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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:
Slovak Republic – Case Study



WORKING FOR THE DANUBE AND ITS PEOPLE

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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

ASTECC Model	Account Simulations for Tariffs and Effluent Charges Model
BOD	Biological oxygen demand
COD	Chemical oxygen demand
FCR	Full cost recovery
HH	household
IND	industry
M(B) WWTP	Mechanical (biological) wastewater treatment plant
MCP	Marginal cost pricing
MU	Management unit
NRO	National Office of Regulation of Network Services
OZ	Odstepny zavod – branch of WW utility
PCH	Pollution charge
PP	Poprad District
PPB	Poprad Branch
PWC	Podtatranska Water Company
RU	Regulatory unit
SL	Stara Lubovna district
SNV	Spiska Nova Ves district
SS	Suspended solids
SU	Service user
UCH	User charge
W&WW services	Water and wastewater services
W&WW utility	Water and wastewater utility

1 Introduction

1.1 Purpose of the Case Study

This report describes the recent history, current conditions, and planned development of the case study community in the northern part of Slovakia: Poprad¹. This examination includes development of several sets of financial “accounts” that are used to make a broad examination of both the current balance sheet of the typical management unit – municipal water company in the district of Poprad and the future financial implication of various investment programs and, of course, changes in the tariffs levied and effluent charges paid by the management unit and its customers. The purpose of this examination is to provide a more concrete background and specific insight for use in identifying and evaluating selected institutional and policy reforms connected to water and wastewater tariffs and effluent charges in Slovakia. This is meant to complement the identification and discussion of some of these same institutional and policy reforms as contained in the accompanying Slovak National Profile Report.

1.2 Case Selected

The selected case belongs to the Podtatranska Water Company (PWC) that was established in May 2003 as a share holding company. The PWC area of responsibility comprises 6 administrative districts. The PWC consists of 3 branch offices (former odstepne zavody - OZ). The total number of municipalities covered by the PWC is 205 with the total population of 381 388 inhabitants. While the case study covers the whole PWC service area, attention is focused on the Poprad Branch (PPB).

The selection for this case study was done due to the data available as for this service area and willingness of the management to participate at the project. Also, the PWC has prepared an investment plan that consists of construction of a new WWTP and new connections.

The service area is located in northeast Slovakia, in a broad mountain valley and the main activities are in tourism, engineering, chemical, and food industries. The area of the PPB consists of the following settlements:

- Poprad district (includes Poprad city and 7 surrounding villages), 72 241 inhabitants, and several industrial activities such as heating and cooking equipment production, kitchen and washing machines production, automatic machines for hot and cold drinks, brewery and canning plant. Inhabitants and industry are connected to drinking water supply and the old (and obsolete) WWTP. Industry also uses the water and sewer system support manufacturing and non-manufacturing facilities. Prior to discharge into the public sewer system, industrial wastewater customers must ensure that the quality of wastewater will not upset the operation of the public W&WW system. However, some industrial facilities also use some private water sources for some processing activities.
- Industrial agglomeration of Svit town, 9 174 inhabitants (that includes also one small neighboring village), with the job opportunities in chemical and textile companies (viscose fiber and engineering production, textile production). Although the inhabitants of the town Svit are collected to the sewer system, the wastewaters are discharged without treatment directly into a recipient water body. Over 90% of inhabitants are connected to the drinking water supply.

¹ As in most of the work of the Tariff and Charges Project, the term "municipal" refers to local water and wastewater service providers and can, as in the case of Poprad, include service to surrounding communities or even a regional utility serving multiple municipalities.

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- Agglomeration of three tourist villages at Smokovce, with a total of 4 509 inhabitants, with several hotels, camping bungalows and motels. It is estimated that 1 500 tourists per day (!) visit this area during the winter season. This agglomeration is connected to the drinking water supply, only a minor part of wastewater is collected and discharged directly into the recipient water body, the rest is disposed of in holding tanks.
 - Agglomeration of three smaller tourist villages at Strba, located at the foot of the mountains, totaling 7 549 inhabitants and in the tourist season, there is additional 10 000 tourists per day. Most employment is in the tourist industry. This agglomeration is connected to the existing WWTP that needs replacement.

All these agglomerations are connected to the drinking water supply system (connection percentage is from 86 to 100%) and sewer and wastewater treatment system (from 55 to 92%).

The service area also includes industry (as mentioned above). For the purposes of the case study these are grouped into:

- “Large industry” (some 10 large factories), that is served by W&WW services but prior to the discharge, industrial waters are pre-treated. The requirements of outlet wastewaters from the industry is stipulated in the Sewerage Order (authorized permit to discharge wastewater from the industrial facility into the public sewage system). Besides the public W&WW service, some industries have their own W&WW system for certain activities.
- “Small industry” that comprises some infrastructure enterprises and institutions (commercial offices, schools, hospital, restaurants, local brewery, meat industry, canning industry).

2 Poprad Case Study Setting

2.1 History and Evolution of the Current Organization

Before May 2003, the selected area belonged to one of five large state-owned companies – Eastern Slovakian W&WW utility. This W&WW utility was split into two larger units (PWC and Kosice Water Company) as the result of decentralization. The Eastern Slovakian W&WW utility belonged to one of the most underdeveloped region in Slovakia with the high share of unemployment (20 – 30% varying in different districts, however there are settlements with more than 50% unemployment). In the PWC service area, 76% of inhabitants are connected to drinking water supply and 51% to sewer system (year 2001).

2.2 The Current Organization of Water and Wastewater Provision

The Podtatranska Water Company (PWC) is composed of the Head Office and three branches. The head Office is located in the district town of Poprad (the recruitment of employees is being conducted now and it is planned to reach 30 employees in 2005). There are three branches: in Poprad (275 employees), Spisska Nova Ves (240 employees) and Stara Lubovna (110 employees). There is a plan that by 2005, there will be a reduction in total employees from 625 employees to 595 employees.

Table 1 summarizes the current PWC activities, grouped in three branch units (Poprad (PPB), Spiska Nova Ves (SNV), and Stara Lubovna(SL)).

Table 1 Connection of Inhabitants to W&WW Systems, 2002

Parameter	Unit	PPB	SNV	SL
Water supply				
Connected inhabitants	Inhabitants	139 799	104 220	32 482
Coverage ratio	%	88.2	76.4	73.7
Amount of drinking water produced	Thous. m ³ /year	15 264	4 149	1 593
Amount of drinking water invoiced	Thous. m ³ /year	8 451	4 965	1 271
Income from drinking water service	Thous. SK/year	131 551	67 993	17 656
Share of invoiced water of households on the total produced water	%	58	74	73
Wastewater collection				
Connected inhabitants	Inhabitants	94 319	83 369	16 041
Coverage ratio	%	67.3	60.3	36.4
Amount of wastewater collected	Thous. m ³ /year	7 385	4 499	1 012
Income from wastewater service	Thous SK/year	86 151	45 587	12 744
Share of households on the total sewerage services	%	51	68	64
Wastewater treatment plants				
Number of plants		18	6	3
of which				
mechanical WWTP		1	2	0
mechanical - biological MB WWTP		17	4	3
Total capacity of WWTP	m ³ /d	37 882	29 376	12 153

Source: Data on investment and operation in Slovakia, Water Research Institute, 2001 and internal statistical data of the PWC, 2003

The main functions related to investment activities are concentrated at the Head Office including the preparation and implementation of major investments. Legal and contractual activities are also the responsibility of the Head Office including the design and development of tariffs. The branch offices are responsible for operation and maintenance of assets (water sources, district water supply networks, sewer systems and WWTPs). A limited responsibility of branch offices is investment planning but that is restricted to purchase of plant operational machinery, laboratory and monitoring equipment, water meters, pumps. Planning and implementation of major investments is the responsibility of the Head Office and is done according to the investment plan of the company.

