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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:
The Czech Republic – 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now available and some of the institutional detail pertaining to a specific country or case study community may now be out of date.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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Abbreviations

Act on PWSS&S	Act No. 274/2001 Coll. on Public Water Supply Systems and Sewers
CSSR	Czech and Slovak Socialistic Republic
CZSO	Czech Statistical Office
CR	Czech Republic
CZK	Czech currency (1 Euro is about 32 CZK)
EU	European Union
MU	Management Units - municipalities or companies established or hired by municipalities to run the system
PWSS&S	Public Water Supply Systems and Sewers - the official title for the MU in the Czech Republic
RU	Regulatory Units, e.g. the government, Ministries and other offices of the public administration, which impose some regulation on the MU
SU	Service Users are households and businesses
VaK	Vyskov Public Water Supply System and Sewerages in Vyskov (selected case site)
VAT	Value Added Tax
Water Act	Act No. 254/2001 Coll. on Water
WWTP	Wastewater treatment plant

Executive Summary

The purpose of the National Profile is to analyse the current situation and future development in the field of water and wastewater management in the Czech Republic, with a strong focus on providing public water supply and sewerage. As a result of describing the historical consequences, the current and future development, possible tariff and effluent charges reforms have been suggested.

The text is divided into 9 chapters, which are focused on different entities of the system, following the basic division into three main groups: regulatory units, management units and service users. This division facilitates defining the individual competences and obligations as well as mutual interactions throughout the whole system.

Whenever possible the stated data and information are related to the Morava River basin – the part of the Czech territory, which belongs to the Danube river basin.

An integral part of the National Profile of Municipal Water and Wastewater Management in the Czech Republic is A Case Study of Municipal Water System Management and the Impacts of Tariff and Effluent Charges: Vyskov. The case study describes the situation of a particular management unit and explores some hypothetical development and policy scenarios.

1. Introduction

This report is, first of all, a compilation of information and data that describes the institutions and conditions that shape and characterize the provision of municipal water and wastewater service in the Czech Republic. The purpose of this compilation is to provide a 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 the Czech Republic.

Indeed, some chapters include brief analyses suggesting such reforms and Chapter 9 concludes this report with preliminary proposals for reforms in the institutional setting and the design of these tariffs and charges. The aim of these proposals is to improve the management of water and wastewater resources used in the municipalities of the Czech Republic generally and including protecting water resources from nutrient loading and toxic substances originating from municipal systems.

1.1. Overview of the Morava River Basin

The Czech Republic is a democratic state in Central Europe which was established in 1993 after the federation „Czechoslovakia“ split up into two republics: the Czech Republic and Slovak Republic. The country is politically stable under the governance of the social democratic party since 1998. The Czech Republic is joining the European Union in May 2004 in the first wave of enlargement.

The state is divided administratively into self-governing units, which are as follows:

- a) municipalities in the first level of public administration (more than 6 000),
- b) municipalities with enlarged competences („small districts“) which administrate the territory of more municipalities and also have some special competences under the government administration, e.g. in the field of water management (about 200),¹
- c) regions as the highest level of public administration (13 regions).

For the purpose of administering watercourses, there is another division of the Czech Republic based on the „river basin“ approach. According to that, there are 5 main river basin territories: Elbe, Vltava, Ohre, Odra and Morava. For the purpose of the report, only the Morava River has any relevance as a part of the Danube river basin. The administrative units' borders do not correspond with particular river basins, which causes some problems in data collection (see Chapter 3).

¹ „small districts“ partly replaced the competences of about 73 districts – units of government administration - that were abolished in 2002

Map 1. River Basins in the Czech Republic

- | | | |
|----------------------|----------------------|--------------------|
| ■ Ohře river basin | ■ Vltava river basin | ■ Elbe river basin |
| ■ Morava River basin | ■ Odra river basin | |



Source: www.povodi.cz

The Morava River basin covers about 21 423 km², which is about 25% of the Czech territory. It covers the area of 4 regions (South-Moravian, Zlin, Vysocina, Olomouc) and encompasses parts of another 3 regions (Pardubice, Moravskoslezsky, South-Bohemia). There are about 1 900 municipalities of different size in the Morava River Basin, from which about 100 serve as a „small district“.

The population living in the Morava River basin is about 3 mil., which is about 30% of the total population.

1.2. Origins of the Municipal Water and Wastewater Industry

In the Czech Republic, the fundamental change in water legislation, in general, took place after the political shift in 1948 (beginning of the socialist period). This change was based on a unified approach to the whole territory and fixed the principles of planned management of the national economy. Watercourses of major importance were declared as a national property. Water management was directed by the Ministry of Public Works, which was responsible for canalising rivers, dams, public water supply systems and sewers (PWSS&S) in selected industrial towns and spas. The Ministry of Agriculture was responsible for the other watercourses, technical drainage, PWSS&S in the villages.

According to Act. No. 138/1974 Coll. on waters, the structure of water management used to have 4 hierarchical levels: the central authority at the national level (Ministry of Water Management and Wood Industry of the CSSR), at the provincial level (the provincial national committee), at the

municipal or city level (municipal or city national committee) and at the local level (local national committee). Most decisions were carried out at the municipal level, i.e. permissions to construct waterworks, agreements on water management authorities, ... etc.

A significant step was the establishment of 6 basin administrations in 1966, which were linked to the General Directorate for Watercourses. In 1970 the general directorate was closed down, and 5 River Authority Companies were set up, together with the Water Management Development and Structures Company.

In the period between 1971 and 1977 the district and provincial authorities responsible for drinking water supplies and sewerage were fused into 7 provincial drinking water-sewerage system companies (Central Bohemian, South Bohemian, West Bohemian, North Bohemian, East Bohemian, South Moravian and North Moravian Water Supplies and Sewerage). However in Prague two independent companies were kept, Prague Water Supplies and Prague Sewerage. This structure lasted until practically 1989. In 1989, the Ministry of Water Management and Wood Industry was closed down

After 1990, the Ministry of the Environment was delegated to oversee water management at the central level to play the role of Central Water Management Authority. Since 1990 some of the responsibility for water management has also gradually been taken over by the Ministry of Agriculture, including the function of setting up water management companies. This situation played a significant role in their privatisation process. Most of the formerly centralised water management companies were dissolved and new private companies have been established. On the basis of a decision of the minister of agriculture, the River Basin Boards were converted into joint-stock companies, where the only shareholder is the Czech State. This decision (which wasn't legally justified) has been changed by Act No. 305/2000 Coll. on River Basin Administrators.

Currently, the Ministry of Agriculture plays the most significant role in the water sector as the central water authority with regions and "small districts" at lower stages of administration. The Ministry also co-finances and drive particular River Basin Boards as administrators of large watercourses.

Major changes have taken place in water supply and sewerage. The transformation followed the basic principle of transferring ownership and responsibility from the state to the new owners, in this case to self-administrating towns and villages. The transformation of public drinking water and sewer systems took place within the second wave of coupon privatisation. Legislatively, this did not take the form of a special act. A governmental decision was issued, which established the following conditions for the approval of privatisation on projects:

- a) the owners of the infrastructure may be only communities, groups of communities and/or joint stock companies in which the communities are major shareholders (with a holding of 80 - 100% of the shares),
- b) the so-called operational property of the former provincial water supply and sewerage companies (buildings, transport and construction machinery) could be privatised using the standard methods of privatisation,
- c) each privatisation project should also take into account the standpoints of the communities involved with respect to the process of privatisation.

1.3. Future Direction

The Czech Republic has become a member state of the EU, which brings the obligation to adopt and enforce all environmental legislation according to European Union directives. The implementation has been in process and for each directive an „Implementation Plan“ has been adopted.

There is a amendment of the **Water Act** in the Czech Parliament, which should ensure the total implementation of the EU Water Framework Directive into Czech legislation.

For the purpose of this study, two significant changes are suggested:

- 1) Municipalities that cause water pollution in excess of 2000 population equivalent are obliged to ensure a functional sewage system and water treatment by the end of 2010. The limits of discharged pollution will be set by a special Government Order. A system of grants and subsidies has also been suggested (see Chapter 7.2.2.).
- 2) 50% of Charges for the Withdrawal of Groundwater will accrue to regional budgets (at present all charges are revenues of the Czech State Environmental Fund). Therefore, central state resources face a reduction of about 350 mil. CZK, but the position of Regional Offices as the second level of the water administration will be stabilized. (for charges see Chapter 4.1.)²

In keeping with EU regulations, an amendment of the **Law on Public Orders** is being prepared. This law is going to regulate investments of PWSS&S, because there is a tendency to over-invest in some territories of particular PWSS&S, where the efficiency of such investments is very low and the subsequent operating costs would be a big burden on the public. To support this regulation, regional plans for development of PWSS&S have been elaborated. Recommendations are to be made by independent experts and the main goal is to choose the economically and technically best option for future development. The water administration should not allow construction other than that identified in the plans.

Regarding municipal water and wastewater services in the Czech Republic generally, we can consider them functioning systems on the whole but posing some potential risks in the future. These are mostly analyzed in the following chapters. One of these risks is the current trend of municipalities selling the infrastructure to private firms which are enormously interested in towns or agglomerations over 10 000 inhabitants where running the system is profitable. The municipality often does not realize the real value of its property (which is often formally depreciated, but will serve another 20 years without any investment) and prefers the immediate revenues that come with possibly precipitous privatisation. This behaviour is also promoted by the particular privatisation process used in the Czech Republic in the early 90s' (for further information on MUs behaviour see Chapter 6.1.).

² As further explained in Chapter 2.4., there is a hierarchy of water authorities in CR: Ministry of Agriculture – regions – “small districts”, through which the water sector is managed. All other institutions and organisation (River Basin Boards, PWSS&S of particular municipalities) do not have executive power and are established only for purposes of better administration or for ensuring basic needs of public.

2. Legal and Institutional Setting

The chapter introduces the main actors playing roles in municipal water management in the Czech Republic and presents their position and power as stated in Czech legislation. These actors are divided into 3 categories: regulatory units (RU), management units (MU) and service users (SU). An overview of the Czech water management legislation is provided, too.

2.1. National Laws and Regulations

2.1.1. Common Provision

For a better orientation in the requirements and definitions set by the legislation, the area of water management in the Czech Republic has been divided into 2 key parts:

1. General use of surface water and groundwater for different purposes.
2. Area of Public Water Supply Systems and Sewers.

2.1.1.1. General Use of Water

The area of the general use of surface water and groundwater (including drinking water) is addressed by **Act No. 254/2001 Coll. on Water (The Water Act)**. Granting of permits to extract water and to discharge wastewater is described, and payments (fees, charges) for particular users are established. The law also covers the area of planning in water management and defines the administrators of watercourses. It implements parts of the requirements of the Water Framework Directive into Czech legislation.

Scope: The law covers any withdrawals and discharges of/to surface water and groundwater which exceed a volume of 6 000 m³ in one calendar year or 500 m³ of water in one calendar month.

Conditions of Use: Surface water and groundwater are not subject to ownership (administrators of these watercourses are established by the law). Any water withdrawn from these sources is no longer considered to be surface water or groundwater. In the Water Law, there is a list of activities for which special permission from the water authority is required. The lowest level of water authority is considered the „small district“. The next grade up in water management is represented by the regions. Both, municipal and regional offices operate with two types of power: independent activities (e.g. cooperation with Ministry of Agriculture in creating River Basin Plans) and government transferred activities (e.g. decision-making, permissions, controlling municipalities...etc.). The central water management administration is represented by particular Ministries (see Chapter 2.4).

Reporting Requirements: For the purpose of water balance, the consumers of surface water and groundwater and those discharging wastewater (= holders of permits) are obliged to report to the river basin administrators (**Act No. 305/2000 Coll. on River Basin Administrators**) or the relevant Ministries. This reporting is done annually and includes the quantity and quality of water withdrawn/discharged. Also the Czech Environmental Inspection is authorised to ask for needed information within its activities.

2.1.1.2. Public Water Supply Systems and Sewers

According to **Act No. 274/2001 Coll. on Public Water Supply Systems and Sewers (Act on PWSS&S)**, the service area of PWSS&S has been legally established as a special network branch

(public utilities subject the regulation, e.g. electricity, telecommunications). For clear understanding, the expression PWSS&S means the entity (public, private or mixed) responsible for ensuring that system operators (that operate the public, municipal water infrastructure) meet the basic needs of the population (while subject to economic, including tariff, regulation. This entity can, but does not have to be interconnected with the municipal bodies or the actual operation of the infrastructure. Various legal status of PWSS&S will be discussed in Chapter 2.2.

Service Area: Historically particular PWSS&S were public companies operating the public infrastructure, established and built as a decision of government or public administration (towns before the Socialist period, the Central Government from 1948). From the 50s', particular construction and supply systems mostly were organized according to districts.

Condition of service: In the legislation, three main categories of subjects are described: the owner of the infrastructure, the service provider and the user of the system. Municipalities are usually the owners of the infrastructure. The service provider is a legal person receiving the permission to do a business from the regional office in a form of concession.

The owner or the service provider has to enable connection into the network (pipelines, sewers) for all users without any discrimination. It is responsible for the reliable and safe operation of the system 24 hours a day. The quantity of the water consumed is usually measured by water meters in households and the quantity of wastewater services estimated based on drinking water consumption. The price for the service (water and sewage tariff) is under price regulation according to Act No. 526/1990 Coll. on prices. The calculation has to be published every year. This means that before the given period (year), PWSS&S itself has to estimate its costs and propose water and sewage tariffs per m³. These prices are invoiced over the whole period. Subsequently, PWSS&S compares the real operating cost with the previous calculation. If there are some differences, the surplus or the shortage has to be given back (or invoiced) to consumers. In practice, an annual water account is sent to consumers with calculated overcharge or surcharge. In some cases, the total of the estimate calculation per m³ and the real calculation is the same.

The quality of the drinking water and harmful substances in wastewater has to be regularly measured and reported to the water authorities.

The customers pay to PWSS&S per measured m³ and they can be disconnected if the invoice is not paid in 30 days. If a new customer wants to join the system he has to pay costs for building the distribution and collection lines on his property and he is an owner of this end part of the infrastructure.

Reporting Requirements: The owner of the infrastructure has to do the record-keeping of his pipelines and sewers (value of the property, sources and quality of used water, price calculations... etc.). This information has to be submitted annually to the regional water authority. This regional authority aggregates the data and sends it to the Ministry of Agriculture. The owner (or the service provider) has to inform the user about the price calculation whenever asked.

Ownership of infrastructure: During the process of privatisation, most of the infrastructure was transferred directly to associations of municipalities or joint-stock companies formed by municipalities, according to their privatisation project (plan for operation of the business) that had to be presented. About 16% of shares of particular companies (their operational property) went to the voucher privatisation and could have been bought by any citizen. Within associations, shares were distributed among municipalities according to two rules: No. of inhabitants or value of the infrastructure, according to a decision of the constituent members. The large towns were mostly agreeable to the process in which small municipalities were favoured (e.g. municipalities with no infrastructure on their territory got some shares, too).

Originally, in most joint-stock companies, the Central Government held one „golden share“ with special rights, e.g. the right to block selling the infrastructure. At present, this share exists in about 20% of companies and there is a strong pressure to inconspicuously lower the power of the Central Government in decision-making.

2.1.2. Self Service

According to the Water Act, any person can withdraw surface water without a permit if such a use does not require special technical facilities.

In other cases (listed in Section 8 of the Water Act) the Permission for the Use of Surface Water or Groundwater is required from the water authority. Every person holding this permit has to measure the quantity and quality of the water used and submit the results to the river basin administrator. There is an exception for small users withdrawing a volume of up to 6 000 m³ in one calendar year or 500 m³ of water in one calendar month or less.

According to the Act on PWSS&S, all water used for drinking purposes has to meet given hygienic standards. The frequency and the process of controls is regulated by a special law from the Ministry of Health.

Most of the self-supplying units in the Czech Republic are exempted from any reporting (especially houses in small villages), therefore the quality of drinking water is very difficult to control. It is assumed, that most of these resources (pump-wells) do not meet hygienic standards.

2.2. Management Units

2.2.1. Administrative Unit

In the Czech Republic, municipalities are responsible by law for providing the water supply and sewage services for the population. Particular municipalities can contract service providers or establish self-operating companies. The price for using the infrastructure depends on local policy.

2.2.2. Operating Units

Water supply and wastewater treatment is primarily organised in combination. There are about 1 400 – 1 600 registered PWSS&S in the Czech Republic and about 800 – 1 000 small municipal MUs running the system without concession. There are about 120 large companies, which are covered by the central records of the Ministry of Agriculture. About 22 of them operate in the Morava River basin.

These companies cover mainly district areas and are characterized by one large „compound“ pipeline, which usually determines the territory of the system (company).

There are many types of PWSS&S in the Czech Republic which can be organized into the following 3 groups:

1. **Joint-stock companies** which own the infrastructure and the operational property (so operates the system themselves) and where a municipality (or Association of municipalities) has got a majority ownership of the stock. In this case every municipality has some directly control of the operations of the system. This control may be limited if a private firm has an ownership position in the company and is responsible for providing services as the operator of the system.
2. **Association of municipalities**, which owns the infrastructure and a separate private company as a **service provider** which owns the operational property. The association of municipalities hires the infrastructure to a service provider and indirectly controls operator's policies, prices of services etc. through the terms of the contract or concession to provide service or any oversight provisions included in that contract.

3. **Small single municipalities**, which own the infrastructure and the operational property and run the system themselves or contract a service provider (if it has no own staff to do it). This type is often similar to the first one, but it is established in small isolated villages in mountains.

2.2.3. Ownership of Facilities

As mentioned before, the ownership of the property has been transferred from the Central Government to a more diversified share-holder basis in the privatisation process. Originally, the state kept a „golden share“ in most companies through which it could regulate important decisions.

At present, the owner of the infrastructure (pipelines, sewers) is mostly the municipality (or association of municipalities). Other functional buildings, cars and other property necessary for providing services belongs to the service provider. Pumping stations, water treatment and wastewater treatment plants are considered as a part of infrastructure. The service provider can be the same entity as the infrastructure owner.

