# MEIF

## (Method of Evaluation of Investment needs, Financing strategies and consequences on water pricing)

## *WP7: Syntheses and research avenues*

**Deliverable 7**

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## Notice

This document contains the deliverable of Work Package 7 of the project MEIF, contract EKV1-CT-2002-80019, funded under the 5th Framework Programme (1998-2002), Energy, Environment and Sustainable Development (EESD).

Deliverable 7: Final report (see sections 1, 2, 3 and 4),

The project MEIF (Evaluation Methods for Investments in the Water Sector: Forward-looking financial strategies and water pricing) is conducted by a consortium led by PricewaterhouseCoopers (www.pwc.com/sustainability) in cooperation with the International Office for Water (www.oieau.fr) and the consultancy BIPE (www.bipe.fr).

More information on the MEIF project is available from the project website (www.meif.org).

# *Content*

# 1 Key objectives and method

## *1.1 Key objectives of WP7*

This work package has 2 key objectives:

- ✓ To produce a synthesis of the works and the results of the others work packages.
- ✓ To present topics of improvement and research avenues.

## *1.2 Expected results*

### 1.2.1 Synthesis of the results

In this part of the work, we will list the main results of our research and we will organise them in order to facilitate

- ✓ Their dissemination,
- ✓ Their comprehension by stakeholders who have not been involved directly to the data production.

In a global approach, these results will include:

- ✓ The variables determining needs of investments. These variables are the first step to the implementation of a forecasting tool of the need of investments.
- ✓ A typology of territories from general data (geography, demography, etc.), economical data, and data related to water sector.
- ✓ A database on institutional organisation, economy of water sector, tariffs policy, method of evaluation of investments needs.
- ✓ A presentation of best practices in investments needs evaluation methods.
- ✓ A reference documents on the various existing financial strategies and a decision tree to describe possibilities of countries.
- ✓ A synthesis of financial attractiveness appraisal for each category of stakeholder.
- ✓ An evaluation of the links between the financial strategies and the price of water.

The coordination team will produce the documents issued from these conclusions. These documents will support the results dissemination.

### 1.2.2 Research avenues

The scope of MEIF project does not allow to carry an exhaustive analysis of the topic. Moreover, as described previously, this survey will put the emphasis in the definition of methodological principles.

For these reasons, it has been logical to define and analyse some research avenues at the end of the project. We had also describe some further works that could be done

# 2 Synthesis per Work Package

## *2.1 WP1: Institutional communication*

### 2.1.1 Creation and implementation of the tools of communication

#### *2.1.1.1 Documents created for communication*

Brochure (English and French version), letters for each water directors in the ten countries concerned by the study, Internet site (www.meif.org), e-mail and small presentation of the project.

#### *2.1.1.2 Local meetings with the members of the consortium*

The local offices of PwC in each of the ten countries studied (except France) have been contacted. Conference calls were organized with our correspondents in the local offices to present MEIF project.

#### *2.1.1.3 Contact list of main partners in the research*

For each country, we have identified different type of targets:

- ✓ First group: institutions that deal directly with water management, especially Ministries of Environment and Water Agencies,
- ✓ Second group: the governmental offices in charge of the national studies for economic and statistical issues. It includes mainly, the ministries of economics, infrastructure, and statistical offices,
- ✓ Third group: independent water experts, water associations, private water companies, universities and also research centres,
- ✓ Fourth group: contact points for the 5$^{th}$ Framework Programme.

### 2.1.2 Information and consultation of the identified institutions

The different tools of communication created were used to promote MEIF project in the different countries. All the identified contacts have been listed under countries thanks to an MS Access database. All these people were informed of the launch of the MEIF project and were invited to participate in this research project.

When necessary, specific conference calls were conducted by PwC with identified experts to ensure their participation in the MEIF project.

## *2.2 WP2: The factors determining investment needs*

### 2.2.1 Key objectives of WP2

The objectives of this work package were twofold: to identify the drivers for investment needs, in the water sector, in a given territory; and to propose a typology of territories as regards the key factors.

The hypothesis is that key factors depend on the type of territory under study. It is most likely that, given a set of factors, the weight of each factor depends on the features of each territory. For instance, in a rural region, with sensitive areas (such as costal areas), population growth will not have the same impact as in urban areas, with dense vertical housing.

### 2.2.2 Key variables (general features)

#### *2.2.2.1 Geographical, topographical features, and the climate*

- ✓ Area (km²) of the territory
- ✓ Nature of the soil, including permeability (limestone, argillaceous, other)
- ✓ Existence of sensitive areas (as defined by UWWTD 91/271/EEC, in % of the area)
- ✓ Hydrologic network

#### *2.2.2.2 Population and the economy*

- ✓ Million inhabitants and equivalent (for industrial uses)
- ✓ Age and revenue (as they determine consumption behaviour)
- ✓ Rate of population growth
- ✓ Permanent *vs.* seasonal inhabitants (%)
- ✓ Population density (inhabitants per km²)
- ✓ GDP/km² (indicates density, and financial resources)

#### *2.2.2.3 The organisation of territories*

The experience of water services shows that the extension of the water service across a larger territory allows for economies of scale, in particular as regards the number of water treatment plants (for both drinking and waste waters); investments are supported by a larger population and consumption.

France is a clear instance of this feature. Municipalities tend to join larger organisations at an intercommunal level, to mutualise equipments and investment. It has established that intercommunal services are more capital effective than

municipal ones: for a given level of production and of population, they require a lower level of investment than the addition of smaller services. In England and Wales, water services were organised at a larger level, so as to maximise capital efficiency.

#### *2.2.2.4 Quality of water resources*

- ✓ Nature of pollutions
- ✓ Distance between water resources, the first water treatment plant, and areas of consumption; it should take into account the declivity of the land (gravitational advantage)
- ✓ Sustainability of the resources (defined as the % of renewable water)

#### *2.2.2.5 Intensity and dispersion of rainfalls*

### 2.2.3 Key variables for drinking water investments

#### *2.2.3.1 Detailed network related features*

- ✓ The material used;
- ✓ The age of the network;
- ✓ Technical considerations; these include the nature and the quality of joints, and related features;
- ✓ Expected life span of the network (quality of the original material, geological nature of the soil, quality of the civil works)

#### *2.2.3.2 Synthetic network related features*

- ✓ % of population connected to public services
- ✓ % of lead pipes
- ✓ availability of reservoirs (impacts on cost and access to water resources)
- ✓ Opinion of a local expert on the rate of network that would need immediate repair

#### *2.2.3.3 Drivers for demand for drinking water*

- ✓ Technology,
- ✓ Demography (including the age of the population),
- ✓ Culture, as it defines water related behaviour. The wealth of the population (revenues) also impacts on the same features.

#### *2.2.3.4 Water abstraction*

- ✓ Global water abstraction (million m3)
- ✓ Ground water, spring and surface water withdrawal (million m3)
- ✓ Supply rate (%)

#### *2.2.3.5 Municipal water production and delivery*

- ✓ Production (million m3)
- ✓ Delivery (million m3)
- ✓ Losses (losses due to network, water distributed but not paid for)
- ✓ Consumption (l/day per head)
- ✓ Population metered

#### *2.2.3.6 Drinking water quality*

- ✓ Quality of drinking water
- ✓ Level of treatment of the drinking water treatment plants (% of total treatment flows, nature of treatment)

### 2.2.4 Key variables for waste water investments

#### *2.2.4.1 Urban organisation*

- ✓ Size of cities
- ✓ Rate of population connected to sewer systems
- ✓ Rate of population with autonomous waste water treatment

#### *2.2.4.2 Industrial waste water*

- ✓ Part of autonomous treatment

#### *2.2.4.3 Rain falls*

- ✓ Intensity of rain falls

#### *2.2.4.4 Synthetic network related features*

- ✓ Types of networks (combined *vs*. separate)
- ✓ Opinion of a local expert on the rate of network that would need immediate repair

#### *2.2.4.5 Level of treatments*

- ✓ Depollution rate
- ✓ Technologies in use
- ✓ Alternative treatments (industries and households, *lagunage*)
- ✓ Quality of final discharge

### 2.2.5 Proposal for a typology of territories

We propose to design a typology based on 5 variables.

#### *2.2.5.1 Overall water policy*

Most of the general water policy that applies to a particular territory is set by Directives at the European level. However, territories regard these directives in specific ways, that connect to local features. The following objectives should be considered as determining factors:

- ✓ As regards drinking water: the quality of service and the use of available resources
  - Rate of population connected to public service (up to 100%),
  - Consumption,
  - Quality of distributed water; the framework directive sets an overall target, but local administration may adapt it to local constraints and opportunities, and set particular objectives or deadlines.
- ✓ As regards waste water: rate of population connected to public service
  - Quality of the collected water,
  - Depollution rate and technologies used for treatment.

#### *2.2.5.2 Existence of sensitive areas*

This key driver impacts on water policy and generates a set of constraints that should be considered as priority.

#### *2.2.5.3 Quality of available resources*

Quality of water resources determines the level of treatment required to produce drinking water.

#### *2.2.5.4 Population density and economic development*

- ✓ The average number of inhabitants per km²;
- ✓ The dispersion around this average number (e.g. existence of a core city).

