached a certain step or module within the TEST process.

In the final analysis, there could have been more information sharing with other agencies beyond the TEST project (e.g. with ICPDR, EU, etc) and within and outside of the TEST project countries. There are justifiable reasons for why this has not occurred as effectively as may have been intended and these relate mainly to project design, the use of the MSP modality and funding constraints. A more specific replication phase should have been designed, possibly even as a separate project. However, any significant criticism under this assessment area has to focus primarily on Project Design and it is fair to say that there were significant efforts and achievements made within the constraints mentioned. Thus the allocated SQA score for Replication is still high at **70%**.

#### **4.1.10 Risks and Sustainability**

Of the 17 enterprises selected, one dropped out in the early stages (Hungary) and was replaced by another enterprise. Otherwise the Project ran successfully from beginning to end with the 17 selected enterprises.

According to the 2004 APR/PIR, some of the key changes bought about by the Project that should be maintained into the future include A) Enhanced national capacity in delivering integrated services to the industrial sector and to the national government on how to address sustainable industrial production, B) Increased awareness within the industrial sector, C) Increased awareness within the local environmental authorities.

The enhanced national capacity to deliver integrated services is already demonstrating sustainability as the demand from the industrial sector for such services is now increasing in all countries. There are market forces now driving this process that will ensure such sustainability, at least in the short-term. As EU Directives become more and more pressing, the awareness of both the industrial sector and the local environmental authorities is becoming increasingly more focussed on TEST-related issues and the need for formally-recognised and accredited cleaner production techniques. Certainly the general feedback at the industrial level is that once a company has successfully attained ISO 14000 accreditation it will make every effort to keep it rather than have to go through a renewed and costly reappraisal.

The company Nitrokemia (Hungary) presented an interesting case. The company successfully implemented EMS and EMA, receiving ISO 14001 certification in 2003. However, during the CPA it was identified that the ‘good housekeeping’ options were marginal and would have had little effect on the production. The primary options for improvement were at the EST level with a switch to a new technology. This became the focus of the EST assessment. The new technical solution was identified and was considered to be acceptable by the company. Implementation was planned for 2004 but had to be postponed due to the on-going restructuring of the company which is being split into several new companies, some with new owners. Although in some respects this has created a non-sustainable situation for the TEST process (at least for the time-being) within this company, Nitrokemia did provide the project with a very good case study for the application of the EMA process.

As mentioned under capacity building, part of the proof of the effective nature of TEST would be to review the trained elements of the project at a selected date after the closure of the project to see how they are using this training. This would apply both to the counterpart institutes and to the



demonstration enterprises. This would be a valuable exercise that falls under post-project evaluation, a concept that is beginning to be included in GEF projects on a more regular basis.

One other issue was raised during the evaluation, which is common to all projects that include capacity building activities. Once the right people are trained there is a tendency for them to leave and seek positions that are better paid. Salaries at the technical level throughout the region are very low. This can be exacerbated at times by international agencies having a policy of preference for recruiting from the developing countries or those in transition as an act of political correctness. This tends to act as a drain on the national human resources in such countries. This can inadvertently result in asset-stripping from such poorer countries in order to maintain a 'feel-good' factor within the international agencies, and to comply with short-sighted policies that do not see the longer term damage that can be created by such policies.

Several CPCs representative and national counterparts had similar views on sustainability with respect to next steps. Marketing of the TEST success was seen as a critical factor which needed more emphasis now that EST was complete. Then financial incentives to A. encourage the demonstration enterprises to continue to apply TEST processes through Type C improvements (higher cost long-term technological changes) and to B. bring other enterprises into the TEST process were seen as a logical progression for the Project objectives. The need for a follow-up investment phase to consolidate the value of TEST was raised by many stakeholders.

Several stakeholders noted that there was a need to specifically identify individual consultants with the skills to work with the CPCs and companies in future.

Inevitably the real sustainability of the TEST Project lies not just in the successful demonstration of the process, but in its transfer and replication as well. This element has already been covered under **Replicability** above and further needs will be reviewed under **Conclusions**.

To summarise, the risks that threatened the project during its implementation were mostly overcome effectively and efficiently. Sustainability can be viewed in the context of 1. The TEST concept and process and 2. The efforts within the demonstration enterprises. With respect to 1. This now very much depends on replication of what has been demonstrated which definitely needs more effort in order to be seen to be sustainable at either the national or regional level. The second aspect, sustainability of TEST at the demonstration enterprises level will become clearer with time and ideally requires re-evaluation some time after closure of the project. As with the replication assessment above, any major concerns here are focused on Project Design inasmuch as little consideration was given in the design of the Project Document to Sustainability concerns *per se*. A search of the actual Project Document reveals a total absence of the concept of Sustainability in fact. In fairness, it should be noted that the actual delivery by the Project within the design constraints has created a reasonable expectation of sustainability inasmuch as awareness and capacity has been put in place to support sustainability both company, national and regional level but that this would need further initiatives (see **Recommendations**) in order to capture the GEF investment. SQA score = **75%**.

## 4.2. Project Management and Implementation

### **4.2.1 Project Design and Planning**

Some of the Cleaner Production Centres were involved in the preparation of the Project. At least one of the CPCs/national counterparts felt that the original Project Document was unsuitable

because of 4 years transition between concept and implementation. Many of the hotspots (along with their factories and machinery) identified by the Pollution Reduction Programme were gone and new ones had sprung up. There were too many steps involved between UNIDO, UNDP and GEF and the process of project development was too slow so that the Project Document, when it was finally approved, was not accurate anymore. This was also one of the reasons behind the alterations away from the stepwise approach to TEST and the adoption of the EMA approach which the CPCs supported (and suggested to some extent).

There is a strong case for stating that the constraints of the GEF funding (coupled with unrealised co-financing) are quite probably responsible for the less-than-successful replication of the TEST demonstrations and the less-than-perfect transfer of lessons and practices. More appropriate funding (possibly linked to a longer project timescale) would almost certainly have resolved this problem and it is the opinion of the Evaluator that the Diffusion component would have been completely successful in the presence of sufficient time and funds.

There is a strong case for believing that this project should have been submitted as a Full Project and its submission and adoption as an MSP created a significant risk to its success, especially in view of the number of countries involved, the transitional nature of those countries, and the fact that this was the first TEST demonstration project of its kind. The fact that the MSP process was successful is more a reflection (in the Evaluator's opinion) of efficient and proactive Project Management and the strong level of ownership and determination by the national counterparts than of the appropriate selection of GEF project modality. There was a very strong risk that the demonstration of TEST in at least one country could have failed as a result of these circumstances, which would have thrown the success of the overall regional project into question.

Another concern related to the MSP modality that has been mentioned previously is the lack of a formal preparatory (PDF) phase. This project could have benefited greatly from at least a PDF A and more realistically from a more prolonged PDF B during which a better understanding and experience of counterpart options could have been developed, and co-financing partnership obligations could have been confirmed and ensured.

The MSP modality and its funding constraints also did not allow for the inclusion of any technical or administrative support to the Project Coordinator. The subject matter and structure of the project was such that the Project Coordinator was required to travel a lot in order to ensure proper implementation and effective project ownership at the national level, and in order to maintain an effective dialogue with all national counterparts and the enterprises themselves. Clearly this placed a heavy burden onto one person for the 3 -year period of the project and reflects both a strong risk in the choice of the MSP modality, and the need to provide dedicated support staff to senior Project Management throughout the project lifecycle if they are to perform their duties effectively. It is insufficient to state that the proof of the effectiveness of the project design lies in the evidence provided by a successful conclusion to the project. The Evaluator strongly suspects that this has more to do with the fortuitous selection of a strong and determined Project Coordinator rather than good project design. This is an all-too-common fault in GEF project design structure and needs serious consideration for future projects of this nature where efficient project management and coordination may be undermined by inadequate support or over-optimistic project targets within a too-limited timeframe.

Another constraint imposed on the project by using the MSP modality was the lack of a significant project development phase in the participating countries. A PDF B phase is often a valuable opportunity to seek out strong counterparts and stakeholders. Also in the case of TEST, it would

have allowed a more phased approach to enterprise selection, with a pre-project opportunity to raise awareness in companies at the level of top management before an enterprise was selected. It would also have allowed more time to confirm co-financing and to ensure formal endorsement of such co-financing (see **Workplan and Budget** below).

There was a general opinion amongst most stakeholders that the project would have benefited from a longer timescale (especially with regard to enterprises implementing CP and EST Option recommendations), and more funding to include a greater number of enterprises. In some cases it was felt that several environmentally sound options had been identified but that their integration into an enterprise's strategy required more time than was available within the time-frame of the project. This time-frame was also considered to be too optimistic with regard to having an effective influence on company strategy. However, having said this it does appear that most companies were impressed with the TEST process and were able to appreciate the improvements that it could make to productivity and competitiveness.

