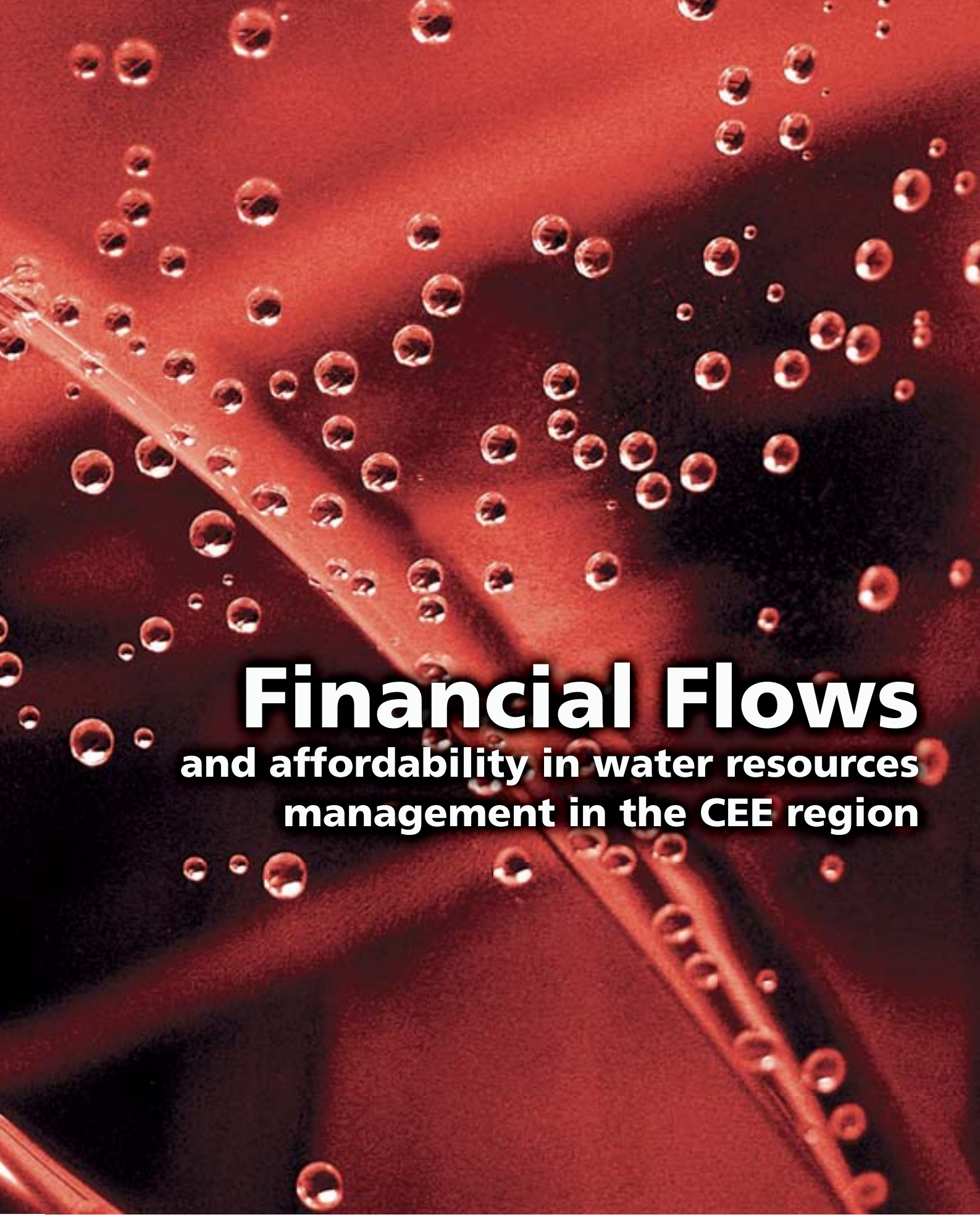


Financial Flows

and affordability in water resources management in the CEE region

Global Water Partnership
Central and Eastern Europe

Global Water Partnership
Central and Eastern Europe

FINANCIAL FLOWS AND AFFORDABILITY IN WATER RESOURCES MANAGEMENT IN THE CEE REGION

final report

Edited by
Krzysztof Berbeka

Cracow-Budapest, May 2003

Acknowledgements

This report is based on a project undertaken by a team of 8 national experts coordinated by Laszlo Somlody and Krzysztof Berbeka of CEE GWP. The author of the report is Krzysztof Berbeka with the contribution of Laszlo Somlyody (project manager) and inputs provided by the national experts. The support and cooperation of all experts listed bellow is gratefully acknowledged:

Bulgaria
Galia Bardarska, Rudan Nikolov
Estonia
Eva Kraav, Enn Lenk, Silja Lupsik
Hungary
Kalman Buzas, Adrienne Clement, Gyorgy Fonyo, Laszlo Somlody
Latvia
Sandra Krivmane
Lithuania
Daiva Semeniene
Poland
Krzysztof Berbeka, Maciej Lorek
Romania
Dan Paduraru, Liviu Popescu,
Slovakia
Tatiana Kluvankova-Oravska, Danka Thalmainerova

The leaders of the project report would like to express their deep gratitude to James T. Winpenny for valuable suggestions to the work programme and to Janusz Kindler for review of the report.

Abbreviations:

CEEC	Central East European Countries
EEA	European Environmental Agency
IFI	International Financial Institutions
PPP	Purchasing Power Parity
PPS	Purchasing Power Standard
REC	Regional Environmental Center
WFD	Water Framework Directive
WWTP	wastewater treatment plant

TABLE OF CONTENT

1. INTRODUCTION

The process of financing many water undertakings is very complex and different in each country. A number of historical and political reasons have influenced the current pattern of financing. Nevertheless, apart from the complexity of the system, it is the lack of a clear, visible financing mechanism that seems to be in many countries the second most common characteristics.

Supervision over the financial issues of water management seems to have increased during the last few years. Several institutions put their effort into identifying selected financial flows, costs and principles of pricing mechanisms.

REC Hungary, DG ENV and GWP made the most important efforts. However, none of the mentioned projects aimed at a comprehensive analysis of financial flows in the water sector. This aspect, combined with an attempt to predict the flows and drivers till 2025, is the target of the present project led by CEE GWP.

This report aims at clarification of the mechanism of financing of many water undertakings. Correct understanding of the roles played by all individual financial flows will enable a discussion concerning an evolution of the present financing system into the one where increasing requirements binding the water economy would be met.

1.1 Objectives and tasks

(1) To estimate the investment outlays and O&M costs (the latter for the existing and new facilities) needed to meet the objectives and vision of an integrated water resources management (focusing not only on EU accession and the municipal sector). As well as possible, the annualised cost will be also estimated as the most appropriate tool for measurement of the total financial burdens caused by implementation of the Water Vision – see Figure 1;

(2) To analyse different sources of financial flows and selected forms of financing investments in the water sector.

Sources of financial flows (according to the institutional division):

- public – including: state budget, environmental and water funds,
- private sector,

For the purpose of the flow analysis some sources that can be qualified as public, private or mix should also be taken into consideration:

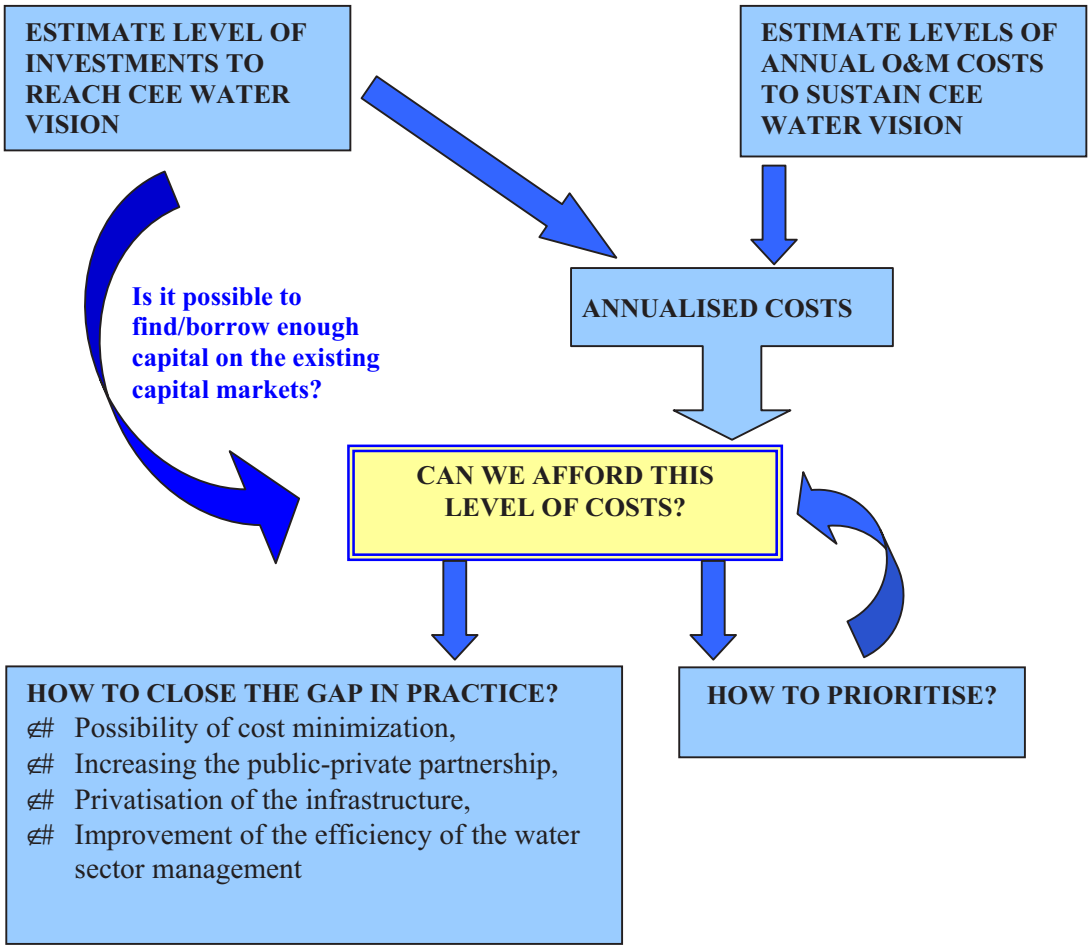
- banks, including international financial institutions,
- EU pre-accession, cohesion and structural funds,
- environmental taxes, charges and non-compliance fees;

Selected forms of financing the investments:

- own sources
- subsidies,
- soft loans,
- loans.