Population density and economic development have similar and additive impacts on such features as water consumption and the production of waste water, the cost of waste water treatment and depollution, the availability of financial resources.

#### *2.2.5.5 History of water services*

Our analysis and observations show that the pace of investment in networks and infrastructures follows a three-step history:

a) The early stage. The focus is on construction of the network and infrastructures. The main tasks to be undertaken include search for water resources, construction of water plants and of communal networks. At this stage, mutualisation across larger territories (such as intercommunality in France) reduces investment needs, since it facilitates concentration on fewer (but larger) equipments.

b) The extension stage. The focus is on connecting disperse housing and remote areas, since the bulk of the population is already connected to water services. It is also on the quality of the water that is produced and distributed.

c) The consolidation stage. Investment is directed towards the consolidation and interconnection of existing networks, and the search for alternative or secondary water resources. It is also on renewal, as the oldest parts of the network get old. Extension is related to economic growth and the location of new industries.

Note that such a sequence works well for drinking water. It is less relevant for the collection and treatment of wastewater, for which two modes of organisation prevail:

a) Either a linear approach, where investment follows a city by city approach;

b) Or a pollution approach, where specific issues are considered in turn, at a global level.

It follows that the history of the water services on a given territory partly defines the main objectives of water policies and the nature and extent of investment programmes. History also refers to the performance of the service and the infrastructure, at a given stage of development[1].

[1] The construction of a new water treatment plant can be postponed by a better maintenance of the network and a reduction of leakages

## *2.3 WP3: Knowledge base*

### 2.3.1 Task 1: Identification of the information sources

We identified and classified, on the basis of a critical approach, information from three main levels of sources: international sources (World Bank, Global Water Partnership), European sources (OECD, Eurostat, European Environment Agency, EBRD, EU and EIB) and national sources. At this stage, the data are based on the existing literature available until 30 June 2003.

### 2.3.2 Task 2: creation of a knowledge base

Knowledge basis produced has been orientated among 4 axes:

#### *2.3.2.1 Water management organisation: key actors, characterization of the territories and water laws*

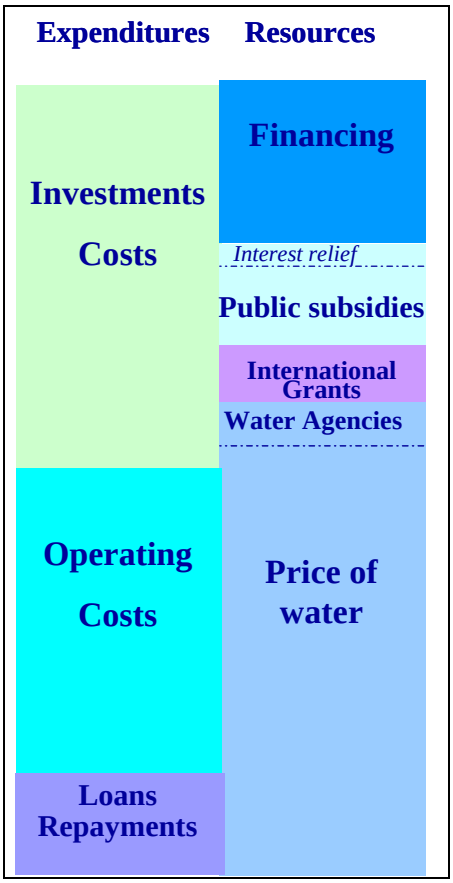
#### *2.3.2.2 Investments needs measured by water international and national actors in Europe*

#### *2.3.2.3 Water investments financing*

We used a methodological approach developed by Mr. Massarutto in his article "Pricing water – economics, environment and society. Conference proceedings, Sintra, September 1999".

The basic principle of the complete coverage of prices would imply the total (100%) recovery of water costs by each user in relation with the individual marginal cost of offer. In reality, the cost is financed according to different methods, from endogenous financing (100% by users) to exogenous financing (100% by next generation) through various intermediate stages of financing including local authorities, subsidies, etc.

An Expenditure / Resource table has been designed to explain how are financed the annual costs for water for each country. This table forms the framework of MEIF research regarding water financing aspects.




Nevertheless, the current analysis, already fraught with difficulties, of trying to identify and quantify the entire scope of source of financing for the water sector only gives a limited picture of reality as it is static and represents a single year. If a dynamic picture could be build, it is reasonable to envisage that the financing portion of the sources could be extremely variable, according to the rhythm of investment programs.

#### *2.3.2.4 Water prices: general principles and specific charges*

We analysed the principles set by each country to define the price of water services:

- Who sets the price,
- Based on which variables,
- Following which principles, or policy objectives.

We did not concentrate on price levels as such. Indeed, prices are subject to change periodically, in particular in countries where the institutional framework and price policies are not yet stabilised.

Price comparisons were made difficult by the differences in perimeters of water price in Europe. Does water price include the whole of the cost of the water supply chain or only that of potable water?

Moreover, we had to keep in mind that water bills do not cover all expenses linked to water use. A bill represents only the price paid by the user of collective water and wastewater services. General taxation for national, regional or departmental

services and assets, localities' aid to community investments, investments by communities and businesses in activities are to be added to obtain the total price of the bill.

## *2.4 WP4: Method of evaluation of investments needs*

### 2.4.1 Recall of the objectives

The objectives of this work package were to make investigations into the public institutions in the 10 targeted countries in order to :

- set an inventory of methods,
- identify the best practices,
- define the methodology bases leading to homogenous approaches and validating the different levels of assessment.

An final step was to design a classification guide, provide definition of the scope of equipment and settlements covered, and to prepare a reference guide of principles suitable methods.

### 2.4.2 Encountered difficulties

Before listing the main results, it is important to outline the main difficulties encountered in the identification and gathering phases.,

- ✓ Many countries, notably candidates countries, still are working on their assessment, for example for implementation of the UWWTD or DWD (waste water directive and drinking water directives respectively). The used methods are in this sense not well-defined, and insufficiently packaged to be clearly characterised.
- ✓ The key persons and key relays were difficult to identify at field level, more particularly if we wish to understand the mechanisms and the institutional chains linked to the methods.
- ✓ The scope of responsibility of different involved actors were not always so clearly outlined regarding the used methods.
- ✓ Some equipment are not well covered by needs assessment, especially rainwater infrastructure. The assessments of the industrial needs are for instance impossible to define, knowing that they arise from a private industrial logic, depending on unknown market evolution.
- ✓ The degrees of harmonisation and consolidation at the scale of a territory are not clear.

### 2.4.3 A non-exhaustive inventory of the processes, practices and methods

Around thirty specific processes have been identified in the ten targeted countries, and these ones appear clearer in the countries from northern Europe than in southern Europe, and sometimes exist in central Europe.

Our tables list every process following a first mode of characterisation, their scale of deployment, the perimeters of the concerned equipment, their detailed description, based on literature references and our interviews.

The advantages and drawbacks of each process are summarised in a matrix that shows the criteria of costs, rapidity, reliability, ease of implementation, number of involved actors, and finally, transparency of the process.

The prevailing method is based on:

- Existing quantitative data aggregation, more or less accurate in reality (length of networks, number of treatment plants, potential population serviced,…)
- Experts advice about technology and joint costs which are more or less precise and justified, with given ratios units (€/ M3 treated, €/Km installed, etc…).

The basic principles to undertake a good estimation are the following :

- Quantitative data of quality and updated, and well-extrapolated,
- Updated data about equipment and infrastructures patrimony
- Data about the real performances of the operating equipment
- Good relationship between technology uses and objectives to goal (cost efficiency, threshold value of treatment,…)
- Analysis of priority for needs,
- Economical basis of calculations of costs, justified and detailed,
- Coherent gross calculating at higher scales .

Case studies are presented to explain the methods and the encountered contexts (3 countries in Central Europe particularly). The following method go beyond the classic approach of expert advice combined with data aggregation.

- The FNDAE Method is described. It is used in France to identify the investments needs in rural area (equivalent of 40 millions of inhabitants of whom 25 million are non-permanent) ; it is supported by :
  - Consistency of the results at national scale. Financing means are organised at a national scale,
  - Inventory directions running for twenty years,
  - Field professional public actors which calculate the costs (DDAF) and have an intricate knowledge of the rural infrastructures patrimony,

- National patrimony method (named Geophen) which is based in France on :
  - An infrastructure inventory in 9 departments, step by step at field scale, characterising their age, the pipelines material, and investigations about the network states with the help of the operating utilities,
  - An extrapolation logic at a national scale for which there are obvious limits ( urban sector not well-appreciated in the study and criteria of renewing of the equipment subject to criticism).

- A Hungarian Method on the needs of individual waste water treatment equipment which relies on :
  - Statistical data about the characteristics of accommodation,
  - Minimal and maximal costs of implementation for autonomous waste water treatment systems,

– Average and estimated costs not explained

- Finally we can mention the Czech approach about the implementation of the UWWT and the DW directives which are based on feasibility studies done in the 12 regions of country by private consultants, with basic economic guidelines, and the Polish approach which is based on sanitation and sewerage works, on the assessment methods used by the Polish National Environmental Fund.