The PWC conducts mandatory activities that are:

- production and distribution of water via water distribution networks
- collection and treatment of wastewater
- maintenance of distribution networks
- preparation of investments, design and engineering of investments
- mandated civic protection and assistance activities.

Besides mandatory activities, the PWC could undertake:

- activities related to civil and mechanical works, transport, including construction services
- laboratory analyses and diagnostics
- operating human resources development and recreational units,
- computer centers (GIS system and maps), including commercial activities
- provision of other economic activities such as consultancy.

The arrangement between W&WW system owner (municipalities) and the PWC is evolving. As of December 2003 the assets are under ownership of the National Property Fund. The assets are to be transferred to the municipalities. All mayors in the district will have the shares depending on the community population regardless of the extent of services provided. That means that those municipalities that are not service users but are located in the jurisdiction of the district will have shares. A Council, consisting of the representatives of respective municipalities, will establish the new, municipally-owned water company. The new municipal water company must be (will be) established by the end of 2003.

Poprad Branch Unit

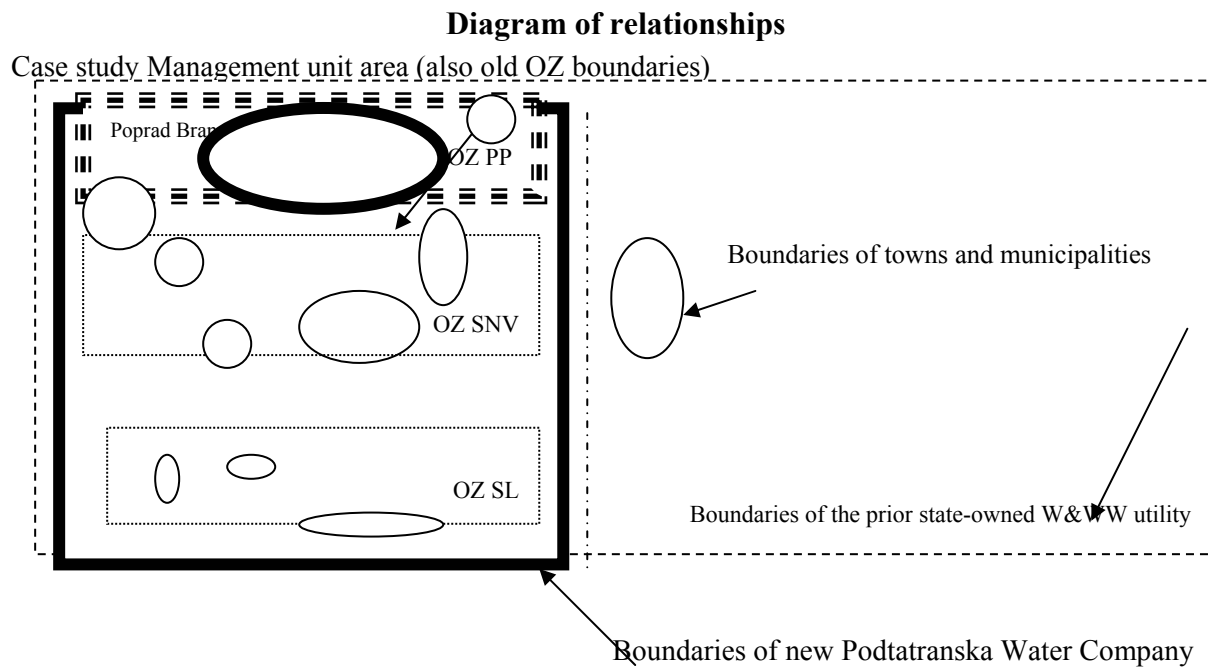
Poprad Branch (PPB) Office is the focus of the case study. The PPB is responsible for operating the water and sewer infrastructure at the territory of the Poprad district as well as the other district of the Branch. There are 140 675 household consumers (drinking water) and 94 952 household consumers (wastewater collection and treatment). Industrial companies, commercial and institutional enterprises are also consumers of W&WW services provided by the PPB. Wastewater collected from households represents 5 086 000 m³ (22%), the industry represents 3 520 000 m³ (15%), other consumers (excluding households) and run-off and infiltration represent 14 790 000 m³ (63%).

Case study unit

The PPB includes the following consumers:

- households that are served by both water and wastewater services
- households that are served by both water and wastewater services, but the wastewater is not treated and is directly discharged into the recipient
- households that are served by drinking water
- large industry with 25 000 pe, in total,
- and small industry and commercial institutions and organizations with 20 000 pe, in total.

All agglomerations are connected to drinking a water supply with connection rates varying from 83 – 99%.



2.3. Relationship among MU, RU, SU

2.2.1 Economic Relationships

The MU (PWC) provides W&WW services to inhabitants, industry and other commercial and institutional enterprises. The contracts are signed individually with all SUs. In the case of inhabitants, meters are being gradually installed for individual households. The penetration of household meters has reached 96%. It should be understood that PWC often treats blocks of residential flats as a single account. It will issue a one single water bill for the block of flats and it is responsibility of owner(s) of the block of flats to redistribute W&WW bill among households (that are metered). For those blocks of flats and households without the meters, estimated water consumption per capita (the range from 16 to 40 m³/capita/year is applied) is the basis for the water bill. Totally, there are approximately 140 000 customer accounts of which one third are companies and the rest are accounts for residential customers.

Industry before the discharge of its wastewaters into public sewer system must have pre-treatment to avoid damaging the effectiveness of the treatment processes of the WWTP. The conditions of industrial discharges are listed in individual contracts and must meet the Sewer Order (the Sewer Order is approved by the Environmental Department of District Office). Share of inhabitants and industry that use W&WW services and data measured at “point of use” are shown in Table 2

Table 2 Amount of Invoiced Water and Collected Wastewater, 2002, (thous. m³/year)

		Provided drinking water
Households		4 896
Industry large		1 185
Industry small		2 370
Share of households on total water consumption (%)		58
Collected wastewater		
Sanitary (households)		3 802
Industrial		3 583
Share of households on the total production of wastewater (%)		51

Source: vykaz Vod Z 1-01, 2002

2.2.2 Management Relationship

The Poprad Branch (PPB) unit is one of three branches of the PWC. The PWC makes all-important decisions including investment planning, and tariffs proposals.

