

Ministry of Environment, DANCEE

Financial needs of achieving the
Millennium Development Goals
for water and sanitation in the
EECCA region

Summary report

February 2004

Table of Contents

1	Summary and conclusions	3
1.1	Key findings	3
1.2	The issue: Achieving the MDG	4
1.3	Definitions of MDG	6
1.4	Existing situation in EECCA	8
1.5	Measures to achieve MDG	13
1.6	Cost estimates for EECCA	15
1.7	Supply of finance	17
1.8	Financing gap in achieving MDG	19
2	Sources and References	24

1 Summary and conclusions

1.1 Key findings

This is the summary report for the project "Environmental Financing Strategies & Cost estimates of meeting the water related issues of the UN Millennium Declaration and Bonn Recommendation for Action" financed by DANCEE (no 128/000-0051). The estimates presented in the report are all subject to some uncertainty and should be understood as providing the order of magnitude.

Listing of main results:

- Total investment costs related to the water and sanitation Millennium Development Goals are estimated to be between 7 and 21 billion EUR for the whole EECCA region;
- Out of the central estimate of 14 billion EUR, water supply improvement accounts for 9.5 billion EUR while sanitation accounts for 4,5 billion EUR; and similarly, renovation and rehabilitation of existing facilities account for 12.5 billion EUR, while new facilities or new connections accounts for 1.5 billion EUR out of the estimate of 14 billion EUR;
- Per capita investments costs amount to 50 EUR with variations among countries from 37 to 78 EUR per capita;
- Financing of the investments has to be seen together with all expenditures related to the sector; total annual expenditure need has roughly been estimated at 23 EUR per capita per year while total supply of finance is estimated at 17 EUR per capita per year.
- The investments in achieving the MDG can to some extent be seen as replacing re-investments that, under all circumstances, are necessary for maintaining service levels and the investments also induce costs savings due to, for example, reduced water losses.
- Average user charges are currently at the level of 1.9 % of household income (simple average) varying from 0 to 4.6 %. Increasing the level to 3-4 % can give an important contribution, but not sufficiently in all countries.
- There is large difference among the countries where potential for implementation of the MDG is largest in Russia, while most difficulties are seen in Central Asia and Caucasus.

1.2 The issue: Achieving the MDG

1.2.1 Background

This note summarises a project that has its background in the EU Water Initiative. At the World Summit on Sustainable Development (WSSD) in Johannesburg in September 2002 the European Union (EU) formally launched the global Water Initiative: Water for Life – Health, livelihoods, economic development and security. The EU-EECCA Water Initiative provides a platform for strategic partnerships with Eastern Europe, the Caucasus and Central Asia (the EECCA countries) to implement the programmes of actions for the WSSD and to contribute to meeting the Millennium Development Goals (MDG) on water.

1.2.2 The Millennium Development Goals

The UN Millennium Development Goals address poverty in a broad sense. One of the sub-goals is related to sustainable development. It comprises the following statements on water supply and sanitation:

- “To halve, by the year 2015, the proportion of people who are unable to reach or to afford safe drinking water and the proportion of people who do not have access to basic sanitation”.

The EU Water Initiative has as its overall objective to support the implementation of the water and sanitation-related parts of the Plan of Implementation agreed at the WSSD. Additionally, the EU WI on Global partnership also includes objectives for Integrated Water Resource Management and preservation of biodiversity.

This project relates to the MDG on water and sanitation and on IWRM. The last issue is not included in this summary report.

1.2.3 Objective

The main objectives¹ of the project are:

- To provide an estimate of the costs of achieving the MDG for water supply and sanitation, the possible sources of finance and the necessary accompanying policy measures.

The idea of comparing the cost estimates and the available finance is the fundamental ingredient in the concept of environmental financing strategy. The financing strategy concept allows for the following which can be seen as the specific objectives of the project:

- To provide input to realistic target setting;

¹ An additional objective, described in a separate report is: To provide and estimate of the costs of introducing IWRM, and the possible sources of finance for implementation of the IWRM.

- To provide input to realistic implementation planning;
- To identify additional policy measures that can support the achievement of the MDG including suggestions for how international donors and IFI can increase the efficiency of their assistance.

1.2.4 Approach

The starting point for our approach is that providing just a number is not in itself the primary objective of a cost assessment, although it indicates an order of magnitude. The objective is to give a more detailed account of the factors behind achieving the MDG in the EECCA region and to provide discussions on the appropriate policy measures needed to mobilise sufficient financing sources.

The UN MDG for water and sanitation are based on a number of so-called improved water supply sources and improved sanitation facilities. The weakness of such a type of definition has gradually been acknowledged: It is not only connection to certain sources but also the *quality* and *reliability* (regularity) of the source or system that matters. Therefore, it might be necessary to rehabilitate existing facilities as part of achieving the MDG.

The costs assessment has been implemented through our cost-finance model FEASIBLE which allow for taking into account the costs of the current service level provision when estimating the financing gap of achieving the MDG.

