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A Review of World Bank Assessments of Water and Wastewater Programs in Central and Eastern Europe

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The paper reviews the policy and financial environment in which Central and East European water and wastewater utilities operate. Particular attention is paid to metering, tariffs, bill collection, and the energy component of utility costs.

This review draws from 16 studies conducted by The World Bank during the period 1994-2001 as shown in the following table.

Country and Municipality	Year of Study	Water Supply	Waste Water
Macedonia – Skopje & Nearby	2001	X	X
Ukraine – Lviv	2001	X	X
Kosovo – Gjakovz (Dakovica)-Rahovec (Orahovac) Area	2000	X	
Russia – Multiple	2000	X	X
Bosnia and Herzegovina – Mostar	2000	X	X
Albania – Multiple	2000	X	X
Hungary – Budapest and Dunaujvaros	1999	X	X
Croatia – Kastela and Trogir Bay Area	1998	X	X
Turkey – Cesme and Alacati	1998	X	X
Bosnia and Herzegovina – Multiple	1997	X	X
Romania – Bucharest	1996	X	
Poland – Bielsko-Biala	1996	X	X
Bosnia and Herzegovina – Multiple	1996	X	X
Turkey – Antalya	1995	X	X
Bulgaria – Multiple	1994	X	X
Albania – Durres	1994	X	X

A few caveats are in order relating to the completeness and currency of the information. First, the information drawn from the World Bank assessments does not reflect actual results from improvements implemented as the analyses were performed prior to implementation of the projects. This shortcoming is mitigated to some extent by inclusion of 'Lessons Learned' and 'Performance Measures' in the World Bank assessments. In conjunction, the underlying reports prepared by consultants were not available and these reports may contain additional useful detail. Also, a comparison of the policy, institutional and infrastructure conditions from the earlier to the more recent reports indicates that the conditions have not changed markedly except for the countries that are scheduled for membership in the European Union in the near future.

OVERVIEW

The underlying rationale for this paper was to examine the cost-effectiveness of improving energy efficiency through the upgrade of water supply and waste water systems and the interplay of the policy, tariff and collection mechanisms in supporting these upgrades. It was found that a comprehensive but measured approach is needed to upgrade the systems versus a piecemeal approach due to the physical condition of the systems. In some cases energy consumption

decreased while it increased in others, and in all cases sustainable social and sanitation issues were more important. The reader will gain an appreciation for the complexity of water and waste water system upgrades and the balance between the institutional, technical, cost, and social issues inherent in each project.

The outline used by the World Bank to assess projects is reasonably comprehensive and consistent, but the content varies due to differences in country conditions, project requirements, and preparation. In general though, more recent projects have emphasized a survey-based social assessment covering willingness-to-pay, and water and wastewater bills as a percent of income. Also, more recent projects have elaborated project performance indicators with quantitative measures and increased use of social surveys to measure and evaluate progress. Another difference in content is that reports for city specific projects tend to contain more detailed project information and evaluation/monitoring criteria, whereas reports for projects that include several municipalities provide general selection and evaluation/monitoring criteria to be used later as the projects for the individual municipalities are developed.

Most of the projects tended to emphasize nearer term priority investments to improve water supply conditions – both quality and quantity. The repair of waste-water systems was generally undertaken to bring system operations to a point where human health was not endangered, but significant improvements to waste-water treatment facilities were usually not undertaken due to the cost and associated ability of customers connected to the system to pay. Exceptions included the installation of wastewater treatment systems in Budapest, Hungary to meet EU acceptance criteria and in the Kastela and Trogir Bay Area of Croatia to reduce the health hazard to the local and tourist populations.

All projects focussed on the development of the institutional base of water and wastewater utilities to include legislative actions to decentralize and privatize utilities, and managerial actions to control costs, collect bills, improve service through maintenance and operations, and plan for future development.