### 2.4.4 Classification and characterization of the "approaches" to carry out the assessment and develop the methods

Each logic / method detailed can be characterised by one or more approaches. We will try to propose a classification of these approaches, even if at this stage, the terminology used is still experimental and needs to be proven or tested.

#### *2.4.4.1 Macroscopic approaches*

Based on census carried out for equipment planning and for infrastructure needs according to precise and determined objectives, these approaches induce more or less high-quality data collection at the scale of an agglomeration.
Both the necessary level of details in terms of data (plans and land register, knowledge about flows, status of the environment, overall knowledge about existing or non existing infrastructures) and the calculation practice needed to convert the « need » into «cost » are going to determine the more or less macroscopic approach of the method. As it is difficult to evaluate the procedures really implemented on site (as in the case of application prepared for specific funds), we shall distinguish between:

- Approaches based on a funding logic (AM1)
- Approaches based on inventories as requested by the EC (AM2)
- Deductive statistical approaches / year by year (AM3)
- Global economic approaches (AM4).

**AM1** approaches are determined by the procedures used for setting up a funding application, which sometimes induce intrinsic specific calculation modes for specific equipment.

**AM2** approaches relate more to an equipment inventory in a works upgrade logic. The existence or not of such equipment in association with the number of concerned consumers put under discharge plants standards allows to calculate, on a given basis, investment needs.

**AM3** approaches result from yearly need identification practices within the framework of investment balances on a comparative basis with previously achieved balances, in which it decided whether investments related to certain areas are to be continued, increased or decreased according to «available funds».

**AM4** approaches are pragmatic and express basic economic needs (regional development and land planning including road system, networks implementation in the broad sense of the term, gas distribution or transport systems).

#### *2.4.4.2 Engineering approaches*

In each field, investment needs assessment intended for areas to be equipped with drinking water and waste water collection and treatment services may clearly be based upon engineering techniques, the latter integrating specific basic scientific factors used for calculation.
These techniques may vary from one country to the other according to the different « schools » and their influence in each country.
They can be classified as follows:

- *Approaches based upon feasibility studies according to a sample of agglomeration, taking into account* : **endogenous data** related to the local context, **combined data** for existing infrastructures as eventual re-use of works with subsequent planned rehabilitation, restoration with existing techniques (destructive or not, inner filling for water pipes or tanks), **exogenous data** related to the choice of processes adapted to the context, for example (type of sewage to be treated with technical local inspection or not, alternative techniques). These engineering approaches are selected either case by case (area by area, agglomeration by agglomeration,), or after some standard feasibility studies that became the basis of standard calculations. The latter are then transposed to other similar agglomerations in terms of application context (transposition of engineering method).

- *Approaches based upon services assessment and linked with advanced patrimony management techniques:* These methods are implemented on drinking water supply or waste water treatment networks, the management of which is controlled by well equipped services (whether public or private), and they are mostly based upon a good understanding of the services and upon measurements of the performance indicators of services.

This indicators evaluation results from an equipment renewal program as well from investment tasks that are, in this case, not induced by demand but are done according to planned objectives.

#### *2.4.4.3 Engineering approaches for large works:*

These approaches are not very that different from the previous ones, but they can nonetheless be distinguished by the fact that they result from studies related to different development scenarios concerning a region in which it is shown, for example, that new water resources will be necessary within the next decade or more.

- *Approaches characterised by a « tropism » called top down , bottom-up or « radiant » (market study for example).* The implementation of these approaches is triggered at a specific level of the actors' territory and may result from a national, local or even intermediate strategy, or they may even be private: market studies carried out by builders, equipment or pipe manufacturers,…

Above defined methodological approaches, whether of macroscopic or engineering type or whether implemented at one or another level of « tropism », are combined most of the time in order to reach the specific goals.

### 2.4.5 Characterisation of determinants associated to the evaluation methods

- Institutional Framework
- Finance organisation and their burden (state or local level)
- Key needs which drive the demand :
    - European standards, territorial development
    - Specific economic development, patrimonial approach
- Capacity level in:
    - Data gathering
    - Conception works
    - Economics
    - Inspection

An estimation chain based on 5 operational stages which have to be framed by special methods taken in charge by actors, harmoniously and with standard processes. Their field of responsibility need to be clearly defined, with precise rules (uncertainties linked to data values, level of quality, safety and sustainable criteria for equipment,…). The main stages are :

1 – Identification of needs

2 – Characterisation of needs

3 – Technology and costs

4 – Accountability

5 – National reporting and decision

### 2.4.6 Uncertainties factors on the methods and difficulties of harmonization

They are described in the report :

- Different technical standards in force (eq.hab,…)
- Different engineering practices country by country
- Quality, reliability and sustainability standards different for the networks and equipments
- Mastering of financial proposals by the public sector
- Annex costs calculated or not :
    - Monitoring
    - Inspection
    - Analysis of samples
    - … Sludge management ….

### 2.4.7 Applying of our investigation and inventory to our analysis grids

#### *2.4.7.1 In the European Union :*

- In Spain and Italy, the transparency is limited about the methods used; macroscopic view of experts and large works logic seem predominant.
- In Germany, engineering approaches and corporate body determine the methods, as well the patrimony management at the municipal scale.
- In Great Britain, the statistics of the regulator Ofwat are from unknown origin but give the bases for the references of costs; patrimony management is very heterogeneous at municipal scale.
- In France, national processes and methods were running in the last two years, but need to be more accurate. The Water Agencies facilitate the assessment of needs of investments partly, with their finance procedures.

#### *2.4.7.2 In the candidates countries :*

- In Hungary, the statistical reporting are of good quality and they have an intermediary agent (Professional syndicate), which is well-organised to regulate the methods and help the state actors ; nevertheless, the capacities and the inspection procedures at field scale are insufficient ,
- In the Czech Republic, macroscopical approach are based on studies done by private firms, and there is a lack of legibility at field scale ; we point also to heterogeneous methods due to various contractual arrangements.
- In Poland, The National Environment Fund determines the methods to simplify but no transparency exists really for the assessments.
- In Romania, the practices of feasibility studies and inventories are developed.

### 2.4.8 Improvement Guidelines

The assessment tools (diagnosis) we are trying to set up are paving the way for concrete improvement:

- Improved benchmarking between forecasted investment data at different national levels owing to the supply of national investment schedules together with consistent explanatory notes related to the methods used and based upon a coherent presentation following, for example, classification schemes and scheduling proposed in our study.
- Keep on using better based assessment procedures (logics) instead of focusing on too macroscopic « experts' system », avoiding the use of uniform national cost ratios that include important error margins and basing costs calculation upon homogenous sheets developed upon qualitative and professional procedures aiming at the technical choices.
- Aggregate at national level the numerous case studies based on local quality assessments of needs and costs, transfer all base documents into a database.

- Considering the amount of data to be gathered and the necessary intermediate standardisation, clearly define all stakeholders' functions, responsibilities and limits within the « assessment process ».
- Facilitate international sharing of practices, of calculation methods, of concrete procedures up to multiple testing of some clearly set up and written down methods in several countries.
- Improve the co-operation framework with the technical operators who are supplying figures, and brief building trades or site government representatives upon appropriate economics in order to make them better understand and manage the assessment procedures used by private stakeholders.
- Ensure that operators master the technique of development schemes they propose and that they take the site / implemented infrastructure data, etc… into account. Validate their technical choices.
- Rather promote « the method » and assessment quality than « hurry up » work implementation which can lead to erroneous results.
- Develop patrimonial culture within local communities through the intervention of operators acting as intermediate between the State and the « owners » of infrastructures, and have their functions clearly defined legally.

## 2.5 WP5: Financing strategies

### 2.5.1 Financing sources

#### 2.5.1.1 Grant and Subsidies (Local, National and International taxpayers)

Grant and subsidy money is the cheapest available source of finance for the water sector. However, one must make a clear distinction between National subsidies and international grants.

In order of priority, International grants should be considered to be cheapest available source of finance. However, International grants are generally linked to international solidarity and political decisions. They can therefore not be considered to be a reliable source of finance. In the case of the scope of this study, international grant finance has been designed to facilitate their preparation for EU accession. ISPA (Instrument for Structural Policies for Pre-Accession) is one of the three non-reimbursable financial instruments (with PHARE and SAPARD) designed by the EU. ISPA will finance, between 2000 and 2006, infrastructure projects in the field of transport and environment. The programme began on 1 January 2000 and operates in the 10 applicant countries of Central and Eastern Europe. Its objectives are, amongst others, to help beneficiary countries to catch up with EU environmental standards, especially in terms of water and sanitation and to familiarise them with policies and procedures of the EU Structural and Cohesion Funds.

Other international grants of interest are the Structural and Cohesion funds. Cohesion funds are specifically dedicated to environmental and transport investments (in the ten countries studied, only Spain qualifies for Cohesion funds) whereas Structural funds are more wide ranging.

The danger with Grant and Subsidies is that it could crowd out competing sources of finances that are not as competitive and eventually restrict access to other sources of capital in the medium to long term.

