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water utility management

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UTILITY PERFORMANCE

The effects of economic growth on water and wastewater utilities: the IBNET sector update



KOSOVO FOCUS



Kosovo water sector management reforms

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Developing efficient revenue collection in Kosovo's water utilities



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Planning long-term investment using pipe risk modelling

Asset management frameworks for smaller organisations - benefits and lessons learned

AWWA releases report on US water infrastructure

The state of water and wastewater infrastructure is the top current issue facing water professionals and those they serve, according to the American Water Works Association's (AWWA) 2014 State of the Water Industry Report, with long-term water supply second on the list.

The AWWA report captures the most pressing water issues as expressed by over 1700 North American water experts. It is available free from AWWA's website.

The need to address ageing drinking water and wastewater infrastructure has been a top concern since the first report in 2004. AWWA executive director David

LaFrance said: 'The millions of miles of water and wastewater pipes running below our streets are essential today and for future generations. They protect public health and the environment, provide fire protection, sustain our businesses and provide the everyday quality of life we enjoy.'

'The 2014 State of the Water Industry Report makes clear that to help citizens and businesses we need workable finance solutions to manage these mounting costs in the years ahead.'

With drought conditions persisting in California, Texas and elsewhere, the survey

respondents rated several issues related to water resources as highly important. Long-term water supply availability was the second most important issue, ground-water management and overuse was sixth, watershed protection was seventh and drought or periodic water shortages was eighth. 64% of respondents indicated long-term water supply was critically important and less than 1% rated it as unimportant. Respondents also expressed concern about the public's understanding of the value of water resources and water systems, which were the fourth and fifth issues respectively. ●

Debts cripple Zimbabwe National Water Authority

A few months after the Zimbabwean government cancelled debts owed the country's water, power and telecommunication utilities, the Zimbabwe National Water Authority (Zinwa) now says that it is bankrupt and cannot meet its financial obligations, including paying staff salaries.

The utility's spokesperson, Marjory Munyonga, said that the state-owned company is owed \$100 million by local authorities, which pay for raw water from dams for purification and distribution. She said government departments, mining companies and corporate entities also owe millions of dollars in unpaid water bills.

Munyonga said government departments owe Zinwa more than \$20 million, while

local authorities owed \$21 million.

Large farmers, who rely on irrigation for production, owe the company \$35 million in unpaid water bills, she said.

In August last year, Zinwa was coerced into writing off \$55 million owed by farmers and local authorities as a fulfilment of a pledge given by President Robert Mugabe ahead of being re-elected.

The country's major utilities were by end of last year owed in excess of \$2 billion, with Zinwa owed \$100 million, power utility Zesa \$80 million and telecommunications firm TelOne \$80 million. Among those owing Zesa is President Mugabe's family, who owe more than \$375,000 in unpaid power bills.

The writing off of debts caused

consternation at the state-owned utilities that are now unable to finance their operations or pay workers. 'The debt write-off had a severe knock on our cash flow, but we are working towards a turnaround in the short-term,' said Honest Murindagomo, Zinwa's finance director.

This comes months after the African Ministers Council on Water in a country status overview on Zimbabwe said President Mugabe's government has an investment gap of \$365 million/year to meet national water supply goals. The ministers' council further said Zimbabwe needs \$544 million to meet its water sector capital expenditure, which should include \$305 million from public investment. ● **Shem Oirere**

Asset management standards launched

A new set of global asset management standards, ISO 55000, have been launched to help organisations improve management of their assets and realise value from them.

The suite of standards provides cross-sector industries and organisations a model management systems framework for asset management. The standards were launched in New York on 13 May at an inaugural conference, which was due to feature many subject matter experts, including some of those who helped to author the standard.

The standards are based on and supersede BSI's PAS 55 standard, which was published

in 2004 and updated in 2008. An advisory committee for the global standard was launched in 2010, to share expertise and best practices learned under the PAS 55 system.

Thomas W Smith, program director, Department of Engineering at the University of Wisconsin, Madison, a conference presenter and one of the principal authors of the standard, said: 'The definition of asset management, as contained in the standard is succinct, but was very carefully considered by the committee, and deserves our continued attention. It is the coordinated activity of an organisation to realise value from its assets.' ●

Bill proposes major changes to water ownership in Chile

A group of government and independent senators in Chile have put forward a bill that proposes a reform to the constitution that would assert state ownership of water resources and create authorities to undertake potable water and sanitation service provision.

The reform would end individual rights to water resources and would give the state the 'absolute, exclusive, inalienable and unlimited right' to water resources. Under this legislation, the state would provide basic services to

guarantee access to water and sanitation.

The nature of the grouping that has proposed the bill is likely to mean it is approved, according to local press source BNAmericas. The proposal is also said to be in line with President Michelle Bachelet's government programme.

The legislation would also ensure integrated management of water basins and aquifers, and calls on the state to prioritise uses of water, a right currently reserved for private users. ●

Water infrastructure financing legislation released

A US House-Senate committee has released legislation to create a pilot Water Infrastructure Finance and Innovation Authority, which is intended to reduce the cost of renewing America's ageing water infrastructure.

The American Water Works Association (AWWA) and the Water Environment Federation (WEF) praised WIFIA as an important new finance tool to help communities address essential water and wastewater infrastructure projects at a lower cost, saving consumers money on their water bills.

David LaFrance, CEO of AWWA, said: 'The imminent creation of the Water Infrastructure Finance and Innovation Authority is a significant breakthrough in confronting the US water infrastructure challenge.'

'WIFIA will reduce the financing costs of critical infrastructure projects, allowing communities to fix and expand water systems at a lower cost to their customers. Our elected representatives and senators deserve our gratitude.'

The creation of a WIFIA is part of the larger Water Resources Reform and Development Act, which now advances for formal approval in the US House and Senate. It is expected both chambers will pass it quickly, and that it will be signed into law by the president.