Of interest to this paper is the energy component of water and wastewater utility costs and debt and the effectiveness of programs to promote demand-side water efficiency. Unfortunately, the more dated World Bank reports did not contain detailed information on this topic, which may be covered in the underlying consultant reports. However, the more recent World Bank reports did include some coverage of the energy component and this is included.

PHYSICAL CONDITIONS

There are two key aspects concerning the physical condition of the water and wastewater systems. First, systems were typically not designed initially to provide supply or waste treatment quality comparable to western systems (i.e. tap water is not treated to the same levels and sewerage collection is not as comprehensive). Even in cases where water supply and waste water systems were designed to Western levels and comparable regulations existed, the systems were generally not maintained and operated to meet design conditions and regulatory levels. The second aspect that the reports suggest is that, starting in the mid 1980's, maintenance was deferred due to unmet budgetary commitments by central authorities and unpaid bills by

customers. In the regions of former Yugoslavia, disrepair was exacerbated by physical destruction.

The magnitude of the deteriorated physical condition is most clearly seen in the leakage rate which is typically reported to exceed 50% in the majority of the studies versus less than 20% for Western European systems. It is thought that 70-90% of the losses are due to the condition of the water network and the remainder to building internal leaks, defective appliances and wastage by households. In conjunction, breaks in the piping system, while not uniformly provided, are estimated at 1.5-2 breaks/km/year based on a few systems versus an average of 0.2 breaks/km/year in Western European utilities. The high level of leakage often results in low or no pressure at higher floors in high-rise buildings, and occupants resort to carrying water for their domestic needs.

Sewage connections lag those of water – where water supply is connected to 60-90% of the population (the connection rate tends to increase with the municipality size), sewer connections are generally provided to 20-30% less of the households. The remainder relies on septic tanks, open pits, or direct dumping to the environment. In areas served by sewer systems, it is not uncommon for the sewer system to overflow onto the streets and into basements due to leakage and pump malfunction.

The World Bank's approach to physical system upgrades has been to invest in higher priority supply and sewerage system improvements in order to improve the level of service to customers and to reduce the threat to human health to an acceptable level. The extent of the upgrades to water supply and disposal systems is constrained by the impact of their costs on tariffs and customer bills in relation to income. The initial World Bank investment is viewed as the first of several phases needed to upgrade the water and wastewater infrastructure to Western standards.

ORGANIZATION AND TARIFFS

I most cases, several national level organizations were responsible for regulating and providing services to water and wastewater utilities, and in a few cases the utilities reported to national level organizations. In many cases, tariffs were set at the national level on a uniform basis, and thus did not recognize differences in cost-of-service at the local level, and imposed cross subsidies favoring residential consumers.

More recently, the organizational and reporting levels for water and wastewater utilities has been pushed down as the countries are in the process of transferring the assets of the utilities to the municipalities or private enterprises. In addition, authority for setting tariffs is also being decentralized to a lower level. The following table provides an overview of the organizations that regulate and operate the water and wastewater utilities, and the manner in which tariffs are set for the 11 countries covered by the World Bank assessments.

