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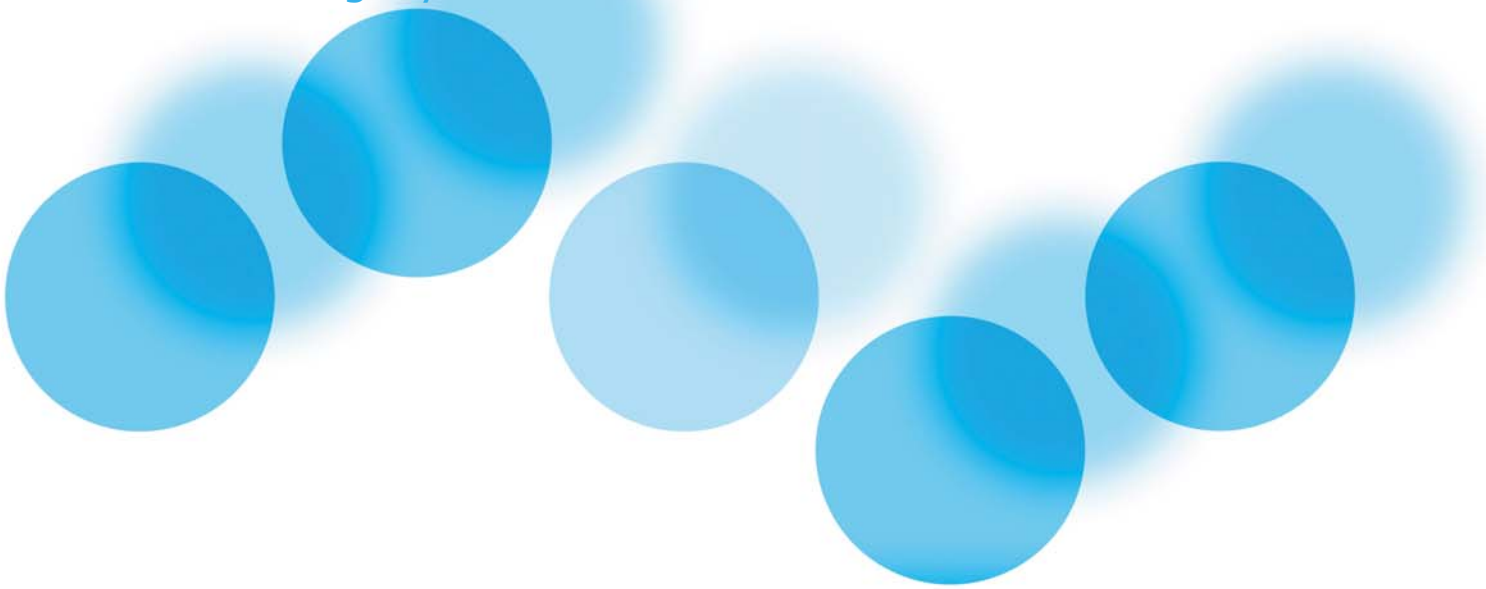
# ASSESSMENT AND DEVELOPMENT OF MUNICIPAL WATER AND WASTEWATER TARIFFS AND EFFLUENT CHARGES IN THE DANUBE RIVER BASIN.

## Volume 2: Country-Specific Issues and Proposed Tariff and Charge Reforms: Hungary – National Profile



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## PREFACE

The Danube Regional Project (DRP) consists of several components and numerous activities, one of which was "Assessment and Development of Municipal Water and Wastewater Tariffs and Effluent Charges in the Danube River Basin" (A grouping of activities 1.6 and 1.7 of Project Component 1). This work often took the shorthand name "Tariffs and Effluent Charges Project" and Phase I of this work was undertaken by a team of country, regional, and international consultants. Phase I of the UNDP/GEF DRP ended in mid-2004 and many of the results of Phase I the Tariffs and Effluent Charges Project are reported in two volumes.

Volume 1 is entitled *An Overview of Tariff and Effluent Charge Reform Issues and Proposals*. Volume 1 builds on all other project outputs. It reviews the methodology and tools developed and applied by the Project team; introduces some of the economic theory and international experience germane to design and performance of tariffs and charges; describes general conditions, tariff regimes, and effluent charges currently applicable to municipal water and wastewater systems in the region; and describes and develops in a structured way a initial series of tariff, effluent charge and related institutional reform proposals.

Volume 2 is entitled *Country-Specific Issues and Proposed Tariff and Charge Reforms*. It consists of country reports for each of the seven countries examined most extensively by our project. Each country report, in turn, consists of three documents: a case study, a national profile, and a brief introduction and summary document. The principle author(s) of the seven country reports were the country consultants of the Project Team.

The authors of the Volume 2 components prepared these documents in 2003 and early 2004. The documents are as up to date as the authors could make them, usually including some discussion of anticipated changes or legislation under development. Still, the reader should be advised that an extended review process may have meant that new data are now available and some of the institutional detail pertaining to a specific country or case study community may now be out of date.

All documents in electronic version – Volume 1 and Volume 2 - may be read or printed from the DRP web site (www.undp-drp.org), from the page Activities / Policies / Tariffs and Charges / Final Reports Phase 1.

We want to thank the authors of these country-specific documents for their professional care and personal devotion to the Tariffs and Effluent Charges Project. It has been a pleasure to work with, and learn from, them throughout the course of the Project.

One purpose of the Tariffs and Effluent Charges Project was to promote a structured discussion that would encourage further consideration, testing, and adoption of various tariff and effluent charge reform proposals. As leaders and coordinators of the Project, the interested reader is welcome to contact either of us with questions or suggestions regarding the discussion and proposals included in either volume of the Project reports. We will forward questions or issues better addressed by the authors of these country-specific documents directly to them.

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# List of Acronyms

KvVM - Ministry of Environment and Water Management

Earlier names:KöViM - Ministry of Transport and Water Management

KHVM - Ministry of Transport, Telecommunication and Water Management

KöM - Ministry of Environment

TF - Regional Environmental Inspectorates

KTFF - Chief Environmental Inspectorate

PDWS - Public Drinking Water Supply

VCsOSzSz - National Professional Association of Water and Sewerage Companies .

OVF - National Water Authority

KSH - Hungarian Central Statistical Office

MWWU- Municipal Water and Wastewater Unit

MU – Management Unit

OU – Operating Unit

# Introduction

This report is, first of all, a compilation of information and data[1] that describing the institutions and conditions that shape and characterize the provision of municipal water and wastewater service in Hungary[2]. The purpose of this compilation is to provide background and inspiration for proposals to reform both the current system of water and wastewater tariffs and effluent charges and coincident proposals to adjust or modify the legal and regulatory system within which these tariffs and effluent charges function in Hungary. Indeed, some chapters include brief analyses suggesting such reforms and Chapter 8 concludes this report with preliminary proposals for reforms in the institutional setting and design of these tariffs and charges. The aim of the these proposals is to improve the management of water and wastewater resources used in the municipalities of Hungary generally and, including protection of water resources from nutrient loading and toxic substance originating from municipal systems.

Since 1970 the structure of the water and sewerage sector in Hungary has been changed dramatically. In the 70's the Hungarian waterworks were organised in 33 state-owned companies.

In 1990 the *ownership* of the majority of water and sewerage infrastructure has been passed to the local governments. The transformation of companies owned by the state and the local councils has begun. In 1991 and 1992 the 33 water companies were replaced by five regional and a vast number of local companies held by the new local governments or theirs groups. This process resulted in an extremely *fragmented structure*. By the end of 2001 altogether 369 companies supplied drinking water and/or sewerage services in Hungary[3].

In the past decade the water consumption (and therefore wastewater emission) decreased significantly due to the economic transition. The transition involved transformation of the industry, closure of some of the great water user factories and fall of the GDP. Increasing service prices and relatively low incomes resulted in the drop of water usage of the households.

The drinking water provision in the country reached a level that is reasonable economically and is available in almost every settlement (99.7 per cent), but it differs heavily by water quality (see section 6.4.1) and settlement type. Situation/provision of settlements with less than 15,000 inhabitants is the least satisfying, 11-12 per cent of the population within these municipalities has no connection to *piped* drinking water, but within distance of 150 m have access to pipe stands.

The level of sewerage lags far behind that of piped drinking water. According to the data of 1993, 43 per cent of the population was connected to the public sewerage system, 10 per cent owned appropriate sewage solutions without drainage, 21 per cent solved it inefficiently, and 26 per cent lived in areas without drainage [Somlyódy 2000]. Due to investments during the 1990's, wastewater services became available for 48 per cent of the households in 1998, and 53 percent in 2001, although the possibility for immediate connection is available for another 9 per cent. If one takes into account the settlements, the picture is darker because only one third participates in public sewage services. This shows that mainly the densely populated settlements, bigger towns and cities are canalised.

The gap between the level of drinking water and sewage service in Hungary is one of the greatest within OECD countries, where this difference almost doesn't exist.

The EU accession process has resulted not only in new pieces of legislation (see 2.1), but in expensive - and sometimes neither thought over, nor justified – investments.

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[1] *The collection of information was closed in November 2003.*

[2] *for a list of the main regulatory units and their abbreviations, see 6*

[3] *130 of these only produces and distributes water, 53 have interests only in sewerage services and 194 are engaged in both activities. 190 companies out of the 369 are operating only at one settlement.*

# 1 Legal and Institutional Setting

## 1.1 Laws Governing Provision of Service

### 1.1.1 Common Provision

The Act LXV/1990 on local governments defines the drinking water provision and sewerage as a task of the local governments. Paragraph 8(4) set the provision of drinking water as an obligatory task that implies, in this case, per capita grant from the central government budget in order to fulfil it. According to Paragraph 8(1) sewerage services, general water management (outside of drinking water supply) and rainfall drainage *(vízrendezés és a csapadékvíz elvezetés)* was up to the decision of municipalities[4]. The latter became obligatory with Act LXXI/2001 amending Water Management Act LVII/1995. The LVII/1995 Act deals with the main aspects of water management, such as state assignments concerning waters and related infrastructure, conditions of operating state property, rights of water authority and establishment of water management associations *(vízgazdálkodási társulatok)* aiming at treating inland water damages.

Act LXXXVII/1990 on tariff elaboration amended by Act CIV /1993 and its modifications[5] declared that local governments have the right to set the prices of drinking water, wastewater collection, treatment and disposal if services originate from a municipality owned facility, otherwise[6] the minister in charge of water management can set these prices. As a private company is only allowed to buy a minority share in water and wastewater companies, other (than public) ownership forms have no conflict with this Act. The LXXXVII/1990 Act contains the main principles upon which water and wastewater service pricing should be based.

43/1999 (XII.26) Decree of Ministry of Transport, Telecommunication and Water Management (KHVM) on the calculation of water resource fee (*vízkészletjárulék*) oblige water users defined in LVII/1995 Act to pay a fee for extraction of water. The amount of the fee can be obtained by multiplying a basic fee (defined in another decree) with the volume of water and with 2 modifying factors (for details see section 6.3.1.1). One factor changes with type of the water resource and the features of the given area. The other represents the measurability of water use.

On one hand 47/1999 (XII.28) Decree of KHVM sets the highest tariffs of water and wastewater services provided by state-owned facilities for households (Annex 1 of the Decree). On the other hand, it defines tariffs for public service providers for water circulated because of safety reason through pipes that connect different networks (Annex 2 of the Decree). This decree prescribes the quantity of water to calculate flat rate consumption for residential and recreational areas without meter. Tariffs are supervised annually; current ones can be found in 34/2000 (XII.21) Decree of Ministry of Transport and Water Management (KöViM).

38/1995 (IV.5) Government Decree on drinking water provision and wastewater service defines the public service obligations. This decree gives the right for the notary to order connection to utilities if sanitation, environmental or water management regulation is offended. On the contrary in the case of

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[4] *The Assembly decided on how and to what extent the municipality should accomplish optional tasks defined not exhaustively in Par. 8(1) after taking into account the needs of inhabitants and the financial situation of the municipality.*

[5] *Modifications refer to 47/1999 (XII.28) Decree of KHVM and to other decrees that it repealed, like the 1/1995 (I.31), 27/1995 (XII.29) and 28/1998 (XII.23) Decrees of KHVM. All concerns tariffs to be paid for water and wastewater services provided by state-owned facilities.*

[6] *See 47/1999 (XII.28) Decree of KHVM and its amendments.*

non-payment water provision can be limited (or even ceased if water is used in production process) to an extent where needs of human life, sanitation[7] and disaster prevention are met.

According to the 72/1996 (V.22) Gov. Decree on exercising water authority rights, permission of (municipality) notary is needed a) to make landing-stages in river basins and in the water territory of public water works *(közcélú vízilétesítmény vízterületén)*, and for households to establish and use with less than 500 cubic meter annual capacity b) to establish individual wastewater disposal or c) to make a well. Otherwise the competence is with the 12 Water Authorities.

In 2001 and 2002 several decrees were issued and the LVII/1995 Act on Water Management was modified as part of the legal harmonisation process with the EU.

50/2001 (IV.23) Gov. Decree sets the conditions for use of wastewater sludge in the agriculture.

201/2001 (X.25) Gov. Decree on the quality requirements of drinking water transposes the requisites of the 98/83/EC directive into the Hungarian regulation. This decree gives the schedule of the national Program aiming to improve drinking water quality. The most urgent task is to lower the arsenic, fluoride etc. concentration of drinking water. Only 58 per cent of the Hungarian population lives in a settlement where the quality of drinking water satisfies the European standards.

203/2001 (X.26) Gov. Decree deals with the quality of surface waters and the conditions of emitting wastewater into surface waters. (It introduced the so-called "p.e.[8]" (population equivalent) measurement unit unknown before in the Hungarian legislation.) According to the decree, everyone discharging more than 15 cubic meter of wastewater a day and wastewater containing dangerous materials is subject to self-monitoring – results should be transmitted to the competent authority. Paragraph 21 updates threshold limits of the 3/1984. (II. 7.) provision of the National Water Authority on wastewater fine. Wastewater fine is imposed (see more in 6.3.1.3) for non-compliance with concentration and quantity in the effluent wastewater. The effluent standards measure 80 elements of pollution and toxic substances (including heat). If emission limit values should be met till 31st December 2010 at the latest for existing facilities with 3 exceptions[9].

204/2001 (X.26) Gov. Decree on sewerage fine updates threshold limits of the 4/1984. (II. 7.) provision of the National Water Authority on sewerage fine (see more in 6.3.1.3). The decree objects to pay for discharging wastewater or fluid waste to the sewerage system with concentration above a set of standards for 32 pollutants. The threshold limits for the same pollutant can vary according to the local environmental sensitivity of different areas. The quantity of wastewater emitted should be measured by the subjects of this decree and also needs to be approved by the authorities. Self-control is obligatory if wastewater emission exceeds 80 cubic meters a day or when it comes from leather, chemical industry or from oil and metal processing.

6/2002 (XI.5) Decree of the Ministry of Environment and Water Management (KvVM) about the environmental standards and control of surface waters for drinking water abstraction and for fish habitats. Paragraph 4 says that the competent environmental inspectorate will classify surface drinking water resources till 1st January 2004 according to treatment methods[10] depending on 40 water quality

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[7] *At least 50 liter of water a day per capita should be available within 150 meters so that sanitary conditions are fulfilled in the case of a building not higher than four floor.*

[8] *An inhabitant is equal to 1 p.e. (population equivalent) which means an emission of 60g BOD5 per capita a day. BOD5 indicates the biological oxygen demand: its amount to break down biochemically organic materials in the water in 5 days.*

[9] *Exceptions: a) for settlements with p.e. above 10 000, located in sensitive areas, the days of grace last till 31st December 2008 for wastewater treatment facilities in those agglomerations, b) for settlements with p.e. below 15000 p.e. till 31st December 2015, and c) for emitters subject to the integrated environmental permitting process 31st December 2007.*

[10] *Treatment methods classes are a1) simple physical treatment and disinfection, a2) normal physical treatment, chemical treatment and disinfection , a3) intensive physical and chemical treatment and disinfection.*

characteristics[11]. The minimal annual frequency of water quality control is set in the 3rd Annex of the decree, nevertheless the competent authority can take into account measurements of the service providers who have to transmit their results.

The frequency of water quality control measurements changes by the number of population concerned, treatment methods and quality characteristics. Below 30,000 inhabitants the minimum frequency of control is 2 per year with one exception where it is 3. Between 30,000 and 100,000 inhabitants the number of annual controls increases only in the first group of characteristics quality (the easiest to measure), above 100,000 inhabitants the highest value is 12 for the aforementioned quality class. It is questionable whether it is enough to meter twice the concentration of even the dangerous chemical substances like chrome, lead etc.

21/2002 (IV.25) Decree of KöViM on the operating of waterworks sets the conditions on how to operate drinking- and wastewater facilities such as the regular control of quality and the required qualification of personnel.

25/2002 (II.27) Gov. Decree on the National program for implementing wastewater collection and treatment (National Wastewater Program). It defines the time schedule to meet the obligation to construct sewage systems with the adequate treatment for according to the area sensitivity and p.e.value.

26/2002 (II.27) Gov. Decree on defining agglomerations in connection with the National Wastewater Program "Sewage agglomerations" are the planning units of the National Wastewater Program. Above 2000p.e.., sewage agglomerations are designated by a national list. Settlements whose p.e. is less than 2000, can join together and form a sewage agglomeration[12] if they fulfil the technical and economical requirements set in annexes therefore the implementation of their sewage treatment can be included in the National Wastewater Program.

27/2002 (II.27) Gov. Decree on record keeping and obligation of reporting in connection with National Wastewater Program. Data transmission is required from a) municipality notaries to the notary of the sewage agglomeration and b) operators of waterworks to the municipality notary and to the notary of the sewage agglomeration and c) anyone investing in wastewater collection, treatment and disposal to the notary of the sewage agglomeration. In the next step the notary of the sewage agglomeration has to forward the data to the Regional Bureau of the State Budget *(Területi Államháztartási Hivatal*) and then they will be aggregated at the National Water Authority.

***Reporting requirements***

Service providers and water users whose activity requires permission of the Regional Water Authorities are both obliged to self-reporting based on the following pieces of regulation.

203/2002 (X.26) Gov. Decree on the quality of surface waters ordain that everyone discharging more than 15 cubic meter of wastewater a day and wastewater containing dangerous materials is subject to self-monitoring – results should be transmitted to competent authority.

27/2002 (II.27) Gov. Decree on record keeping and obligation of reporting in connection with National Wastewater Program. See above.

7/2002 (III.1) Decree of KöM on measure, control, data provision of used and wastewater effluent and the special rules of water pollution fine. The decree defines the pieces of information that have to be included in the annual summary report of the data describing the wastewater emission of those who are subject to self-monitoring.

(See 6.2 for details on data collection and activity permitting)

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[11] *Quality characteristics are grouped into 3 classes by sampling and measuring frequency.*

[12] *The center of agglomeration is the settlement where the wastewater treatment installments or the final wastewater disposal facility is situated*

Information reported by service providers and other statistical data on the Hungarian water sector are available in aggregated form from the three following sources:

- The **Hungarian Central Statistical Office** (KSH) collects and publishes in the general statistical yearbooks basic data on drinking water and sewerage service provision for households and on the public infrastructure for these services.

  Data on household expenditures on water and sewerage charges relative to net income are also available from household budget surveys, based on a sample of households (KSH publishes results of the regular household budget surveys annually). Environmental data and related fine revenues are published in the Environmental Statistical Data yearbook.

- The most important source of statistical data is a yearbook of the water sector (Vízgazdálkodási adatok) published by the **National Water Authority** (OVF). This yearbook is accessible in public libraries. It contains detailed data on water production and consumption, but provides no information on prices and balance sheets of the water companies. The basis of the yearbook is data collected from the notaries of the sewage agglomeration through the Regional Bureaus of the State Budget, as described above.

- Data on the regulated *prices* (drinking water and sewerage) and other information on the individual companies are available from the **National Professional Association of Water and Sewerage Companies**' Yearbook (VCsOSzSz). In 2002 the association had 96 members (out of the 369 companies), however these companies produce and distribute 95% of drinking water and have about 90% share in sewerage services [VCsOSzSz 2002].

Other information is available only on an irregular basis from publications and personal communication with experts in the field.