The analysis of financing the MDG has therefore comprised the following steps:

- 1 Assessment of the annual expenditure need for operation and maintenance of the existing service level;
- 2 Estimation of the costs of increasing the existing service level to comply with the MDG;
 - 2.1 new connections to improved water supply sources and improved sanitation facilities;
 - 2.2 rehabilitation of existing facilities and infrastructure;
- 3 Assessment of current supply of finance and financing gap - baseline;
- 4 Alternative policy scenarios;
 - 4.1 Estimation of additional supply of finance under affordability considerations;
 - 4.2 Estimation of additional supply of finance under affordability considerations and real income growth assumption;
- 5 Calculation of resulting financing gap for alternative scenarios.

Through this approach, one makes sure that the additional costs following from implementing the MDG are evaluated together with the whole sector requirements.

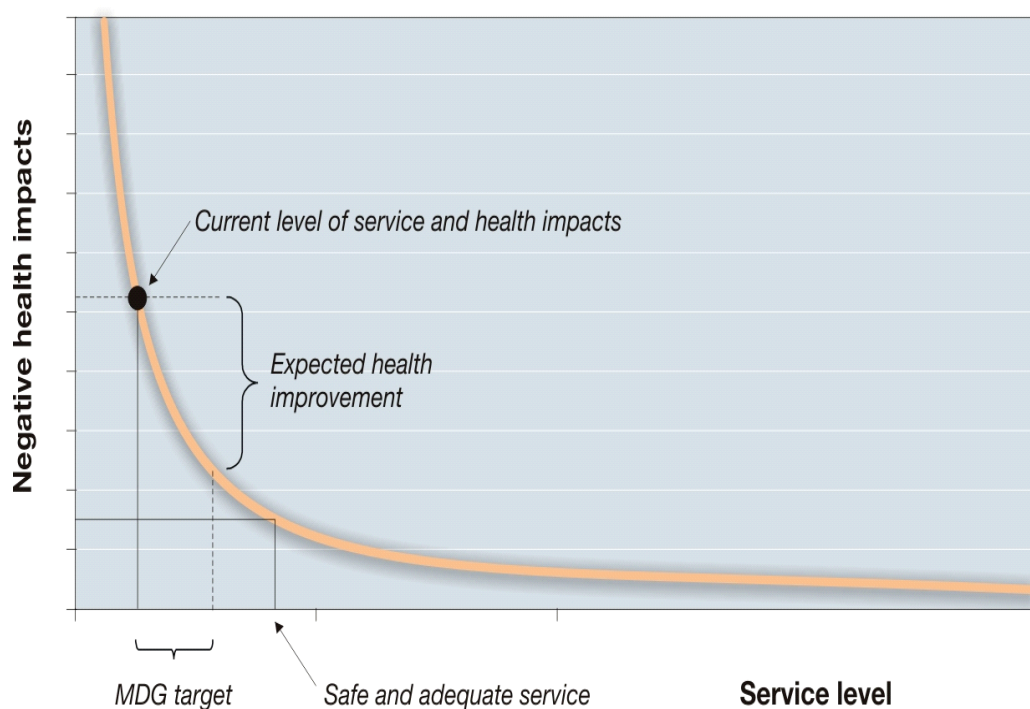
1.3 Definitions of MDG

1.3.1 The relation between water services and health

Poor water and sanitation services influence the health condition of the population through at least two ways. Firstly, diseases can be transmitted by dirty water used as drinking water, secondly, poor water and sanitation service can influence hygienic behaviour and standards. It is also likely that low standards of services like water and sanitation generally affects the wellbeing of the population, in particular if the services have deteriorated.

Below is an illustration of how the relationship might be. The figure show how an increasing service level leads to decreasing negative health impacts. By service level is implied the type of water source or sanitation method that each individual has access to. Unfortunately, it is not possible to directly compare service levels and health status.

Figure 1-1 Illustration of the relationship between service level in water and sanitation and the resulting level of health impacts



Although one can argue that there are certain discrete steps in the health effects when going from one source or technology to another, for the whole country, a continuously relationship can be expected.

The negative health effects are results of poor water quality where diseases are transmitted through the water, through poor hygienic practices for example due to very irregular supply, and through lack of appropriate sanitation facilities.

The evidence from the EECCA region is fragmented in terms of health indicator statistics. However, the available statistics indicate the high incidence of certain water related diseases.

The MDG definition is not extremely specific and therefore they represent a range of possible service levels unless a specific interpretation has been made. More than the specific interpretation of what the MDG implies, the effect of achieving the MDG depends on the current level of service and health impacts as illustrated.

Lastly, the above illustration points to the fact that in most countries the likely long term objective will be to reduce the water caused health impacts to the possible minimum. The MDG is thus in many cases an intermediate target. For achieving the targets, political commitment is necessary and here, again there could be differences amount regions and countries as to what level of target can constitute an acceptable service level.

The implication for the assessment of the costs of achieving the MDG in EECCA regions are the following:

- The most basic service level might not provide acceptable health standards, due to the fact that the population used to have a slightly higher service level; and
- It might be difficult to get commitment to a very basic service levels as an acceptable political target.