Particular distributaries and collection lines on private property are the private property of the owner of the connected land/building.

2.3. Service Users

2.3.1. Classification of Users

There are the following water users in the Czech Republic:

- PWSS&S,
- agriculture,
- industry and electricity producers,
- others.

Within the category of **PWSS&S**, a further sub-classification of Service Users can be made:

- households (consuming about 63 % of water invoiced in 2001³),
- agriculture (1.3 %),
- industry (7.4%),
- others (28%).

All categories of users show a decreasing trend in surface water and groundwater withdrawals.

Of the total amount of wastewater annually discharged into the sewage system about 59% is domestic wastewater and about 41% industrial and other wastewater.⁴

³ Source: *Směrný vodohospodářský plán – věstník, 2001, Ministry of the Environment*

⁴ Source: *Czech Statistical Office, www.czso.cz*

2.3.2. Special Legal Consideration by User

The user (customer) of PWSS&S is the owner of the property or building connected to the water supply or sewerage network. If there is more than one private independent owner of apartments in the building, the user of PWSS&S is always an association of these owners.

In the case of national or municipal property, the user is an organizational constituent of the Czech state, which administers the property.

2.4. Regulatory Units

Ministry of Agriculture is the major water authority in the Czech Republic and it shares its responsibility with other central bodies. Its domain is:

- To control drainage systems on agricultural and forest land, irrigation networks, ponds and small water reservoirs, if they serve agriculture and forestry,
- To administer watercourses important in water management via the River Board State Companies,
- To develop the conceptual framework, international cooperation and centralize the PWSS&S records (in practise done only for the large PWSS&S).

Other Ministries responsible for particular parts of water management are as follows:

- **Ministry of the Environment** in the field of natural water accumulation and water sources protection (surface and underground water) and providing the central control for flood protection ,
- **Ministry of Health** in the field of drinking water hygiene and quality,
- **Ministry of Transport** in the field of water transport,
- **Ministry of Defence** as a watercourse authority inside military training areas,
- **Ministry of Finance** in the field of distributing State Budget funds to selected water construction works and the price regulation of MUs.

Watercourses are subject to administration. They are classified into significant watercourses and minor watercourses. In a decree the Ministry of Agriculture, in co-operation with the Ministry of the Environment, stipulates a list of significant watercourses.

Administrators of significant watercourses are 5 legal entities called **River Boards State Companies** established by a special Act (River Board Elbe, River Board Vltava, River Board Ohre, River Board Odra and River Board Morava).

Administrators of small watercourses belong to the following institutions:

- a) **Forests of the Czech Republic State Company** in mountains where forests are the major part of the territory;
- b) **Agricultural Water Management Administration**;
- c) Ministry of Interior in military zones;
- d) Administration of national parks in the territory of national parks;
- e) Municipalities through whose territory minor watercourses flow or a natural person of legal entities using minor watercourses or to whose activity the minor watercourse is related and they are permitted to do so by the Ministry of Agriculture.

The Ministry of Agriculture will appoint small watercourse administrators based on application. The administrators established by this Ministry (River Boards State Companies, Forests of the CR State Company and Agricultural Water Management Administration) cover about 95% of the entire length of rivers in the CR.

According to the Water Act and the Act on PWSS&S, there is a general 3-level hierarchy of the central and local water authorities driving the Czech water management as a whole (including the field of PWSS&S): **Ministry of Agriculture – regions – „small districts“**.

The Czech Environmental Inspection is the main controlling body in protecting the water environment (as well as other folders of the environment, e.g. air, wastes). According to the Water Act, the Inspection controls the use of surface water and groundwater, monitors accidents endangering water quality, supervises compliance with the provisions on fees for discharging wastewater ... etc. The superior body of the Inspection is the Ministry on the Environment. Inspectors are entitled to enter into objects controlled and required all relevant documents.

Other ministries and local offices or citizens can announce their suspicions of the environmental risks or failures against laws directly to the Inspection. In practice, there are not enough people and resources in the Inspection that is why its power is limited.

The Czech State Environmental Fund represents an important resource for long-term financing in water management. It was established in 1991 by Act No. 388/1991 Coll. as a supplementary financial source to support environmental improvement. The Minister of the Environment is responsible for the distribution of resources. Charges and fees related to water abstraction are important revenue for the Fund. Its granting priorities are stated for the each year.

2.4.1. The Overview of the Environmental Regulation

Act No. 254/2001 Coll. on Water (The Water Act)

- general use, permissions and protection of watercourses,
- river basin district plans and protected and sensitive areas,
- supporting fish life, minimum residual flow, minimum level of groundwater,
- harmful substances, obligations in the case of accident.

Act No. 258/2000 Coll. on the protection of public health

- drinking water analyses,
- standards for drinking water and water in swimming pools.

Decree No. 376/2000 on drinking water standards and volume and frequency of controls.

Decree No. 20/2001 on the frequency of measuring the amount and quality of water.

Government order No. 103/2003 on protected zones.

Decree No. 241/2002 on watercourses where using boats with combustion engines is prohibited.

Decree No. 336/2002 on creating flood plain maps.

Government order No. 103/2003 on sensitive areas and using fertilizers, rotating agriculture and carrying out anti-erosion measures.

Government order No. 71/2003 on establishing watercourses suitable for fish life.

2.4.2. The Overview of the Economic Regulation

Act No. 254/2001 Coll. on Water (The Water Act)

- water management structures,
- obligations of owners of water management structures,
- charges, fees and sanctions.

Act. No. 274/2001 Coll. on Public Water Supply Systems and Sewers

- determining the field of doing business in drinking water supply and sewerages generally,
- a region's public water supply and sewers plan,
- a region's permission to provide water supply services and sewers,
- delivering, measuring and pricing,
- sanctions.

Act. No. 305/2000 Coll. on River Basin Administrators

Act No. 200/1990 Coll. on Misdemeanours (with amendments)

- withdrawal or discharge of water without permission

Act No. 388/1991 Coll. on the State Environmental Fund of the Czech Republic

- fees for discharging wastewater,
- transfers for the area of water supply and sewerage systems.

Act No. 526/1990 Coll. on Prices

- regulation of water and sewage tariff.

Act No. 265/1992 Coll. on recording the property right belonging to real estates

- the obligation of the owner of the infrastructure to make a property record.

Decree No. 293/ 2002 on fees for the discharge of wastewater into surface water.

Decree No. 292/2002 on the river boards territories.

Decree No. 274/2001 on PWSS&S.

Financial Bulletin of the Ministry of Finance (rules for calculating prices).

3. Data

There is a general problem with data collection at river basins in the Czech Republic, which must be separate from national statistics done according to municipalities, district and regions, especially for all socio-economic indicators and PWSS&S. Both the regional division of the country and the borders of particular PWSS&S, do not respect the river basins' borders. This problem affects the consistency of the separate statistics made by River Boards Companies and (according to Water Framework Directive requirements) it must be solved in the near future.

3.1. Water Production

About 98% of surface water and 80% of groundwater withdrawals are registered in the National Water Statement. Other withdrawals are below the minimum level for registration (a volume of 6 000 m³ in one calendar year or 500 m³ of water in one calendar month).

3.1.1. Abstraction of Surface Water

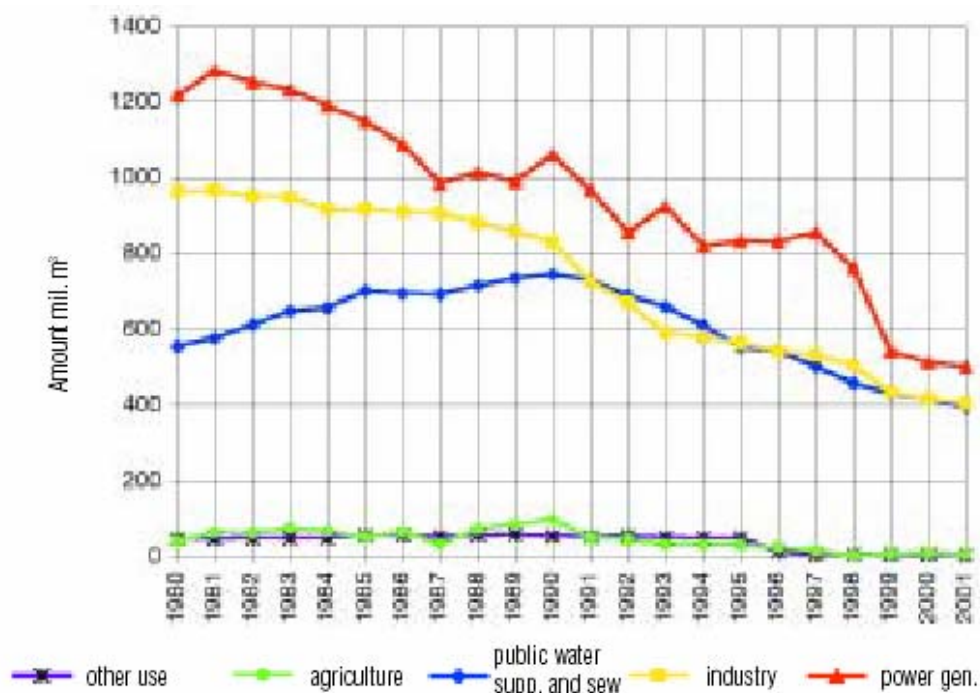
The structure of abstraction of surface water presented over time in Figure 1 and for 2001 and 2002 in Table 1. From the national time series, the overall substantial downward trend in the abstraction of surface water is emphatic, especially in light of the higher water tariffs for industry and households.

The total abstraction of surface water diminished from 1 342.7 mil.m³ in 2000 to 1 300.1 mil.m³ in 2001. The Morava River basin represents the only exception to this trend: total surface water abstraction increased by 2.5% in comparison with 2000, although the decrease in the category of PWSS&S withdrawal in 2001 was the most significant in the CZR (about 91.9% of the previous year 2000). There was a large increase in water consumption by industry in the Morava Basin.

Agricultural withdrawals decreased in all river basins. Industrial consumption accelerated to 106.8% in 2001 (in comparison with the year 2000)⁵.

PWSS&S represented about 24% of the total amount of surface water withdrawn in the Morava River basin in 2001.

⁵ Source: *Směrný vodohospodářský plán – věstník, 2001, Ministry of the Environment*

Figure 1 Abstraction of Surface Water in the Czech Republic in 1980 – 2001

Source: Report of the State Water Management in the Czech Republic 2001

Table 1 Abstraction of Surface Water in Millions of m³

	River Board Morava in 2001	River Board Morava in 2002*	CR in 2001
Public water supply and sewers			
- amount in mil. m ³	41.9	49.7	394.6
- number of users	33	39	157
Agriculture			
- amount in mil. m ³	4.3	4.4	6.9
- number of users	19	15	58
Electricity generation			
- amount in mil. m ³	98.5	96.3	500.0
- number of users	3	2	19
Industry			
- amount in mil. m ³	26.1	24.9	403.1
- number of users	94	127	457
Other			
- amount in mil. m ³	0.5	0.1	4.4
- number of users	8	9	45
Total			
- amount in mil. m ³	171.3	175.4	1 300.0
- number of users	157	192	730

Source: Report of the State Water Management in the Czech Republic 2001

*Source: Recent statistics of River Board Morava

In Table 2, the difference between abstraction and consumption of water indicates the amount of sewage water. In 2001, this consumption is about 20% in the category of PWSS&S, 100% in agriculture and 12% in industry.

Table 2 Total Recorded Abstraction and Consumption of Surface Water (mil.m³/year, %) in 2001

River Basin	Year	PWSS&S		Agriculture		Industry + others		Total	
		Abstract.	Consump.	Abstract.	Consump.	Abstract.	Consump.	Abstract.	Consump.
Morava	1990	91.1	18.2	52.0	52.0	262.9	31.5	406.0	101.7
	1995	53.8	10.8	11.2	11.2	164.0	19.7	229.0	41.7
	2000	45.6	9.1	4.4	4.4	117.1	14.1	167.1	27.6
	2001	41.9	8.4	4.3	4.3	125.1	15.0	171.3	27.7
	01/00	91.9%	92.3%	97.7%	97.7%	106.8%	106.4%	102.5%	100.4%
	01/95	77.9%	77.8%	38.4%	38.4%	76.3%	76.1%	74.8%	66.4%
CR	1990	739.6	147.9	114.5	114.5	1 913.5	229.6	2 767.6	492.0
	1995	544.4	108.8	28.4	28.4	1 408.6	169.1	1 981.4	306.3
	2000	408.3	81.6	8.8	8.8	925.6	111.1	1 342.7	201.5
	2001	384.1	76.9	7.4	7.4	908.6	109.0	1 300.1	193.3
	01/00	94.1%	94.2%	84.1%	84.1%	98.2%	98.1%	96.8%	95.9%
	01/95	70.6%	70.7%	26.1%	26.1%	64.5%	64.5%	65.6%	63.1%

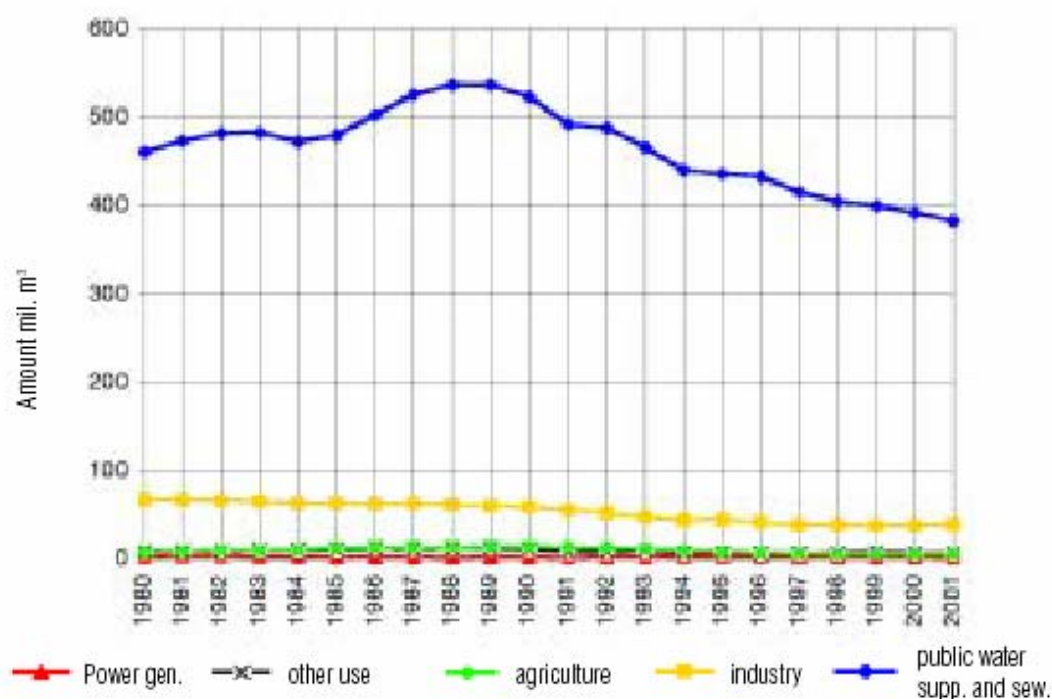
Source: Směrný vodohospodářský plán – věstník, 2001, Ministry of the Environment

3.1.2. Abstraction of Groundwater

In the Czech Republic, the amount of abstracted groundwater dropped slightly in all the river basins in comparison with the year 2000. Abstraction in the Morava River basin accounted for 34.2% of the total amount groundwater withdrawn in the CR.

Withdrawing groundwater for the purpose of PWSS&S represented more than 90% of the total of groundwater extracted in 2001. The reason is that the Water Act regulates use of groundwater primarily for drinking water production. In addition, there was no abstraction payments levied on PWSS&S for this sort of withdrawal in the past (see Chapter 4.1.3.).

In the Morava River basin, there are about 400 withdrawals in the category of PWSS&S, of which about 20% exceeded production of 1,000 thous. m³.

Figure 2 Abstraction of Groundwater in the Czech Republic in 1980 – 2001

Source: Report of the State Water Management in the Czech Republic 2001

Table 3 Abstraction of Groundwater in the year 2001 in millions of m³

	River Board Morava in 2001	River Board Morava in 2002*	CR in 2001
Public water supply and sewers			
- amount in mil. m ³	137.9	126.8	382.3
- number of users	373	502	1 618
Agriculture			
- amount in mil. m ³	2.2	1.6	5.1
- number of users	68	87	156
Electricity generation			
- amount in mil. m ³	0.0	0.0	1.1
- number of users	0.0	0.0	3
Industry			
- amount in mil. m ³	8.8	9.7	38.9
- number of users	124	214	393
Other			
- amount in mil. m ³	1.1	2.8	6.5
- number of users	21	37	85
Total			
- amount in mil. m ³	150	140.9	433.8
- number of users	586	840	2 255

Source: Report of the State Water Management in the Czech Republic 2001

*Source: Recent statistics of River Board Morava

3.2. Water Processing/Cleaning

For the use of PWSS&S, the sources for the drinking water produced in the Czech Republic in 2001 were as follows:

- 48.9% groundwater
- 51.1% surface water.

According to the Act on PWSS&S, the service provider can withdraw surface water or groundwater if the quality of the resource is satisfactory and the costs of processing and cleaning are not exorbitant. If there is any uncertainty, the regional office (as a water authority at the second stage of approval) decides.

The process of transforming raw water into drinking water (including methods, frequency of analysis, ...etc.) is described in Decree No. 274/2001 on PWSS&S. The requirement related to ensuring the minimal quality of drinking water is included in Act No. 258/2000 Coll. on the protection of public health.

3.3. Water Distribution

In Table 4, shows basic delivery information from the stated River Board Morava statistics. From the time series, the following aspects can be emphasized:

- the Dukovany nuclear power station is situated in the Morava River basin, so that is why the surface water consumption of industry is so high,
- the extraction of surface water for agricultural purposes (e.g. irrigation... etc.) became free of charge,
- the extraction of groundwater for purposes of PWSS&S was free of charge until 2001.