### 1.1.2 Self service

Big industrial companies produce (industrial) water for their own. Their extraction of (ground)water exceeds the 500 $m^3$/annum quantity therefore needs permission of the competent Regional Water Authority. The Authority observes the plans, gives the final permission of operation and collects the water abstraction fee (see 6.3.1.1). Below the mentioned limit the municipal notary can permit any water abstraction activity.

Section 2.3.1 and Table 2 presents data on the industrial users' production and Table 3 on consumption, Table 11 gives a full picture of water cycle, Table 7 about Water users Public Drinking Water Supply (PDWS) user.

For the sewage treatment capacity of the industry see Table 7.

The population uses its own, self-made shallow wells. Previously these wells provided drinking water, but the contamination of shallow ground water made the construction of pipe network necessary. The wells are recently used to gardening, because the quality of the water allows less and less to be used for drinking and bathing. Meanwhile increasing water prices result in opening new (legal and illegal) wells. The interconnection of the two systems – public drinking water supply and self-supply - is prohibited because of considerable health risks. Just to widen the picture, there are examples where these old wells were used to load sewage into.

Sewage collection is solved by individual facilities to a great extent. Only 10 per cent of the population owns appropriate sewage storing technology without drainage, 21 per cent solved it inefficiently. These not properly built individual facilities pollute the ground water because they leak and increase its nutrient content. In some cases the water of these tanks are used for gardening as well.

## 1.2 Management Units

### 1.2.1 Administrative Units

Act LXV/1990 on local governments, Act LXXXVII/1990 on tariff elaboration, Act XVI/1991 on concession Act XXXIII/1991 on the handing over of state-owned assets into the property of local governments and Act LVII on water management along with 1997/CXLIV Act on Companies set up the framework of operation of waterworks and organisational system of water and wastewater services.

The responsibility for administering (drinking- and wastewater) service within its territorial boundary is delegated to the Assembly of the given local government. It decides on the institutional structure (legal form) of the service that is consistent with Company Law.

The whole system of water- and wastewater service consists of management units (for a detailed description see 5.1) that hold together several operating units (see 1.2.2 and chapter 4 together with Table 24 and 4.1-4.5) that reach final consumers with the help of transport and pipe networks (4.3 and 4.4).

Management units show a great variety of size and ownership structure as well. Service providers are sharply divided, only 6 per cent of the firms (24) serves districts with more than 100 thousand inhabitants, but at the same time these units serve 75 percent of the population. If there is sewage service in the service area usually both services are provided by the same firm[13]. In chapter 5, Table 22 shows the distribution of management units by types and Table 23 illustrates their fragmented structure with number of municipalities served by 1 company. The big providers are the state owned regional providers, the waterworks of the main cities and the remaining parts of the county based waterworks of the previous management system.

Service provision by an operating company can take several forms:

**The owner is the operator:** A company is owned exclusively or in majority by one or more local governments The company absorbed the whole or a part of the public infrastructure into the company, which means that the company is the owner of the infrastructure. Some interpretations of the legal requirements concerning the public ownership of the public infrastructure would not allow this form, thus this solution, though still exists, becomes less common. In case of state owned companies the owner rights are exercised by the KvVM and the infrastructure is given to companies with trustee contract.

**Owner owns part of the operator:** A company only operates the public infrastructure on the basis of a contract with the owners (usually the local governments). The companies pay for renting the infrastructure from the owners. Local governments are allowed to outsource the service without a tender if they own at least majority share in the company. The company can be newly founded for this purpose or can be a previously existing one as well. A private enterprise may take part in either the foundation of the operating company, or buy a share of the operating enterprise when and if sold by the local government.

**The owner and the operator are different:** A company only operating the public infrastructure on the basis of a concession contract with the owners (usually the local governments). The companies pay for renting the infrastructure from the owners. If companies compete in the tenders, state or local government share in the companies are not required. This form in present practice is only an exception.

**A unit of the local government operates the public infrastructure** (the owner is the local government). These organisations are not formally enacted, but units within the general government. This form is relatively frequent only among the smallest water companies. There is no publicly available data collected on this organisational option since these units are rarely members of the waterworks' association [MAKK 2000].

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[13] *The only exception among the large waterworks is Budapest.*

The distribution of network ownership and operation patterns is discussed in Chapter 6.

### 1.2.2 Operating Units

Operating units are the basic elements of water service provision supplying usually one settlement under the direction of a management unit that work in a smaller territory (pl. kistérség). The structure of these facilities reflects the characteristics of management units such as their fragmented structure. While Table 1 shows the great number of different drinking water facilities[14], chapter 4 provides more detailed information about them. Table 24 represents their distribution by type of ownership and operator.

**Table 1 Facilities of Drinking Water Provision**

| Drinking water facilities | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|
| Facility of water production | 1836 | 1854 | 1852 | 1858 |
| treatment | 798 | 813 | 828 | 846 |
| transporter[15] | 886 | 884 | 884 | 896 |
| distributor | 3306 | 3338 | 3347 | 3356 |

*Source: OVF, p.78*

## 1.3 Service User

### 1.3.1 Classification of Water Users

In general, the following classes of water users can be distinguished:

households

others (public institutions, small business and industry).

public drinking water supply (PDWS) user

water user

**1. Households**

Household (residential) users can be put into the same category as the other users like public institutions and small business and small industry. It is because their water consumption is similar just like the quality of the emitted wastewater. However, the two classes differ as far as the pricing system is concerned. See in detail in chapter 7.2.

**2. Industry**

Water companies also supply water for industrial users but in this segment their role is not dominant.

3. PDWS and Water User

The law defines two consumer statuses of the large water users: water user and PDWS user. The difference between them is the source, which they obtain the water from.

- More than half of the water used by industries is produced by the users themselves.

[14] *The number of facilities can be compared with the fact that there are about 3200 municipalities in Hungary.*

[15] *Transport facilities take the water from the place of production or treatment to place of consumption. They do not join directly either regional network of pipes or pipes that lead to consumers.*

"*Water user"* is who undertakes an activity that requires *water use license, which* are the following:

- to build, reconstruct or eliminate water facilities,
- for water abstraction activity from any surface water body or
- from groundwater more than 500 cubic meter per annum.

- A *„public drinking water supply user (PDWS)"* is one who uses more than 10,000 cubic meters per annum of water from the public drinking water supply for its own business purposes.

  A special, rather exceptional type of PDWS user is an entity, which buys water under drinking water quality from the water companies.

  These industrial customers usually pay a charge different than that of household consumers and in certain cases pay an additional abstraction charge. (See more on this issue in part 3.1 and 6.3.1.1)

### 1.3.2 Classification of Sewage Service Users

Regarding *sewerage*, industrial users can be divided into categories similar to water use, that is whether they

- treat sewage themselves (see Table 7 about their wastewater production) or
- use the services of water companies.

  In this case factories with larger emission can install an initial treatment phase for filtering the wastewater in order to reduce the possible extra fines. See Table 11 about wastewater given to public waterworks for treatment and industrial wastewater without treatment.

## 1.4 Regulatory Units

### 1.4.1 Environmental Regulation

**The Ministry of Environment and Water Management** (KvVM) is the chief (environmental) regulatory body of the water sector. Under his direction the **National Water Authority** (OVF) and the 12 **Regional Water Authorities** (organised by river basins) under OVF exercise authority rights over the sector and share duties with the **Chief Environmental Inspectorate** (KTFF) and the 12 **Regional Environmental Inspectorates** (TF) (organised by river basins). The Public Health Authority has also significant role in regulation of drinking water quality. Its county units exercise health authority rights in practice. For details on regulatory bodies, see Chapter 6.

### 1.4.2 Economic Regulation

After 1990 not only the ownership, but also regulatory responsibilities have also shifted from the central to local governments. The most important of these is setting local drinking water and sewerage prices from 1994 (including both determining actual prices and choosing the price scheme). The prices of service of the five regional state-owned companies are still set by the Ministry of Environment and Water Management. The Ministry also sets the wholesale prices of drinking water sold by the regional companies to other water companies.

The prices of industrial and agricultural water provision are not regulated. They are determined through the contracts between individual providers and users. Our previous study [MAKK 2000] showed examples that fees for agricultural water use differ on a wide scale without real economic reasons.

The legislation on price setting (for details see 1.1.1) is not specific enough, only states soft criteria for cost recovery. It says that of the regulated prices, the highest has to cover costs of efficient service providers and allow them to gain profit for the operation with taking into account deductions and subsidies. The lowest does not have to provide profit.

Considerable problems occur with setting individual depreciation rules and capital assessment on the ground of the mentioned soft criteria. On one hand when the owner of public infrastructure is different from the operator, the latter cannot account depreciation costs in their balance sheets. However the owners (local governments) rarely accumulate the rent companies pay for using the infrastructure. On the other hand, even if local governments account depreciation costs its current level is far below the necessary level (see also 8.2.1).

The appraisal of the capital value of the infrastructure is not uniformed; in several cases the value of the assets in the books had been reduced to zero earlier, that is amortisation cannot be accounted on these assets.

The owner is responsible for the financial control (the local governments or, in the case of the 5 state owned regional waterworks, the KvVM). However, the local governments lack the required economic skills and have no capacity to exercise effective control. The Water Directorates have no right to examine complex economic status of a given service provider.

The State Audit Office can conduct investigation ex post on economic activity of local governments. Unfortunately these investigations have no real effect on the questioned processes.

# 2 Product Quantity and Quality - Data

## 2.1 Water Production

**Table 2 National Water Production**, million cubic meter

| | 1992 | 1995 | 1998 | 2001 |
|---|---|---|---|---|
| Drinking water | 927 | 796 | 746 | 717 |
| Industrial without electricity prod. | 36 | 30 | 20 | n.a |
| Agriculture | 1707 | 1670 | 1358 | 1601 |
| Other organisation's water production incl. electricity prod. | 5197 | 4475 | 4570 | 4250 |
| Total | 7867 | 6971 | 6694 | 6568 |

*Source: Env. Stat. Data of Hungary(1999), (2001)*

## 2.2 Water Consumption

**Table 3 National Water Consumption**, million cubic meter

| | 1992 | 1995 | 1998 | 2001 |
|---|---|---|---|---|
| Drinking water | 775 | 618 | 551 | 535 |
| **Industrial** without electricity prod. | 35 | 29 | 19 | n.a |
| Agriculture | 1078 | 867 | 616 | 649 |
| Consumption of other organisation's own production incl. Electricity prod | 4986 | 4276 | 4443 | 4100 |
| Total | 6874 | 5790 | 5629 | 5284 |

*Env. Stat. Data of Hungary(1999), (2001)*

**Table 4 Drinking Water Production, Consumption and Consumption of Households**

| | 1992 | 1995 | 1998 | 2001 |
|---|---|---|---|---|
| Drinking water *production* | 926.1 | 795.9 | 719.9 | 717.1 |
| **Leakage and technical losses** | 169.9 | 165.6 | 153.9 | 130 |
| Drinking water *consumption* | 775.2 | 618.1 | 549.8 | 534.8 |
| Consumption of households♣ | 512 | 421.4 | 377.2 | 375.6 |
| Consumption of households per total drinking water consumption[16] | 66% | 68.2% | 68.6% | 70.2% |

*Sources of data: MAKK (2000), KHVM (1994), KHVM (1998), KHVM (2000), OVF (2002)*

*Note: Drinking water consumption does not equal drinking water production minus leakage! The difference contains "transfers to and from other systems (for safety reasons)" and "internal use" of providers. The data on 1992 are incoherent, we show it to demonstrate the decrease of consumption. ♣: Including water supplied to households connected to the public water network and water supplied through public outlets. The share of the latter decreased from 2.1% to 1.2% in the period considered.*

[16] *Drinking water consumption includes water use of households and other (public institutions and companies (public drinking water user)) users as well.*

**Table 5 The Rate of Flats Connected to the Public Water Supply System by Settlement Type**

| | 1992 | 1995 | 1998 | 2000 |
|---|---|---|---|---|
| Rate of flats connected to public water supply | 0.85 | 0.90 | 0.91 | 0.93 |
| of this: Budapest | 0.98 | 0.97 | | 0.99 |
| other towns | 0.90 | 0.92 | 0.94♣ | 0.93 |
| villages | 0.73 | 0.82 | 0.87 | 0.87 |

*♣: towns including Budapest*

Sources of data: MAKK (2000): 1991-1997, 2000: TÁKISZ local governmental data base, 1998: KHVM

**Table 6 The Rate of Flats Connected to the Public Water Supply System by Number of Inhabitants in Settlements**

| Rate of flats connected to public water supply | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|
| No of inhabitants below 2000 | 0.85 | 0.852 | 0.869 | 0.881 |
| 2001-10000 | 0.878 | 0.866 | 0.893 | 0.89 |
| 10001-15000 | 0.888 | 0.885 | 0.908 | 0.908 |
| 15001-50000 | 90.5 | 0.92 | 0.931 | 0.934 |
| 50001-150000 | 0.986 | 0.964 | 0.979 | 0.962 |
| Above 150000 | 0.983 | 0.982 | 0.983 | 0.984 |
| Total | 0.919 | 0.916 | 0.93 | 0.931 |

*Source: OVF (2002)*

## 2.3 Wastewater Production

**Table 7 Wastewater Production without Waterworks**, million cubic meter

| Water users[17] | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|
| Wastewater from water users | 170.8 | 162.5 | 142.2 | 131.1 |
| Used, heat polluted water needing no treatment | 4299.6 | 4096.1 | 4126.1 | 4332.8 |
| Wastewater from other organisations | 19.3 | 14.6 | 11 | 14.7 |
| Total | 4489.7 | 4273.2 | 4279.3 | 4478.6 |

*Source: OVF (2002)*

[17] *Water user means a company that uses water more than 5 cubic meters per hour or 80 cubic meters per day for its business activity.*

## 2.4 Wastewater Effluent

**Table 8 Treatment of Sewage Collected** (public sewerage network only) **and the Capacity of the Sewage Treatment Facilities,** million cubic meter per year

| | 1992♣ | 1995 | 1998 | 2001 |
|---|---|---|---|---|
| Total sewage collected | 787.9 | 643.3 | 552.8 | 513.7 |
| of this: from households | 308.1 | 248.4 | 250.6 | 243.9 |
| Sewage without treatment | | 346.0 | 245.3 | 203 |
| Sewage with treatment | | 303.4 | 311.9 | 311.5 |
| of this: primary treatment only | | 30.6 | 17.6 | 20.4 |
| Primary and secondary treatment only | | 247.6 | 230.5 | 180.9 |
| primary, secondary and tertiary treatment | | 25.2 | 63.8 | 110.2 |
| Capacity | | | | |
| Primary treatment only | | 78.7 | 117.3 | 141.2 |
| primary and secondary treatment only | | 488.6 | 471.0 | 427.6 |
| primary, secondary and tertiary treatment | | 54.2 | 118.1 | 201.6 |

♣: other data for these years or either not available or seems inconsistent with the later years, probably the definitions of the categories has been changed

*Source: KHVM, OVF (2002)*

**Table 9 Number of Flats Connected to the Sewage System**

| | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|
| No of flats thousand | 3045 | 3116 | 3168 | 3247 |
| Connected to the sewage system | 1926 | 2002 | 2085 | 2173 |
| in Budapest | 745 | 750 | 754 | 762 |
| in other towns | 1022 | 1057 | 1097 | 1150 |
| in villages | 158 | 195 | 233 | 260 |
| Not connected in serviced area | 361 | 475 | 467 | 347 |

*Source: OVF (2002)*

**Table 10 The Rate of Flats Connected to the Public Sewage System by Number of Inhabitants in Settlements**

| Rate of flats connected to public sewage system | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|
| No of inhabitants below 2000 | 0.065 | 0.098 | 0.10 | 0.131 |
| 2001-10000 | 0.174 | 0.203 | 0.238 | 0.263 |
| 10001-15000 | 0.358 | 0.399 | 0.441 | 0.48 |
| 15001-50000 | 0.504 | 0.522 | 0.552 | 0.558 |
| 50001-150000 | 0.413 | 0.753 | 0.766 | 0.774 |
| Above 150000 | 0.871 | 0.874 | 0.88 | 0.888 |
| Total | 0.476 | 0.493 | 0.513 | 0.533 |

*Source: OVF (2002)*

The connection rate of Budapest is higher then the last category's average, it is above 90 per cent, but the data is ambiguous.

Based on different sources we put together a coherent closed water use cycle.

**Table 11 Water Use Cycle, million cubic meter 2001**

| | |
|---|---|
| Drinking water | |
| Consumption purpose from waterworks to | 534.8 |
| Households | 375.6 |
| other users | 159.2 |
| Industrial purpose from other water producers | 46.7 |
| Non drinking water use of industry | |
| Industrial water production of water producers | 4457.2 |
| Industrial w. transferred from waterworks | 12.4 |
| Total consumption | 5038.7 |
| | |
| Wastewater | |
| Used water of industry, requiring no treatment | 4332.8 |
| Wastewater of industry (requiring treatment) | 145.8 |
| Of which require treatment of the user | 100.6 |
| Of which transferred to waterworks | 45.2 |
| | |
| Wastewater collected by waterworks | 513.7 |
| of households | 243.9 |
| of other organisations | 269.9 |
| | |
| Total wastewater, industry and households* | 614.3 |
| | |
| Distribution of total wastewater | |
| Without treatment from waterworks | 203.1 |
| Without treatment from industry | 39.6 |
| Total without treatment | 242.7 |
| | |
| Treated in waterworks | 308.6 |
| Treated in industrial plants | 60.5 |
| Total with treatment | 369.1 |
| | |
| Effluent of treated quantity | 360.6 |
| Utilised of treated quantity | 8.5 |

**The sum doesn' t add up the two components, to avoid double counting industry's transfer to waterwork, that shows up in box: waterworks collection from otherorganisations .** The utilisation of treated quantity means usually agricultural use of sludge*

# 3 Economic Data

## 3.1 Prices at Various Points in the Production/Distribution System and Different SUs

Table 12 shows the estimates of mean water and sewage charges for households in case of service provided by member companies of the National Professional Association of Water and Sewerage Companies (VcsOSzSz).

**Table 12 Estimates of Water and Sewage Charges for Households**, HUF per cubic meter at 2002 prices

| | | 1999 | 2000 | 2001 |
|---|---|---|---|---|
| **Water** | Minimum charge | 62 | 30 | 31 |
| Maximum charge | | 295 | 303 | 292 |
| Weighted mean | | 135 | 138 | 153 |
| Sewage | Minimum charge | 38 | 27 | 24 |
| Maximum charge | | 223 | 456 | 416 |
| Weighted mean | | 109 | 113 | 123 |

*Source: National Professional Association of Water and Sewerage Companies, the 2001 data: Koskovics 2002*

**Table 13 Water and Sewage Charges for Non-Household Consumers, in Case of Service Provided by Member Companies of (VcsOSzSz)**, HUF per cubic meter at current prices

| | | 1999 | 2000 | 2001 |
|---|---|---|---|---|
| **Water** | Minimum charge | 57 | 66 | 59 |
| Maximum charge | | 2812 | 2770 | 2058 |
| Weighted mean | | 133 | 132 | 173 |
| Sewage | Minimum charge | 35 | 49 | 49 |
| Maximum charge | | 1448 | 933 | 1146 |
| Weighted mean | | 115 | 119 | 167 |

*Source: National Professional Association of Water and Sewerage Companies, the 2001 data: Koskovics 2002*

The comparison of average prices can reveal the phenomenon of cross-subsidisation (see also 8.2.4). The financing of real cost of low household-tariffs by high charges for the others is more significant in drinking water provision than in wastewater services.

Cross-subsidisation, through distorted price setting can be a local political issue, therefore maximum charges can show extremities. The lower ratios of maximum prices to average prices (see Table 14) for household users as compared with non-household users can support this idea[18]. Dispersion of maximum charges of drinking water for non-household consumers were about tenfold greater than for

[18] *There was no possibility to count the average of variances instead of comparing only to the maximum and minimum values.*

household users in 1999-2000, but in 2001 it fell to „only" six fold (see Table 14). As far as wastewater charges are concerned the ratio of maximum charges relative to the weighted mean for the two consumer groups is much lower and changed from six fold to double. There is little difference in the dispersion of minimum charges.

The current system of cross-subsidisation cannot be maintained in the European Union, according to the guidelines of the Water Framework Directive. If cross-subsidies are phased out, then household tariffs will on average increase, while tariffs of other service users will on average decrease.