Our approach to deal with these issues entails the use of scenarios. We estimate the costs of alternative level of water supply and sanitation services and thereby demonstrate the need for each country to make decision on their understanding of the MDG and how they will implement the goals in actual policy.

1.3.2 Sources of improved and non-improved water supply and sanitation

"Improved" water supply technologies are: household connection, public stand-pipe, borehole, protected dug well, protected spring, rainwater collection. "Not improved" are: unprotected well, unprotected spring, vendor-provided water, bottled water (based on concerns about the quantity of supplied water, not concerns over the water quality), tanker truck-provided water. It is assumed that if the user has access to an "improved source" then such source would be likely to provide 20 litres per capita per day at a distance no longer than 1000 metres.

"Improved" sanitation technologies are: connection to a public sewer, connection to septic system, pour-flush latrine, simple pit latrine, ventilated improved pit latrine. The excreta disposal system is considered adequate if it is private or shared (but not public) and if hygienically separates human excreta from human contact. "Not improved" are: service or bucket latrines (where excreta are manually removed), public latrines, latrines with an open pit.

Table 1 *Categorisation of water supply and sanitation technologies according to official definition*

	<i>Water supply</i>	<i>Sanitation</i>
"Improved"	<ul style="list-style-type: none"> • Household connection • Public standpipe • Borehole • Protected dug well • Protected spring • Rainwater collection 	<ul style="list-style-type: none"> • Connection to a public sewer • Connection to septic system • Pour flush latrine • Simple pit latrine • Ventilated Improved Latrine
"Not improved"	<ul style="list-style-type: none"> • Unprotected well • Unprotected spring • Vendor-provided water • Bottled water • Tanker truck-provided water 	<ul style="list-style-type: none"> • Service (or bucket) latrines (where excreta are manually removed) • Public latrines • Open / uncovered latrines (referring to the hole not to a lack of super-structure)

Above definitions provide formal delineation between standard water and sanitation technologies into categories according to their "believed" ability to deliver improved water and provide access to basic sanitation. It is interesting to look at quantitative implications of these definitions on the assessment of situation in EECCA region.

1.4 Existing situation in EECCA

Review of official water and sanitation statistics and a large number of projects and studies have been combined with own data collection forming the basis for the assessment. Main sources for the information were official statistics from the EECCA countries, relevant international databases, reports and studies carried out by major international organisations, COWI own projects, first of all number of Environmental financing strategies prepared during recent years in several EECCA countries, and information collected by local consultants.

The review and comparison reveals that the data reflecting the actual situation with drinking water supply and sanitation are not consistent. Even reliable data on population in cities and settlements of different size across the region and for all the countries is difficult to obtain. However, based on the described sources, not at least consultations with national experts, we have made an estimate of the current situation.

1.4.1 Demographic description

Although estimation and analysis has been done for each EECCA countries, some of the assumptions are the same for countries within a sub-region of EECCA. Thus, for facilitation of the analysis the countries have been grouped as shown below in four sub-regions.

Table 2 *Regional grouping of countries and respective regional GDP and population*

Countries	Regions			
	A	B	C	D
	Russia	Ukraine Byelorussia Kazakhstan	Armenia Azerbaijan Georgia Moldova	Uzbekistan Tajikistan Turkmenistan Kyrgyz Republic
Regional GDP in million EURO	282,300	65,220	12,520	22,350
Regional population in '000	145,182	72,673	19,962	41,693
GDP per capita in EUR	1,945	897	627	546

Sources: see section 2

Table 2 shows countries in each group with corresponding total GDP and population used in further cost estimating model.

Split of the population into urban and rural is shown below. Division between urban and rural population in the EECCA region vary a lot from country to country and ranges as presented in the Table 3 below between 27% of urban population in Tajikistan to 73% of urban population in Russia.

Table 3 *Urban and rural population fractions in EECCA countries*

Region	Country	Population, year-end 2002	Urban population, 2001 (% of total)	Rural population, 2001 (% of total)
A	Russia	145,181,900	73	27
B	Ukraine	48,173,729	66	34
	Belarus	10,055,413	69	31
	Kazakhstan	14,443,600	54	46
	Armenia	3,213,011	69	31
C	Azerbaijan	7,947,320	52	48
	Georgia	4,518,600	54	46
	Moldova	4,283,000	46	54
	Uzbekistan	24,902,590	38	62
D	Tajikistan	6,506,434	27	73
	Turkmenistan	5,284,950	53	47
	Kyrgyz Republic	4,999,096	37	63

Sources: see section 2

Water supply and sanitation facilities are very different in the rural and urban areas and in cities and villages of different size. Therefore, for estimation of costs related to the MDGs it is of crucial importance to have a picture of settlements pattern in each country. For the estimation of the costs of achieving the MDG, we have divided the agglomerations and settlement into typically four categories: The capital and other large cities (above 500,000 inhabitants),

medium towns (about 100,000 inhabitants), small towns (around 10,000 inhabitants) and villages (50 to 1000 inhabitants). Below is shown, the total distribution on categories.