WIFIA will provide low-interest federal loans to communities to reduce the cost of financing large water and wastewater infrastructure projects.

'We at WEF know that continued progress on clean water will require innovative technological practices and also innovative financing,' said WEF executive director Dr Eileen O'Neill. 'The WIFIA pilot programme included in this bill offers municipal water leaders an additional way to finance their infrastructure needs.' ●

AWWA calls for caution in Detroit rush for privatisation

The American Water Works Association's deputy executive director of government affairs has cautioned against Detroit's rush to privatise its water and wastewater systems, arguing that more time is needed.

Tom Curtis is quoted in local press as saying: 'Speed is your enemy here. The biggest single caution here would be to take the time to be deliberate and thorough to get it right.'

In March, the city asked private companies to provide preliminary proposals to manage the city's Water and Sewerage Department and binding bids will be submitted this month.

The decision to seek private input follows the breakdown of negotiations with suburban counties to create a regional water authority, according to local press. The city is hoping to be out of bankruptcy by October.

Thirty letters of interest have been received, the city has revealed, noting that this is a 'robust response'. A spokesperson for the emergency manager, Kevyn Orr, said that 'all those who are interested believe the proposed schedule and time line is completely workable'.

However industry watchdog Food and Water Watch has warned that a privatisation programme of this level of complexity should take at least a year to prepare.

Detroit is seeking a commitment from bidders to limit future rate increases to no more than 4% per year for the first ten years. The Department is also cutting its workforce from around 1600 to below 1000. Companies said to be interested in the deal include American Water and Severn Trent Services. ●

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Cover photo credits: A Danilenko and IRD/SIWS. See features p6 and p23.

Bangalore set to get new SCADA system for water and wastewater

The city of Bangalore is to get a new Supervisory Control and Data Acquisition (SCADA) system from Yokogawa India for its centralised SCADA monitoring system, which will supervise the city's water distribution network and wastewater facilities.

The purchase is the company's first order from a municipality in India. Yokogawa will deliver its FAST/TOOLS

SCADA software and the STARDOM control system, which will monitor all data from the Bangalore Water Supply and Sewerage Board.

Because of rapid growth in both its industries and population, Bangalore suffers frequent water cutoffs. With the data that it will collect from the SCADA system, it will optimise the supply of water

to the city and improve the operating efficiency of the facilities.

Ultimately, the centre will be integrated with the billing system. Yokogawa is undertaking the engineering installation and commissioning of the software and instruments. Funding is being provided by JICA, and the system will go live in May 2015. ●

Kampala wastewater treatment comes online

Uganda's president has inaugurated a new 5.4MLD wastewater treatment plant, which will serve parts of Kampala including Kawempe, Bwaise, Katanga, Makerere, Nsooba and surrounding areas. The Lubigi plant is part of phase one of the Lake Victoria Protection Project, which is intended to reduce pollution to lake Victoria and improve wastewater treatment. Three other plants will also be built under this scheme.

Regulators group together to form a UK Regulators Network

The Civil Aviation Authority, the Financial Conduct Authority, regulators Ofcom (communications), Ofgem (energy) and Ofwat (water and sewerage), the Office of Rail Regulation and the Northern Ireland Authority for Utility Regulation have announced that they have collaborated to form the UK Regulators Network (UKRN), which has been created to improve coordination across regulated sectors. Making the announce-

ment, Ofgem reported that UKRN is expected to enhance investment and efficiency for the benefit of consumers across regulated services. It added that Monitor (regulator of health services) and the Water Industry Commission for Scotland are participating in the UKRN as observers.

New task force established to consider future water supplies

Australia's federal government has established a task force to consider the country's future water supply needs. Announcements reveal the ministerial group will prioritise investigations into how investment in new water infrastructure can be fast-tracked.

World Bank approves water and sanitation credit

The World Bank has approved a \$205 million IDA credit to Ethiopia to increase access to clean drinking water and improve sanitation services for the poorest in the country. The funds will support the country's water supply, sanitation and hygiene

project, designed to contribute to meeting Ethiopia's One WaSH national programme (OWNP) and Growth and Transformation targets of 100% access to water and 84% improvement in household latrines by 2015.

Utilities agree to buy Prevas maintenance system

Norwegian municipal wastewater treatment and transportation company Nedre Romerike Avløpsselskap IKS and bulk potable water delivery company Nedre Romerike Vannverk IKS have signed an agreement with Prevas to implement its Infor EAM maintenance system. The companies were looking for a joint operations and maintenance system that could improve operational reliability and capacity, as well as better traceability for completed tasks in planned and urgent work. Infor EAM is based on web technology and uses graphic key performance indicators and personal inboxes to provide a quick overview of the tasks and their status.

World Bank report outlines Vietnam's finance challenges

A new report from the World Bank's Vietnam office advocates involving the private sector and market-based mechanisms to improve financing to develop its municipal infrastructure. The report highlights the key constraints, opportunities and options for improving government access to financing for municipal infrastructure development.

Laguna looks for sustainable wastewater model

Manila Water subsidiary Laguna AAA Water Corporation is undertaking a study to determine a suitable model for a sustainable wastewater system in its concession area. The utility is currently undertaking a feasibility study in the cities of Cabuyao, Santa Rosa and Biñan, which will be completed by the end of the year. The options include new sewers, a new drainage system and wastewater treatment plants. The company is also interested in expanding its services to other parts of Laguna.



EDITORIAL

Editor / Associate Publisher
Keith Hayward (khayward@iwap.co.uk)

Publishing Assistant
Catherine Fitzpatrick

Water Utility Management International focuses on the interests of utility executives, policy makers and advisors around the world engaged with the key management issues faced by water and wastewater utilities. As well as senior utility managers, WUMI will be of interest to regulators, consultants, contractors, academics, and financial, technical and legal professionals.