2.2.3 Regulatory Relationships – Economic

The maximum water tariff for households in this district is fixed by the Decision of National Office of Regulation of Network Services (NRO) and for the year 2003 it was set at 16.07 SK/m³ (with VAT) for drinking water and 10.15 SK/m³ (with VAT) for wastewater collection and treatment.

Industrial users have individual contracts, but the NRO also limits these tariffs. In 2003 the maximum tariff was set at 36.48 SK/m³ (drinking water) and 26.22 SK/m³ (wastewater collection and treatment).

The effective tariffs (as opposed to the maximum tariffs just discussed) for both residential and industrial accounts (as opposed to the maximum tariffs just discussed) are proposed by the PWC. A complex formula for the calculation of tariffs is involved. The NRO determines an important coefficient used in the formulas. The coefficient of annual increase of water tariff for 2003 for households is 1.35 for drinking water and 1.30 for wastewater. Table 3 shows the progression of maximum tariffs for each year as determined by the NRO through 2007.

It should be noted that sewage water is not metered but usually assumed equal in quantity to the measured amount of drinking water consumed.

Table 3 Development of Water Tariffs (including VAT) in the PWC (SK)

Year		1996	1998	2001	2003	2004	2005	2006	2007
Drinking water	Households	5.00	8.00	11.50	16.07	21.69	28.95	37.44	37.44
	Others	15.80	21.20	25.30	36.48	36.48	37.44	37.44	37.44
Sewage water	Households	3.00	4.00	7.50	10.15	13.19	17.59	22.87	29.25
	Others	10.80	15.90	18.70	26.22	26.22	29.25	29.25	29.25

Source: Internal data of the PWC

Households are determined by the National Office according to the Act 276/2001. Others are regulated by the National Office as the maximum applicable tariff; exceptionally different tariffs might be applied in the case high-volume discount (lower tariff) or high concentration of pollutants (higher tariff). After the 2007, the increase will follow the inflation, plus 5% increase. Thus the production costs in 2007 will be corrected by the inflation factor of the year 2007 plus maximum 5%. The tariffs include VAT (in 1998 it was 6%, in 1999-2002 it was 10%, in 2003 it was 14%, in 2004 – 2007 the plan is 17%)

Remark: the Government in July 2003 agreed on the VAT 19% (applicable from 2004) that is not considered in the table 3.

2.2.4 Regulatory Relationships – Environmental

Environmental regulation consists of an obligation to receive

- the permit for the withdrawal of ground and surface water, and
- the permit for the discharge of treated water into the recipient water body.

The permits are issued by the Environmental Department of the District Office. The permit for the discharged wastewater was issued for each WWTP in Poprad branch (totally 3 under operation). Also, wastewaters that are not treated must have a permit (2 discharges).

The MU is obliged to pay withdrawal charges for the withdrawal of ground water and surface water. These are 1,80 Sk/m³ for surface water and 1 Sk/m³ for ground water. The charges are income of the River Basin Management Enterprise for surface water and an income of Ministry of Environment (MoE) for ground water. In 2002, the total amount of withdrawal charges was 17.4 mill. SK.

Also, the pollution charge for discharge of wastewater is paid. The pollution charges are collected by River Basin Management Enterprise and are the income of the MoE. In 2002 it was 8.3 mill. SK. The mechanism of the calculation of pollution charge is described in the Slovak National Profile of the Slovak Country Report for the Tariff and Charges Project.

2.4. Interactions and Conflicts between MU, RU and SU

There are several conflicts between the MUs and RUs:

- The tariffs for households and industry are regulated by NRO. MU is obliged to increase the tariff for households by the coefficient established by the National Office.
- National Office has a policy to reduce the gap in the tariff between households and industry (all SUs will have the same tariff). This will increase economic pressure (increased costs) on households and political pressure (to minimize cost increases) on municipalities and the Central Government.
- The PWC pays withdrawal fees for surface and ground water. Although the fees levels are currently also regulated (by the Ministry of Finance) there is a threat that these fees will increase in the near future. In the past, these fees were returned to the PWC in the form of a transfer from the central Government. No subsidies are granted from 2003 as the PWC was transformed from the state own water utility to the municipal water company.
- Currently, the Environmental Department of the District Office is reviewing all permits issued in 1994 for existing discharges and temporary permits for the discharges without treatment. The Environmental authority must issue new permits by the end of the year 2003 and is tied by the new Regulation on Permissible Level of Pollution, and new Water Act. As this legislation is in compliance with EU water directives, limits for discharges will be stricter. The service area also lies in a designated sensitive area and new limits must be reached by 2004. It is expected that the PWC will receive a temporary transition period as a new WWTP is under construction and the new EU-based effluent discharge limits are supposed to be met by 2007.
- The PWC is not excluded from the payment of pollution charges although the WWTP is under the construction during this transition period.

There are conflicts between MU and SU:

- There are groups of inhabitants that do not pay for the drinking water and MU is reluctant to cut off their supply of drinking water. An internal decision of the PWC management was

made that un-paid clients will be disconnected or the responsibility for the payment will be passed on the municipality but how this policy will work in practice is unknown.

- Consumption of households has been decreasing and this has caused reduced revenues and certain technical problems in distribution pipes and treatment efficiency that increase operating costs per m³.
- There is not an expectation that old claims for the past water bills will be collected. However, it is not clear what is the volume (amount) of the old claims, as the process of transformation is not completed. Totally, the PWC has 120 mill. SK of claims.
- The PWC has 25 mill. SK in loans from domestic commercial banks and 150 mill. SK debts to its suppliers. Thus it must pay a total of 175 million SK in debt out of its revenues.

There is also an internal conflict within the MU, where investment needs and financial resources of the PWC are not balanced. In other words, the PWC developed a detailed investment plan without the real plan for obtaining the necessary financial sources or a plan to repay any associated debt.

3 Current Operating Conditions of Management Unit

In this section we begin to develop a more detailed description of accounts, facilities, costs, and revenues for the PPB. Most of these data will be used directly, or become the basis for, data to be used in the ASTEC model.

3.1 Physical Conditions

The main source of water in the Poprad district is spring water. There are two spring fields:

- LT Spring (561 l/s, varying from 500 – 800 l/s), supplying most of Poprad and Svit towns and some of the villages northeast of Poprad; the chlorination station is in place but not functioning and the chlorine is added at the pressure break on the main transmission line to the town of Poprad.
- NO Spring with 128 l/s capacity, supplying town of Poprad and surroundings. The water is chlorinated.

There are three additional small water springs with a yield of 20 – 25 l/s and equipped with filtration, pH adjustment and disinfection.

The second largest source of drinking water is ground water. There are 8 deep wells (of 80 – 160 m depth) with submersible pumps.

The PWC also withdraws surface water from a small river with capacity of almost 100 l/s. The treatment consists of sedimentation, rapid sand filtration, lime dosing and disinfection. One treatment component consists only of chlorination.