Country	Organizational Status and Tariff Setting
Albania	Drinking water supply is the responsibility of the Ministry of Public Works, Territory Adjustment and Tourism (MoPW), basically organized by district with each district usually having its own water supply enterprise. Technical assistance is provided to these enterprises by the MoPW through its Directorate General of Water, which also finances infrastructure investments. The management organization of sewerage systems is similar to that of water supply systems, although sewage departments are normally smaller and often linked with other municipal services. In a few cities the water supply and sewerage departments have been merged into one enterprise.[1, 2000] In 1998, the Government lifted the tariff cap, established a Water Regulatory Commission, and took first steps toward the corporatization of water and wastewater companies and the transfer of assets from the central Government to municipalities.[2, 2000]
Bosnia-Herzegovina	At the federal level the responsibility is with the Ministry of Agriculture, Water Resources and Forestry (MAWRF), which sets policies and standards and recommends legislation for all water management functions. Implementation of the policy and legislation is the responsibility of Vodoprivreda (VBH), headquartered in Sarajevo with three regional offices. Municipalities have primary responsibility for the provision of water supply, sanitation, and solid waste services in Bosnia Herezgovina through komunalcos (municipal service companies) that function like municipally owned joint stock companies. The municipalities served must approve tariffs, but finances are kept separate from municipal revenues. In the past, project proposals for investments generally were initiated by the komunalcos. If the projects were local and did not require federal funding, they were planned and implemented by the komunalcos. If they were regional, they were implemented by VBH.[1, 1996]
Bulgaria	At the federal level, the National Council on Water (an inter-ministerial body established in 1991) is responsible for water legislation, the Ministry of Health monitors and enforces drinking water quality standards, the Ministry of Environment (NOR) monitors ambient water quality, enforces standards, and finances construction of wastewater treatment plants, and the Ministry of Regional Development and Construction (MRD) plays a policy-making and operational role for the sector with key State-owned sector enterprises are under its (MRD's) authority. In the early 1990's, the Government began restructuring the major State enterprises under the Ministry of Regional Development (MRD) -- Vodokanal Engineering, Hydrostroy Construction and all State owned water companies were transformed into "Sole Proprietorship Limited Liability Companies" (i.e., Sole Proprietor Ltd. Company) and all operating subsidies were eliminated. MRD's water and sewerage companies were transformed to 29 regional water and sewerage companies (RWCO), each delivering water and sewerage services to 3-17 municipalities. There are also 14 municipal water and sewerage companies serving 15% of the population (1.3 million). Water and sewerage tariffs are set by the water companies in accordance with guidelines issued by the Council of Ministers. Compliance with the guidelines is monitored by the National Committee on Tariffs.[1, 1994]

Croatia	Information was not available in the Project Reports or the Country Assistance Study.
Hungary	Water supply ownership and management have been decentralized to the local governments, and most tariffs reflect the cost of service. There are five regional water companies in Hungary owned by the Government. Initially, these companies were established as suppliers of bulk water to supplement sources of local water companies owned by the municipalities. The local water companies have maximized the use of local resources and draw on the regional systems only to meet peak demands. Because the tariff systems of the regional companies do not include a demand charge, their revenues have dropped and they are no longer profitable.[1, 1999]
Kosovo	Information was not available in the Project Reports or the Country Assistance Study.
Macedonia	Macedonian water and wastewater utilities are typically organized as departments of the municipalities that they serve, although there has been an increasing trend towards establishing the utilities as independent municipal enterprises, as in Skopje. These utilities do not function as fully autonomous, commercially-oriented companies and in many cases, also have to provide services that are not directly related to the water sector, e.g services related to solid waste management and street cleaning. Tariffs are approved and set by the local governments at levels that are intended to cover operational expenses but are not adequate for a satisfactory maintenance and replacement program.[1, 2001]
Poland	The Local Self-Government Act of March 1990 transferred responsibility for water and wastewater services to municipal (gmina) governments. Many progressive local governments and enterprise managers have launched important initiatives to privatize the water and wastewater enterprises and adjust tariffs towards full cost recovery.[1, 1996]
Romania	Use of water resources at the national level is administered and regulated by the Ministry of Water, Forestry and Environment (MOWFEN) within which APELE ROMANE is responsible for water management questions. MOWFEN is also responsible for monitoring and enforcing water pollution and quality standards, while certain drinking water standards are enforced by the Ministry of Health (MOH). Operational quality standards and norms for water and sewerage utilities are set by the Ministry of Public Works and Regional Development (MOPWRD), while the financial aspects of local utility management are monitored by the Ministry of Finance. Provision of water supply, sewerage and wastewater treatment services is a responsibility of municipal governments. Water is provided by APELE ROMANE to municipal water companies for an abstraction fee.[1, 1996]
Russia	Information was not available in the Project Reports or the Country Assistance Study.