The ISPA program is tailored to fund a maximum of 75% of total project costs through EU grants, the rest being co-financed either by the national or local taxes, loans or grants from a third party

National subsidies come in two forms: national budget and dedicated environment funds. National subsidies are less attractive than international grants as they reduce the overall amount of finance available at the national level. They also tend to increase the level of public debt.

#### 2.5.1.2 Debt and Bonds

Financing instruments such as debt and bonds are obviously more expensive than pure grants or subsidies. Their cost will depend on risk perception and guarantees. This cost is therefore directly related to the perceived level of attractiveness of the country.

Loans can be obtained from a variety of financial institutions, the international financial institutions such as the EIB and EBRD tend to offer competitive rates and long term maturities compatible with the lifetime of investments in the water sector. IFI loans are often the only option available for less attractive countries however they have two major limitations. Firstly, such loans will be labelled in an international currency whereas the money raised to repay the loan will be in the local currency: there is therefore a currency risk resulting in an extra cost burden to the borrower. Secondly, strict conditions are generally attached to such loans. It is quite frequent that securing a loan from an international financial institution for a given operator eventually lead to its partial privatisation, as the lender needs to secure its repayments.

However, financing through specialised local commercial banks will not provide very long-term loans, as their deposits are not of sufficiently long maturities. They are generally unwilling to lend in such situations without guarantees from some state entity to cover their perceived risks or prefer to be involved with multilateral banks through *pari passu* loans. International commercial banks have shown, for the time being, a strong appetite for water projects.

Domestic capital markets represent an attractive source of financing for municipal water and sanitation infrastructure. Bond issues have long been an effective instrument for financing municipal infrastructure such as water and sanitation infrastructure. However, this financial instrument is not currently very developed.

#### *2.5.1.3 Equity*

Equity is an expensive option. It is directly linked to the participation of the private sector. England and Wales are the only two countries were equity is widely used. However, due to the constraints linked to equity, we witness an overall increase in debt to equity gearing ratios in England and Wales. Indeed due to the costly nature of equity, operators tend to favour debt over equity for their capital investment. However, one operator, United Utilities, faced with huge capital investment requirement has just launched a rights issue.

The use of equity in water infrastructure creates a paradox. It is widely believed that higher risks bring higher potential return on equity, however in the water sector it is the higher returns that can bring higher risks. High returns on equity or profits tend to be politically suspicious and raise the political risk of a given operation, as is often the case with concession type projects. The same can be said of the UK privatisation process. Very high rates of return on equity have been witnessed in the early years of the process as the regulator was coming to grips with setting up a tight monitoring and regulatory framework. However, since the latest price review of 1999, rate of return on equity in the UK water industry have been very low.

#### *2.5.1.4 Users charges (Tariff)*

The simplest source of finance for investment is to generate a surplus through water operations. This means raising income above the levels required just to pay for operating costs and debt service, so that there is extra cash that can be invested. Using cash in this way avoids, in theory, borrowing costs. However, water systems are so capital intensive that it would require large surpluses or very high tariff

levels to finance all investments out of operating surpluses. Borrowing money has the advantage of spreading the cost across a number of years.

The following table summarises the main characteristics of major financing sources, namely in terms of cost, availability, constraints and the level of control a national government has over such sources.

| | Cost | Availability | Constraints | Level of control |
|---|---|---|---|---|
| **International Grants** | Free | Good (ISPA, Cohesion and Structural funds) | Political decisions | None |
| **Surplus - Cash Flows** | Very Low | Limited (price) | Limited by price (regulation) | Limited by price (political and social acceptance) |
| **National Subsidies** | Free (but cost to the country*) | Limited | Budget deficit (macroeconomic balance) | Good |
| **National loans - bonds** | Medium | Good | Developped local capital market | Limited |
| **International loans - bonds** | High | Infinite ? | Attractiveness | Limited |
| **Equity** | Highest | Infinite ? | Attractiveness | Limited |

*on national budget, danger to long term attractiveness.

### 2.5.2 Financing strategies: combination of financing sources

A major issue surrounding financing strategies is the issue of cross-subsidies to finance water investments: how to mutualise investments and ensure national solidarity. Social solidarity is deeply entrenched in the historical heritage of most countries.

Apart from social cross-subsidies, which are now expressed at the European level through the various European funds and grants, made available to both disadvantaged European countries and Accession and candidates countries from Central and Eastern Europe, we also witness other mechanisms of cross-subsidies: through space (centralisation of services), through time (water funds, depreciation…) and through sectors (water and sanitation, households, industries, agriculture).

Most models are more a result of historical constraints rather than deliberate choice among a full range of existing options. However, accession and candidate countries can benefit from the full range of existing experiences to structure their financial strategies according to their needs and their constraints. Full cost recovery is a laudable principle from the Water Framework directive: it is however likely to remain a distant and long-term objective, especially from countries from Southern Europe and accession and candidate countries. However countries have to report on how they recover costs in the water sector.

#### *2.5.2.1 The unique UK model: equity and debt*

Following a privatisation process of both water operations and water infrastructure, England and Wales are now purely relying on debt and equity to finance water

related investments. The relative success of the privatisation model must not hide the fact that, before selling off the water operations and infrastructure to the private sector, the Government totally wrote off the debt of the pre-existing Regional Water Authorities and offered a "green dowry" to facilitate compliance with EU regulations. Both measures amount to about 10 billion euros of subsidies. However, subsidies and grants are no longer part of the equations.

The merits of this UK private model can be seen during the Price Review process held every five years which transparently sets out the costs and benefits of different investment scenarios and their financial impact, namely on prices. Especially, current uncertainties concerning the status of sewerage networks are a major concern

#### *2.5.2.2 The EU model:*

- ✓ Towards full cost recovery: France, Germany.

Within the EU, both France and Germany are close to achieving the full cost recovery for water and sanitation operations and investments. A marginal level of subsidies remains in both countries, mostly as an expression of solidarity between West and East in Germany and between different territories (mainly urban and rural) in France. Grants are no longer part of the equation.

France relies on delegated management, mostly through management contracts whereas Germany has a transversal approach. France historic preference for the private sector enabled to the sector to be freed from the accounting rules pertaining to public assets, especially in terms of depreciation, that are not necessarily compatible with a long term management of assets, especially in terms of renewal.

However, debates are raging, especially in France, about the impact of environmental compliance and the sustainability of the full cost recovery model. Major issues revolve around the investment needs in terms of sanitation and in terms of renewal costs.

- ✓ A reliance on the taxpayer model: Spain, Italy, Scotland and Northern Ireland.

Northern Ireland uses a full reliance on the taxpayer to finance its water operations and investment.

Spain and Italy, both from Southern Europe with constraints in terms of water quantity and availability and intensive use of water for agricultural uses rely heavily on the taxpayer to finance their investment. Regional water supply, used above for agricultural purposes remains in full public control whereas local distribution is mostly in private hands (especially in Spain). Both countries are still far from full cost recovery, mainly in the sewerage and sanitation sector.

Heavy reliance of subsidies and grants has undesirable consequences: a tendency to over-invest, limited management of water demand and a tendency to waste water

#### *2.5.2.3 The accession model*

We can distinguish two groups within the accession countries, according to their readiness for accession. The Czech Republic, Hungary and Poland are entering the

EU in May, have higher levels of income and have started diversifying their sources of finance for water investment: they form the first group.

Bulgaria and Romania are due to join the EU in 2007. They are still in the process of restructuring their water sector: they form the second group.

The first group has diversified its sources of finance with the creation of environmental funds. Hungary and the Czech Republic have shown eagerness to attract the private sector in their water sector. Poland is showing more suspicion towards private sector involvement. It may well be partly an unforeseen consequence of the ISPA programme. Poland may have chosen to make the best of international grants before involving the private sector. Experiences, notably in Romania, have shown that it is extremely difficult to combine ISPA funds with private sector participation.

Bulgaria and Romania are still relying on a mixture of user charges for a small part and taxpayer money to finance water investment. ISPA funds are also starting to finance mostly wastewater and sanitation infrastructure in both countries with the attached co financing from EBRD or EIB. The private sector is also getting involved in both countries with a few high level concessions having been awarded in recent years.

#### *2.5.2.4 A decision tree for financing*

✓ General issues

Currently, the decision tree for financing investment is severely limited by constraints. Choices tend to be extremely limited. For the purpose of analysis within the scope of this study, we will try to present a simple graphical model to illustrate the financing strategy. It should prove an interesting decision tree, opening new opportunities for water finance.

The current analysis, already fraught with difficulties, of trying to identify and quantify the entire scope of source of financing for the water sector only gives a limited picture of reality as it is static and represents a single year. If a dynamic picture could be build, it is reasonable to envisage that the financing portion of the sources could be extremely variable, according to the rhythm of investment programs.

The finance aspect is nonetheless essential. Indeed, local governments do not have annual cash surpluses large enough to pay for the entire cost of water projects. They therefore face a choice: accumulate savings until they are able for the entire capital investment or borrow to finance all or part of the project.

In order to simplify and clarify the model, we can regroup sources of finance into three broad categories: water price (user charges), grants and subsidies (international, national or local taxpayer) and debt instruments (loans, bonds, and equity, considered as quasi-debt for the sake of clarity). Considering our analysis of water financing structure and strategy of ten European countries, we observe that none of the three sources act as a single adjustment variable but rather that the three variables are all interconnected. They are also linked to external key variables exposed in the countries presentation (overall national income, country's attractiveness…): we shall however present the interaction between the three

financing sources as a first step. In a second step, we will look at the possibility to expand the respective sources.