One area of concern that can be traced back to project design is the issue of demonstrating TEST processes at companies that produce little by way of water-borne pollution or whose water consumption is of little consequence. This only really applied to two companies out of the 17. In fairness to the Project Management, the Project Document itself makes few references specifically to water-related pollution. In fact, Component 2 – Enterprise Demonstrations actually states as one of its Outputs “Applying the TEST approach to 20 enterprises in order to identify the least cost solution for complying not only with water related environmental norms, **but also with other environmental norms as required by EU Directive on Integrated Pollution Prevention and Control**”. The IPPC Directive clearly includes reduction in the use of raw materials (especially toxic chemicals), air emissions and energy efficiency among its environmental norms. In future, Project Documents related to TEST should be specific about which types of enterprises should be selected in keeping with the aims and Operational Strategy for GEF International Waters. In this particular situation a case can be made that all forms of pollution, waste generation, or inappropriate use of resources can be harmful in the long-term to the well-being of the Danube River Basin.

Although the overall concept of the Project Design was good and the Components were logical there were a number of design constraints which represented real risks to the project and affected actual delivery in some areas. These included the fact that the GEF preparation and submission process was so long that many of the hotspots had changed when the project reached implementation. The regional Project Management team was effectively one person with no allowance made for administrative support and the backstopping during the considerable periods of travel inevitable in a project of this nature. The deliveries were too optimistic for an MSP. The lack of a preparatory phase and a reasonable inception stage were problematic. Finally, Companies had barely enough time to adopt and implement their Type A-C options. SQA score = **70%**.

#### **4.2.2 Project Management**

There is very clear evidence throughout the project of effective and consistent networking between the Project Management and the various stakeholders (including the national counterparts, selected enterprises, responsible government agencies, and relevant NGOs). Much of this networking and communication was at a one-to-one level. The value of this close working relationship and the consequent strong network was recognised by the counterparts in each country as well as many of the government and industry stakeholders. The very tangible outcome of this effort by the Project Management and the Project Coordinator in particular is an established and sustainable network of

cooperation and information-sharing throughout the project host countries and beyond into the other Danube countries. The Regional Coordinator recognised that one possible improvement could have been the development of community level NGOs to raise awareness and to empower the community with regard to industrial activities related to specific hotspots. However, this was not within the remit of the original project document and certainly the constraints of timing and funding associated with an MSP would not have allowed the flexibility to add such activities without jeopardising or weakening existing project requirements.

The general consensus from the CPCs/Institutes was that the Project Management had been handled very capably and very professionally, especially in view of the different levels of capacity in each country, and the difficulties in early implementation and counterpart selection in at least 2 of the countries. The early stages of the project required a level of sensitivity and diplomacy, balanced with firmness and good guidance, and the counterparts felt that this was achieved effectively and was critical in the overall success of the Project. One CPC, with considerable experience of working in the region and with UN-type projects, stated that this was “the best-managed project that they had ever experienced”.

The counterparts also valued the regular meetings between themselves and the Project Management which provided excellent opportunities to share experiences, technological innovations, and new TEST-related approaches. However, one suggestion for improvement was that the technical consultants should be included in such meetings in any future Project of this nature, and to arrange different types of meeting focusing on technical level exchange, training, top management policy, etc. Although the CPCs recognised the generally weak interaction with government in the TEST Project they also felt that the project objectives did not require significant input from government and that TEST can function directly through its relationship with the private sector, with some simple links to government for information and awareness purposes. The general feeling was that the project was a successful one because it was directly addressing the private sector as the root cause of the threat. In the Evaluator’s opinion (strongly supported by majority of stakeholders), it is the strength and determination of the Project Management throughout the implementation of the Project that has been a major factor in the success of this project. SQA score = **100%**.

### **4.2.3 Project Execution and Implementation**

Project Execution was undertaken by UNIDO (United Nations Industrial Development Organisation). According to the Project Coordinator this UN Agency was the best choice for the Executing Agency (EA) as they already had considerable experience in cleaner production techniques and many of the TEST procedures. They also have direct contacts with the existing CPCs and many related institutions, as UNIDO was instrumental in setting up the CPC network. The procedures used during TEST (both the technical requirements and the capacity building and training) are fairly standard approaches for UNIDO. This choice of EA was supported by all stakeholders, and the Evaluator noted all-round strong support for UNIDO’s contribution and handling of the project execution from all stakeholders questioned.

Project Implementation was through UNDP (the formal Project Implementing Agency – IA). No problems were identified by the project Coordinator and EA regarding the IA/EA relationship nor did they note any failures on the part of the IA to support the project. One minor criticism of the IA was aimed at their lack of attendance at any of the appropriate regional project stakeholder meetings. However, this may also be a reflection of the absence of a formal Steering Committee for this project as discussed above. In any event it appears to the Evaluator that the Executing Agency was well in control of Project activities and that there was no apparent need for the IA to involve

itself more than it did. There may have been a diplomatic role for the IA with regard to the situation in Bulgaria where an inappropriate counterpart had been selected, but in the final analysis this situation was resolved by the Project Coordinator and the project network, without any need to resort to higher-level diplomatic intervention. Certain CPCs were a little more critical of the IAs role and stated that they saw little input or interest from UNDP at the national level. Most contracts were paid directly by UNIDO but in some cases it was through UNDP Country Offices and, where this was the case, payments were frequently delayed. This was often blamed on 'incorrect reporting and payment request procedures' but the CPCs were given no instructions on how to report or who to report to and felt that this was unfair. One concern noted previously by the Evaluator that applies here is the lack of feedback from the IA on the APR/PIR. This is a common criticism within GEF projects and can have substantially harmful effects where the APR/PIR identifies critical issues such as the lack of co-financing that was related to this Project. Later discussions with the IA on this matter revealed that the IA had not provided any response as it considered that these APR/PIRs were among the best provided by any project each year and required little if any revision. In particular the IA felt that they were especially strong in reporting on quantifiable indicators. However, the Evaluator feels that the IAs should provide some feedback to all Project reports (not just annual but quarterly) even if it is only to inform the Project management that they are satisfied with the progress indicated by the report and have no specific comments on the content. Lack of any feedback can be disheartening to an overworked and dedicated project team. Certainly some response should have been forthcoming in relation to the clear indication that unrealised co-funding was presenting a problem to the project.

The National Cleaner Production Centres were directly involved in the execution of the project, while the Regional Environment Centres helped significantly with the dissemination of information.

Each country had an Advisory Board made up of relevant stakeholders from the CPCs or pollution control institutes, and from government. For example, in Croatia the AB consisted of a representative from the Ministry of Environmental Protection and Physical Planning, The Ministry of Economy, the Ministry of Agriculture and Fisheries, the State Directorate for Water, the Regional Environmental Centre, and the CPC. The Regional Environment Centre was seen to be acting as an 'umbrella' representative for NGO organisations. The National Advisory Boards met 2-4 times per year depending on country and need. The national ABs were instrumental in the selection of the demonstration enterprises for TEST. Preliminary hotspots were taken from the Danube Pollution Reduction Programme, and then updated and reconfirmed by priority by the State Directorates for Water. All relevant Ministries were asked to provide input at this stage. The AB then looked at the long-term viability of the enterprise including its financial situation and the status of ownership. All candidate enterprises were required to provide a current list of emissions. Generally, the ABs found that the enterprises could see the overall advantages of cleaner production in relation to EU requirements and competitive marketing. Some companies were already aware of the concept of cleaner production through an earlier project financed by USAID. The Concept of environmental accounting was a fairly new idea and this required some patient explanation. One stakeholder did raise a concern that although the ABs had a significant role on the launching of the project (especially identification of the enterprises) they had less of a role in monitoring and dissemination of the results. Another problem that was noticed during the project was the continuity of membership of the ABs as a result of changes in Ministry personnel and responsibilities

A final meeting of all National Counterparts was held in Vienna where each country presented its results. Following this there were the National Dissemination Workshops to which all relevant national stakeholders were invited.

In conclusion, Project Execution was seen to very effective. Implementation must be considered to have been less effective and there are concerns here regarding better oversight of Project Design in relation to standard GEF requirements. These Implementation concerns are reflected in the slightly lower than perfect SQA score = **80%**

#### **4.2.4 Country Ownership/Driveness**

Country ownership of the project resides in the Advisory Boards (ABs) and in the national counterparts (at the individual and agency level). At the national level, the ABs were directly involved in the selection process for the enterprises, the identification of which industrial sectors the project should focus on, and in negotiating the involvement (including signed agreements) by the selected enterprises. A further function of the ABs was to provide political support to the project, create national awareness and to promote and disseminate the results. The level to which the ABS have been effective in this role varies from country to country. The membership of the AB in each country was discussed and agreed with the national counterparts and with the GEF Focal Points. The Project tried to ensure a wide selection of stakeholders but with any emphasis on those directly involved in industrial policy, environmental concerns, and the pertinent EU directives. AB members were not paid for their involvement so this does represent a direct commitment at the national level.

All of the TEST project counterparts have been non-profit organisations. Representatives of the Regional Environmental Centres (which are the most important pertinent NGO in Central and Eastern Europe) were also members of the national Advisory Boards.