Turkey	At the national level, responsibility for water supply and sewerage in Turkey is shared by six institutions: the State Planning Organization (SPO), which reviews and approves investment plans; the State Hydraulic Agency (DSI), which administers national water resources, develops major water sources, and provides bulk water supply to cities with populations greater than 100,000; the Bank of the Provinces (Iller Bank), which administers central government fiscal transfers to local governments and designs, funds, and executes works for water supply, sewerage, and solid waste collection and disposal for small cities; the General Directorate of Rural Services (GDRS), which provides water supply and sanitation in rural areas; the Ministry of Health, which sets standards of quality for water sources and water supply to consumers and monitors compliance; and the Ministry of Environment. (MOE), which monitors and enforces environmental legislation through its branch offices at the provincial government level. In the sixteen largest cities designated as metropolitan municipalities, water supply and sewerage services are the responsibility of autonomous utilities owned by the metropolitan and district municipalities. In smaller municipalities, water supply and sewerage services are provided by municipal departments.[1, 1995] The 1981 enabling law of Istanbul Water Supply and Sewerage Authority (ISKI), gave the Municipal Council the right to set water tariffs and sewerage charges without prior approval by the Central Government, as had been required before.1[, 1998]
Ukraine	Municipal water and wastewater companies provide service under the direction of national organizations assigned to the municipal level. Tariff setting authority rests with the local government, except for residential tariffs, which are approved by the Oblast (Regional) governments.[1, 2001]

The information in this table was drawn from World Bank project assessments at [1]http://www4.worldbank.org/sprojects/Results.asp?phrase=&Reg=ECA&Sec=WX&Prod=&Lend=&sYr=&eYr=&Env=All&Stat=All&sortby=bdate&sortcat=Desc&display=10&st=DetSrc&IMAGE1.x=33&IMAGE1.y=8 and Country Assistance Study reports at [2]http://www.worldbank.org/html/pic/cas/caslist1.htm.

The social survey clearly indicates that a majority of customers do not perceive that the level of service is commensurate with the tariff and have expressed a willingness-to-pay for increased levels of service. The low levels of service may include one or more of the following problems:

- Delivery as low as 2 hours per day.
- Sediment in the water.
- Smelly and/or foul tasting water.
- Low or inadequate pressure.
- Inadequate treatment that must be resolved by boiling.

One of the studies reported that over 80% of the population sampled stored water at least once a day and that about 50% stored up to 25 liters per day. About 15% indicated that they poured out stored water into wastewater when they replenished their stocks.

The World Bank's strategy in this area has two basic components. The first is to separate the management and operation of the utility from the municipality and establish legally separate or municipally owned companies that operate autonomously and on a commercial basis and are regulated by the municipality. The second is that the combined water supply and waste-water tariffs be set to recover the full cost of service, including maintenance and operation, reduce cross subsidies, and provide that average bills do not exceed a maximum of 5% at the higher income levels and preferably less than 3% for the lowest Quartile.

REVENUES

Revenues depend on 1) the combination of consumption, tariff levels, and revenue collection rates, and 2) subsidies. These items are discussed below.

Metering is often not present or the meters do not operate, so consumption is based on a flat rate per person that may be 170 liters/day or higher. In more than one case, meters reportedly exist on most connections, but only 25% are operable. In the case of apartment buildings that have a single meter, the buildings' consumption is averaged across all of the units or the number of people in each unit. This lack of accountability reduces the incentive to use water conservatively.

In other cases, consumers receive less (as low as 55 liter/day) than minimum standards, which may be as low as 80 liters/day as compared to 120 liters/day in Western Europe. Coupled with the lack of accountability and below normal deliveries, are the quality and reliability components to service presented above.

Collections, related to accountability and level of service, have decreased from close to 100% to as low as 50%. There are cases where, for a majority of customers, consumption is monitored by working meters providing consumption of 140 liters/day, close to West European levels of 120 liter/day, yet collections are lower than outstanding amounts – as low as 60%! Often, the majority of overdue bills are due to a minority of institutional and industrial customers. Residential customers often do not pay their bills due to the poor service and their income levels. An important factor is that customers are unlikely to be disconnected, as there are restrictions or prohibitions for turning off the water services for nonpaying customers.