Utility reform and achieving efficiency are central themes of the publication, encompassing topics such as benchmarking, investment

planning, consolidation, public / private sector roles, leadership, IT, and human resources. Other regular themes include financing, regulation, charging policies, procurement, corporate governance and customer issues.

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PUBLISHING

Publisher
Michael Dunn

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IWA Publishing
Alliance House,
12, Caxton Street,
London SW1H 0QS, UK
T: +44 (0)20 7654 5500
F: +44 (0)20 7654 5555
E: publications@iwap.co.uk
W: www.iwapublishing.com

Design & print
Layout: IPL Print & Design Ltd
Printed by Hobbs the Printers, UK

Advertising
Paul Tilston
T: +44 (0)20 7368 7145
E: paul.tilston@caspiamedia.com

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Contact
Portland Customer Services
Commerce Way, Colchester
CO2 8HP, UK
Fax: +44 (0)1206 799331
Email: sales@portlandpress.com

Or visit:
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Lesotho launches \$1.3 billion water project

South Africa and Lesotho have launched phase two of the \$1.3 billion Lesotho Highlands Water Project.

The project involves the diversion of 15 cubic metres of water per a second from the Senqu River System in Lesotho to South Africa's economic hub and water-stressed region of Gauteng.

Trans-Caledon Tunnel Authority (TCTA), the South Africa state-owned agency implementing the project, says phase two entails the construction of what will be Polihali Dam, a transfer tunnel from the dam to the Katse Dam, a pump storage scheme to generate 1200MW, and associated transmission lines and appurtenant works. The existing Katse Reservoir will become the lower reservoir and a new upper reservoir will be developed in the

Kobong Valley. The 2.2 billion cubic metre capacity Polihali Dam is to be built in Lesotho's Mokhotlong district.

Water delivery under phase two is expected from June 2020 with TCTA saying the phase will be financed by funds borrowed from financial markets. TCTA says apart from being a lifeline for South Africa's economic nucleus, the Lesotho Highlands Water Project is a prime example of what can be achieved when neighbouring countries join forces and work towards a common goal.

South Africa's President Jacob Zuma said on Thursday: 'The project represents a win-win mechanism, as it provides needed water to South Africa and creates an opportunity for the required infrastructure development and energy

generation in Lesotho.'

'South Africa benefits from the project are immense as the country will gain high-quality water transfers and job opportunities,' said Zuma.

'There is improved infrastructure in Clarens, Fouriesburg, Ficksburg and Ladybrand in the form of new border crossings and improved amenities, community halls, clinics, houses and enhanced rail facilities such as in Ficksburg,' Zuma said.

Zuma said both South Africa and Lesotho have 'committed themselves to doing everything possible to ensure the full realisation of this important cross-border project that epitomises the everlasting and enduring friendship between the two countries.' ●

Report identifies massive South Asia infrastructure deficit

A new World Bank report warns that South Asia needs to spend up to \$2.5 trillion on infrastructure by 2020 to bring power grids, roads and water supplies up to the standard needed to serve its growing population.

The 'Reducing poverty by closing South Asia's infrastructure gap' report is the first analysis by the World Bank of the region's infrastructure.

The only indicator where the region is roughly on a par with the rest of the world and East Asia is improved water access, which stands at around 90% of the population in the region, the report notes. However, most of this is through public

stands; only 25% of the population has access to piped water, and a 24-hour water supply is a rare exception in South Asian cities.

To close the infrastructure gap South Asia needs to invest between 6.6 and 9.9% of 2010 GDP a year compared to the 6.9% invested in 2009, says the report. Governments in the region need to ensure that infrastructure access is extended to people who need it the most: women, the poor and marginalised social groups, the report adds.

According to the study, South Asian policy makers should invest in rehabilitating and maintaining infrastructure assets to

deliver services efficiently and sustainably, moving away from the 'build, neglect, and rebuild' mindset.

Another suggestion is to reform service providers and ensure financial and operational sustainability so that these bodies can plan and implement sound investment strategies and improve operational performance for the long-term.

Governments could establish solid and transparent legal, policy and regulatory frameworks to attract private investment in line with the best organisational form for each service and could also appropriately decentralise service provision, the report concludes. ●

CAF development bank approves Panama water and sanitation loan

Latin American development bank CAF has approved a \$100 million loan to Panama for its Program of Aqueducts and National Sewage Systems (PAYSAN). The executing agency will be the National Institute of Aqueducts and Sewers.

The project, which has a total estimated cost of \$126 million, aims to design, construct and rehabilitate drinking water and wastewater systems in six municipalities in the provinces of Chiriquí, Veraguas, Bocas del Toro and Panamá.

Among the principal works that CAF will finance is the

extension and improvement of the sanitary sewer system of Puerto Armuelles and the modernisation of the untreated water intake and the supply pipeline for Chorro Blanco.

In Veraguas, the system of collection and treatment of wastewater in Santiago will be developed; in Bocas del Toro, work will be undertaken on the sanitary sewer and treatment system of Almirante, and the water treatment plant on Isla Colón will be expanded. In the province of Panama, water collectors will be built in San Francisco, Coco del Mar and Vía Israel. ●

Rapporteurs demand warring parties respect human right to water

UN special rapporteur on the human right to safe drinking water and sanitation, Catarina de Albuquerque, and health special rapporteur Anand Grover have warned the warring parties in Syria that 'interference with water supplies even in the context of an ongoing conflict is entirely unacceptable'.

The statement references reports that the city of Aleppo had its water supplies completely cut off on 10 May, resulting in up to a million people being left without access to safe water and sanitation.

The cuts appear to be the result of deliberate interference with the water supply, the rapporteurs noted, with conflicting allegations blaming armed opposition groups and the Syrian government.