Table 4 River Board Morava – Basic Water Delivery Information in 1997 - 2001

	1997	1998	1999	2000	2001
DELIVERY OF SURFACE WATER (thous. m³)					
Total	205 819	187 546	165 541	167 158	171 303
Charged	201 655	171 842	156 247	141 902	132 680
Of this: - for PWSS&S	40 833	38 086	36 499	38 768	39 398
- for industry	156 612	133 731	119 566	103 134	93 282
Of that: - power stations and heat. Plant	130 093	111 105	48 783	43 518	43 269
- once-through water cooling	77 267	59 991	50 698	41 632	31 927
- for agriculture	4 210	25	182	0	0
EXTRACTION OF GROUNDWATER (thous. m³)					
Total	x	161 804	156 750	152 770	147 752
Charged	x	3 608	3 890	3 935	3 646
PAYMENTS FOR ABSTRACTION OF SURFACE WATER (thous. CZK)					
Total	273 329	264 284	269 989	276 996	287 368
Of this: - for PWSS&S	78 397	79 982	86 406	98 083	105 006
- for industry	186 885	184 251	183 201	178 913	182 362
Of that: - power stations and heat. plant	136 096	107 339	110 738	110 101	115 095
- once-through water cooling	35 543	29 396	26 870	23 314	19 156
- for agriculture	8 047	51	382	0	0
PAYMENTS FOR EXTRACTION OF GROUNDWATER (thous. CZK)	x	7 216	7 779	7 871	7 294
Payments for using water bodies for the electricity production (thous. CZK)	15 324	15 176	15 153	15 215	15 602

Source: T. G. Masaryk Water Research Institute, 2002

3.4. Water Purchased

For particular price calculation items see Chapter 4.3.

3.5. Water Consumption

3.5.1. General Consumption of Water in the Czech Republic

Table 5 represents reconstructed data of water withdrawals according to final users as stated in the National Water Statement in 2000 and 2001. This data represents all water withdrawals in the Czech Republic in the given period. There are always several problems with gathering and reprocessing these data (see notes under line).⁶

⁶ Problems with data reprocessing:

a) Public water supply systems and sewers cover only water produced, technological water (water delivered in lower quality not for drinking purposes) is shown separately, that is why it is only partly included in the National Water Statement. River Boards State Companies represent a higher number of withdrawals of surface water for public water supply than public water supply systems and sewers, which only deal with produced drinking water.

b) Statistics of River Boards State Companies do not cover the area of other river basin administrators therefore their numbers are lower than in the National Water Statement.

c) There are no data on private well withdrawal.

d) There is no data on small enterprises under the withdrawal limit established by the Water Act.

Table 5 Reconstructed Data of Water Withdrawals According to Final Users in CR (mil. m³)

Users	Total		Surface water		Ground water	
	2000	2001	2000	2001	2000	2001
Households						
- public supply systems ^{*)}	808	779	404	399	404	380
- private wells (assumption)	48	48	-	-	48	48
- industry and services from public supply systems ^{**)****)}	-60	-56	-30	-29	-30	-27
- agriculture from public supply systems ^{**)****)}	-12	-13	-6	-5	-6	-8
- others ^{*)****)}	-218	-212	-109	-112	-109	-100
Households - total	566	546	259	253	307	293
Industry and services						
- from private sources	971	948	933	908	38	40
- from public supply systems ^{**)****)}	60	56	30	29	30	27
Industry and services – total	1 031	1 004	963	937	68	67
Agriculture						
- irrigation	9	7	9	7	-	-
- animal production from private sources	15	15	-	-	15	15
- agriculture from public supply systems ^{**)****)}	12	13	6	5	6	8
Agriculture – total	36	35	15	12	21	23
Others						
- others from public supply systems ^{*)****)}	218	212	109	112	109	100
- global (assumed)	12	12	6	6	6	6
Others - total	230	224	115	118	115	106
TOTAL	1 863	1 809	1 352	1 320	511	489
National Water Statement - Total	1 804	1 744	1 363	1 310	441	434

Source: Směrný vodohospodářský plán – věstník, 2001, Ministry of the Environment

^{*)} including non-invoiced and technological water

^{**)} including non-invoiced water

^{****)} part of the amount of surface and groundwater were derived from the first row

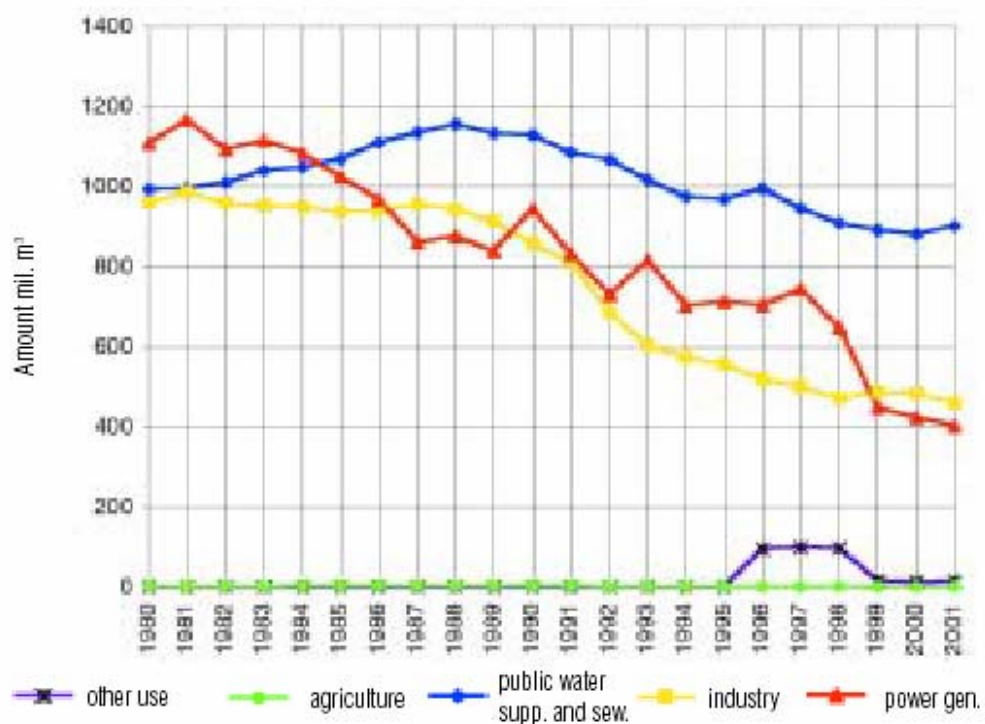
3.5.2. Water Consumption of PWSS&S

In 2001, about 87% of the total number of inhabitants of the CR were supplied by water from PWSS&S. A total of 753.8 mil.m³ of drinking water was produced in all companies. Losses of drinking water for the main operators were about 25% of the water produced.

3.6. Wastewater Production

As stated in Table 6, the wastewater discharge of PWSS&S represented about 67% in 2001 in the Morava River basin which is above the national average (50% in CR).

The total water abstraction of PWSS&S (groundwater + surface water) is lower than stated wastewater discharge of PWSS&S in Morava River basin and the Czech Republic, too. This comparison highlights the problems of data inconsistency.

Figure 3 Discharges into Surface Water in the Czech Republic in 1980 – 2001

Source: Report of the State Water Management in the Czech Republic 2001

Table 6 Discharges of Waste and Mine Water into Surface Water in Millions of m³

	River Board Morava in 2001	River Board Morava in 2002*	CR in 2001
Public water supply and sewers			
- amount in mil. m ³	204.2	194.4	902.5
- number of users	397	508	1 561
Agriculture			
- amount in mil. m ³	0.1	0.0	1.7
- number of users	2	0	12
Electricity generation			
- amount in mil. m ³	69.3	66.6	403.4
- number of users	3	2	41
Industry			
- amount in mil. m ³	28.7	32.0	460.4
- number of users	134	142	674
Other			
- amount in mil. m ³	1.6	5.4	15.8
- number of users	26	48	140
Total			
- amount in mil. m ³	304	298.4	1 783.9
- number of users	562	700	2 428

Source: Report on the State of Water Management in the Czech Republic 2001

*Source: Recent statistics of the River Board Morava

3.7. Wastewater Collection and Processing

In 2001, there were 7 706 200 inhabitants connected to public sewers in the Czech Republic, which is about 74.9%. There is an increasing trend in this area. The difference between inhabitants supplied with drinking water and inhabitants connected to public systems was about 12 % (1 275 mil.) and it is stable over time. The portion of storm water in total wastewater treated is about 36% in 2001.

In regions, which are situated in the Morava River basin, the percentage of inhabitants connected to public sewerages was about 75% in the South-Moravian Region and 75.5 % in the Zlin Region in 2001.

Table 7 Population and Public Sewers in CR between 1995 – 2001

Indicator	Unit	1995	2000	2001
No. of population living in houses connected to public sewers	thous.	7 559.1	7 685.2	7 706.2
Population living in connected houses in relation to the total population of CR	%	73.2	74.8	74.9
No. of inhabitants connected to public sewers, of which:	thous.	6 708.1	7 028.9	7 060.7
- No. of population connected to sewer with sewage plant	thous.	5 784.2	6 571.2	6 692.8
Amount of discharged water, of which:	mil. m ³	649.7	576.0	570.7
- sewage	%	56.0	64.0	66.9
- industrial	%	44.0	36.0	33.1
Amount of wastewater treated (including storm water)	mil. m ³	866.3	854.3	886.2
Amount of wastewater treated	mil. m ³	581.3	546.1	544.8

Source: Směrný vodohospodářský plán – věstník, 2001, Ministry of the Environment

3.8. Wastewater Effluent Discharge

Regarding Table 6 and Table 7, the total amount of wastewater discharged after processing in 2001 was between 886.2 mil. m³ and 902.5 mil. m³ in the Czech Republic.

4. Economic Data

In the following sub-chapters, the system of different payments for water and wastewater in the Czech Republic will be analysed. This system includes fees and charges for using water (as national natural wealth) and the amount is set by law. Apart from these there are also prices (tariffs) for the service of water supply and wastewater discharge, as set by the MU. These prices are based on the cost conditions of particular companies, but their amount is also regulated by the Act No. 526/1990 Coll. on Prices. The RU is the Ministry of Finance and controls are done by its network of regional and municipal Financial Offices (which are mostly focus on tax revenues of the state).

4.1. Tariffs, Fees and Charges

4.1.1. Tariffs for PWSS&S Services

Up until the end of 1990, tariffs for water supply and sewerage services were centralized by the Government. For households the water tariff was 0.60 CZK/m³ and the sewage tariff was 0.20 CZK/m³, for other users these tariffs were about 3.70 CZK/m³ and 2.35 CZK/m³.

At present, in the field of drinking water treatment, the PWSS&S calculates „factually rectified“ or „regulated“ prices for the following types of services provided:

- drinking water and service water delivered directly to the customer;
- drinking water and service water delivered to the water network of another supplier;
- wastewater coming into the public sewers.

These tariffs are calculated per m³ and there was a possibility to distinguish between households and other users according to the regulatory scheme as set out by the law. From the 1 January 2001 the price levels for both categories were united, so each company is obliged to use only one level of tariffs for all customers.

The price regulation imposed by the law is based on the notion that water and sewage tariffs can only reflect economically eligible costs of production and an adequate "profit". It also has to consist of "given" items (see Chapter 4.3.) and it has to be published annually and provided to customers whenever requested. As mentioned in Chapter 2.1.1.2., every PWSS&S estimates the cost calculation for the coming year and subsequently re-calculates real costs. That is the reason for the small differences between calculated and realised prices in Table 8.

From 2002, tariffs can be charged as 2-component prices with a fixed component (for the privilege of getting some minimal level of service) and floating part (a consumption charge or tariff per unit of additional water consumed). The fixed part's maximum is 20% of the tariff and in the Act on PWSS&S, there are strict rules for its calculation (e.g. metering of consumption). The main purpose of creating this possibility is to impose some minimal charge on users with extremely low consumption (e.g. cottages) and high charges for customers who are larger consumers of water (or wastewater) services. Some PWSS&Ss have a problem with seasonal residences or cottages, because if such a residence is connected into the network, the invoicing, checking the water meter and other services have to be done throughout the year, even if the consumption is only a few m³ per year.

The PWSS&S can decide which type of tariff (1-component or 2-component) to use. The 2-component price is not connected to the cost calculation, which means: the fixed component of the price is not derived from fixed cost of the company, but from the formula given by the Ministry of Agriculture.

As shown in Table 8 (maximum and minimum values), there are huge differences in water and sewage tariffs between particular PWSS&S because of the different local cost conditions. The average water tariff was about 18 CZK/m³ and the average sewage tariff was about 15 CZK/m³ in 2000.

Table 8 Water and Sewage Tariffs in the CR in 2000

CZK/m ³	Water supply			Sewerages		
	Average	Households	Others	Average	Households	Others
Calculated prices (without VAT)	17.19	16.68	18.04	14.45	13.62	15.40
Calculated prices (with VAT)	18.05	17.52	18.94	15.17	14.30	16.17
Realised prices (without VAT)	17.15	16.61	18.05	14.39	13.52	15.39
Realised prices (with VAT)	18.00	17.44	18.96	15.11	14.20	16.16
Minimum value	7.73	7.28	8.00	6.09	5.16	7.56
Maximum value	28.04	28.04	31.28	25.95	19.78	31.27

Source: T. G. Masaryk Water Research Institute, 2002

4.1.2. Payments to Cover Watercourse and River Basin Administration

According to the Water Act, any person authorised to withdraw surface water is obliged to pay for the administration of the watercourse depending on the purpose for which the surface water is withdrawn. The price for withdrawal differs according to the following purposes of withdrawal:

- single use cooling water for stream turbines;
- agricultural irrigation (free of charge from 2000);
- filling during artificial terrain activities (pits following raw material excavation) in cases requiring water pumping or transfer ;
- other withdrawals.

The payment for the withdrawal of surface water is assessed by the River Board Company in accordance with a special act⁷. If the quantity of the water does not exceed 6 000 m³ per calendar year or 500 m³ per calendar month, the subject is not obliged to make any payment. The payment accrues directly to the River Board Morava and it is an important part of its revenues.

According to the legislation, this payment is also defined as a „factually rectified“ or „regulated“ price. This means that (as in the case of PWSS&S) the River Basin Boards are obliged to develop a price calculation of their operational costs per m³ withdrawn. This calculation can be controlled by the Ministry of Finance. In practice, this payment is calculated by dividing the total assumed operational cost by assumed number of m³ withdrawn in future period. The payment differs between river basins according to the amount of water withdrawn for industrial, drinking and other purposes. Agricultural withdrawn are free of charge. In the Morava River basin the payment is 2.66 CZK/m³. This is nearly the highest level in the CR and is due to the large number of farmers in the territory.

⁷ Section 6 of Act 526/1990 Coll. on Prices

Table 9 River Board Morava: Payments for Surface Water Abstraction in Morava River Basin in 1997 - 2001

CZK/m³ without VAT	1997	1998	1999	2000	2001
Single use water cooling	0.46	0.49	0.53	0.56	0.60
Others	1.92	2.10	2.27	2.53	2.66

Source: T. G. Masaryk Water Research Institute, 2002

4.1.3. Charges for the Withdrawal of Groundwater

An authorized person withdrawing groundwater is obliged to pay charges for the actual quantity according to the purpose of the water withdrawal. For drinking water supply, there is a rate of 2 CZK/ m³ and for other uses there is a rate of 3 CZK/ m³. Until 2001, PWSS&S were exempted and were not subject to any payment. PWSS&Ss began paying the full for withdrawal charge in 2004.

Groundwater withdrawals from one resource not exceeding 6,000 m³ per calendar year or not exceeding 500m³ per month are exempt from payment. The charges go to the Czech State Environmental Fund and the State Budget as revenues.

4.1.4. Fees for the Discharge of Wastewater into Surface Water (Effluent Charges)

There is a fee for the level of the discharged wastewater's pollution and its volume. These fees are imposed on individual sources of pollution. The charges go to the Czech State Environmental Fund as revenues. For more detailed information see Chapter 4.3.1.

4.1.5. Fee for a Permitted Discharge of Wastewater into Groundwater

The authorised person shall pay a fee in respect of a permitted discharge of wastewater into groundwater. The permission is given by the water authority (small districts), the quality of wastewater is judged. If wastewater from a family dwelling is purified by a domestic treatment plant, no fee applies to the discharge. In other cases, the permitted discharge is subject to a fee of 3 500 CZK per year.

The fee is payable to the municipality in the area where the discharge takes place.

No national statistics on permitted discharges into groundwater are published.

4.2. Sales to Particular Service Users

4.3. Costs on Purchased Inputs

Due to large differences in tariffs between particular PWSS&S (see Table 8), the concrete calculation of VaK Hodonin is used as an example. The calculation of PWSS&S Hodonin includes the main cost categories as stated in the Financial Bulletin of the Ministry of Finance in which certain price regulation conditions are regularly up-dated.

The Value Added Tax (VAT) is paid as a percentage from the price of PWSS&S services (see the last row in Table 10). At present, VAT is 5%, but in the future we can assume an increase because of the fiscal harmonization with EU requirements (VAT should vary from 15 to 25% for all goods and services in all European countries). The current discussion in the Czech Parliament is to offset water and wastewater services to the group of 19% VAT.

Table 10 Calculation of Prices in Vak Hodonin in 2002

	CZK/m ³	
	Water rate	Sewage charge
1. Direct material	2.37	1.24
1.1 Unprocessed water	0.42	0.00
1.2 Chemicals	0.25	0.44
1.3 Other material	1.70	0.80
2. Direct salaries	2.87	2.50
3. Other direct material	9.81	12.62
3.1 Depreciation	4.42	5.25
3.2 Reparations and services	0.89	1.82
3.3 Social cost	1.01	0.87
3.4 Fees for the discharge of wastewater	0.00	0.86
3.5 Charges for the withdrawal of groundwater	0.89	0.00
3.6 Energy	1.51	1.52
3.7 Others	1.09	2.32
Company's cost – TOTAL	15.05	16.38
4. Manufacturing overheads	0.91	0.64
5. Administrative overhead expenses	2.20	2.19
TOTAL COSTS	18.16	19.21
Profit	0.72	0.77
PRICE (without VAT)	18.88	19.98

Source: <http://www.vak-hod.cz>

All categories must be in harmony with the price regulation schemes. The “Profit” represents the allowed category above costs which can be used as a dividend for shareholders or for the investments.