In total there are 8 treatment units, 7 of which 7 have:

- rapid sand filtration with open sand filters
- pH adjustment (lime or dolomite filtration)
- disinfection (NaClO₂ or Cl gas)

The distribution systems consist of the main gravity pressured 700 mm steel pipe constructed in 1973 and a number of smaller networks. The system for drinking water production and distribution needs some modernization and/or replacement. This is particularly important for pumping stations and treatment plants. Also, there is a high percentage of un-accounted for water that represents in average 33% (but varies from 19 – 65%). In general, facilities are well maintained and satisfactory operating. The program of extension and substantial replacement and repair of drinking water supply is planned in the longer period (beyond 2015). The short-term plan includes the rehabilitation of 16 km of pipes in order to decrease leakage. This investment is estimated to cost of 24 mill. SK. The treatment plant rehabilitation is planned for the period of 2005-2010 and 2015 at a total estimated cost of 212 mill. SK.

The wastewater system is constructed as a combined wastewater and storm-water system (except one minor part of the sewer system in Poprad South III). It consists of 6 major sub-structures.

Under normal conditions, the collection system is satisfactory but in situations with extreme surface runoff, the hydraulic capacity in the sewer is not large enough to handle the accumulated runoff. Overflow constructions were established to avoid backup of water in cellars and roads. This combined sewer overflow allows a part of the wastewater to be discharged from the sewer to creeks or rivers.

There are 3 existing WWTPs and one WWTP (MATEJOVCE) that is not yet completed. These WWTPs are:

Old WWTP in town of Poprad

It has operated since 1969. It has mechanical and biological treatment and anaerobic sludge handling. In 1991, a new technological unit, Cityclar, was connected in parallel. The wastewater from the City of Poprad is treated in this WWTP. The permit to discharge wastewater was issued in 1994. The WWTP consists of following facilities:

- overflow chamber before the WWTP
- closing chamber and hand-raked bar screen
- centrifugal sand trap
- primary clarifier (1 tank) and activation tank (4 tanks) with 8 aerator turbines. One tank is used as sludge regeneration, 3 tanks are contactor tanks
- pumping station for mechanical pretreated of water, storm water, return sludge, primary and excess sludge
- secondary clarifier (1 tank), hydraulically overloaded
- anaerobic sludge handling in two stages with boiler house and gasholder
- sludge dewatering in centrifuge
- treatment unit Cityclar consisting of pumping station and mechanical pretreatment tank, 2 biological reactors and a sludge storage tank

The WWTP is has old technology and old types of mechanical equipment. It is not suitable for reconstruction or extension to comply with the new Slovak effluent limits. Effluent parameters and effluent limits according to the permit of Environmental District Office from 1994 are as follows (in mg/l):

Table 4 Effluent Parameters and Limits

Parameter (in mg/l)	Pollutants					
	COD	BOD ₅	SS	N-NH ₄	N _{tot}	P _{tot}
Effluent	63.7	35.5	26		18	2.6
Limit	85	40	35	60		5

Old WWTP in Nova Lesna

This plant began operating in 1985 and will be in use only until completion of the new MATEJOVCE WWTP. It consists of

- hand-raked coarse bar screen and sand trap
- flow measure channel
- dividing chamber for two biological treatment lines
- activation tanks (2 tanks) with aerating turbines and secondary clarifier (2 tanks)
- sludge storage tank (1 tank), the excess of sludge is transported to old WWTP of town Poprad

Table 5 Technical Parameters and Permitted Limits Issued by the Environmental District Office in 1994 (in mg/l)

Parameter (in mg/l)	Pollutants				
	COD	BOD ₅	SS	N _{tot}	P _{tot}
Design parameters		191			
Influent	186	99	84	18	4
Effluent	30.63	17.21	13.42	8.86	1.58
Limit	55	25	35		

Old WWTP in Smokovce

It is plant with mechanical and biological treatment. It has been in operation since 1971. The WWTP consists of

- dividing chamber and flow measure channel
- hand-raked coarse bar screen and sand trap
- primary clarifier (2 tanks) and activation tank (4 tanks) with aerating turbine (partly damaged)
- secondary clarifiers (2 tanks)
- return sludge pumping 2 sludge pumps
- sludge storage tank (1 tank)
- chlorination tanks (2 tanks), but chlorine is not added.

New MATEJOVCE WWTP

Construction started in 1991 as mechanical biological treatment and anaerobic sludge digestion. Construction was never completed due to a lack of funding. A project has been planned to upgrade the plant with N and P removal. Currently the project is being considered for receipt of an ISPA grant. The technical design will allow meeting strict environmental limits mandated for of sensitive areas.

Table 6 summarizes the collection and treatment of wastewater in the PPB.

Table 6 Collected and Wastewater Discharged, 2002 (thou. m³)

Parameter	
Collected and treated water	
Sanitary (households)	3 802
Industrial	3 583
Storm water collected and invoiced	782
Total collected wastewater	7 385

Source: vykaz Vod Z 1-01

Table 7 shows quantities of water produced, purchased, unaccounted for in the PPB.

Table 7 Amount of Water Produced, Invoiced and Unaccounted, 2002(thous. m³)

Variable	
Number of inhabitants	139 799
Number of inhabitants connected to public drinking water supply	94 319
Water Production	
Water produced	15 264
Water transferred free of charge to another PWC unit (to Spisska Nova Ves)	3443
Provided drinking water – Invoiced Water	
Households	4 896
Small industry and others	2 370
Large industry	1 185
Unaccounted Water	
Losses (leakage) in pipes	3 370
Own consumption	285
Other unaccounted water	106

Source: vykaz VOD 1-01, 2002,

3.2 Financial Conditions

3.2.1 Prices, Sale and Revenue

Drinking water is provided for households and other clients. The prices are set based upon the Decision of the NRO and in 2003 it is 14.10 SK/m³ for households or accounts classified as like residential accounts (16.07 Sk/m³ with VAT) and 32 SK/m³ (36.48 SK/m³ with VAT) for Other Users. A similar situation applies in the case of collected and treated wastewater. The households or accounts classified as like residential accounts price is 8.90 SK/m³ (10.15 with VAT) and Other Users price is 23 SK/m³ (26.22 Sk/m³ with VAT). The development of prices in the period of 1996 – 2003 and the proposal for 2004-2007 is shown at the Table 3. Income of MU from W&WW services in 2002 was 131.5 mill. SK for drinking water and 86.1 mill. SK for collected sewage water.

Other income to the PWC comes from construction services, installment of connections, and other activities as shown in Table 8.

Table 8 Other Income of the PWC, in Period 2000 – 2002 (thous. SK/year)

Item	2000	2001	2002
Revenue from drinking water supply	127 700	134 278	131 551
Revenue from wastewater collection and treatment	93 262	95 208	86 151
Total revenue from W&WW services	220 962	229 486	217 702
Construction works	711	771	159
Installment of connections	1 298	630	651
Other production activities	135	711	1 055
Other non-production activities	1 981	2 372	2 531
Other revenue	3 272	2 623	4 833
Total from other than W&WW services	7 397	7 107	9 229
Internal revenue*	6 050	7 950	7 007

Source: Internal statistical data of the PWC, 2003

* internal revenue represents the income from transferred water to other utility of the same water company

3.2.2 Expenditures

Expenditures include costs of purchased inputs and cost of investments through amortization and depreciation allowances. It should be noted that current pollution charges paid by the PPB represents less than 5% of total annual expenditures.