It was notable within one of the 5 project countries that the GEF Focal Point was quite unaware of the status of the project at the time of the evaluation. Several enquiries on the part of the Evaluator identified that the fault appeared to lie within the government department responsible and not with the Project. The department had been consistently appraised and invited to attend project meetings and workshops but appeared to suffer from either limited human resources or limited awareness possibly as a result of constant changes in personnel or other priorities. It is however, a fairly serious concern at the regional level that a GEF Focal Point should be out of touch with a project of this national significance. This concern should be addressed by UNDP (in coordination with UNIDO) as the Implementing Agency that has regional responsibility in this case. It should be noted that where government agencies were actually involved in the TEST project, they were generally fully committed. However, there was a general opinion among the stakeholders that government (certainly at the policy level) should be taking a closer interest in the outcome and lessons from the TEST project. SQA score = **75%**

#### **4.2.5 Workplan and Budget (including cost effectiveness)**

The Project appears to have stayed fairly close to its original scheduled workplan, although with the need for some changes in order to embrace the new integrated and modular approach to TEST.

On the topic of cost-effectiveness it has to be stated that the Project objectives and intended outcomes were overly optimistic within the constrained budget of a GEF Medium-Sized Project.

Much of the identified co-funding was never realised as such. If the co-financing had been realistic and accurate then the MSP approach could have been more appropriate. The Project Management estimated that only 20% (US\$250,000) of the projected co-financing was ever realised. The Project Coordinator felt that 3 years was not too ambitious although it certainly left little room for flexibility. But the framework of activities had to be revised to fit within that time constraint. Some of the activities identified within the stepwise approach (See figure C.1 in the original project Document) were inappropriately placed, especially under the new modular integrated approach adopted at the beginning of the Project and needed to be re-shuffled.

The Project Coordinator identified no significant problems with project disbursement of funds. One recommendation was that fewer contracts with each country would have been safer and more manageable. A further recommendation was for a preparatory phase for such a project to allow time to secure co-financing and to develop early working relationships with and between the national counterparts (especially in those countries which had no CPCs) and to allow for time to discuss and explain the workplan and budgeting procedures.

The 2003 APR/PIR notes that there is a deficit of -\$860,000 between the proposed (\$1.48 mill) and actual (\$0.62 mill) co-financing for the project. This deficit is reflected again in the 2004 APR/PIR but as a slightly higher figure of -\$930,000. Most of the deficit seems to have been from co-financing originally expected to be realised through UNIDO. In fact, the actual co-financing includes additional cash contributions from Governments (\$90,000) and Private Sector (\$380,000) that were not in the original Project Document calculations. The actual deficit of contributions is \$1.48 million that was originally expected to come from UNIDO. Although it is not initially clear from the Project Document or the APR/PIR exactly where the responsibility for the shortfall in co-financing lies, the Evaluator was informed by Project management that the problem was due to non-delivery of expected co-financing from the Swiss and Austrian governments to UNIDO, two countries which had initially been very supportive of the project. Attempts were made through the Executing Agency to negotiate the delivery of these expected funds but this was unsuccessful. The Project decided therefore to try to make up the deficit through other potential donors and the Czech and Hungarian governments came to the project's assistance with co-financing of \$90,000. UNIDO also contributed a further \$150,000. It should be noted here that one very positive element with respect to the co-financing was the significant contribution provided to the project by the enterprises themselves, both cash and in-kind. The 2003 APR/PIR identifies \$308,000 in additional co-finances representing such enterprise inputs as the allocation of human resources for training in the various modules and aspects of TEST. Furthermore, the various enterprises between them contributed \$2.2 million by way of adoption of cleaner production and low-cost technological modification measures.

Generally, budget expenditure seemed to have been handled efficiently and all disbursements were as planned. The project workplan was followed fairly accurately, taking into account the modifications to the Project in the early stages and the budget constraints previously mentioned. However, the budget shortfall mentioned above could have represented a serious risk to the project and is quite probably responsible for the reduced deliver within Component 3 (Diffusion of Results) and one or two other areas of the project relating to replication and transfer of lessons. There is a serious lesson to be learned from this. **SQA = 70%.**

#### **4.2.6 Monitoring and Evaluation**

The Project followed standard procedures for reporting and monitoring. Quarterly Reports were prepared for UNIDO to submit to UNDP in Bratislava (the Implementing Agency's Regional

Office). UNDP Annual Project Reports (APR) combined with GEF Project Implementation Reviews (PIR) were prepared in 2003 and 2004. The Project received some feedback on these APR/PIRs from UNDP-GEF in New York, but did not receive any feedback from the Regional Office on the quarterly reports. This lack of feedback on formal project progress reports is a fairly common concern raised in GEF projects. If a Project Manager/Coordinator has taken time to prepare such a quarterly update it does seem reasonable to expect the relevant office receiving the report to at least acknowledge the report even if only to recognise that the project is running on schedule and efficiently. Of course, lack of response is a more serious concern if such reporting does actually identify some issues that may be impeding project progress. One example would be the deficit of co-financing (as discussed above under **Workplan and Budget**) which should have received a response from the Implementing Agency) In future it might be advisable to include a final section within the report format that requires an official response from and signature from the IA.

All assessments of project objectives and achievements within the 2003 and 2004 APR/PIRs have been given a Satisfactory or Highly Satisfactory score (which has presumably been accepted by the EA and IA) and Risks to the project are rated as Low or (at worst) Modest. The Document also carries an explanation of the changes in procedure and modality for the TEST project approach, and relates these to the need to develop and promote synergies between the different and complementary environmental management tools supporting top management decision-making processes in medium and long-term planning toward environmental compliance and eco-efficiency. Overall, the approach was improved and redesigned to be more proactive and sympathetic to the individual needs of each enterprise, whilst still aiming to capture the lessons and best practices from the overall TEST process for comparative purposes between each enterprise.

The Project Coordinator noted that a set of project indicators is undoubtedly a useful guideline for project performance but that there needs to be some flexibility to compensate for changes and improvements in project activities and outcomes. The Evaluator would fully concur with this observation. It was felt that the original indicators could have been more appropriate. There was never really an opportunity to re-focus the indicators after the changes were made to the TEST procedures. Revised indicators were included in the 2004 Annual Project Report which but these were less quantitative than the original indicators, and were never formally acknowledge or adopted. One CPC noted that it would have been helpful to have specific indicators to follow (within the Project Document) that related more accurately to what the project was trying to achieve.

It seems that this Project was developed and submitted on the cusp of changes to monitoring and evaluation by GEF. In this respect, it should be taken into account that at the time of the Project submission the concept of Process, Stress Reduction and Environmental Status indicators were only just being introduced and this project was submitted prior to their general adoption. Furthermore, the Evaluator would certainly accept that the original project indicators were no longer appropriate for the new integrated and modular TEST approach and were probably never appropriate to the original project, or indeed realistic. With this change in approach, a new set of indicators should have been discussed and refined at this early implementation stage in the project and adopted by the Advisory Boards, EA and IA. It would be valuable in future if the format for the APR included a question on the continued appropriateness of the original indicators and whether they still serve their purposes for Project M&E, otherwise projects could find themselves being evaluated on the basis of inappropriate and out-of-date indicators and could find themselves being allocated low success rates despite good proactive delivery.



The Project Advisory Boards in each country were made aware of the project status vis-à-vis the results from the APR/PIR assessments. There was no disagreements or additional input required as far as these stakeholders were concerned.

There was no mechanism included in the original project design, nor are there any current plans to review the status of the demonstration enterprises or the national counterpart institutions following closure of the Project. This would be a valuable exercise, as it would be with any GEF Project, although it is rarely included in the design or in the final Project Document workplan. This is not a fault of the Project as such. At the time that this Project was submitted, post-project evaluation and assessment was not considered a requirement by GEF. Even today, it is only included if the Project designer feels it is important, and it is still not an essential part of a GEF Project life-cycle or workplan. In the case of this project, a 'hindsight' recommendation would have been for UNIDO to cover the post-project assessment and evaluation as part of its co-funding to the project.

Finally, there was no mechanism built into the original project for its evaluation. This is a considerable oversight in project monitoring and evaluation and created further financial constraints to the project as funds had to be reallocated for this work. As a consequence there were barely sufficient funds available to carry out an effective terminal evaluation of the project. However, the Project managed to react to this oversight proactively and should be given credit for this.

SQA score for this project criteria = **85%**

### 4.3. Overall Project Impact

#### **4.3.1 Objective Achievements**

On a general level, the contribution to the long-term objective to clean-up the Danube River basin is very positive. The Project has demonstrated real actions and processes that can achieve this aim and has done so very successfully. According to various stakeholders, it has also catalysed some changes in political thinking within the participating countries and the overall TEST approach is accepted within most pertinent government circles as being good practice. At the private sector level there was overall strong support for the process and the demonstration enterprises now strongly value and support this approach which relates cleaner production to increased savings, and a more competitive company status in a wider market. As a bonus the companies also gain an improved image as they enter a different arena of judgement and criticism within the EU.