Table 4 Settlement structure for EECCA region

Category	Population	Share
> 1,000,000	46,898,181	17%
100,000 - 100,0000	29,316,007	11%
50,000-100,000	51,116,421	18%
5,000 - 50,000	70,908,979	25%
< 5,000	80,550,428	29%
All	278,790,016	100%

Sources: see section 2

This structure is important, first of all because the unit cost for most of the alternative technologies for improved sources varies significantly with average size of the town.

1.4.2 Service levels

The EECCA countries cover a huge geographical area and a vast variety of living standards, reflecting cultural and national distinctions of different countries. Application of the same definition of indicator across the whole region characterised by so substantial differences will not, probably be fully justified.

Climatic and national differences, as well as previously applied service level have to be taken into consideration. E.g., the outdoor protected pit latrine satisfies, in principle, the improved/adequate sanitation definition, but, in this region provide a very low service level in the EECCA region as the outdoor temperature in some parts of EECCA stays below zero for large part of the year. Similarly, for rural settlements that used to be connected to the centralised water supply systems that are not in operation any longer due to lack of resources for O&M, many of individual solutions, own wells, and rainwater collection would not, most probably, be seen as an "improved" solution.

During the Soviet past majority of the cities, town, and town-like settlements in the EECCA countries have been piped and had an access to centralised water supply system. Villages and other settlements in the rural areas (which have been governed through the "kolkhoz" communities) had also one or the other form of semi-centralised water supply or, at least, access to relatively stable water source (wells, springs, rainwater collections, etc.). Similarly, majority of cities, towns and town-like settlements have been provided with centralised or semi-centralised wastewater collection and treatment systems. Villages and other settlements in the rural areas, if not centralised, had normally some form of relatively well protected from human contact latrines, pit latrines, etc.

Table 5 Water supply coverage by improved and non-improved sources in %

	Improved				Not improved	
	Urban		Rural		Urban	Rural
	Centralised	Other	Centralised	Other		
Russia	86.0	14.0	39.0	61.0	0.0	0.0
Belarus	94.0	6.0	70.0	30.0	0.0	0.0
Kazakhstan	90.8	7.6	35.3	55.7	1.6	9.0
Ukraine	95.6	3.9	55.0	38.7	0.5	6.3
Armenia	98.0	0.2	82.2	0.7	1.8	17.1
Azerbaijan	83.7	8.8	28.3	29.2	7.5	42.5
Georgia	86.2	3.3	42.8	18.4	10.5	38.8
Moldova	79.6	17.5	10.2	77.6	2.9	12.2
Kyrgyz Republic	96.6	1.7	59.3	9.0	1.7	31.7
Tajikistan	87.0	5.9	34.6	12.3	7.1	53.1
Turkmenistan	89.1	8.0	34.6	38.0	2.9	27.4
Uzbekistan	93.2	6.2	65.5	22.9	0.6	11.6

Sources: see section 2

In general, the degree of coverage by improved sources are much high in the urban areas than in the rural. Also the situation varies between the sub-regions. Russia, Belarus, Kazakhstan, and Ukraine has higher shares of the population covered by the so-called improved sources. Caucasus and Central Asia has in particular in the rural areas large shares covered by non-improved sources.

The pattern is somewhat different for sanitation. The coverage by central sewerage is lower than coverage by central water supply. However, the most common alternative, pit latrines, are generally considered to be an improved source of sanitation.

Table 6 Sanitation coverage by improved and non-improved sources in %

	Improved				Not improved	
	Urban		Rural		Urban	Rural
	Centralised	Other	Centralised	Other		
Russia	84.0	16.0	30.0	70.0	0.0	0.0
Belarus	98.0	2.0	62.0	38.0	0.0	0.0
Kazakhstan	80.8	19.1	4.9	94.1	0.1	1.0
Ukraine	79.8	20.2	20.6	77.0	0.0	2.4
Armenia	90.3	9.2	20.5	79.1	0.5	0.4
Azerbaijan	55.3	34.5	1.3	69.1	10.2	29.6
Georgia	79.8	20.1	5.1	93.9	0.1	1.0
Moldova	76.0	23.0	3.1	95.0	1.0	1.9
Kyrgyz Republic	51.6	48.4	3.1	96.7	0.0	0.2
Tajikistan	33.2	64.1	0.7	87.2	2.7	12.1
Turkmenistan	54.5	44.9	0.9	98.0	0.6	1.1
Uzbekistan	46.7	53.0	2.5	97.0	0.3	0.5

Sources: see section 2

In spite of the relatively high coverage or connection figures by "improved" facilities and sources, the adequacy of service is a major concern. As discussed before, access to safe drinking water and adequate sanitation comprise three dimensions. Coverage or connection is one, while quality and regularity of the sources is equally important.

Reliability and quality of water supply

One of the most serious problems in many of the EECCA countries is irregular and unreliable water supply. Armenia, Azerbaijan, Georgia, Moldova, and some parts of Ukraine are those countries that suffer most from this problem.

Irregular water supply: Long interruptions of power supply caused by energy crisis in Georgia are the reason that some systems are provided with power for only 4 hours/day, in some places, e.g. Rustavi - even less - from 1 to 2 hours². In the area of Greater Baku, Azerbaijan, average water supply time is 22 days/month, only 4 hours/day³. Power cuts are the key reason for irregular water supply in Moldova⁴, where cities with population between 25.000 and 50.000 inhabitants are regularly disconnected from water supply for 4-8 hours/day.