Even if collections were near 100%, revenues would often not be sufficient to cover operating cost, much less depreciation, as tariffs are often set below cost recovery levels. Tariff levels often have ceilings and cross subsidies exist that are not set to recover the full costs of operation. In cases where a uniform tariff is set, factors peculiar to a location are not recognized.

This is where subsidies, which come in two forms, were designed to play a contributing role. The first form is to designate social groups that have below average incomes, such as the elderly and handicapped. The second is direct payments from the central government, usually to cover major repairs, construction, and high operating costs. Nothing was said about the first type of subsidy in the reports surveyed, but direct payments from the central government to the utilities have all but ceased. The result is that total revenues are well below operating levels and even basic maintenance is deferred, which accelerates the decay of the water and sanitation systems

and is thereby increasing the need for new investment, which in turn is putting an additional financial burden on the Government.

The strategy of the World Bank is to install meters, improve service & collections, and increase tariffs to the extent possible. Limitations are the target for increasing tariffs and improving service sufficiently to induce customers to pay along with enforceable penalties for non-payment. The typical tariff structure contains three parts consisting of (1) a basic fixed element that does not change, (2) an adjustment provision to account for changes in the environment such as inflation, a rise in energy prices, or other unforeseen events, and (3) a surcharge to cover debt service, internal cash requirements for counterpart funds, and depreciation over the life of the investments.

The projects in Croatia, Hungary, and Poland have large wastewater components reflecting the fact that revenues largely cover operating expenses and that other segments of operation and cost control are at more acceptable levels.

COSTS

It is difficult to provide a precise breakdown of costs because of differences in accounting methods, inclusiveness of each of the cost categories, and absence of data in over half of the reports. Given that, operating costs were examined for wages, operation & maintenance, and energy based upon the available financial summaries and anecdotal information contained in the reports.

One report states that the share of cost allocated to labor for well-run utilities does not exceed 25%. Virtually all of the projects exceeded that share with labor accounting for 30-60% of operating costs. While labor reduction is a prime area to focus cost reduction efforts, political and social factors often prevent extensive downsizing.

Operation & maintenance and energy vie for second place in the operating cost category. In nearly half the cases for which information was available, energy comprised a greater share of costs than O&M, running from the high teens to as high as 60% of costs with O&M accounting for 10% or less of operating costs. The shares were reversed in the other half of the cases. The reason for this imbalance is the age of the pumping equipment (approaching 30 years old) and the high leakage rate, and in combination the shortage of funds to dedicated to maintenance. The estimates in the reports forecast that, with the investment program, O&M will rise to 25-35% and energy will fall to 4-8% of total costs and 15-20% of operating costs.

In addition to the sensitivity of reducing labor and creating unemployment, workers often lack incentives. Managers do not engage in planning to anticipate needed improvements, maintenance workers do not conduct repairs on a timely basis, and collections are not strictly enforced.

An interesting element of cost control is reducing leakage rates – typically by about 10-25%, leaving leakage rates in 25-35% range. Based on the underlying analyses, this is as far as they can go with system improvements and cost reduction measures without raising tariffs beyond the 5% threshold.

An element of the World Bank strategy is to allocate 20+% of the project funding and effort to strengthen the institutional aspects of the utilities that directly impact cost control -- activities typically included are:

- Develop the procedures and capacity to develop and manage the water and wastewater systems in an integrated manner.
- Establish institutional arrangements and procedures for identifying and proceeding with investments.
- Establish cost recovery (i.e. tariffs and collections) policies to cover cost of service.
- Improve service levels.
- Privatize engineering, construction, and other enterprises not directly related to the provision of water and wastewater services.