Although there were differing levels of achievement within the different enterprises, none of the selected enterprises withdrew from the Project at any stage, and all of them achieved notable results and a considerable degree of success by moulding the TEST process and modules to suit their individual needs. The Project Management consider the primary reason for this success to be based on the confirmation of the overall TEST approach, namely that improving environmental performance does not have to be achieved at the expense of competitiveness or through non-retrievable investment. This in itself has provided a 'model' demonstration of the basic premise of TEST. It should, however, be noted that the EU pre-accession environment in Central and Eastern Europe at the time of the TEST project was very beneficial to project objectives and delivery, and provided an enormous incentive to the enterprises.

The Project has undoubtedly achieved its overall objective as stated in the Project Document

#### **4.3.2 Constraints**

One early constraint on project delivery was the problem of explaining to managers the potential for savings through more cost-effective use of resources and through the introduction of cleaner production and reduced discharges. A lot of the resistance to these new ideas can be understood when considering that costs in CEE for utilities and raw materials are relatively low, as is also the case for waste disposal fees and associated penalties. The Project identified early in the implementation process that low stakeholder interest in environmental performance along with limited external motivation to improve environmental performance represented significant impediments on persuading companies in the initial project stages to participate in TEST. One project conclusion has been that the usual economic drivers (such as EU pre-accession requirements) acted as much stronger incentives than the environmental ones. A very strong incentive that was developed through the TEST process was the realisation of a 'hidden' non-product factory producing high levels of wastes, and representing (for example) 60% of their production costs.

The transitional nature of the region, whilst providing strong incentives through the EU pre-accession landscape, also created some constraints in enterprise selection which had some influence on the fact that a final set of 17 rather than 20 enterprises were adopted. The economics and politics of this region are still transitional and mobile. In some instances, companies that had agreed to sign up to TEST (or actually had signed up) withdrew a few days later with a change in political thinking or an overnight change in company ownership. However, generally the CPCs felt that having these contractual agreements helped to keep the companies on track once the TEST process had started.

Another constraint to the long-term effectiveness of TEST is the weakness of government ownership of the project. There has been excellent transfer of ownership of the Project to the national counterparts and their institutes. But there has been very little transfer of ownership and knowledge to the government agencies (with possible one exception), especially at the policy level. Understandably such ownership is difficult to build, as this is a relatively small project with little funding 'incentive' to government to raise its profile. One possibility of capturing this government ownership exists in the potential for follow-up activities in which government funds (such as environmental trust funds) are accessed to support some of the TEST activities. In this respect, it is noted that Croatia has recently established a new Environment Fund (supported by, for example, collecting annual revenues from CO<sub>2</sub> emissions from cars and from company emission fees). The intention is for this funding to be fed back into emissions and industry to improve environmental performance. However, there is some concern that the funds may be used for domestic wastewater treatment instead.

At the regional level, ownership is also not as strong as it could be. The Danube Commission has provided a forum to present some of the TEST activities and results but this is insufficient at the regional level in view of the potentially large value of TEST to the other Danube countries, and the potential for improving the overall environmental landscape of the Danube river basin. Additional effort and planning at the regional level to drive home the lessons and practices from TEST (throughout all Danube countries) is an essential next step.

In at least one country, the TEST team noted that although they were able to build commitment at the higher management level, the lower levels were often reluctant to embrace the TEST process as they saw it as additional work with no real personal pay-back, plus they felt that management didn't really appreciate the extra effort they had to put in. The team had to work hard to overcome this attitude initially, which was a product of poor top-down communications.

One fairly significant constraint placed upon the project reflects a less than adequate Project Design. This has been discussed in some detail under the relevant sections. The Evaluator was concerned to note that there were no references whatsoever in the Project Document to either Sustainability or Replication of project activities and results. This is further reflected in the fact that although the project delivery has been superlative, there is no effective mechanism to capture the lessons and best practices and to actively transfer and replicate them. Without such a mechanism the GEF investment is questionable. This is addressed (in relation to possible solutions) later under **Recommendations**.

## **5. CONCLUSIONS OF EVALUATION**

This Project has provided a highly valuable demonstration to the industrial private sector of how cleaner production and more environmentally sound technologies can be embraced successfully by companies without jeopardising their market positions, and without incurring any significant long-term costs. In fact, the TEST process has demonstrated that CPA and EST can add a significant market-level advantage and can increase productivity and make companies more cost-effective while producing less waste materials. These waste materials are not only expensive to dispose of but also constitute a significant 'production' cost to the companies. Therefore the TEST process has been clearly demonstrated to be a 'win-win' exercise for all stakeholders.

One of the major benefits of the CP assessment for the participating enterprises was to provide the management with a clear definition and identification of the source of their pollution problems, and closely related to this, the source of much of their loss of production costs. This was then related to a structured planning process including an analysis of the causes, and identification of a selection of measures for resolving the problems. Faced with a multitude of potential CP and EST solutions, the methodology enabled the management to prioritise their actions and select the most effective solution. One significant output related to the EMA modules is the change in management attitude away from an intuition-driven investment approach to a proper investment appraisal including evaluation of environmental impacts in monetary terms.

The demonstration enterprises have made significant improvements at both the type A and B level, with some type C (high investment, long-term payback) being implemented also. But the enterprises now find themselves constrained by the need for long-term costly investments and are keen to identify possibilities for favourable loans and assistance.

Beyond this, the Project has developed capacity and strengthened institutions within the region. The existing national CPCs have learned new skills and been given new tools with which to advice and support industry in the growing need for CP and EST improvements linked to the demands and requirements of the EU and its IPPC and ISO requirements.

The Project has developed a wealth of sound lessons and valuable best available practices which can be shared and transferred not only throughout the region but also throughout the world. It is imperative that these lessons and BATs should not be lost.

Now, to be truly effective TEST does need a transfer-and-replication phase that goes beyond just the admirable but fairly limited national dissemination workshops that were built into the project design. If there were a shortcoming of the TEST Project then this would be it. Project Management were aware of this and recognised it as a constraint to project success but, once more, were clear that financial constraints and initial project design would not allow more than was carried out. At the very least, the project achievements should be captured and sustained through national

programmes promoting TEST, and using the capacity and resources now already in place. Greater recognition of the value of the TEST process by government departments, coupled with more widespread awareness within the private sector of the availability of specialist assistance (Consultants, CPCs, other institutes) would be highly beneficial in this respect. There may also be a case for enhancing UNIDO's own promotion of the TEST approach within its country-specific programmes and the through its network of CPCs.

In this respect the Project Management is to be applauded for its persistence and tenacity in ensuring that the objectives of the Project were not undermined by some of the financial and project design constraints as well as some of the difficulties encountered in the early stages as a result of the absence of a preparatory phase. Furthermore, the Project Management has shown a good, proactive approach to project implementation which has proved to be responsive to the evolving needs of the clients (the enterprises and the national counterpart institutions) and to the Project Objectives as a whole. There are several examples of this proactive flexibility that is essential to a dynamic GEF project. The early modification of the TEST process in collaboration with the counterparts, the resolution of the problems with the earlier selection of inappropriate counterpart institutions, the time constraints imposed by the MSP modality along with the funding constraints, etc. All of these could have proved to be a substantial risk to the success of the project if they had not been effectively addressed, both quickly and efficiently.

Equally, the national counterparts are to be applauded for their commitment and support both to the project itself in their endeavours to build their own capacity and experience, and to the enterprises with respect to the amount of time that the counterparts spent in raising awareness and then introducing and completing the TEST modules.

The Overall Project Achievement and Impact SQA score and Rating is shown below in Table 12. The Project has achieved an overall evaluation rating of **4.2** which is equivalent to **Excellent Delivery Overall**.

In the Evaluator's opinion, the TEST project demonstrates one of the best investments that GEF has made in a MSP project within the International Waters portfolio. The important step now will be to build on this valuable investment and to capture and transfer the lessons, practices and procedures developed through this very successful project.