The rapporteurs said: 'All parties to the conflict must take immediate steps to ensure that the water supply in Aleppo is permanently restored, and prevent any further interference with access to potable water, and other vital supplies. Relevant UN bodies and concerned states with influence over those parties must make that clear to them.' ●

The effect of economic growth on water and wastewater utilities: the IBNET sector update

The International Benchmarking Network for Water and Sanitation Utilities (IBNET) has been involved in water sector monitoring since 1997, collecting performance results analysing performance assessment. This data can be used to monitor trends in service coverage and utility performance and assess how events such as the 2008 financial crisis have impacted these areas. **CAROLINE VAN DEN BERG**, **BERTA ADELAIDA MACHEVE DE SILVA** and **ALEXANDER DANILENKO** outline the latest results from the database and the trends that can be seen.

The International Benchmarking Network for Water and Sanitation Utilities (IBNET) has been involved in water sector monitoring since 1997; collecting performance results and setting a global standard for performance assessment.

As of mid-2013, the IBNET database contained information from 3400 utilities from 115 countries. In 2011, the IBNET database reported the performance results from 1861 water utilities serving nearly 489 million people with water and 309 million with wastewater in about 15,000 cities and towns. This is approximately 13 percent of the total population of all households with piped water access in the world or nearly 42 percent of the urban population of developing countries. The database represents the equivalent of more than \$39 billion in annual revenue in 2011. The utilities represented in the database employ 573,000 staff.

This sector assessment is based on intensive analysis and data collection for the period from up to 2011. The IBNET database has been growing steadily over the years in both size and depth. It usually

takes the IBNET team two to three years to collect the data for a given year because it relies on audited statements and because collection is performed at frequent intervals to save costs. Hence, the data from 2009 are the most complete in terms of all regions relatively well covered, with a total population of 695 million served with water and 336 million with sewerage services. However, the 2011 data also have sufficient depth to also be reported on, but although information is collected from countries in all regions, countries in Africa and South Asia, which also tend to be grouped mostly under low-income countries, are somewhat less well represented in the database for the year 2011 as data collection has not yet been completed. Therefore, when reporting by income classification, data from 2009 are mostly used for the analysis and reporting.

Water sector performance is significantly affected by the economic environment of the country, and even the city, in which a utility operates. The economic climate has changed significantly during the past decade: 33 of the 100 countries

in the IBNET database moved into a higher income category in this period, with the number of utilities in low-income countries therefore decreasing. In addition, the period after 2008 was characterized by some major economic developments when many countries and utilities were coping with the impacts of the financial crisis, the food crisis and the fuel crisis. Depending on how countries were affected by these crises, many utilities were affected by the fiscal consequences of the financial crisis and the effects of higher fuel prices.

As the first decade of the twenty first century showed unprecedented economic growth in many countries around the world, we would like to highlight the effects of this economic growth (whether or not tempered in recent years by the impacts of the triple crisis (fuel, food, and finance)) on the performance of the utilities. We will look how economic growth and the triple crisis have affected the financial and operational performance of utilities.

Access improvements

Water supply coverage

Achieving the Millennium Development Goals (MDGs) has been a major driver in the sector over the past decade. Between 2000 and 2011, median water supply coverage expanded from 82 percent to 89 percent, despite the rapidly growing urban population. Water coverage varies with the income level of the represented countries. As expected, utilities in low-income countries show lower water supply coverage rates than utilities in middle-income countries.

In 2009, the median water coverage for households in low-income countries was 63 percent, compared to 90 percent in middle-income countries, and virtually 100 percent in high-income countries. Although water coverage has increased in the past decade and water became accessible to more people, the financial crisis of

Wastewater treatment plant in Ivanovo, Russia. Many utilities were affected by the fiscal consequences of the financial crisis and the effects of higher fuel prices. Credit: A Danilenko.



2008 had a major impact on the sector, with some of the gains made in earlier years being lost. By 2008, water coverage had increased to 92 percent, but by 2011 the rate had slipped to 89 percent. Water coverage has declined in both low- and middle-income countries since 2008. The decline was much more noticeable in low-income countries.

Wastewater coverage

Median wastewater coverage increased from 61 percent in 2000 to 75 percent in 2011, while the number of utilities that provide wastewater services also significantly increased. Nevertheless, wastewater coverage continues to lag behind that of water. In addition, levels of wastewater coverage also vary with economic development: utilities in low-income countries show lower wastewater coverage rates than utilities in middle-income countries.

In 2011, average wastewater services coverage for households in low-income countries was 45 percent, compared to 75 percent in middle-income countries, and 93 percent in high-income countries. The majority of the increase in wastewater coverage occurred in middle-income countries. Yet, there was a 77 percent wastewater coverage rate in 2009 compared with 75 percent in 2011, suggesting that wastewater infrastructure investments are not keeping up with urban population growth in many places, especially in middle-income countries.

Operational performance

The economic environment plays a significant role in water utility performance because all revenues come from the local constituencies and almost all costs are local. The financial crises of 2008 significantly hampered the same trend with wastewater services. When looking at the effect of the triple crisis in recent years and the steady economic growth in most of the rest of the decade, one would assume that utilities have reacted by improving their performance in recent years to deal with the outfall of the financial crisis, by either passing on a growing part of their operation and maintenance (O&M) costs to the consumers and / or improving service efficiency. This can be measured by looking at a number of key financial and operational performance indicators.