LESSONS LEARNED

Many lessons have been learned from this experience. Key issues pertain to project design and reforming national and local policies necessary to ensure successful implementation. Past experience has shown that it is very important to:

- Create client ownership and collaborate with stakeholders during all phases of project preparation and implementation.
- Integrate project activities within a broader context of sector reform, with a focus on regulatory and legal issues.
- Design simple and focused projects for implementation to fulfill institutional, financial and technical efficiency development objectives.
- Provide a quality control component for construction activities.
- Involve local entities in the selection of components using established criteria.
- Provide private sector operators with authority to exert decision-making authority in all aspects of company management.
- Recognize the difficulties involved in using local contractors unaccustomed to competitive bidding processes.
- Construct new infrastructure only when existing facilities are properly managed.
- Limit consideration of waste water treatment initially to primary treatment (secondary and tertiary treatment should be considered on a case-by-case basis only.
- Appoint a management consultant for the duration of the project to assist with the implementation of institutional and financial reforms, adopt modern forms of management and procurement, and assist with the technical design and construction supervision of project components.
- Structure projects to minimize disruptions that may result from delays in obtaining co-funding.
- Coordinate closely with donors to avoid duplication of efforts and allow for the establishment of common sector policy principles.

Regarding the third bullet, it is important that the project design be preceded with a technically and operationally sound assessment of needs with a well-defined priority strategy, objectives, and realistic efficiency improvement targets and financial projections. The project plan also needs a clear definition of project responsibilities and processes defining the responsibilities of

the agencies and organizations involved. Attention should be paid to provide institutional autonomy and freedom from political interference to allow selection and implementation of components quickly and transparently. It is important that a uniform system of financial accounts be used to provide transparency. Finally, implementation readiness, such as preparation of bid documents, is important of to avoid potential delays in project initiation and disbursements.

A number of additional lessons apply to emergency operations, such as areas that have suffered from conflict, as productive assets may be damaged and policy-makers, technical staff and others are occupied with several competing demands.

- In addition to keeping projects simple, project activities must focus on key areas of need, doing as much up-front preparatory work as possible, and leaving longer-term reform measures for normal sector operations.
- Structure project activities to cope with difficulties that arise in areas with landmines and unexploded ordinance.
- Design flexible and streamlined implementation and execution arrangements, while seeking to ensure that concerns about due diligence, transparency, and corruption prevention are addressed.

PERFORMANCE MEASURES

Risks and performance measures have been elaborated in the more recent studies, with the performance measures tailored to mitigate the risks and monitor project progress. The performance measures have been generalized and are separated by major category – Institutional, Project Management, Water Supply and Disposal, Water Quality, and Energy Consumption.

Institutional performance measures are designed to measure stakeholder commitment with the enactment of legislation, policy actions, and reforms needed to enable the project to succeed. These actions are needed to implement sectoral reforms to simplify and clarify institutional responsibilities and authorities, improve collections, raise tariffs to cost recovery levels, disconnect non-payers, enforce standards, and provision of co-funding on a timely basis. Improvements in collection rates ranged from a high of 100% within a given a time frame to as low as 75%. The World Bank and donors have a key role in ensuring that cooperation and co-financing is forthcoming on a timely basis

Project management is a broad category focussed on building the institutional infrastructure and human capacity in the utility, while at the same time implementing physical upgrades to improve service levels and working with customers to improve collections, all within a project schedule and budget. By itself, the institutional infrastructure and human capacity category is broad measuring progress in utility reorganization, development of annual business plans, computerizing accounts, and adapting a universally accepted financial system. A major aspect of this category is measurement of cost-recovery and improvement of financial health by increasing tariffs and collections, which are dependent upon improved service levels and customer relations. Improved customer relations may be measured by education and outreach activities, and the establishment of an ombudsman to pursue customer suggestions and complaints.

The project management category also has performance measures for external factors to measure the capacity of the local construction industry, and integrate the contributions and actions by the government and donors to enable the project to proceed.

Water supply and disposal are major components of improving service so that customers will respond with full payment of their bills. On the supply side, measures for repairing piping include kilometers of replaced pipe and number of pumps, installation of production and customer meters, improved pressure, hours of service, and leakage reduction. In one case, the measure was to decrease unaccounted for water from 60% to 35% by the end of the project. Finally, measures apply to the quality of the water supplied to rate the sensory (sight and smell) qualities and compliance with standards.