**Table 14 Rate of Minimum and Maximum Charges Relative to the Weighted Mean by Consumer Groups**

| | **Household user** | | | **Non-household user** | | |
|---|---|---|---|---|---|---|
| | **1999** | **2000** | **2001** | **1999** | **2000** | **2001** |
| **Water minimum** | 0.46 | 0.22 | 0.20 | 0.43 | 0.5 | 0.34 |
| **Water maximum** | 2.19 | 2.19 | 1.91 | 21.1 | 20.9 | 11.9 |
| **Wastewater minimum** | 0.35 | 0.24 | 0.20 | 0.3 | 0.41 | 0.29 |
| **Wastewater maximum** | 2.06 | 4.05 | 3.38 | 12.6 | 7.84 | 6.86 |

The above quoted data is aggregated from MU level. There can also be price differences in an agglomeration between the central settlement and its outlying areas as well. On one hand this reflects natural differences of scale and density factors that result in lower per capita investment and operation costs in central settlements. On the other hand, as the distribution of household income shows strong correlation with the population size of the settlements, the willingness to connect is lower in the smaller villages of outlying communities and this results in greater average costs for those households that are connected.

The break-up of existing companies in 1990 led to various agreements among co-operating municipalities. Equity or short term economic interests were the most influential motivators. Moreover without general rules of cost-sharing price differences exist not only between service providers but inside one management unit as well.

Data on charges for industrial users are available only for those connected to the public drinking water and sewage network. When a water company sells industrial (non-drinking) water, the price is not regulated. It is a deal between the supplier and the customer. Data on these prices are not available, but the quantity of water supplied this way is very small.

## 3.2 Sales

**Table 15 Revenue of MWWUs from Drinking Water Fees**, million HUF, at 2002 prices

| Source of revenue | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|
| Households | 47698 | 48338 | 52926 | 52462 |
| Other organisations | 21457 | 22243 | 22250 | 22968 |

*Source: OVF (2002)*

**Table 16 Revenue of MWWUs from Sewage Service, million HUF** at 2002 prices

| Source of revenue | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|
| Households | 23235 | 25018 | 26833 | 27735 |
| Other organisations | 19054 | 20386 | 20522 | 21028 |

*Source: OVF (2002)*

The state gives support to improve water and wastewater service provision and level their inequalities of cost, see Table 30 in 6.3.3 about the degree of **grants and subsidies**.

# 4 Infrastructure - Plant and Equipment

This chapter gives a picture about the number of operating units (with bold letters that refer to Table 1). These facilities exercise the operations of drinking water production, distribution, treatment and that of wastewater as well.

All data is from year 2001, their source is OVF (2002).

## 4.1 Production

**Table 17 Water Production**

| | |
|---|---|
| Number of plants | 1858 |
| Capacity (1000$m^3$/day) | 4986.3 |

Source: OVF (2002)

## 4.2 Processing of Drinking Water

**Table 18 Processing of Drinking Water**

| | |
|---|---|
| Number of plants | 846 |
| Water purification capacity (1000$m^3$/day) | 2313.7 |

Source: OVF (2002)

## 4.3 Distribution

**Table 19 Distribution**

| | |
|---|---|
| Number of water **transport** networks | 896 |
| Number of **distribution** networks | 3356 |
| Length of networks in km (A+B) | 83010 |
| A, Transport | 7296 |
| Drinking water transport networks, transport pipes | per cent |
| Under 2 kms | 31.6% |
| 2 to 5 kms | 38% |
| 5 to 10 kms | 15.4% |
| 10 to 20 kms | 7.8% |
| Above 20 kms | 7.2% |
| B, Distribution | 75714 |
| B.1 Connection | 19662 |
| B.2 Main | 56052 |
| Of which drinking water networks, main pipes | Per cent |
| Under 10 kms | 61.8% |
| 10 to 20 kms | 20.9% |
| 20 to 50 kms | 11.9% |
| 50 to 100 kms | 3.5% |
| Above 100 kms | 1.9% |

OVF (2002)

## 4.4 Sewage Collection

**Table 20 Sewage Collection**

| | |
|---|---|
| Number of collection networks | 997 |
| **Total length** of sewage network km (A+B) | 35104 |
| A, Length of **collection** network km | 32916 |
| A.1 Connection pipes | 8965 |
| A.2 Main pipes | 23951 |
| ***Sewerage*** systems, ***main*** pipes | per cent |
| Under 5 kms | 23.5 |
| 5 to 10 kms | 24.9 |
| 10 to 20 kms | 25.2 |
| 20 to 50 kms | 18 |
| Above 50 kms | 8.4 |
| B, Length of **transport** network | 2188 |
| Sewage transport systems, transport pipes | per cent |
| Under 5 kms | 80.3 |
| 5 to 10 kms | 12.6 |
| 10 to 20 kms | 3.9 |
| 20 to 30 kms | 1.6 |
| Above 30 kms | 1.6 |

OVF (2002)

## 4.5 Processing of Wastewater

**Table 21 Processing of Wastewater**

| | |
|---|---|
| Number of treatment plants | 539 |
| of which sludge treatment | 499 |
| Treatment plant capacity by treatment level mill $m^3$/year | |
| Mechanical | 141 |
| Mechanical + biological | 428 |
| Mechanical + biological +chemical | 202 |

OVF (2002)

It can be stated from the tables above that the water distribution system is frittered, as the share of 5 km long pipes is dominant. It can be also assumed that most of the water and sewage systems each serve only one settlement.

# 5 Management Units

## 5.1 Types of Management Units

The Act XXXIII/1991 on the handing over of state-owned assets into the property of local governments determined the distribution of ownership of MWWU assets in 1991. The separable operating units that matched the territory of a given municipality became the property of the municipality. The indivisible systems remained state property. The laws on transformation did not limit the right of the new owners to break up the system (as was done, for example, in the case of East Germany).

Management units are on the top of water- and wastewater system, as they direct the operating units (see 1.2.2 and chapter 4) that serve final consumers with the help of transport and pipe networks (see 4.3 and 4.4).

**Table 22 Number of Units by Types of Service**

| **Types of service** | **1998** | **1999** | **2000** | **2001** |
|---|---|---|---|---|
| Only drinking water provision | 144 | 137 | 134 | 130 |
| Only wastewater service | 37 | 38 | 51 | 53 |
| Drinking water and wastewater service | 178 | 187 | 190 | 194 |
| **Total** | **359** | **362** | **375** | **377** |

*Source: OVF (2002)*

Table 23 illustrates the structure of the system. About 69 per cent of companies provide water and sewage service in only 1 settlement. However only 6 per cent of the firms (24) serves 75 per cent of the population.

**Table 23 Number of Municipalities Served by 1 Operator**, 2000

| No. of municipalities served by 1 operator | Drinking water | Wastewater | Both |
|---|---|---|---|
| | Number of operators | | |
| 1 | 158 | 159 | 190 |
| 2 – 10 | 111 | 56 | 123 |
| 11 – 50 | 40 | 14 | 40 |
| > 50 | 16 | 0 | 16 |
| Total | 325 | 229 | 369 |

*Source: VCsOSzSz (2000)*

Waterworks usually operate in the legal form of a joint stock company (Rt.) or limited liability company (Kft), but in real terms, given the — not entirely unambiguous — legal constraint that the basic infrastructure is required to remain the property of local governments Table 24 shows the division of these elementary facilities by ownership type.

**Table 24 Division of Drinking Water Facilities by Type of Ownership and Operation**

| | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|
| **Total number of network elements** | **6826** | **6889** | **6911** | **6956** |
| of them by *ownership* ***type*** (per cent) | | | | |
| State-owned | 10 | 9,2 | 9,2 | 9,2 |
| Municipality owned | 76.1 | 77 | 76,6 | 74,7 |
| Other | 13.9 | 13,8 | 14,2 | 16,1 |
| Total | 100 | 100 | 100 | 100 |
| By operation type (per cent) | | | | |
| State | 8.5 | 8.3 | 8.1 | 8.1 |
| Municipality | 60.4 | 61.4 | 61 | 60.8 |
| Companies with concession contract | 10.6 | 10.3 | 10.8 | 10.9 |
| Companies with operating contract | 20.5 | 20 | 20.1 | 20.2 |
| Total | 100 | 100 | 100 | 100 |

*Source: OVF (2002)*

Ownership of the networks, based on rough evaluation of the drinking- and wastewater infrastructure data, is estimated as follows: 20 per cent of the networks are the property of companies that have private partners. 20 per cent of the networks are exclusively the property of the central government. The remaining 60 per cent of the network is wholly owned by local governments (Mezei 2003 ref.).

One conclusion from the above data is that private entities have a more important role in operation than in ownership.

## 5.2 Trends in Formation or Consolidation of MUs

The assignment of ownership of networks to local governments and of indivisible systems to regional waterworks created incentives to some communities to withdraw from the regional/conty waterworks. The communities with the lowest average cost found it advantageous to set up for themselves and in this way management units were created. This led to quick localisation and to reduction in the size of the regional/county companies.

One of the most serious problems comes from the fragmentation of water and sewerage companies: the low extent of spreading the costs over territories with different unit costs. Smaller companies were created in settlements or in micro-regions with more favourable natural or other characteristics[19] (i.e. lower costs of water production and / or sewerage treatment requirements) than the surrounding

[19] *For example a region with substantial tourism in the summer season (e.g. Lake Balaton) is unfavourable for the settlements in the same region, since the maintenance of the additional infrastructure used only in summer should be paid by the permanent consumers of the region (if no extra charges are set for the summer users). This prompted Kaposvár, a town in the region of Lake Balaton to found a new, smaller company. (Makk 2000)*

territories. This way the new, smaller companies can ensure lower tariffs, while the tariffs for the rest go up[20] [MAKK, 2000].

The organisation and ownership of the system and operating companies changes constantly (see Table 22). Smaller municipalities frequently give up independent operation of their infrastructure and contract with the dominant service provider of the area. Meanwhile there are some examples of smaller local governments operating their recently finished network in order to gain more control over the prices and hiring.

There was a wave of introducing private capital in waterworks between 1994 and 1997. It took the form usually of gaining concession contract for operation and this was connected to the possibility to reach up to 49% ownership in the given company.

French and German water companies were its most prominent participants. Their stakes are widespread among the largest MWWUs. In 1994 Générale des Eaux gained a 49% share in Szeged Vízmű Kft, in 1995 Lyonnaise des Eaux got 48% in Pécs Vízmű Rt; in both cases new companies have been founded for operation (Horváth, 1995). (Szeged and Pécs are the fourth and fifth largest cities in Hungary). In 1997 Lyonnaise des Eaux and the RWE Aqua GmbH bought a 25%+1 share in the water company of Budapest (Fővárosi Vízművek Rt), however the contract provided the French owners a 49% role in the management of the company. At the same time Générale des Eaux and Berliner Wasser Betriebe bought a 25%+1 share in the sewerage company of Budapest: Fővárosi Csatornázási Művek Rt. Berliner Wasser Betriebe obtained also a 48% share in the water company of Hódmezővásárhely (the 21st largest town in Hungary) (Víz- és Csatornaművek Országos Szakmai Szövetsége, Évkönyv '98).

From 1994 Lyonnaise des Eaux has a 35% share in the Kaposvári Vízművek Kft, a company with a concession contract for operating the waterworks of Kaposvár (Horváth, 1995; Papp, 2000). The only other example of the concession contract form can be found at Szolnok (Papp, 2000). (Szolnok and Kaposvár are the 11th and 13th largest cities in Hungary).

Large minority private owners (up to 49 per cent) have not invested much capital in new networks or facilities, however these firms could get decisive influence this way with a comparatively small investment [BKÁE 2002]. They only took part in modernising and improving the operation, like billing and customer service, but not the expansion of the wastewater collection networks and improvement of drinking water quality. Although the justification of these investments are unquestionable, it can be questioned whether these were the most important issues what a low-income population should finance if their ability is limited. As the cost of modernised surplus operations appeared, the (partly) privately owned providers introduced higher prices. [Mezei 2003].

## 5.3 Special Obligations

The waterworks have to provide service to all consumer units that are tied to its network. In case of non-payment, the service could be restricted, but a minimum level of it has to be maintained. (see 38/1995 (IV.5) Government. Decree on drinking water provision and wastewater service in 1.1.1) Not only disconnection, but connection to utilities can be ordered if sanitation, environmental or water management regulation is offended (refers to 38/1995 Gov.decree).

In order to maintain the required standards of drinking water quality the network needs a minimum quantity of flow without regard of actual supply and demand levels on both ends. This is because the system capacities are higher than the actual demand, but technically it is not viable to put them out of order. Independent waterworks of formerly united networks could be targets of *this kind* of water acquisitions. The quantities and the prices of these necessary basic water flows were regulated in 47/1999 (XII.28) Decree of KHVM.

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[20] *If one tries to measure economies of scale without controlling for natural characteristics, diseconomies of scale will be detected; the unit costs of smaller companies are lower.*

## 5.4 Financial Condition

### 5.4.1 Current Account Balances

There were considerable differences of balances between water and wastewater service providers of the capital and the rest of the country. These differences, based on a 1998 study (Oko Rt, 1999) are the result of special privatisation conditions for the two firms in the capital.

According to the study, which covered the biggest 90, firms (who provided 96 per cent of the total quantity of water) the aggregated losses of the 35 MUs from drinking water service equals the aggregate gains of the other 55 firms. 35 firms suffered operating losses from drinking water provision and 37 suffered losses on sewage service. 12 companies used their gains to pay dividend for 2,181 billion HUF, of this 89 per cent went to the owners of the wastewater company of Budapest. Total after tax income of the other 78 companies amounted to 1 billion HUF.

Table 25 shows that water service is unprofitable for the water company of Budapest (because of the management fee paid due to the contract of privatisation) and for the state-owned service providers as well. It can be explained with the transformation trends in management units: settlements with the lowest average cost left the utilities in order to provide services at a lower cost or make higher net revenues. Therefore not only did the size of the regional companies decrease, but settlements that can be supplied only with higher cost stayed inside these companies.

**Table 25 Operating Results of Water Service Providers by Type of Ownership (million HUF), 1998**

| | |
|---|---|
| Losses of municipality-owned companies (without Waterworks of Budapest) | -514 |
| Gains of municipality-owned companies | +689 |
| Losses of waterworks of Budapest | -1.670 |
| Losses of regional (state-owned) companies | -246 |
| Gains of regional (state-owned) companies | +38 |
| Total operating results of water service provision | -1.703 |

*In Million HUF, current prices. Source: ÖKO (1999).*

Wastewater service providers achieved operating gains regardless of type of ownership (see Table 26) Aggregated operating gains for sewerage service without Budapest is a half billion HUF (approx. two million USD), which is equal to 1.5 per cent of the service-specific wastewater revenues collected.

**Table 26 Operating Results of Wastewater Service Providers by Type of Ownership (million HUF), 1998**

| | |
|---|---|
| Losses of municipality-owned companies (without Wastewater Company of Budapest) | -603 |
| Gains of municipality-owned companies | +1.035 |
| Gains of wastewater company of Budapest | +4.613 |
| Losses of regional (state-owned) companies | -37 |
| Gains of regional (state-owned) companies | +86 |
| Total operating results of wastewater service provision | +5.094 |

*In Million HUF, current prices. Source: ÖKO (1999)*

Table 27 shows that aggregate losses and gains in either the water or the wastewater sector offset each other if the service providers of Budapest are not included.

**Table 27 Operating Results of Water and Wastewater Companies *without Budapest (million HUF)*, 1998**

| | Water | **Wastewater** |
|---|---|---|
| Losses of municipality-owned companies | -514 | -603 |
| Gains of municipality-owned companies | +689 | +1.035 |
| Total of municipality-owned companies | +175 | +432 |
| Losses of regional (state-owned) companies | -246 | -37 |
| Gains of regional (state-owned) companies | +38 | +86 |
| Total of regional (state-owned) companies | -208 | +39 |
| Total operating results of services | -33 | +471 |

*In Million HUF, current prices. Source: ÖKO (1999)*

### 5.4.2 Capital Account Balances

The transformation of the water sector to municipal ownership and smaller operating units resulted in a wide variety of infrastructure representation in the books of the operating firms and the local governments. Although it should not affect the accumulation measures (i.e. accumulation of capital for future investments), it does. Also the discipline of accumulation for future needs differs between the firms and the municipalities. Municipalities are eager not to accumulate funds for long-term maintenance of the operation in order to keep tariffs at low levels.

Those sums that companies can amortise – can be accounted as costs or "write off" in each period – is not enough to cover the real maintenance and restoration costs of the infrastructure. This is due to several factors:

- the assets' real values are not recorded, because their proper valuation is delayed or biased (expected length of operation, gross/net values, valuation differences), in 1996 the state owned companies were revalued, but it wasn't obligatory for the other ones.
- the general amortisation rules (rates) are not suited to this service's infrastructure, although the operators don't exhaust these measures either,
- the application of proper discount rate would result in increases of tariffs.

# 6 National Regulatory Units

## 6.1 Main Regulatory Units

**The Ministry of Environment and Water Management** (KvVM) is the chief (environmental) regulatory body of the water sector, it determines pollution fines/charges, manages funds subsidising the operation of companies and investments in the water sector. It is also the owner of the five regional water companies.

The Ministry was founded in April 1988 with union of the National Office of Environmental Protection and Nature Conservation (Országos Környezet- és Természetvédelmi Hivatal) and the National Office of Water Management (Országos Vízügyi Hivatal). From 1990, the Ministry of Transport, Telecommunication and Water Management (KHVM) was in charge of water management till the end of May 2002 when this range of duties were attached again to the Ministry of Environment and Water Management[21].

**National Water Authority (NWA)** and the **12 Regional Water Authorities** (organised by river basins) under NWA

Water authorities deal with river management, defence against floods and inland waters, have regulatory function as well. They give permission for activities such as water production and distribution, sewerage services and also building of related infrastructure (both in the case of water and sewerage companies and in the case of industrial water production for own use). NWA exercises first-degree jurisdiction and second degree in case of appeal against a judgement of a Regional Water Authority.

**Chief Environmental Inspectorate** (Környezet- és Természetvédelmi Főfelügyelőség) and the **12 Regional Environmental Inspectorates** (Természetvédelmi felügyelőségek)

The Chief Inspectorate is a national office under the supervision of the Minister of Environment and Water Management. The Regional Environmental Inspectorates have similar role to the Regional Water Authorities concerning the process of jurisdiction, the duty of collecting data. Moreover, they perform tasks of monitoring, measuring, collecting, processing and registering data on loading and state of the environment, in order to be able to operate the National Environmental Information Network.

**Ministry of the Interior**

The Ministry subsidises local governments through general grants and subsidies specific to services including investments in the local water and sewerage infrastructure. In detail see 7.2.3.2 Grants.

In most of the cases, local governments can decide upon water and wastewater activities (except for the regional companies)

**Ministry of Health and Social Affairs**

The Ministry regulates the quality of supplied drinking water and provide authority control of services through its county based offices.

[21] *The Ministry was called Ministry of Environment (KVM) for a short time between 1988 and 1990. After it became Ministry of Environment and Development of Territory (KTM), but in 1998 it changed name again to of Ministry of Environment (KöM).*

## 6.2 National Planning and Permitting

The 25/2002 (II.27) Government decree initiated the National Program of Municipal Sewage collection and treatment. It set a time schedule for *sewage agglomerations* **(see** 26/2002 (II.27) Gov. Decree in Chapter 1.1.1) to fulfil the requirements based on EU approximation plans and water and wastewater directives. (For details on relevant pieces of legislation, see 1.1)

### 6.2.1 Data Collection

Authorities collect data on one hand due to legal obligations by measuring emissions, on the other hand they obtain data from companies subject to self-monitoring. See reporting requirements in 1.1.1 for institution collecting data.

21/2002 (IV.25.) Decree of KöViM on operating waterworks says that only appropriate laboratories can exercise control, examine samples of wastewater and wastewater sludge. The decree authorises the Chief Environmental Inspectorate to set conditions for the approval of suitability.

203/2001 (X.26) Gov. Decree on rules on the protection of the quality of surface waters sets the obligation of self-monitoring for those discharging more than 15 cubic meter of wastewater a day and wastewater containing dangerous materials – results should be transmitted to the competent environmental inspectorate.