(3) To analyse an overall affordability of water services by the society (considering local/regional implications, the share of households with low income in the total population, demand reaction in response to an increase in prices, etc.); Results of the a.m. affordability analysis will influence the assessment of a possibility to provide the necessary capital. Low affordability will limit the willingness of the private capital involvement. In such case, a possibility of finding the necessary capital on the market should be carefully reviewed.

Figure 1



Although the data are compared across the reviewed countries, the main target of the investigation was focused not on a comparative analysis but on the affordability assessment on a single-country level. The problem of affordability is more related to individual cases rather than big aggregates.

It was originally assumed that the study would cover a long period, until 2025. During the process of data gathering it became apparent that there was no reliable prognosis concerning main economic indicators in such a long period. Therefore, the time horizon of the analysis was reduced down to 2015.

1.2 Structure of the report

The report consists of 8 parts. After the introductory note, the methodological chapter is included followed by a brief description of the reviewed countries. The said overview covers some main macroeconomic indicators and technical infrastructure existing in the water sector. Chapter 4 contains a description of the main investment needs identified in the water sector, using general financial formats (rather than technical or physical units). Such approach was adopted due to the character of the study that is focused on general economic aspects. Chapters 5 and 6 present a description of selected, important financial flows existing in the water sector, such as taxes and charges imposed on selected activities. Furthermore, there is an estimation of the value of the existing turnover in the water and wastewater municipal sector. The ex-post view is supplemented by a forecast of a growth of this sector (in financial units). Chapter 7 deals with affordability analysis on two levels: the level of households and the macro level. In this case, the lack of detailed calculation per each country is made up for by a detailed analysis carried out in selected countries. At the end the conclusion, remarks and suggestions are presented.

2. METHODOLOGY

The project methodology was developed on the basis of a survey of the existing incremental analyses performed in the EC and the OECD. However, studies focusing on a general overview of the financial flows are scarce, therefore some patterns and tools were developed during the inception phase of the project.

2.1 Concept and type of analyses

Current and ex-post analysis

The main target of the study is to develop an opinion about a possibility for a long-term implementation of the present water policy in selected countries. This opinion will only concern the economic aspects of the water policy (the technical and legal aspects are beyond of the scope). The assessment had to be made on the basis of a detailed review of financial flows existing in the water sector. Although each country has gathered some statistical information describing selected flows, it seems that there is a lack of a comprehensive, synthetic view on all the flows. Therefore, description of the present situation seems to be necessary for further analysis.

Concept of the current and ex-post analyses

There are three main ways to present financial flows in the water sector.

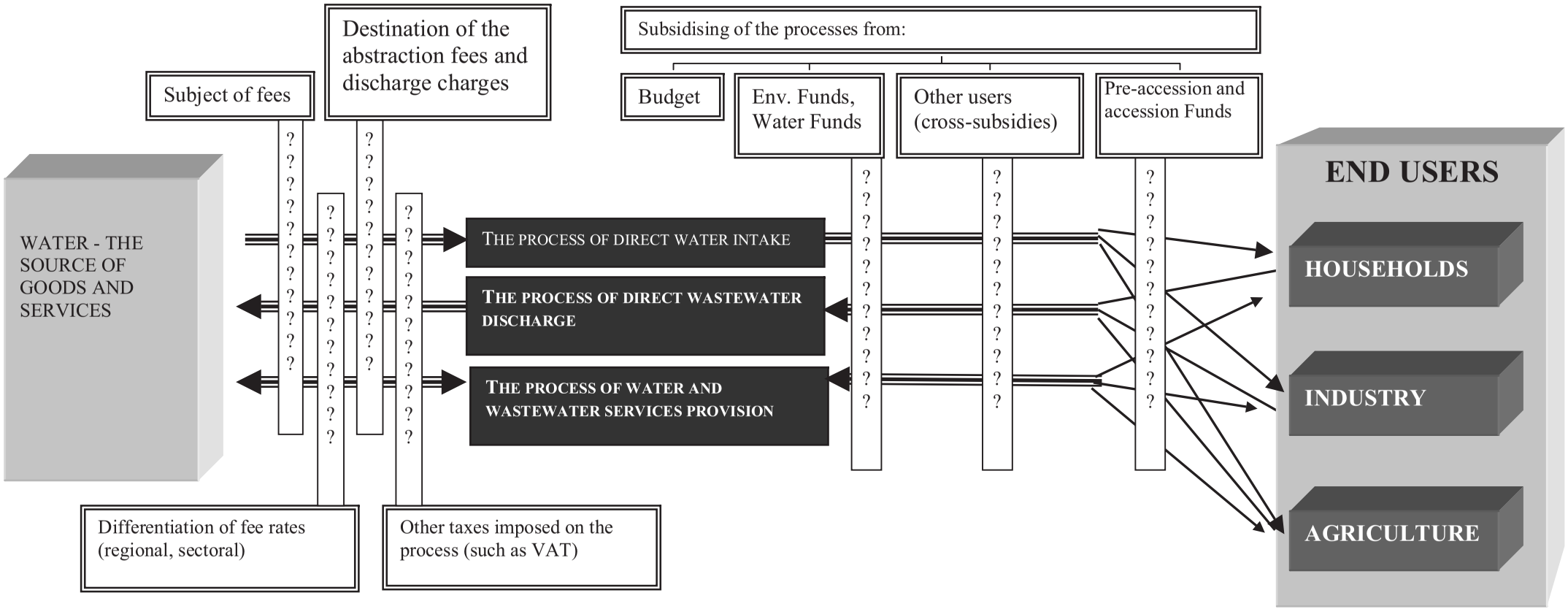
(a) to present flow by flow on the basis of a proposed scheme (Figure 2). This idea is close to typical accounting system, in main assumption more detailed, nevertheless, in practice, description of some of the flows may be unreliable. Furthermore, a step by step description may unable a comprehensive and consistent view on the whole system,

(b) to start from the main processes (water intake, wastewater discharge, flood management). This way seems to be more natural and logic. The above mentioned processes should be

described through financial flows they cause. There is however a danger to skip some of the flows not connected directly with a single process or to make double accounting.

(c) to start from the main actors (water operators, environmental funds, budget, enterprises, etc). This way seems to be a good supplement for the two previously described methods. The role of environmental funds and other funds (such as pre-accession funds, other ecological foundations) seems important. Therefore a comprehensive view on the input and output of the a.m. institutions will be useful.

Figure 2 Financial flows in the water sector



The nature of financial flows is dynamic but for the statistical purpose it is prepared to be viewed in annual periods, which have static character. Changes in the streams described by annual flows indicate the main trends. Because the general assessment should be made in a short, medium and long term, an analysis of current trends will be useful for short and medium term forecast.

Ex-ante analysis
Fluctuation of financial flows in the water sector depends on several variables (economic, legal and social). Therefore, the use of a simple extrapolation of current trends did not seem to be an appropriate tool. Experts' estimations (including the new constrains and drivers) were applied instead. A possibility of including new flows caused by EU integration is one of the main advantages of expert's estimation. There are also some premises of long-term predictions. The history of EU integration shows the evolution of the accession countries' economies. The changes are going to be more coherent and in fact similar to the economies of other EU countries. Therefore, benchmarking can be used as a tool for forecasting long-term targets for the accession countries subject to the analysis. Not only the targets were benchmarked based on UE member states. Also the systems of investment financing, and implementation and enforcement of the "User Pays principles" have to be in a long term the same or similar in all member states.

Sensitivity analysis
A number of economic, legal and social aspects influence the water management. Because during the project only a simple linear model was developed, there was no chance for full optimisation of this multi-parameters solution. In the case of a lack of the high-advanced models[1], the simple sensitivity analysis in ceteris paribus conditions seems to be sufficient.