Table 9 Costs of W&WW Services, 2002 (thous. SK)

Parameter	Costs (thous. SK)
Material consumption	37 340
Energy consumption	18 041
Repair and maintenance	8 514
Salaries	59 228
Overheads (services, ravel and P&R)	6 829
Amortization	38 883
Depreciation allowances	51 010
Other (including pollution charges)	10 743

Source: internal statistical data of the PWC, 2003

For the purpose of the case study, the costs of investments were investigated only for the selected service area of the PPB.

Drinking water

The investment and operating costs of all the operating facilities described above was grouped into:

- Treatment facilities (in the case of the PPB service area, these are simple treatment facilities as the majority of water is withdrawn from springs and wells). The treatment facilities consist of simple sedimentation, filtration, pH adjustment and disinfection.
- Distribution system

Both items have an assumed lifetime of 40 years.

Collection and treatment of wastewater

The investment and operating costs of facilities were grouped into:

- sewer network (40 years lifetime)
- wastewater treatment (30 years lifetime)
- machinery and equipment (12 years lifetime)

All costs are listed for existing facilities. New MATEJOVCE WWTP is a subject of the project preparation that is currently under consideration for an ISPA grant. The total investment cost of the ISPA project was taken from the short list of ISPA strategy (pipeline of ISPA projects).

3.2.3 Grants and Transfers

In 2001, the PWC received an annual transfer from the Government, so called “earmarked subsidy” to recover cost related to tasks in the public interest. These were actually a rebate of costs that the PWC paid for the withdrawal of surface and ground water and part of production costs with respect to treatment and distribution of drinking water. Since 2002, the company has not received any grants and transfers.

3.2.4 Existing Contracts

The PWC provides services to SUs based upon a contract. The are following groups of SUs are distinguished because of cost, service, or tariff differences:

- Households who are connected to the complete W&WW services, including wastewater treatment
- Households who are connected to drinking water supply and sewer system, but wastewater is not treated and is directly discharged into the recipient water body
- Households who are connected to drinking water supply without sewer services and use holding tanks
- Large industry that comprises several chemical and mechanical industries. These industries use W&WW services for both infrastructure (offices, canteens) and production activities
- Small industry and other commercial users, located mainly in Poprad and Svit. Also, commercial users are small pensions, restaurants and tourist industrial companies in towns Smokovce and Strba.

Potential SUs are:

- **inhabitants to be newly connected; the sewer system is under construction and will be connected to the new WWTP (approx. 15 000 – 20 000 pe)**
- **there is a plan to establish an industrial park that might use W&WW services.**

4 Regulatory Unit and the PWC

4.1 National Planning and Permitting

Basic national requirements are discussed in detail in the Slovak National Profile Report. In general, there is only framework planning document that includes all communities that require construction and/or upgrade of a W&WW system. This national plan is limited to the statement that the PWC is located in the sensitive area and must meet strict emission limits. The current ISPA project support plans include an investment in the WWTP Matejovce.

In summary, the PWC must have following permits:

- **license to operate the W&WW system; the license is issued by the License Office.**
- **Operation Order that includes all technical details, manuals, work safety guidelines, accident and emergency plan; the Operation Order is approved by the Environmental District Office.**

4.2 Economic Regulation

The PWC must receive the Decision of the National Office for Regulation of Network Sectors on maximum allowable price for households and industry. The details of such a ruling the design of the maximum tariffs are described in the Slovak National Profile of this report. The PWC is the VAT-tax payer.

4.3 Environmental Regulation

The PWC must receive:

- **permit to withdraw ground and/or surface water**
- **permit to discharge waters and wastewaters.**

The permits are issued by the environmental authority (Environmental District Office). Permits include a monitoring obligation with set measuring frequencies and reports. Parameters of quantity and quality of discharged wastewater are specified in the permit. The Environmental District Office also issues the payment decision on withdrawal water charges and pollution charges. These payments are enforced by River Basin Enterprise (under the Slovak Water Management Enterprise that is a governmental agency). Besides water and wastewater permits, the Environmental District Office must approve the Waste Management Plan. The plan includes conditions for handling of sludge and its final disposal. It also includes the conditions for handling other waste generated by the PWC. Further details on the environmental requirements are described in the Slovak National Profile of this project.

5 The PWC Planned Operating Conditions

5.1 Physical Conditions

The service area is rich in water sources suitable for drinking water supply; the problem is with the discharge of wastewater. The PWC has a plan to phase out three existing, obsolete WWTPs and reconnect all municipal wastewaters into a single WWTP that will be equipped with nutrient removal technology. The investment project is currently under the development and the PWC has applied for an ISPA grant. The completion of the new WWTP will also support new residential and commercial connections in the service area (including customers who currently use holding tanks).

In the medium-term, there is not a plan to invest in a drinking water network. The program of extension and substantial replacement and repair of the drinking water supply is planned in the longer term (beyond 2015).

The PWC does not have a clear picture about the future development of W&WW services. The management is skeptical about the growth in water consumption. All drinking water service users have an incentive to reduce the water consumption given projected tariff increases. The installment of water meters and water saving equipment in households will lead to more effective water use. The industrial users will seek to reduce water costs in order to reduce production costs as the water bills of some industrial units can be an important share of the total production costs. Another alternative for large industrial clients is to find or expand privately developed and owned sources of water

5.2 Financial Conditions

The PWC has already developed a plan for the increase in tariffs. It is not clear, if the PWC included new investment in the forecast of the tariffs. In any case, the tariffs are subject to the approval from the NRO. Table 10 shows that the tariffs for household consumers will increase faster and, by 2007, equal the tariffs of Other User customers.