Lack of pressure in the supply systems is typical for all EECCA countries and results in urban areas to water being provided only to the 1st to 4th floors in multi-storey buildings. Insufficient water pressure is one of the most important causes for the unreliable and intermittent water supply as well as poor water quality.

Discontinuity of water supply does not only creates inconveniences for the water users but also contributes substantially to further deterioration of water supply infrastructure and increase risk of drinking water contamination and water related health problems, as waterborne diseases are most often caused by secondary contamination of water in urban distribution systems. Entering of sewage water into empty water supply systems is often the reason for contamination of drinking water when both water supply and sewage networks leak in the same place.

In many EECCA countries, water quality, does not meet basic chemical and microbiological standards and therefore constitutes a health threat. Polluted drinking water is one of the most important environmental and public health problems currently facing most of EECCA countries. Unsafe drinking water can be a significant cause of diseases such as trachoma, cholera, typhoid, and hepatitis. Drinking water can also be tainted with chemical, physical and radiological contaminants with harmful effects on human health.

² DHI/COWI/Eurofin, 2003, Recommendations for "Drinking Water Quality and Supply Strategy"

³ WB, 2001, Greater Baku Water Supply Rehabilitation Project - Supplemental Credit, Environmental Management Plan

⁴ OECD/DANCEE/COWI, Environmental Financing Strategy, Moldova, 2000

Such problems obviously occur when water for drinking purposes is derived from sources classified as "not improved". An important observation, however, for further costing of MDG in EECCA region is that poor quality of water is frequently associated with water sources formally classified as "improved". Significant share of water supplied, for example, through centralised pipe network, or water abstracted from wells, does not meet requirements and basic standards of healthy drinking water. Case notes presented in the main report of this study provide detailed review of the water quality issues in each of EECCA country. They vividly demonstrate that existing water and sanitation infrastructure require substantial rehabilitation efforts in order to practically comply with minimum requirement of MDG in supplying water which is safe to drink without immediate threat to human health.

1.5 Measures to achieve MDG

It follows from the brief description and assessment of the current situation what type of measures is needed to achieve the compliance with MDG. Below, the measures are summarised.

1.5.1 Water supply systems:

- Centralised water supply systems in urban areas are in state of dis-repair. If they are to provide safe drinking water at minimum sanitation and biological standards and regularity, a substantial rehabilitation of 10-50% of network infrastructure and equipment is required. Renovation of 30 % has been estimated for the majority of countries, though 20 % for Russia and Belarus.
- For a share of population in urban areas not having access to safe water supply the adequate technology is considered connection to existing centralised system. Such a technology is the most effective in densely populated urban areas from both cost and coverage point of view.
- In rural areas, existing water supply systems are also in need of renovation. As demonstrated in case descriptions in the main report, in most of the countries, more than half of previously existing systems supply water which is not considered safe by all standards. Thus, we assume about 30%-50% of existing systems will need rehabilitation investments. The same applies to other sources of water supply, considered as "improved" and widely used in EECCA region - wells and springs. Condition of these water sources vary significantly among countries. It is very much dependant on the quality of water at the intake, pollution levels of shallow water and degree of human activity in the area. On average, however, water from those sources cannot be considered safe in about 20%-40% of cases. Thus, corresponding percentages of existing simple systems are to be rehabilitated.
- Rural population without access to improved water will, in general be assumed to be provided water through two main technologies - stand posts

with small system supplying water for relatively large rural settlements and hand pumps for smaller villages.

1.5.2 Sanitation:

- Centralised sewerage collection and treatment systems in urban areas are in state of dis-repair and cannot be considered as providing adequate sanitation. This, as discussed earlier, relates to cross-contamination of the water supply systems from sewerage and discharge of un-treated water into the public waters. Degree of system deterioration, on average across the region is considered to be 20%-50%. For achieving the MDG a full rehabilitation is not required, thus, it is estimated that about 10% of the existing sewerage infrastructure will have to be rehabilitated in further cost calculations.
- For a share of population in urban areas not having access to sanitation the adequate technology is considered connection to existing centralised system, similarly to water supply. Once again, such technology, is the most effective in densely populated urban areas from both cost and coverage point of view.
- In rural areas, existing sanitation systems (septic tanks, pit latrines) sometimes formally bear the name, while actually having only distant resemblance with the mentioned technologies. To estimate which share of formally covered population in EECCA region have such poorly constructed system is difficult, as the situation varies not only across countries, but also between the areas in the country. On the basis of several cases, however, presented in the main report, we have assumed, similarly to urban regions, that about 40% of formally existing rural sanitation technologies are either poorly structured or are in need of additional work to be utilise as adequate sanitation method.
- Rural population without access to improved sanitation is assumed to be connected to simple ventilated pit latrine.

1.5.3 Unit costs for water supply

The unit cost per capita of new connection or rehabilitation of existing systems depends on the size of the settlements (central systems) or number of people using the system (individual systems). This feature is one the advantages of the cost-finance model FEASIBLE that we have used to implement the analysis.