204/2001 (X.26) Gov. Decree on sewerage fine rules that the quantity of wastewater emitted should be measured by the subjects of this decree and needs to be approved by the authorities. Self-control is not sufficient if wastewater emission exceeds 80 cubic meters a day or when it comes from leather, chemical industry or from oil and metal processing.

6/2002 (XI.5) Decree of Ministry of Environment and Water Management (KvVM) about the environmental standards and control of surface waters for drinking water abstraction and for fish habitats.

### 6.2.2 Activity Permitting

From technical point of view, the National Water Authority (NWA) and the 12 Regional Water Authorities (organised by river basins) under NWA assert the right of authorising: water production and distribution, sewerage services and building water and sewerage infrastructure. (Both in the case of water and sewerage companies and in the case of industrial water production for own use).

The Chief Environmental Inspectorate, via its twelve Regional Environmental Inspectorates (organised by river basins) control those subject to self-monitoring (see 203/2001 (X.26) Gov. Decree) and imposes (then collects) pollution fines related to wastewater.

Recently the organisational and functional merger of water and environmental inspectorates is under way.

The municipal notaries give permission to small-scale water use (below 500 cubic meters annual consumption), according to the 72/1996 (V.22) Gov. Decree on exercising water authority rights (see 1.1.1).

## 6.3 Economic Regulations or Limitations

The Ministry of Environment and Water Management is the chief regulatory body of the water sector. The Ministry owns the five regional water companies and it manages funds subsidising the operation of companies and investments in the water sector. It administers environmental regulation of the water sector, determining pollution fines/charges and manages and disburses funds subsidising sewerage investments.

The Ministry of the Interior runs the most important funds that subsidise investments and development activities of local governments (see short description of grants in6.3.3.2).

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## 6.3.1 Taxation

### 6.3.1.1 Water Abstraction Fee

In Hungary a water abstraction or resource fee has been paid for past three decades. However agricultural water use has been included only since the early 90's. All "water users" and "PDWS user" (see 1.3 for the classification of users) shall pay water abstraction fees to the appropriate Water Fund. These Funds are under the exclusive control of the Ministry of Environment and Water Management (KvVM) (43/1999. (XII. 26.) Min. Decree). In 1999, the separated Water Fund (along with the Environmental protection Fund) was drawn under the central budget. This means that its funds were not earmarked, compared with the situation when it was a separated state fund. The CXVI/2003 Law defined that the revenues of water abstraction fee support the Environmental Protection and Water Fund Appropriation.

The water abstraction fee is collected by the regional water authorities and passed to the central budget from 1st January 2001, but will then be earmarked as a subsidy in the target estimates of the given chapter of the budget according to Act CXXXIII/ 2000 on the budget of the Republic of Hungary.

The water abstraction fee was 5.7 billion HUF in 1997, 5.9 billion HUF in 1998, and 5.7 billion HUF in 2000. [MAKK 2000]. 2003 9.07 billion HUF. estimated. There is no official data available on the debts or the collection efficiency[22].

The abstraction fee to be paid by the water user is calculated by multiplying a base fee rate with factors which reflect the type of water resource used, the purpose of use, the method of determining the volume of water used and the water management situation of the given region. The base fee rate is set annually in the central budget legislation, the factors are set for longer term in separate KvVM decree. The volume accounted for the abstraction fee is minimum 80 per cent of the volume set in the waterpermit. (Except for certain cases in which the abstraction fee is not to be paid. Such cases include: authorities' order of water use restriction, fire extinguishing, when the used volume is under 500 $m^3$/annum if the permitted water volume is not at disposal for natural reasons, and for Public Drinking Water Supply (PDWS) users if public health regulations require drinking water quality for the particular use).

**Table 28 The Base Fee Rate for Water Users in 1993-2000**, HUF 2002 per cubic meter

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2003 |
|---|---|---|---|---|---|---|---|---|---|
| Water user | 1.4 | 2.0 | 1.6 | 1.6 | 1.6 | 1.6 | 1.7 | 1.8 | 2.3 |
| PDWS user | 4.3 | 6.1 | 4.8 | 4.9 | 4.7 | 4.9 | 5.3 | 5.5 | 5.1 |

*Source: Makk (2000)*

The actual water abstraction fee (WAF) to be paid depends on several factors besides the base fee rate (as above mentioned), and is to be calculated as follows:

$$WAF = V*B*M*G$$

where

- V is the volume used or planned to use in $m^3$
- B is the base fee
- M is a measurement parameter; the value is 1 if the water volume is measured, 2 in other cases (until 2000 the latter value was 1.2)

[22] *Sums are in HUF 2002*

- factor G depends on the type of the water use and the water body, and the water management situation of the given region. Its value can vary from 0.001 to 10. The former is the multiplication factor for surface water used by hydro power plants; the latter is for medicinal water for non-defined usage. The values are given in order to restrain sensitive water sources to meet inappropriate demand (e.g. using carstic water at an animal farm).

#### 6.3.1.2 VAT

The VAT rate increased from 0 to 6 per cent in 1993, then to 10 per cent in the same year, then to 12 per cent in 1995. Even the recent rate (15%) is still lower than the general 25 per cent on most of the goods and services.

#### 6.3.1.3 Pollution Fines

**Wastewater fine**

This is a pollution fine that has to be paid if the wastewater emission of a water user exceeds threshold limit defined in the permission or if it contains not permitted or prohibited material. The wastewater fine is based on the 203/2001 (X.26) Gov. decree on the quality of the surface water (see 1.1.1) The effluent standards measure 80 elements of pollution and toxic substances (including heat).

70 per cent of the wastewater fine revenues go to the "Environmental Protection Fund Appropriation" (EPFA), which is managed, by the Ministry of Environment and Water Management. The other 30 per cent flows to the municipality from the territory of which the fine was collected. The fines are imposed and collected by the regional environmental inspectorates as opposed to the environmental load fee, which is collected by the tax authority.

Wastewater fine can be calculated on the bases of the a) weight and b) excessive concentration of the polluting material in wastewater.

Sewerage fine

The non-compliance of wastewater producers with the operation requirements of the public waterworks is penalised by the 204/2001 (X.26) Gov. decree: the sewerage fine.

The sewerage fine charges for discharging to the sewerage system concentrations above a set of standards for 32 pollutants. This fine is collected by the local governments and transferred to the local sewerage company. This fine was introduced to motivate polluters to install pre-treatment facilities, but local governments have a discretionary right to disregard this fine.

The threshold limits for the same pollutant can vary according to the local environmental sensitivity of different areas.

The authorities distinguish between regular and one time (accidental) pollution.

The total revenue from all environmental fines imposed in 2000 amounted to a bit less than 1.9 billion HUF; of this the share of water pollution was 55.27 per cent. Compared to the total revenues of the sewage services market, it means that service providers had to pay about 2.3 per cent of their revenue, as fine which, in itself, is not enough incentive to reduce effluent discharges.

This 1 billion HUF of wastewater and sewerage fine does not spread evenly along the rivers, it reflects the capital-focused industrial activity in the country. 69 per cent of this kind of fines had to be paid in the territory of the Environmental Inspectorate of the Central Danube valley.

The pollution fines remained in force after the water load fee had been introduced on 1 January 2004.

#### 6.3.1.4 Summary of the Partly Released Environmental Load Fee Legislation

The Law on Environmental Load Fee (89/2003) is based on the (53/1995) Environmental Protection Framework Law. It imposes burden of payment to those licensed users of the environment that discharge or emit substances into the environment and the loaded quantities are measurable. The Load fee has three types differentiated by the receptor: air, surface water (temporary water-flow as well) and soil.

##### 6.3.1.4.1 Water Load Fee

The Water Users have to pay the fee based on their license data or measurement. The user that discharges into surface water via the public sewerage has to pay the fee to the public waterworks above its current fee.

The base of the fee is the annually discharged amount of specified materials in kilograms. The final volume of the fee is counted by considering the type and weight of each discharged material, the sensibility of the area and the sludge disposal multiplier. The formula: Water Load Fee (HUF/year)= ($M_i$ [kg/year] x $P_i$ [HUF/kg]) x T x I[23] for each discharged material type. The sensibility multiplier doubles the value between the average territory and Lake Balaton. The other protected areas' fee results in no change due to the "T" factor. Sludge disposal multiplier penalises temporary and single-sludge-deposit disposal, and reduces the burden of agricultural, recultivation and compost activities.

The water load fee payment burden can be reclaimed by 50%, in case of public sewerage system investments if the investment reduces the discharged quantity. An investment is eligible for reclaim only if it takes place during the development period, but for not more than 5 years. The rate of reclaim has no connection with the rate of decrease of the given discharged material. According to analysis carried out at MAKK (2003) the structure of the reclaim system will provide an incentive for MWWUs to delay the completion of their wastewater investments in order to take full advantage of the reclaim potential. The regulation gives possibility to lower the calculated tax with cost of purchased quality monitoring equipment as well.

The incentive structure is further complicated by the gradual introduction of the water load fee; the fee starts from 30% of the defined level in 2004 and reaches its full value in 2008.

The central tax office collects the charge. There is no straightforward earmarking of the collected fund in the state budget.

##### 6.3.1.4.2 Soil Load Fee

This type of load fee has to be paid by those dischargers that do not connect to the available public sewerage network and have license to sewage discharge based on municipal water management authorisation or of the water law.

The fee is calculated considering a predetermined unit price, the volume, the sensibility of the area and the risk posed by the different compounded materials. The formula: Soil Load Fee = E [HUF/$m^3$] x A [$m^3$] x T x V[24]. The volume of "A" is based on the purchased drinking water quantity. It can be reduced by the quantity of water used to gardening. Local authorities have the right to reduce the level of the charge or disregard it on social bases. Users of small scale or individual sewage disposal facilities are exempt of paying the fee if their facility fits to the required technical parameters. Risk and sensibility multipliers treat differently the activities authorised by municipality or water directorate. The measurability gives the difference. Locally authorised activities (pe.: households sewage disposal) have no possibility of measuring components, only in case of activities authorised by

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[23] *where $M_i$ – the "i"th materials net discharged amount, $P_i$ – the "i"th material's unit price, T - Territory Sensibility multiplier, I - multiplier of sludge disposal. T and I values are defined by the law's annexes*

[24] *where E is the unit price, A – the discharged amount, T - Territory Sensibility multiplier, V – risk (caused) multiplier. T and V values are defined by the law's annexes*

the water and environmental directorate can the components' load be traced back and charged each. In case of sensibility the local activities have lower risk factors at each sensibility category. The difference grows from 10% to 60% in line with the level of sensibility.

The soil fee charge can be reduced with the charge paid after the amount of sewage that was withdrawn from the discharger's sewage (septic) tank and verified with bills, issued by an authorised sewage (municipal wastewater) collector agent.

In case of both fee type the discharger that runs waste reuse activity (including energy generation) can reduce its payment burden after the reused quantity.

The charge is collected by the central tax office in case of activities under the authority of the regional water directorates. In case of licenses to sewage discharge based on municipal water management authorisation the municipality collects the charges. These local revenues have to be add to the local environmental protection fund, the use of these revenues are restricted to investments to quantity and quality improvement of soil and subsurface water bodies.

No detailed estimation of revenues from the above mentioned fees has been published. The 2004 central budget expects 14 billion HUF (70 million USD) from the three type of load fee, without the revenues of the municipalities.

### 6.3.2 Pricing (tariffs)

There are 2 kinds of pricing systems on water services in Hungary: a volume proportional and a two-component, with a set fixed part and a commodity charge for the water actually used or wastewater actually discharged (volume proportional).

The one component pricing system is disadvantageous for the service provider or for the small users as costs are not recovered in the case of a consumer who uses small amount of water or not regularly, they have to be paid by the other consumers.

The proportion of fixed costs (independent of the water consumption) is high in the water sector, amounting to 65-85 per cent [Szabó 2001]. They occur in connection with the amortisation of facilities, maintenance, book keeping and reading of water meters.

The one component pricing system has however certain advantages, such as its acceptance among the consumers and easy application. The two-component system lacks the former characteristic, but it is more equitable, because everyone pays for availability of the service. In this case the variable component is usually (ceteris paribus) lower than the volumetric system.

However, even in the case of a two-component tariff structure, the portion of the fixed element of the charge within total charges paid is estimated to be far below the proportion of fixed costs in water production and distribution.

In Hungary of the largest MWWUs 71 companies used a constant volumetric water charge, 25 companies used a two-component water charge and 82 companies used a constant volumetric sewage charge, and 11 companies used a two-component sewage charge [VCsOSzSz 2002]. The Ministry of Environment and Water Management sets the prices for the regional providers as one component volumetric ones.

### 6.3.3 Grants and Subsidies

#### 6.3.3.1 Subsidies

The huge cost differences among MWWUs and extremely high costs in some locations have made interaction of the central budget inevitable. Subsidising the operation of the companies is the responsibility of the Ministry of Environment and Water Management. In each year threshold limits for water and sewerage unit costs are determined, and settlements with higher costs receive the difference as a subsidy from the Ministry. The charges paid by the household consumers in the

subsidised settlements are equal to the threshold level of costs in Table 29. Tariffs of non-household users are not subsidized.

**Table 29 Subsidy for Water and Sewage Services**, HUF 2002 per cubic meter

| | 1997 | 2000 | 2002 |
|---|---|---|---|
| Drinking water | 206 | 241 | 240 |
| The sewerage service | 151 | 168 | 194 |
| The two services together | 357 | 370 | 434 |

*Source: BKAE (2002)*

If water and sewerage services both are provided at the settlement, the acknowledged costs of the two services have to reach the combined threshold limit to qualify for the subsidy. This form of subsidisation is addressed to local governments, not to companies. Table 30 shows the evolution of the sum spent on this purpose by the Central Government. Between 1992 and 2002 the subsidy more than tripled in nominal value, but fell back in real terms. This solution means only a slight compensation for W&WW companies and municipalities, (6 per cent of the household sales revenue, even though more than one third of the settlements of Hungary receive this kind of subsidy – but they are usually smaller villages) and not for the majority of the local governments that own water facilities where costs are spread within the area of the company, but they supply some settlements with extremely high unit costs.

**Table 30 Total of Subsidy on Household Water and Wastewater Tariffs**, billion HUF 2002

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total subsidy** | 1.5 | 1.5 | 1.5 | 2 | 2.5 | 3 | 3.4 | 3.8 | 4.1 | 4.5 | 4.9 |
| **In 2002 price** | 6.5 | 5.3 | 4.5 | 4.6 | 4.7 | 4.8 | 4.7 | 4.8 | 4.7 | 4.7 | 4.9 |

*Source: BKAE (2002)*

In practice in each year the Ministry first decides on the aggregate amount of transfers, and then determines threshold values with regard to the sum and the actual claims of local governments.

#### 6.3.3.2 Grants

Local governments can receive grants below 1 billion HUF of "special purpose" (if they meet legal requirements for investment purposes) without fulfilling any other professional, technical or economic criteria. Grants require 40-60 per cent own financial resource of the cost of the project, which can even be other state support like Environmental Fund (Környezetvédelmi Alap Célfeladat) or Water Fund (Vízügyi Célelőirányzat). Above 1 billion HUF only allocation is available that has to be approved by the parliament in order to assure transparency of public funds. With the coming accession to European Union new rules are introduced from 2002. A more effective constraint criteria are set for local governments, they have to dispose at least 15 per cent of project value. The legislation encourages association of local governments with 10 per cent increase of the amount of the grant. Knowing the Hungarian situation, it can be useful to rebalance the current fragmented structure.

- **Grants** from the **Ministry of the Interior**. Local governments can apply for state funding if they meet criteria of Act LXXXIX/ 1992 (amended by LXXXII/2001) on system of grants of special purpose (céltámogatás) and allocations (címzett támogatás) for local governments. Grants of special purpose can be obtained for investments of special interest, to carry out basic functions of local governments, e.g. sewage system, drinking water provision, education or culture. The list of special purposes can change every year. "Allocation" serves for important investments left out of subsidies of special purpose. Grants for sewage investment can only be obtained if the local government can prove that 60% of the inhabitants will be connected to the sewage system 1 year after the start of running, otherwise the grant has to be paid back. From the same point of view, cities where the rate of connection is below 50/km and villages below 30/km of sewer, cannot apply. A recent study (Oko, 2000) argues that the grant system worked inefficiently. The cost

standards were substantially higher than the ex-post analysis of constructions showed. The other problem is the location; the grant system was ineffective in the sense that it did not finance the plans that had the highest wastewater collection effect. It financed too many small settlement projects.

- The **Water Fund** (VICE) was established by the 11/1999 (III.11) Decree of KHVM. It can support for example installing facilities to improve water quality, building and developing public waterworks. In 2001, the amount that can be spent to the previous purposes from the Fund increased from 40 to 50 per cent, but in 2002 went down to 40 per cent.
- The Environmental protection Fund (KAC), according to 28/2001 (XII. 23) Decree of KöM on the use, register and control of KAC, gives also grants for the protection of surface waters by title of aims of environment protection programs. At least 65,5 per cent of the money of KAC have to be spent on these programs (that contains program to protect other elements of the environment). KAC also provides preferential loans to support environmental investments.

## 6.4 Environmental Regulations and Restrictions

### 6.4.1 Quality of Drinking Water

201/2001 (X.25) Gov. Decree on the quality requirements (see also 1.1.1) of drinking water defines deadlines for the national Program of improving drinking water quality. Priority lists were set up with tasks to complete. The first-priority list contains quality improvements to achieve till 25th December 2006 in settlements where arsean (0.03 mg/l), boron (1 mg/l), fluoride (1.5 mg/l) and nitrite (0.5 mg/l) concentration exceed the threshold limit. According to the second-priority list, drinking water has to be improved in settlements where concentration is more than 0.01-0.03 mg/l for arsean and 0.5 mg/l for ammonium. For the other parameters the deadline is 2015.

In Hungary, meeting these European standards will cost 111.3 billion HUF (of investments) according to estimation of experts (at prices of 2001, Koskovics 2002), as great number of inhabitants is involved. 877 settlements and 2.75 million people are concerned with task needing to complete till 2009, but in the whole program 4.42 million people (about 44 per cent of the population). The most critical situation is in South-Eastern region of the country: the population touched by the deadline of 2009 amount to 97.9 per cent in Csongrád county, 89.7 per cent in Hajdú-Bihar county and 79.6 per cent in Békés county.

### 6.4.2 Effluent Quality

Problems occur with effluent quality because the proportion of properly treated wastewater is low. Table 8 shows treatment of sewage collected in public sewerage network by type of purification and the capacity of the facilities. Table 11 represents the whole water cycle, but gives data about the characteristics of industrial sewerage.

The National Wastewater Program earmarks 972.4 billion HUF (of grants) for municipal sewage collection and treatment between 2001 and 2015. From 1993 till 2001 in agglomerations above 2000 p.e. 221.6 (with agglomerations below 2000p.e., 310) billion HUF was spent on collection works and 68.6 (93.1) billion HUF on wastewater and sludge treating and disposal facilities, in total 290.2 (403.1) billion HUF.

# 7 Service Users

## 7.1 MU Customer Types

The official statistical data differentiates between households, other users (public institutions, small business and industry), and industrial (self-supplying "water user" and "PDWS users") users. This chapter deals only with the household (residential) consumption; see 1.3.1 to find out about the other users. The other customer types can be described by the following tables: Table 7 Table 11 what can be found in the text, the population is the group that have special features to discuss in detail.

## 7.2 Population Served

The level of drinking water provision is available countrywide although it differs heavily by water quality and settlement type (see Table 5.)

Wastewater service provision can be described by the classification and the relevant data of the National Sewage Program (see Annex I) there are 682 (660 normal 22 sensitive[25]) agglomerations that exceed the 2000 population equivalent (p.e.) limit of the 91/271/EEC Directive (transposed in the Hungarian legislation with 203/2001 (X.26) Gov. Decree). Among them 284 have no sewerage collection system and only in 373 can be found a treatment facility.

There are 826 (661 normal 165 sensitive) sewage agglomerations below the 2000 p.e.limit, among them 756 having no sewage collection network and only 67 have a treatment facility. In these areas the National Sewage Program indicates individual "state of the art" supplement solutions. The number of less than 2000 p.e. agglomerations without sewage system seems to be enormous, however their wastewater emission represents only 4.17 per cent of the total 14 352 702 p.e.of Hungary. 58.1 per cent of the settlements are involved in wastewater collection[26] and 38.5 per cent in wastewater treatment[27].

