ANALYSIS OF ENVIRONMENTAL FINANCING THROUGH VARIOUS DEVELOPMENT STRATEGIES - RECOMMENDATIONS FOR ENVIRONMENTAL PROTECTION FINANCING SYSTEM¹

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ABSTRACT

Sustained provision of sufficient financial resources for environmental investments is a prerequisite for addressing environmental challenges in the Republic of Croatia on its way to EU accession. The key component is the creation of specific national financial strategies for implementing concrete requirements of particular directives. These specific strategies are parts of broader national investment strategies. Broad national investment strategies estimate the size of financial needs and the time frame for their enforcement. Based on the timing and scope of necessary investments, the government has to prioritize the environmental issues in public expenditure framework, create suitable climate for private sector investments in environmental projects and establish mechanisms that will facilitate private sector contributions to public sector environmental infrastructure projects.

Key words: Environmental policy / Environmental financing / Environmental heavy cost-investments / Environmental protection expenditure / European Union / Croatia

INTRODUCTION

The EU accession process called for major restructuring in all areas of public life. The environment represents a separate chapter in accession negotiations, which is further divided into 11 sub-sectors. The environmental acquis consists of more than 300 legal acts that have to be transposed into national legislation.

EU accession process in the Republic of Croatia provides increased focus on environmental goals and compliance with the environmental acquis. It requires substantial investments that are associated with implementation of 15-20 key investment-heavy directives². Therefore, it is

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² Key "investment-heavy" directives include: the Urban Wastewater Treatment Directive, Drinking Water Directive, Dangerous Substances into Water Directives, Nitrates Directives, Landfill Directive, Municipal Waste Incineration Directives, Hazardous Waste Incineration Directive, Packaging Waste Directive, Large Combustion Plants Directive, Fuel Quality Directives, Air Quality Directives, IPPC Directive, VOC Solvents Directive.

necessary to analyze how estimated expenditure needs can be financed.³ Financing strongly depends on the public sector (national and local governments), bilateral donors, European funds and International Financial Institutions (IFIs). The creation of specific national financial strategies for implementation of concrete demands of particular directives is regarded as the key component for successful harmonization with the environmental acquis. These specific strategies are included into sector-specific national investment strategies that estimate the size of financial inputs and the time frame for their enforcement.

In this paper, first we present relevant strategic documents and action plans in Croatia. This is followed by overview of the estimates of financial needs for Croatia's alignment with environmental acquis and potential financing sources. Based on the investment needs and implementation period, necessary transition periods are identified. Finally, conclusions are presented.

OVERVIEW OF STRATEGIC AND IMPLEMENTATION DOCUMENTS RELATED TO ENVIRONMENTAL PROTECTION ISSUES

Croatia's development strategy is defined in the <u>Strategic Development Framework 2006-2013</u> (<u>SDF</u>)⁴. Environment is one of 10 priority areas identified by the Strategic Development Framework (SDR) and SDR outlines the national environmental policy. Instruments and actions defined in SDF are taken up by the <u>Pre-accession Economic Programme (PEP</u>)⁵, PEP is drafted and submitted to the European Commission every year. It provides a short inventory of the measures achieved so far, as well as the future three-year implementation agenda. It is focused on the goals and actions identified by the SDF, and also on the necessary actions foreseen in the framework of structural reforms and macroeconomic policy. In addition, <u>Economic and Fiscal Policy Guidelines</u> define key objectives, principles and directions of the Government's fiscal policy in the following three-year period.

The Strategic Development Framework for 2006-2013, the Pre-accession Economic Programme and the Economic and Fiscal Policy Guidelines represent main pillars of economic policy making in Croatia. They define the Croatian Government policy priorities, the sequencing of these priorities as well as measures for their implementation.

SDF objectives within the environment sector are further elaborated by the National Environment Strategy (NES) and the Strategy for Sustainable Development and their implementing documents, such as National Environmental Action Plan (NEAP) 2002.

<u>National Environment Strategy</u> (NES) adopted in 2002 for the first time created structure for a comprehensive process of environmental policy-making. NES has contributed to a establishing of a new practice in the entire development of Croatia. The Strategy includes basic guidelines

³ Current financial and economic crisis make the access to finances increasingly challenging, but this aspect of the environmental financing is not in the scope of this paper.

⁴ SDF defines national economic goals and instruments for their implementation in the period between 2006 and 2013, with the overall aim to achieve economic growth through competitiveness and employment embedded in the modern state of social cohesion. Goals and instruments defined in the document are drafted in accordance with the determination of Croatia to become a full member of the EU and its obligations arising from this process.

⁵ Regarding environmental policy measures, enforcement of various kinds of environment impact assessments should lead to the integration of environment protection principles into planning and implementation of sectoral policies.

and directions for co-coordinating economic, technical, scientific, educational, organizational and other measures, as well as measures for the implementation of international obligations aimed at environmental protection. The Strategy comprises short-term and long-term measures aimed at preventing and combating environmental pollution, identifies sequencing of measures and sets implementation deadlines. An estimate of the funds needed for the implementation of the environmental protection measures and their possible sources have also been incorporated in the Strategy . It also identifies needs for environmental education and training, as well as scientific research in the environmental protection field.