Typical unit costs are shown below.

Table 7 Unit costs and cost functions, EUR per capita

Category	Rural village	Small town	Town	Large city
Population	1,000	10,000	100,000	1,000,000
Hand pump /protected well	45	45	45	45
New connection treatment	80	45	20	10
New connection distribution	100	100	100	120
Renovation - treatment	25	15	7	4
Renovation - distribution	30	30	30	40
Pit latrine (improved)	40	40	40	40
New connection - wastewater treatment (mechanical)	60	40	20	20
New connection - sewer	180	160	150	100

Sources: see section 2

The applied cost functions have been developed and tested against empirical cost data. However, they represent average conditions and thus, many local specific factors can cause deviations. Using the cost functions to a large number of towns of various sizes reduces the significance of local factors. The cost functions have been calibrated to the price and cost levels in the various parts of the EECCA region. The unit cost examples presented above are the costs after this correction.

1.6 Cost estimates for EECCA

1.6.1 Achieving the MDG

The overall cost estimate for achieving the MDG in the EECCA region is shown below. The total investment costs are estimated at around 14 billion EUR for the entire period. A very extensive sensitivity analysis has been carried out. All the main input data and assumptions have been evaluated. That has included the number of people to be connected to improved sources, the unit cost of connection, the share of renovation of existing systems and the unit costs of renovation.

The sensitivity analysis has been implemented under the assumption that all these factors vary independently. Thus, the total range is estimated at 7 to 21 billion EUR.

Below, the results are shown for each country using the best estimate (mean values) for all key input data. The table also display the per capita values allowing for comparison across the region.

Table 8 Estimation of the investment costs of achieving the MDG for water supply and sanitation, totals in million EUR, per capita in EUR

Country	Water Supply		Sanitation		Water supply and Sanitation	
	Total Expenditure	Per Capita	Total Expenditure	Per Capita	Total Expenditure	Per Capita
Russia	3,850	27	2,370	16	6,220	43
Belarus	430	43	190	19	620	62
Kazakhstan	540	37	170	12	710	49
Ukraine	2,180	45	780	16	2,960	61
Armenia	140	44	50	16	190	59
Azerbaijan	280	35	340	43	620	78
Georgia	190	42	50	11	240	53
Moldova	110	26	50	12	160	37
Kyrgyzstan	210	42	30	6	240	48
Tajikistan	270	41	60	9	330	51
Turkmenistan	270	51	70	13	340	64
Uzbekistan	1,150	46	500	20	1,650	66
TOTAL	9,620	34	4,660	17	14,280	51

Sources: see section 2

Table 9 Estimation of the investment costs of achieving the MDG for water supply and sanitation, costs divided on new connections and renovation of existing systems in million EUR

Country	Water Supply		Sanitation		Water supply and Sanitation	
	Renovation	Service Extension	Renovation	Service Extension	Renovation	Service Extension
Russia	3,850	0	2,370	0	6,220	0
Belarus	430	0	190	0	620	0
Kazakhstan	520	20	140	20	660	40
Ukraine	2,050	120	660	110	2,710	230
Armenia	140	0	50	10	190	10
Azerbaijan	260	30	140	200	400	230
Georgia	170	10	40	10	210	20
Moldova	100	10	40	10	140	20
Kyrgyzstan	170	40	20	20	190	60
Tajikistan	200	70	10	40	210	110
Turkmenistan	260	10	50	20	310	30
Uzbekistan	910	240	80	420	990	660
TOTAL	9,060	550	3,790	860	12,850	1,410

Sources: see section 2

The analysis has shown that the majority of the investments relates to improvement of water supply services. It can also be seen that renovation of the existing infrastructure accounts for the main part of the costs.

The analysis of how to finance the MDG requires a more total perspective on the water and sanitation sector. Using the FEASIBLE model, it has been possible to give an estimate of the total sector costs in the region.

1.6.2 Total expenditure in the water and sanitation sector

Table 10 Total average annual expenditure including O&M, Reinvestment, and the investment for MDG, in million EUR per year

Country	Water Supply		Sanitation		Water supply and Sanitation	
	Total Expenditure	Per Capita	Total Expenditure	Per Capita	Total Expenditure	Per Capita
Russia	2,650	18.3	1,230	8.5	3,880	26.8
Belarus	230	23.1	90	9.1	320	32.2
Kazakhstan	250	17.1	90	6.5	340	23.6
Ukraine	900	18.6	560	11.6	1,460	30.2
Armenia	50	16.8	30	7.9	80	24.8
Azerbaijan	110	13.4	90	10.7	190	24.1
Georgia	70	15.4	30	6.1	100	21.5
Moldova	50	10.6	20	5.6	70	16.2
Kyrgyzstan	80	16.5	10	2.8	100	19.3
Tajikistan	90	13.1	20	2.7	100	15.8
Turkmenistan	120	23.3	30	5.6	150	28.9
Uzbekistan	420	16.8	110	4.3	530	21.2
TOTAL	5,020	18.0	2,310	8.3	7,320	26.2

Sources: see section 2

1.7 Supply of finance

Data on the existing structure of financing the expenditure in the water and sanitation sector is not easily available. For example, a large share of the expenditure is covered by the user charges which are collected by the individual municipal utility responsible for the service. Therefore, the supply of finance is partly estimated for this analysis. Based on the extensive data from the environmental financing strategies supplemented with specific data collection a reasonable overview has been generated.