Local and regional companies produce and distribute drinking water for the vast majority of households and supply sewerage services for those connected to the existing network. The accessibility of the sewerage service is different between the larger and smaller municipalities. It is widespread phenomena that households do not connect to the sewerage system because of the financial burden it puts on their budget (see Table 35).

The composition of the service and the level of average costs usually differentiate residential users. The average cost of service differs in the central settlement and its outlying areas. On one hand this reflects natural differences of scale and density factors that result in lower per capita investment and operation costs in central settlements. On the other hand, as the distribution of household income shows strong correlation with the population size of the settlements, the willingness to connect is lower in the smaller villages of outlying communities and this results in greater average costs for those households that are connected.

Over 97% of household water consumption is metered. However, in the case of a substantial share of consumers (data not available) consumption is metered by blocks of flats, not by households. The bill is paid by the community of the blocks, and within the community the costs are divided by the number of families, or the number of persons, but do not reflect the actual water use of the individual household. In this case the households has no direct incentives to control or reduce their water

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[25] *Sentive means that a territory or waters have to be defended against nutrients because of eutrofization or the necessity to maintain the possibility of water provision.*

[26] *57.8 per cent if sewage agglomerations below 2000 p.e. are not taken into account*

[27] *38.2 per cent if sewage agglomerations below 2000 p.e. are not taken into account*

consumption. Nevertheless, this practice seems to survive for several reasons. First, there are technological difficulties that may make impossible to install meters in each of the flats (distinct pipes going to the kitchen and the bathroom, etc.). Second, neither the suppliers nor the consumers would stand the costs of installing hundreds of thousands of new meters. Third, even if the problem of installing the meters were solved, experts estimate, that the current costs of checking the consumption by households and sending hundreds of thousands more bills in every two months would offset the saving of slightly decreasing consumption at an aggregate level. Fourth, suppliers are disinterested in this solution, since beyond the additional costs of billing, they were faced to rising average costs of water supply, as well, because of the lessening rate of exploitation of the existing capacities.

Settlements, where recreational activity is dominant, face a special problem. Because of the seasonal fluctuation, of the number of the population, wastewater services have to be tailor-made. However implementing sewage collection and treatment facilities for these holiday resorts is not included among the objectives of the National Wastewater Program. People in these areas do not accept the two-component pricing system. They find it unequal to pay a fix charge when they do not use the service. However it can be just, because the construction and maintenance cost of a network has to be covered.

**Table 31 Per Capita Water Consumption of the Population Between 1994-2001**, cubic meter/year

| | **1994** | **1995** | **1996** | **1997** | **1998** | **1999** | **2000** | **2001** |
|---|---|---|---|---|---|---|---|---|
| **Quantity** | 43.4 | 41.3 | 38.4 | 36.9 | 36.8 | 36.6 | 38.4 | 37.3 |

*Source: KSH Env. Statistics*

The growth of the drinking water and sewerage rate caused serious drop in the water consumption (see Table 31). However it hides great differences, because in the capital the consumption reached 65.7 cubic meters per year, while in small settlements only 18.25. This caused a decrease in the exploitation of the existing sewage works. By defining the capacity of new works, the local governments are rarely taking into account the possibility of gradual expansion, so the new works are also hydraulically not exploited.

Altogether less than 80% per cent of the population with connection possibility joined the pipe network (see Table 10). Wastewater service provider can increase efficiency of their operation if they convince people to connect to the existing network. The source of efficiency gain is presented in the second row of Table 32.

**Table 32 Proportion of Flats Connected and Not Connected to Sewage System Compared to the Sum of Flat in Territory Provided with Wastewater Service**

| | **1998** | **1999** | **2000** | **2001** |
|---|---|---|---|---|
| **Flats connected** | 0.63 | 0.64 | 0.65 | 0.66 |
| **Flats not connected** | 0.12 | 0.15 | 0.15 | 0.11 |

*Source: OVF (2002)*

The low proportion of connection decreases further the exploitation of the sewage disposition and treatment system. The low exploitation results in high specific costs and high rates, which forms a vicious circle. To get out of this situation, the conditions of grants for sewage investment became stricter and now depend on the connection rate to the network (for details see 6.3.3).

## 7.3 Financial Conditions

Table 33 shows expenditures on water and wastewater compared to net income of the different deciles of the population[28].

**Table 33 Estimated Average Household Expenditures on Drinking Water as a Percentage of Net** (after tax) **Income by Income Quintiles**

| Deciles | 1st decile | 1st quintile | 2nd quintile | 3rd quintile | 4th quintile | 5th quintile | 10th decile | Average |
|---|---|---|---|---|---|---|---|---|
| **1997** | 2.05% | 1.91% | 1.72% | 1.62% | 1.54% | 1.49% | 1.47% | 1.42% |
| **2001** | 2.9% | 2.5% | 2.2% | 2.1% | 1.9% | 1.3% | 1.1% | 1.8% |

*Source: KSH (2002), KSH (1998)*

**Table 34 Cost Burden of Public Water Service as % of the Average Net Household Income by Region (2001).**

| Region | Central Hungary | Central Dunantul | Western Dunantul | Southern Dunantul | Northen. Hungary | NorthenAlfold | Southern Alfold |
|---|---|---|---|---|---|---|---|
| Average W&WW fee / year HUF | 30270 | 27405 | 28943 | 26469 | 23151 | 22391 | 21609 |
| Annual cost per household / Average Net Income | 2.0% | 1.8% | 2.0% | 2.0% | 1.8% | 1.6% | 1.5% |

*Source: KSH (2002)*

According to Table 35 the rate of public water service expenditures relative to low income of the households exceed 3 per cent ratio, which is said to be acceptable by international studies.

**Table 35 Rate of Public Water Service Expenditures Relative to Income**

| | **% of Average income** | **% of Low income (66%)** |
|---|---|---|
| Expenditures at average fee and average consumption level | 2.2 | 3.4 |
| Expenditures at high fee and high consumption level | 4.2 | 6.4 |

*Source: BKÁE (2002)*

[28] *The 1st quintile is the poorest one*

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# 8 Policy Issues

## 8.1 Economic Perspective

### 8.1.1 Efficiency

The decrease of consumption in the whole water sector - household and industry as well - over the last decade is due to price increases, economic decline and technology changes. The operation of the networks shows inefficiency, as the served quantities are very low, comparing to the capacity of the facilities. The efficiency situation is even worse than the sole effect of economic changes would indicate as future system capacity requirements were already overestimated at the last National Water Management Materplan in the 80's.

The sewage service has to cope with the scale problem as well: the utilisation of treatment (especially hydraulic) capacities is low, in consequence of the low level of drinking water consumption, however the pollution concentration of waste water is increasing The connection rate of households has improved due to government actions, but still there are possibilities in this field. Under-utilisation of the existing capacities also drives unit costs up and decreases the willingness of households to make additional connections to the system. Regarding sewage treatment, additional asymmetries were generated in the 90s (when e.g. treatment plants have been built for a middle size town and the surrounding villages, while the network of pipes covers only a part of the town), as an adverse effect of the grant system.

### 8.1.2 Equity

The transformation of the institutional frame of waterworks service has resulted in large differences in tariffs for both services, occasionally even in one service district. This situation is based in part on scale differences of service providers and natural circumstances, but the different quality of management, and local political consideration as well. It is highly problematic that the price of a basic service can vary in the same area even twofold just because of ownership differences. This is an equity question, but this problem roots in the weak and unequal regulation measures.

To a limited degree, the Central Budget provides payments to compensate inequalities between high and low cost areas. In this way the state spreads above-limit-costs over a larger number of population, that local governments cannot achieve. This system, however, raises another question of equity, since above limit costs often originate from the fact that local actors lack the incentive of negotiation and to reach agreement in small-regional distribution problems, or simply there is a bad management, and as a result, taxpayers in general cover extra costs.

The non-use of (even) the newly built networks also generates equity problems. The present practice penalises the ones who co-operate, use the (new or upgraded) service and do not cause extra environmental harm.

### 8.1.3 Sustainability – Stability of Operation

From its political perspective there is no clear cut (and widely accepted) view on how the cost burden of the whole network restoration, upgrade and expansion will be distributed among users and the state budget. The driving force of recent development policy is the criteria of the EU accession, embodied in the National Wastewater Program, and the will to intake the accompanied EU funds. Meanwhile the financial requirements of these funds that will bind future users together with the enforcement of Water Framework Directive's cost recovery principle limits the possibilities of future considerations. But the prospected effect of these requirements on service costs has not been widely recognized yet.

This situation gives weak ground for discussions about the role of private capital in the service. Recently private capital participation is allowed up to 49% in municipality owned service providers, but this arrangement avoids answering some basic questions. The limit on private ownership is

intended to protect the position of municipalities to control the services they are responsible for. At the same time, more threat to the service originates from the public owners lack of market regulation skills and the weak, unclear financial position the municipal sector has. Lack of skills keeps municipalities back to protect users' interest through regulation without exercising ownership rights and being involved in the operation and financial matters of a service itself. Weak financial position makes the municipalities unable to accomplish long term financial policies that result in dependency of the government initiated and financed programs (and in more or less natural misallocation of investment sources). Both leads to strong demand for capital involvement, but the lack of own resources pave the way toward bad and disadvantageous conditions of any type of capital provision. This is what really hurts users interest.

## 8.2 Policy Fields

### 8.2.1 Economic Regulation

Local governments have widespread licenses in service provision, but at the same time they incorporate conflicting interests that reduces their ability for efficient regulation.

Letting short-term interests prevail can lead to serious problems, just like in the case of un-accounted amortisation costs, or the shift of infrastructure rent to operation expenses.

Setting cost covering prices would increase charges - which have grown already to a relatively high level compared to household income (even in an international comparison) - to secure sound future operation of the services, can become a serious local political issue. It can be very unpopular and the political costs for local leaders can also be high.

Their ownership role conflicts with their obligation to protect consumer's interests. Moreover, local governments have insufficient knowledge to effectively regulate local monopolies neither on cost control nor on price issues.

The system of subsidy worsens the problem, because local governments can obtain subsidy to household prices above an annually defined threshold limit that reduces the incentives to organise the operation in a more efficient way.

Central Government institutions have small terrain to influence local governmental decision on long-term operation issues. Although a new act is under evaluation that initialises a regulation office with extended licenses to investigate and issue general rules about the experienced mis-functions, the main problem of local service provision is the ever-changing financial conditions of central budget mechanism. It is very difficult if not impossible to make long-term financial plans - municipalities have no substantial own source – that paves the way to the questionable shortsighted decisions.

### 8.2.2 Cost Recovery/Economic Sustainability

Fees more or less cover the costs of present operation, but not the restoration or upgrade of the existing infrastructure.

Since amortisation is equivalent to future costs (assuming that past investment costs are equal to future replacement investments), this element can be most easily disregarded when charges are expected to match costs, although delayed or missing repairs can endanger future service quality. Moreover, the current level of accounted amortisation cost is far below the necessary level, because political considerations prevent local governments and the state as well from taking it into account.

There is no uniform appraisal of the capital value for infrastructure, but neither is the responsibility clarified on the administrative level, which has to accumulate the necessary fund to the long-term maintenance of infrastructure. The owner status is only one side of the problem as the municipalities lack the own financial sources that are proportional with the required tasks.

The problem could only be solved by a clear, sector-specific regulation of capital assessment and amortisation rules. New rules need to be elaborated to make incentives for the local governments to have a long-term approach. Therefore subsidy systems have to be modified in a way to enforce more efficient management. Local governments should receive state funds only if their pricing system can assure resources for the future operation and they can prove that rent or accounted amortisation cost was spent on maintenance or new investment of waterworks. Furthermore, gradual operating efficiency improvements can also be required (if they are feasible) just as it happens for some other regulated services, e.g. electricity distribution.

It is in relation with economic sustainability and equity as well, the interests of future generations have to be regarded, meanwhile step-by-step introduced cost recovery schemes can provide redistribution between the present and a wealthier generation.

### 8.2.3 Tariff Structure

Many of the users have not yet accepted the two-component tariff structure. The price of the constant element that represents the cost of the possibility to be connected to the service is debated, especially in case of temporary/seasonal use.

The distribution effect of shifting to this tariff structure is beneficial for the users of bigger quantities, because the burden of capital and fixed costs should be covered user by user on an equal basis not on the basis of consumption. The higher cost this structure imposes on small quantity, low income user groups will very likely fall back on the provider, or the central budget, through non payment, that is why only few actors are keen on the issue. There are, nonetheless, examples of two-part tariffs in Hungary, but mostly at more effluent locations.

As a result of the debts of consumers, even if the charges per unit of consumption matched the costs per unit, actual revenues from charges would not fully recover the costs. In Hungary these debts were estimated to be above 10 per cent of the overall revenues regarding the member companies of VCsOSzSz at the end of 1998 [Papp, 2000]. Therefore rising the charges would not only increase the rate of non-payment, but at the same time debts will motivate companies to raise charges further, in order to increase overall revenues and cover their current costs, and this process can start a “vicious circle”. The firms' bargaining power is weak as legal and technical constraints make it impossible to completely stop providing drinking water for households.

Lastly, the application of two-component tariff systems should be introduced if politically and economically viable rules can be applied for distribution of capital costs among users.

### 8.2.4 Cross Subsidy

Though overall revenues from charges almost match current costs, this does not apply for household charge. Generally, the price paid by households for drinking water is lower than that paid by other users (see 3.1). Cross-subsidisation in favour of households can be explained by political considerations of local governments, but service providers may also be interested in this solution, since debts of households is more difficult to collect. Cross-subsidisation is considered acceptable from a social aspect, but it is counter-productive in the sense that it increases the costs of the firms.

### 8.2.5 Benefits Commensurate with Costs

A sustainable water and wastewater service will benefit future generations (by its economic and environmental effects) rather than the recent one, meanwhile costs – relative to economic production – are higher for the recent users. A gradual approach would be the solution, but the EU accession process drives it to the opposite extreme.

The quick satisfaction of sector specific (especially wastewater) standards gives less opportunity to “complex” considerations that have beneficial by-products. Development programs – especially in the countryside, where land and workforce are relatively cheaper than technology – should examine not only the efficiency perspective of the water sector, but of the small local economies’ perspective as well. The different technology solutions have different distribution effects on the population of a given area, through the natural resource and workload they use. The National Wastewater Program defines

the necessary conditions of the decision between building a local network and a connection to a bigger one. The measure is based only on the investment and operation cost comparison, and neglects the involvement of externalities and the consequences of considerations behind the sustainability principles.

### 8.2.6 Administrative Units

The split of the regional or multi-settlement networks was based on the cost components of the existing networks, but development and investments to restore the systems will show economies of scale again.

The big number of MUs causes extra cost at least in the co-ordination of water basin wide operation. This structure increases the possibility of overuse of the natural water resource base of the given area due to less transparent basin wide operation. This risk can be lowered only through stricter regulation and control; otherwise the cost will be paid by the whole society.

One possibility for reaching economies of scale again, in theory, is forced centralisation (by restrictive economic means), but this strategy may be rather counter-productive as local governments will accept it only with strong contra feelings because of their past experience. (The system of self-governance has worked for merely 13 years.) It is proven on other fields of local service that they defend their independent institutions in a way that may hurt their own economic interests. A graduate, co-operative process of revealing the common interests of local governments in regional operation is needed. It should be supported by the system of grants, like the recent legislation earmarked more money for associations of local governments. Furthermore, cooperation through long-term contracts, as opposed to mergers of legal entities, may be an attractive option for local decision makers. A good example for this is waste management: especially smaller local governments are happy to contract “outside” companies for this service, without retaining their own landfills or even collection systems, in exchange for economic gains and improved service quality.

## 8.3 Policy Recommendations and Evaluation

In this chapter we draw some policy recommendations that reflect the problems listed above. Single policy recommendation rarely reaches the desired goal, rather results can be expected from a group of jointly issued measures. We try to follow this concept. The headings below refer to themes of the previous policy field discussions in Chapter 8.2.

### 8.3.1 Economic Regulation

Experience: misallocation of financial sources of sewerage investments

Recommendations:

Clear long-term central budget conditions of the service provision

Tighter supervision by regulators pe.: State Audit Office

| Strategy Description | Comment/Concerns |
|---|---|
| Clear long term central budget conditions of the service provision | It enhances long term local planning and co-operation instead of "now or never" type grant applications. |
| | The state's role in this service is not yet a relaxed public opinion; the question can (and should) generate political debate. |
| | It touches a lot of unsolved agenda so the process can be easily stalled. |

*Gabor Ungvari; Zsuzsanna Mohai /MAKK*

| | |
|---|---|
| | It reduces the chances of politicians rent seeking possibilities. |
| Tighter supervision by regulators pe.: State Audit Office | It does not necessarily mean new organizational elements, rather sources to increase the ability of quick supervision of the processes. |
| | Meanwhile the control / supervision of characteristic service provision types with additional control licenses to central regulator would be beneficial. |

### 8.3.2 Economic Regulation/Cost Recovery/Economic Sustainability

Experience:

Lacking financial strategies to obtain own sources for investments in the medium and long run.

Recommendations:

Regulatory frame in order to push owners to start accumulate funds for future investments.

Provide information to owner municipalities about possibilities of financial markets to better represent the interest of present and future generations.

Earmarked increase of tariff for restoration, replacement.

| Strategy Description | Comment/Concerns |
|---|---|
| Regulatory frame in order to push owners to start accumulate funds for future investments. | These elements are useful, but they must be issued in a joint package. Single elements can result in loss of accumulated capital, misuse, or public opposition against additional tariff increase. |
| Provide information of owner municipalities about possibilities of financial markets to better represent the interest of present and future generations. | Municipal assemblies are not the best organisations to bring unprecedented financial decisions, the decentralisation of this function without clear responsibilities and credibility inside the municipal administration the efficient management of these funds cannot be solved. |
| Earmarked increase of tariff for restoration. | This measure can increase transparency, with a wider public negotiation of goals, which may not be in the interest of the management, or the owners, although that's what the Water Framework Directive initiates. |

### 8.3.3 Tariff Structure/Cross Subsidy

Experience:

Unexploited efficiency gains in the current operation, blocked by social considerations that the gains may compensate.

Recommendations:

Reconsider the conditions of current subsidy scheme of villages with extra high tariff.

Two-part tariff with low and high fixed block.

| Conditions to be benefited from subsidies on social bases. Strategy Description | Comment/Concerns |
|---|---|
| Reconsider the conditions of current subsidy scheme of villages with extra high tariff. | The compensation in its present form does not push municipalities toward co-operation or strategies for increased efficiency |

| | |
|---|---|
| | The central budget intervention could be (partly) constrained to those areas, where the integration of these sub networks to a wider network would cause unproportional increase in tariffs of the whole, in other cases the possibility of local negotiations can be expected. |
| Two-part tariff with low and high fixed block. | In strict economic perspective differentiation in the burden share of fixed cost is not efficient, but in case of low consumption, worse off users, lower tariff may result in higher revenue stream for the service provider. On a wider perspective see the sustainability considerations in 8.3.5. |
| Conditions to be benefited from subsidies on social bases. | Public acceptation results more stable operation, meanwhile it has to decide whether the municipality or the provider have to bear the cost of preferential tariff decreases. If only the municipality takes the burden it can inspire service provider to be less keen on bill collection. |

### 8.3.4 Benefits Commensurate with Costs/Sustainability/Administrative Units

Experience:

There are user groups that would be worse off by applying any type of economic reform proposal that points toward more stable and sustainable operation of the waterworks. With its local political consequences it may block any reform effort. To provide low income consumers with off-network solutions results in lower public cost then if they quit the service in random ways.