The key operational indicators of interest are non-revenue water (NRW) loss, staff productivity and collection

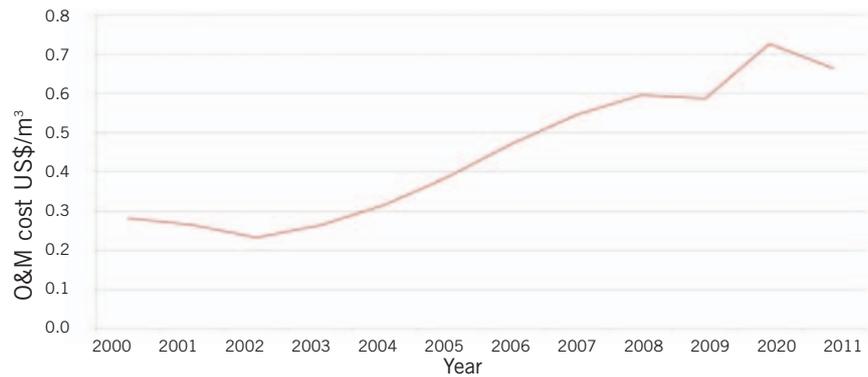


Figure 1: Operation and maintenance costs per cubic metre sold in US Dollars (median values).
Source: IBNET database. Note: The 2011 data collection cycle is not yet complete.

efficiency. Efficiency improvements in these indicators allow utilities to reduce some of the financial consequences of the triple crisis, but analysis of the IBNET performance data shows that the incentive structure of water utilities is blurred by the environment utilities operate in and the substantial proportion of fixed costs in total O&M costs. Water operation costs are generally fixed, but utilities may benefit from an increase in coverage, staff productivity and reduction of unaccounted-for losses. However, analysis suggests that these benefits are unlikely to be sustainable if the owner of these utilities does not provide motivation.

Non-revenue water

The median NRW (measured as the volume lost in cubic metres per km per day) has decreased from 26 cubic metres per km in 2000 to 14 in 2011, showing that improvements have been made over the past decade, but the majority of these improvements took place before the financial crisis.

The data suggest that there is no strong correlation between NRW levels and economic development. On average, utilities in middle-income countries do not show better management of NRW than utilities in low-income countries and often utilities in middle-income countries tend to face even higher NRW levels. The median NRW level in low-income countries was about 36 cubic metres per km per day, whereas it was about 17 cubic metres in middle-income countries. In high-income countries (a relatively small group of observations), about six cubic metres per km per day were lost in 2009. Although NRW appears to be lower in low-income countries, this mainly reflects the incidence of interrupted service being a more common phenomenon in low-income countries: the median hours of water supply are significantly lower in

low-income countries than in middle-income countries. In middle-income countries, the median utility offered almost 24 hours of water supply per day in 2009, compared to only 16 hours a day in low-income countries.

Staff productivity

Median staff productivity, measured as being the number of staff per 1000 people served, improved from 1.36 in 2000 to 1.00 in 2011. Yet, progress since 2008 has been very limited. The variance in staff productivity is partially linked to differences in connection practices. In many places in the world, water connections are often shared and hence serve multiple households. In Latin America, where most households have individual water connections, staff productivity is less than three staff per 1000 connections. In Eastern Europe and Central Asia, many apartment buildings are still fitted with a single connection; hence staff productivity per 1000 connections is likely to be very low, at about eight staff per 1000 connections in 2010. In Africa, staff productivity in 2010 was eight staff per 1000 connections, but this was partly because, as household surveys¹ increasingly show, many households are not connected to the piped network, but access the network by using (and often paying for) their neighbours' piped water.

Part of the improvement in staff productivity can be the result of outsourcing staff functions. In such a case, the increase in staff productivity does not necessarily translate to lower staff costs. Staff cost trends differ significantly between regions. In Latin America and East Asia, labour costs decreased between 2000 and 2010, whereas the opposite occurred in Africa and in Eastern Europe and Central Asia. Median labour costs as a percentage of total operating costs was about 36 percent in low-income countries in 2010, compared to about 40 percent in



New water pumps at Agua de Maputo, Mozambique. IBNET shows how economic growth and the triple crisis of finance, fuel and food have affected the financial and operational performance of utilities. Credit: A Danilenko.

middle-income countries. The fast increase in median staff employee costs is directly linked to economic development and to the fact that an increasing number of utilities participating in IBNET are located in middle-income countries.

Collection period

The median collection period decreased from 154 days in 2000 to 66 days in 2011. This is a rapid improvement and means that the median utility is achieving the benchmark of 90 days. This confirms that many utilities have become more proactive regarding the collection of their unpaid bills.

Financial performance

Operation and maintenance costs

The proportion of energy costs in the total O&M cost increased from 19 percent in 2000 to 23 percent in 2010³, crowding out other costs and directly reflecting the impact of the fuel crisis on the utilities' performance. As mentioned above, staff costs per employee have also increased during the past decade. As gross national income (GNI) tends to affect O&M costs, having more countries and



Berta Adelaida Macheve de Silva

utilities located in middle-income countries impacts on price levels: an increase in GNI tends to drive O&M costs upward. Also driving O&M costs is per capita water consumption (which tends to be higher in middle-income countries than in low-income countries). At the same time, wastewater coverage has increased over the past decade. The more wastewater collected and (especially) treated to increasingly high standards, the higher the O&M costs will be.

As such, it may not come as a surprise that median O&M costs per cubic metre of water sold have increased rapidly since 2000, from \$0.28 to \$0.70 per cubic metre in 2011. The large and increasing standard deviations suggest a wide divergence between utilities in the cost of water and wastewater services sold.

Operating revenues

Median revenues per cubic metre of water sold (as a proxy for tariffs) increased from \$0.34 in 2000 to \$0.72 in 2011. However, the indicator increased from \$0.34 in 2000 to \$0.81 in 2010, but then declined to \$0.72 in 2011. This shows that implementing water tariff increases in constrained economic environments remains difficult. The increase in average revenues has been especially pronounced in low-income countries, where median revenues per cubic metre of water sold increased from \$0.17 in 2000 to \$0.35 in 2010. In middle-income countries, median revenues per cubic metre of water sold increased from \$0.34 in 2000 to \$0.72 in 2011.

Whereas income growth positively impacts water consumption, water consumption shows diverse patterns between income groups and between regions, depending on economic growth trends and differences in real tariff developments. Water consumption saw a decline in low-income countries between 2000 and 2010. In middle-income countries, water consumption shows a much more complex picture. Overall, water consumption increased marginally, yet different regions show very different trends. In East Asia and



Caroline van den Berg



Alexander Danilenko

Latin America, water consumption increased during the same period, whereas in Eastern Europe and Central Asia water consumption declined.