✓ Interactions between financing sources

In an emerging or accession country, it is most likely that income per capital will remain low in the short to medium term and that financial markets will have a limited development. As a result, the financing portion is likely to be low, due to limited attractiveness. Income per capital will be the limiting factor capping both user charges and national subsidies. Decision regarding the financing structure is therefore limited between taxes and water price.

Until countries reach a certain level of income, water price will be capped by the limited income of households. However in trying to develop a sustainable cost recovery policy, decision makers should try to keep prices as high as possible.

In order to break the under-investment circle described above, apart from economic growth which will increase national income, only international solidarity in the form of international grants can be applied at an initial stage to increase the investment capacity. Loans will not be readily available, not so much because of the lack of income, but because attractiveness will be insufficient to attract the necessary capital. Long-term loans could ease the financial burden in the early years when income is still low but because of perceived risk and low income, financial attractiveness is insufficient to attract such loans.

International grants being the only likely option at that stage, one must consider how to maximise the benefits of this grant money. Grant money being cheap, it will not necessarily be used in the most effective way. That very grant money could be used to leverage extra capital through credit enhancement programs (partial guarantees, bond pooling structures, revolving fund, bond insurance…)

✓ How to improve the availability of different financing sources?

What are the constraints needed to increase the availability of different financing sources? International grants are based on political decision. In our study, all identified grants came from the EU to enable accession countries to catch up in terms of infrastructure endowment with their richer future partners of the EU. It is a clear expression of solidarity between the EU and its would-be members. Therefore international grants will tend to decrease over time. In the case of Italy and Spain, beneficiaries of EU structural or cohesion funds, we notice that such funds have not financed water and sanitation projects since 2001.

In terms of national subsidies, the issue remains political but can be managed at the national level, so full control over the level of subsidies remains sovereign, the only constraints being the overall state budget and the priority given to water and sanitation within the budget. In terms of subsidies the choice is largely political: it is arbitration between the taxpayer and the water user to pay for water investment. Countries from southern Europe such as Spain and Italy make extensive use of subsidies in order to finance the water and sanitation investments. This is because of relative water scarcity and important regional disparities in infrastructure and income calling for national solidarity.

We now come back to issue of debt instruments such as loans and bonds. Equity remains a marginal instrument so we will treat it as quasi debt for the sake of

analysis. The availability of loans and bonds is directly linked to the overall financial attractiveness of the country. External variables are the key elements to increase the availability of debt instruments: namely a sound legal and regulatory framework. As briefly mentioned previously, carefully designed use of national subsidies can enhance the overall attractiveness and increase the availability of debt instruments.

Price remains in most cases the final adjustment variable. If investments are completed in the time schedule required by the EU Directives, price should at least cover operating costs; the remaining can then be used to finance capital investment. Just as national subsidies, the national level of income limits price. However, water price is also constrained by other factors such as the public perception of water as a public good. We can see that even in rich countries such as the UK, water prices cannot rise indefinitely, due to users complaints.

✓ Further issues.

At the current stage, we have identified broad financial strategies for the ten countries studies. There is neither an ideal financial strategy nor true choices for financial strategies. Financial strategies have to be designed within a framework of constraints.

The quality of sources has been the focus of our analysis up to now. But financing strategy is also decided according to the amount of capital you invest in the national water sector every year. There is huge per capita difference between the 111 millions € spend annually on water investment in Bulgaria and the 5 billion € spend annually in England and Wales.

Finally, one should consider the leverage that can be drawn from policy measures acting on external key variables to engage in a self-strengthening circle of water financing. Carefully designed policies and financial instruments could open up the possibilities and the decision making tree available to the different countries. The establishment of targeted environmental funds is a step in the right direction.

### 2.5.3 Financial attractiveness restricts financial strategies: a typology of territories.

#### *2.5.3.1 The UK: the attraction of regulation.*

The United-Kingdom has contrasted results in terms of attractiveness. Its regulation authority is both a source of insurance for investors and the capital markets but its latest price review of 1999 has considerably eroded profitability and made the country less attractive, although profitability is probably more in line with risk level than it used to be. This eroded profitability may also partly explain the shift of financing sources from equity to debt.

#### *2.5.3.2 The other EU countries: a heterogeneous group.*

Apart from Italy, which is still currently in a long process of restructuring its water sector, the other countries are considered to have stable and fair legal and regulatory framework. Competition is an issue in both France and Germany as competition is considered “for the market” rather than “in the market”. Complex

institutional and financial arrangements in both countries also limit their attractiveness.

Spain is considered relatively attractive and has recently seen a number of innovative financial schemes based on the "canon de mejora" principle (a specific user charge specifically created to repay loans).

Due to huge needs in terms of new investments, both Spain and Italy should become coveted markets in the medium term.

#### *2.5.3.3 Accession and candidate countries*

The Czech Republic and Hungary are comparatively more attractive than the rest of the group.

Poland's case is mostly linked to the political reservations about the private sector involvement in water services in the country and the lack of regulation. An official tariff system is still being drafted and no legal framework for water services provision exists at present. Water consumption is very high and tariff hikes are likely to be an issue in the future. Poland is considered an attractive market in the medium due to the size of the market and the infrastructure backlog.

Romania and Bulgaria stand at the bottom of the league. Most stakeholders do not have a lot of knowledge on these two countries and this fact illustrates their limited interest. In terms of municipal risk, both countries still rely heavily on transfers from the central government to fund the municipal budgets. Moreover, operating risk is an issue as the infrastructure is lacklustre.

Romania, often compared to Bulgaria, is considered a more attractive country. The overall legal framework in Romania is quite developed although its implementation remains an issue. There is a national economic regulator of public services but its proposed secondary legislation on water services is being put into question by a number of observers. Political commitment is considered sufficient and Romania already enjoys a small number of PPP in the water sector, notably in the capital, Bucharest where a full concession is being run by a subsidiary of Veolia Water. Water consumption, the ability to raise tariffs and the state of infrastructure are the main issues.

Bulgaria, apart from a troubled concession in its capital, Sofia, must still deal with a highly centralised water services organisation, which hinders operations and involvement by the private sector. Furthermore, municipalities are considered not to have a sufficient budget discipline as they are nearly fully funded by transfers from the national budget.

#### *2.5.3.4 At the national level: urban, peri-urban and rural areas*

Although our focus was mainly on urban water and sanitation investments, our study enabled us to draw some general considerations on intra-national attractiveness. In order of declining attractiveness we have large urban areas, medium urban areas and small urban areas, peri-urban areas and rural areas.

If we consider private sector involvement, the latter tends to limit itself to large urban areas such as national or regional capitals in its involvement. Small and medium sized cities (roughly below 250 000 inhabitants) are considered "no go"

areas. The main issue appears to be the question of economy of scale and lower disposable income in smaller urban centres.

Attractiveness can be improved by pooling smaller municipalities, even together with rural areas. It is the centralisation option of the England and Wales model or the “intercommunality syndicate” model of France.

#### *2.5.3.5 The attractiveness of projects*

Beyond country attractiveness and general financial strategy, investment is eventually closely related to specific projects. Prior to seeking finance, an essential step is to identify commercially viable projects for they attract investors. Careful project design is based on a situation analysis which reviews population and economic trends, municipal finances and projected service gaps. These gaps are translated into projects, assessed in terms of costs and benefits as well as lending terms and pricing mechanisms. Project identification and feasibility analysis calculates the rate of return on the investment by analysing the costs and revenues of the project; looks at pricing and cost recovery issues. It should also assess institutional arrangements and presents options for mitigation of related risks and adverse factors.

## *2.6 WP6: Towards a prospective analysis of water prices*

In this chapter, we attempt to draw the threads together: how do investment needs, financing strategies and water prices intertwine ? Is the price an adjustment variable, which is used to meet investment needs, in the context of a given financing strategy ?

The research suggests that the answer depends on the following variables:

- The pricing policy implemented in a specific country. This policy relates to a general objective and a price structure;
- The relative weight of tariffs in the cost recovery equation;
- The economic and social features of each territory (such as the wealth of the population and the ability to pay for the service).

It follows that prospective scenarios on water pricing have to be designed on a geographic basis, taking into account various levels of territorial organization.

The report investigates the pricing policy of the ten countries, and the respects such policies pay to EU core principles. It tries to estimate the relative weight of water prices, although such an endeavour could not be thoroughly achieved in the context of the study, since existing data is far too scarce.

Here we draw attention on the typology of territories that we were able to derive from the above analyses. We reflect on the way EU core principles are implemented. Finally, we pinpoint some connections between the financing strategy and water pricing, and suggest incentives for virtuous dynamics.

### 2.6.1 A typology of territories

The country reviews point at some features of the territories which account for a major part of the discrepancies between the way the variables (investment needs, financing strategies and, water pricing) are intertwined.

Here, some of these features are highlighted, as they appear to contribute to the prospective scenarios on the future evolutions of the economics of water. Some of the selected items cohere with the elements for a preliminary typology elaborated in WP2.