Table 10 Development of Water Tariffs (including VAT) in the PWC (SK)

Year		2003	2004	2005	2006	2007
Drinking water	Households	16.07	21.69	28.95	37.44	37.44
	Others	36.48	36.48	37.44	37.44	37.44
Sewage water	Households	10.15	13.19	17.59	22.87	29.25
	Others	26.22	26.22	29.25	29.25	29.25

Source: Internal data of the PWC

6 Scenario Development

The ASTEC model is designed to run numerous, hypothetical tariff, investment, effluent charge and policy combinations. It was tested for the Poprad case study with many variations in key input data². The main variables are:

- entities' accounts
 - Current SUs represent number of pe. In the case of industries, the number of entities' accounts (pe) was estimated by the PPB.
 - New SUs represent number of households that will be connected to the sewage system after completion of new sewers and the new WWTP
- investment costs
 - in each model trial, past investment costs are zero, as the operator inherited the system without any financial obligations
 - fixed annualized costs that deal with regular repair and maintenance of the system
 - fixed annualized costs that deal with the adjusting entry (allowance) – represent future savings associated with cost-saving investments.
 - fixed annualized costs that deal with annual salaries and management overheads (expressed as services, P&R, remuneration)
- depreciation of facilities and amortization of debt
 - amortized payments on short-term commercial debts the operator is obliged to pay
 - replacement investment costs deal with the investment necessary to replace the system (no upgrade, no increase efficiency)
 - new planned investment deal with the planned project to build a new WWTP and associated collection networks that will serve all existing SUs as well as new WW service users. The project also deals with the treatment of wastewaters that are currently collected by public sewer system but discharge directly into the recipient water body
- operation costs
 - Current operation costs deal with the production of drinking water and collection and treatment of wastewater. Major components of operation costs are materials and energy.
 - New user charge deals with the establishment of a new charge for the withdrawal of ground and surface water for drinking water purposes. This charge exists in Slovakia at the level of 2 Sk/m³ since 1989, but public W&WW operators were excluded from this charge. New Regulation on Water Charges envisages establishing this charge for all water users.
 - New pollution charge deals with the establishment of new effluent charges that will replace existing effluent charges. New Regulation of Water Charges envisages that pollution charges will be based on the quality parameters of discharged water, with the emphasis on removal of N and P. Currently applied pollution charges (from 1979) favor those polluters that discharge a high volume of wastewater regardless of the treatment technologies.
- tariffs
 - tariffs for households are established by the NOR. There is an annually increase of tariffs by the coefficient 1.35 for drinking water and 1.30 for sewage water. The operator has already estimates on tariffs by 2007.
 - Tariffs for others are also established by the NRO based upon the redistribution of total production costs of the individual operator.

² A guide to the ASTEC model can be found in Vol 1 of the Tariff and Charges Project report.

The ASTEC model for PWC and the Poprad Branch was constructed to allow for the modeling different scenarios depending on the issue of interest. The selected variable parameters included:

- **Increase of tariffs for selected groups of clients.** This is the most interesting variable parameter. The managers need to know what will be the balance of revenues and costs in on-going years, as it is decided by the NRO that tariffs can increase to reach full cost recovery.
- Increase of pollution charges and user charges. This is very important feature in the case of Slovakia. Currently, pollution charges are obsolete, designed from 1979 without any incentive function. The details on pollution charges are discussed in the Slovak National Profile of this study. It has been assumed that if pollution charges (and user charges) increase by 10-fold that this might result in different behavior by the operator of W&WW systems as they try to control the costs.
- Increase of investments. The Podtatranska Water Company has developed an investment project to meet a new Slovak Water Act that requires removal of nutrients for all agglomerations larger than 10000 pe. Also, the operator has prepared an attractive investment project to receive ISPA grant covering up to 75% of total investments. The additional financial sources for the investment and associated operating costs must be sought from system revenues or at a lender. These features were modeled in this case study.

Besides variable parameters listed above, ASTEC includes some automatic options that allow for different strategies for setting tariffs that cover costs:

- Scenario Type 1: full cost recovery (FCR) without marginal cost pricing (MCP). During the model run the tariff changes so as to reach full cost recovery by selected users at the minimum tariffs necessary to provide revenues that just cover costs. This is economically not necessarily an economically efficient scenario if tariffs do not equal the short run marginal costs (when there is excess capacity) or long run marginal costs when demand would otherwise exceed capacity. Nevertheless, such cost-recovery strategies are widely used in practices.
- Scenario Type 4: no marginal cost pricing and no cost recovery. The original tariffs and charges are maintained. Used to explore the budgetary implications of investments or policies initiatives without raising tariffs or adjusting effluent charges.
- Scenario Type 5: no marginal cost pricing, no full cost recovery, new tariffs and charges are used. No optimization is carried out, but the new level of tariffs will influence service level through the elasticity of demand.

Other automated scenario types of ASTEC (2 and 3) were not used in the Slovak case study of the PWC and the Poprad Branch.

As it is described above, the model allows for numerous alternatives. The limited selection of scenarios was tested and the results of modeling are summarized as follow.

6.1 Baseline Scenarios

Description of the CURRENT PPB SYSTEM in 2002

This is the most straightforward scenario. The description of the current PPB system in 2002 was input into the ASTEC model. Model inputs:

- Current SUs only
- Tariffs of 2002 applied that are based on the Decision of NRO
 - Tariffs for Households are 10.45 SK/m³ of drinking water and 6.80 SK/m³ of sewage water
 - Tariffs for Others are 23 Sk/m³ of drinking water and 17 Sk/m³ of sewage water
- Investments costs include fixed annualized costs (maintenance of current system), depreciation, salaries, management overheads, and the debts to be paid
- Operation costs include current operation costs and current effluent charges (based on volume of discharged wastewater). It should be noted, that current effluent charges are based on the volume of discharged wastewater rather than quality of discharged wastewater.

Question:

What is the balance of revenues and costs of the operator when fixed tariffs of 2002 are applied? What tariffs should be applied to reach full cost recovery (without marginal cost pricing)?

S0: Scenario type 4: no marginal cost pricing, no full cost recovery and original tariffs and charges are applied

S1: Scenario type 1: FCR, not MCP

Results and Analysis:

The operator runs the PPD system with a net revenue + 50 mill. SK annually. In the case of the FCR, tariffs would be significantly lower for both customer groups (HH and IND) in the drinking water supply. However, the tariffs for wastewater services should increase for HH to reach the tariffs of IND. This last result occurs in part because we assume that the costs associated with providing wastewater service to HH is the same per m³ of service as it is for industrial customers.

These results suggests that

- the operator cross-subsidies costs of wastewater treatment by higher tariffs for drinking water supply
- IND wastewater customers cross-subsidizes HH wastewater customers. Remember, however, that this result assumed IND customers effluent was no more costly to treat than HH .

Description of CURRENT SYSTEM in 2003

There was a decision by the NRO that the tariffs must gradually increase by given coefficients. This situation was tested in the Poprad application of ASTEC.

Question:

What is the balance of revenues and costs in 2003 when the NRO decided that households` tariffs should be increased by the coefficient 1.35 for drinking water and 1.30 for sewage water?

Model input:

Same as previous scenario, except the tariffs of 2003 of National Office decision are applied.

S2: Scenario type 4: no marginal cost pricing, no full cost recovery and the new tariffs and charges are introduced.

Analysis:

Operator in 2003 runs the system in higher net revenue in comparison with 2002 due to increased tariffs for both groups. The net revenue represents +128.7 mill. SK.

Description of the system with NEW POLLUTION CHARGES and NEW USER CHARGE in 2015

Currently, the pollution charge is based on volume of water discharged. From 2015, the pollution charge will include quality components, among which N_{total} and P_{total} will have a significant impact on the operation of WWTP.

Question:

What would happen to the current system if the new user charge and new effluent charges scheduled for 2015 are applied today?

Remark: The scenario models the situation in 2015. For this purposes, the investment costs that represent 'replacement of facilities by 2015 were inserted. In other words, the operator will operate the system without an upgrade of the current WW treatment technology.