Operating cost coverage

The median operating cost coverage ratio remained more or less constant between 2000 and 2010, moving between 1.10 in 2000 and 1.09 in 2011. The operating cost coverage ratio indicates that even at the best of times, the median utility barely covers its O&M costs and hence has no capacity to replace its assets once they wear out, let alone expand services to larger groups of consumers.

The proportion of utilities that could not cover their basic O&M costs increased from 34 percent in 2000 to 36 percent in 2010, with most of that increase occurring due to the fuel crisis. The effect is especially noticeable in low-income countries, where on average the percentage of utilities that cannot cover O&M costs increased most rapidly from 28 percent in 2000 to 51 percent in 2010 and 2011. Middle-income countries seem less affected, partially because many of these countries' economies continued to grow rapidly. Most utilities, however, have passed at least part of the growing O&M costs on to consumers. At the same time, governments still dominate utilities' financial performance.

Conclusions

In the past ten years municipal water performance has improved despite accelerated urbanization and impacts of the triple crisis (fuel, food, and financial). Overall, water coverage increased and water became accessible to more people. Economic environment plays a significant role in water utilities' performance given that all revenue comes from the local constituency and almost all costs are local in nature. At the same time, more and more utilities are actively handling

About the authors:

Caroline van den Berg is a Lead Water Economist at the World Bank, Washington DC, USA. Email: cvandenberg@worldbank.org.

Berta Adelaida Macheve de Silva is at the World Bank, Washington DC, USA. Email: bmacheve@worldbank.org.

Alexander Danilenko is a Senior Water and Sanitation Specialist at the World Bank, Washington DC, USA. Email: adanilenko@worldbank.org.

water billing, collection, and water management. Most utilities have been able to pass at least part of the growing O&M costs on to consumers. Other indicators also showed improvement, such as median staff productivity and median collection periods. At the same time, governments still dominate utilities' financial performance. Median revenues have just kept pace with O&M costs,

even though utilities became slightly more efficient as measured by improvements in staff productivity and NRW. ●

Notes

¹ It should be noted that wastewater coverage as measured here refers to connection to a sewerage system, not to the actual treatment or disposal of this wastewater.

² Data from Demographic Health Surveys and Multiple Indicator Cluster Surveys underlie most of the data

collected by the UNICEF-WHO Joint Monitoring Program, which measures progress toward the achievement of the MDGs for water supply and sanitation.

³ The 2007 data are still being collected and as a result the number of observations is relatively small. Only data with a sufficient number of observations will be reported upon.

This paper was presented at International Water Week Amsterdam, which took place 4-8 November 2013 in Amsterdam, The Netherlands.

INVESTMENT PLANNING

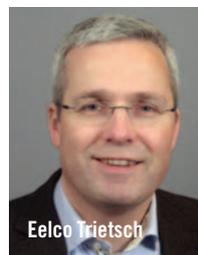
Planning long-term investment using pipe risk modelling

Dutch utility Vitens has studied the long-term investment needs of its distribution mains network using a risk model for each pipe. **REINDER VAN DEN BRINK-BIL, EELCO TRIETSCH, FRED VAN LAARHOVEN, TJIBBE BOUMA** and **LUC STAKENBORG** outline the study and how knowledge was obtained, particularly about the relationship between investment and Vitens' strategic key performance indicators.

Vitens aims to improve its asset management investment process to make optimised and balanced decisions for its (long-term) investment plans. An important guideline for Vitens was PAS 55, which has just been succeeded by ISO 55001, which provides guidelines for the optimised management of (physical) assets.

The principal benefits of optimised lifecycle asset management include long-term planning, performance sustainability and an optimised return on investments. Essential for the successful implementation of such an approach is adequate information and knowledge of asset condition, desired performance, applicable risks and costs, and the relationships between these. This study is an important step forward in fulfilling this precondition to facilitate balanced decisions for the investment plans.

Important questions in this study about the short- and long-term investment forecast include: what investments are needed in order to meet the company's key performance indicators (KPIs), and what are the weak spots in the network? In order to answer these questions, Vitens has studied the long-term investment needs for its distribution mains, taking into consideration the issue of a sustain-



Eelco Trietsch



Fred van Laarhoven



Tjibbe Bouma



Reinder van den Brink-Bil



Luc Stakenborg

able water infrastructure and future resource requirements.

In the past various projects with similar goals have been undertaken by others as part of European Union-funded research projects¹. These studies have focused mostly on developing models of failure modes and their associated probabilities. In the study reported here the consequences of failure for Vitens' service delivery are explicitly taken into account and are shown to lead to different priorities in investment decisions. The study was completed in March 2013. The model is run on IMQS software and the project is supported by Quasset BV – a Dutch asset management consultancy.

Determining and implementing the methodology

Balancing risk and resources

The investment planning method adopted by Vitens focuses on the systematic identification and management of risk.

Even with unlimited resources it would be impossible to eliminate all risk and the reality is that water utilities operate in a very constraint public environment. Therefore, it is crucial to optimise the risk reduction strategy and in the process estimate the optimum level of expenditure to ensure long-term sustainability of the utility service goals. Within a financially constrained budget, it is important that the elements of the

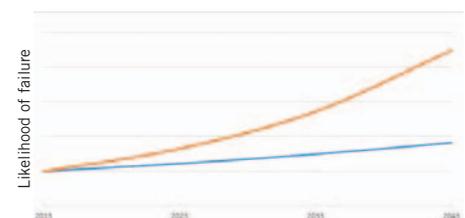


Figure 1: Different increase of likelihood of failure over time for identical pipes in different operating conditions. Key: blue = pipe in neutral environment; orange = pipe in harsh environment (settling, waterhammer...)