The NES has been subsequently supported by sub-sectors strategies, such as the Waste Management Strategy, National Waste Management Plan, Water Management Strategy and Strategy for Air Protection.

National Waste Management Strategy is founded on the EU's general principles of waste management. It provides the framework for a sustained waste management in Croatia by the year 2025. The Strategy provides an overview of the current situation in waste management and defines objectives and the means to reach them in the period until 2025. The Strategy seeks to provide a realistic framework for the effective reduction of national waste load and for a sustainable waste management. It defines 15 major waste flows which are in concordance with the EU practice. It also defines waste management buildings and plants, and looks into the remediation of municipal waste landfills. According to the Strategy, waste management will be present on all levels of administration: from national to local, and will include all areas of production, consumption, and everyday life.

The <u>Waste Management Plan</u> in the Republic of Croatia is prepared on the basis of the Waste Management Strategy of the Republic of Croatia and other legislation in force and guidelines of the European Union. The Plan is the fundamental document on waste management in Croatia for the period from 2007 to 2015. Its basic task is to organize the implementation of following waste management goals:

- establishment of an integrated waste management system,
- remediation and closing of existing landfills,
- remediation of "hot spots", locations in the environment which are highly burdened with waste,
- development and establishment of regional and county centres for waste management, with pre-treatment of waste before final disposal or landfilling and
- complete computerization of the waste management system.

The <u>Water Management Strategy</u> defines the legislative, organizational, financial, technical, scientific, and IT aspects of water management activities in the present socio-economic circumstances of the accession process of the Republic of Croatia to the European Union, as well as in the future circumstances of full membership. The Strategy shall be in force as long as the assumptions on the basis of which it was adopted hold true, taking into consideration the period of legal approximation lasting until the end of 2008, and two 15-year investment cycles closing at the end of 2038.

The basic aim of the Strategy is the establishment of an integrated and coordinated water regime on the national territory and on each of the four river basin districts, which includes the following:

- provision of sufficient quantities of drinking water of good quality for the population,
- provision of the required quantities of water of adequate quality for various economic purposes,
- protection of people and assets against floods and other adverse effects of water, and
- achieving and preserving the good status of water in order to protect aquatic and waterdependent ecosystems.

The <u>Strategy for Air Protection</u> creates an integral part of the Strategy for Environmental Protection. Its implementing document is the <u>Plan for Protecting and Improving Air Quality</u> 2008-2011. The Plan defines and elaborates objectives and measures by individual sectors of influence, including priorities, time frames and implementing agencies. The main goal is to achieve the first category of air quality throughout the territory of Croatia by the end of 2011.

The priority is a gradual reduction in air pollution, with the aim of protecting human health, the environment, and material goods. Individual goals are following:

- In areas in which the first category of air quality has been achieved, preventive measures must be implemented to prevent deterioration in air quality and facilitate continual improvement.
- The first category of air quality is to be achieved throughout the territory of Croatia by the end of 2011. The deadline for ozone is still to be established. According to the Air Protection Act, this means levels of concentrations indicating that the air is clean or imperceptibly polluted, and that limit values have not been exceeded for even one pollutant.
- Intervening measures must be ensured wherever there is a risk of pollution occurring to levels above critical values.
- The effects on the eco-system, crops and material goods due to acidification, eutrophication and ground-level ozone must be reduced.

The <u>Strategy for Sustainable Development</u>, adopted in 2009 is a key document that directs long term economic and social development as well as environmental protection towards the sustainable development of the Republic of Croatia. The Strategy for Sustainable Development integrates different development policies by trying to find solutions suitable for all three components of sustainable development: economic, social and environmental. It contains fundamental principles and criteria for determining the objectives and priorities in considering the long term transformation towards sustainable development of the Republic of Croatia.

<u>National Environmental Action Plans (NEAP)</u> contain fundamental objectives, conditions and comprehensive environmental protection measures. Additionally, they include priority environmental protection measures categorized according to specific components and specific spatial units, and elaborate in detail the environmental protection principles and directives comprised in the National Environmental Protection Strategy.

FINANCIAL IMPLICATIONS OF STRATEGIC ENVIRONMENTAL GOALS

National Environmental Action Plan_(NEAP) has foreseen total investments in the environment 2002-2012 in the amount of EUR 7.8 billion. In thematic documents the development of the entire waste management system in the same ten year period has been estimated at some EUR 2.2 billion. The problems of waters will require about EUR 5 billion in case that investments would cover ten years only and air sector around EUR 0.6 billion. This would mean the yearly investment in the field of environmental protection of approximately 4–5% of the GNP.⁶

So far environmental budgets in Croatia amounted to only 0.2-0.3% of the GNP. In accordance with the practice of the developed countries, the share might reach 1% of the GNP which is still well below necessary amount. Total environmental investments aimed at reaching the average EU standards (water, air, waste) is roughly estimated at the level of at least 1,500-2,000 \in per capita. To this amount annual operating costs are to be added which makes these expenditures extremely high. For all other areas costs of legislative harmonization will lie between 5-8% of the total expenditures required.