**TABLE 12: OVERALL SQA SCORES AND RATING FOR PROJECT ACHIEVEMENT AND DELIVERY**

PROJECT ACHIEVEMENT	ESTIMATED PERCENTAGE SUCCESS OF COMPONENT OR OBJECTIVE																				RATING
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	
<b>PROJECT DELIVERY</b>																					<b>1-5</b>
OUTPUTS AND ACTIVITIES																					<b>4.5</b>
THREATS & CAUSES RESOLUTION																					<b>4</b>
GLOBAL & NATIONAL BENEFITS																					<b>5</b>
STAKEHOLDER PARTICIPATION																					<b>4</b>
CAPACITY BUILDING																					<b>5</b>
POLICY AND LEGISLATIVE REFORMS																					<b>5</b>
REPLICABILITY																					<b>3.5</b>
RISKS & SUSTAINABILITY																					<b>3.75</b>
<b>PROJECT IMPLEMENTATION</b>																					
PROJECT DESIGN & PLANNING																					<b>3.5</b>
PROJECT MANAGEMENT																					<b>5</b>
PROJECT EXECUTION & IMPLEMENTATION																					<b>4</b>
COUNTRY OWNERSHIP																					<b>3.75</b>
WORKPLAN AND BUDGET																					<b>3.5</b>
MONITORING & EVALUATION																					<b>4.25</b>
<b>OVERALL ACHIEVEMENT &amp; IMPACT</b>																					<b>4.20</b>

## **6. RECOMMENDATIONS**

### **6.1 Recommendations Specific to the TEST project and similar Projects**

- A. It is now very important that the lessons and best practices evolved through the TEST project are properly captured and transferred to other relevant projects, initiatives and agencies. There would be considerable value in the production of a single, consolidated technical report on the TEST Project that includes the results and achievements from every demonstration enterprise along with documented lessons and best practices. A valuable output from the TEST Project as a whole would be a set of Knowledge Products carefully crafted and aimed at such audiences as the Danube Regional Project, ICPDR, the EU, the GEF Dnieper River Basin project, and other future GEF projects. Such Knowledge Products are now a growing requirement of UNDP as part of the evaluation of its projects and it may be that UNDP could assist in the development of such a package. These could focus on capacity building and institutional strengthening experiences at the project level, as well as on BAT and TEST-related lessons at the technical level.
- B. The existing national CPC network needs to be sustained and expanded, both geographically and in substance. The two countries that participated in the TEST project without a formal CPC need assistance to develop such a centre, and other countries in the Danube region also need similar assistance. The CPCs should receive all the necessary and appropriate training to raise them beyond just CP centres to EST centres including training and experience in the TEST modules. This would help to provide the necessary framework for more effective transfer and replication of the TEST project results (lessons and Best Practices). Furthermore, some consideration should be given to marketing of the CPC expertise within the private sector, not only in the context of their ability to undertake appropriate TEST modules but also as impartial, independent and non-commercially orientated advisors to industry on BATs.
- C. An effective single CPC networking facility should be maintained at UNIDO based on the advances made through the TEST project in this area. This should include development of the Information Management System linked into ICPDR, the Danube Regional Project and other relevant bodies.
- D. Existing demonstration enterprises need some further assistance if possible with identifying soft-loans and investment opportunities to support their approved type C (and, in some cases, type B) EST improvements. Such soft-loans could also be made available to new enterprises wishing to pursue the TEST approach, once they have demonstrated commitment through the implementation of type A and type B improvements. Furthermore, companies have identified the need for some financing to help them to develop the technical aspects of the actual loan applications.
- E. There is a need to involve government more closely in the TEST concept and to inform them of the successes and potential advantages at the national level. This requires a concerted effort of targeted awareness. Government agencies need to be engaged in the TEST process as there may well be further concessions and incentives that they can offer to companies to bring them on board in the first instance (bearing in mind that once companies have been trained and sensitised in the TEST approach they usually see the advantages for themselves).

- F. Some level of post-project assessment would be valuable to see how sustainable the TEST process has remained within the companies and at the national level. There is a potentially valuable role for the CPCs to play in this assessment process which could actually go beyond just assessment and review and involve active encouragement to the demonstration enterprises to continue their TEST-related activities.
- G. In consideration of A-F above, there is a strong case for the development of a follow-up phase to the TEST MSP. Such a phase could concentrate on capturing the lessons and best practices, replicating them throughout the Danube region, using the lessons learned to strengthen the network of CPCs, developing an expanded programme of TEST throughout further enterprises with more support (both financial and policy-wise) from governments which includes investment options and soft-loans for the larger EST needs, etc. The requirement for such a follow-up phase was a consistent priority identified by nearly all stakeholders during this evaluation and would seem to be a logical consolidation and expansion of the relatively small but successful investment made so far through the MSP.

## 6.2 Recommendations Specific to the GEF Project Design and Implementation Process

- A. In future, careful consideration should be given to the appropriateness of the MSP modality for regional projects of this nature. This modality has constraints related to the lack of a substantial preparatory phase (such as a PDF B) during which project partnerships are developed, institutional weakness and strengths can be assessed, and financial commitments vis-à-vis co-financing can be formally confirmed and endorsed. Furthermore, the MSP modality, by virtue of its fixed funding ceiling, inevitably has constraints related to the project timescale and to the level of funding available for project management and administrative support.
- B. Implementing Agencies should develop a policy of response to all project quarterly reports and APRs. Ideally, the APR/PIR format should require a signed response from the IA to ensure that the Agency is aware of concerns raised in the report and has identified actions that are to be taken to rectify these concerns.
- C. Any changes in the Project Document and its Outputs and deliveries should be reflected (where appropriate) in corresponding changes to the Project's indicators. These should be documented within the APR/PIR and approved by the EA and IA.
- D. GEF projects should strive to develop appropriate measurable indicators with the Mid-Term and Terminal Evaluation processes in mind. Evaluators depend on these verifiable indicators to measure the success of a Project and their absence can cause an overly subjective review. In this context, GEF and IAs should consider modifying MSP formats to include the Logical Framework approach (or similar logical progression leading to identification of measurable indicators) as a requirement.

## **7. List of Annexes**

- Annex I: ToR
- Annex II: Lists of Persons/Agencies/Bodies interviewed
- Annex III: List of Documents Reviewed
- Annex IV: Questionnaire sent to non-mission country stakeholders



## **ANNEX I: TERMS OF REFERENCE FINAL EVALUATION**

**Project number - EG/RER/00/G35**

***Project Title - Transfer of Environmentally Sound Technology (TEST) in the Danube River Basin***

Background

Enterprises in the countries of the middle and lower Danube River basin are facing numerous challenges as they go through a radical reshaping in their move towards market economies. At the same time, they are in the process of responding to the environmental objectives of the Danube River Protection Convention (DRPC) and the environmental requirements that come with accession to the European Union; the most significant of these is the EU's Integrated Pollution Prevention and Control (IPPC) Directive. The DRPC and the EU's IPPC Directive both require enterprises to apply best available techniques (BAT/EST) and best environmental practices (BEP).

In 1997, the United Nations Development Programme (UNDP), with the financial support of the Global Environment Facility (GEF), launched the 'Pollution Reduction Programme for the Danube River basin', through which it identified 130 major manufacturing enterprises known as 'hot spots' that were significant sources of pollution to the waters of the Danube River basin. A significant number of these enterprises were contributing to transboundary nutrient and/or persistent organic pollution.

In April 2001, UNIDO started the implementation of the TEST programme taking on the challenge to effectively demonstrate to the industries of five Danubian countries (Bulgaria, Croatia, Hungary, Romania and Slovakia) that it is possible to comply with environmental standards and still maintain, or even enhance their competitive position.

The TEST programme's primary financial supporter was GEF, with some participation from UNIDO and other donors (the Hungarian and Czech Governments). The project's national partners (counterparts) were the National Cleaner Production Centres (NCPCs) of Croatia, Hungary, and Slovakia (members of the UNIDO/UNEP network of NCPCs), the Institute for Industrial Ecology (ECOIND) in Romania, and the Technical University of Sofia in Bulgaria.

*The objective of the TEST project was to build capacity of the national institutions in the five selected Danubian countries in integrated environmental management (TEST integrated approach) for the Transfer of Environmentally Sound Technology. The TEST approach has been introduced at selected industrial hot spots to demonstrate that it is possible to comply with environmental norms of the Danube River Protection Convention while at the same time taking into account the needs to remain competitive and to deal with the social consequences of major technology upgrading. The enhanced institutional capacity would then be available to assist other enterprises of concern in these countries as well as other Danubian countries.*

The implementation of the project consisted of three operational components:

- Component I. Institutional Strengthening
- Component II. Enterprise Demonstrations
- Component III. Dissemination of Results

The TEST programme in the Danube River basin targeted 17 hot spots of industrial pollution (the list of enterprises is provided in table 1), of various industrial sectors. Through the programme, these industrial polluters have been introduced to the TEST integrated approach having the opportunity to learn how to use environmentally sound technologies to improve productivity, whilst at the same time complying with environmental norms and regulations.

	Country	Selected Enterprise	Industrial Sector – Focus of the project
1	Croatia	Agroproteinka	Meat Rendering
2		Gavrilovic d.o.o.	Integrated meat processing
3		Herbos	Pesticides Atrazine plant
4		IPK Tvornica Secera Osijek	Sugar production
5	Romania	ASTRA Romana	Petrochemical – refinery
6		Rulmentul	Machinery – bearing production
7		Chimcomplex	Intermediate Chemicals -Isopropyl -amine
8		SOMES	Pulp and paper
9	Slovakia	AssiDoman Sturov	Pulp and paper
10		Zos Trnava	Machinery - repair railway wagons
11	Hungary	Gunter – Tata Kft.	Machinery - repair railway wagons
12		Indukcios es Vedogazos	Steel heat treatment
13		VIDEOTON Audio Company	Electronic products, plastic and wood processing
14		Nitrokemia 2000	Intermediates Chemicals
15	Bulgaria	Yuta JSC	Textile
16		Slavianka JSC	Fish processing
17		Zaharni Zavodi AD	Sugar - Alcohol production

Table 1 – List of demonstration enterprises participating in the TEST project

### TEST project implementation strategy

The project implementation strategy has been adjusted during project implementation, as indicated in the UNDP/GEF Project Implementation Report (PIR<sup>2</sup>) June 2003 (section 3) in order to reflect country specific conditions and to achieve the project objectives in a timely and cost-effective way. By replacing the original step-by-step approach with the integrated approach, the revised TEST project implementation strategy promotes synergies between different and complementary environmental management tools supporting top management decision-making processes in medium and long-term planning toward environmental compliance and eco-efficiency.