Analysis of legal and institutional aspects
The systems of financing the water management vary significantly between the analysed CEE countries and EU countries. In a long period this difference should diminish as one of the integration effects. This fact helps in preparation of the forecasts for financing and consumption patterns for the reviewed countries. Nevertheless, in a short term the legal and institutional bindings lead to continuation of former schemes and patterns. Detailed analysis of the said bindings will show the methods for increasing efficiency in operational and financial aspects.

2.2 Data needed

There are at a minimum two independent aggregations of necessary data. Both classifications were used simultaneously. The first aggregation concerns main users of water:
- Municipalities,
- Agriculture,
- Industry,

The second division classifies the flows existing in all of the above-specified groups:
- Payments for using water as a source of goods and services (payments for water abstraction and payments for discharge of the load of pollutants into water)

[1] Probably the best solution should be based on neurone network engines, which are one of the most advanced methods of modelling

- Data describing the main water and wastewater operators (a) financial data: set of tariffs, incomes from provision of the services and costs of these services. Both sets of information enable estimation of the possibilities for financing the new investments using the user charges. Furthermore, data describing the process of subsidising the water management were necessary (b) quantitative data: amount of services provided broken down by different groups of users.
- Data describing the amount of necessary investments (a) caused by implementation of EU requirements (b) caused by others activities necessary for implementation of CEE water vision (c) necessary to stop depreciation of the existing facilities. Apart from the investment outlays, the O&M costs of new facilities should be known. In addition to the financial data, also the quantitative data are necessary (number of connected inhabitants, new capacity of the wastewater treatment plants, etc.)
- Data describing the available sources of financing the investments
- Data enabling assessment of affordability of the proposed policy; level of households' welfare (described by disposable income per capita), net profit from agriculture production (€/ha) combined with the function of utility of irrigated water.

The time and budget constrains of the present study excluded a possibility of preparation of special researches for supplementing the missing data, especially in sectors where the process of data estimation is time consuming (for example, costs of implementation of selected water directives such as the framework directive, or IPPC). Therefore, the best available estimation will be used for the project purposes.

Basic information was gathered by means of a questionnaire investigation. The questionnaire consists of 5 parts, 130 questions in total. It seems that a large number of questions leads to a dispersion of the effort, therefore in the future, investigation should be focused on the core area of the project. Possibly, skipping the general and technical background will allow to obtain more detailed data concerning specifically the essential part of the research.

The process of questionnaire investigation was preceded by a special workshop[2] focusing on avoiding some fundamental mistakes, misunderstandings of the basic terms, unification of categories, double accounting, etc. The workshop was addressed to the country representatives responsible for filling in the questionnaire. Additionally, special guidelines were prepared for the participants.

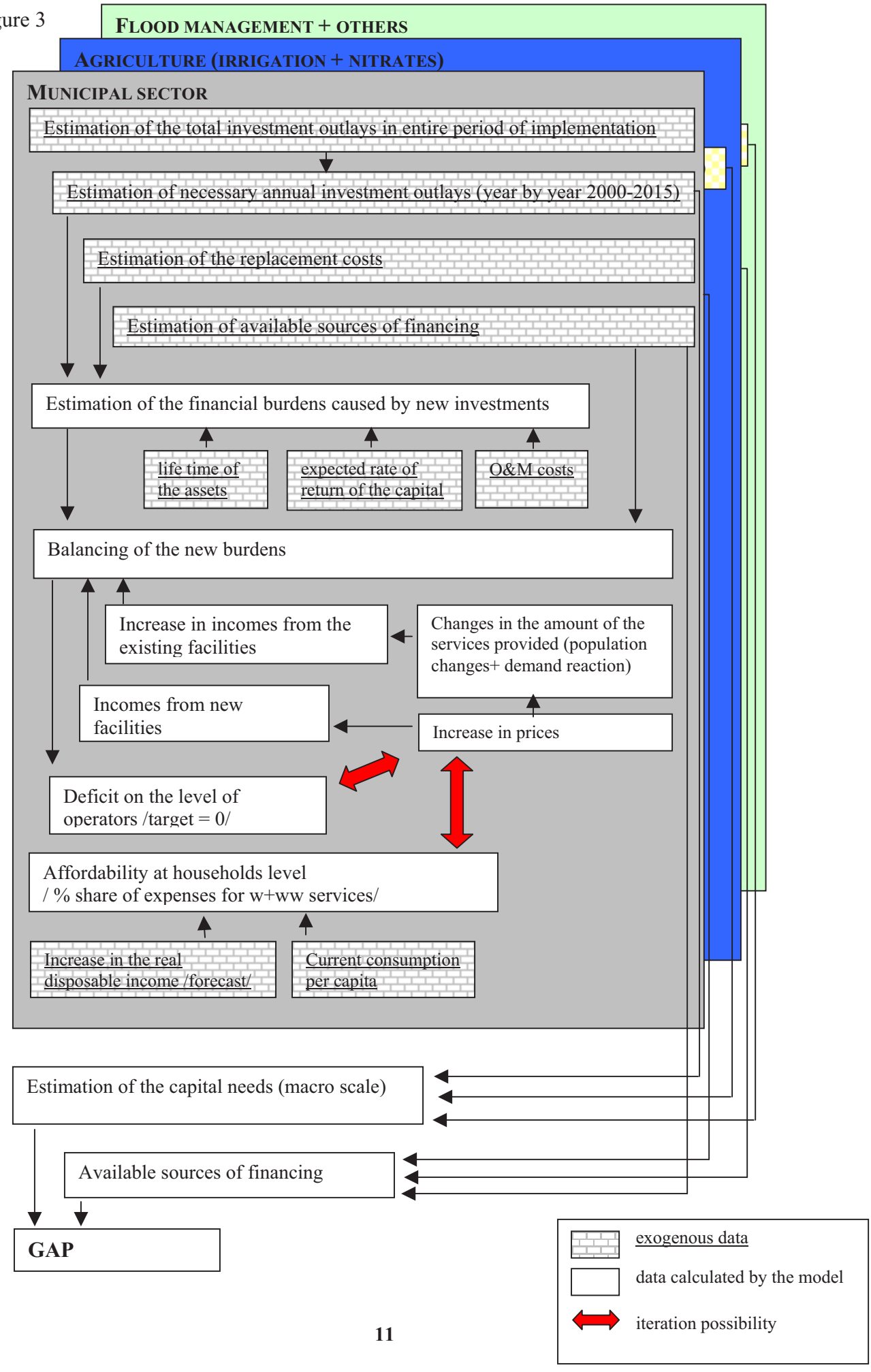
Finally, some background economic data from the questionnaire was replaced by data derived from EC statistical sources. The main reason for such an action was the inconsistency of data format or the year of comparison.

An instrument for the development of the affordability analysis was prepared especially for this project. The tool was based on the Excel spreadsheet that enables an integrated and dynamic assessment of the affordability on several levels and in different sectors. Figure 3 presents the scheme of the prepared tool.

Due to difficult access to data in a unified format, the tool developed was only used for Poland and Estonia. Lack of basic data for other countries made such detailed calculations for those countries impossible.

[2] The workshop took place in Budapest in June 2002.

Figure 3


FLOOD MANAGEMENT + OTHERS
AGRICULTURE (IRRIGATION + NITRATES)
MUNICIPAL SECTOR
Estimation of the total investment outlays in entire period of implementation
Estimation of necessary annual investment outlays (year by year 2000-2015)
Estimation of the replacement costs
Estimation of available sources of financing
Estimation of the financial burdens caused by new investments
life time of the assets
expected rate of return of the capital
O&M costs
Balancing of the new burdens
Increase in incomes from the existing facilities
Changes in the amount of the services provided (population changes+ demand reaction)
Incomes from new facilities
Increase in prices
Deficit on the level of operators /target = 0/
Affordability at households level / % share of expenses for w+ww services/
Increase in the real disposable income /forecast/
Current consumption per capita
Estimation of the capital needs (macro scale)
Available sources of financing
GAP
exogenous data
data calculated by the model
iteration possibility

The results presented in the report are partially inconsistent. Sometimes they refer to 10, but in many cases only to 8 CEEC. It is caused by the absence of any response to the questionnaire investigation from the Czech Republic and Slovenia. Where it was possible to obtain the missing data from public sources, the results for all countries were presented however, some information was not available for the authors without co-operation with in-country experts.

3. THE CEE REGION, MACROECONOMIC AND TECHNICAL BACKGROUND

The CEE region covered by this study includes 8 countries: Bulgaria, Estonia, Hungary, Latvia, Lithuania, Poland, Romania and Slovakia. Partially, data for the Czech Republic and Slovenia are included[3]. The population of investigated countries (CEEC-10) amounts to 104 millions inhabitants. Basic macro-economic data are presented in Table 1.

Table 1 Basic macroeconomic data

	CEEC-10	EU-15
Unemployment rate %	11,9	8,2
Monthly expenditure per capita €	114	1093
GDP total, billions €	393	8510
GDP, € per head	3764	22633
GDP at PPS[4], billions €	912	8510
GDP at PPS per head, €	8735	22500

Source: Eurostat

The above table compares the CCE region seen as a whole to the EU. However, differentiation of the indicators across the region is high. For example, the GDP at PPP ranges from 5200 € per capita (Romania) to 15600 € per capita (Slovenia).