1.7.1 User charges

User charge information has been collected for a number of countries and estimated for other. The estimation has been based on the average per m³ rate for households and other consumers respectively and the average consumption by these groups.

As the estimation of the costs also includes the individual systems in the rural areas the financing of these has also been included. Individual systems are typically private and thus the costs entailed are private. We have assumed that the all the costs of having individual systems are covered and thus the private finance has been equalled to the estimated expenditure.

The table below shows the estimated user chares and private finance of individual systems.

	Households	Non-households	Total	Total
	Mill EUR	Mill EUR	Mill EUR	Per capita
Current level	2,203	1,594	3,797	14
Estimated with 4% affordability limit (year 2001 is shown)	2,481	1,594	4,075	15
Estimated with 4 affordability and 4 % income growth (year 2015)	5,309	1,594	6,903	25

Sources: see section 2

1.7.2 Public budget

Public subsidies have been estimated based on partly available official data on national budgets contribution, partly on the results from our environmental financing strategies where detailed data was collected on the local and regional level. Oblast and municipal budgets contribution is only estimated and is subject to some uncertainty.

1.7.3 International donors

International donor support has been estimated based mainly on OECD database of international assistance activities. The results are summarised below regarding the bilateral donor assistance. The average has been used to project the future level of assistance.

Table 11 *Bilateral assistance to water and sanitation in EECCA, million EUR*

	1997	1998	1999	2000	2001	1997-2001	Average
Armenia		1.80	0.65	2.64	11.94	17.04	4.3
Azerbaijan		1.80	0.02	15.59	0.34	17.75	4.4
Belarus		0.04	0.09			0.13	0.1
Georgia				0.60	5.59	6.19	3.1
Kazakhstan	0.07	0.17	1.76	6.54	22.30	30.83	6.2
Kyrgyz Republic		0.16	0.03	0.27	6.52	6.98	1.7
Moldova			0.16	0.39	0.67	1.22	0.4
Russia	2.34	2.43	22.20	7.21	28.56	62.74	12.5
Tajikistan		0.03			0.18	0.21	0.1
Turkmenistan		0.02			0.02	0.04	0.02
Ukraine	3.63	6.93	0.39	1.14	4.50	16.60	3.3
Uzbekistan	0.86	12.88	9.74	2.80	0.52	26.80	5.4
NIS Unallocated	0.22		0.34	0.19	5.05	5.80	
Total	7.12	26.28	35.38	37.39	86.18	192.35	41.5

Sources: see section 2

1.8 Financing gap in achieving MDG

1.8.1 Baseline scenario

Our approach allows for analysing the expenditures following from the existing water and sanitation systems in the EECCA region. Implementation of the measures necessary for achieving the MDG has several effects on the costs. Extension of coverage by the so-called improved sources implies investment costs as do the renovation of the existing systems. The renovations aiming at first of all a more regular supply mean network rehabilitation which significantly reduces the losses. Thus, there will be a cost saving effect in terms of lower O&M. New connections work in the opposite directions increasing the O&M costs. All these effects are included in the analysis and aggregated results are displayed below.

The table shows that currently there is a financing gap or deficit in terms of not sufficient re-investments. This is what causes the ongoing deterioration of the central water supply and sanitation systems. Already the environmental financing strategies made for several oblasts and countries in EECCA has demonstrated and quantified this effect.

Table 12 Expenditure, supply of finance and resulting gap for baseline scenario, million EUR per year

	Base year	2010	After 2015
WS			
O&M	2,850	2,450	2,219
Reinvestment	1,747	1,462	1,775
Renovation	0	647	0
Service Extension	0	39	0
Total Water Supply	4,597	4,599	3,994
WW			
O&M	654	605	578
Reinvestment	1,255	1,186	1,395
Renovation	0	271	0
Service Extension	0	61	0
Total Sanitation	1,910	2,123	1,974
WS+WW			
O&M	3,504	3,055	2,797
Reinvestment	3,002	2,648	3,170
Renovation	0	918	0
Service Extension	0	101	0
Total WS+WW	6,506	6,722	5,967
Supply of Finance			
HH charges	1,704	1,704	1,704
Non-HH Charges	1,594	1,594	1,594
Public Budget	865	865	865
Private financing	499	499	499
Bilateral assistance, Grants	42	42	42
Total Supply of Finance	4,704	4,703	4,703
Gap	1,803	2,019	1,492

Sources: see section 2

Note: WS - water supply, WW - sanitation

Adding the investments costs of achieving the MDG increases the financing gap, however, the reduced O&M can be seen. If the renovation in water supply networks would be implemented resulting in lower losses, the final effect would be a significant reduction in the production costs.