A rough break-down of costs related to meeting the requirements that arise from legislative harmonization is as follows: for water protection 40-45% of the total costs, for waste disposal 35-40%, for air quality protection 8-10%, for nature protection 4-5%, for industrial pollution control and risk minimization 2%, for horizontal legislation harmonization 0.3-0.4% and for the rest 0.1%.

Program	Time framework	Cost (billion euro)
NEAP	2002-2012	7.8
Waste management strategy	2005-2025	3.3
Waste management plan	2007-2015	0.4
Water management strategy	2008-2038	7.3
Air Quality Protection and Improvement		
Plan	2008-2011	0.6

 Table 1
 Breakdown of investments in main strategic document

Source: Authors' calculations

According to an estimate, the implementation of the National Strategy of Waste Management will cost over HRK 24 billion (about EUR 3.3 billion).

In the Waste management plan the rehabilitation of landfills and "hot spots" is co-financed by the Environmental Protection and Energy Efficiency Fund (EPEEF) according to its work program. The amount of HRK 162 million to be allocated by the EPEEF for rehabilitation of hazardous waste landfill sites will be allocated according to the amount of pollution and harmfulness of impacts on the environment and human health. However, the costs of hazardous waste disposal exceed planned costs. Thus, additional funds (most likely loans) are necessary. Remediation of hot spots might be financed by European structural and cohesion

⁶ NEAP 2002

funds. According to the estimated cost of investment, the setting up a waste management system under the county concept requires the amount of $397,000,000 \in$ and with the regional concept the value is lower and amounts to some $350,000,000 \in$.

A more realistic cost estimate for setting up the system will be only available upon adoption of waste management plans for the counties and the City of Zagreb, i.e. after the counties will have selected a waste management concept (CWMC/RWMC) and the technology of waste treatment prior to final disposal.

Taking into account the necessary adjustment period for legal transposition and for the creation of assumptions for full implementation of the Water Management Strategy by the end of 2008, the two 15-year investment cycles during which its goals will be fulfilled and loans repaid will be completed by the end of 2038. The total implementation costs of the Strategy for developmental water management projects are estimated at ca. HRK 52.8 billion, around HRK 13 billion of which will go to public water supply projects, around HRK 20 billion to urban wastewater sewerage and treatment projects, and around HRK 10.8 billion to projects in the field of protection against floods and other adverse effects of water. Approximately HRK 4.5 billion will be invested in the development of irrigation, and another HRK 4.5 billion will be invested in the construction of the multifunctional Danube-Sava canal. The total costs of regular economic and technical maintenance of watercourses, water estate, and regulation and protective water works, which is the responsibility of water management, are estimated at around HRK 915 million per year, while the total costs of carrying out technical tasks are estimated at around HRK 270 million per year. One part of the funds needed for the implementation of the Strategy will be obtained from the current pre-accession and subsequent Structural and Cohesion Funds of the European Union. It is estimated that the planned investments are maximum in view of the financial potential of Croatia's citizens and its economy.

The overall annual cost of the Air Quality Protection and Improvement Plan is estimated at some HRK 4.1 billion (EUR 571 million), of which some HRK 7 - 10 million will be financed from the state budget. Other costs will be borne by legal and natural persons, through direct investment or via different fees as well as by local and regional self-government units.

INTERNATIONAL SOURCES OF ENVIRONMENTAL PROTECTION FINANCING

Croatia, as a candidate country for EU membership, has access to the Instrument for Pre-Accession Assistance (IPA) launched in 2007. The IPA provides assistance to build institutional capacity for the efficient implementation of the acquis communautaire and to prepare for the management of Structural Funds on accession. The <u>Strategic Coherence Framework (SCF)</u> is a programming document that serves as a reference point for the use of the EU assistance in Croatia. The SCF deals with Component III (Regional Development) and Component IV of IPA (Human Resource Development). These Components are designed to assist the candidate countries in policy development and prepare them for the implementation and management of the Community's Cohesion policy: in particular the European Regional Development Fund and the Cohesion Fund (Component III) and the European Social Fund (Component IV).

Major policy priorities and objectives defined in the SCF are in accordance with the priorities and objectives set out in:

- national strategic documents (i.e. Strategic Development Framework for 2006-2013);
- strategic documents referring to the EU integration process of Croatia (Stabilization and Association Agreement, Accession Partnership, 2006 Progress Report, Multi-annual Indicative Planning Document for Croatia, Multi-annual Indicative Financial Framework for Croatia for 2007-2010);
- relevant sectoral documents defining broad policy-guidelines in particular areas with a view to adopting EU standards and best practices (e.g. priorities within the section on human resource development are aligned with Joint Memorandum on Social Inclusion of the Republic of Croatia and Joint Assessment Paper);
- documents establishing broad EU priorities linked to the Lisbon agenda and forming a reference point for member states' strategies and programmes (i.e. Community Strategic Guidelines).

<u>The Environment Protection Operational Program</u> draws upon existing EU and national policies and strategies. It is proposed to concentrate IPA assistance from Component III for development of environmental protection infrastructure on two "investment-heavy"areas related to the adoption of the acquis and in line with the medium-term priorities of the Accession Partnership. These two areas are: waste management infrastructure and water supply and waste-water treatment infrastructure. All investments in these areas should be in line with the National Waste Management Implementation Plan and the National Waster Plan.