Model inputs:

- current SUs only
- 2003 tariffs applied
- investment costs include replacement investment costs for water and wastewater treatment facilities in 2015 and fixed annualized costs (taken from S0 and S1)
- operation costs:
 - new user charge 2 SK/m³ of withdraw water,
 - new pollution parameters BOD = 12 Sk/kg, COD = 1.40 SK/kg, SS = 2.4 SK/kg, N_{tot} = 14 Sk/kg and P_{tot} = 90 Sk/kg

S3: Scenario type 4: no marginal cost pricing, no full cost recovery and 2003 tariffs and charges are applied

S4: Scenario type 1: FCR, no MCP applied

Analysis:

With the increase of pollution charge (from 8.3 mill. SK to 60.7 mill SK), the operator runs the system in a net revenue - 20 mill. SK (when 2003 tariffs are applied).

The results of analysis are that

- new user charge for drinking water supply will significantly impact the operator's costs (operation cost represents almost 50% of total cost of drinking water service)

- the new pollution charge does have a dramatic impact on the increase of total costs for wastewater service. Pollution charge contributed to the total costs for wastewater services by 7 %; after the increase, it represents 30%.

6.2 Expansion/Upgrade Scenarios

The New Water Act mandates the upgrade and expansion of the current wastewater system of the PWC. The upgrade and extension will include a new WWTP that will allow for removal of nutrients and connecting new households to the system. It will also solve the problem of untreated wastewater of the community that is currently connected to the sewage system, but the wastewater is directly discharged into the recipient river body without the treatment. The details are discussed in the chapter 5.1.

Description of the system with PLANNED INVESTMENT in 2015

Question:

The operator will build a new WWTP that will allow connecting households that are currently not treated; new clients (only households) will be also added. What will happen with the current system when these new investments are completed? In addition, the new user charge and pollution charges will also be applied.

Remark: new operation cost for WWTP takes into account the treatment of excess of sludge due to nutrient removal. Also, higher consumption of chemicals and energy is reflected in the costs. The drinking water services are not upgraded; only replacement costs for the system scheduled through 2015 are applied.

Model input

- additional SUs
- 2003 tariffs applied
- investment costs:
 - planned investments to build a new WWTP and extend sewage collection network
 - fixed annualized costs
- new operation costs (based upon the assessment of operator) and new operation costs to remove excessive sludge added
- old operating cost reductions associated with abandoned WWTP

S5: scenario type 4: no marginal cost pricing, no full cost recovery and original tariffs and charges are applied

S6: scenario type 1: full cost recovery, no marginal cost pricing, everyone pays the same charge using the ASTEC clustering method of cost allocation.

Analysis:

The construction of new WWTP will bring additional costs and the operator will run the system in net revenue –26.5 mill. SK. Based upon the analysis it is shown that:

- pollution charges will be lower (from 60.7 to 48.3 mill SK) but the total costs to treat wastewater will increase from 200 mill SK to 222.2 mill. SK

- pollution load into the recipient will increase due to larger volume of wastewater collected from new clients
- there will be a dramatic impact on HH tariffs but the IND will be better off (have lower wastewater tariffs) than at present.

The same input data were used modeling the S5 and S6 scenarios with the exception that the investment costs were replaced by the ISPA grant at the level of 50% of total investments into a new WWTP. The results are summarized at the Table 9. It is obvious, that the ISPA grant will bring the operator in positive net revenue (+37,1 mill. SK annually). In the case of FCR, the wastewater tariffs will increase moderately for the households (from 10.70 to 11.4 SK/m³) and decrease relative to scenario S6 for IND clients (from 27 to 18.50m SK/m³).

6.3 Modeling of Total Service Area

The PPB unit is a fragment of the total service area that was selected for the modeling due to the developed financial plan to upgrade the WWTP to tackle water pollution in sensitive area. The Podtatranska Water Company (PWC) is composed of two additional units: Spiska Nova Ves and Stara Lubovna. Thus, the overall W&WW service development, investment planning including the tariff policy of the management is established for the total service area. The operator claims that the production costs are high despite a regular increase of tariffs. The Purpose of the modeling was to assess the revenue/cost balance for the total area.

Model inputs:

SUs of total area served are divided into following 8 groups

- drinking water and sewage services to households (PP, SNV and SL)
- only drinking water to households (PP, SNV and SL)
- large industry
- small industry

All other parameters are taken as S0 for the all area of three units.

S7: scenario type 4: no FCR, no MCP (No new investments are tested, no new user charge, no new pollution charges are tested).

S8: scenario type 1: FCR, no MCP

S9: scenario type 4: no FCR, no MCP (No new investment, but new user charge and new pollution charge tested).

Analysis

Operator runs in a net revenue –35 mill. SK annually. The situation will be worse when new pollution charges will be applied, the net revenue will be – 160.1 mill. SK annually. Even, a planned increase in tariffs (set by the NRO) the net revenue will be –22.1 mill. SK. In the case of FCR, the tariffs should increase for HH but decrease for IND. It was not possible to model the situation when the PWC invests into the upgrade/expansion of its facilities outside the PPB due to absence of relevant data (for two additional units).

Table 11 Summary of Scenario Results from the ASTEC Model with PPB and PWC Data

Summary description of each scenario	Tariffs of drinking water Sk/m ³		Tariffs for wastewater Sk/m ³		Revenue mill SK		Costs mill. SK			Balance
	households	others	households	others	Commodity charge	Fixed tariffs	Annualized inv. costs	Operation costs	Pollution charge	
S0: (type 4) Current status in 2002	10.45	23	6.80	17	217.9	0	134.6	25.1	8.3	+49.9
S1: (type 1) Current status in 2002, FCR of S0	4.61	4.63	17.08	17.08	166.2	0	134.6	22.9	8.3	- 0.5
S2: (type 4) Status with 2003 tariffs,	14.10	32	8.90	23	296		134.6	25.1	8.3	+ 128.7
S3: (type 4) Replacement of facilities in 2015 Tariffs of 2003 applied New PCH and UCH applied	14.10	32	8.90	23	296.7	0	198.4	55.6	60.7	- 20.0
S4: (type 1) Same as S2, but FCR required	11.50	11.50	29.74	29.74	302	0	198.4	47.7	56.9	- 1.0
S5: (type 4) New investment of WWTP, incl. new clients New PCH, UCH Tariffs of 2003	14.10	32	8.90	23	310.6	0	228.1	60.6	48.3	-26.5
S6: (type 1) same as S4, but FCR required	11.70	11.70	27	27	324	0	228.1	52	45.5	- 1.7
S5ISPA (type 4) New investment of WWTP, incl. New clients New PCH, UCH Tariffs of 2003	14.10	32	8.90	23	310.6 + 30.4*	0	228.1	60.6	48.3	+ 37.1
S6ISPA (type 1) Same as S5ISPA, but FCR required	11.40	11.40	18.5	18.5	265 + 30.4*	0	180.1	53.8	48.3	- 1.8
S7: (type 4) Total area current system, tariffs of 2002	10.45	23	6.80	17	354		231.7	113.6	43.6	- 34.9
S8: (type 1) Same as S7, but FCR required	7.74	7.74	23.32	23.32	379.3		231.7	108.9	41.2	- 2.7
S9: (type 4), Same as S7 plus New PCH and UCH applied, tariffs of 2003 applied	14.10	32	8.90	23	492		231.7	155.3	127.1	- 22.1

* annualized transfer of ISPA

7 Scenario Results

The Poprad unit of the larger Podtatranska Water Company has a plan to complete an investment in a new WWTP and to extend collection network for wastewater. The investment projects will provide a solution to several problems:

- to meet the strict EU requirements with respect to new pollution limits designated for sensitive area
- to connect current community to WWTP that has sewage collection system in place, but wastewaters are not treated
- to add new households to W&WW services
- to close existing obsolete WWTPs in the area that will bring operational savings
- to allow the expansion of tourist industry in the area in the High Tatras.