Vitens has studied the long-term investment needs of its mains network. Credit: Vitens.

infrastructure that pose the biggest risk with respect to a utility's strategic goals are prioritised.

Towards a practical implementation model

An important first step to achieve this balanced approach is the realisation that risk is the product of probability of failure and consequence of failure. Although this seems a straightforward and logical principle, it is surprisingly hard in practice to systematically act on it. For example, a decision to replace an expensive main transport pipe that has not yet failed instead of using the same budget to replace a number of smaller pipelines that have been leaking repeatedly and have caused major headaches for the operator can be tough to explain, but may be perfectly justified.

A second step is to identify parameters that contribute to the risk profile and can be influenced directly or indirectly by management decisions. A risk matrix that cannot be translated into ways (read: processes) to improve them, are ineffective from a management point of view. In other words: you always need a knob that can be turned in some way to influence the situation. It is quite common that sensible company values are defined, but the translation into procedures that would make them controllable is missing.

The third and crucial step in the model described here is that the identified actors on the risk profile are attributed to individual pipes. For the probability of failure this includes parameters like age, material, water hammer, groundwater level, settlement, acidity and diameter. Likewise, the consequence of failure is determined by, e.g., the number of directly affected customers, vulnerable customers and pipe

locations, for instance in a rural or urban area. The relative weighting of each of these factors is based on existing knowledge of pipe degradation and expert judgment. The number and type of parameters taken into account is also dependent on the utility's strategic goals and the availability of data. The combined probability and consequence of failure gives the relative risk for each pipe. Using these factors each pipe receives a risk ranking.

Investment planning based on risk ranking

Once this risk ranking is completed it becomes possible to determine replacement scenarios based on available investment budget (Capex). The pipes with the highest risk ranking are those with the highest priority to be replaced. The total number of pipes that can be replaced obviously depends on the available budget and the cost of replacement of the highly ranked pipes. The model allows for automated calculation and virtual replacement of pipes in the grid, thus creating a new realisation of the distribution grid. By repeating the calculation for each year the future development and performance of the grid can be simulated against identified KPIs. For the study described here a timeframe of 100 years was used to study the development of grid performance. KPIs considered as being crucial for grid performance were customer minutes lost (CML, defined as the sum of the number of minutes affected customers have no water delivery service per year), the number of pipe failures and operational expenditure (Opex) for each year. This gives insight into the relationship between the Capex and Vitens' KPIs, and allows for the calculation of different scenarios.

Key advantages of the adopted model

A unique and central feature of the model is that it allows both detailed analysis of (even very small) parts of the distribution grids for almost day-to-day operations and decisions, but at the same time the results can be aggregated to determine the macro performance of the complete grid. The same is true for the investment horizon, which can be scaled from very short timescales to very long periods to bring long-term trends into view.

A key realisation for the approach is that identical pipes may have very different lifetimes depending on their location and operating conditions. This is illustrated in Figure 1 by considering two identical pipes. One pipe is located in a benign soil environment without any subsidence and is operated under very stable conditions. The other pipe is exposed to harsh operating conditions and was laid in a strained environment. Over time the probability of failure for the two otherwise identical pipes will develop quite differently and the strained pipe will become a priority for replacement much quicker.

One of the major advantages of the adopted approach is that the results can easily be viewed and analysed in a themed GIS map using different legends. This provides immediate and intuitive insight in the geographical areas of concern, much more than a list of assets would do. It also provides an important decision support tool to prioritise actions and communicate with other stakeholders (e.g., other utilities) sharing the same geographical space.

This is illustrated in Figures 2–4. Figure 2 illustrates the likelihood of failure ranking for a limited geographical area. This themed map indicates where problems are most likely to occur. Figure 3 displays the same area, but now the theme indicates the pipes based on the consequence of such failures. It is clear that a burst water main would have much more severe consequences than a small





Figure 2: Relative priority of pipes based on likelihood of failure

artery in a peripheral area, so the main pipe feeding that area has the highest consequence factor. Finally in Figure 4 the same area is displayed, but now themed as the overall risk, taking into account both probability and consequence. This map indicates the main pipes of concern and provide a birds' eye view of the priorities for maintenance and replacement from a risk perspective.

The same information can be aggregated to compare performance of certain areas to others as illustrated in Figure 5. Such aggregated information can be used to support a variety of processes, ranging from Capex and Opex budget allocation to certain regions, to determining capacity requirements for repair crews, optimising repair crew response times, and long-term maintenance personnel requirement planning.

Obviously, the model is very data-intensive because it builds up aggregated information from information attributed to individual pipes. Hence, the reliability of the model critically depends on the availability and quality of the relevant data sources. This creates an incentive to improve the data collection and management, which in turn can be used to drive improvement of other business processes.

Results

The result of this study provides Vitens with new and valuable insight into the asset management process. First of all, it gives insight in the relation between the Investments (Capex) and the Vitens KPIs. And as a consequence, it rationalises and objectifies the discussion about investment needs. Furthermore, it provides a priority ranking of pipes considered for replacement in the coming years, creating opportunities to optimise investments in relation to municipal and utilities investment plans. Finally, it reinforces the data improvement process at Vitens, increasing the maturity of the asset management process.



Figure 3: Relative priority of pipes based on consequence of failure

New insight in the long-term investment policy and its effects on KPIs

The long-term effects of the current level of investment were not explicit before this study. One of the important questions to be answered by this study was to understand the long-term trend of the Vitens KPIs, given the current level of investment. And then, inevitably, the next question is: what investment budget is needed to sustain the desired performance of the company's KPIs?