Priority 1: Developing waste management infrastructure for establishing an integrated waste management system in Croatia⁷

Priority 2: Protecting Croatia's water resources through improved water supply and integrated wastewater management systems⁸

Priority 3: Technical assistance

⁷ Establishment of new waste management centers at county/ regional levels, remediation of sites highly polluted by waste (hot spots) and project preparation.

⁸ Establishment of modern water supply systems and networks, construction of WWTP for domestic and industrial wastewaters and upgrading of sewerage network and project preparation

Proposed indicative financial breakdown of the financial allocations of the OP Environment Protection is presented in the Strategic coherence framework 2007-2013.⁹ The following distribution is proposed under the Components III¹⁰ and IV of IPA program¹¹.

Table 2Financial breakdown of the financial allocation of the OP Environment Protection
in the Republic of Croatia

Year	Total public	EU IPA (€)	National public	IPA co-fin rate
	eligible cost (€)		(€)	
2007	22,667,000	17,000,000	5,667,000	75%
2008	24,000,000	18,000,000	6,000,000	75%
2009	24,667,000	18,500,000	6,167,000	75%
Total years	71,334,000	53,500,000	17,834,000	75%
2007-2009				

Source: SCF 2007-2013, Croatia

The Environmental Operation Programme (EOP) covers a 3-year programming period (2007-2009) for IPA component III amounting to $55,000,000 \in$ and builds upon previous investments co-financed by ISPA. Therefore the Environmental Operation Programme priorities include:

- construction of waste management infrastructure with the aim to establish an integrated waste management system of Croatia amounting to 27,500,000 €, and
- protection of Croatia's water resources through improvement of water supply and discharge and wastewater treatment systems amounting to 27,500,000 €.

The World Bank has been extensively engaged in providing financial support, technical assistance, policy advice and analytical services to Croatia since the country joined the Bank in 1993. The sector composition shows that the Bank's major goal is to assist in improving the conditions and efficiency of the transport sector (27%), strengthening the capacity and quality of services in the public administration and justice (24%), and <u>improving infrastructure in the water sector (17%)</u>. While Croatia's portfolio has traditionally focused on infrastructure and environment, the current operations in this sector are designed to assist Croatia in its EU accession efforts.

⁹ Strategic coherence framework 2007-2013.

¹⁰ The major areas of intervention in the field of environment include drinking water, wastewater and waste management. Investments shall be made into wastewater collection and treatment facilities, drinking water supply systems, establishment of waste management centres at county and/or regional levels (including municipal waste landfills, facilities for separation and waste treatment), as well as remediation of sites highly polluted by waste (hot spots).

¹¹ Components III and IV aim at supporting Croatia in policy development as well as preparation for the implementation and management of the Community's cohesion policy, in particular regarding the European Regional Development Fund, the Cohesion Fund and the European Social Fund. In terms of pre-accession assistance under Components III and IV, priorities comprise acquis-related investment in environmental protection and the development of a European transport network together with support to the productive sector, in articular to SMEs; Component IV priorities comprise investment in employment, education, social inclusion and human capital formation.

Tišma, S., Pavičić Kaselj, A., Boromisa, A, Analysis of environmental financing through various development strategies – recommendations for environmental protection financing system.

World Bank financed projects	Estimated value of projects in Million EUR
Ongoing projects	
Inland Waters	133.4
Coastal Cities Pollution Control	47.5
Forecast projects	
Coastal Cites 2	94
GEF ¹² Coastal Nutrient Reduction	7

Table 3World Bank financed ongoing and forecast projects in the Republic of Croatia

Source: World Bank, Project Portfolio Croatia, 2008

The priorities of the <u>European Bank for Reconstruction and Development (EBRD)</u> in the area of infrastructure and environment will focus on projects that promote energy efficiency, security and diversity of energy supply, and include support in the preparation of IPA projects.

The activities of the <u>European Investment Bank (EIB)</u> have so far focused on the rehabilitation and construction of transport and energy infrastructure. In the medium term, one of the important priority areas will include environmental sector (waste water treatment, incinerators, air quality, supply of the drinking water).

<u>The United Nations Development Program (UNDP)</u> for the period 2007-2011 focuses in the area of environment on environment protection in the specific fields of climate change and biodiversity.

The major value added of the <u>Council of Europe Development Bank (CEB)</u> is financing of environment protection projects and modernization of rural areas through provision of local infrastructure networks.

The assistance provided by a number of <u>bilateral donors</u> in Croatia as a rule focuses on the priorities that are directly linked to Croatia's EU accession process. It is usually provided in the form of small scale technical assistance in response to the Accession Partnership requirements, or those resulting from the screening and negotiations process.