The PPB unit does not have any problems with drinking water supply in the short term; it has access to good quality of drinking water sources from local wells and springs. There is a problem with leakage that reaches 22.9% in the Poprad unit, but the average leakage for the total area (including the two additional units) is 33%. This higher leakage contributes to higher operation costs: in Poprad operating costs are 3.95 SK/m³ while operation costs in the total area are 14.8 SK/m³.

The PPB unit received the Decision of the NRO with respect to tariffs for households and industrial clients. Based on the spreadsheet model, we showed that the PPB unit apparently runs the W&WW service with substantial positive net revenue. However, the tariffs are calculated based upon the production costs of the total area (include two additional units). As it is shown in the spreadsheet model, the total area services currently appear to run at a loss after allowing for all costs, including depreciation.

Results of the modeling shows that to attain cost recovery the tariffs for households should slightly increase, but the industry would be better off and tariffs would be almost a half of the current tariffs.

In spite of untreated wastewater of 30% of population, the pollution charges are small and do not provide any incentive to build a new WWTP. A driving force to invest into a new WWTP is the strict limit for the discharge recently adopted by the Government. The PPB unit is eligible to receive ISPA grant, as the service area fits into a sensitive area and nutrient removal is an obligation. In a near future, the Poprad unit area will need to carefully plan investments to upgrade drinking water supply system as well.

In general, the cost-increasing factors include:

- the need to replace an ageing infrastructure
- the costs of meeting increasing demands for water
- the historic under-pricing of water services (use of average historic costs)
- failure to create adequate replacement funds
- deferral of capital improvements; and
- reductions in past subsidization by the Central Government.

In order to improve cost effectiveness and reduce the burden on customers, the oversight and economic regulation of water operating systems needs to be better integrated and modified.

There appears to be a need for more careful and continuing examination of costs and of tariffs on a system-by-system basis for the purpose of assuring that costs are under control and tariffs impose a reasonable burden on customers and, on the other hand, that tariffs are sufficient to meet the needs for service provision and environmental protection.

How to regulate MUs revenues and encourage cost control?

- role of the NRO should be limited to the regulatory function over the monopoly position of the PWC
- the National Office should not dictate the maximum tariffs uniform for the total serving area and should allow for increasing/decreasing tariffs within the MUs

Burden indices

In the course of the development of this case study, some attention was given to “burden indices”. Although the following assessment is devoted to the broad consideration on burden indices, issues of the balancing efficiency and equity and benefits and costs should be studied in details. Burden indices are shown in order to provide more perspective on the cost estimates and tariff changes associated with two selected situations compared with the current status.

In Table 12, current status in Poprad unit is illustrated together with the situation when:

- the operator does not build new WWTP and new environmental charges are applied (A scenario)
- operator built new WWTP to reduce nutrient pollution into the recipient, new environmental charges are applied (B scenario)

The data was extracted from the regional statistic review and could be found at www.statistics.sk/reg

Table 12 Burden Indices, Selected Items

Possible burden indices for scenarios	Baseline	A scenario	B scenario
Absolute annual costs (mill. SK of 2003)	168	315	337
Annual cost per capita served (SK/capita)	1 800	3 350	3 590
Annual costs per capita served as a percentage of GDP per capita (%)	0.013	0.024	0.026
Annual cost per Household/Median net household income (%)	0.008	0.015	0.016
Annual cost per Household/Median income of the lowest quintile (%)	0.13	0.24	0.26

Source: for the GDP and the household income, the source is www.statistics.sk - regional indicators

Based upon the illustration, the aspects of affordability of household water services were examined. At the selected case of Poprad community, the annual cost is compared with household income. The impact of increased total costs is not significant for average household income. The situation is more difficult for poor group of inhabitants (those living on social security income). There will be a 50%-increase of total cost of water services in both situations: when the operator will (for scenarios A) or will not (for scenario B) invest into upgraded water services.

In general, Slovak households` spending is not significant for water services in comparison with other expenditures as shown at the following Table 13

Table 13 Share of Expenditure in 2002 (%)

Parameter	Median household expenditure of average income groups	Medium household expenditure of the lowest income groups
Total expenditures	100	100
Taxes and insurances levies	20	16
Foodstuff consumption	24	29
Electricity, gas and other fuel	11	13
Housing rent	1.5	2
Water services	0.008	0.009
Solid waste disposal	0.005	0.005
Health care services	0.01	0.01
Transport services and personal cars	0.02	0.02
Recreation and leisure services	0.07	0.06

Source: Income, expenditure and consumption in households, Statistical Office, 2002

The distribution of expenditures indicates that social pressure is on taxes and basic foodstuff supply, rather than on water service. However, the prospective doubling of water service expenditures, even for average income households, may push the costs of environmental services generally above the 5% threshold that many suggest is reasonable..

8 Conclusion and Summary

This case study described the recent history, current conditions and planned development of the one selected unit – Poprad Branch. The service area lies in sensitive area and new environmental regulations require upgrading current W&WW system. The purpose of the examination of the investment plan in the PPB unit was to provide a more concrete background and specific insight for use in identifying and evaluating selected institutional and policy reforms connected to water and wastewater tariffs and pollution charges. The case study should be considered in the framework of the National Profile Report. Following table summarizes potential strategy that is considered and/or suggested by the project team.

Strategy Name	Strategy description	Comments/Concerns
Introduction of regulation over monopolies	Examination of individual constituents of costs and tariffs Clear description of cost items including depreciation and future savings Independent auditing Allow for increasing/decreasing block tariffs Informing the public about future rising costs	Time consuming legislative process Needs to improve enforcement
Introduction of cost center	Examination of individual constituents of costs and tariffs Examination of two-part tariff structure Clear description of cost items including depreciation and future savings	Increase costs in a short-term Unwillingness of operator to introduce a cost center Unwillingness of municipal boards to be involved in examination High willingness of industry to participate
Revision of pollution charges	Examination of unit cost of pollution reduction Allow for payment holidays in case of mitigation investments Allow for increasing/decreasing tariff depending on input pollution load (mainly valid for industry)	Needs to improve enforcement and monitoring of polluters