At this stage, all these variables are still assumptions. They should be individually tested, their independence should be assessed; the cartography of the territories they design is still to be made.

Here, we provide a short definition of each variable and of how it impacts prospective scenarios.

#### *2.6.1.1 External features*

✓ Population and economic density

We already stated that these dimensions determine the wealth of the territory. It is related to the capacity to pay; it might relate to the capacity to attract financial resources as well (an hypothesis that still has to be tested).

✓ Homogeneity of the territory

Geographical, population, and economic features determine the way investment needs spread across the territory. In turn, this is related to opportunities for cross subsidies. Germany, which copes with the former East-West separation, and other countries with strong contrast between big cities and rural areas, illustrate this feature, and the cross subsidies dynamics it generates.

#### *2.6.1.2 Institutional issues*

✓ Quality of the regulatory framework

The commitment to the core principles that define water economics takes place among the factors which determine which variable will be considered as primary. Moreover, a thorough policy of resource management and prevention brings rigour and coherence to the whole water cycle. The Czech Republic illustrates such a commitment, with the consequences on the arbitrage regarding the institutional organisation of territories and services.

✓ Institutional organisation of territories and services

Country reviews (Italy, Hungary) suggest that when the water industry is fragmented in a large number of services, and when the institutional organisation allows for decisions to be made closer to the population (France, Poland), compliance to the regulatory requirements seems to fade out.

This is even more typical when financial resources are scarce, since such an institutional organisation impairs the ability of public decision makers to adjust water prices or work programmes to investment needs.

✓ The separation of ownership from exploitation

Whether the operating company is separated from the owner of the infrastructure is consequential in a number of ways. In particular, it loosens the burden of covering capital costs by operation revenues, a charge that seems to exceed what a water service can offer in the long run. The French and Hungarian examples suggest that such an organisation fosters recovery of operating costs; however, it may loosen the constraint on delays for the implementation of regulatory framework.

#### *2.6.1.3 Management and operation*

✓ Stage in the lifecycle of the infrastructure

WP2 has established that investment needs are related to where the infrastructure stands in its lifecycle. This again has a impact on the way investment needs might be covered by water related revenues, and how attractive a project might be for a financial investor.

✓ Existence of incentives to anticipate future expenses and to cover them

The case of France has confirmed that such incentives impact on the level of water prices (see 2.4.3. above) and on the system's capacity to generate revenues to cover (or at least to contribute to) the financing of the programme.

✓ Quality of current management of services

It is obvious to say that poor management leaves room for improvement. Indeed, it is likely that poor management inflates investment needs (poor performance of the network, illustrated by leakages); it also restrains customers' willingness to pay.

Whereas, as the English case exemplifies, quality enhancement might lower investment needs, increase the willingness to pay, thus narrowing the gap between financial needs and resources.

Bulgaria illustrates this situation where quality enhancement might generate huge opportunities for a better service and a sound economy of water, thus generating to opportunities to articulate investment needs, financing strategies, and affordable water prices.

This situation might pave the way to an increase recourse to public-private partnerships, with renewed modes of intervention of the central regulator (where it exists). The past history of France shows that concession, as a mode of contracting, develop during cycles of heavy investments.

This, in turn, confirms that the ability of territories to attract private investments in all water related matters (drinking, waste, rain and sludge) is a crucial feature. This question, again, refers to the amount of trust vested by the final consumer in the water services, which determines the propensity to pay the right price for the service, and the sustainability of this willingness.

### 2.6.2 The implementation of EU core principles

Tariffs and pricing are financial tools. They are means that dictate and manage demand as well. Thus water prices should allow to cover operating charges, long term marginal costs, and the economic costs related to an increasingly scarce resource.

In theory, the structure of water prices can rely on a variety of bases, including the volume of consumption. Prices can either be proportionate to this volume, or adopt a binomial structure (that includes some other variable, such as the size of the household, for instance). The binomial structure might have discrete levels, if rates change depending on the level of consumption.

The latter structure is most appropriate to resource management policies, although the regular household might find it opaque and hard to manage. It presumes that consumption can be metered. Thus metering is some sort of implicit arbitrage in favour of a resource oriented water policy. It should be noted that metering is unevenly implemented across Europe.

Accordingly, economic theory vows for water prices that rely on two components, as seen above.

The EU has set two basic principles that apply to water prices:

- ✓ Prices should be linked to the quantity of water used and of pollution rejected (polluter pays principle);
- ✓ Each user should pay for the costs that result from its use, including environmental costs and resource related costs (cost recovery principle).

Based on these principles, prices can be used as incentives towards more reflected modes of water consumption and pollution.

#### *2.6.2.1 Polluter pays principle*

It is fair to say that the 10 countries under study comply with the "polluter pays" principle, at least for water. All countries have favoured the generalisation of meters for both domestic and business consumptions. A small number of endeavours in that direction has still to produce their full scale effects, but all countries are moving in the right direction. It should be noted that this direction was likely to trigger related difficulties, such as the consumers willingness to pay.

In this regard, the picture is getting broadly in line with the EU objectives.

The situation is more unequal as regards to wastewater. This is so for a number of reasons. Among the main reason lies a technical difficulty to measure discharged water and the level of contaminants in it. In some territories, the relatively low level of consumers connected to collective sewerage infrastructures makes it even more difficult to control discharge in the natural environment.

#### *2.6.2.2 Cost recovery principle*

The principle is advocated to be at the heart of all national economic schemes related to water and wastewater services. Indeed, its salience is noticeable in various ways. One particular point is that cross subsidies tend to diminish. Another one is that it is widely accepted that water revenues should cover operating costs.

However, the implementation of the principle remains unequal. In a general and too rapid way, very few countries have managed to implement it in all its dimensions.

England and France might range at the right end of the continuum. However, some observers express doubt on the reality of this picture.

On the one hand, the English model has shown its limits:

- ✓ The scheme suffers important exceptions, in the "cost pass through" logic, which prevent new regulation to be efficient;
- ✓ There are questions on the sustainability of the effort made by water companies, some of which being concerned about the general trend affecting their market value;
- ✓ The system has financed noticeable achievements focused on the earlier stage of the water cycle, but it has failed to provide for revenues in line with the overall needs for investment.

On the other hand, in France,

- ✓ The territorial organisation hinders the impact of the cost recovery principle, since a large number of smaller municipalities do not have to comply;
- ✓ A noticeable part of the communities have failed to pay due respect to the deadlines set for implementation of various European Directives. As a consequence, legal action is being taken by the EU against the French State, although local government agencies should be made accountable.

At the other end of the continuum, one finds countries which were unable to cope with investment charges within the limit of the water economy. No country whatsoever has ever financed network and infrastructure reconstruction without having recourse to external founds, such as the State or local budgets. This was true for older infrastructures (like the ones in France), this remains for newer ones.

Thus, two questions remain, which the implementation of the cost recovery principle triggers:

- ✓ What is the exact perimeter to which the principle applies ? Some costs obviously stay out of the realm of the principle (such as investments in water transport in Spain); others are clearly accepted as being within this realm (operation costs of existing systems). The question remains about a large grey zone; for instance, there is no clear-cut definition of how maintenance should be part between investment and operation; this is more clearly stated when ownership and operating involve different agents.
- ✓ How should cross subsidies be defined and to what extend should they be avoided ? *We* understand that the Framework Directive does not aim at abolishing cross subsidies, but at making them obvious: who pays what ? Is this interpretation is correct, than the various levels of cross subsidisation should be carefully defined and analysed: across consumers and tax payers, across customers types (business and domestic, rich and poor, etc.), across territories within a national perimeter (rural and urban areas, rich and poor), across countries within Europe, etc.

### 2.6.3 Financing strategies and water prices

One set of variables directly relates financing strategies to water prices: cross subsidies across services, across territories, and across time.

#### *2.6.3.1 Cross subsidies across services of different natures*

Cross subsidies across services of different natures contradicts the full cost recovery principle. However, some boundaries between water related investments and other domains are unclear, and remain matters of interpretation; this is so for some staff charges, some costs related to civil works or administrative tasks, and some financial charges (when loans are contracted on a general basis) of the structures that own or operate water and wastewater services.

This is obviously so for rain water, where no separate network exists, for instance. This is also the case for the transport of raw water, as in Spain. In such cases, some water related costs might be financed by a general budget, at local or State level.

#### *2.6.3.2 Cross subsidies across territories*

Cross subsidies across territories is another direction. It was particularly developed in France, where the initial number of municipalities (36,000) had fostered a multiplication of small scale services, which were unable to gather the necessary resources to finance water related investments. The development of intercity structures tends to go with an increase in the level of investment. A recent survey by the *Observatoire des finances locales* shows that investment increases by 30% the first year (when such structures are created), and by 7% the second year.

The development of intercity services has revealed the pros of this sort of cross subsidies. Among them, one notices a higher level of professionalisation, that includes the collection and management of financial resources, and the implementation of investment programs that comply with EU regulation.

#### *2.6.3.3 Cross subsidies across time*

Cross subsidies across time can be defined as the ability to anticipate future investments and to incorporate them in the current price for the service. It should be recalled that water prices in Germany cover past costs and expenses[2], where, in other countries like England and France, it tends to generate resources for future investments.