¹² This GEF grant is considered one project with IBRD Agricultural Acquis Cohesion

ENVIRONMENTAL INVESTMENT AND FINANCING STRATEGY (EFS)

As a part of the project Developing the Capacity of Environmental authorities, through Transfer of Best Practice and Training to Support Effective Use of Financial Resources, Environmental Investment and Financing Strategy of the Republic of Croatia has been drafted. The Environmental Investment and Financing Strategy describes the present situation and requirements in terms of investments and operation and maintenance expenditure to meet the EU environmental acquis in the future in particular as regards heavy cost investments in the water, waste and air sectors.

Available Finance

In order to develop an appropriate investment plan, it is important to analyse how estimated expenditure needs may be financed by existing and possibly new financing sources.

A combination of domestic and foreign sources has been and will be used in the future in Croatia to meet EU compliance schedules. The domestic sources historically used for financing of the environmental sector in Croatia include mainly state revenues and revenues of the Croatian Waters (for water sector) and Environmental Protection and Energy Efficiency Fund (EPEEF)¹³ (for waste sector), as well as water and waste charges (tariffs) for respectively water provision and wastewater collection, and solid waste collection. In the future full cost recovery user charges in the water sector will have to be implemented so as to meet the "polluter pays" principle. Eventually, all investments as well as O&M expenditure will be financed by user charges as a result. The foreign financing sources comprise grants and loans from international financial organisations, the EU or bilateral donors.

The following table summarises the baseline availability of the main financial sources for investment expenditure for the environmental sector.

¹³ EPEEF is one of the key administration bodies within the waste management system. It collects taxes for motor vehicles, for sulphur and nitrogen oxide pollution sources, for environmental hazardous and non-hazardous industrial waste load, and for the use of the environment. The Fund participates in the ongoing municipal landfill remediation projects and programs all over Croatia and helps to establish new regional and county waste management centers. It co-finances clean production technology projects, projects whose aim is to reduce the emission of harmful gases, projects for reusable energy sources and for more efficient use of energy, projects for remediation of unregulated municipal landfills, projects for primary recycling, and projects for biodiversity landscapes.

Tišma, S., Pavičić Kaselj, A., Boromisa, A, Analysis of environmental financing through various development strategies – recommendations for environmental protection financing system.

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
In million HRK															
Total public env spending	1,233	1,485	1,697	1,887	2,034	2,198	2,361	2,540	2,727	2,924	3,130	3,344	3,568	3,800	4,041
Public investment for water in m HRK	910	1,093	1,212	1,335	1,440	1,555	1,671	1,797	1,930	2,069	2,215	2,367	2,525	2,689	2,860
Public investment for air in m HRK	91	196	242	261	282	304	327	352	378	405	433	463	494	526	559
Public investment for waste in m HRI	163	169	216	261	282	304	327	352	378	405	433	463	494	526	559
Public investment for other env in m I	68	27	27	29	31	34	36	39	42	45	48	51	55	58	62
IFIs, million HRK															
WB for water	100	185	348	348	348	248	163								
EBRD for water	37	37	57	57	57	19	19								
IFIs for air															
IFIs for waste															
IFIs for other env sectors															
EU, million HRK															
EU for water	91	75	63	66	68	137	205	205	205	205	205	205	205	205	205
EU for air															
EU for waste	0	44	63	66	68	137	205	205	205	205	205	205	205	205	205
EU for other env sectors															
Total:															
Total spending for water	1,138	1,391	1,679	1,806	1,912	1,959	2,058	2,002	2,135	2,274	2,420	2,572	2,730	2,894	3,064
Total spending for air	91	196	242	261	282	304	327	352	378	405	433	463	494	526	559
Total spending for waste	163	213	278	328	350	441	532	556	582	610	638	668	699	731	764
Total spending for other sectors	68	27	27	29	31	34	36	39	42	45	48	51	55	58	62
Total env spending	1,461	1,827	2,227	2,424	2,575	2,738	2,953	2,949	3,137	3,334	3,539	3,754	3,978	4,210	4,450

 Table 4
 Summary of financial sources available for investment expenditure for all environmental sectors - baseline

Source: EFS, 2008.

Based on the current situation in water and wastewater, solid waste and air sectors, main challenges for each of the sectors are presented below:

Water and Wastewater Sector

The technical measures, which need to be taken in order to implement water sector heavy cost directives, can be divided into the following groups:

- Expansion of drinking water network
- Sourcing of drinking water (i.e. establishment of proper drinking water extraction units) for those additionally connected
- Proper treatment of surface water used for drinking purposes
- Extension of sewerage system
- Upgrade of wastewater treatment plants where required
- Construction of new wastewater treatment plants where required

EFS presents all results in scenarios. For water and wastewater there is one baseline scenario and two policy (or approximation) scenarios. Difference between the two policy scenarios is in classification of receiving waters and thus in necessary wastewater treatment plant technologies. The baseline scenario assumes that the current situation is continued; additional population is provided the same water and wastewater service as the current population (unchanged connection ratios), but no improvements are made to water supply or wastewater and no projects which increase connection rates are carried out.

The decision on designation of Croatian receiving waters is not yet made. The first policy scenario assumed that all receiving waters are sensitive, thus the scenario is called "sensitive scenario". The second policy scenario assumed that all receiving waters are normal thus the scenario is called "normal scenario". It is of course possible that a decision is made that some receiving waters are "sensitive" and some are "normal". The advantage of the two scenarios made is that they provide a maximum and a minimum cost estimate and any other decision on designating receiving waters will fall within these two costs estimates. It is interesting to note that the investment cost difference between the "sensitive" and the "normal" is not very big. In terms of O&M cost the "sensitive" scenario is more costly, but the difference is not very big.