4.3.1. Effluent Charges

As mentioned above, there are 2 components to the effluent charges in the Czech Republic which are called:

- Fee for the Pollution of Discharged Wastewater:** The polluter must pay a fee for the pollution of discharged wastewater if it exceeds both the quantity and the concentration limit for paying the fee of the respective pollution indicator (see the Table 11)
- Fee for the Volume of the Discharged Wastewater into Surface Water:** The polluter must pay a fee if the volume of wastewater exceeds 30 000 m³ in one calendar year. Then, the fee shall be calculated as a multiple of the discharged wastewater volume at the rate of 0.1 CZK per m³.

This means 2-composit effluent charges: amount of water discharged (e.g. 45 000 m³) multiplied by the 0.1 CZK and if there is a phosphorus in that amount of 6 mg/l, the second component is calculated as follows: 45 000 m³ x 6 mg of phosphorus = 0.27 kg of phosphorus discharged x 70 CZK/kg = 18.9 CZK. The total effluent charge is: 18.9 + 4500 = 4518.9 CZK.

Table 11 Rates for the Fee Calculation and the Quantity and Concentration Limits for the fee Imposition

POLLUTION INDICATOR	Rate CZK/kg	LIMITS FOR THE PAYMENT	
		Quantity kg/year	Concentration mg/l
1.			
a) chemical oxygen demand – non-purified wastewater, until 31 December 2004	16	20 000	40
from 1 January 2005	16	8 000	40
b) chemical oxygen demand – purified wastewater	8	10 000	40
c) chemical oxygen demand for purified wastewater used in the production of pulp and refining of cotton and flax textiles	3	10 000	40
2. dissolved inorganic salts	0.5	20 000	1 200
3. non-dissolved substances	2	10 000	30
4. total phosphorus			
until 31 December 2004	70	13 000	3
from 1 January 2005	70	3 000	3
5. ammonium nitrogen until 31 December 2001	40	15 000	15
6. nitrogen Ninorg from 1 January 2001	20	20 000	20
7. AOX from 1 January 2002	300	15	0.2
8. mercury	20 000	0.4	0.002
9. cadmium	4 000	2	0.01

Source: Water Act

In 2002, the average effluent charge per m³ was about 0.48 CZK, which can be considered as a negligible cost. In the tariff calculation, this cost is usually included in the category „Other Direct Materials/Cost“.

4.4. Grants or Transfers

Due to the decreasing trend in water consumption, there have been no requests for installing new capacity to ensure the water supply. There are no plans for the construction of new dams and other big water management structures. The dominant focus of investments is nowadays on the construction of new sewage treatment plants according to EU Directives. Sources of financing include: municipality resources, the State Budget via the Ministry of Agriculture, the Czech State Environment Fund and international institutions. After 1996, the elimination of damages due to the catastrophic floods on the Morava and Odra rivers was the dominant investment. For particular sources see chapter 7.2.2.

There are concern that the PWSS&S's investments should be directed to the maintenance and reconstruction of existing installations for which no grants and subsidies are available. But in reality, most of PWSS&S do not seem to make a priority of these investments.

5. Infrastructure

As mentioned above, water and wastewater infrastructure and other operational property was privatised in 1993 – 1995 and most became the property of municipalities. The residual value of these assets had to be estimated because during Socialism, the recording of the company's depreciation and reserves for future investment was not done properly.

At present most of the infrastructure built in the 60s' and 70s' has been completely depreciated although estimates are that it will serve another 10 – 15 years without large investments. This is the reason why the problem of the system's sustainability is sometimes neglected, especially in small municipalities (local MUs), which are under the pressure from inhabitants to ensure cheap water and wastewater services. Unfortunately the data on the age, repairs and the current quality of the infrastructure are spread among MUs, so it is very difficult to get accurate and useful numbers.

This problem will be further discussed in Chapter 6.1.

5.1. Production, Processing and Distribution of Water

Table 12 shows the data about PWSS&S development in the Czech Republic between 1995 and 2001. As you can see, in the past decade, there were no essential investments in building new pipelines. The existing system has sufficient water resources and transport capacity to meet the demand.

Generally, the high percentage of losses during transport (about 27%) is a characteristic feature of the Czech water supply system.

In the water tariff, usually only the current (annual) depreciation is included. This sum depends on the assumed residual value in privatisation.

Table 12 Development of the Public Water Supply between 1995 – 2001

Indicator	Unit	1995	2000	2001
No. of population supplied from public water supply	thous.	8 377.9	8 681.5	8 702.0
No. of public water supplies		2 011	2 037	2 091
Length of pipelines	km	46 071	53 288	54 736
Length of pipelines per connected inhabitant	m	5.50	6.14	6.29
No. of distributaries	thous.	1 214.4	1 367.5	1 396.3
No. of inhabitants per 1 distributary		6.90	6.35	6.23
No. of water meters	thous.	1 207.5	1 385.5	1 409.4
Water invoiced, from which:	mil. m ³	624.8	538.0	519.7
- share of households	%	59.8	63.4	63.4
- share of agriculture	%	1.6	1.5	1.3
- share of industry	%	18.3	7.5	7.4
- others	%	20.3	27.7	28.0
Non-invoiced water, from which:	mil m ³	302.2	212.9	206.5
- losses in pipelines	mil m ³	275.2	189.3	182.6
- share of losses in pipelines	%	29.7	25.2	25.1

Source: *Směrný vodohospodářský plán – věstník, 2001, Ministry of the Environment*

5.2. Collection and Treatment of Wastewater

In comparison with pipelines the evolution of investments in sewers is a little more dynamic. This fact is related to the requirement of the European Union Directive (91/271/EHS) according to which every municipality or town up to 2 000 inhabitants (population equivalent of 2000) has to build or ensure the connection of the local sewerage system to a WWTP.

The current situation in the Czech Republic is as follows: towns up to 10 000 inhabitants usually have their own WWTP (according to requirements of the previous regulation and investments). Sometimes, thought, the quality of the water treated doesn't meet the nitrogen standards, so the plant has to be upgraded in the future. Municipalities and towns of 2 000 – 10 000 inhabitants have to build a sufficient WWTP by the year 2010. In this category, there is one town of 5 000 inhabitants (Senov) and about 23 other municipalities without any sewers. About 49% of municipalities with sewers are not connected to any WWTP.

In the field of the municipal wastewater treatment, the Czech Republic has been given a transition period from the EU until 2010 and these particular investments by PWSS&Ss are strongly supported by financing from the Ministry of Agriculture and the Czech State Environmental Fund. This sources of financing have being used for development of sewerages since the early 90s'. The financial aid is focused on the "rehabilitation" of the WWTPs as well as on new construction of WWTPs and new sewage networks if needed. There is no support for any (future) operating cost of the sewerages and repairs of existing infrastructure (for financial resources see Chapter 7.2.2.).

Table 13 Development of Public Sewers between 1995 – 2001

Indicator	Unit	1995	2000	2001
Length of sewers (without collection lines)	km	18 295.0	21 615.0	22 253.0
No. of collection lines	thous.	590.3	726.8	741.8
No. of WWTP, of which:		783	1 055	1 122
- with mechanical treatment		61	42	41
- with bio-mechanical treatment		722	1 013	1 081
Amount of wastewater treated, of which:	mil. m ³	832.7	808.8	841.4
- share of sewage water	%	37.1	39.0	39.3
- share of industrial and other wastewater	%	28.7	22.9	20.2
- share of storm water treated	%	34.2	38.1	40.6
Amount of wastewater treated in WWTP with the adequate level of treating (according to standards)	mil. m ³	660.0	751.7	783.6
- share of sufficiently treated wastewater (according to standards)	%	79.3	92.9	93.1
Sludge produced by sewerage plants, of which:	thous. tons of solid	146.4	206.7	205.6
- disposed of in landfills	thous. tons of solid	60.9	44.3	37.9

Source: Směrný vodohospodářský plán – věstník, 2001, Ministry of the Environment

6. Management Units

Thanks to the different size, historical development of a particular territory, structure of ownership and other features it is difficult to describe the situation of MUs in the Czech Republic in general. Therefore, conditions of specific PWSS&S (VaK Vyskov) are analysed in the Case Study.

The regulation of the PWSS&Ss (although it seems to be strict) still gives a lot of latitude in decision making to the PWSS&Ss owners and operators. PWSS&S are not a subject of direct regulation from the Ministry of Agriculture, so only municipalities (as owners) or the Ministry of Finance can somehow influence their behaviour. Suspicions of unreasonable pricing policies are very difficult to detail and prove.

The position of the municipal government is determined by the size of the municipality population, the value of the infrastructure in its territory, and which type of PWSS&S provides local service. To identify the main possible conflicts between customers, the municipality, and the operators of the PWSS&S we will discuss particular types of MUs again.

6.1. Types of Management Units

The distinctions between the 3 main categories of MU organizations were made in Chapter 2.2.2. Here, we would like to focus on the relative positions of the municipality, the service provider (or operator) and customers under different types of MU organizations.

- A. The position of a small municipality (as an owner of the infrastructure), which contracts with a service provider, is very problematic. The control of water service prices is done through political pressure on the municipality. In this type of organization, the municipality is usually pushing the provider not increase prices very often because this is not popular with the municipal governments constituency – the water customers.. Often there is no independent economic analysis of the real cost of providing service., The municipality does not have the technical or financial expertise at its disposal to characterize the situation of its water and wastewater system. A common result in such a situations is that costs of the real depreciation are not covered in order to keep prices down but keep net revenues up for the operator. Cuts in management (providers') wages is the last saving to be accepted. Degradation of the of the infrastructure used through depreciation is preferred. The system is running "unsustainably", which the municipality does not know or does not care about.⁸
- B. Another mode of organizing the elements of the MU is a joint-stock company with municipalities as the majority share-holders (e.g. VaK Vyskov from the Case Study), where Mayors and the management of the company are both in the Board. This type of company enables the municipalities to more directly manage the system and to have a control of management policies implemented by the operators. There may, however, be some lack in motivation to produce water efficiently (cost savings to increase profits is not the driving force). Sometimes the tariffs of services are derived from the average of the Czech Republic, which is regularly published according to an analysis of data from the 120 largest service providers, and the cost calculation is done retroactively.
- C. According to some water management officials, large association of municipalities (or joint-stock companies) as infrastructure owners with separate companies for conducting operation is the most effective organizational form (e.g. Severoceske VaK). The reasoning is that the service provider runs the real business and both the provider and the association of

⁸ These conclusions result from the consultation with officials at the Ministry of Agriculture (Mr. Chaloupka) who are requiring the change of the system of the control. They ask the direct responsibility of their Ministry to achieve the effective (not only formal) price regulation.

municipalities have their own experts reviewing the tariff setting, cost conditions, and the quality and sustainability of the services provided. Very often there is international capital in these types of MUs. The main difference between A and C type is in the power of municipality/municipalities to monitor the behaviour of service providers and get an independent and transparent evaluation of the condition of the water and wastewater systems.

Broadly considering the behaviour of Czech municipalities and their elected representatives, the 5-year electoral period there is a lot of time for corruption and lobbying with respect to PWSS&Ss, especially in the following areas:

- a) selling the infrastructure,
- b) controls of the system's sustainability (accumulation of resources for reconstruction),
- c) over-investment from government resources when the rate of return and cost of operation are neglected.

All these cases are common thanks to the ineffective price regulation, which rests with the Ministry of Finance (regional financial offices with lack of experiences in PWSS&S) and also on particular municipalities renting out the infrastructure. When it comes to monitoring and economic regulation, the Ministry of Agriculture has no legal status to ensure proper record keeping and planning at the PWSS&Ss.

6.2. Management Units Service Areas

See section 2.1.1.2.

6.3. Population Served

See Table 7 for sewerages and Table 12 for water supply.

6.4. Special Obligations

6.5. Financial Conditions

Before 1990, the centralized system of prices did not allow the specific regional costs of water production and treatment to be dealt with. The difference between operational costs and revenues of particular PWSS&S (if necessary) was covered by subsidies from the State Budget. The investments were planned and financed by the Government.

From 15 May 1993, no additional subsidies to cover operation costs of PWSS&S were available. The reimbursements for drinking water delivery and sewage service are fully included in the receipts of PWSS&S and these are set in order to repay the operational costs and have a „reasonable profit“. The current depreciation and repairs are included in the calculations. The category of reasonable profit is not specified by the regulation and there is no cost limitation for it (i.e. the % of the cost...etc.).

In reality, PWSS&S mainly covers operational costs, but only partly covers the investment costs. Because of the danger of the high social burden, the full cost is not transferred to the final users (households), which could be a problem in the future, because the costs of reconstruction and operation of new facilities will not be covered from Central Government resources. A significant part of new constructions is covered in the State Budget, loans from the European Investment Bank and other international resources. The repayment of any of this external debt will place more pressure on future tariffs and burden customers.

6.6. Current Plans for Expansion and Investment

There are some investments of PWSS&S financed by their internal resources, but the capacity for doing this believed to be very limited. Loans are sometimes used as a support for these investments done without public financial support (usually repairs) and, as noted above, must be repaid with interest.

7. Regulatory Units

Considering and describing the position of a particular RUs again, the focus will be mainly on the grants and subsidies provided from public resources (the state budget and other funds). In water management of the CR, there are two main areas granted:

- 1) development of PWSS&S,
- 2) investments of River Board Companies.

Subsidies represent the essential source of their long-term financing, although in some cases PWSS&S has started to behave as a private sector. The reason for the importance of using public resources resides in the taxation power of the Central Government and the general acceptance of this source of financing since it is often thought to limit a rapid or high tariff increase.

7.1. National and Local Planning and Permitting

There are several sources of data related to water management in the Czech Republic according to the different institutional needs. These data are aggregated and published annually. The main institutions dealing with data collection are:

7.1.1. Data Collection

Czech Statistical Office (CZSO) collects data from almost 200 of the largest PWSS&S and therefore describes the situation of about 97% of the population served. This information (populations connected, water and wastewater production, length of pipelines, ... etc.) is structured according to regions and published on the Internet pages of the Office under Chapter 2 – Environment and Agriculture. Also the quality of water in particular watercourses is monitored.

Czech Hydro meteorological Institute (CHMI) is a central state institute of the Ministry of the Environment for monitoring and collecting data in the field of hydrology and water quality. It runs a national network for water monitoring and analyses the collected data. It carries out hydrological studies and forecasts and, recently, it has focused on flood prevention.

T. G. Masaryk Water Research Institute is an organization working under the Ministry of the Environment. It annually publishes data on river basins and PWSS&S, where about 120 of the largest companies are included. Data on PWSS&S is aggregated for the whole country.

7.1.2. Planning and Development

The grant policy of the Czech Government has the following 3 main priorities:

- a) to finish the construction of the large water supply systems,
- b) to support the construction of sewage treatment plans,
- c) to support building the water supply infrastructure in small municipalities.

In the future (generally 10 – 15 years), the subsidies from public sources should be totally replaced by loans and construction costs should become a part of water and sewage tariffs. The factor of social acceptability is still a significant limitation.

7.2. Economic Regulations or Limitations

7.2.1. Pricing (tariffs)

The operational expenses (surface water delivery, management and maintenance of watercourses) of the River Boards State Companies are mainly covered by payments for abstracting surface water, which go to their budget. The present prices of water withdrawal mainly cover the current costs and do not play the role of economic tools because the development costs and environmental costs are not included. Payments differ between particular river basins from 1.5 to 3 CZK/m³ according to the amount of total water withdrawn and the status of users in the territory (industry, agriculture...etc.). The payment is an important income item of River Board State Companies and it has to cover their operational cost. The level of payment for surface water abstraction represents a cost for PWSS&S.

The construction of tariffs is under the price regulation of the Ministry of Finance, however the real pressure to keep reasonable prices fails. During controls of calculation – if conducted - it is very difficult to prove if the tariff is too high (some waste cost are included) or too low (it causes the degradation of the system). For the efficient financial control, experts with the knowledge of local conditions and technical knowledge are needed. They are usually not available for the task of the Ministry of Finance (e.g. at local financial offices).

The problem of the actual independence of PWSS&S and the consequences was discussed above and will be further discussed in Chapter 9.

7.2.2. Grants and Subsidies

In the Czech Republic, the following sources of grants and subsidies are available for PWSS&S:

- a) **Czech State Environmental Fund** as a tool of relatively stable financing for WWTP construction. In 2001, the total revenues of the Fund were about 3 242 bil.CZK, from which 1 213 bil.CZK came from the water management of the CR. Charges for the withdrawal of groundwater and fees for wastewater discharge into surface water are important revenues of the Fund (about 43%).
- b) **State Budget** via grant programmes of particular Ministries (Ministry of Agriculture, Ministry of the Environment... etc.), through which large investments into WWTP are realised.
- c) **Budgets of Regional Offices** can become an important source of money in future when delegated competences will be followed by incomes from taxes and various fees (e.g. 50% of charges for the withdrawal of groundwater).
- d) **European Investment Bank**, which (through the Czech Government as a guarantee) offers favourable long-term loans.
- e) **Structural Funds** of the EU.

River Board Companies are not a source of money for PWSS&S. They are responsible for the administration of watercourses and their only interconnection with PWSS&S is through withdrawals of water and subsequent payments for that. River Boards themselves get grants and subsidies from various sources and they use them for building anti-flood measures, dams ... etc.

As already mentioned, the main issue in the current grant policy is investments into constructing sewers and WWTP in towns over 2000 population-equivalent. In Table 14, the main resources of money coming to this area between 1995 and 2001 are shown. In Table 15, the future requirements on public resources are estimated.