Performance measures for wastewater collection systems generally count the number of kilometers of replaced pipe and number of pumps installed. Measures for leakage may be visual and where possible, measures of harmful matter from sampling. In the case of treatment, the volume and content of output may be measured, as well as the changes in the dilution level of discharges into the environment.

Finally, the reduction in energy needed in total and per kWh per cubic meter are measured. While energy consumption is largely a by-product of pumping related to leakage reduction and pump replacement, a portion is due to the installation of meters, increase in tariffs, and information programs encouraging end-use management.

DEMAND MANAGEMENT ACTIONS

Demand management is mentioned in a number of the reports, and generally refers to the utility efforts to improve energy efficiency by reducing leakage, replacing pumps, and switching to metered consumption to. In this vein, the 2000 study on Durres, Albania provides an estimate of the reduction electricity consumption associated with major components and system improvements, but the table that displayed the data was unreadable. In terms of energy, other reports provide a wide range of results calculated for the portion of investments targeting water system upgrades (i.e. the waste-water and institution building portions of the investments are excluded):

- The study on Ukraine estimates a 26% reduction in energy use and a simple payback of 16 years. This project includes leakage reduction and pump replacement.
- One city in the Russian study estimates a simple payback of 8.5 years through reliance on pump replacement and the installation of meters.
- The study for Macedonia estimates that energy consumption will increase 31% and the study for Bosnia Herzegovina estimates a 7% increase. In these cases, improving deliveries to consumers clearly outweighs leakage reduction and pump replacement.
- In two cases energy consumption was expected to triple due to a combination of supply side measures and waste treatment facilities.

About half of the reports discuss demand-side management program but few specifics other then installation of meters in combination with higher tariffs so that billing can be based on actual consumption coupled with information programs. These measures were expected to lead to a

reduction in user side leaks and wasteful practices, but an estimate of the amount was not provided.

CONCLUSIONS AND IMPLICATIONS

The 16 World Bank assessments reviewed proved the viability of financing investments in water supply and wastewater systems with the primary benefits being improvement of water supply reliability and service, pollution reduction, institution strengthening, and meeting conditions for European Union membership. In general, infrastructure was severely depreciated due to age and lack of maintenance coupled with a lack of incentives that resulted in high costs, low cost-recovery, and low levels of service. Solutions involve consideration of policy, institutional, technical, economic and social factors to identify and undertake the first phase of system upgrades. Basically, the approach was to implement institutional reforms in tandem with priority technical upgrades addressed on a least cost basis so as not to increase customer bills to more than 5% of income.

Reducing energy consumption was not a primary goal in any of the studies and an examination of limited information indicates that the energy savings do not constitute a significant enough cost component to justify a system wide project by themselves. Individual measures, nevertheless, including pumps and/or billing for actual consumption, may be cost-effective on an energy basis. This type of investment ignores system measures and benefits needed to improve service, cost recovery and institutional factors

A detailed estimate of the cost and energy related benefit of individual measures was not presented in the World Bank reports, but should be provided in the underlying consultant reports. A post project evaluation of technical performance would be useful for guiding future measure specific energy efficiency investments, as well as to determine if improved service and associated reforms have reduced non-payments and the extent that policy and institutional reforms have taken place.

Information about tariffs indicates that, depending on the country, tariffs for water supply and water-water treatment are set at all levels of government, but tariffs set at the regional or municipal level generally follow national level guidance and are subject to national level approval. Tariffs generally do not reflect the full cost of service and cross subsidies exist that favor residential customers.

In the absence of meters or operable meters in many cases, billing is based on a flat rate of consumption per consumer. This, coupled with low tariffs and service levels (water quality and delivery), reduces the incentive for customers to adopt conserving practices. The low incentives and economic conditions result in non-payment, which approaches 50% in some cases and 20-30% is not abnormal, often due to a relatively small number of industrial customers that comprise a large share of the revenue.