In summary the three scenarios made are:

- 1. Baseline scenario no new targets, just existing situation is maintained;
- 2. Approximation scenario 1 All receiving waters are sensitive– "sensitive scenario"
- 3. Approximation scenario 2 All receiving waters are normal "normal scenario"

Water Sector Baseline Scenario

The expenditure needs resulting from the baseline scenario are summarised in two figures below. Figure 1 shows investment expenditure needs for water supply, Figure 2 for wastewater. The re-investment expenditure needs increase during the planning period. This is in line with decreasing assets values over years.



All numbers are in fixed 2005 prices.

Figure 1 <u>*Baseline*</u> scenario drinking water, total investment expenditure need for Croatia, 2005 - 2015 (HRK in fixed 2005 prices)



Figure 2 Baseline scenario wastewater, total investment expenditure need for Croatia, 2005 - 2021 (million HRK in fixed 2005 prices)

Water Sector Approximation Scenarios

Table 5Expenditure for the implementation of the **drinking water** directive, HRK, 2005
prices

HRK
14,679,273,000
8,062,522,000
1,764,390,000
9,826,912,000
24,506,185,000

Source: EFS, 2008

Estimated expenditure for the "normal" scenario for UWWTD results are provided in Table 6.

Table 6Expenditure for the implementation of the wastewater, normal scenario, 2005-
2021, HRK, 2005 prices

Approximation expenditure for 2005-2021	HRK
- O&M Expenditure	5,667,305,000
- Re-investments expenditure	12,986,243,000
New investments expenditure	9,059,032,000
Total investments	22,045,275,000
Total	27,712,580,000

Source: EFS, 2008

In the case all Croatian water basins are designated as sensitive waters, investment costs increase by 3 billion HRK or approx. 14%. However, the increased treatment level also gives rise to higher O&M expenditure, calculated as an increase of 1.1 billion HRK over the 16 year period.

Table 7Approximation expenditure for the implementation of the wastewater, sensitive
scenario, 2005-2021 HRK, 2005 prices

Approximation expenditure for 2005-2021	HRK
- O&M Expenditure	6,846,672,000
- Re-investments expenditure	12,455,452,000
New investments expenditure	12,518,729,000
Total investments	24,974,181,000
Total	31,820,853,000

Source: EFS, 2008

Estimated expenditure needs are compared with the available funding. In EFS two types of comparison are made:

- available financial sources for capital expenditure and investment needs are compared to see whether, first of all, construction of needed infrastructure can be funded. The comparison is made year by year to detect any short falls in any years.
- Secondly, forecasted revenue from user charges is compared to operational and maintenance and also reinvestment costs to see whether households will afford paying increased sums for better environmental infrastructure and whether these increased sums will be sufficient to cover mentioned operational, maintenance and reinvestment costs.

The results hereof are illustrated below, i.e that it is possible to have a transition period up to 2021. Considering that normal scenario is less demanding, this will also require a transition period up to 2021 or shorter.



Figure 3 Gap between financial resources and investment needs for the implementation of the UWWTD by 2026, <u>Approximation Sensitive</u> Scenario, thou HRK, fixed 2005 prices

Policy Conclusions - Water and Wastewater

In conclusion, it is the estimated that a transition period for Urban Waste Water Directive for Croatia up to 2021 is possible - on the assumption of a large increase in public sector funding for water and wastewater.

Solid waste sector

Based on the requirements of the Landfill and Packaging directive new modern regional waste management systems are in the process of being established in Croatia. The EFS analysed the following scenarios:

- 1. Baseline scenario, reflecting the current unchanged situation for the future
- 2. Approximation scenario 1.1. Use of MBT technologies combined with dual collection and incineration in Zagreb; county concept
- 3. Approximation scenario 1.2. Use of MBT technologies combined with dual collection and incineration in Zagreb; regions approach

Implementation measures and achievement of targets in solid waste sector

In order to meet the directives a number of implementation measures are needed. These include for scenario 1.1 and 1.2:

- Establishment of waste management centres with sanitary landfills and mechanical biological treatment (MBT) facilities.
- Establishment of community centres and bring banks in both urban and rural areas
- Incineration in Zagreb municipality
- Establishment of C&D recycling and systems for hazardous waste collection and treatment.

The difference between scenario 1.1 and 1.2 is the number of waste management centres. The two scenarios reflect the two alternatives in the national waste management plan.

Table 8 illustrates that in the baseline (no change) scenario the amount of BMW increases as the economy grows. However, both policy scenarios provide a very significant reduction of BMW landfilled compared to the 1997 baseline and they are both in compliance with the requirements of the landfill directive.