The TEST integrated approach to industrial environmental management developed by UNIDO, has been designed to assist enterprises in the developing and transitional countries to effectively adopt Environmentally Sound Technology (EST). The application of the TEST integrated approach and its tools, leads to continuous improvement of the economic and environmental profiles of companies.

The integrated TEST approach is based on several three basic principles:

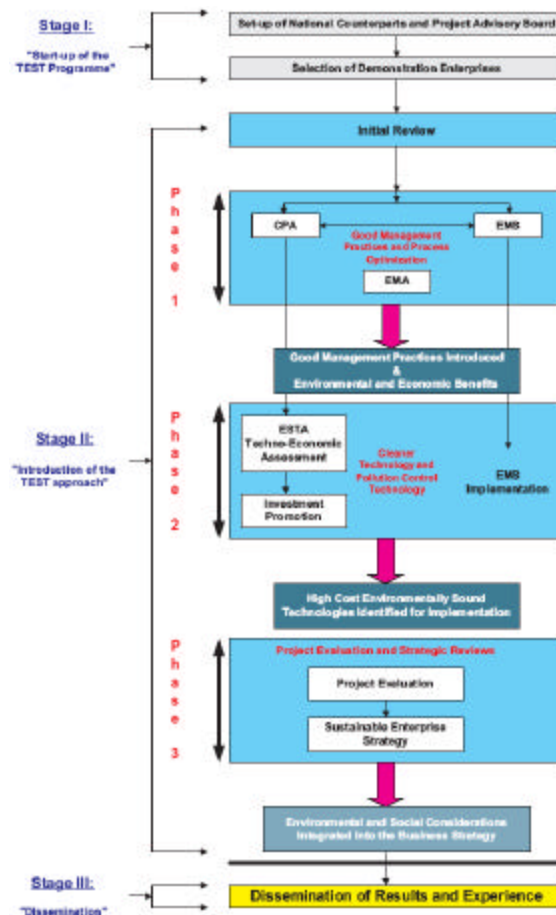
1. First, it gives priority to the preventive approach of Cleaner Production (systematic preventive actions based on pollution prevention techniques within the production process) and it moves intoconsiders the transfer of additional technologies for pollution control (end-of-pipe) only after the

<sup>2</sup>For additional details on the revised implementation strategy see the related PIR - June 2003

cleaner production solutions have been explored. This leads to an transfer of technologies aimed at optimizing environmentally and financial ly optimized elementstransfer of technologies: a win-win solution for both areas.

2. Second, the integrated TEST approach addresses the managerial aspects of environmental management as well as its technological aspects, by introducing tools like such as Environmental Management System (EMS) and Environmental Management Accounting (EMA).
3. Third, it puts environmental management within the broader strategy of environmental and social business responsibilities, by leading companies towards the adoption of sustainable enterprise strategies (SES).

The scheme below shows the stages of the revised TEST implementation strategy.



### Objective and Scope of the Evaluation Mission

The evaluation is an activity in the project cycle, which attempts to determine as systematically and objectively as possible, the relevance, efficiency, effectiveness, impact and sustainability of the project against its objectives. It will also identify factors that have facilitated or impeded the achievement of these objectives. While a thorough review of the past is in itself very important, the in-depth evaluation is expected to lead to detailed recommendations and lessons learned for the future.

The mission will assess, with respect to:

### Project Design

- Appropriateness of the project's concept and design to the overall situation of Danube River Basin and related situation of the industrial hot spots
- Relevance of the project design within the framework of GEF programmes and guidelines

### Project Implementation

- General implementation and management of the project in terms of quality and timeliness of inputs and activities, adherence to workplans and budgets
- Adequacy of management arrangements as well as monitoring and backstopping support given to the project by all parties concerned
- Institutional set-up through the National Advisory Board mechanism and the degree to which it has encouraged full involvement of the countries
- Responsiveness of project management to changes in the environment in which the project operates
- UNIDO execution modality
- Co-operation among project partners (UNIDO, UNDP/GEF, Commission for the Protection of the Danube River Basin (ICPDR), National counterparts and National Coordinators)

### Project Impact

- Achievements of the project against the original objectives, outputs and activities as detailed in the project document
- Level of awareness of the participating countries regarding project outputs
- Level of ownership of the project by the participating countries
- Level of commitment of the countries to support ongoing project and potential future replication activities
- Degree of support given by the riparian Governments in integrating the project objectives and goals into the national development programmes and other related projects, and how well the project fits into national development policy
- Impacts on policy and strategy of countries
- Project impact on enhancing co-operation among industrial sectors and project partners

## Conclusions and Recommendations

Based on the above points, the evaluation mission should provide conclusions and recommendations, including:

- General feedbacks on the implementation of the project
- The degree to which the project objectives have been satisfied
- Significant lessons that can be drawn from the experience of the project and its results, particularly those elements that have worked well and those that have not
- Recommendations on further actions in the region upon completion of the current project

### Methodology

The evaluation will be composed of three activities: studying documents, observing project participatory processes, and interviewing individuals who are either involved in the project, or who have or might be expected to have been impacted by the project.

#### (i) Studying documents

The team members shall familiarize themselves with the project through a review of relevant documents prior to travel to the region. These documents include interalia,

- Project Document
- TEST project manual
- National publications
- GEF Project Implementation Review (PIR) 2003 and 2004
- UNDP/GEF Quarterly Operational Reports (QOR)

Electronic copies of selected documents will be sent to the Evaluator in advance of the mission.

#### (ii) Observing project participatory processes

- [Observe national dissemination seminar in Sofia, Bulgaria \(Date to be fixed second half of February 2005\)](#)

#### (iii) Interviewing project partners

- Project Coordination Unit at UNIDO
- Selected national coordinators in the participating countries
- UNDP Country Office focal points in the participating countries
- GEF focal points and UNDP-GEF regional coordinator for Central Eastern Europe
- ICPDR EMIS group - focal points
- National counterparts/ project coordinators / co-operating institutions
- Representatives of demonstration enterprises

And in doing so, undertaking field visits to at least two project countries.

### Composition of the Mission

An international consultant who shall be responsible for the overall review of the project shall conduct the project evaluation. He should have extensive technical and managerial background at both policy and institution level of environment and international waters in particular, and in-depth experience of project evaluation techniques, particularly of those projects, which are funded by GEF. Experience in Central and Eastern Europe is preferable. Fluency in English is required.

### Mission timetable and itinerary

The duration of the consultancy for the Team Leader shall be 15 working days, including travel time, based on the following itinerary:

2 days	Home-base review of relevant documents
1 day	travel to Vienna
2 days	Interviews with UNIDO project management unit and ICPDR
1 day	<a href="#">Travel to project country one (to be identified)</a>
2 days	National counterparts, Members of national advisory boards and enterprise visits
1 day	<a href="#">Travel to another project country (to be identified)</a>
2 days	National counterparts, Members of national advisory boards and enterprise visits
4 days	Draft and finalize report

### Report

In drafting the report, the consultant will be guided by the standard UNDP Guidelines for Evaluators.

The final report should contain the following Annexes:

- Terms of Reference for final evaluation
- Itinerary (actual)
- List of meetings attended
- List of persons interviewed
- Summary of field visits
- List of documents reviewed
- Any other relevant material

As the report is the product of an independent evaluation, it is up to the consultant to make use of the information provided during the mission. However, the evaluation team is responsible for reflecting any factual corrections brought to their attention prior to the finalization of the report. Therefore, in order to ensure that the report considers the view of all parties concerned, is properly understood, and is factually accurate, it is required that the consultant submit draft report to UNIDO and UNDP/GEF. UNIDO will revert promptly with collective feedback from project partners in order that the evaluator may finalize his/her report.

The final version of the evaluation mission report should be submitted in electronic format (MS Word) to UNIDO and UNDP/GEF no later than one month from the date of start of the evaluation. The report shall also be submitted in five hard copies to UNIDO.