Figure 4 presents the current level of technical infrastructure in the municipal sector. The indicators should not be directly compared across the reviewed countries, because the target is not the same for all the countries and the indicators presented (for example, not all inhabitants have to be connected to the sewerage, what indicates that sometimes target<100%). The available (mostly estimated) targets are also marked on the picture, therefore a rough[5] assessment of gaps is possible on the basis of differences between the targets and the present levels.

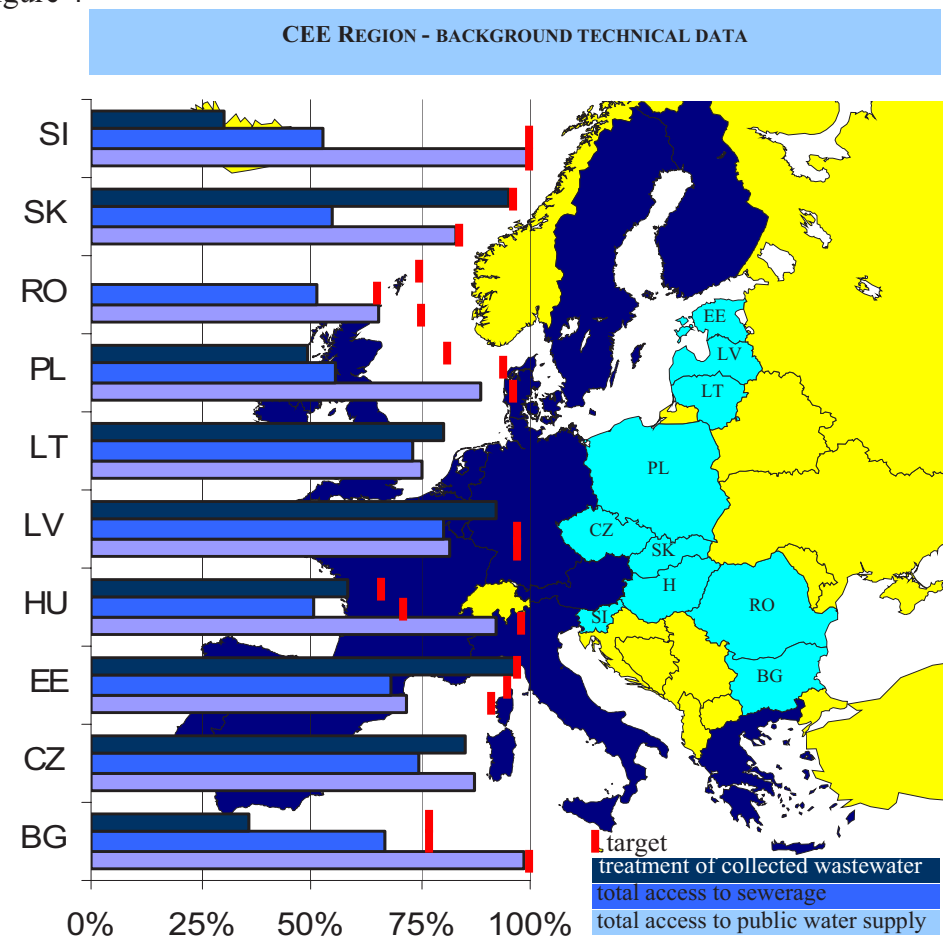
As far as the industry sector is concerned, description of the present level in physical units is more complex. Requirements for different branches are not the same, furthermore a unified indicator, such as COD, does not correspond to all needs in this sector. Therefore, it is more accurate to switch from various technical requirements to the financial requirements. This step will be presented in the next chapter.

[3] To avoid possible misunderstandings or misinterpretations the short names CEEC-10 and CEEC-8 where used for better description of the investigated sample.
[4] PPS – Purchasing Power Standard. It is an effect of using Purchasing Power Parity (the rate of currency conversion, which eliminates the differences in price levels between countries).
[5] Apart the mistake in estimation, the replacement activity is skipped at all.

Similar situation exists in the agriculture and flood management. Quantitative data are not very popular, especially concerning a description of the targets. It seems that there are two independent reasons for such situation:

a) the process of setting out the targets has not been finalised,
b) there are political obstacles for defining the targets in quantitative units because, once this is done, monitoring of the progress and efficiency becomes easy and visible.

Figure 4



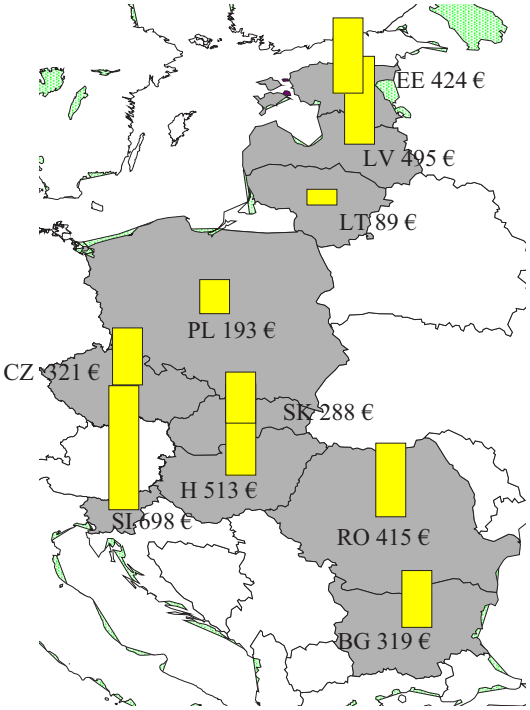
Source: Own estimation on the basis of the country questionnaires

4. INVESTMENT CAPITAL NECESSARY FOR IMPLEMENTATION OF EU WATER RELATED DIRECTIVES

Estimation of the necessary investment capital has to be interpreted with special care. The total amount of necessary investments over the period 2003-2015 includes automatically one fundamental mistake. The capital that should be spent in different years is added together, ignoring the fact that there is a significant difference between spending the sum in the first year and in the last one[6]. Therefore, the full modelling, including the balance of the capital year by year is the best method of analysis. Unfortunately the year-by-year breakdown of

[6] The fact of using constant prices still does not solve this problem.

FIG. 5 WATER AND WASTEWATER SECTOR - NECESSARY INVESTMENT OUTLAYS IN € PER CAPITA OVER THE PERIOD OF IMPLEMENTATION (UNTIL 2015)



necessary investments was available only for a few countries, therefore the report presents only the most aggregate figures.

Figure 5 presents the burdens caused by investments necessary in the municipal sector[7] in € per capita. There is 8-fold difference between the reviewed countries. Such a high differentiation is caused by several factors, therefore the real differences in technical equipment are only partially responsible for such divergence. Other reasons are the following:

a) lack of unified methodology concerning the problem of including or excluding the replacement costs and their subsequent assessment,
b) differences in price levels between the countries.

The values presented on Figure 5 should be supplemented by other investments related to the water sector, such as the costs caused by a control of industrial and agricultural discharges, irrigation, flood control. Because of the missing data such assessment has only a limited creditability. Obviously, some of the incremental costs can be ignored when the range is very small. Nevertheless, such items as flood control or discharging dangerous pollutants into the water should be included in all country estimations. For example, only Estonia and Hungary estimated additional costs of implementing the Water Framework Directive; discharge of dangerous pollutants was included only in Hungarian and Polish estimations. In the mentioned cases, a single estimation can raise the total costs by 30%.

Table 2 Rough estimation of total investment needs in the selected CEE countries for the period until 2015

	BULGARIA	ESTONIA	HUNGARY	LATVIA	LITHUANIA	POLAND	SLOVAKIA
sum of financial needs (million €)	2602	841	8450	2004	728	18549	2149

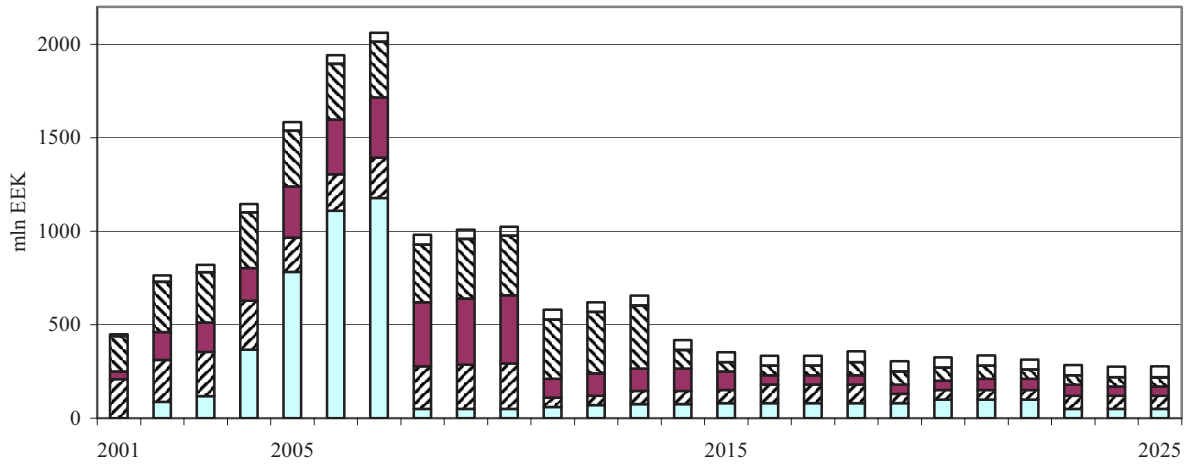
Source: Countries' investigations

It should be noted that studies related to the preparation of investment process in the water and wastewater sector are continuously going on e.g., latest investigations in Lithuania (Master plans for river basins) showed that overall investment needs in Lithuania to achieve water standards not only in towns bigger than 2000 p.e., but also in smaller settlements by 2020, makes approximately 1 billion €. Investment needs by 2010 amount to 600 million €. It could be stated that this number to some extent reflects the implementation of the WFD. Thus, sum of financial needs in the above figure (5) and in the above table would need to be updated

[7] Water intake, sewerage, and wastewater treatment.