Table 14 Subsidies to Investment in Constructing PWSS&S and Wastewater Treatment Plants in 1995 – 2001 (in mil. CZK)

Year	From the State Budget		From the Czech State Environmental Fund		Total	
	Total Subsidies	Of which, loans	Total Subsidies	Of which, loans	Total Subsidies	Of which, loans
1995	3 250	1 064	2 200	1 000	5 450	2 064
1996	3 101	1 366	1 947	854	5 048	2 220
1997	2 154	838	1 892	747	4 046	1 585
1998	1 648	435	1 083	512	2 731*	947
1999	1 718	473	1 069	414	2 787**	887
2000	1 340	422	1 130	438	2 106***	859
2001	700	219	1 604	656	2 304****	875

Source: Ministry of Agriculture, Czech State Environmental Fund

* plus additional resources from the European Investment Bank: 798 mil. CZK

** plus additional resources from the European Investment Bank: 568 mil. CZK

*** plus additional resources from the European Investment Bank: 164 mil. CZK

**** plus additional resources from the European Investment Bank: 222 mil. CZK

Table 15 Assumed Financial Resources for the Implementation of Directive No. 91/271/EHS (in mil. CZK)

Year	2003	2004	2005	2006
State Budget	1 797	974	1 075	1 075
State Environmental Fund	948	1 699	859	859
ISPA	4 197	0	0	0
Cohesion Fund	0	2 962	3 162	3 162
Phare CBC	188	0	0	0
Structural Funds	0	256	436	436
Other international grants	93	93	0	0
Own (private) resources	3 480	3 350	3 485	3 485
Average annual resources	9 518			

Source: Amendment of the Water Act, Draft No. 352/2003

7.3. Environmental Regulations and Restrictions

The quality of water withdrawn and discharged is regularly monitored. This monitoring includes:

- quality of extracted surface water and groundwater for water supply purposes,
- quality of drinking water delivered,
- quality of wastewater before treatment,
- quality of wastewater discharged.

The current system of monitoring and controls should ensure the appropriate quality of all the categories mentioned. In the field of drinking water the Czech Environmental Inspection and the Ministry of Health (of the hygienic service) perform the controls (double checks).

Regarding effluent charges in the Czech Republic (fees for the discharge of wastewater into surface water), the average payment for the discharge of wastewater is about 0.48 CZK/m³, which is considered a nearly negligible cost. The effluent charges are stated as a fixed amount of money, so any incentive they might provide to reduce effluent discharge may be eroded by inflation. For municipalities (or service providers), there is no economic incentive to build a WWTP to avoid these effluent charges. So, the only way how to ensure the implementation of the EU directives is to push municipalities of greater than 2000 PE to construct a WWTP and to find some public resources for such investments and local resources to support operating costs..

In the future, effluent charges should become the revenue of River Basin Administrators according to the philosophy of the Water Framework Directive.

8. Service Users

Information on service users is very complicated to get and analyse. In the available statistics, the total amount of inhabitants in the Czech Republic connected to networks is expressed, as is a list of towns and municipalities with their own pipelines, sewers and a WWTP connection. The following chapter therefore does not answer all the questions posed.

8.1. MU Customers

Information on MU customers is mostly distributed among particular PWSS&S.

As mentioned in the Czech Case Study, people that are not connected to public pipelines and sewers mostly live in small villages of 400 – 700 inhabitants. The possibility of their being connected in the future depends on the activity of the Municipal Office, its investing and grant-searching ability and communication with the local PWSS&S (if any exists).

At present, the annual payment for PWSS&S services is about 2 500 – 4 000 CZK per household per year given the average level of consumption and level of tariffs. This sum of money represents 1 – 3% of the net average income of the average household and 5 – 7% of the net average income of the first decile of households (the low-income households). Regarding the continual increase in all costs (e.g. energy, gas, rent... etc.), the room for tariff increase is therefore limited.

8.2. Self Supply Users

The majority of self supply users in the Czech Republic extract water from their private or small municipal wells. The statistics on these users are weak and based on general assumptions, because the amount of water withdrawn usually does not exceed the minimum volume established by the Water Act.

The population continuously supplied by their private wells is about 1.5 mil. (14% of all inhabitants). In comparison with 1990, there is an increasing number of people using this source as a service water, which is a consequence of the growth in prices.⁹

As mentioned in Chapter 2.1.2., the lack of the self supply statistics represents a serious problem in the Czech Republic. It is assumed that about 95 – 98% of private and public well water does not meet health standards (due to bacterial contamination), because owners and users of wells do not carry out regular testing, cleaning, ... etc. A large number of wells are poorly situated and protected from contamination.

⁹ Source: „Voda v České republice“, document of the Ministry of the Environment from 18. 10. 2002

9. Reform Proposals Connected with Tariffs and Charges

Generally, the situation in public water supply and sewerages can be evaluated as more stable after the dynamic changes in the beginning of 90s'. The Czech Republic has got sufficient water resources to meet current and future demand. There is a new legislation (Water act, Act on PWSS&S) establishing basic rules and main actors.

About 89% of population is connected to pipelines and about 77% of population connected to sewers, which can be considered as a high percentage. Most MUs are metered. An average consumption is about 90 l/person/day and slowly decreasing because of higher prices of water every year.

Therefore the only problem visible while analyzing general numbers is quite high loss in pipelines about 23% (and slowly increasing due to the lack of maintenance). Following sub-chapters will discuss further problematic areas related to pricing policies and the structure of charges.

9.1. Tariff Structure

At present and in the future, one price within each PWSS&S is considered for all consumers, neglecting the idea of cost-based pricing. In the past (up to 2001), there were 2 levels of prices for businesses and households, regarding the social issue. The goal was to redistribute the profit of PWSS&S from the prices for households to the prices for businesses. But in many cases, the operating costs were also redistributed, so the price began to be very unfavourable for business. They started to disconnect from the system, which enormously increased the prices for households. That is, why this approach is not used any more.

It is necessary to emphasize, that about 50 – 80% of the costs for water and wastewater services are originally from capital (fixed) costs. This fact means that when large service users disconnect in conjunction with splitting up the large PWSS&S into small ones always has a strong impact on prices. To save money while running the system, maintenance was often passed over as mentioned in previous chapters.

In order to ensure sustainable pricing of PWSS&S services, price regulation is imposed by the Ministry of Finance, although the real power to control tariffs is on particular municipality as the owner of the infrastructure or a share-holder of PWSS&S. To reform the current practices in pricing systems toward higher sustainability, we recommend investigation of the possibility of 2-component pricing based on following covering of costs of PWSS&S:

- a) fixed payment per year to cover capital cost,
- b) payment per m³ to cover operational cost.

This option and its impact on particular MUs is investigated in the Pilot Case Study.

9.2. Economic Regulation

The price regulation of the Ministry of Finance is inefficient, although regular controls of calculations are conducted. The cost categories stated in the Financial Bulletin of the Ministry of Finance, as well as the definitions of „economically eligible costs“ and „adequate profit“ are very weak. There is no percentage limitation of the profit at all.

The PWSS&S always has a monopoly on financially data, so it is very difficult for controllers to detect if the price is reasonable or if the system is sustainable. To improve the sustainable or unsustainable situation of the company, there is a special tool called “technical audit” in the Act on PWSS&S. This means large technical control done by special inspectors of Ministry of Agriculture if

asked by the municipality or other institutions. The institution ordering the audit has also to pay the bill, so it is not widely used.

It is necessary to say that officials (especially at the Ministry of Agriculture) know about the only “formal” power of the Czech price regulation. The reason why it is not abolished is expressed by the opinion, that at least somebody has a right to get full financial data from companies and check their bills. In the future, Ministry of Agriculture is going to amend the Act on PWSS&S to create the direct responsibility of PWSS&S to the Ministry.

9.3. Economic Sustainability

As mentioned, in the Czech Republic there is unsustainable pricing of services done by PWSS&S which could cause large problems with the money shortage for reconstructions of the infrastructure in the next 10 – 15 years. To avoid that, following measures has to be done:

- a) to include the real depreciation of the property into tariff calculations by the law or by the change of the system of the price regulation,
- b) to establish stable rules of the ownership (e.g. by the Act on public-private partnership), which creates better conditions of the long-term using of the property in the sector, where public and private capital is usually in combination.

9.4. Effluent Charges

As mentioned, effluent charges in Czech Republic are very low – only about 0.48 CZK per m³, which is about 3% of the average sewage tariff. They are stated in CZK/unit, so they erode by the inflation. According to Ministry of the Environment officials, the increase of these charges is desirable in future (although any proposal is prepared yet). Still, their level will not influence the behaviour of PWSS&S in the near future (e.g. decisions between charges and new investment in treatment).

9.5. Summary of Reforms

In the Table 16 problematic issues and possible future changes of the public water supply and sewerages in the Czech Republic are gathered. Some of these reforms has been already investigated or discussed at Ministries.

Table 16 Summary of Reforms

Strategy Name	Strategy Description	Comments/Concerns
Financial control	The control of tariff calculations of PWSS&S will be done directly by Ministry of Agriculture.	This will be done by the change of the Act on PWSS&S. The reform is pushed by Ministry of Agriculture.
Effluent charges increase	The absolute levels of effluent charges (e.g. CZK/kg) in Water Act will be increased.	This will be probably done by the amendment of Water Act. The reform is pushed by Ministry of the Environment.
Monitoring of self supply users	The goal is to ensure the appropriate monitoring of about 14% of self-supplied population (e.g. wells) – this means at least the location of SUs and the quality of water used.	The monitoring of water withdrawals is on river basin authorities (if exceeds a given amount of m ³) or on Czech Environmental Inspection (dealing with water in general). The monitoring of quality of drinking water is on Ministry of Health. So far – no information about reform proposal.
Stable rules of the ownership	The goal is to established strict and clear rules for hiring the infrastructure own by municipalities (= public property). These rules should ensure the long-term perspective of doing business for the leaseholder and the sustainable management of the property for the renter (e.g. the obligation to give the property back to owner in the same condition as get it).	This could be done by the Law of Public-Private Ownership which has to be amended according to EU legislation.
Institutional reform	According to EU Water Framework Directive, the management of water should be done by river basins through independent River Basin Administrators. In CR these bodies only administers watercourses and financially and legally depends on the Ministry of Agriculture.	The first step of the institutional change could be done by giving the financial independency to River Boards (e.g. to let them cover not only operational, but also capital cost from charges, to shift effluent charges to their budget,... etc.). But this independency would have to be done through the establishing their new legal status, too.

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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:
The Czech Republic – Case Study



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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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Abbreviations

ASTEC	Accounts Simulation for Tariffs and Effluent Charges
CZSO	Czech Statistical Office
CR	Czech Republic
CZK	Czech currency (about 32.9 CZK is 1 Euro – 12 February 2004)
EIB	European Investment Bank
EU	European Union
MU	Management Units - municipalities or companies established or hired by municipalities to run the system
PWSS&S	Public Water Supply Systems and Sewers - the official title for the MU in the Czech Republic
RU	Regulatory Units, e.g. the government, Ministries and other offices of the public administration which impose some regulation on the MU
SU	Service Users are households and businesses
VaK Vyskov	Public Water Supply System and Sewerages in Vyskov (selected case site)
VK	Sewage system without treatment
WWTP	Water treatment plant

Executive Summary

The Pilot Case Study for Water and Wastewater Management in the Czech Republic was developed to examine the opportunities for, and consequences of, possible tariff and effluent charges reform in a certain water and wastewater service area of the Morava River basin.

The case selected, the Vyskov public water supply system and sewers, represents an average Czech management unit in the field of water and wastewater services. The analyses of its cost conditions and decision-making processes regarding future investments helped us to discover some future issues related to this public sector.

The Pilot Case Study focused mainly on two important cost factors: constructing sewage treatment plans under the requirements of the EU directive and the impact of real investment needs to ensure the sustainability of the whole system.

The testing of particular tariff changes was made by using ASTEC, a water spreadsheet model, which can be considered as an important and useful tool for this type of analysis.

1. Introduction

The Pilot Case Study constitutes a complementary part of the report: National Profile for Water and Wastewater Management in the Czech Republic. It is focused on the practical functioning of Public Water Supply and Sewers (PWSS&S) which provides water supply and wastewater services under the conditions of the current regulation in the Czech Republic.

These analyses were developed under the auspices of the UNDP-GEF Danube Regional Project and thematically belongs to components 1.6 and 1.7.

1.1. Purpose of the Pilot Case Study

The Pilot Case Study contributes to the analysis of water and wastewater tariffs and effluent charge designs focusing on nutrient reduction and the control of dangerous substances in the Danube river basin. The main purpose is to propose a possible country tariffs and effluent charges reform which:

- a) enables the ongoing development of the water supply and sewage systems,
- b) ensures service providers' financial stability ,
- c) meets the environmental criteria stemming from the EU directives.

1.1.1. Develop a Case Study

The Case Study analyses the economic and environmental position of owners of the infrastructure and service providers in the field of water supply and sewerage. The infrastructure owner is usually a municipality, the service provider is a person contracted by the owner to provide water supply and sewage services. Municipalities can run the system themselves.

Several existing forms of MUs can be divided up into 3 groups according to size and ownership. These are described in the National Profile that accompanies this case study.

The Case Study use the water spreadsheet model to work with the empirical data from a particular water supply and sewage system. As a result of this modelling, the possible institutional and financial reforms can be proposed based on different scenarios, but in a realistic content.

1.1.2. Data

In the Czech Republic, the following sources of data are available on individual PWSS&Ss:

Czech Statistical Office (CZSO) provides information divided according to districts and regions. The Census of Public Water Supply Systems and Sewers was executed in 2002. The study contains the technical data of districts (length of pipelines and sewers, No. of people connected, water sources ... etc.).

T. G. Masaryk Water Research Institute is the organization working under the Ministry of the Environment. It annually publishes data on river basins and PWSS&S, where about 120 of the largest companies are included. Data on PWSS&S is aggregated for the whole country.

Particular PWSS&S and their private statistics, financial and technical data represent an essential source of required information. For the purpose of this study balance sheets, tariff calculations, numbers on production and consumption were used.

Assumptions are important data sources as well. In the Case Study all assumed data are labeled in italics.

In the pilot case study, all data are related to the year 2002, if it is not mentioned otherwise.

1.2. The Case Selected

Name of the MU: **Vodovody a kanalizace Vyskov, a. s. (VaK Vyskov)**
Translation: Vyskov Public Water Supply System and Sewage, joint-stock company

In the considered territory, the Morava River basin, there are about 22 large MUs, which run under different ownership structures and operate at diverse levels of infrastructure, which was mostly built before 1989. From this point of view, the current joint-stock company VaK Vyskov operates over the entire territory of the former Vyskov District State Company. This fact enables us to analyze the current position of such a the context of the past level of district investments, which were planned and financed by the Central Government.

In the Czech Republic tariffs on water supply and sewage are regulated. The country average is about 19.11 CZK/m³ for water and 15.61 CZK/m³ for wastewater, although these tariffs vary enormously from company to company. In VaK Vyskov, the water rate is about 22.80 CZK/m³ and the sewage charge is about 14.40 CZK/m³. That means VaK Vyskov charges roughly average tariffs. There are many institutional and economic factors which influence the level of both tariffs charged by VaK Vyskov and these will be discussed in the following chapters.

The criteria of MU selection:

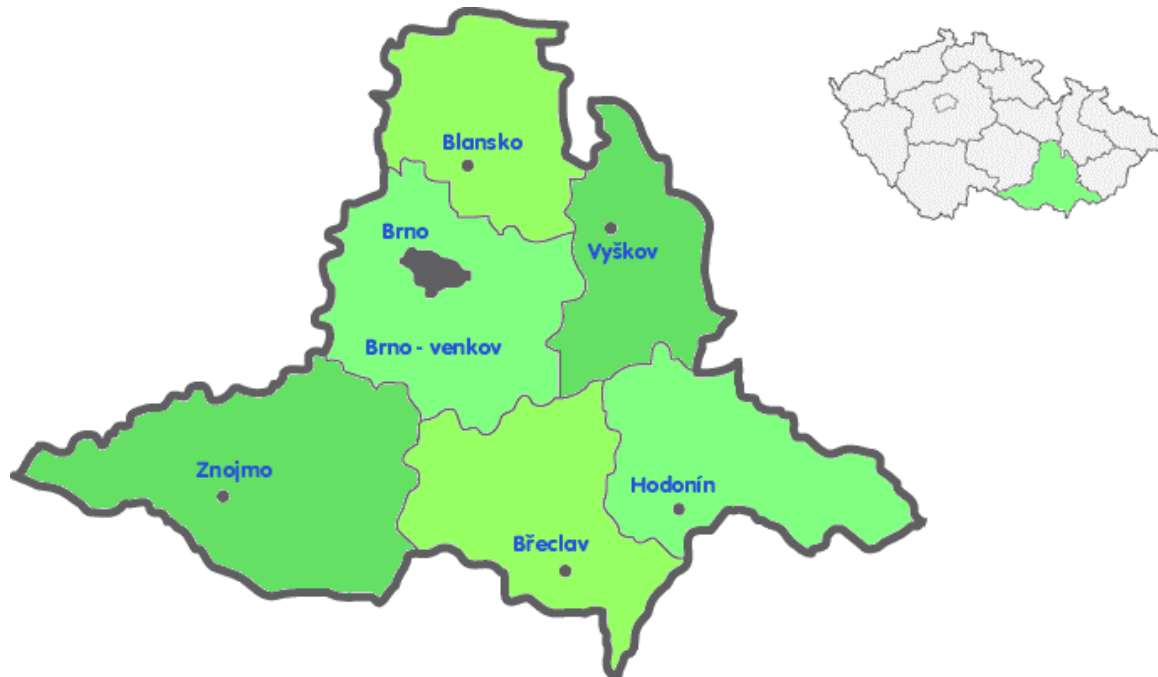
- a) location in the Morava River basin,
- b) historical infrastructure links,
- c) Czech average tariff level,
- d) data accessibility.

2. Case Settings

2.1. Service Area of the MU

VaK Vyskov administrates the whole territory of the former district Vyskov. Only one municipality not in the district is connected to the system (Ujezd u Brna)

Map 1. The Location of the Vyskov District in the South-Moravian Region



The Vyskov district is a part of the South-Moravian Region. It covers a territory of about 889 km², where 5 towns and 77 villages are situated. It has about 86 400 inhabitants. The population density is 97 inhabitant/km², which is below the average of the Czech Republic (131 inhabitant/km²). The capital of the area (former district) is the town Vyskov with 22 400 inhabitants. Other towns and villages with more than 1000 inhabitants are listed in Table 1 and labeled in Map 1.