Contact information for UNIDO and UNDP/GEF:

Mr. Pablo Huidobro

**UNIDO**

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Tel.: +421-2-59337458

## **ANNEX II: LIST OF PERSONS/AGENCIES/BODIES INTERVIEWED**

### **UNDP**

Andrew Hudson – UNDP GEF Principal Technical Advisor on International Waters, UNDP NYC  
Juerg Staudenmann – Water Governance Advisor, UNDP Bratislava Regional Centre, Slovak Republic

### **UNIDO**

Roberta De Palma – GEF TEST Regional Programme Coordinator – UNIDO Vienna  
Pablo Huidobro, Chief, Water Management Unit, UNIDO, Vienna  
Mihaela Popovici – Technical Expert – Water Management and Pollution Control - ICPDR

### **Slovak Republic Stakeholders**

Viera Feckova – Director - Slovak Cleaner Production Centre (TEST Project NFP)  
Jana Balesova – National coordinator- Slovak Cleaner Production Centre  
Jaroslav Burjaniv – Lead Test Consultant TEST to ZOS Trnava enterprise- Slovak Cleaner Production Centre  
Vladimir Hudek – Director – Slovak Regional Environmental Centre  
Zdena Kenarova – Senior Advisor – Ministry of Environment (ICPDR focal point)  
Juraj Sikra – Desk Officer for UN Agencies – Ministry of Foreign Affairs  
Michal Deraj – Project Manager - Slovak Regional Environmental Centre  
Rudolf Brezovsky – Director – Zos Trnava Enterprise  
Frantisek Ruzicka – Deputy-Director - Zos Trnava Enterprise  
Jaroslav Striz – Market Manager – Zos Trnava Enterprise  
Frantisek Drgon - Systems Manager – Zos Trnava Enterprise

### **Croatian Stakeholders**

Marijan Host – Director – Croatian Cleaner Production Centre (TEST Project NFP)  
Morana Belamaric – National Coordinator -Croatian Cleaner Production Centre  
Zeljka Medven – Project Manager – Regional Environmental Centre  
Ivana Halle – Head of Department, Ministry of Economy, Labour and Entrepreneurship (and UNIDO Focal Point)  
Visnja Jelic Muck – State Secretary – Environmental Protection Division - Ministry of Environmental Protection, Physical Planning and Construction  
Gordana Ruldic – Assistant to State Secretary - Environmental Protection Division - Ministry of Environmental Protection, Physical Planning and Construction  
Mojcu Luksic – ICPDR Focal Point – Ministry of Agriculture, Forestry and Water Management (previously Head of Water Policy Section in EMIS)  
Slavko Brebric – Technical Director – Gavrilovic Enterprise  
Milica Opacic – Head of Environmental Management - Gavrilovic Enterprise  
Dascha (Unknown Surname) – Head of Human Resources - Gavrilovic Enterprise  
Janez Petek – CPC Consultant for IPK Tvornica Secera Osijek Enterprise Demonstration  
Nafis Defterdarovic – CPC Consultant for Gavrilovic Enterprise Demonstration

### **Bulgarian Stakeholders**

Tzanko Tzanov – Associate Professor – Technical University of Sofia – TEST Project National coordinator - Bulgaria  
Alexandar Kiriy – Professor and Dean – Faculty of Power Engineering and Power Machines – Technical University of Sofia



Milko Lovchev – Professor and Expert in Water Chemistry – COGen Engineering Ltd (TEST Project Team)

Margarita Neznakomova – Sector expert- Head of Non-Woven and Technical Textiles Laboratory – Department of Textile Engineering – Technical University of Sofia (TEST Project Team)

Nikola Stankov – Energy Efficiency Expert - Technical University of Sofia (TEST Project Team)

Dimitar Kiossev – Sector Expert - Technical University of Sofia (TEST Project Team)

Velio Donchev – Sector Expert - Technical University of Sofia (TEST Project Team)

Ivona Grozeva – EMS Expert for Yuta enterprise (TEST Team- Ministry of Environment)

Ilian Ivanov – Financial Expert – University of National and World Economy

Maria Nonova – Expert on Permit Issuance for Waste Treatment and Transportation, Waste Oil and PCB – Waste Management Directorate - Industrial and Hazardous Waste Management Department – Ministry of Environment and Water.

Ivanka Zanivar – Technologist and Head of Laboratory and Environmental Concerns - Zaharnia Zavodi AD Demonstration Enterprise

The Evaluator also received email feedback from the following consultants involved in TEST:

Ivan Zavadsky - Project Manager - UNDP/GEF Danube Regional Project

Vladimir Dobes – CP Trainer and consultant (international expert) Assisting in design of the TEST methodology, providing on-site technical assistance in implementation of the CP module in Romania and Bulgaria and helping with writing the TEST report (UNIDO publication).

And received completed Questionnaires (see Annex V for template below) from:

Liliana Chirila - Director – Sectoral Operational Programme Management Directorate – Ministry of Environment and Water Management – Romania (former GEF focal pint Romania)

Ágnes Kajdacsy - QMS - EMS Consultant – (former environmental manager of Nitrokemia Enterprise Demonstration – Hungary)

Mihaela Oprescu – Senior Consultant (TEST team) - Head of Environmental Department, IPROCHIM (Chincomplex) Demonstration – Romania

Margareta Nicolau - Managing Director - National R&D Institute for Industrial Ecology (ECOIND) –Bucharest - Romania

Maria Teodorescu – National coordinator TEST/Romania -Environmental Senior Consultant – International Programmes, National R&D Institute for Industrial Ecology (ECOIND) –Bucharest – Romania

Maria M.Galambos - Chief Senior Counsellor - Ministry of Environment and Water, Hungary

Sándor Kerekes - Dean of Faculty of Business Administration - Corvinus University of Budapest – Hungary (National coordinator TEST/Hungary)

### **ANNEX III: LIST OF DOCUMENTS REVIEWED**

1. The Project Document
2. The Project Brief
3. UNDP/GEF Quarterly Operational Reports (QOR)
4. GEF Project Implementation Review (PIR) and Annual Project Review (APR) 2003 and 2004
5. TEST project manuals
6. National publications
7. UNIDO TEST Website
8. ICPDR Website
9. DRP Website

## **ANNEX IV: QUESTIONNAIRE SENT TO NON-MISSION COUNTRY STAKEHOLDERS**

### GEF TERMINAL EVALUATION – TRANSFER OF ENVIRONMENTALLY SOUND TECHNOLOGY IN THE DANUBE RIVER BASIN

**GUIDANCE:** Please answer the questions briefly but feel free to add extra comments to explain your responses. Not all of the questions may be appropriate to your involvement in the project or may be outside of your experience in which case please ignore those particular questions. Sections written in **black** explain the aim of the question and provide some background. The Sections in **blue** are the actual questions

#### A. OVERALL OBJECTIVE

**To build capacity in existing cleaner production institutions to apply the UNIDO Transfer of Environmentally Sound Technology (TEST) procedure to technology transfer to 17 enterprises that are contributing to transboundary pollution, and primarily nutrients, in the Danube River Basin and the Black Sea.**

**Has the Project achieved its aims in delivering its primary outcomes to:**

**A.1 To strengthen capacities to introduce Cleaner Technologies for pollution reduction (with Cleaner Production centres supporting industries to reduce pollution)**

A.2 Improve water quality (and reduce the number of Danube industrial hotspots)

#### B. THREATS AND CAUSES

**B.1 Has the project made a significantly contribution by demonstrating workable solutions to the main problems effecting water quality in the Danube? In particular has it demonstrated effective and acceptable solutions for industrial installations in relation to the following:**

- Reducing nutrient loading into the Danube and Black Sea
- Reducing other hazardous industrial discharges
- Reducing sewage and other organic inputs from human settlements and activities
- Reducing extraction levels of water for cooling and other industrial processes

**B.2 Has this been demonstrated through improvements in water quality and an overall reduction in harmful discharges – if so how has these been measured and quantified?**

C. OUTPUT AND ACTIVITY – (Indicators provided by MSP Project Document)

#### **Component 1: Establishment of TEST Focal Points**

1.1 Set up TEST Focal points in NCPC or PPC.

1.2 Identify appropriate institutions and experts to support NCPC/PCCs to carry out project requirements

1.3 Introduce Focal points to test Programme, install information management system (linked to ICPDR), prepare implementation schedule for TEST at selected enterprises

#### Original Indicators

- Networks in 5 countries providing integrated package of services needed to achieve compliance with environmental norms
- NCPC/PPCs have a new service to market to industrial clients

**1:1 In your opinion, has the project met its Indicators for Success under Component 1? If not what are the likely reasons?**

**Component 2: Application of the TEST procedure to 20 enterprises**

- 2.1 Selection of enterprises and securing their commitment to participation in TEST
- 2.2 Training of TEST teams in analytical techniques (see Figure C.1)
- 2.3 Application of TEST procedure to 17 enterprises to identify least-cost solution to comply with environmental norms

**Indicators**

- EST options for nutrient and toxic pollutant reduction under active investment negotiations in 10 enterprises by end of project.
- Measurable nutrient/toxic/organic pollutant reduction (down by 30%) in 8 of the enterprises by end of project, and some reduction in the remaining enterprises.
- EST options for organic pollutant reduction under active investment negotiation in 10 enterprises.
- Measurable organic pollutant reduction (down by 40%) in 12? of the enterprises by end of project.

**2:1 In your opinion, has the project met its Indicators for Success under Component 2? If not what are the likely reasons?**

**Component 3: Disseminating results to other enterprises and countries**

- 3.1 Preparation of information material for TEST procedure, including the Test Manual and Case Studies.
- 3.2 National seminars in each of 5 participating countries.
- 3.3 One-day assessment at pollution enterprises to demonstrate benefits of applying TEST procedure.
- 3.4 Introduction of TEST procedure to the 6 other Danubian Countries through a regional workshop.