Detailed aggregation of the investment outlays (by year and source of costs) is available for Estonia and Poland. The case of Estonia is presented on Figure 6.

Figure 6 Outlay of annual investment cost, Estonia 2001-2025



EU WFD, Flood control, Wetland reconst., Melioration, Lakes, River basin
Drinking water
Sewerage
Municipal wastewater
Nitrate directive

The investment outlays do not have a strict character of financial flows. The necessary capital is gathered thanks to a combined input from different sources. The structure and capacity of selected sources will be discussed in the further chapters.

5 TAXES, CHARGES AND THEIR IMPORTANCE FOR FINANCIAL FLOWS CIRCULATION IN THE WATER SECTOR

The main influence comes from VAT, abstraction charges and discharge charges however roles of the mentioned burdens vary. VAT is a typical tax aimed at raising the budget incomes and leads to an increase in the final price for end-users, although this statement is not quite that obvious.

The role of abstraction and discharge charges is a little different as the payment is connected with obtaining/purchasing goods[8] or services[9]. There are several targets of the charges:

a) to show that the value of environmental goods and services is different from 0
b) to reduce the amount of consumption of goods and services
c) to raise the state budget incomes (if the charges collected are transferred to the state budget)
d) to support environmental protection activity (if the charges collected are transferred to environmental/water funds).

The VAT rates across the investigated countries are presented in Table 2.

[8] water
[9] discharge of pollutants into the environment.

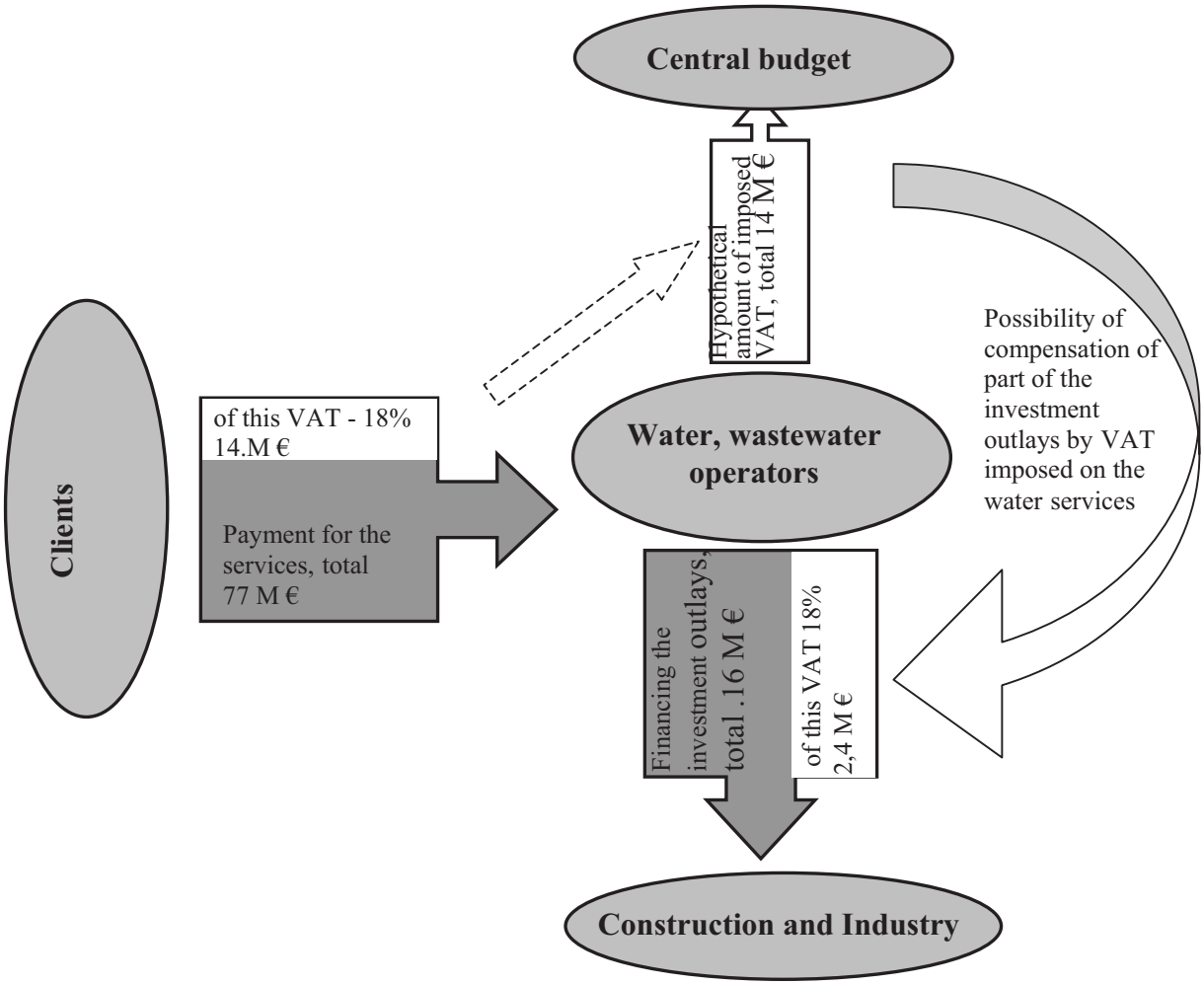
Table 2 VAT rate imposed on the water and wastewater services

Country	VAT rate (%)	Remarks
BULGARIA	20	
CZECH REP.	5	reduced rate
ESTONIA	18	
HUNGARY	12	reduced rate
LATVIA	exemption in case of households	
LITHUANIA	18	
POLAND	7	reduced rate
ROMANIA	19	
SLOVAKIA	10	reduced rate
SLOVENIA	8	reduced rate

Source: Water pricing in selected Accession Countries to the European Union, current policies and trends. DG Env.

Investigation of a real impact of VAT on the price increase was however unsuccessful. It is incorrect to assume a direct increase in prices as a result of imposing this tax. From the VAT imposed on the services provided, the operator can deduct the VAT paid during the process of purchasing goods and services necessary for his own activity. Due to this possibility the VAT imposed on the water services is always higher than the VAT actually transferred to the state

Figure 7 Impact of VAT on financial flows in the water sector - Estonia



budget. In the case of an intensive investment process (for example a construction of a new WWTP), the VAT is not transferred to the state budget at all and in fact, the costs of construction of the WWTP are reduced. Quantitative description of these processes was unsuccessful, except for some rough data for Estonia and Poland. Figure 7 presents the case of Estonia, where a partial VAT compensation is possible. Similar comparison made for Poland[10] indicates a possibility of full compensation of the imposed VAT due to the high value of investment.

Conclusions

- The process of VAT imposing is not equivalent with price increase, nevertheless it serves as a good justification for such increase used in political discussions between the operators and municipal councils. As far as the prices are controlled by political decisions of the municipality council and the operator's incomes do not cover all costs (lack of full cost recovery), the VAT is used as a tool for increasing prices, independently from the essential technical reasons.
- In many cases the VAT leads to a decrease in necessary investment outlays, and in fact there is no net transfer from the operator to the central budget in relation to the VAT payment.
- The situation with abstraction and discharge charges is similar, however the patterns of flows circulation are different in each country. Additionally, there is more data available describing the size of cash flow transferred from the fee-payer[11] to the receiving institution (budget/environmental funds). Full data are available for Estonia, Hungary, Latvia, Lithuania, Poland, and Romania. Annual transfer in this sample amounts to 170 millions €, about 64% (100 m €) of which is made in Poland (due to the highest unit rates and the size of the country). It must be said however that this relatively large stream does not play an important role. The abstraction and discharge charges constitute less than 10% of the total investment outlays spent for the water sector (or less then 7% of the annual value of the water and wastewater market) in Poland.