Table 1 **Towns and Municipalities of the Vyskov District with Population up to 1000**

Name	Status	Population
Bosovice	village	1 073
Bucovice	town	6 286
Drnovice	village	2 171
Ivanovice na Hane	town	2 892
Krenovice	village	1 755
Letonice	village	1 438
Nesovice	village	1 137
Otnice	village	1 409
Pustimer	village	1 532
Racice-Pistovice	village	1 019
Rousinov	town	4 929
Slavkov u Brna	town	5 893
Vyskov	town	22 433
Total – town	-	42 433
Total	-	53 967

Source: Czech Statistical Office, 2002

Map 2. Municipalities, Pipelines and Sewage Treatment Plants in the Vyskov District



The population is mostly concentrated in the central part and in the Southwest of the service area. The Northern part of the Vyskov district is covered by mountains (Drahanská vrchovina). There is a motorway, which divides the territory into 2 parts – the hilly area in the north and flatlands to the south. As for water resources, there is a large surface reservoir, Opatovice, near the town of Vyskov and about 15 sources of groundwater of which Dedice, Manerov and Drnovice are the most important.

2.2. History of the Current Organization

The first pipelines in the area of the Vyskov district were built in Slavkov in 1932 and in the town Vyskov in 1935. From 1955, these pipelines were administrated by the regional organization as public property.

In 1960, there was institutional reform establishing districts as a second level of the government administration. In that year, the Vyskov District Watercourse Administration was established for providing water supply and sewage services. In the following 20 years, large investments into improving quality and enlarging the network of pipelines and sewers were made. The construction of the large surface water reservoir in Opatovice had been initiated, the first sewage treatment plants were constructed.

In 1977, the district organization was assimilated by the South-Moravian Water Supply Systems and Sewerages within the government idea of the central management of the whole public water service. This idea of successfully managing 6 large state PWSS&S was not fulfilled.

After 1989, the South-Moravian state company entered into the second wave of voucher privatisation. It was partly privatized according to the proposal of the Vyskov district towns and municipalities. In 1993, the VaK Vyskov was established as a joint-stock company. VaK Vyskov is considered to be a “integrated” company, because its ownership consists of both, infrastructure and operating property such as trucks, pumps, etc. (type one from Chapter 1.1.1.). Both Mayors and the management are represented on the company Board.. VaK Vyskov owns about 360 km of pipelines, 385 km of sewerages, 3 water processing plants and 7 sewage treatment plants.

2.3. The Current Organization

2.3.1. Identification of Water and Wastewater Services

Water supply and wastewater services represent the major part of the company’s activities. Besides that, the following services are provided:

- construction works in the field of water management,
- consulting and project creation in the field of water management,
- laboratory testing of water quality.

These services represent about 8% of company revenues.

2.3.2. The Relationship between MU, SUs and RUs

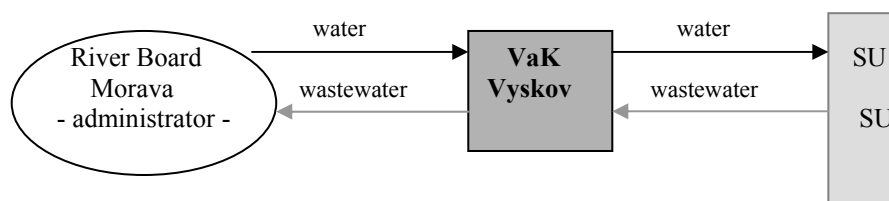
2.3.2.1. Economic Relationships

VaK Vyskov provides water supply and sewage services to all inhabitants and businesses connected to public pipelines and sewage networks. The services are provided on the basis of individual contracts between VaK Vyskov and consumers. Prices (water and sewage tariffs) as well as their calculation must be published annually according to the form set by the Ministry of Agriculture. Manner of the tariffs and supporting calculation have to be sent to a customer whenever requested. If a customer does not pay for the service for more than 30 days from the invoice’s delivery, the MU is allowed to cut off their service.

VaK Vyskov has to pay fees for withdrawing surface water, groundwater and discharging wastewater. These payments have got a different status:

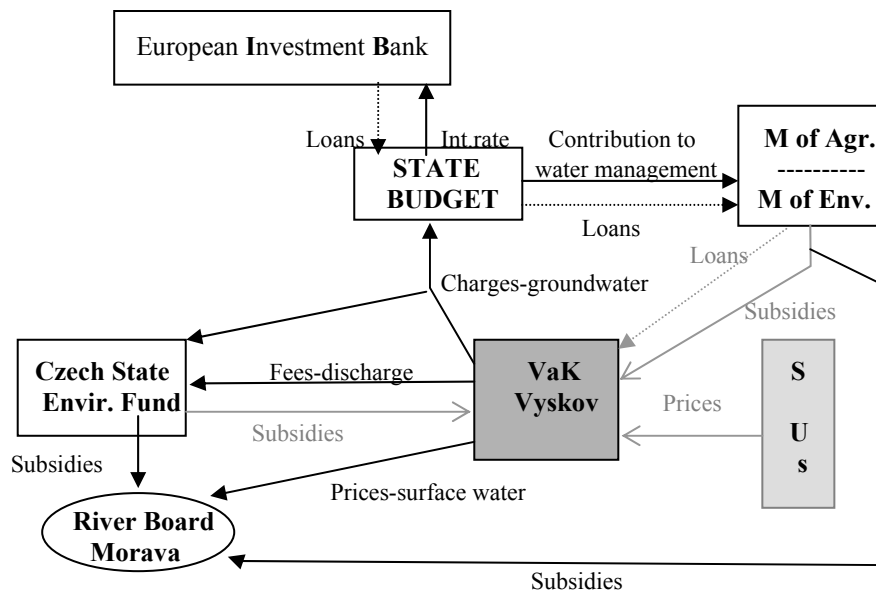
1. **Payments to Cover Watercourse and River Basin Administration** is a price belonging to the River Board Morava for withdrawing surface water. River Board Morava sets this price per m^3 , the current price is about 2.70 CZK/ m^3 .
2. **Charges for the Withdrawing Groundwater** are established by the Water Act. For the purpose of drinking water supply, there is a rate of 2 CZK/ m^3 . Half of the payment belongs to the Czech State Environmental Fund and the second half to the State Budget. Until 2001, PWSS&S had an exemption and were not subject to any payment. So only a charge of about 0.70 CZK/ m^3 was paid in 2002 and about 1.40 CZK/ m^3 in 2003. Next year in 2004 the charge for PWSS&S should be the maximum declared sum.
3. **Fees for the Discharge of Wastewater into Surface Water** are: a Fee for Pollution of the Discharged Wastewater calculated according to particular pollutants (see the National Profile Report), and a Fee for the Volume of the Discharged Wastewater which is paid if the volume of wastewater exceeds 30 000 m^3 in one calendar year. The fee shall be calculated as a multiple of the discharged wastewater volume and the rate of 0.1 per m^3 . Fees go to the Czech State Environmental Fund as revenues.

Sch 1: Scheme of services provided



2.3.2.2. Management Relationships

The description of particular payments by VaK Vyskov was mentioned in the previous chapter. The flow of the financial resources has to be completed by transfers and subsidies from government and other public resources. The Czech State Environmental Fund finances smaller investment projects on sewers. From the State Budget, money is provided for Ministry of Agriculture and Ministry of Environment programmes. These programmes include building pipelines, construction of sewage treatment plants ... etc. There is no money for infrastructure re-construction from these sources. The Czech Government also got a loan from the European Investment Bank. These resources are used for different purposes in the field of water management. The interest rate is paid by the Government.

Sch 2: Scheme of the Financial Flows**2.3.2.3. Regulatory Relationships**

The MU is a subject of regulation and control from different institutions. There is a hierarchy of water authorities which represents the governance of PWSS&S. This hierarchy is: „small districts“ – regions – Ministry of Agriculture. All of these water bodies imposes different obligation on PWSS&S. If the territory of a particular PWSS&S overlaps the territory of one “small district”, the regional office works as a local regulator in the first instance.

The regulation and control cover the following areas of activities:

I. Economic Regulation

1. According to Act No. 526/1990 Coll. on Prices, the price calculations of the MU only have to cover economically eligible costs and an adequate profit. In the interpretation of the Water Law it is stated that the cost of building pipelines or a sewer network can be included into the price calculation, if it is in a harmony with the Law on Prices. In the Financial Bulletin of the Ministry of Finance, the rules on the construction of all regulated prices (see the National Report) are published annually. The Ministry of Finance and its Financial Offices in regions are responsible for financial regulation..
2. According to Act. No. 274/2001 Coll. on PWSS&S, once a year the MU has to publish the clear and entire price calculation (water and sewage tariff) by 30 June the next year. There is no strict formula on how to meet this obligation. Usually, the company puts the calculation on its web site or displays it on a information board in the municipality.
3. According to the Water Act, the MU has to compile a Statement of Discharged Water and submit it to the water authority (region) by the 15th February the following year. In this statement, the MU has to specify the actual information regarding the number of pollution indicators subject to a fee, their concentration in the discharged wastewater and the volume of the discharged water. On the basis of this statement, the water authority assesses the fee for the previous calendar year and delivers the total sum to the MU, or the financial office and Czech State Environment Fund. The financial office of Ministry of Finance is responsible for collecting fees. The control of the wastewater quality and quantity is done intermittently by the Czech Environmental Inspection.

4. According to Act. No. 274/2001 Coll. on PWSS&S, the Regional Office is forced to develop the regional plan on the future development of pipelines and sewers by the end of 2004. This document has to be amended by the Ministry of Agriculture. It directly regulates new investments in the region, because construction offices are not allowed any further construction than that selected in the plan. Regions (as water authorities at the second stage) do this work for the Ministry of Agriculture which is responsible to ensure the development of PWSS&Ss in the CR as a whole. The plan is being processed in these days, so the practical functioning of this type of regulation has not been checked yet.
5. According to Act. No. 274/2001 Coll. on PWSS&S, the owner of the infrastructure (municipality) keeps documentation of the property and announces the annually updated information to the water authority (region). The records are kept on pipelines and the sewage network, water processing plants and sewage treatment plants. All information is centralized at the Ministry of Agriculture. The first deadline for this obligation is the end of 2004.
6. According to Act. No. 274/2001 Coll. on PWSS&S, the owner of the infrastructure has to keep functional (operating) evidence, which contains information on water resources, the drawn documentation of the infrastructure, price calculations, the plan of the control of the water quality ... etc. This data is also provided to the water authority (region) and aggregated at the Ministry of Agriculture. The first deadline for this obligation is also the end of 2004.
7. According to Act. No. 274/2001 Coll. on PWSS&S, the Ministry of Agriculture is allowed to conduct the technical audit of pipelines and sewerages. This large technical control starts from an impulse of the municipality, the Ministry of Finance or the Office for the Protection of Competition. The main task is to justify the cost of a particular network and to adopt measures for future development and repairs. The MU has to provide all data required by the special controllers.

II. Environmental Regulation

1. According to Act. No. 274/2001 Coll. on PWSS&S, the quality standards of the water withdrawn have to be met. Once a year, the MU has to provide all results of these measurements to the regional office. Czech Environmental Inspection controls these obligations. If the quality of the water is not sufficient the resource cannot be used.
2. According to Act. No. 274/2001 Coll. on PWSS&S, delivered drinking water has to meet the hygienic standards of water. The frequency and the process of controls is regulated by a special law of the Ministry of Health.
3. According to Act. No. 274/2001 Coll. on PWSS&S, the owner of the sewage network has to develop a sewage regulation plan in which the maximum level of pollutants in wastewater is stated. This document has to be approved by the water authority ("small district"). The operator (or the owner) of the sewage network has to regularly measure the pollution of wastewater.

2.3.3. Identification of Conflicts among MU, RU and SUs

General conflicts are described in Chapter 9 of the National Profile. In brief, the following problems arise:

- a) the price regulation of the MU is mostly a formality,
- b) the recording of the MUs (no. of companies, calculations) should be done by the Ministry of Agriculture, but it is not. The Ministry monitors about 120 of the largest MUs (including VaK Vyskov), but there are about 800 small ones with concessions and another 1000 subjects without any permission to run the service, which are not recorded at all,

-
- c) municipalities put the political pressure on service providers to lower the prices of services, which leads to infrastructure degradation and no provision for replacement,
 - d) municipalities should not sell the infrastructure, but the only regulatory tool is the government „golden share“ in particular joint-stock companies (PWSS&S), whose power is limited. The current trend is a great deal of pressure on municipalities that is done by large private investors, especially in town with more than 10 000 inhabitants, to sell or privatize the operation and ownership of the water system.

3. Current Operating Accounts of MU

Before describing MU current accounts of, it is important to emphasize, that in the Czech Republic in price calculations, the current and capital accounts are not clearly distinguished and they cannot be analyzed separately. Every company can also include different types of cost into particular account categories (especially into „other direct cost“ and „production overheads“), which do not enable a ready comparison between calculations.

3.1. Product Quality and Quantity

3.1.1. Water Production

In 2002, VaK Vyskov produced 3 869 696 m³ of water, from which 2 100 379¹ m³ were from the large reservoir Opatovice. That means MU withdraws about 54.3% from surface water and 45.7% from groundwater. Particular resources are listed in Table 2.

Table 2 Aggregated Data on Water Resources of VaK Vyskov in 2002

Name of the Withdrawal	Groundwater m ³	Surface water m ³
VaK Vyskov Manerov	195 900	x
VaK Vyskov-Dedice SV (HV 114, 117, 117, 4)	394 200	x
VaK Vyskov-Drnovice	825 300	x
VaK Vyskov-Kasparov	77 700	x
VaK Vyskov-Koberice	33 900	x
VaK Vyskov-Krasenko	9 600	x
VaK Vyskov-Milesovice	10 200	x
VaK Vyskov-Moravske Malkovice	44 400	x
VaK Vyskov-Moravske Prusy	23 500	x
VaK Vyskov-Nemcany	15 100	x
VaK Vyskov-Olsany	25 600	x
VaK Vyskov-Opatovice (VN)	x	2 142 100
VaK Vyskov-Racice	34 200	x
VaK Vyskov-Rasovice	13 300	x
VaK Vyskov-Slavkov Ligary	8 200	x
VaK Vyskov-Slavkov:HV2	10 300	x
VaK Vyskov-Svabenice Detkovice	28 800	x
TOTAL groundwater/surface water	1 750 200	2 142 100
TOTAL	3 892 300	

Source: River Board Morava statistics

Water resources of the Vyskov district are currently employed at 70% of capacity. There are no plans to build other reservoirs and discovering additional groundwater resources is also unnecessary. For these reasons, development will be made through investments to infrastructure and enlarging the existing pipelines to connect other villages nearby existing infrastructure (if decided by local PWSS&S and stated in the development plan by the Ministry of Agriculture).

¹ according to VaK Vyskov data

3.1.2. Water Processing/Cleaning

VaK Vyskov owns 3 water processing plants, which are situated at Manerov, Dedice and Lhota (for the Opatovice reservoir). Unfortunately, there are no additional data of the level of processing or the operational financial conditions and remaining service life of the current equipment.

3.1.3. Water Distribution

VaK Vyskov operates on 476.5 km of pipelines, from which 389.3 km is in the ownership of the joint-stock company and the rest (18%) is used on the basis of contracts with pipeline owners. The length of a company's pipelines has been stable over the last 4 years. In 1998, there was a large increase from 304 km to 377 km of pipelines. There is one large pipeline, the "Composite Pipeline Vyskov", then the second largest is an independent pipeline Pustimer-Ivanovice (see Map 2) and about 10 small technically (not financially!) independent pipelines.

Total water loss represented about 16% of the water produced. The loss from the pipelines was about 13% from the water produced and it slowly increases over the time as is visible from Table 3. In comparison with the national average (23%), VaK Vyskov infrastructure is in good technical condition.

Table 3 Loss in Pipelines of VaK Vyskov

Year	1998	1999	2000	2001	2002
Loss in pipelines in %	14.30	11.70	12.11	12.96	13.41

Source: VaK Vyskov

There are about 58 200 inhabitants connected to the water supply, which is about 67.4% of the total population of the district. This is below the national average (89.9% according to CZSO). Changes in the number of people connected showed an abrupt decrease in 1998, although during the same year the length of pipelines was largely increased. During the conversation with the VaK Vyskov managers these changes were not explained.

Table 4 Population Connected into VaK Vyskov Pipelines

Year	1996	1997	1998	1999	2000	2001	2002
No. of inhabitants	60 960	69 959	56 159	57 982	58 122	58 336	58 237

Source: VaK Vyskov

3.1.4. Water Purchased

In 2002, VaK Vyskov invoiced 3 234 311 m³ of water. This number corresponds to water production lowered by the total loss. From the total water invoiced about 58% belonged to households and 42% to 400 businesses connected into the public water supply.

The total revenues from the water supply was about 73 700 thous. CZK, according to the VaK Vyskov accounts. The water tariff was 22.8 CZK/m³ without VAT in 2002.

In 2002, the total leakage was about 16% from the water produced, which means 635 404 m³.

3.1.5. Water Consumption

About 58% of water delivered is consumed by households and about 42 % by industry. The consumption is slowly decreasing over time. For the unit consumption of particular SUs, see Chapter 5.

3.1.6. Wastewater Production

In 2002, VaK Vyskov collected and treated about 3 842 848 m³ of wastewater, from which 2 967 352 m³ was wastewater produced by households (56.86%) and businesses. 675 642 m³ was storm water estimated and invoiced according to a special formula (in the Law on PWSS&S there is a formula how to charge storm water to customers), and the rest (199 854 m³) was public (unidentified) wastewater.

3.1.7. Wastewater Collection

VaK Vyskov operates on 391 km of sewers, from which 363.9 km is in the ownership of the joint-stock company and the rest (7.4%) is used on the basis of contracts with their owners. The length of the company's sewers has remained stable over the past decade.