Recommendations:

Create guidelines with official backing on proportional allocation of costs between different consumer groups. These guidelines should provide information on how to match policy goals (express local values) with suitable rules of financing the operation, in order

- to facilitate self-reorganisation of the network for efficiency gains, or
- to create alternative ways to exit existing technical solutions of the networks on their edges.

| Strategy Description | Comment/Concerns |
|---|---|
| Facilitate self-reorganisation of the network for efficiency gains | Communities can distribute common burden to citizens several ways, local rules and non-economic elements may override the described traps. |
| Create alternative ways to exit existing technical solutions of the networks on their edges | This can take the form of: applying new small scale ecology driven solutions for small settlements, adjusting land-use patterns for safer resource use and harness ecological services of abundant local access to land (pe: Target oriented use of new financing possibilities of EU) |

### 8.3.5 Sustainability Principles

Experience:

Present networks were designed and built in a different state of the society and different perspective on environmental resources use (sustainability) than now. This situation is accompanied with technology development as well. These changes pose question how to adapt network structures to these new conditions and requirements. Solutions that involve joint means not just of the water sector can give

better outcome. It has effect on what direction to develop the networks and for different user groups it may result in accumulating capital for different purposes on different time scales.

Recommendations:

Bottom-up virtual re-planning of water system of the serviced area.

Estimate potential sustainable water supply of sub (river, stream...) basins of the service area

Tariff changes for efficiency gains have to be issued together – in package – with local initiatives that targeted more sustainable environmental resource use of the district.

| Strategy Description | Comment/Concerns |
|---|---|
| Estimate potential sustainable water supply of sub (river, stream...) basins of the service area | Ecologists use the term potential vegetation that refers to the "natural" land cover of a given territory. In this sense the potential exploitable water resource of a sub basin is countable by its present and a targeted future status based on the area's environmental resources (land use pattern and ecological quality). This volume is considered as a threshold to decide on. |
| Bottom-up virtual re-planning of water system of the serviced area. | The disposable water resources of a given sub-network area and the adaptation capabilities of users defines whether a separate system or a connected network could give suitable solutions. |
| Tariff changes for efficiency gains have to be issued together – in package – with local initiatives that targeted more sustainable environmental resource use of the district. | Smaller consumption and extensive land-use gives the opportunity to the community to benefit from cheaper waterworks solutions that are based on the area's ecological services. (It usually provides other positive extern effect to local economies as well.) |
| | Even in case of over-demand, if there are consumers which want to use W&WW services over the region's sustainable (per capita) capacity thresholds, they could be the burden taker of the more expensive additional system. It gives rational and proportional differentiation (pe.: in fix tariff components) that recently has no means to measure. |

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# ASSESSMENT AND DEVELOPMENT OF MUNICIPAL WATER AND WASTEWATER TARIFFS AND EFFLUENT CHARGES IN THE DANUBE RIVER BASIN.

## Volume 2: Country-Specific Issues and Proposed Tariff and Charge Reforms: Hungary – Case Study

UNDP GEF

WORKING FOR THE DANUBE AND ITS PEOPLE

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REGIONAL
PROJECT

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## PREFACE

The Danube Regional Project (DRP) consists of several components and numerous activities, one of which was "Assessment and Development of Municipal Water and Wastewater Tariffs and Effluent Charges in the Danube River Basin" (A grouping of activities 1.6 and 1.7 of Project Component 1). This work often took the shorthand name "Tariffs and Effluent Charges Project" and Phase I of this work was undertaken by a team of country, regional, and international consultants. Phase I of the UNDP/GEF DRP ended in mid-2004 and many of the results of Phase I the Tariffs and Effluent Charges Project are reported in two volumes.

Volume 1 is entitled *An Overview of Tariff and Effluent Charge Reform Issues and Proposals*. Volume 1 builds on all other project outputs. It reviews the methodology and tools developed and applied by the Project team; introduces some of the economic theory and international experience germane to design and performance of tariffs and charges; describes general conditions, tariff regimes, and effluent charges currently applicable to municipal water and wastewater systems in the region; and describes and develops in a structured way a initial series of tariff, effluent charge and related institutional reform proposals.

Volume 2 is entitled *Country-Specific Issues and Proposed Tariff and Charge Reforms*. It consists of country reports for each of the seven countries examined most extensively by our project. Each country report, in turn, consists of three documents: a case study, a national profile, and a brief introduction and summary document. The principle author(s) of the seven country reports were the country consultants of the Project Team.

The authors of the Volume 2 components prepared these documents in 2003 and early 2004. The documents are as up to date as the authors could make them, usually including some discussion of anticipated changes or legislation under development. Still, the reader should be advised that an extended review process may have meant that new data are now available and some of the institutional detail pertaining to a specific country or case study community may now be out of date.

All documents in electronic version – Volume 1 and Volume 2 - may be read or printed from the DRP web site (www.undp-drp.org), from the page Activities / Policies / Tariffs and Charges / Final Reports Phase 1.

We want to thank the authors of these country-specific documents for their professional care and personal devotion to the Tariffs and Effluent Charges Project. It has been a pleasure to work with, and learn from, them throughout the course of the Project.

One purpose of the Tariffs and Effluent Charges Project was to promote a structured discussion that would encourage further consideration, testing, and adoption of various tariff and effluent charge reform proposals. As leaders and coordinators of the Project, the interested reader is welcome to contact either of us with questions or suggestions regarding the discussion and proposals included in either volume of the Project reports. We will forward questions or issues better addressed by the authors of these country-specific documents directly to them.

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# Table of Contents

## List of Abbreviations

| | |
|---|---|
| AC | Average Cost |
| ASTEC Model | Accounts Simulation for Tariffs and Effluent Charges Model |
| CR | Cost Recovery |
| D | Demand |
| EDV | Eszak-Dunantuli Vizmuvek, North-Transdanubian Waterworks, the site of the case study |
| HUF | Hungarian Forint, the currency of Hungary |
| MC | Marginal Cost |
| MCP | Marginal Cost Pricing |
| MEWM | Ministry of Environment and Water Management |
| MU | Management Unit |
| RU | Regulatory Unit |
| RWW | Regional Water Works |
| SU | Service User |
| T1 through T8 | The territorial categories applied in ASTEC modelling |

# 1 Description of the Case Study Area

## 1.1 Brief Historic Overview

The examined area is a sub-system of the North-Transdanubian Waterworks (Eszak-Dunantuli Vizmuvek, EDV)[1]. It is situated along the Danube riverbank where two towns and four villages are located, as well as several small communities uphill from the river. The total population of the district is around 80 thousand, half of the population lives in the two towns, and the other half in the villages, with populations between 500 to 5000.

There are different kinds of heavy industry in the region with high volume water consumption (machinery, glass production and power plant). All of them have their own water extraction facility and some of them have their own treatment plant as well.

The district is a mix of state and local government owned subsystems, that (except for a few network elements) are operated by a state owned regional water works company (RWW). The dominant owner of the network is the state. The basis of the district is the regional water supply network that provides water from a bank filtered water basis and a carstic well to the whole area and sells water to supply a handful of small communities on the territory of the neighbouring regional system.

The sewage systems of the district show a more complex picture. The towns and the villages next to them are serviced by a state owned network, operated by the regional waterworks company . The other sewage systems service small groups of (one to three) municipalities, these are owned by the municipalities. The RWW and a private firm run these small networks (based on concession contracts). The RWW deposits the sewage sludge of its treatment plants on the landfill of the region's solid waste management firm.

The examined area is part of a bigger service district where the mentioned state owned RWW is the dominant service provider of both water and wastewater. Its network is separated from other districts of the region, and it consists of two operation sub-units.

The predecessors of the RWW date back to the 19$^{th}$ century. The unification process of the region's small waterworks started early in the 60's, and later during the decade a county wide service provider was organised that operated all of the public water utilities of the county. Due to the development program of the water utilities in the region its service districts reached beyond the administrative boundaries of the county. Due to the ownership transfer of state property to the municipalities, some of the new owners withdrew their sub-systems from the RWW's operation. The examined area has approximately 25% of the total population serviced by the company.

## 1.2 Grouping of Territories and Users inside the Case Study Area

### 1.2.1 Description of Territories

To make the upcoming discussion easier to understand I show a territorial categorisation of the created service user (SU) groups which reflect the most important patterns of service provision. These groups will provide the base for the model's territorial differentiation.

T1. Town A - Centre

T2. Town A - suburban area

T3. Town B

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[1] I would like to acknowledge the time and efforts of the colleagues at the Eszak-Dunantuli Vizmuvek Rt to provide us the required information to evaluate this case study. The basic data was provided by EDV Rt regarding a wider territory than of the company. The calculations and the conclusions express the opinion of the author, not necessarily coincides with of the company.

T1,T2,T3 are the core settlements of the service area with 53% of the service area's population. The reason of splitting them into three is the allocation of cost elements. T1 and T2 have a common drinking water supply branch, while in case of the sewerage network T2 and T3 are components of a local system.

T4. "Mountain" group of 9 villages. These villages are on the same branch of the drinking water network. There are three small sewage networks that service six of them. In the remaining three villages sewerage substitution modules have to be developed until 2015.

T5. A village next to Town B, where the sewerage system will be built with connection to the treatment plant of Town B

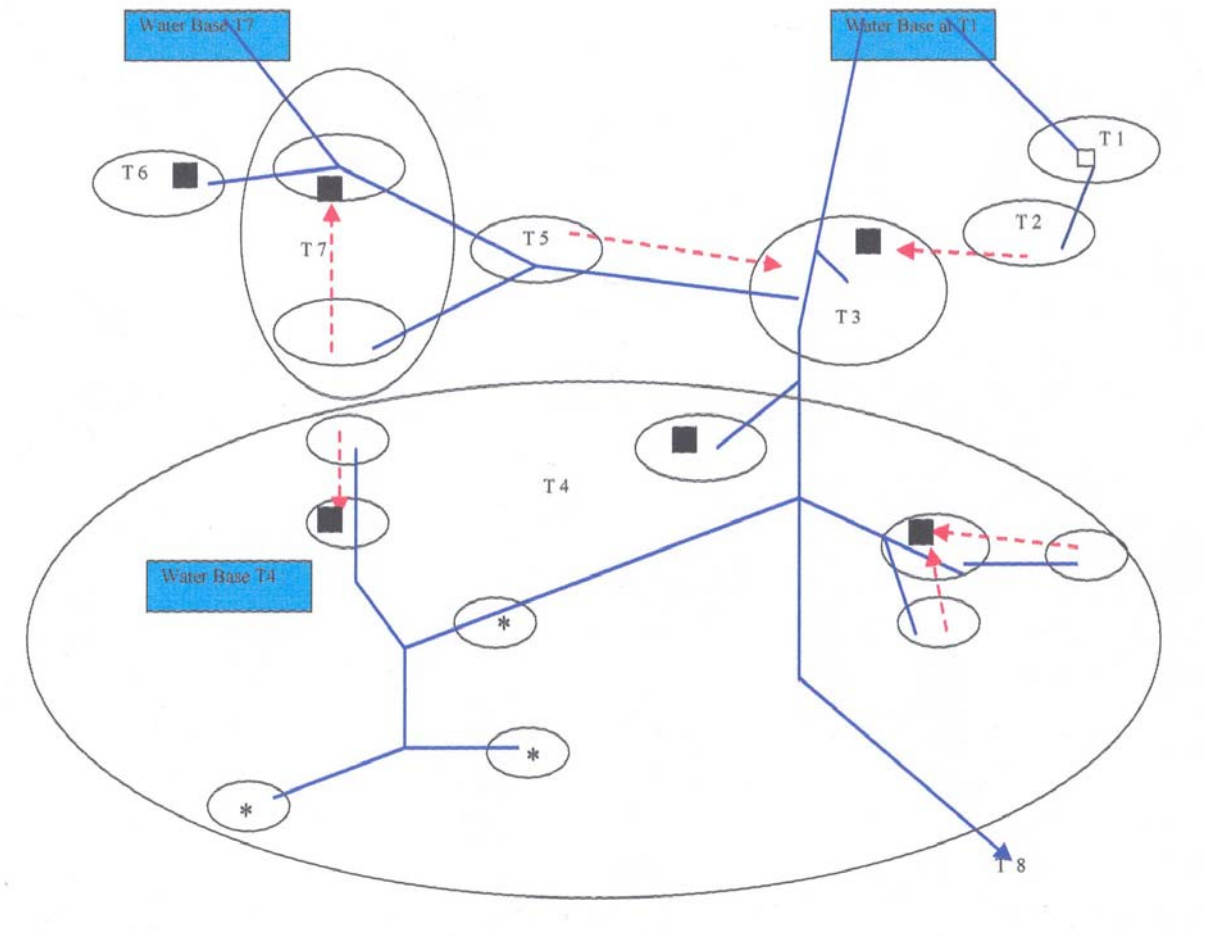
T6. A village at the end of the network where the regional provider supplies drinking water and it operates the wastewater system of the municipality

T7. Two villages, where the regional provider supplies the drinking water and a private firm services the wastewater.

T8. Three off-border villages, the waterworks sell drinking water to another waterworks to supply these villages.

Basic data in the territory units is organised by households, public institutions, big industrial users (if there is any) and other industrial users. The grouping inside one territory unit is based on the quantity and the drinking water/sewage production similarities (the households always appears as an independent group).

**Figure 1 The Map of the Service District**




Legend: Circles: municipalities Tx: territorial groups of analysis, the description is in the main text.

Blue (constant) line : drinking water network.

Red (staggered) line : sewerage networks.

Square: treatment plant. Star: there will be no sewerage network, only substitutions

### 1.2.2 Desription of Management Unit (MU), Operation Units (OU's), and Regulatory Units (RU's)

#### 1.2.2.1 Water Supply

The water supply network is one system, although it is operated from two bases. Accordingly, it consists of two Operation Units. These units are responsible for maintenance, customer relations, metering and the service of information. OU 1 is responsible for territories T1, T2, T6 and T7, OU 2 comprises T3, T4 and T5.

The MU of the case study district is the centre office of the RWW (that is located outside the area). It runs the networks, decides on the necessary development investments from a technical point of view, but it has to reach agreement on financial conditions with the owner - the Ministry of Environment and Water Management (MEWM). The Ministry has MU licenses as it exercises the right to set prices (annually by the modification of the concerned decree), decides about the amortisation measures. In the past it provided financial sources of large development investments through grants and preferential loans (the details see later).

The RU licences on drinking water supply are delegated to the owner, the Ministry of Environment and Water Management.

#### 1.2.2.2 Sewage System

Operation Units.

There are seven networks (collection and treatment included) in the area. Two of them (at T1 and T3 ) are owned by the state. The other five networks belong to the municipalities. Six of the networks are operated by the RWW. One system (at T7.) is operated by a private service provider.

The function defined as of the MUs are allocated among several actors. There are two MU's that have the responsibility on operation issues. These are the RWW and the private sewage service provider of T6. The owners of the infrastructure have MU licences on tariff issues. In T1,T2,T3 the Ministry of EWM has these licenses, in the other areas, from T4 to T7 the municipalities have this right each by each. The municipalities' have concession contracts with the service providers that define the algorithm of price modification.

The municipalities and the MEWM have RU licences over the sewerage networks they own.

### 1.2.3 Service Users

#### 1.2.3.1 Households

The household groups mean residential customers in territory 1 to 7 (except 5). The portion of joint metered apartment buildings is very low. The division of households follows the territorial units. The average consumption based on the year 2001 is 84 $m^3$/household(max 100 $m^3$/household, min 75 $m^3$/household).

#### 1.2.3.2 Non-Household Groups, Public Institutions

I create public institution as a single consumer group only in T1 (the biggest town in the area). This is because public institutions are concentrated in the towns, the proportion of their consumption in the villages are very low. In T3 however the small scale industry and the public institutions have similar water consumption/sewage production patterns, therefore there was no reason to differentiate among them. The group called "other" aggregates their consumption.

#### 1.2.3.3 Industry

There are some big industrial users in the area and several small ones. The big ones locate in T1, T3 and T7. All of them have access to the drinking water network, two have their own water extraction facilities and all of them have installed pre-treatment devices on wastewater outflow to the public network.

Industry "A" locates in T1. It is a heavy industry site. It has its own wells, applies advanced water re-circulation technologies to optimise water consumption. The factory has a pre-treatment plant and loads the sewage to the public sewerage system. For modelling purposes water use and wastewater discharge are handled as independent services.

Industry "B" in T1 was distinguished from all other industry. As their consumption pattern differs from Industry "A", for modelling purposes water use and wastewater discharge are handled as composite services.

Industry "C" in T3 is a pharmaceutical factory. It has water supply from the public utility and has its own treatment plant.

In T7 there is a glass producer, that consumption is 12% of the territories' consumption and 62% of the industrial consumption, but the 15-group model capacity prescribe the compromise of merging all non-household customer and this is the smallest "big" industrial user. Cost allocation of the Spreadsheet model is based on the flow quantities a specific network element can be associated with. Big industrial users' cost structure includes their location's distribution and collection costs with a smaller weight (20%).

#### 1.2.3.4 Purchase of Water

T8. The regional waterworks purchase water, and transfers it to the neighbouring regional waterworks.

### 1.2.4 User Groups in the Spreadsheet Model

**Table 1 The Main Characteristics of the Defined User Groups in the Year 2001**

| User groups | No. of units | Drinking water consumption in thousand $m^3$ | Sewage quantity in thousand $m^3$ | Consumption pattern of drinking water and sewage services |
|---|---|---|---|---|
| Households in T1 | 7200 | 626 | 488 | Composite |
| Public in T1 * | 610 | 313 | 283 | Composite |
| Industry A in T1 | 1 | 31 | 156 | Independent |
| Industry B in T1 * | 322 | 161 | 127 | Composite |
| Households in T2 | 1862 | 167 | 103 | Composite |
| Households in T3 | 4968 | 387 | 315 | Composite |
| Industry C in T3 | 1 | 356 | 315 | Independent |
| Other small users in T3 | 369 | 163 | 136 | Composite |
| Households in T4 | 5529 | 417 | 175 | Composite |
| Other users in T4 | 247 | 98 | 8 | Independent |
| Households in T6 | 295 (12) | 26 | 20 | Composite |
| Households in T7 | 2948 | 295 | - | - |
| Other small users in T7 | 227 | 105 | - | - |
| Purchasing water to T5 | 941(53) | 99 | - | - |
| Purchasing water to T8 | - | 174 | - | - |

** Number of all non-households are divided by their consumption*

# 2 Scenarios

## 2.1 Lines of Investigation

**Baseline scenario**

Current operation

> This scenario deals with the current operation for up to one year. Computed cost include variable costs, that change as the serviced volumes change, and fixed costs that do not change with the volume of the services, but are necessary conditions of running the networks (i.e. salaries, maintenance). This scenario does not include capital costs of assets or amortisation.

**Economic sustainability scenarios**

Medium term economic sustainability

> This scenario incorporates capital cost elements up to seven year lifetime. Volumes and tariffs are computed with the Cost Recovery requirement[2].

Long term economic sustainability

> This scenario consists of all the capital cost of system elements that are shown in the RWW's book and system elements of municipalities owned networks that the RWW operates on a contractual basis. Capital costs are computed assuming that the necessary assets to cover future investments were provided from the capital market (present value of 4% real interest rate). Because the sewerage network of T5 will be completed next year, the long term restoration cost of this network part is included. Volumes and tariffs are computed with the Cost Recovery requirement .

Sub-scenario: Extra Investments for further nutrient load decrease on the long run

> Although this service district is not ranked as sensitive territory, the scenario shows increased economic burdens if third phase (nutrient load reduction) devices were introduced. Volumes and tariffs are computed with the Cost Recovery requirement.

**Distribution of cost burden**

This analysis is based on the allocation of costs among the distinguished network parts (T1-T8). In the current situation there is a flat tariff for all the drinking water users and flat tariffs respectively by ownership. The baseline scenario spreadsheet model counts the distribution effects of this tariff. The model reflects the present financial flow, without cost recovery condition.

**Efficiency gains of tariff structure reform**

The Medium term sustainable scenario is the basis of the comparison of Cost Recovery and Cost Recovery with marginal cost pricing scenarios. This comparison intends to show the efficiency changes and the distribution effect of an optimal two-component tariff structure.

**Incentive measure to increase connection rate to the sewerage network.**

This analysis is based on the previous one. As an additional feature, it counts the volume of a specific charge targeting households that do not connect to the sewerage network in spite of technical possibilities.

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[2] *Without Marginal Cost Pricing*

## 2.2 Economic Sustainability

### 2.2.1 The Current Practice

During the pre-transition period the development of the system and the large scale maintenance needs were financed from state sources. The transformation of the service providers into the market compatible form of joint stock company raised the question of valuing the system's assets. The assets were revalued in 1996. This forms the basis of our calculation on infrastructure.