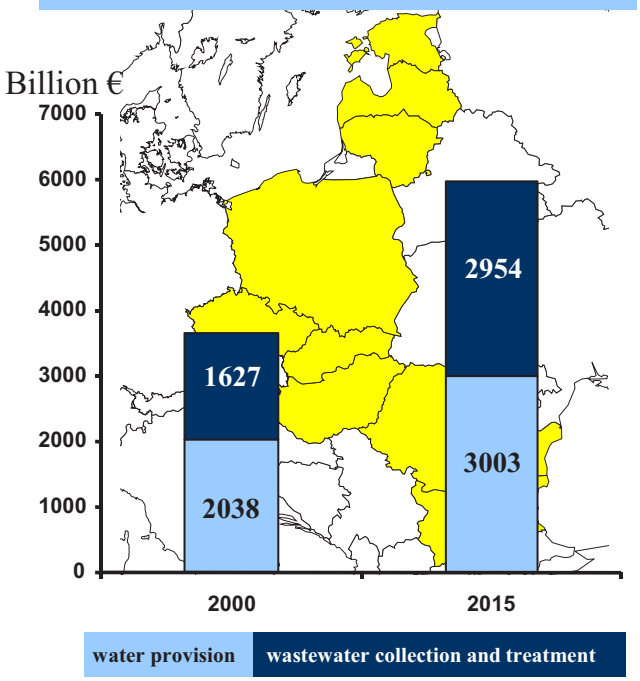
a) the role of charges as a hypothetical tool for closing the gap in the investment outlays is in fact very limited. Significant increase in the unit charges plays a minor role as an additional source of capital. For other countries[12], contribution of the mentioned charges is even more limited; and
b) the unit charges play only a minor role in the increase in prices for the end-users.

10 Berbeka K., Analysis of financial flows in the water economy - case of Poland. Report prepared for this project.
[11] municipal operators, agriculture, industry.
[12] countries other than Estonia, Hungary, Latvia, Lithuania, Poland, and Romania

6 MARKET OF WATER AND WASTEWATER SERVICES

Payments for water and wastewater services play an important role in financial flows in the water sector. The rough estimation of the annual value of this market amounts to 3,7 billions € in 2000. The assessment was made on the basis of countries' investigations, the missing data were estimated based on various known prices, amount of services provided and rates of execution existing across different groups of clients in the reviewed countries. Implementation of drinking water directives, municipal wastewater directive and realisation of other targets[13] in the municipal sector will lead to a dynamic growth of this market. The prediction includes a development of the infrastructure (new clients), an increase in the unit prices and related demand reactions (decrease in unit consumption). Figure 8 presents the structure of the existing and a prediction of the future market. Detailed estimations (including demand reaction) were made only for Poland, for other countries the Polish results were expanded. The main trend of changes is connected with growing importance of incomes from the collection and treatment of wastewater. This is a direct result of an intensive development of the sewerage systems. Additionally, the participation of clients other than households seems to be decreasing.

FIGURE 8 CEEC-10, ESTIMATED AND PREDICTED ANNUAL TURNOVER OF THE WATER AND WASTEWATER SERVICE MARKET, MILLION €



The values presented indicate also a possibility of financing the investment activities using own capital. Although only in a few countries information concerning profitability of water activities in the municipal sector was available, the existing data indicate a very low level of net profit generated by water and wastewater operators. The net profit is beside depreciations a source of self-financing (co-financing) of the investments (or paying back loans). The very low profit (below 3%) suggests that the possibility for a development of the existing infrastructure without a significant public support is seriously limited.

[13] At a minimum there are two targets not directly included in EU directives:
a) necessity to increase the share of population connected to the piped water is not included in EU directives, nevertheless this target exists in water policies of all the reviewed countries
b) full implementation of User Pays Principle is mentioned only in the WFD, without quantitative and precise indicators.

7 AFFORDABILITY ASSESSMENT

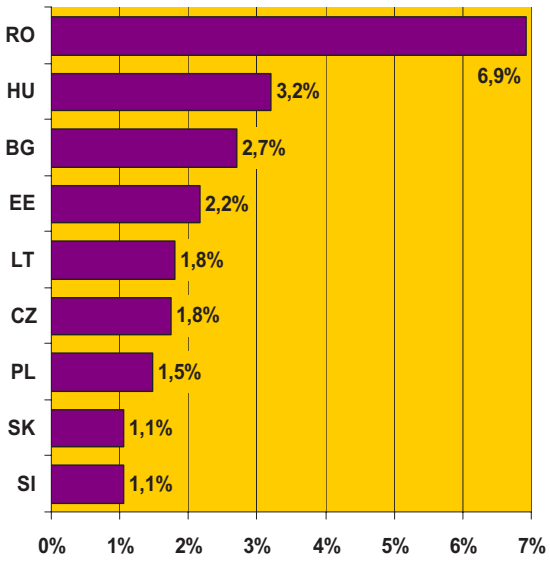
7.1 Affordability assessment at households' level

The analysis should start from the micro level. A positive result enables obtaining a loan on the commercial market. A negative result indicates a necessity to increase the subvention level via grants and other instruments.

The necessity to implement "User Pays" as one of the main rules implies increase in prices for the services aimed at covering of all costs, including the capital costs. The process of price increase for water provision and wastewater collection is typical for CEE region.

Nevertheless, the prediction of changes in prices is much more complex than a simple addition. Figure 3, included in the methodological chapter, can be also useful for reviewing all the correlation.
The ex-post view – current share of the expenditures spent on purchasing water and wastewater services is presented on Figure 9

FIGURE 9 EXPENDITURES FOR WATER AND WASTEWATER SERVICES AS % OF THE TOTAL HOUSEHOLDS EXPENDITURES



Single solution to the problem of balancing the new cost by incomes, with all price, demand and welfare implications, is presented in Table 3.

The detailed analysis of affordability at households' level is presented on the basis of Poland. The high number of variables (9)[14], creates so high number of possibilities that it exceeds the technical capacity of description of all variants. However, on the basis of the analysis of the solution in several variants, it is possible to formulate some principles and barriers for funding the right output. For the model, the solution exists if the increase in costs is balanced by the increase in incomes. Not in all cases it is possible to find this solution because the demand reaction on the price increase can lead to a decrease in the total incomes. Furthermore, not all results found by the computer could be accepted by the economists and stakeholders (for example, the solution assuming a decrease in demand to the level of 40% of the current consumption). Therefore, the developed model can support the decision making process but it must not serve as a substitute for this process.

[14] The model enables differentiation of following factors: Expected rate of return of the capital (%), Rate of rediscounted bills (%), Life time of the assets (years), O&M costs as a % of investment outlays (%), Demand price elasticity factor (-), Replacement investments as % of total investment outlays (%), Current monthly water consumption per capita (m^3/per capita), Current monthly disposable income per capita (€/per capita), Annual increase in the real disposable income (%)

In the attached case, the necessity to balance the costs by a new income leads to a 100% increase in the unit price for water provision and wastewater treatment in the period of 6 years. The forecast assumes an increase from the level 0,8 €/m^3 to 1,15 €/m^3 in 2006, which seems to be possible, taking into account that in 2002 there are already some cities in Poland where the price exceeds the level predicted for 2006 (Cracow). Synthetic results of the calculation are presented in Table 3.

Table 3 The changes of prices and demand reaction in the municipal sector, Poland

	2000	2006	20015	2025
Price €/m^3	0,80	1,15	1,62	1,71
Increase in real terms (inflation excluded)	-	44,0%	102,0%	114,2%
Demand reaction (decrease, % of basic amount of provided services, increase from new facilities excluded)	-	4,4%	10,2%	11,4%

Source: Own calculation

The related demand reaction in 2006 was calculated at 4% of the total water provision. A single case in Poland indicates that the demand reaction can reach even 10% per year, which indicates that 5% calculated for 6 years is absolutely possible.

In many cases it was possible to find the solution providing that the value of some of the specified variables does not exceed the below-specified level. For example:

- The value of the demand price elasticity factor in many cases can not exceed -0.1. In the literature, the value of that factor was in the range -0,1; -0,2. This fact indicates that the demand reaction plays a serious role in the process of infrastructure development. Analysis of single cases confirms this theory.

The results of verification of several variants and sensitivity analysis are the following:

1. A change of the expected rate of return of the capital has a significant influence on the final price of the services. For example, changing the mentioned variables from 10% to 8% leads to a controlled price increase by 7% till 2005 and 14% till 2010.
2. In the whole period of the analysis (till 2025), the share of expenditures for water and wastewater services in disposable income does not exceed 2,5% of average income per capita (170 €, in 2000). However, the affordability analysis should focus on the poorest group of population. There are two most common definition of low standard of life in Poland: (a) minimum of existence (further decrease in income is danger for biological existence) and (b) social minimum (income enabling satisfaction of the needs, also cultural needs, on a low level). Approx. 8% of the population live below the first level, and 54% below the second level. The rough application of numerical values for both levels of income is included in Table 4.