Also, the required renovation for achieving the MDG is not to be added fully to the otherwise necessary re-investment in keeping the existing systems at their current service levels. It means that if the MDG scenario is compared to a scenario with no major renovations and rehabilitation, high re-investments would be required in any case.

On average at least half of the estimated necessary re-investments are avoided due to the high level of renovations. The main implication of this is that achieving the MDG does not imply large extra costs to what has to be re-invested in maintaining the existing infrastructure. After implementation of the

MDG measures, the total annual expenditure need would most likely have decreased.

1.8.2 Alternative scenarios

Closing the financing gap regarding the investment required for achieving the MDG can be done in two ways. Reducing the expenditure need and increasing the supply of finance.

Reducing the costs can happen if new and cheaper solution to providing safe drinking water and adequate sanitations are found. As the main cost element is equipment, it is very important to look at the possible accompanying measures.

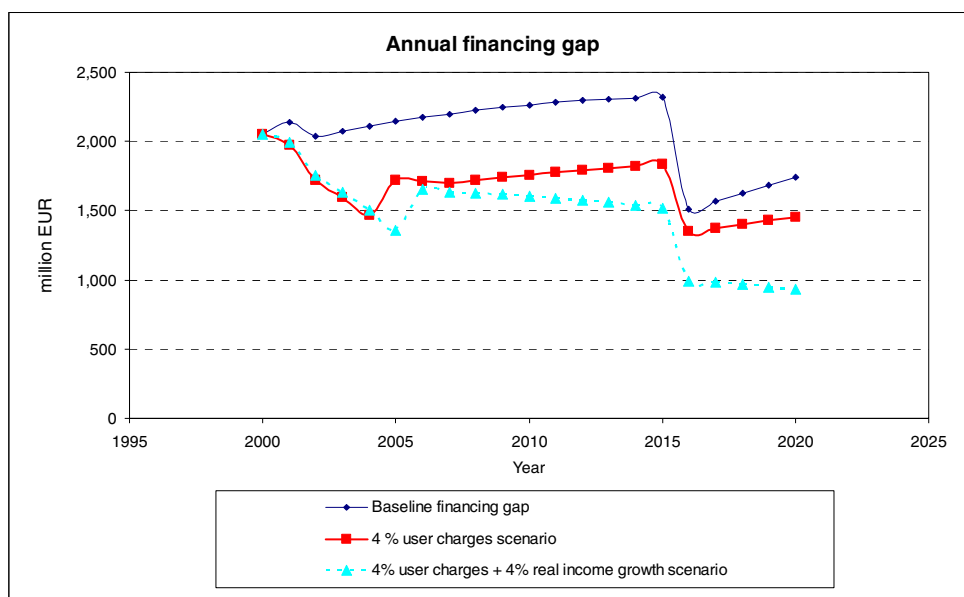
On the supply of finance, the main source is user charges accounting for approximately 80% of the total supply. We have made some additional scenarios analysing the potential for increasing the user charge contribution.

Ultimately, affordability of the users and in particular the households for paying more for improved water services depends on priority. Often a rule of thumb stating that households should not use more than 3-4 % of the income on water and sanitation services is applied.

We have estimated the effect of increasing the household user charge payment up to 4 % of average household income and combined this with either "no" or 4 % annual growth in real incomes. The results are displayed below.

The effect of a gradual increase in the level of household user charges to an average level of 4 % of household income give a significant contribution to closing the financing gap. It is, however, recognised that such an increase is difficult to implement due to the high level of poverty in many parts of the region.

Figure 2 Comparison of supply of finance scenario with respect to total financing gap



Sources: see section 2

If a real income growth would take place at a rate of 4% per year, this combined with the increased user charges would generate a significant amount of extra revenues over a 20 year period. In some countries this would be almost sufficient to close the gap while in most of the countries there would still be need for other sources to increase their contribution.

1.8.3 Supplementary policy measures

Most important for achieving the MDG is that a number of actions are taken. Defining an implementation strategy for MDG is one of the first and most important steps. This could, in many cases, be combined with the effort to implement integrated water resource management, IWRM. It is also important that is combined with the sector plans for water and sanitation services if such plans are developed.

We see the following key issues in developing the strategy:

- Definition of more precisely the national goals and targets, as the MDG declarations are not sufficiently specific
- Decision on the level of responsibilities, most important, should the municipalities define their own service levels, maybe subject to minimum standards.
- Implementation of incentive schemes, so that municipalities actually implement the MDG.
- Decision on national policy that needs to be in place for supporting the implementation of the MDG.

1.8.4 Donor focus

The donor support is essential for achieving the MDG. It is not so much an issue of providing a large share of the finance. The share of donor finance can not

be expected to increase sufficiently to cover the financing gap. What is important is the role of facilitating and accelerating the process of MDG implementation.

Donor support to demonstrations projects where alternatives measures both regarding the specific technical solutions as well as the organisation and institutional set-up could be very important.

2 Sources and References

This paper is a Summary Report. The main report provides full details of the study. It also includes references and descriptions of all utilised data and information sources. References and sources for tables and graphs in this Summary Report were deliberately omitted, as each table or graph is based on a large number of individual sources.