The case of France suggests that public and private operators perform differently in this regard. In a recent reference paper, BIPE has shown why privately operated water services were more likely to anticipate and to make sure that current prices provide for the financing of forthcoming investments. Some publicly operated services certainly can compete with this ability. However, most of the municipalities that operate their own water services are more likely to underestimate future investments, and, consequently, to set prices that do not match with the long term economics of the service, and that fail to generate the adequate resources to finance actual investments.

Where necessary, the State, as a central regulator, could certainly devise incentives that would invite service operators to increase their performance in this regard. This would be a relevant and proper manner to improve the performance of water related services, without taking part in the public *versus* private debate.

[2] The system allows for an annual profit, that provides resources for future investments and forbids decapitalisation of water services; however, this opportunity is not always exploited by the *Stadtwerke*.

# 3 Research avenues

The analyses above have pointed to some research avenues that seem both relevant and timely. MEIF has stressed that the lack of reliable and up-to-date information constitutes a severe drawback to the development of common knowledge and the making of sound decisions.

In the section below, some of the research avenues identified all throughout the project are sketched, in order to help the Commission to reflect on past experience and to devise the nature of the data and the expertise it wishes to produce.

## *3.1 Consistency of investment scope*

Currently, we observe a great variety in the scope of investments taken into account to calculate gross figures at the national level. For instance, raw water management and water transfer infrastructure is generally not included in investment figures. The Spanish Hydrological Plan is an illustrative case: the investments planned are not included within the investment figures for the water and sanitation sector, as most of the water will be used for agricultural and irrigation purposes. However, if we consider that 10 or 20% of the transferred water will eventually be used for human consumption, shouldn't 10 to 20% of the total investment be included in investment plan ?

It would therefore be very useful to develop a nomenclature of investments in the water sector in order to facilitate accounting and consolidation. Major categories would be:

- ✓ raw water management and water transfers
- ✓ potable water
- ✓ Sanitation
- ✓ Rain and storm waters.

The nomenclature should also provide guidelines on quality and technological levels.

In terms of nomenclature, an important issue also revolves around renewal charges: which should be accounted as investment charges, and which should be considered as operating costs? When the responsibility for infrastructure and for operation and maintenance are separated, as in many delegated management contracts, the issue is generally clarified contractually.

Such a nomenclature would facilitate the collection of data and enable international comparisons. It would also highlight the variety of investment needs according to different types of territories (arid to humid territories) and political choices (quality and safety levels: e.g. water storage infrastructure).

## *3.2 Setting up a water observatory*

The MEIF project has collected a great wealth of valuable information at the scale of 5 European countries and 5 accession and candidate countries. Providing a thorough picture at a given stage in time, this information is likely to become outdated very quickly and to lose its usefulness.

The creation of an independent water observatory would help to preserve the momentum initiated by the MEIF project. Its main purposes would be:

- ✓ The tracking and collection of data on water management (institutional features and key contacts), investment, financing and prices.
- ✓ The identification and dissemination of practices in terms of:
    - ✓ regulatory environment
    - ✓ investment assessments
    - ✓ financial planning
    - ✓ private sector participation
    - ✓ technological improvement
    - ✓ the monitoring of the system performances (from an economic, ecologic and social perspective).

## *3.3 Reconciling micro and macro level approaches to investment assessment*

Different countries adopt different methodologies in order to assess investment needs. All too often, such methods are disconnected from one another and very difficult to reconcile. In order to improve the consistency of reconciliation between macro top-down approaches and micro bottom-up approaches, the following tasks should be undertaken:

At the macro top-down level, to define assessment guidelines based on standard data collection:

- ✓ Quantitative indicators of water uses (potential subscribers in the past, present and future for instance) and of corresponding volumes to be produced and managed
- ✓ State of the environment (relief, discharge environment, soils, traffics…), global state of infrastructure, percentage of areas subject to specific environmental constraints…
- ✓ Type of technology used for extension and rehabilitation and their respective costs, separating standard unit costs for materials, plants, equipment, workforce, landscaping and so forth. Develop reliability assessment according to different technological choices (availability, lifespan...)
- ✓ Reconciliation between existing statistical data and required quantitative information for proper assessments.

At the micro level :

- ✓ Undertake virtual feasibility "case studies" on concrete cases with a presentation of technical and financial choices but also a presentation of the global state of the case study (environmental indicators, infrastructure quality…)
- ✓ Comparison of detailed feasability studies conducted on similar cases to determine variation and uncompressible contingencies and common needs.

At the meso level

- ✓ Qualify the studied territory inside a sub-grid until one reaches a consistent assessment
- ✓ Transfer assessment values collected at the micro level to target areas within the grid for which feasibility studies will not be conducted but offer similar configurations
- ✓ Eventually recalculate standard cost variation on specific investments to validate geographical extrapolation
- ✓ When extrapolating investments costs, bear in mind uncertainties in costs and justify such uncertainties (quality of raw water, specific soils…)

In the end, stakeholders at the meso level will be equipped with statistical, technical, environmental and economic tools that will enable justifiable extrapolation from the micro to the macro level with a clear knowledge of

uncertainty level according to specific territorial traits. In the end one should be able to unravel the “magic wand” effect that currently exists when extrapolating micro data to the macro level.

## *3.4 Investigating method to identify financing sources*

WP5 showed that the analysis with an Expenditure/Resource chart was relevant and raised a significant interest among water experts in the different countries studied. Nevertheless, at the moment, this analysis might only be partial and inaccurate in some countries because relevant and/or consolidated data do not exist.

Therefore, in the future, it would be interesting to draw a coherent framework of analysis for the water financing in Europe. The case of France might be seen as a reference. Indeed, France has recently reformed the way of calculating water investments. IFEN (French Institute for the Environment) has worked during three years to reform the methodological approach of water accounts, through an approach based both on supply and demand. The result was a conciliation between water companies and municipalities investments data at the national level. This has also permitted IFEN to evaluate the corresponding resources (price of water and public subsidies).

This kind of approach could be lead in other European countries even if the historical and institutional background plays a crucial role in this kind of work. It would also be necessary to define a precise scope for water investments in order to have coherent figures from a country to another.

As a consequence, we find appropriate to build this kind of methodological tool in a specific country, even region. This research project could be imagined in a country that has not already developed its own reporting tools for water investments. It will aim at designing an Expenditure/Resource table for this region and would permit to draw a methodological approach that might be adapted to other countries.

This kind of project would match with some of the main objectives for the European Union regarding water financing:

- ✓ In the Water Framework Directive, a description of the application of the water cost recovery principle among the different economic agents is needed. Such an economic analysis has to be done thanks to the analysis of financial flows in each country. The spread of an Expenditure/Resource analysis in European countries would be very helpful in this case,

- ✓ It would enable the different countries to optimise the planning of their future investments and also to have a concrete idea of the ways to finance it in the future. This type of analysis will allow the countries to better use public subsidies each year.

## 3.5 Measures to increase national attractiveness

As we have seen during the MEIF study, a country's financial attractiveness towards financial institutions and water multinational operators is a key element in diversifying financing sources, decreasing the cost of capital and offering more opportunities in terms of financing strategies.

Attractiveness could be improved in a number of ways. One could explore, for instance:

- ✓ The development of new legislative and regulatory frameworks,
- ✓ The clarification of institutional arrangements in the water sector,
- ✓ The improvement of municipal finance (credit enhancement program),
- ✓ The use of international and national subsidies as financial leverage to maximise attractiveness.

It is essential to identify, for each country, an array of measures likely to improve attractiveness and to build upon existing best practices, may they be at project level and to devise ways of replicating them at a larger scale.

In terms of legislative, regulatory and institutional framework, the impact of the following elements on national attractiveness should be further analysed and weighted.

Government organisation must be streamlined to facilitate coordination of policies and approvals and to clarify roles and responsibilities with respect to investments.

Legal impediments to private participation must be removed: the most important regard the private ownership and operation of public services and the possibility of foreign investment in infrastructure.

Property and land-use rights must be clearly stated and safeguarded.

Competition law and policy is also a key element, especially if state enterprises have monopoly status.

Finally all provisions regarding business operation (currency exchange, tax benefits…) should create obstacles to private involvement.

Beyond the framework itself, all rights under the law must be properly enforced.

Municipal finance can be improved by technical assistance in accounting, capital planning, cash flow projections and project design, implementation and management. Municipalities learn to work with constraints, match revenues to expenditures.

Innovative financial instruments should be explored at the national level to overcome the constraints. Such instruments could be:

- ✓ partial sovereign guarantees,
- ✓ intergovernmental payment intercepts (ex: budget transfers from national to local government can be pledged and intercepted to repay loans),

- ✓ set up intermediary financial institutions for small borrowers (bond banks, bond pools, revolving loan funds and municipal lending institutions).

## *3.6 Development of a prospective methodology for financing needs and their structure*

As the preliminary results have shown, it is currently very difficult to provide clear guidance on prospective financial scenarios for water investment. This is because none of the three key variables of MEIF (investment, financing and price) stands out as the defining or the adjustment variable. Investments are largely determined by the supply of finance, itself conditioned by pricing policy.