Table 4 Expenditure of the poorest group of households on water and wastewater services in Poland

	The level of income per capita in 2000 (€/month)		Share of disposable income spent on purchasing water and wastewater services %	
	minimum of existence	social minimum	minimum of existence	social minimum
One person households	80 €	100 €	over 4% from 2003, maximum 5,3%	over 4% from 2009, maximum 4,2%
Four person households	53 €	61 €	over 4% from 2002, maximum 7,9 %	over 4% from 2003, maximum 6,9%
Percentage of population living below standard	8 %	54 %		

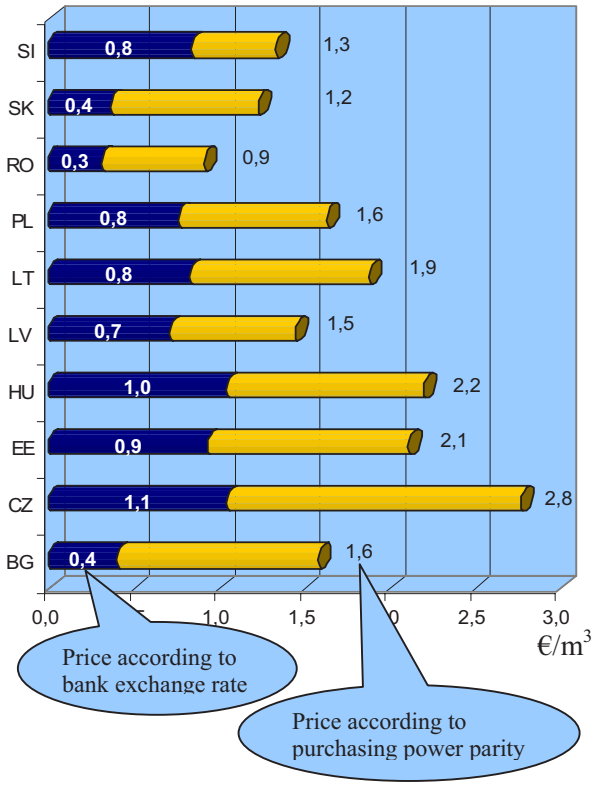
Source: Own calculation

The table above illustrates hypothetical problems related to financing investments with a strict enforcement of the User Pays Principle. There is a serious danger that approx. 50% of the population will not be able to pay the whole costs resulting from water and wastewater services. In fact, the wording "full costs" is not exactly true, because the attached calculation bases on the assumption that all EU funds and 40% of public funds are grants - not credits or soft loans (the assumption that EU grants can be skipped in price calculation still exists). Some changes in this pessimistic picture are possible due to an increase in the annual factor of real income growth (from 2,0% to, for example, 2,5%). A sensitivity of the analysed calculation to this kind of changes is low. The barrier of 4% will be exceeded 1 year later than in the previous case (except the social minimum in one-person households, where the results do not exceed 4% in the whole period). Another implication of this conclusion is that the process of balancing the available and the necessary investment outlays is not enough for the assessment of the entire and complex affordability issue. Furthermore, the barrier highlighted indicates that moving some grants from the wastewater sector to the flood management program is not possible.

3. Influence of the assumed lifetime on the assets was analysed. Changes of the average lifetime from 25 to 30 years have very limited influence on the price (the assumed rate of return on the capital - 10%). Mentioned changes lead to changes in the price for the services in 5-year horizon (2005) of about 2% (107% instead of 109%)
4. Influence of O&M costs on the final price is moderate. In the model, the O&M costs are calculated as % of investment outlays. 1% change of this factor of leads to changes of the price for the services of 8% in the horizon of 2005 (107% instead of 115%).

An analysis of affordability differs across the CEE countries. Rough investigation in Lithuania indicates that the level of 4-5% will not be exceeded, as opposed to Romania, where increase in the prices without special protection activities can bring about the necessity for spending 5-15% of disposable income.

FIGURE 10 AVERAGE WATER AND WASTEWATER PRICES IN CEE REGION



The problem of a high share of the analysed expenditures is related not only to the high prices for services (see Figure 10), but also to the amount of consumption.

The prices calculated according to the PPP enable reliable comparison of the unit burdens.

Simultaneously, low price at PPP indicates a serious need for an increase in the unit prices. It should be stated that analyses made on the country level smooth some local differentiation of prices, level of welfare etc. As a result of using such a high level of aggregation some local problems are missed.

7.2 Possibility of balancing the investment needs by the available sources of capital

The discussion of balancing the needs has to start from a review of the current situation. As the second step the time path of the needs and prognoses of available capital should be prepared. Unfortunately, a comprehensive review of all sources of capital is impossible for many CEE countries (except Estonia, Hungary, Poland and Slovakia). It is a classic example of an absence of monitoring of the investment process in the water sector. This fact indirectly indicates the lack of a comprehensive policy related to the water sector, or the lack of any problems with balancing the needs by the sources (like in Lithuania[15]).

The existing schemes (Table 5) show high differentiation of the current patterns of financing. Some differences are obvious, as small countries receive higher foreign support per capita than the biggest countries. As a result, the share of foreign support is higher in small countries.

[15] On the base of Lithuanian report prepared for this study.

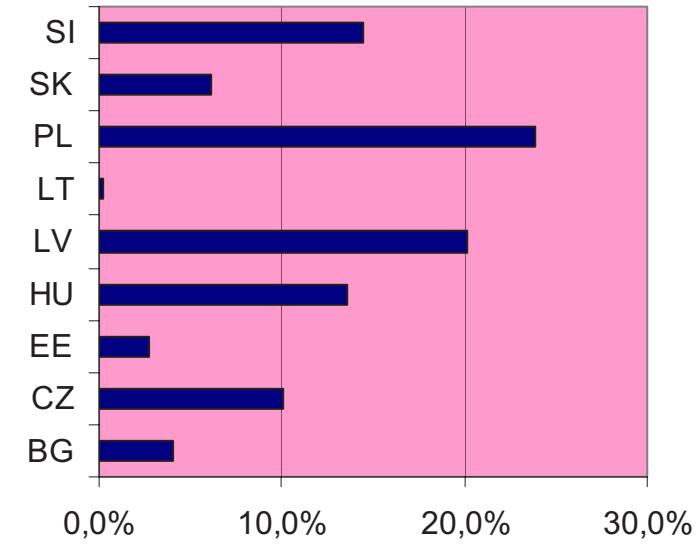
Table 5 Comparison of the structure of financial sources for investments in the municipal sector, 2001

Source:	Estonia	Poland	Slovakia
State budget	18 %	5%	9 %
Water and Environmental Funds	8 %	27%	25 %
Loans	3 %	7%	2 %
Own sources	42 %	48%	40 %
Other (EU, IFI)	38 %	5%	15 %

Source: Questionnaires and reports from investigated countries

Also comparison of the selected sources, such as environmental/water funds (with the available data) indicates different role of the same financial instrument, (Figure 11). Presented case shows different capacity of the same sources of capital across the reviewed countries. This remark confirms the statement that the balancing of the needs by the available capital has to be done separately for each country, regarding specific constrains characterising each source of the capital.

Figure 11 Relation of the annual support privided by environmental/water funds to the annual investments needs



The long-term forecast of the amount of capital available from all sources is a huge macroeconomic task, well beyond the scope of the current project. For countries where results of such modelling are available (Estonia, Poland), the final gap in the investment capital in the water sector was estimated. Figure 12 reflects a prognosis for the situation in Estonia, while Figure 13 a forecast for Poland. In both analysed countries the gap exists, however the amount of missing capital is different. It seems that in the municipal sector in Estonia changes in scheduling will be sufficient to fully balance the needs by the available capital.

Figure 12 Balancing of the necessary capital in the water sector in Estonia, million €