There are about 58 200 inhabitants connected to the sewer network, which is about 67.3% of the total population of the district. This is also below the national average (77% according to CZSO). The number of people connected had the same evolution as in the case of pipelines and is displayed in Table 5.

Table 5 **Population Connected to VaK Vyskov Sewerages**

Year	1996	1997	1998	1999	2000	2001	2002
No. of inhabitants	60 910	60 850	56 120	57 915	58 100	58 250	58 200

Source: VaK Vyskov

3.1.8. Wastewater Processing

VaK Vyskov owns 7 wastewater treatment plants (WWTP), from which only 1 is mechanical and the rest of them are bio-mechanical. The largest treatment plant is situated in the town Vyskov.

3.1.9. Wastewater Effluent

Table 6 represents particular places of wastewater discharge and the volume of discharged water. The abbreviation „VK“ indicates a sewage system without treatment.

Table 6 Aggregate Data of VaK Vyskov Discharges in 2002

Place of the discharge	Discharged water in m ³
VaK Vyskov – Ruprechtov WWTP	105 100
VaK Vyskov – Pistovice WWTP	133 600
VaK Vyskov – Rousinov WWTP	155 300
VaK Vyskov – Vyskov WWTP	2 449 000
VaK Vyskov – Nemčany VK	27 400
VaK Vyskov – Otnice VK	29 600
VaK Vyskov – Krasensko WWTP	36 600
VaK Vyskov – Bucovice WWTP	360 000
VaK Vyskov – Hrusky WWTP	71 700
TOTAL	3 368 300

Source: River Board Morava Statistics

Data on the effectiveness of treatment of particular WWTP is not available. Information about the No. of population connected to every plant is also unavailable. In 2002, the Czech average effluent charge was 0.48 CZK/m³, which is about 3% of the sewage tariff.

3.2. Prices and Other Financial Information

3.2.1. The Construction of Prices

Prices (water and sewage tariff) are constructed according to the instructions of the Ministry of Finance under the special regime of regulation („factually rectified“ prices). The calculation includes items which have to be published annually. From 2003, there is a new form, which has to be filled in, through which the Ministry of Agriculture tries to ensure better comparison between calculations from different MUs. This new form was published in the Financial Bulletin of the Ministry of Finance.

The MU sets out the results of price calculation per m³ for a given year. These prices are invoiced in the whole period. Subsequently, it compares the real operating cost with this calculation. If there are differences, the surplus or the shortage has to be given back (or invoiced) to consumers. The clearing is done once a year.

In VaK Vyskov in 2002, the prices were as shown in Table 7

Table 7 Price Calculation of VaK Vyskov in 2002

Item	Water rate CZK/m ³		Sewage Charge CZK/m ³	
	Planned	Actual	Planned	Actual
Direct Material	4.16	4.12	0.45	0.30
Direct Wages	2.25	2.31	1.12	1.11
Other Direct Costs	9.68	9.59	9.22	9.92
Production Overheads	1.94	2.06	0.71	0.76
Administration Costs	2.06	2.10	1.06	1.02
TOTAL Cost	20.09	20.18	12.56	13.11
Profit	2.67	2.58	1.82	1.27
Price without VAT	22.76	22.76	14.38	14.38

Source: VaK Vyskov

Prices include only economically eligible costs and an adequate profit (given by the law which is used for dividends of shareholders or for investment of the PWSS&S). Other Direct Costs means e.g. depreciation and repairs to the property, electricity, charges on groundwater and surface water, social insurance of employees... etc.

3.2.2. Sales

In 2002, VaK Vyskov invoiced about 3 234 311 m³ of water and 2 967 352 m³ of wastewater. Revenues from these categories are listed in Table 8 Considering the price of 22.8 CZK per m³ of water, there is an inconsistency in data: $70\,335\,000/22.8 = 3\,084\,868$, which means that the payment of more than 100 000 m³ is missing. There is no such large a difference in the case of wastewater.

Table 8 Structure of Revenues of VaK Vyskov in 2002

Revenues	Thous.CZK	%
Water rate	70 335	57.5
Sewage charge	42 201	34.5
Rent of the infrastructure	24	0,0
Other services	9 762	8.0
TOTAL	122 322	100.0

Source: VaK Vyskov

3.2.3. Costs or Purchased Inputs

See section 3.2.1.

3.2.4. Grants or Transfers

There are no grants or transfers associated with the current operating accounts of VaK Vyskov.

3.2.5. Existing Contracts

There are about 58 237 inhabitants connected to VaK Vyskov pipelines and about 58 200 inhabitants connected to the sewers. For the purpose of the model these data were divided by 2.5 inhabitants that

is the average household in the Czech Republic. Assuming that the consumption of every household is metered and separately invoiced, there are about 22 495 households connected. About 56.6% of people live in flats rather than in houses². For Vyskov it means 9 763 households living in houses and 12 732 households living in flats. Besides there are only about 400 households using only the water supply and the same number of households using the sewers only (they are supplied by a different drinking water MU to the east).

There are about 400 businesses connected to VaK Vyskov networks. The division between small and large industries is estimate based on the personal judgment. There are about 364 small businesses and 36 large businesses. The consumption of water is the criteria for such a division (see Chapter 5).

² According to the CZSO

4. Current Capital Accounts of MU

As mentioned in the previous Chapter 4, the capital accounts of VaK Vyskov had to be derived from given calculations and partly assumed.

In general, establishing the real value of the infrastructure and operational property is very complicated. The baseline came from the evaluation during the privatisation and in many cases the book value after the depreciations is zero, although the property still has an additional 10 years or more of economic life. To deal with „old“ prices from 1993, a high inflation of more than 10% should also be considered.

4.1. Infrastructure – Plant and Equipment

There is a shortage of data related to the infrastructure of VaK Vyskov, so the division between particular categories (production, processing, collection) could not be developed. For the purpose of the spreadsheet model, several assumptions based on the country averages were accepted.

The joint-stock company Vyskov has got 404 900 000 CZK of corporate stock, which represents the value of issued shares. Every share has got a value of 1000 CZK. The total sum represented the present value of the property in 1993.

Municipalities of the Vyskov district own about 92.2% of these shares („registered shares“), they can be sold only with the agreement of the Shareholders Meeting. About 7.8% are „bearer shares“ and they are owned by the private sector. There is also 1 „golden share“ of the National Property Fund of the CR.

The current capital of the company is about 526 140 000 CZK. The annual depreciation is 88 088 000 CZK. The cumulative amortization between 1993 – 2002 is 158 936 000 CZK. The cumulative repairs of the property between 1993 – 2002 are 72 190 000 CZK, and cumulative investments are 249 093 000 CZK.

From these data and further consultations with experts, the following numbers can be estimated:

- functioning (operational) property of VaK Vyskov is about 31 798 000 CZK (value of bearer shares that went to the voucher privatisation)
- the assumed present value of the infrastructure is 500 057 000 CZK (404 900 000 – 158 936 000 + 249 093 000), from which 60% is related to water supply and 40% to wastewater production.

Table 9 **Property of the VaK Vyskov**

Type of property	Current value CZK	Residual lifetime Years
Pipelines	240 027 360	15
Water processing plants	60 006 840	10
Sewers	120 013 680	15
Sewage treatment plants	80 009 120	5
TOTAL	500 057 000	-

Source: Assumptions

4.2. Valuation of Infrastructure

See Chapter 4.1.

4.3. Capital Accounts

In VaK Vyskov, most investments are covered by revenues arising from the “depreciation” costs. These investments include reconstructions and repairs to the property. In 2001, a two-year long large reconstruction with the up-grade of the Vyskov treatment plant began. This project represented about 93% of investments in 2001 and 90% in 2002. Resources for the self-financing come from the profit and other direct cost, where the depreciation cost is included.

There is no debt service at present, although VaK Vyskov is applying for a loan from the European Investment Bank for new pipeline construction. Czech public budgets are not considered as accessible resources for the future development of the company.

In the future, the town of Rousinov and other municipalities (about 8000 population equivalent in total) are going to ask for a grant from the EU Cohesion Fund. The purpose is to build a new sewage treatment plant to meet EU requirements on wastewater treatment. The project costs should be about 1 200 000 thous. CZK, co-financing from their own resources (the budgets of the town) will be about 20%. The WWTP would be operated by VaK Vyskov which is supposed to cover operating cost of the new facility entering its network.

For the purpose of the model we assume:

- The construction will last about 5 years and it will start in 2006.
- From the total sum, 840 000 thous. CZK is for constructing the plant and 360 000 thous. CZK is for building additional sewers.
- The lifetime of the investment is 40 years for the network and 20 years for the sewage treatment plant.
- The construction affects about 3 200 households (1 000 living in flats and 2 200 living in houses).
- Due to the new treatment plant, operating costs will rise in two categories: direct material to 0.35 CZK/m³, and other direct costs to 10.55 CZK/m³.

5. Current and Capital Accounts of SU

In the Czech Republic, customers (SUs) are supplied on the basis of a contract, which is concluded with the owner of the property connected or with the Association of flat owners (if there is a block of private flats).

The sealed water meter measures the consumption of every contracted customer and is read quarterly. If there is a severe inconsistency in time series data (e.g. meter error), the average consumption from previous periods is used. In the case of a block of flats, the consumption in particular apartments is usually metered, too. If there is a difference between the central water meter for the whole building and the sum of individual meters (e.g. water leakage in service pipes), it is distributed among households.

The amount of wastewater discharged is usually assumed according to target figures set by a special law. The formula is based on the consumption of drinking water.

5.1. Current Accounts for Customers

As mentioned in Chapter 3.2.5, there are 6 categories of users. The diversification, services provided and the amount of water and wastewater consumed are stated in Table 10. According to VaK Vyskov data, the annual average water consumption is 109 m³ per household and 3 650 m³ per industry. Water use within groups of SUs is based on assumptions.

There is a special category of entities paying for storm water. This annual amount of about 675 642 m³ of wastewater is invoiced separate to the SU accounts. For the purpose of the ASTEC model, the municipality is considered as the payer.

Table 10 **Classification of SU in VaK Vyskov**

SU	Type of service	Number of entities	Annual water consumption m ³	Annual wastewater production m ³
Households - houses	W S	9 763	87	77
Households – flats	W S	12 732	78	71
Households – w/o sewers	W	400	83	0
Households – w/o water supply	S	400	0	77
Industry – small	W S	364	1 926	1 810
Industry - large	W S	36	18 358	17 260
Entity paying for storm water	S	1	0	675 642

Source: VaK Vyskov + Assumption

From the year 2000, there is only one price level for all categories of users. In 2002, the water tariff was 22.8 CZK/m³ and the sewage tariff was 14.4 CZK/m³.

Analyzing the current account of households, the average wage in CR in 2001 was 14 633 CZK per month and in the Vyskov district it was about 12 181 CZK per month. There were about 1.2 economically active persons per household.³

The Czech average net income was 93 153 CZK per year per person in 2002, which means 232 883 CZK per household per year⁴. To count the household's expenses on water supply and sewage services, prices with VAT % have to be used (23.9 CZK/m³ water rate, 15.1 CZK/m³ sewage charge). It means that the average household pays annually about 1 984 CZK for water consumption and 1 163 CZK for sewage services. The sum is 3 147 CZK per household per year and it is about 1.4% of their average net income.

5.2. Capital Accounts for Customers

5.3. Profile of the Potential Customers

There are about 28 000 inhabitants of the Vyskov district which are not connected to VaK Vyskov networks. These people mostly live in smaller villages with an average of 400 inhabitants in the case of water service and with an average of 700 inhabitants in the case of sewers. These people are served by small local MUs.

³ according to the CZSO

⁴ according to the CZSO

6. Regulatory Units

See Chapter 2.3. or Chapter 2.4. of the National Profile.

7. Tests of the Baseline Model (S1)

We began the case study simulations by testing the ASTEC spreadsheet model with VaK Vyskov data using the simplest modelling option: This we call the “baseline” scenario and all data entries (accounts, tariffs, consumption, costs) remain the same as estimated for current Vak Vyskov PWSS&S. The result allows us to estimate revenues available, at current tariffs, to pay for the present system and level of service. This baseline model runs without optimization (minimization of tariffs subject to various constraints). This means that there are no requirements for marginal cost pricing, full cost recovery, etc.

Results:

Consumption: the same (water supply: 3 237 629 m³/year, wastewater discharge: 3 642 356 m³/year)

Water tariff: 22.8 CZK/m³

Sewage tariff: 14.4 CZK/m³

Balance of accounts: - **2 212 thous. CZK/year**

The results suggest that the implementation in ASTEC parallels the present Vak Vyskov system and that the system is in rough short-term financial balance. The loss of about 2 212 thous. CZK is less than 2% of the gross revenues. This balance is at least partly a consequence of the price calculation and re-calculation of PWSS&S as described in 3.2.1. It suggests that there will be a short term financial balance if current tariffs are raised by about 2%.

8. Prospective Policy Developments in VaK Vyskov and their Representation in the ASTEC Models

Using the simple spreadsheet model calculation we demonstrated that VaK Vyskov is in a rough short term financial balance. Now we examine the direct impacts of additional costs when introduced into the company's prices. Using different scenarios, 2 circumstances will be investigated:

1. the impact of new investment,
2. the impact of real depreciation of the infrastructure.

8.1. Short-Term Scenario with „Sunk Cost“ + Price Calculation of VaK Vyskov

In the short-term scenario with “sunk cost” (past investment costs do not have to be repaid and are considered equal to 0), only the current annual depreciation of 88 088 thous. CZK is considered as the cost of maintenance of the infrastructure. This sum is included into price calculations in “Other direct cost” category. The VaK Vyskov calculations of the water and sewage tariffs are used as a data entry, although such a division between operating and fixed cost is misleading (e.g. other direct cost are considered as operating cost, although they includes the annual depreciation which reflects change in the value of fixed assets that is for the most part only modestly related to increase or decreases in consumption levels). Results of this scenario are introduced in the following sub-chapters.

8.1.2. Cost Recovery with Only Commodity Charges (S2)

During cost recovery commodity charges change so as to assure full cost recovery. Clusters of user accounts distributed costs to three groups of customers: households, small industry, large industry. For each of these 3 groups a different water and sewage tariff was calculated according to consumption and cost assigned to that group.

Results:

Consumption charges (tariffs per unit of water consumed) increased slightly. In all groups of users actual consumption declined slightly given the increase in tariffs and the demand elasticity used in this application. Total water production and wastewater discharge also slightly decreased.

Table 11 **Water and Sewage Triffs (CZK/m³):**

SU	Water tariff	Sewage tariff
Households - houses	23.57	15.63
Households – flats	23.57	15.63
Households – w/o sewers	23.57	0.00
Households – w/o water supply	0.00	15.63
Industry – small	23.58	15.64
Industry – large	22.70	15.06

Balance of accounts: **2 965 thous. CZK/year.**

As a consequence of cost recovery, the increase of both tariffs for all users is visible (except the water tariff for the category of large industry). In general changes in tariffs to achieve full cost recovery were not very large - which is the result suggested by the baseline scenario described in Chapter 7.

8.1.3. New Investment and With Cost Recovery (S4, S5)

The construction of the new sewage treatment plant is incorporated into the cost calculations (data from the Chapter 4.3.). There are 2 new categories of users (households-houses-NI, households-flats-NI) which are directly associated with the new investment. Costs are distributed as in the previous option, which means 3 groups: households, small industry, large industry.

Results:

Consumption: total water supply is 2 865 268 m³/year and total wastewater discharge is 3 301 749 m³/year – decreases from the other scenarios..

Table 12 Water and Sewage Tariffs under Scenario S4- (CZK/m³):

SU	Water tariff	Sewage tariff
Households – houses	23.06	45.11
Households – flats	23.06	45.11
Households – w/o sewers	23.06	0.00
Households – w/o water supply	0.00	45.11
Industry – small	23.04	15.36
Industry – large	23.34	15.56
Households–houses-NI	23.06	45.11
Households-flats-NI	23.06	45.11

Balance of accounts: - **820 thous. CZK**

From the results, it is obvious that the cost of the new investment constitutes a large burden for the SUs, although about 80% of it will be financed by the grant. The price for wastewater discharge more than doubled in the case that all households pay the same tariff. If only these 3 200 households connected to the new WWTP, bore the burden, the sewage tariff would be about 294 CZK/m³ which can be considered as an untenable price and maybe not to build the WWTP according to the current design.

If we consider only one consumption charge level of tariffs, there will be the following impact on cost of the new investment:

Table 13 Water and Sewage Tariffs under Scenario S5 CZK/m³):

SU	Water tariff	Sewage tariff
Households – houses	23.33	27.33
Households – flats	23.33	27.33
Households – w/o sewers	23.33	0.00
Households – w/o water supply	0.00	27.33
Industry – small	23.33	27.33
Industry – large	23.33	27.33
Households–houses-NI	23.33	27.33
Households-flats-NI	23.33	27.33

Regarding these tariff changes, we can conclude that the plan for such a construction of the new WWTP is more the political declaration of the Mayor than a reasonable investment, because the benefits are very limited but the wastewater tariffs go up substantially. For a further discussion of this topic, see the final Chapter 9.

8.2. Short-Term Scenario with „Sunk Cost“ + New Price Calculations

According to consultations with water management experts the following hypothetical price calculation of VaK Vyskov costs was developed. This calculation is based on the following guidelines:

- the direct material and direct wages remain unchanged
- the capital (fixed) costs have to represent about 60% of total costs
- for the calculation of amortization and repairs per m³, real data from VaK Vyskov were used.

Table 14 New Calculation of Operational and Fixed Costs of VaK Vyskov Services

	Water tariff CZK/m ³	Sewage tariff CZK/m ³
Operational Costs		
Direct Material	4.12	0.30
Direct Wages	2.31	1.11
Electricity + Other direct costs	1.64	3.35
Effluent charge	-	0.48
Fixed Costs		
Repairs	1.7	1.7
Amortization + Others	10.41	6.17
TOTAL Cost	20.18	13.11
Profit	2.58	1.27
Price without VAT	22.76	14.38

Source: VaK Vyskov + Assumption

This calculation became an input for the following scenarios.