	1997	2005	2012	2015	2020
EU targets	-	-	75%	50%	35%
Baseline	100%	94%	111%	120%	138%
Approximation scenario 1.1.	100%	94%	68%	19%	19%
Approximation scenario 1.2.	100%	94%	76%	20%	20%

Table 8	The disposal of biodegradable municipal waste at landfills compared to generation
	in 1997 (MBT residuals have no BMW content)

Source: EFS, 2008

Table 9 illustrates the effects on recycling and recovery ratios of scenario 1.2. This is slightly more efficient than scenario 1.1 but the differences are very small. The table illustrates that the chosen technologies meet the required recycling targets. With regard to glass there is a deposit refund system in Croatia which contributes significantly to meeting the target and it is seems that

the target for glass will be met with a combination of the technologies in scenarios 1 and an ambitious deposit refund scheme.

The table also illustrates that overall recovery is very high. This reflects the assumption that paper wood and plastics is used as refuse derived fuels (RDFs) and burned in co-combustion, for example in cement kilns.

Two key assumptions have been made. It has been assumed that the residuals from MBT have no BMW content as results of this content being below the determined threshold values. Such threshold values need to be established in Croatian law. According to oral information from the MEPPPC, the Ministry at the moment has identified a shortfall of demand for refused derived fuels of 100,000 tonnes annually, but MEPPPC expect to find "buyers" for all the RDF in due time. The calculations above assume that this will happen. Otherwise it will be difficult to reach objectives of the Landfill directive to reduce biodegradable waste transfer to landfills up to 35% of the 1997 amount.

Packaging recycling ratio	EU targets	Approximation scenario 1.2 (2015)	Approximation scenario 1.2 (2020)
Glass	60	78	80
Paper and cardboard (incl. bulky)	60	67	69
Metal	50	71	72
Plastics	22.5	41	42
Overall recycling	55-80	64	66
Overall recovery	>60	92	94

Table 9Predicted packaging recycling and recovery ratios in Croatia (in %), Approximation
scenario 1.2.

Source: EFS, 2008

Waste sector expenditure needs

Below the expenditure needs for scenario 1.2 is summarised. Expenditure needs for scenario 1.1 is higher than the numbers shown below due to the economies of scale in the regional approach (shown below).

Table 10Approximation scenario 1.2, accumulated expenditure need in 2005 2015, thousand
HRK, fixed 2005 price 14

Approximation expenditure for 2005-2021	000 HRK
- O&M Expenditure	3,810,000

¹⁴ The calculations are based on simple sums of expenditure needs over the period

Tišma, S., Pavičić Kaselj, A., Boromisa, A, Analysis of environmental financing through various development strategies – recommendations for environmental protection financing system.

- Re-investments expenditure	1,817,000
New investments expenditure	5,652,000
Total investments	7,469,000
Total	11,279,000

Source: EFS, 2008

Waste Sector Financing Gap

The figures below illustrate that there is no financing gap in the waste sector even assuming a short transition period where all major investments are implemented by 2014. The national waste management plan assumes that the criteria of the packaging waste and landfill directives will be met by 2015, effectively allowing one year for ensuring that all new measures perform according to their design criteria.

Unlike in the water sector, there is no problem to cover operational and reinvestment costs in the solid waste sector. One of the reasons is that already now waste charges, which generators are paying, are high.



Figure 4 Gap between financial resources and investment needs, <u>Approximation</u> <i>Scenario 1.2., million HRK, fixed 2005 prices

The figure indicates gap between funds from the public budget and grants compared to investment expenditure needs this gap can be funded with IFI loans or through private debt financing of the MBTs. The Government of Croatia plans that the MBTs will be established with private debt financing. In this case only the planned incinerator for Zagreb will need additional IFI financing or additional private debt financing. This is true of both scenarios.

Figure 5 illustrates that user charges can easily finance both O&M expenditure and re-investment expenditure. This is true of both scenarios.



Figure 5 Gap between user charges and expenditure need for O&M, <u>Approximation</u> <i>Scenario 1.2., million HRK, fixed 2005 prices

Thus in conclusion for the waste management sector there is not likely to be a financing gap.

Policy choices - Solid Waste Management

There are two policy choices for waste management in Croatia that should be addressed. In both cases the national waste management plan is taken as the starting point.

The first choice is whether to maintain the very ambitious time schedule for implementation. While it is demonstrated in this report that the implementation plan can be financed there is an issue related to whether the sector can absorb so many investments in such a short time.

The second choice relates to whether to implement a regional approach or to have more MBTs. The economies of scale favour the regional approach, however the differences are not very large. The answer to this choice will also depend on private sector interest.

Air Sector

Measures and Expenditure Needs - Air Sector

The following table summarises measures and costs needed for achieving requirements in the air sector above-mentioned directives.

	-	
Investment	Million EUR	Million HRK
Ambient air quality management – monitoring and analysis	2.3	17
LCP technical compliance	1,060	7,800
Control of VOC emissions from petrol storage and	95	700
Treatment of VOC emissions from solvent applications	70	500
Total	1,230	9,000

 Table 11
 Initial approximation investment costs in air sector

Source: Card 2002 project outputs and new data from MEPPPC for LCP

Financing Gap and Transition Periods - Air Sector

In case the mentioned investments are to be covered by public financial sources and in case the investment plan is implemented in equal portions, the gap between funding sources' demand and supply is obvious (see Figure 6).