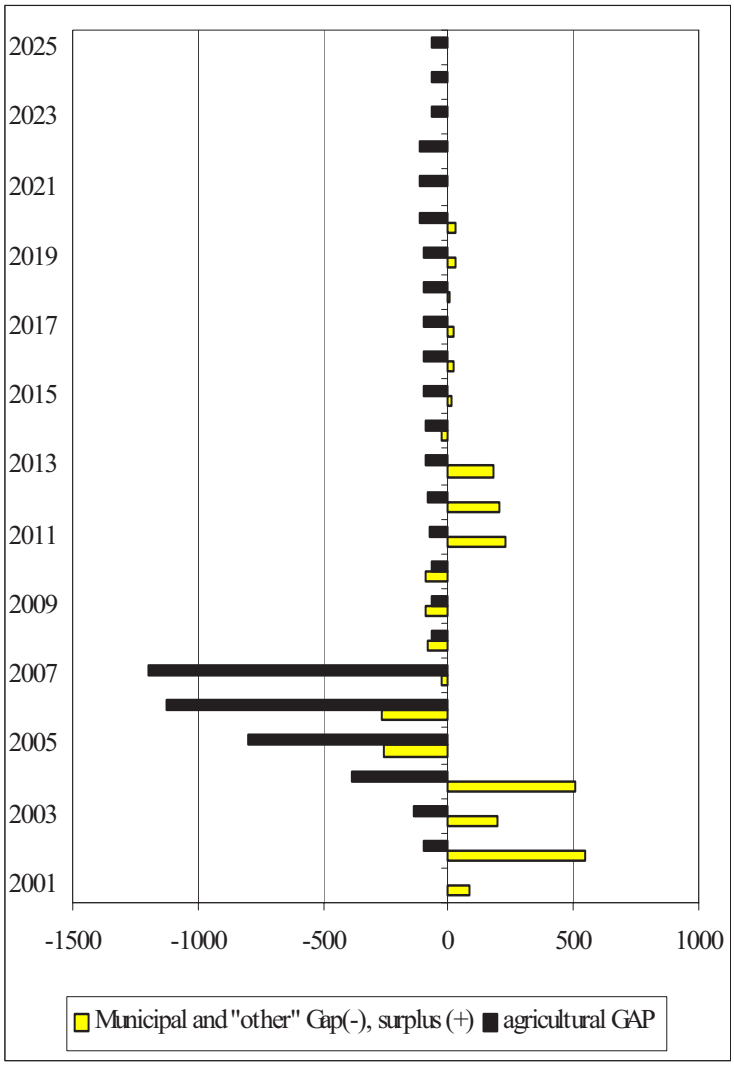
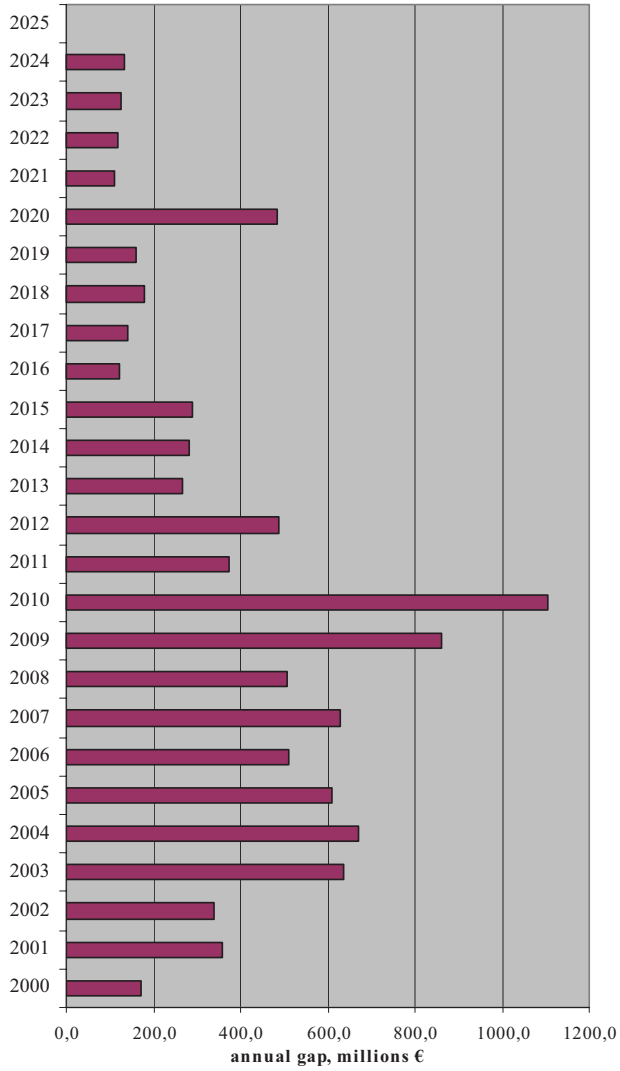


Figure 13 Annual gap in capital investment, Poland (municipal, agriculture, flood), million €



Taking into account that the amount of public support (foreign and national) is limited and not flexible, the range of the gap suggests that an improvement of the User Pays principle is needed. Other sources of financing (except commercial sources) have the capacity that is not comparable with the required amount of capital. Access to commercial sources will be open only when the possibility of payback the capital is increased, which leads directly to a necessity for improvement in the pricing policy.

8 CONCLUSIONS

1. There is no one pattern of circulation of the flows across the reviewed countries. Historical and administrative reasons seem to make a unification of these processes impossible. Furthermore, it seems that there is no reason to unify the system of financing across all countries.
2. There is a serious need for a holistic management of financial flows. Several targets with associated costs require a comprehensive view on the necessary and disposable capital. An independent implementation of incremental tasks will not guarantee that the targets at the national level in the predicted transition periods are met. Especially, the incentives like EU financial support have to be managed, including balance of all needs, individual ability of covering the costs by users, etc.
3. It has been stated the needs for an improvement of the information concerning financial aspects of the water management (only less than 50% of CEE countries have more or less comprehensive view on the financial aspects in the water sector). Attention is now focused only on balancing the investment needs. Except for single countries (Hungary), the O&M cost are skipped in a discussion concerning the total financial burdens caused by implementation of the water vision.
4. An increase in costs in the water sector caused by implementation of EU water related directives leads in many countries to a deficit in the investment capital. A process of closing this gap requires a wide acceptance of an involvement of a private capital in the water sector. The term „acceptance" covers: friendly legal environment, understanding of needs by stakeholders and end-users (households and business).
5. UE support will help fill in the investment gap but this is not equivalent to solving the problem of proper pricing and implementation of the Users Pay's Principle. Additionally, expectations concerning access to EU funds are a disincentive for using commercial sources of capital.
6. Expected growth of the GDP (the result of convergence process) does not guarantee an automatic growth of the amount of capital available for environmental investments (there is no simple correlation between an increase in the GDP and an increase in environmental protection activities). On the other hand, a decrease in the economy will immediately cause a decrease in the environment related investment activity.

LITERATURE

[1] Berbeka K., *Analyse of financial flows in water economy -case of Poland*. Report prepared for this project, Cracow, 2002.

[2] Buzás K., Clement A., Fonyó Gy., *Financial Flows in the Water Sector in the CEE Region*. Hungarian data collection and analysis Budapest, 2003.

[3] *Environmental benchmarking for local authorities: from concept to practice*. Environmental issues report No 20. EEA, 2001.

[4] Kraav E., Lenk E., Lupsik S., *Analyse of financial flows in water economy -case of Estonia*. Report prepared for this project. 2002.

[5] *Statistical Yearbook of the Republic of Slovenia 2001*. Statistical Office of the Republic of Slovenia, 2002.

[6] *Water for the 21st Century: Vision to Action*. GWP CEETAC, 2000.

[7] *Water pricing in selected Accession Countries to the European Union, current policies and trends*. DG Environment, 2000

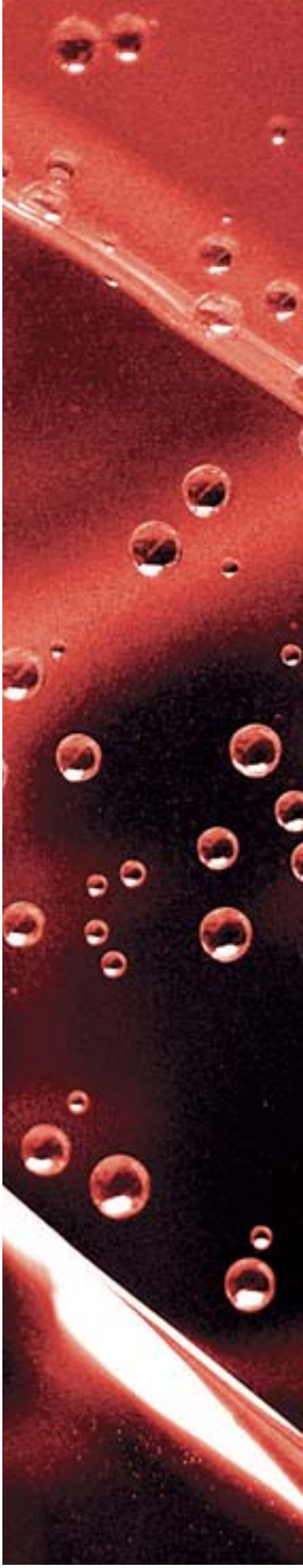
[8] Winpenny J.T., *A Note on Future GWP Work on Financial Flows*. Working paper Produced for the CEETAC Workshop on "Financial flows in the water sector in the CEE region", Budapest, Sept 2-3, 2001

[9] Winpenny J.T., *Financial needs and funding sources for the water sector: A conceptual and methodological note.* Produced for the CEETAC Workshop on "Financial flows in the water sector in the CEE region", Budapest, Sept 2-3, 2001

The GWP-CEE region

BG	–	Bulgaria	LV	–	Latvia
CZ	–	Czech Rep.	P	–	Poland
EE	–	Estonia	RO	–	Romania
H	–	Hungary	SK	–	Slovakia
LT	–	Lithuania	SL	–	Slovenia

ISBN 80-88907-45-4
9 788088 907459



The Global Water Partnership (GWP), established in 1996, is an international network open to all organizations involved in water resources management: developed and developing country government institutions, agencies of the United Nations, bi- and multilaterial development banks, professional associations, research institutions, nongovernmental organizations, and the private sector.

GWP was created to foster Integrated Water Resources Management (IWRM), which aims to ensure the coordinated development and management of water, land, and related resources by maximizing economic and social welfare without compromising the sustainability of vital environmental systems. GWP promotes IWRM by creating fora at global, regional, and national levels designed to support stakeholders with their practical implementation of IWRM.

Currently, the GWP network consists of twelve regions: Central America, Central and Eastern Europe, Central Asia and Caucasus, China, Eastern Africa, Mediterranean, Pacific, South America, South Asia, Southeast Asia, Southern Africa and West Africa. The GWP Secretariat is located in Stockholm in Sweden and supported by the following resource centers: DHI Water & Environment in Denmark, HR Wallingford in the UK, and the International Water Management Institute (IWMI) in Sri Lanka. The mission of GWP is to "support countries in the sustainable management of their water resources."

GWP Central and Eastern Europe
c/o Slovak Hydrometeorological Institute
Jeseniova 17, 833 15 Bratislava, Slovakia
E-mail: gwpcee@shmu.sk

GWP Secretariat
Hantverkargatan 5
SE-112 21 Stockholm, Sweden
E-mail: gwp@gwpforum.org