8.2.1. Baseline (T1)

Results:

Consumption: the same

Water tariff: 22.8 CZK/ (original value)

Sewage tariff: 14.4 CZK/ (original value)

Balance of accounts: - **12 989 thous. CZK/year**

There is a higher financial loss of the system than in the case of the previous Baseline scenario, which means that the roughly balanced budget in S1 probably is the result of underinvestment in the system.

8.2.2. Cost Recovery with Only Consumption Charges (T2)

As a result of the larger loss of about 13 million CZK, the modelling option with cost recovery gave us higher tariffs. Again, cost clusters of users were distributed as follows: households, small industry, large industry. For each of these 3 categories a different water and sewage tariff is calculated according to their assigned costs and consumption.

Results:

Table 15 Water and Sewage Tariffs (CZK/m³):

SU	Water tariff	Sewage tariff
Households - houses	24.35	17.35
Households – flats	24.35	17.35
Households – w/o sewers	24.35	0.00
Households – w/o water supply	0.00	17.35
Industry – small	24.30	17.31
Industry - large	24.89	17.73

Balance of accounts: -**937 thous. CZK**

The increase in tariffs are about 10 – 15%.

8.3. Real Investments

Developing the new price calculation of VaK Vyskov enabled us to clearly distinguish between fixed and operational costs of services. According to the assumptions of the current value of the property and the residual lifetime from Table 9, a more realistic situation of the company can be calculated in following scenarios.

8.3.1. Costs Repair and of Infrastructure Replacement Included (U1)

Into the scenario spreadsheets, following fixed cost entered:

- a) annual depreciation, repairs and other fixed cost (as in T1).
- b) current value of the infrastructure (pipelines, water processing plants, WWTP and sewerages) as assumed in Table 9 First, the effect of the real investment (= annual financial needs to run the system sustainable) caused a high loss of the system. It means that current price calculations of VaK Vyskov do not cover the real investment needs, so the property slowly depreciates.

Results:

Consumption: the same

Water tariff: 22.8 CZK/ (original value)

Sewage tariff: 14.4 CZK/ (original value)

Balance of accounts: **- 54 663 thous. CZK**

The impact of this financial loss on tariffs will be investigated in following scenarios.

8.3.2. Cost Recovery with Only Consumption Charges (U2)

The cost recovery scenario without marginal cost pricing calculated the new level of commodity charges to cover the total costs of the company. So, to create a sufficient amount of resources for repairs, the water tariff should be about 32 CZK/m³ and the sewage tariff about 27 CZK/m³. Clusters were distributed into 3 groups: households, small industry, large industry, but the difference between tariffs for particular groups is negligible.

Results:

Consumption: total water supply is 2 792 335 m³/year and total wastewater discharge is 3 237 594 m³/year.

Table 16 Water and Sewage Tariffs (CZK/m³):

SU	Water tariff	TOTAL CZK/year	Sewage tariff	TOTAL CZK/year
Households - houses	32.97	2 868.39	27.30	2 102.10
Households – flats	32.97	2 571.66	27.30	1 938.30
Households – w/o sewers	32.97	2 736.51	0.00	0.00
Households – w/o water supply	0.00	0.00	27.30	2 102.1
Industry – small	32.89	63 346.14	27.23	49 286.30
Industry - large	33.57	616 278.06	27.80	479 828.00

Balance of accounts: **- 672 thous. CZK**

The tariff increase is about 45 – 50 % in comparison with original values (22.8 water tariff and 14.4 sewage tariff).

8.3.3. Full Cost Recovery with Mrginal Cost Pricing (U4, U5)

The clearer division between fixed and operational cost enables us to develop a scenario in which 2-composite tariffs are calculated. It means that operating costs are covered by the commodity charge and fixed costs by the fixed tariffs under the condition of full cost recovery. Clusters of users were distributed as follows: households, small industry, large industry.

Results:

Consumption: total water supply is 4 135 203 m³/year and total wastewater discharge is 4 453 168 m³/year – increase.

Table 17 Water and Sewage Tariffs (CZK/m³):

SU	Water tariff			Sewage tariff		
	Fixed t. CZK/year	Comm. charge CZK/ m ³	Average Account Expenditu re CZK/year	Fixed t. CZK/year	Comm. charge CZK/ m ³	Average Account Expenditu re CZK/year
Households - houses	1 685.72	10.65	2 612.55	1 378.28	6.99	1916.51
Households – flats	1 685.72	10.65	2 516.42	1 378.28	6.99	1874.57
Households – w/o sewers	1 685.72	10.65	2 569.67	0.00	0.00	0.00
Households – w/o water supply	0.00	0.00	0.00	1 378.28	6.99	1916.51
Industry – small	39 619.74	10.65	60 131.64	33 949.35	6.99	46 601.25
Industry – large	280 133.34	10.65	475 646.04	240 147.36	6.99	360 794.76

Balance of accounts: **0 CZK**

Comparing total annual payments of particular SUs, establishing 2-composite price results in lower payments in all categories. This is possible thanks to the much higher consumption of water, through which fixed costs are split up into more units (= the water is cheaper).

From the environmental point of view the higher consumption of water (and higher production of the wastewater) can be considered as a negative feature. But considering the low average water consumption in the CR per person (about 90 l per day), this increase would not cause over-consumption in the scale of international level.

Generally, this option can be considered as an optimum, because costs of the system are covered appropriately. Further, if we suppose industry to cause much higher fixed costs than particular households, this system is correct, because the industry pays a much higher annual fixed tariff.

If it is not so (and we do not want to consider any social redistribution to households), we can analyze the effect on average payments while using only one cluster. Through this option, the annual fixed tariff is the same for every SU.

Results:

Consumption: total water supply is 4 013 205 m³/year and total wastewater discharge is 4 341 333 m³/year – increase.

Table 18 Water and Sewage Tariffs (CZK/m³):

SU	Water tariff			Sewage tariff		
	Fixed t. CZK/year	Comm. charge CZK/ m ³	Average Account Expenditu re CZK/year	Fixed t. CZK/year	Comm. charge CZK/ m ³	Average Account Expenditu re CZK/year
Households – houses	2 708.78	10.97	3 663.17	2 256.12	8.40	2 902.92
Households – flats	2 708.78	10.97	3 564.44	2 256.12	8.40	2 852.52
Households – w/o sewers	2 708.78	10.97	3 619.29	0.00	0.00	0.00
Households – w/o water supply	0.00	0.00	0.00	2 256.12	8.40	2 902.92
Industry – small	2 708.78	10.97	23 873.00	2 256.12	8.40	17 460.12
Industry – large	2 708.78	10.97	204 096.04	2 256.12	8.40	147 240.12

Balance of accounts: **2 081 thous. CZK**

This system of pricing increases the average unit payment for households (water tariff: 42 CZK/ m³) and decreases the cost of industry (water tariff: 12 CZK/m³). Large consumers can distribute the fixed payment into more units consumed.

9. Pilot Case Study Results – Issues and Policies

The main purpose of the final chapter is to summarize the results of the modelling and to integrate the tariff calculation with the institutional and legislative framework of the Czech Republic. For the overall picture of water and wastewater management, Chapter 9 of the National Profile contains the necessary background material.

9.1. Charges Reform as a Result of Using the Model

Considering water and sewage tariff reforms, the current trends in pricing policies have to be taken into account. These trends are as follows:

- a) one level of pricing for all SUs (no preference to household users as in the past),
- b) one-composite price in most PWSS&S (no fixed charge).

9.1.1. Impact of the New Investment

The issue of new construction reflects the situation in the CR the moment before drawing upon the financial subsidies from EU resources (Structural Funds). This aid will be available from 2004 for municipalities of more than 2000 population equivalent and the main purpose is to build sewage treatment plants according to the requirements of the EU directive (91/271/EEC).

From interviews with Czech officials and the management of VaK Vyskov, there is a fear that selecting the project applying for EU resources will be created by a political decision of the mayors. To suggest such construction without a deep analysis of their own financial resources and the future impact on operational costs, constitutes a serious risk for the efficiency of the whole system (e.g. VaK Vyskov).

The case of a large construction of a sewage treatment plant in Rousinov is an excellent example of such a possible waste of resources and the serious impact on tariffs. From the analyses (Chapter 8.1.3.), we can see the following results:

Table 19 **Impact of the New Investment (NI) on the Sewage Tariff (in CZK/m³)**

SU	Original value	Impact to household connected to NI	Impact to all household	Impact to all SUs
Households - houses	14.40	14.91	45.11	27.33
Households – flats	14.40	14.91	45.11	27.33
Households – w/o water supply	14.40	14.91	45.11	27.33
Industry – small	14.40	14.91	15.36	27.33
Industry - large	14.40	14.91	15.56	27.33
Households–houses-NI	14.40	293.56	45.11	27.33
Households-flats-NI	14.40	293.56	45.11	27.33

In the third column of Table 19, we can see an enormous increase in the sewage charge for customers directly connected to the new investment. In the following columns this burden is redistributed to other SUs, but still the operational and fixed costs of the investment are almost double the original value even with 80% grant financing of the investment.

Fortunately, there are some controlling mechanisms, which can influence the final decision-making of local officials. First, the co-financing of every investment from EU resources (20-40%) is necessary. This is mostly impossible to be done from the municipal or company resources, so they have to ask e.g. for a favorable loan from the Czech government (that serves as an intermediary for the EIB loans). The government evaluates the efficiency or propriety of an investment.

Second, to any investment financed by the EU, the standpoint of the Czech institutions (Ministry of the Environment, .. etc.) has been developed. From this standpoint the Ministry should not agree with a costly and low priority investment. The national plan (or a list) of sufficient construction of sewage treatment plans will be elaborated at the Ministry of the Environment.

9.1.2. Impact of the Real Depreciation of the Infrastructure

The second important issue related to the financial stability of PWSS&S is: How to persuade/force owners of the infrastructure to run the system sustainable?.

The problem is that due to the inefficient price regulation the full, real depreciation of the infrastructure is not included in current tariffs. Because most of the PWSS&S property has been formally depreciated (through book depreciation in the past), there is no tool to create a financial reserve for future reconstructions. Although companies are in short term financial balance at present, in 10 or more years they could get into trouble.

Under our assumptions regarding real depreciation (because VaK Vyskov was not able to provide real data), the impact on current prices was investigated. Considering tariffs per unit, the increase from 22.80 to 33.00 CZK/m³ in the case of the water tariff and the increase from 14.40 to 27.00 CZK/m³ in the case of the sewage tariff would ensure the sustainability of the system. In relative numbers, it is a 45% increase of the water tariff and 88% increase of the sewage tariff.

Further analysis was done by the investigation of two-composite tariffs, where the commodity charge covers operational costs and the fixed annual tariff covers the system's fixed costs. Results are summarized in the Table 20

Table 20 Annual Average Payment per Account of SUs (in CZK/year)

SU	Water tariff			Sewage tariff		
	One-composite tariff	Two-composite tariff I.*	Two-composite tariff II.**	One-composite tariff	Two-composite tariff I.*	Two-composite tariff II.**
Households - houses	2 868.39	2 612.55	3 663.17	2 102.10	1916.51	2 902.92
Households – flats	2 571.66	2 516.42	3 564.44	1 938.30	1874.57	2 852.52
Households – w/o sewerages	2 736.51	2 569.67	3 619.29	0.00	0.00	0.00
Households – w/o water supply	0.00	0.00	0.00	2 102.1	1916.51	2 902.92
Industry – small	63 346.14	60 131.64	23 873.00	49 286.30	46 601.25	17 460.12
Industry - large	616 278.06	475 646.04	204 096.04	479 828.00	360 794.76	147 240.12

*) fixed tariff is different for household, small industry and large industry

**) fixed tariff is the same for every SU

As an optimal option, which imposes the lowest payments for all types of SUs, the option with two-composite tariffs I. can be chosen. In this option, fixed and operational costs of VaK Vyskov are covered by separate payments. The fixed part of the tariff differs between particular consumers.

9.2. Burden Indices of SUs

The further analysis of SU accounts helps us to assume the possible impact of particular tariff reforms the on households' standard of living. There are 2 possibilities how to express such an impact:

- a) costs as a portion of GDP/household,
- b) costs as a portion of the net average income.

According to CZSO statistics, the following data will enter Table 21:

- GDP in 2002: 2 275 600 mil. CZK
- no. of inhabitants in 2002: 10 208 438
- GDP per capita in 2002: 223 000 CZK
- average annual net (=disposable) income per capita in 2002: 93 153 CZK⁵
- average annual net income of the first decile of households: 51 831 CZK

Table 21 Burden Index Analyses for Households

Indicator	Year 2002		
	Baseline	S4 (Table 11)	U2 (Table 16)
Water and wastewater absolute annual costs (CZK per year)	3 147	5 633.5	5 219
Absolute change in annual costs over the Baseline (CZK per year)	-	2 486.5	2 072
Percentage Change in annual costs over the Baseline (percent change per year)	-	79 %	66%
Annual cost as a percentage of GDP per household	0.56 %	1.01%	0.94%
Annual cost as a percentage of net average income	1.4%	2.4%	2.2%
Annual costs as a percentage of net average income of the first decile of households	6.1%	11%	10.1%

From the absolute values we can see, that both changes of tariffs (due to the new investment or the real pricing) results in large increases in the cost of water and wastewater services. For the average household the payment for these services does not represent an exorbitant expenditure, but it has to be considered in relation with other cost of households on housing (e.g. electricity, gas, rent ... etc.). All these cost are increasing almost every year. The impact on low-income families can be considered as an especially high burden.

⁵ For the purpose of the analysis GDP per capita and average annual net income per capita were recalculated per households (that means multiplied by 2.5)

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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:
The Czech Republic – Summary

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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: The Czech Republic

In the accompanying National Profile and the Case Study the institutional framework, legal status and financial conditions of public water supply and sewerage systems are described. The current situation of municipal water management in the Czech Republic is examined. Based on this examination, we make suggestions for, and related to, tariff and effluent charge reforms. This portion of the Czech Country Report briefly introduces some reform suggestions and critical points regarding the current of municipal water system thanks. These basis for these reform proposals is more fully developed justified in the following chapters.

1 The Control of the Price Regulation

Currently, water and sewage tariffs of MUs are under the financial regulation controlled by the Ministry of Finance and its regional Financial Offices. This regulation includes a strict rule for tariff construction (e.g. given items) and regular reporting on tariffs to customers and government administration. The problem is that Financial Offices do not have water-management experts, so it is very difficult for them to identify any failure (e.g. inappropriate pricing) or to accurately estimate the “real” financial need for running the system sustainable. Thanks to the different types of MUs (in which municipalities as owners and businesses as service providers have different agendas – almost each MUs is an “original”- the tariff level can be both:

- a) lower than optimal, which means that sufficient resources are not saved for future investments and repairs of the infrastructure (especially when Mayors are pushing not to increase prices of water),
- b) higher than optimal in some items (e.g. management wages, administration overheads... etc.).

To find what is “optimal” from outside is very difficult, especially for the Financial Offices. Due to this limitation on financial control, there is a danger of unsustainable running of MUs that can cause the severe deterioration of the infrastructure in the next 10 – 15 years.

That is why in the near future the Ministry of Agriculture, as the responsible body for the development of public water supply and sewerages, is going to propose a significant change in the price regulation control: They ask the **responsibility to be shifted from Ministry of Finance to Ministry of Agriculture**, where the special department should be established as a controlling body. This change would need to be initiated by the amendment of related laws.

2 Effluent Charges Increase

In the Czech Republic, effluent charges for wastewater discharge are derived from both, the total quantity discharged and the level of pollution in discharged water (there is a list of pollutants for which different payment are settled in absolute numbers – e.g. 16 CZK/kg of phosphorus).

Regarding other cost of wastewater treatment, the level of effluent charges can be considered as rather low (the average payment in 2002 was about 0.48 CZK/m³). Effluent charges therefore do not

seriously influence the behavior of MUs, e.g. discouraging a decision to building a wastewater treatment plant to avoid the payment of the effluent charge. Further, the fixed component of the charge can erode with inflation.

Ministry of the Environment is **considering the proposal of new levels of effluent charges**. At present, to enforce this increase, the amendment to the Water Act has to be adopted (which is much more difficult and time-consuming than to change a decree of the Ministry – the second and maybe the better option of how the effluent charges can be revised).

While considering the increase, the appropriate relation between the payment for the volume and the payment for the pollution has to be kept. In this system of payments, there is a danger of encouraging reductions in the effluent charge through dilution but producing more wastewater on volumetric terms.).

3 Tariffs and Wastewater Treatment Plant Constructions

According to the EU Directive on Municipal Wastewater Treatment (No. 91/271/EHS), each agglomeration over 2000 of population-equivalent is obliged to be connected into sewerages and to ensure the sufficient treatment of its wastewater. To meet this requirement themselves is impossible for most of municipalities (also because new constructions have always been subsidized and centrally planned) and it is therefore expected to be heavily subsidized from national and international public resources.

The scenario of the construction of WWTP in such small municipalities has been investigated in the Case Study (S4, S5). Even with the assumption of a substantial external investment grant, the case study result is an **enormous cost on the public** (e.g. increase of the sewage tariff of about 300%). We will briefly summarize, what are main factors and critical points of doing such investments:

- 1) The un-subsidized costs may sometimes be distributed only to the particular customers connected to the new plant or distributed to all customers of a particular MU. Even the latter, to realize such an investment in small towns (up to 2000 PE) may be an enormous financial burden to carry into the future.
- 2) Although the construction of WWTP is subsidized, the minimal participation of municipal resources (at least 20% of the investment) is required and, as illustrated in the case study, these costs may increased current sewage charges significantly.
- 3) The operational cost of running the new infrastructure or WWTP are not subsidized. These costs are key to necessitating increases in the sewage tariff..

Constructions of a new WWTP in the Czech Republic and also getting national and EU subsidies should be **coordinated by the Ministry of the Environment**. It should ensure that resources will be allocated efficiently and that such an investment will not threaten financial collapse of MUs in the future.