The company operates system elements (both water and sewage) on a contractual basis; the amortisation value of these are negotiated with the owner municipalities. Amortisation is collected as part of the tariffs and usually the company itself uses the sum for maintenance. No additional funds are set aside by the municipalities for this purpose.

Although the economic context has changed, some of the pattern of financing still remained. It was the result of the valuation that an amortisation constant multiplier of 0.3 was created. This is the sum the owner allows to impose for generating revenues to cover long term investment needs.

Meanwhile, on the average the same amount was transferred to the company from the owner Ministry year by year for specified investment purposes such as the renewal of treatment sites etc. The company can negotiate about its view on system needs, but the investment decision, the planning and the execution of the investment is out of the scope of the management of the company. As years went by the sum of reallocated investment has decreased. Due to these circumstances the company does not have a long term financial plan for accumulating the necessary restoration fund.

In the economic sustainability issue emphasis has to be placed on changing the financial burden, if new elements necessary for long term functioning are to be introduced.

### 2.2.2 Comparison of Different Scenarios for Economic Sustainability

Economic sustainability scenarios are based on the gross capital assets according to the bookkeeping of the company. There are network elements that show up in the municipal books, especially in case of the sewage network, but there is no coherent data on some of these units. Therefore, besides these elements I use values that are based on the ministerial guidelines of per capita investment cost on water and sewage development, as well as a guideline of the National Water Chief Directorate that further elaborates these values based on research studies of development investments[3].

[3] *The missing elements are based on the per capita investment guidelines of the Ministry, and their correction (OVF-Öko Rt, 1999).*

**Table 2 Comparison of Economic Sustainability Scenarios (total costs million HUF, commodity charge HUF/m$^3$)**

| | Current revenue | Costs of Current **Operation Scenario** up to one year run | Costs of **Medium run Scenario**, up to 7 years | **Long run scenario** with "borrow policy" |
|---|---|---|---|---|
| Water supply | 639 | 529 | 561 | 661 |
| Sewage service | 254 | 256 | 409 | 701 |
| Total | 893 | 785 | 971 | 1 363 |
| Water commodity charges HUF/m$^3$ | | | | |
| Uniform (average) price | 190 | 190 | 163 | 201 |
| Households T1-T7 | | | 171 | 216 |
| Industry | | | 117 | 130 |
| Other | | | 177 | 217 |
| Sewage commodity charges HUF/m$^3$ | | | | |
| Uniform (average) price | - | 122 | 227 | 417 |
| Households T1-T3 | 122 | | 199 | 293 |
| Industry | 122 | | 148 | 213 |
| Other* | * | | 199 | 293 |
| Highest household price** | 290<br>rate 2.3 | | 547 | 1680 |
| Rate of highest and lowest household sewage price | | | 2.7 | 5.7 |

**There are several tariffs each by treatment plant, in T4 they ranges from 190 HUF to 290 HUF, at one plant charges 390 HUF for industry, in T6 the uniform tariff is 380 HUF*

*** In the investigated scenarios the highest tariffs resulted in T4, due to this, the basis of comparison at current revenues is T4 not T6*

**Table 3 Balance of Current Revenues and Total Costs of Scenarios (million HUF)**

| Balance of Current Revenues and: | **Short run Operation Scenario** | Medium run Scenario | Long run Scenario with "borrow policy" | Long run Scenario with expansion and environmental upgrade, „borrow policy"* |
|---|---|---|---|---|
| Water supply | 110 | 78 | -22 | -14 |
| Sewage service | -2 | -155 | -447 | -613 |
| Total | 108 | -77 | -470 | -627 |

**The details of this scenario are discussed in the next chapter*

The Table 2 shows different angles on the current financial policy. It shows the cost of different scenarios of water and sewerage service compared to the present revenue stream. The first, Short Run Operation Scenario indicates that without any amortisation (capital cost replacement) the overall balance is positive, but there are differences between the two services.

The next column contains data that reveals the current scope of the accounted capital cost (amortisation). If the capital cost of assets (with lifetime up to seven years) were accounted for, a negative balance would result, which reaches 8 percent of the Medium run scenario's overall costs. This reflects the practice that the sum received for amortisation is spent on the maintenance needs of the network while there is no room for long term accumulation or restoration of the fundamental elements such as pipes and treatment plant bases.

Next table shows the difference in total cost of the Operation Costs Scenario and the Long Run Economic Sustainability Scenario with 4% real interest rate on borrowing the necessary funds.

### 2.2.3 Future Trends, Policies to Cover the Gap

What kind of considerations should be taken into account when deciding on the long-term capital needs of the operation? The lack of suitable sewage infrastructure is the result of the state's previous practice. It did not allocate the necessary funds to maintain the already existing networks, and did not push the expansion of the sewage networks in line with the expanding (state funded) drinking water supply network. The reason behind the state funded development activity was the sheer fact of income centralisation.

From this point of view the burden lies on the state to provide for the missing infrastructure, without any exception as to who owns or runs the regions' existing infrastructure, as there can be no difference between settlements' financial burden based on whether the state financed the development earlier or not (as they have to do it themselves now). Meanwhile it is unrealistic to take the position that the burden of financing lies with the state, in spite of the goals the government issued in the National Wastewater Program. (There are several other programs that have been halted or substantially delayed due to the lack of even smaller public resource needs.) It is more reasonable to suppose some kind of accumulation of own sources of the users themselves.

I consider two policies that aim at accumulating the necessary funds. Both target the full recovery of capital costs. These scenarios are static ones, as they do not consider the process of gradual replacement. Both calculate the effect of full capital replacement.

The "borrow" scenario assumes the financial market provides the necessary funds. It reflects the user pays consideration, and implies that after the replacement of a certain system element the users will pay the capital cost of investment through the fees. The consumers use the capital market to provide themselves with the necessary funds for the lifetime of the operation.

The "self-financing" scenario uses the capital market to invest, and thus increase the value of the accumulated fund that the community raises in advance to finance the necessary developments in the future.

Both financial policy solutions have their advantages and disadvantages. The factors that have to be taken into consideration at a local decision are numerous: Technical, geographical patterns, local economic power, actual co-financing policies and the financial market's condition on long term borrowing and savings. The decision also relies heavily on the inhabitants view about the future prospect of their own settlement. Accumulation of local funds for future investments can put the settlement in a better position in the long run as the local economy (as a whole) may pay less for the provision of the necessary funds. Although the duration and the margins can change outcome of a given policy dramatically, even turn it to disadvantageous. Most influential parameters (more precisely their rate) are the real interest rate on borrowing, real interest rate on savings and the growth of spending on a specific target due to economic expansion or necessity[4]. The longer the accumulation period the more beneficial for a local community to choose savings instead of future use of external sources. But the threshold of duration that marks the length of savings that could be more advantageous than borrowing, shows great volatility. Although comparing different rate sets in case of the around-and-over-25-years-long run savings the possibility that such an outcome is more probable. As a consequence, such a savings policy will hardly take place without a regulatory frame and an efficiently working financial market.

## 2.3 The Extension and Upgrade of the Service - Environmental Scenario

This chapter follows the previous chapter's line of thought. One of the main tasks of the program is the reduction of nutrient load of the Danube basin. In this context the reduction of nutrient load can be achieved by

- installation of third treatment phases in the plants and

- the increase of the connected consumers' rate.

### 2.3.1 System Extension and Upgrade

The next table shows the increase of costs due to the new system elements.

*[4] Above this calculation of circumstances, a local decision on financial policy even consider the other local activities' alternative cost of capital use.*

**Table 4 The Changes of the Expansion and Upgrade Scenario**

| | Current revenue | Costs of Short Run **Operation Scenario** up to one year run | Long run Scenario with **expansion** and environmental **upgrade**, borrow policy |
|---|---|---|---|
| Water supply | 639 | 529 | 651 |
| Sewage service | 254 | 256 | 867 |
| Total | 893 | 785 | 1 518 |
| Drinking water commodity charge HUF/$m^3$ | | | |
| Uniform (average) price | 190 | 190 | 200 |
| Households T1-T7 | | | 217 |
| Industry | | | 132 |
| Other | | | 210 |
| Sewage water, commodity charge HUF/$m^3$ | | | |
| Uniform (average) price | - | | 506 |
| Households T1-T3 | 122 | 122 | 340 |
| Industry | 122 | | 264 |
| Other | * | | 340 |
| Highest household price | 290<br>rate 2.3 | | 1888 |
| Rate of highest and lowest household sewage price | | | 5.6 |

**the same considerations as the description of the other scenarios*

### 2.3.2 The Potential Increase of Sewage Connection Rate

The difference between drinking water supply and sewage water provision is the main problem of the service, although a considerable number of consumers do not use the sewerage network even if the possibility of connection is given. In this system there is one village where the sewerage system (T5) will soon be completed, and there are two small villages in T4 where the National Wastewater Program does not provide for a sewerage system, only substitution for it, but with no specific deadline. T5 will be part of the sewage network of T2 and T3, and the expansion of the network is included in the Long term and environmental scenarios.

Beyond its environmental impact, the increase of connected users has economic benefits as well. The higher the collected amount the lower the per cubic meter average fixed cost. The next table shows the potential increase of wastewater at each of the territories and the resulting price changes. I assumed that the drinking water / sewage water rate changes to 95% in towns, 90% in suburban areas and to 80% in villages.

**Table 5 The Comparison of Medium Run CR Scenarios with the Current and a Plausible Full Sewage Connection Rates**

| | Present Drinking / Sewage Transformation rate | Rate of D/SW at "full" connection | Medium Run CR tariff (HUF/$m^3$) | With full connect tariff (HUF/$m^3$) | Change of Total Sewage Volume | Change of total annual revenue |
|---|---|---|---|---|---|---|
| Households in T1 | 78% | 95% | 199 | 179 | 1.23 | 1.10 |
| Public Inst. in T1 | 90% | 90% | 199 | 179 | 1.01 | 0.91 |
| Households in T2 | 62% | 90% | 199 | 179 | 1.46 | 1.31 |
| Households in T3 | 81% | 95% | 199 | 179 | 1.18 | 1.05 |
| Other small users in T3 | 83% | 90% | 199 | 179 | 1.09 | 0.98 |
| Households in T4 | 38% | 69% | 547 | 303 | 1.86 | 1.03 |
| Households in T6 | 77% | 80% | 426 | 413 | 1.04 | 1.01 |

Although the connection between sewage collection efficiency and nutrient load reduction of the Danube is more complex. Fostering connection without suitable third phase installments at the treatment plants the higher rate of collection may even result the increase of load. Meanwhile the precautionary principle rather suggests that collecting wastewater is more justifiable than the prolonged use of leaking sink tanks.

## 2.4 The Cost Burden

The table below shows the changes of households' cost burden based on different scenarios. It reflects that the less advantageous small facilities cost increase substantially as the capital intensity of the sites grow. The comparison is based on the average household net income of the region. If the lower income groups are considered, water and wastewater costs can have an even higher share. (The lowest income deciles is 50%, the lowest quintile 62% and the second quintile 80% of the average income). Moreover the distribution of income is unequal, it tends to be higher in urban areas.

**Table 6 The Allocated Cost Burden of Households Compared to the Net Household Income of the Region in 2001**

| Households | Current Operation Costs | Medium run with cost recovery | Long run scenario with "borrow policy" | Long run scenario with expansion and environmental upgrade, borrow policy |
|---|---|---|---|---|
| T1 | 1.7% | 2.1% | 2.7% | 2.9% |
| T2 | 1.6% | 2.1% | 2.7% | 2.9% |
| T3 | 1.5% | 1.8% | 2.4% | 2.6% |
| T4 | 1.4% | 2.7% | 6.5% | 7.2% |
| T6 | 2.9% | 3.0% | 7.4% | 8.0% |

*Households average incomes: KSH, 2001*

## 2.5 The Distribution of Cost Burden – Equity

As a result of the institutional changes of the last decade, the previously existing structure of service provision was split, and one provider was replaced with several providers. This process was led by the strong need for low cost areas to gain short term benefits from their geographical or system advantages. This process has left other areas worse off. The central government answered this problem by developing a subsidy scheme, which aims to subsidize the households that face the highest cost.

From the government's point of view it is reasonable to prevent the less capable rural population from facing the exaggerated effect of the price changes. This policy tries to avoid shifting the (environmental and health) cost to the more exposed segment of the population through the increase of water use from lower quality local wells. But the current practice gives no incentives to municipalities for regional co-operation and for finding less costly solutions to their common problems (in sight of WFD for example). The present situation results in questionable differences between villages in cost burdens in case of a basic service, as the differences can be random and are not based on the villages own previous decisions or geographical patterns.

The investigated systems make it possible to determine the effect of further assignment of actual costs to the users. The wastewater systems are separate local networks where differences in ownership have resulted in different charges as well. The water system is a single network although there is a possibility for a virtual separation of the system into smaller systems. The system could be divided by the three water extraction points into sub districts if we suppose that the production of the wells is constant in time and that they service only the nearby villages, at levels up to their production volumes[5].

Who finances whom?

The tariff scheme recently defined by the Ministry is quite simple. It defines one-component, flat tariffs for drinking water provision and for the sewage service as well. There are no different tariff measures for households and public institutions. This tariff scheme is valid throughout the district for drinking water provision, and for the sewage systems run by the municipalities which are state owned (T1, T2, T3), but not for other municipality sewage systems. The municipalities set their own sewage prices in accordance with the concession contracts they have. Some of them differentiate between households and other users, other apply a uniform tariff, but all of them have per cubic meter prices more than twice as high as the uniform price of the state owned system.

The baseline scenarios show that the balance of costs and revenues for drinking water supply shows a surplus, while sewage provision costs exceed revenues.

The cost allocation models reveal that the uniform tariff results in cross-subsidisation of households at the expense of industry. The small villages benefit more from the current tariff structure than the cities of T1, T2 and T3, in spite of the more cost based prices of the sewage service (where, due to the municipal ownership the tariffs actually are two-three times higher). So the small settlements benefit more from the uniform drinking water tariffs than they "lose" due to the unequal cross subsidisation of sewage provision.

[5] *This division results in mixed supply only in case of two municipalities.*

**Table 7 Rate of Total Revenues (Paid) per Total Costs (Allocated) by Consumer Groups for Both Services Together**

| Current situation | Total Revenue / Total Cost ratio |
|---|---|
| Households in T1 | 1.09 |
| Public Institutions in T1 | 1.06 |
| Industry A in T1 | 1.16 |
| Industry B in T1 | 1.36 |
| Households in T2 | 0.91 |
| Households in T3 | 1.05 |
| Industry C in T3 | 1.49 |
| Other small users in T3 | 1.05 |
| Households in T4 | 0.83 |
| Other users in T4 | 0.87 |
| Households in T6 | 0.86 |
| Households in T7 | 0.99 |
| Other small users in T7 | 0.99 |
| Purchasing water to T5 | 0.64 |
| Purchasing water to T8 | 0.62 |

*T7, T5, T8 only water provision.*

The cost recovery scenario that I run to analyse the current situation supports this hypothesis. The uniform cost recovery price is 8 HUF lower than the actual water tariffs, meanwhile the uniform sewage tariff of T1, T2, T3 and the industry is 76 HUF higher than the actual tariff.

The revenue / cost ratios show that when considering both services, all the household groups are more or less in balance, with the costs they are responsible for being roughly equal to the tariffs they pay for the service, only the industry is worse off.

## 2.6 The Potential in Tariff Structure Reform

The allocation of costs (to territories T1-T7) revealed that the further reflection of real costs can result in efficiency gains on network level. To show the effect I compare the shift from a one-component tariff to a two-component tariff, both with Cost Recovery (the latter one includes marginal cost pricing, MCP) in case of drinking water provision.

MCP pricing implicates two-component tariffs. The characteristics of the D, MC an AC curves imply that the tariff contains a constant element that results in a relatively high burden compared to the tariff's variable element. The question is whether the MCP pricing in case of infrastructure with big spare capacity can result in gains that originate from higher levels of consumption[6]. The table shows that overall, the proportional change in volume of water exceeds the proportional change of the sum it costs to the consumers, making the average costs of water lower. That results in a 9% gain. But it is still not a widely accepted technique due to the conflicts such a tariff change would generate on local political fields.

The identification of cost elements is a technical problem, meanwhile introducing new cost-sharing rules is a political one. The result of stricter allocation of costs borne by consumer groups reflects in tariff differences. One of the arguments against this (two-component, MCP) tariff structure is that definite customer groups (located in high cost areas or with low level of consumption) will be worse off. This outcome emerges if the total price these groups pay for their consumption is lower than the costs delegated to the fixed tariff element in the new tariff regime. This leads them to a disadvantageous situation that - in case of constrained purchasing ability - has no simple solution to adjust their consumption. The price increase in low consumption areas can cause an unfortunate positive feedback. Due to the low consumption the further decrease of consumption results in a disproportionately large increase in average costs that force the prices even higher… etc. The other element is a substitution effect: if the only rational response of the consumer to an increase in price levels is to leave the system and base his consumption on the existing old wells.

Meanwhile, the cross-subsidisation of household consumption contradicts the overall interest of the region as it puts costs on industry that other regions may not. The political cost of price increase is high. So tariff structures have to incorporate definite social or local political considerations.

[6] *The external costs of water extraction are not within the scope of our research, and we are not in a position to judge if this solution is in accordance with environmental considerations.*

**Table 8 Volume Change / Total Tariff Payment Change Ratio due to Shift from Medium Run Cost Recovery Scenario to Medium Run Cost Recovery with Marginal Cost Pricing**

| | Drinking water |
|---|---|
| Households in T1 | 1.44 |
| Public Institutions in T1 | 1.51 |
| Industry A in T1 | 1.09 |
| Industry B in T1 | 1.09 |
| Households in T2 | 1.02 |
| Households in T3 | 1.21 |
| Industry C in T3 | 1.12 |
| Other small users in T3 | 1.26 |
| Households in T4 | 0.84 |
| Other users in T4 | 0.88 |
| Households in T6 | 0.80 |
| Households in T7 | 0.99 |
| Other small users in T7 | 1.04 |
| Purchasing water to T5 | 0.65 |
| Purchasing water to T8 | 1.03 |
| Total | 1.09 |

*Drinking Water Cost Clusters: The costs are allocated by territory and inside a given territory the division of costs are based on the used amount.*

The table shows that T4, T5 and T6 would be worse off with this tariff change, these are the villages that are among mountains, or at the far end of the network. Usually in village areas the average income is lower.

## 2.7 Sewerage Substitutions or Emission Tax

A widespread problem of sewerage development is the low connection rate of households to the existing networks. This feature has an environmental aspect as well, because leakage is a “built-in” function of these sewerage substitution tanks. The waterworks offer free connection to the sewerage network, but this has not resulted in an increase in the number of households connected.

How much would the connected user save if all the technically feasible households were connected? The calculation is based on the above discussed Medium Run scenario with MCP. Except for T5, the sewerage networks cover the area of the water supply network. It means that the lower number of sewerage connection indicates the unwillingness of the population to use the service. These households cause losses to their fellow citizens as the per capita fixed costs are higher for the ones who co-operate, and they cause environmental damages as well. The remediation or the purification of the polluted water imposes extra costs on the community. The low sewage water / consumed water quantity rates of communities show the potential in increased use of the sewerage network.

A local environmental load fee imposed on the non-connected households can provide an incentive to co-operate. The possible measures of this fee can be based on the MCP pricing method as this method calculates by dividing fix and variable costs and gives an efficient quantity / tariff set.

The distribution of the investment cost among all households (connection charge) will bring the previously non-connected households to a point where the costs they incur and the costs they are responsible for are balanced (in the medium run). If the local environmental load fee consisted of the per household fixed costs and the variable cost of an average household's consumption, then it would be indifferent to the non-connected user if he was connected to the network or not. In fact, if users also incur some cost of illegal disposal (e.g. maintenance of the septic tank or payment for transport of the septics) then non-connected users would have an incentive to connect. The average fixed cost per household in the district is 25,500 HUF (minimum 10,300 HUF, maximum 62,300 HUF) the fine where the user charges cover the costs (adding the average consumption) is 28,300 HUF annually. Introduction of such a charge may result in a 20 percent increase in the total collected sewage water quantity (in case of currently under utilised systems).