**Indicators**

- TEST Management Toolkit (technical manuals & enterprise reports) for nutrient and toxics reduction available.
- TEST Management Toolkit for organic pollutant reduction available.
- At least 20 of 130 enterprises committed to implementing TEST procedure by end of project
- 

**3:1 In your opinion, has the project met its Indicators for Success under Component 3? If not what are the likely reasons?**

**Expected Project Outcomes:**

Description of Expected Project Outcomes:

**As far as you are aware:**

**C.4. Have all participating enterprises prepared a *Sustainable Enterprise Strategy* and do these SESs explain how they would implement best available techniques and best environmental practices to integrate successfully ESTs into their production processes?**

**C.5. Have Environmentally sound technology options (a combination of advanced process, pre-treatment and final pollution control technologies) been successfully identified for 15 enterprises which bring them into compliance with environmental norms of the EU and the Convention?**

**C.6. Have there been at least 30 per cent pollutant reductions within 10 participating enterprises, with some pollutant reductions in the other 10 as a result of implementing cleaner production (process change) measures?**

**C.7. Have training courses been undertaken by international experts and have these built capacity within national institutions to advise the remaining industrial hot spots in the five participating countries on implementing the TEST procedure?**

**C.8. Has a TEST management toolkit been developed and made available to national experts to assist remaining enterprises to identify and install the appropriate ESTs at least cost.. and how effective and useful is such a kit?**

## **D. GLOBAL AND NATIONAL BENEFITS**

### **D.1. Operational Programme**

**D.1.1. Does the project address the aims and objectives of OP8 (waterbody-based) and OP10 (contaminant-based) both in its design and in its implementation?**

### D.2. Conventions

Statements from Convention

**D.2.1 Does the project address the requirements and priorities of the Danube River Protection Convention and the Danube River Pollution Reduction Programme?**

### D.3. National Priorities

**D.3.1 Were the national priorities and their linkage to GEF's global aims within this project clearly defined in the Project Document?**

**D.3.2 Is the project addressing national priorities for developing ESTs and for pollution reduction?**

## **E. PROJECT MANAGEMENT AND IMPLEMENTATION**

**E.1 Has the Executing Agency fulfilled its responsibilities effectively as per its ToR?**

**E.2 Has the Implementing Agency fulfilled its role as required?**

**E.3 Has the PIU/Project Management Unit functioned effectively in its management role?**

**E.4 Have the channels of communication between the PIU, the EA and the IA worked effectively and has response to requests for assistance etc been forthcoming and timely?**

**E.5 Has the Project Management networked effectively with other project stakeholders (e.g. national focal points, hotspot industries, responsible government agencies, relevant NGOs)?**

**E.6 Are there any improvements which could have been made to Project Management and Implementation which would be worth capturing for future projects of this nature?**

#### **F. WORKPLAN AND BUDGET**

**F.1 Has the project followed the workplan (taking into account any amendments made by the Project National Advisory Boards)?**

**F.2 Was the Workplan realistic in terms of delivery and timing?**

**F.3 Has the budget proved to be an accurate assessment of the project's financial needs?**

**F.4 Have there been any problems in disbursement?**

**F.5 Based on experiences from this project are there any recommendations regarding workplan delivery and budget disbursement which would improve efficiency for further projects**

#### **G. MONITORING AND EVALUATION**

**G.1 Were adequate monitoring and Evaluation procedures (Indicators, criteria for measuring performance, results, impacts, etc) built into the project design?**

**G.2 What standard UN-GEF M&E procedures were followed (Quarterly and Annual reports, site visits, representation at SteerCom?).**

**G.3 Have these M&E procedures been followed and implemented? (reporting, PIR, Tripartite Review, MTE?)**

**G.4 Have any concerns or recommendations arising for the M&E process been acted on to improve project performance?**

**G.5 Have all stakeholders been transparently engaged in the M&E process (Advisory Boards, Project Implementation Review, etc) during project implementation?**

**G.6 How could M&E have been improved**

#### **H. STAKEHOLDER PARTICIPATION**

**H.1 Were appropriate stakeholders involved in the Project Development?**

**H.2 Were adequate provisions/arrangements made within the original Project Document to allow for comprehensive and fair stakeholder involvement and input to the project?**

**H.3 Has stakeholder input and involvement been adequate? If not, why not?**

**H.4 Were any principal stakeholders not included in this process and how would this have affected the project's delivery and long-term success?**

**H.5 Have relevant stakeholders (e.g. National/regional experts and specialists, NGOs, community groups, other Government Departments, etc) been involved directly in executing specific activities?**

**H.6 How could stakeholder participation have been improved in the project?**

#### **I. CAPACITY BUILDING**

**I.1 Did the Project Document accurately identify the required capacity building and institutional strengthening?**

**I.2 What capacity building and institutional strengthening has been achieved?**

**I.3 What training has been achieved?**

**I.4 Has the project provided any equipment and has this been used effectively?**

- I.5** Has any of the capacity building and institutional strengthening focused on NGOs or community groups? If yes, how effective has this been?
- I.6** Will the capacity building and institutional strengthening that has been provided be sustainable?

#### J. POLICY AND LEGISLATIVE REFORMS/IMPROVEMENTS

- J.1** Were any policy reforms or legislative amendments identified as project requirements? If not, should they have been and has their absence affected project performance?
- J.2** If policy reforms and legislative amendments were identified as project requirements, how effective has the project been at delivering these reforms and amendments?

#### K. REPLICABILITY

- K.1** How replicable within the project region are the lessons and practices developed through this project?
- K.2** How replicable would they be in other areas throughout the world?
- K.3** Does the project have a mechanism for replication and transfer (within project system boundary, and beyond at global level)

#### L. SUSTAINABILITY

- L.1** Are the activities undertaken so far and their outcomes and deliverables sustainable in the long-term? Can the enterprises maintain the requirements (e.g. of ISO 14000) within their current financial structures and into the future?
- L.2** Are the overall objectives of the project likely to be sustainable beyond the project lifetime and for the foreseeable future?
- L.3** What could need to be done to improve the chances of sustainability?

#### M. OVERALL IMPACT OF PROJECT

(List any positive and negative impacts)

- M.1** Natural/Environment. What improvements or harm has the project had on the natural environment both within the Danube and beyond?
- M.2** Political: Has the project affected political thinking and policy. Is it seen as a good or a bad thing by local politicians and/or industry?
- M.3** Economic: Has the project had a positive or negative economic effect either within or outside of the project areas?
- M.4** Social: Has the project created noticeable and measurable improvements, or notable problems within associated or affected communities?

#### N. FEASIBLE IMPROVEMENTS TO PROJECT

- N.1** Overall, what improvements could have been made to the project?

#### O. FURTHER REQUIREMENTS

- O.1** Based on achievements and lessons learned from this project, are there any logical follow-up activities or initiatives which could be considered which would build on the investment made during this project's lifetime?

**P. GENERAL QUESTIONS**

- P.1 Has there been a fair, transparent and equitable involvement and input from all 5 participating countries?**
- P.2 Has there been effective and transparent involvement of and communication with the other Danubian countries?**
- P.3 Has the project had any identifiable (with specific reference) effect on general awareness and understanding of pollution issues within communities along the Danube and the general regional population?**
- P.4 Are there any mechanisms in place to monitor the achievements of the project and to ensure that the improvements made are not lost after project closure (especially in relation to pollution reduction and water quality)?**

**Q. DO YOU HAVE ANY OTHER COMMENTS OR CONCERNS WHICH HAVE NOT BEEN ADDRESSED IN PREVIOUS QUESTIONS?**



## LIST OF STAKEHOLDERS TO CONSULT

### **PROJECT**

Project Staff  
National Advisory Boards  
Other Project Implementation/Execution bodies? (e.g. technical advisory groups)

N.B. The Project Document has no description of Implementation/Execution Arrangements as is a requirement for GEF Implementing And Executing Agencies.

### **INTERNATIONAL**

UNDP  
UNIDO  
ICPDR

### **NATIONAL/LOCAL**

TEST Focal Points  
Board of Advisors  
Programme Coordinators for the DRPC  
Enterprise Representatives  
National CICs and PPCs  
Any relevant NGOs (especially within Danube Environment Forum)  
Any relevant community groups  
Any Local Community representatives within or associated with enterprises and discharge areas

Representatives of :

Ministry of Environment and Water, Sofia, Bulgaria.  
Ministry of Environmental Protection and Physical Planning, Zagreb, Croatia.  
Ministry for Environment International Funding Department, Budapest, Hungary.  
Ministry of Waters, Forests and Environmental, Bucharest, Romania.  
Ministry of the Environment, Bratislava, Slovak Republic.

N.B. Co-Funders? Although the Budget (P.14) lists **Other Sources** of funding (\$1.48 million) , it does not state where the funding comes from except in the case of UNIDO or by implication with respect to National In-kind Co-funding? This makes it difficult to discuss project achievements with this important body of stakeholders.

Figure: C.1 Test