However for planning purposes, especially financial planning, it is still essential to design medium to long term financing strategies. An estimate of water investment needs and current financial structure of the water sector should enable the determination of financing gaps. Below are the four main financing gaps likely to occur:

- ✓ total financing deficit: total expenditure need exceeds the total supply of finance. There is a gap between investment target and available financing,
- ✓ Cost recovery deficit: operations and maintenance expenditure are not covered by the supply of finance from user charges. Going a step further, operations and maintenance expenditure and re-investment expenditure are not cover by the supply of finance from user charges,
- ✓ Re-investment deficit: total supply of finance does not cover the operations and maintenance and re-investment needs. A maintenance backlog is then likely to occur, jeopardising the sustainability of the existing infrastructure,
- ✓ Investment expenditure: a likely deficit: the supply of finance targeted for capital expenditure is insufficient to cover the investment needs for renovation, upgrading and extension of the infrastructure.

Once the financing gap is identified, a baseline scenario can be build to address them through a combination of three measures:

- ✓ cost savings through efficiency improvements (network efficiency, collection rates),
- ✓ increased supply of finance,
- ✓ decreased investment ambitions (this may not be possible in the context of EU directives, however, the compliance calendar can be slackened to accommodate the gaps).

Increased supply of finance will be the key element. However, one must bear in mind that increased user charges are probably the most realistic and sustainable option in the long run (anyway user charges will have to pay back the loans contracted out for the investment program).

Public sources of finances are also likely to play an essential role in leveraging financing for capital investments. Public funds remain essential for social provision of water. However, public sources should be used as efficiently as possible, strategically targeted at investments likely to improve efficiency or bundled to leverage other financing sources (as guarantees, co-financing…).

International financial institutions will also have a key role, as essential suppliers of long-term finance.

In a number of countries, where attractiveness is still questionable, the private sector is unlikely to engage in capital investment but still has a key role to play in improving the overall efficiency of the sector.

## 3.7 Typology of territories

Private sector participation generally occurs earliest in a country's large metropolitan areas, those with populations of at least half a million. Yet smaller municipalities have just as much need for better water and sanitation services and can also benefit from private participation. But their financial, economic, institutional, and technical conditions present difficult problems. A private contractor will often find it harder to make sufficient returns on its investments in small networks unless it operates many in the same region. The generally lower average household income in smaller towns makes it more difficult for families to pay tariffs that cover costs and yield a reasonable return. And smaller systems offer fewer opportunities to exploit economies of scale, making it harder for the private sector to reduce operating costs and achieve operating efficiencies. The relatively limited administrative skills and institutional capacity in many smaller municipalities also pose a problem for private sector participation. Small municipalities generally lack the personnel to bid, award, and negotiate contracts for private sector participation and to supervise them after they are awarded. Local officials and their staff will need assistance from higher-level government agencies in preparing for a private sector project.

There are several ways to tackle these problems. Several smaller towns can be grouped into a single service area large enough to provide the economies necessary to attract private investment while keeping tariffs affordable (see the section above on financial viability). Officials from neighbouring towns can collaborate on a private sector project and create a single administrative entity responsible for implementing a contract. The national government can help smaller cities by supplying standardized advisory services, financial models, and contractual documents—an approach most likely to be feasible if private sector participation has already been implemented in one or more larger cities. The documents should serve as aids rather than inflexible guidelines, able to be tailored to meet the needs of each locality.

Access to financial markets is often cost effective only for large municipalities. In order to cater for the needs of the vast number of small and medium sized cities, pooling arrangements should be developed at the national or regional level. Bond banks can issue bonds under its name and use the bond proceeds to purchase debt obligations of municipalities. They provide smaller towns lacking the financial expertise and credit history to go to the financial markets on their own. Repayments for the pool and not a single municipality reassure bondholders, thereby spreading their risk. Furthermore, because of economies of scale (spreading rating fees, advisory fees, legal fees…), the cost of capital is reduced.

## *3.8 Opportunities for mutual funding, in the water industry in Europe*

MEIF has investigated the relationship between three variables that are the investment need, the financial strategy and the water prices. At the core of this triangle lies the value of the asset and the financial capital that were invested in this capital-intensive industry.

WP5 and 6 have confirmed that the capacity of a territory (be it a country, a river basin, or a city) to attract private capital (be it domestic or foreign) relieves some of the burden of the financial equation and offers better opportunities to match investment needs and water prices. One criterion here is the capacity of the industry, or of particular contracts, to reward the financial resources mobilized in the investment programme.

The picture looks quite different if the asset does not have to be rewarded, or if the level of reward is kept low. The current financial situation of the two leaders in the water industry, and its consequences on their commercial approach, confirms that a reflection ought to take place about the status of financial assets of water services. Analyses cohere and suggest that the current model of water economics advocated by the World Bank and other institutions, which rely on the injection of private capital in the industry, is at stake.

Mutual property, as it has been discussed in the case of England and Wales, or public ownership, as in the case of France, might be interesting avenues to be considered to relieve the burden of additional return on investment, for a capital-intensive industry, in countries facing severe financial problems.

The exploration of this avenue digs deep into the roots of water economics:

- ✓ What statuses and legal options should be envisaged to transfer assets to mutual funds? A legal review would be necessary. Comparative analysis across countries, and across services would be a strong input;

- ✓ How do “community saving funds” develop? Some financial institutions have taken initiatives to support the development of such funds. What are the prospects of growth of financial resources vested in these tools? Under what conditions could they be used in the water industry?

An in depth inquiry into these hypotheses should rely on a multidisciplinary approach, targeting the same issue from different and perspectives (law, economy, finance, and management).

## *3.9 Analysis of water demand elasticity to water prices*

On one hand, WP5 in particular has confirmed that water prices remain a major input of financial strategies.

On the other hand, customers' willingness and ability to pay their bills obviously are a financial resource that lies at the core of the water economics. Moreover, it is related to the trust that consumers vest in the service provided to them; hence. WP6 has established that, under certain circumstances, price adjustments are necessary to meet investment programmes under severe financial constraints.

It follows that a key variable for both policy and industry matters is the maximum level of price customers are ready to pay, for water services.

This certainly is a tricky issue. Indeed, variables are connected in complex ways:

- ✓ The willingness to pay depends on the quality of the service and the trust vested in it by the consumer;
- ✓ It also depends on the education the customers has been exposed to, to grasp the economics of the service; institutional communication and public opinion, at both national and local levels, then relevant;
- ✓ The answer should probably be devised for different types of customers (business vs. domestic, urban vs. rural, etc.);
- ✓ Price increases are consequential for water uses, and the arbitrage between uses; the relation between the variables depend on the availability of alternative sources of water or service organisations (for collection and treatment of wastewater, for instance);
- ✓ For the price to be a tool of resource management and allocation, bills have to be based (at least partially) on consumption, which presumes that consumption is measured;
- ✓ How are the additional revenues derived from price increases divided among beneficiaries?

To address this question, it might be useful to have recourse to a variety of method, that include statistical research, econometrics and modelling, surveys. The consequences for policy making would certainly be of most interest, at Community, national and local levels.

# 4 Overall synthesis

MEIF started with a general dissatisfaction about the availability and reliability of data on financing needs to meet the investments required in the water services (drinking and waste water, for households and industry customers) in Europe.

The Framework Directive, again, stresses that more accurate information is needed to account for the economics of water, and to engage towards a sustainable management of this very specific resource.

Thus, the research was organised as follows:

First, to identify the investments needed to meet the EU requirements and the quality standards that European citizens opted for. Since this information is not available, one cautious step forward was to identify and to compare the methods used to assess such needs. MEIF has highlighted the great variety of methods implemented in various countries; it has pinpointed best practices that deserve scrutiny and set a agenda to improve methodological soundness and coherence across EU countries.

Second, to reflect on the financing strategies that would allow to meet the investment needs identified above. MEIF has shown that countries have access to a variety of financing sources. However, we encountered a limited number of financing strategies. With the notable exception of England, these strategies are generally unable to attract the necessary resources in the water sector in the EU countries. It does not follow that the English model should apply everywhere. However, the project insists that the capacity to attract necessary resources requires new financing strategies, based, for instance, on an analysis of the availability of alternative resources, such as mutual funds.

Third, to see how financing strategies impact water prices, for a given set of investment. The analysis of price structures and tariffs across Europe has confirmed that the EU principles defined to set water prices are acknowledged as core features of pricing policies, even though the full cost recovery principle is subject to a variety of interpretation. Now, it does not follow that price is the adjustment variable. Indeed, the analysis shows that the adjustment variable depends on the territory. MEIF has managed to define types of territories, where either the price, or the investment need is the adjustment variable: in some cases, water prices are so constrained that it is more likely that the investment programme is cut down, or postponed.

The consortium hopes that the EU and its partners will find in these preliminary results materials to reflect further on the economics of water services in Europe, and to consider accompanying measures that are adapted to the specific situations of each territory. Research avenues are sketched, to explore more deeply these domains, and to define more clearly an agenda for a sound monitoring and regulation system of the water sector in the mid term. In that sense, MEIF opens innovative paths to improve the social, technical, and economic performance of water services in Europe.