# 3 Policy Recommendations

## 3.1 Local Decision on Financial Policy, Responsibility of Inter-Generational Burden Allocation

Experience:

Lacking financial strategies to obtain own sources for investments in the medium and long run.

Recommendations:

1. Regulatory frame in order to oblige owners to start accumulate funds for future investments

2. Provide information to owner municipalities about possibilities of financial markets to better represent the interest of present and future generations

## 3.2 Grant / Subsidy Allocation

Experience: misallocation of financial sources of sewerage investments

Recommendation: Tighter supervision by regulators pe.: State Audit Office

## 3.3 Equity and Complexity

Experience:

1. Efficiency gains on network level makes some user-groups worse off especially ones with small consumption and less ability to adjust their consumption

2. Worse off groups may leave the system and apply illegal solution that impose extra charges and costs to the communities

Recommendations:

1. Reconsider the conditions of current subsidy scheme of villages with extra high tariff

2. Tariff changes for efficiency gains have to be issued together – in package – with local initiatives that targeted more sustainable environmental resource use of the district.

3. Create guidelines with official backing on proportional allocation of costs between different consumer groups. These guidelines should provide information on how to match policy goals (express local values) with suitable rules of financing the operation, in order

- to facilitate self-reorganisation of the network for efficiency gains, or
- to create alternative ways to exit existing technical solutions of the networks on their edge. In form of: applying new small scale ecology driven solutions for small settlements, adjusting land-use patterns for safer resource use and harness ecological services of abundant local access to land (pe: Target oriented use of new financing possibilities of EU)

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# ASSESSMENT AND DEVELOPMENT OF MUNICIPAL WATER AND WASTEWATER TARIFFS AND EFFLUENT CHARGES IN THE DANUBE RIVER BASIN.

## Volume 2: Country-Specific Issues and Proposed Tariff and Charge Reforms: Hungary – Summary

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WORKING FOR THE DANUBE AND ITS PEOPLE

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REGIONAL
PROJECT

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## PREFACE

The Danube Regional Project (DRP) consists of several components and numerous activities, one of which was "Assessment and Development of Municipal Water and Wastewater Tariffs and Effluent Charges in the Danube River Basin" (A grouping of activities 1.6 and 1.7 of Project Component 1). This work often took the shorthand name "Tariffs and Effluent Charges Project" and Phase I of this work was undertaken by a team of country, regional, and international consultants. Phase I of the UNDP/GEF DRP ended in mid-2004 and many of the results of Phase I the Tariffs and Effluent Charges Project are reported in two volumes.

Volume 1 is entitled *An Overview of Tariff and Effluent Charge Reform Issues and Proposals*. Volume 1 builds on all other project outputs. It reviews the methodology and tools developed and applied by the Project team; introduces some of the economic theory and international experience germane to design and performance of tariffs and charges; describes general conditions, tariff regimes, and effluent charges currently applicable to municipal water and wastewater systems in the region; and describes and develops in a structured way a initial series of tariff, effluent charge and related institutional reform proposals.

Volume 2 is entitled *Country-Specific Issues and Proposed Tariff and Charge Reforms*. It consists of country reports for each of the seven countries examined most extensively by our project. Each country report, in turn, consists of three documents: a case study, a national profile, and a brief introduction and summary document. The principle author(s) of the seven country reports were the country consultants of the Project Team.

The authors of the Volume 2 components prepared these documents in 2003 and early 2004. The documents are as up to date as the authors could make them, usually including some discussion of anticipated changes or legislation under development. Still, the reader should be advised that an extended review process may have meant that new data are now available and some of the institutional detail pertaining to a specific country or case study community may now be out of date.

All documents in electronic version – Volume 1 and Volume 2 - may be read or printed from the DRP web site (www.undp-drp.org), from the page Activities / Policies / Tariffs and Charges / Final Reports Phase 1.

We want to thank the authors of these country-specific documents for their professional care and personal devotion to the Tariffs and Effluent Charges Project. It has been a pleasure to work with, and learn from, them throughout the course of the Project.

One purpose of the Tariffs and Effluent Charges Project was to promote a structured discussion that would encourage further consideration, testing, and adoption of various tariff and effluent charge reform proposals. As leaders and coordinators of the Project, the interested reader is welcome to contact either of us with questions or suggestions regarding the discussion and proposals included in either volume of the Project reports. We will forward questions or issues better addressed by the authors of these country-specific documents directly to them.

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# Overview of Issues and Proposed Tariff and Charge Reforms: Hungary

The present document consists of two chapters, following the issues and reform recommendations of the National Profile and the Case Study, respectively.

## 1 Overview of the National Profile

### 1.1 Background

The national profile is, first of all, a compilation of information and data that describing the institutions and conditions that shape and characterize the provision of municipal water and wastewater service in Hungary . The purpose of this compilation is to provide background and inspiration for proposals to reform both the current system of water and wastewater tariffs and effluent charges and coincident proposals to adjust or modify the legal and regulatory system within which the these tariffs and effluent charges function in Hungary.

Since 1970 the structure of the water and sewerage sector in Hungary has been changed dramatically. In the 70's the Hungarian waterworks were organised in 33 state-owned companies.

In 1990 the ownership of the majority of water and sewerage infrastructure has been passed to the local governments. The transformation of companies owned by the state and the local councils has begun. In 1991 and 1992 the 33 water companies were replaced by five regional and a vast number of local companies held by the new local governments. This process resulted in an extremely fragmented structure. By the end of 2001 altogether 369 companies supplied drinking water and/or sewerage services in Hungary.

In the past decade the water consumption (and therefore wastewater emission) decreased significantly due to the economic transition. The transition involved transformation of the industry, closure of some of the great water user factories and fall of the GDP. Increasing service prices and relatively low incomes resulted in the drop of water usage of the households.

The drinking water provision in the country reached a level that is reasonable economically and is available in almost every settlement (99.7 per cent), but it differs heavily by water quality (see section 6.4.1) and settlement type. Situation/provision of settlements with less than 15,000 inhabitants is the least satisfying, 11-12 per cent of the population within these municipalities has no connection to *piped* drinking water, but within distance of 150 m have access to pipe stands.

The level of sewerage lags far behind that of piped drinking water. According to the data of 1993, 43 per cent of the population was connected to the public sewerage system, 10 per cent owned appropriate sewage solutions without drainage, 21 per cent solved it inefficiently, and 26 per cent lived in areas without drainage [Somlyódy 2000]. Due to investments during the 1990's, wastewater services became available for 48 per cent of the households in 1998, and 53 percent in 2001, although the possibility for immediate connection is available for another 9 per cent. If one takes into account the settlements, the picture is darker because only one third participates in public sewage services. This shows that mainly the densely populated settlements, bigger towns and cities are canalised.

The gap between the level of drinking water and sewage service in Hungary is one of the greatest within OECD countries, where this difference almost doesn't exist.

The EU accession process has resulted not only in new pieces of legislation (see 2.1), but in expensive - and sometimes neither thought over, nor justified – investments.

### 1.2 Policy Issues

#### 1.2.1 Efficiency

The decrease of consumption in the whole water sector - household and industry as well - over the last decade is due to price increases, economic decline and technology changes. The operation of the networks shows inefficiency, as the served quantities are very low, comparing to the capacity of the facilities. The efficiency situation is even worse than the sole effect of economic changes would

indicate as future system capacity requirements were already overestimated at the last national water plan in the 80's.

The sewage service has to cope with the scale problem as well: the utilisation of treatment capacities is low, in consequence of the low level of drinking water consumption. The connection rate of households has improved due to government actions, but still there are possibilities in this field. Under-utilisation of the existing capacities also drives unit costs up and decreases the willingness of households to make additional connections to the system. Regarding sewage treatment, additional asymmetries were generated in the 90s (when e.g. treatment plants have been built for a middle size town and the surrounding villages, while the network of pipes covers only a part of the town), as an adverse effect of the grant system.

### 1.2.2 Equity

The transformation of the institutional frame of waterworks service has resulted in large differences in tariffs for both services, occasionally even in one service district. This situation is based in part on scale differences of service providers and natural circumstances, but the different quality of management, and local political consideration as well. It is highly problematic that the price of a basic service can vary in the same area even twofold just because of ownership differences. This is an equity question, but this problem roots in the weak and unequal regulation measures.

To a limited degree, the Central Budget provides payments to compensate inequalities between high and low cost areas. In this way the state spreads above-limit-costs over a larger number of population, that local governments cannot achieve. This system, however, raises another question of equity, since above limit costs often originate from the fact that local actors lack the incentive of negotiation and to reach agreement in small-regional distribution problems, or simply there is a bad management, and as a result, taxpayers in general cover extra costs.

The non-use of (even) the newly built networks also generates equity problems. The present practice penalises the ones who co-operate, use the (new or upgraded) service and do not cause extra environmental harm.

### 1.2.3 Sustainability – Stability of operation

From its political perspective there is no clear cut (and widely accepted) view on how the cost burden of the whole network restoration, upgrade and expansion will be distributed among users and the state budget. The driving force of recent development policy is the criteria of the EU accession, embodied in the NationalWastewater Program, and the will to intake the accompanied EU funds. Meanwhile the financial requirements of these funds that will bind future users together with the enforcement of Water Framework Directive's cost recovery principle limits the possibilities of future considerations. But the prospected effect of these requirements on service costs has not been widely recognized yet.

This situation gives weak ground for discussions about the role of private capital in the service. Recently private capital participation is allowed up to 49% in municipality owned service providers, but this arrangement avoids answering some basic questions. The limit on private ownership is intended to protect the position of municipalities to control the services they are responsible for. At the same time, more threat to the service originates from the public owners lack of market regulation skills and the weak, unclear financial position the municipal sector has. Lack of skills keeps municipalities back to protect users' interest through regulation without exercising ownership rights and being involved in the operation and financial matters of a service itself. Weak financial position makes the municipalities unable to accomplish long term financial policies that result in dependency of the government initiated and financed programs (and in more or less natural misallocation of investment sources). Both leads to strong demand for capital involvement, but the lack of own resources pave the way toward bad and disadvantageous conditions of any type of capital provision. This is what really hurts users interest.

# 2 Overview of the Case Study

## 2.1 Description of the Case Study Area

### 2.1.1 Brief Historic Overview

The examined area is a sub-system of the North-Transdanubian Waterworks[1]. It is situated along the Danube riverbank where two towns and four villages are located, as well as several small communities uphill from the river. The total population of the district is around 80 thousand, half of the population lives in the two towns, and the other half in the villages, with populations between 500 to 5000.

The district is a mix of state and local government owned subsystems, that (except for a few network elements) are operated by a state owned regional water works company (RWW). The dominant owner of the network is the state owned RWW. The basis of the district is the regional water supply network that provides water from a bank filtered water basis and a karstic well to the whole area and sells water to supply a handful of small communities on the territory of the neighbouring regional system. The sewage systems of the district show a more complex picture. The towns and the villages next to them are serviced by a state owned network, operated by the regional waterworks company . The other sewage systems service small groups of (one to three) municipalities, these are owned by the municipalities.

### 2.1.2 Service Users

Households

The household groups mean residential customers in territory 1 to 7 (except 5). The portion of joint metered apartment buildings is very low. The division of households follows the territorial units. The average consumption based on the year 2001 is 84 $m^3$/household(max 100 $m^3$/household, min 75 $m^3$/household).

Non-household groups, Public Institutions

I create public institution as a single consumer group only in T1 (the biggest town in the area). This is because public institutions are concentrated in the towns, the proportion of their consumption in the villages are very low. In T3 however the small scale industry and the public institutions have similar water consumption/sewage production patterns, therefore there was no reason to differentiate among them. The group called "other" aggregates their consumption.

Industry

There are some big industrial users in the area and several small ones. The big ones locate in T1, T3 and T7. All of them have access to the drinking water network, two have their own water extraction facilities and all of them have installed pre-treatment devices on wastewater outflow to the public network.

Industry "A" locates in T1. It is a heavy industry site. It has its own wells, applies advanced water re-circulation technologies to optimise water consumption. The factory has a pre-treatment plant and loads the sewage to the public sewerage system. For modelling purposes water use and waste water discharge are handled as independent services.

Industry "B" in T1 was distinguished from all other industry. As their consumption pattern differs from Industry "A", for modelling purposes water use and waste water discharge are handled as composite services.

Industry "C" in T3 is a pharmaceutical factory. It has water supply from the public utility and has its own treatment plant.

In T7 there is a glass producer, that consumption is 12% of the territories' consumption and 62% of the industrial consumption, but the 15-group model capacity prescribe the compromise of merging all non-household customer and this is the smallest "big" industrial user. Cost allocation of the

[1] The basic data evaluated in this case study was provided by the EDV Rt, the calculations and the conclusions express the opinion of the author, not necessarily coincides with of the company. I would like to acknowledge their time and efforts to provide us the required information.

Spreadsheet model is based on the flow quantities a specific network element can be associated with. Big industrial users' cost structure includes their location's distribution and collection costs with a smaller weight (20%).

### 2.1.3 The list of user groups in the spreadsheet model

The main characteristics of the defined user groups in the year 2001:

| User groups | No. of units | Drinking water consumption thousand $m^3$ | Sewage quantity thousand $m^3$ | Consumption pattern of drinking and sewage use |
|---|---|---|---|---|
| Households in T1 | 7200 | 626 | 488 | Composite |
| Public in T1 * | 610 | 313 | 283 | Composite |
| Industry A in T1 | 1 | 31 | 156 | Independent |
| Industry B in T1 * | 322 | 161 | 127 | Composite |
| Households in T2 | 1862 | 167 | 103 | Composite |
| Households in T3 | 4968 | 387 | 315 | Composite |
| Industry C in T3 | 1 | 356 | 315 | Independent |
| Other small users in T3 | 369 | 163 | 136 | Composite |
| Households in T4 | 5529 | 417 | 175 | Composite |
| Other users in T4 | 247 | 98 | 8 | Independent |
| Households in T6 | 295 (12) | 26 | 20 | Composite |
| Households in T7 | 2948 | 295 | - | - |
| Other small users in T7 | 227 | 105 | - | - |
| Purchasing water to T5 | 941(53) | 99 | - | - |
| Purchasing water to T8 | - | 174 | - | - |

* Number of all non-households are divided by their consumption

## 2.2 Scenarios - Lines of investigation

### 2.2.1 Baseline scenario

**Short run, Current operation:** This scenario deals with the current operation for up to one year. Computed cost include variable costs, that change as the serviced volumes change, and fixed costs that do not change with the volume of the services, but are necessary conditions of running the networks (i.e. salaries, maintenance). This scenario does not include capital costs of assets or amortisation.

### 2.2.2 Economic sustainability scenarios

**Medium term economic sustainability:** This scenario incorporates capital cost elements up to seven year lifetime. Volumes and tariffs are computed with the Cost Recovery requirement[2].

**Long term economic sustainability:** This scenario consists of all the capital cost of system elements that are shown in the RWW's book and system elements of municipalities owned networks that the RWW operates on a contractual basis. Capital costs are computed assuming that the necessary assets to cover future investments were provided from the capital market (present value of 4% real interest

[2] Without Marginal Cost Pricing

rate). Because the sewerage network of T5 will be completed next year, the long term restoration cost of this network part is included. Volumes and tariffs are computed with the Cost Recovery requirement .

**Extra Investments for further nutrient load decrease on the long run:** Although this service district is not ranked as sensitive territory, the scenario shows increased economic burdens if third phase (nutrient load reduction) devices were introduced. Volumes and tariffs are computed with the Cost Recovery requirement.

Balance of current revenues and total costs of scenarios (million HUF):

| Balance of Current Revenues and: | Short run operation scenario | Medium run scenario | Long run scenario with "borrow policy" | Long run scenario with expansion and environmental upgrade, „borrow policy” |
|---|---|---|---|---|
| Water supply | 110 | 78 | -22 | -14 |
| Sewage service | -2 | -155 | -447 | -613 |
| Total | 108 | -77 | -470 | -627 |
| Rate of highest and lowest household sewage price | | 2.7 | 5.7 | 5.6 |

The table below shows the changes of households' cost burden based on different scenarios. It reflects that the less advantageous small facilities cost increase substantially as the capital intensity of the sites grow. The comparison is based on the average household net income of the region. If the lower income groups are considered, water and wastewater costs can have an even higher share. (The lowest income deciles is 50%, the lowest quintile 62% and the second quintile 80% of the average income). Moreover the distribution of income is unequal, it tends to be higher in urban areas.

The allocated cost burden of households compared to the net household income of the region 2001:

| Households | Current Operation Costs | Medium run with cost recovery | Long run scenario with "borrow policy" | Long run scenario with expansion and environmental upgrade, borrow policy |
|---|---|---|---|---|
| T1 | 1.7% | 2.1% | 2.7% | 2.9% |
| T2 | 1.6% | 2.1% | 2.7% | 2.9% |
| T3 | 1.5% | 1.8% | 2.4% | 2.6% |
| T4 | 1.4% | 2.7% | 6.5% | 7.2% |
| T6 | 2.9% | 3.0% | 7.4% | 8.0% |

Households average incomes: KSH, 2001

### 2.2.3 Distribution of cost burden

This analysis is based on the allocation of costs among the distinguished network parts (T1-T8). In the current situation there is a flat tariff for all the drinking water users and flat tariffs respectively by ownership. The baseline scenario spreadsheet model counts the distribution effects of this tariff. The model reflects the present financial flow, without cost recovery condition.

The cost allocation models reveal that the uniform tariff results in cross-subsidisation of households at the expense of industry. The small villages benefit more from the current tariff structure than the cities

of T1, T2 and T3, in spite of the more cost based prices of the sewage service (where, due to the municipal ownership the tariffs actually are two-three times higher). So the small settlements benefit more from the uniform drinking water tariffs than they "lose" due to the unequal cross subsidisation of sewage provision.

### 2.2.4 Efficiency gains of tariff structure reform

The Medium term sustainable scenario is the basis of the comparison of Cost Recovery and Cost Recovery with marginal cost pricing scenarios. This comparison intends to show the efficiency changes and the distribution effect of an optimal two-component tariff structure. The results verify that overall, the proportional change in volume of water exceeds the proportional change of the sum it costs to the consumers, making the average costs of water lower. That produces a 9% gain. But it is still not a widely accepted technique due to the conflicts such a tariff change would generate on local political fields. The T4, T5 and T6 territories would be worse off with this tariff change, these are the villages that are among mountains, or at the far end of the network. Usually in village areas the average income is lower.

### 2.2.5 Incentive measure to increase connection rate to the sewerage network.

This analysis is based on the previous one. As an additional feature, it counts the volume of a specific charge targeting households that do not connect to the sewerage network in spite of technical possibilities. Introduction of such a charge may result in a 20 percent increase in the total collected sewage water quantity (in case of currently under utilised systems).

## 2.3 Policy Recommendations Based on the Case Study

### 2.3.1 Local decision on financial policy, responsibility of inter-generational burden allocation

Experience:

Lacking financial strategies to obtain own sources for investments in the medium and long run.

Recommendations:

1. Regulatory frame in order to oblige owners to start accumulate funds for future investments

2. Provide information toowner municipalities about possibilities of financial markets to better represent the interest of present and future generations

### 2.3.2 Grant / Subsidy allocation

Experience: misallocation of financial sources of sewerage investments

Recommendation: Tighter supervision by regulators pe.: State Audit Office

### 2.3.3 Equity and complexity

Experience:

1. Efficiency gains on network level makes some user-groups worse off especially ones with small consumption and less ability to adjust their consumption

2. Worse off groups may leave the system and apply illegal solution that impose extra charges and costs to the communities

Recommendations:

1. Reconsider the conditions of current subsidy scheme of villages with extra high tariff

2. Tariff changes for efficiency gains have to be issued together – in package – with local initiatives that targeted more sustainable environmental resource use of the district.

3. Create guidelines with official backing on proportional allocation of costs between different consumer groups. These guidelines should provide information on how to match policy goals (express local values) with suitable rules of financing the operation, in order

- to facilitate self-reorganisation of the network for efficiency gains, or
- to create alternative ways to exit existing technical solutions of the networks on their edge. In form of: applying new small scale ecology driven solutions for small settlements, adjusting land-use patterns for safer resource use and harness ecological services of abundant local access to land (pe: Target oriented use of new financing possibilities of EU)