If no private, additional capital is involved in the air sector high cost directive implementation, the Government will have to either increase its expenditure for air sector investments or request to prolong the implementation schedule.

However, since most of the required investment belongs to LCP, it is fair to assume that through a privatisation process or otherwise it should be possible to secure the required private finance for the sector. However, even in this case the Government may opt for a longer transition period as they would reflect positively on the sales price.



Figure 6 Gap between public funding sources for air sector and demand for investments if implemented until 2016

The next Figure presents the situation when the implementation period is prolonged and investment volumes increase with time. In this case 9,000 million HRK can be invested over 20 years period, if started from 2006.



Figure 7 Gap between public funding sources for air sector and demand for investments if implemented until 2025

As LCP directive related investment expenditures are at least 10 times higher than those of other air sector directives, it is feasible that other directives are implemented by 2012.

Summary of Investment Expenditure and Transition Periods

Table 12 summaries the investment expenditure needs in the scenarios analysed. It is seen that the total approximation investment expenditure needs are in the 7.0 million EUR to 7.6 million EUR range for Croatia for the water, wastewater, solid waste and air sectors.

					Total
	Implementation	investmente	Deinvestmente	investments	investments
	Implementation	investments,	Reinvestments,	investments,	investments,
Sector	year	billion HRK	billion HRK	billion HRK	billion EUR
Water supply	2005 - 2015	1.8	8.1	9.9	1.35
Wastewater - normal scenario	2005 - 2021	9.1	13	22.1	3.01
Wastewater - sensitive scenario	2005 - 2021	12.5	12.5	25	3.40
Solid waste - MBT's, county	2005 - 2015	6.3	1.9	8.2	1.12
Solid waste - MBT's, region	2005 - 2015	5.7	1.8	7.5	1.02
Solid waste - closure of dumpsites	2005 - 2015			2.8	0.38
Air - Ambient air quality management	2005 - 2025			0.02	0.00
Air - LCP technical compliance	2005 - 2025			7.80	1.06
Air - VOC	2005 - 2025			1.20	0.16
Air - Total	2005 - 2025			9.02	1.23
All sectors total	2005 - 2025			51 ~ 55	7,0 ~7,5

 Table 12
 Summary of investment expenditure required

Source: EFS, 2008.

Based on the necessary costs and the feasible timeline for investments, Table 13 illustrates necessary transition periods, as proposed by EFS, for a few heavy cost directives.

Sector	Directives	Transition period
Water	Drinking Water	5 year (up to end 2015)
	Urban Wastewater	11 years (up to end 2021)
Waste	Upgrade of landfills to EU standard	5 years (up to end 2015)
	Diversion of BMW from landfills	2 years (2013 deadline moved up to 2015)
	Recycling and recovery targets	5 years (up to end 2015)
Air	LCP	15 years (up to end 2025)
	VOC from Petrol	5 years (up to end 2015)
	VOC from Solvents	5 years (up to end 2015)
	Ambient Air Quality	To be determined

Table 13Summary of investment expenditure required

Source: EFS, 2008

CONCLUSIONS AND REMARKS

The process of harmonization of Croatian legislation with EU regulations implies significant financial investments, estimated between 6 billion and 12 billion \in for ten to fifteen years period. The necessary financial investments and the foreseen period for implementation of the EUs financially heavy environmental directives differ in various strategic documents developed in Croatia.

The EU has supported accession efforts by providing financial and technical assistance from its pre-accession funds. Even so, horizontal legislation, nature legislation and framework legislation has to be completely transposed before the EU membership. Compliance with the acquis demands the creation of strong and well-equipped administration at the national, regional and local level. At least one authority at the national level has to assume overall responsibility for implementation of the acquis in the field of environment. Competences can be separated among several institutions at the same level or at different levels. However, the division of competences between the different actors and level had to be very clear. The new system of environmental protection introduced decentralisation which is shifting many environmental responsibilities into the regional and local level. In this case, decentralization is creating demand for better environmental services at the local level and increases awareness and willingness to pay for environmental improvements.

The process of decentralization is shifting many environmental responsibilities onto the regional and local level. Together with the EU regional approach toward future financial assistance it poses a major challenge for regional and local authorities. In this case, decentralization is creating demand for better environmental services at the local level, while public awareness and willingness to pay for environmental improvements are increasing.

In order to increase financing from external sources more attention should be devoted to the foreign direct investment (FDI) that promote sustainability by attracting the investment that improved efficiency of environmental resource use, foster development, transfers and implements more environmentally friendly technologies and encourage the adoption of higher standards of environmental responsibility. This is specially important in current circumstances of crisis, when access to finances is increasingly challenging.

Beside external sources of finance, it is of high importance for the Republic of Croatia to develop and increase the efficiency of domestic sources of environmental finance. According to the polluter pays principle, user charges are source of sustainable financing for environmental utility services. Therefore, new policies and programs, including the national environmental action programs, accession strategies, and economic instruments encourage the implementation of the polluter-pays principle. Main objective is to the move from partial to full cost recovery. In such a case, the prospect of EU accession can be regarded as a motivation factor for improving environmental conditions.

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