The result of the 100-year forecast provides Vitens for the first time with quantitative insight. One of the model scenarios was to stick to the current investment level and to analyse the effects on CML and Opex in the long-term. Another scenario was to determine the required investment budget, in order to maintain the current KPIs at the same level. These scenarios give insight in the lower and upper boundaries of the future investment budget of Vitens. The final decision for the actual investment level rests with the non-executive board, which needs this information to make informed decisions based on the relation between budget and KPIs (for an example of this relation see Figure 6). Understanding this relation is crucial for the asset management process, as AM is defined as optimising the asset performance to meet the company's strategic goals in the most effective and optimal way. The effectiveness and optimisation can only be realised by having insight into the effects of investment and maintenance decisions. Therefore, this study takes Vitens a step forward in professional asset management.

Improved understanding of the link between Capex and Opex

One of the KPIs considered in this study is the Opex. The Opex is defined as all the operational costs that can be linked directly to the pipeline repairs (including all associated costs such as the laboratory, facility costs and call centre). Meeting

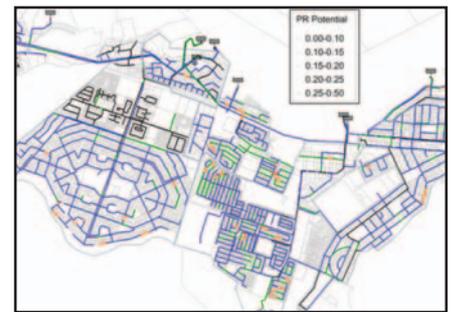


Figure 4: Relative priority of pipes based on likelihood and consequence of failure

the company's goals in the most effective way means that the relation between Capex and Opex needs to be modelled and understood. It requires management of the total lifecycle costs of the assets, whereby the sum of Capex and Opex has to be minimised over the total lifespan. This insight is provided by incorporating the predicted number of failures (and the associated Opex) into the model. The long-term forecast of the Capex in combination with the Opex provides a basis for a profound and rational discussion about the relation between both. It is foreseen that this will give guidance to the allocation of the department budgets in the future.

A new tool to rationalise and objectify the discussion about investment needs

It often happens that the functional responsibility and position of someone within an organisation marks their opinion about a certain issue. This can lead to (sometimes heated) discussions due to the absence of objective criteria. Obviously, all perspectives have to be taken into account, as a maintenance engineer has different information and responsibilities to, e.g., a data analyst. In the same way, the environmental manager has a different perspective compared to the head of the water quality monitoring laboratory. Nevertheless, the final decision has to be based as far as possible on objective criteria. In the end, the company's strategic goals are leading, therefore insight in the relation between expenditures and KPIs is crucial for an objective discussion. The two preconditions for such objective discussions are first that the company's strategic goals are embraced and secondly that input, validity and objectiveness of the outcomes of the model studies is recognised. The insight provided by this study is a first step towards rationalising and objectifying the discussion about investment needs. Furthermore, it emphasises the importance of a transparent model, in

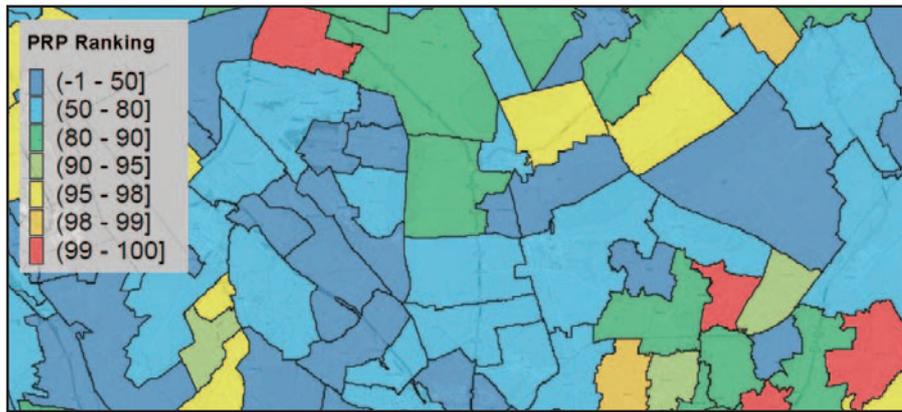


Figure 5: Performance comparison between different areas based on aggregated information

which the assumptions can be openly discussed and adjusted if needed.

The model facilitates better choices for Capex budget allocation to individual pipes

Until recently the replacement of pipes was primarily determined by information provided by maintenance. In practice this meant that pipes exhibiting multiple failures were prioritised for replacement.

The model provides insight into prioritised individual pipes for each year, taking both probability of failure and its consequences into consideration. It is also possible to aggregate the results for a certain area (e.g., district metered areas). Information can be derived for the predicted failure rate, the consequence factors and the overall pipe replacement potential (PRP, which is the product of failure and consequence). This provides Vitens with an overview of the low and high priority areas, as well as the priority of the individual pipes within a certain area. This information can help to support the decision process of detailed investment planning for the next budget year. The PRP list can serve as input for the replacement project discussions.

Clearly, for final decisions more information is needed, such as local information about complaints, agreements with the municipality or residents, specific information about the pipe condition or environmental factors. Nevertheless, the PRP information is crucial in the decision process for the pipe replacement list for the next budget year, as it gives a priority ranking for all pipes, by taking into account the pipe condition, environmental factors and the consequence of failure.

Improved decision process for combined reconstruction works with other stakeholders

Insight into the aggregated results of the PRP provides a solid basis for a discussion with municipalities and utilities about their respective reconstruction and

investment plans. This study revealed that the effectiveness of the replacement programmes as part of municipal reconstruction works is relatively low, which means that most of the replaced pipes (forced by municipalities) have an expected remaining life which is on average high. The replacement of relatively good quality pipes negatively affects the effectiveness of the investment budget, i.e. it would often have been better to spend the money elsewhere. A more proactive attitude will bring a better alignment with the interests of Vitens. This is possible by having objective information about the low and high priority areas for the short- (1–5 years) and mid-term (5–20 years). Sharing this information at an early stage of the process with other stakeholders will help to align the interests of Vitens with the interest of the municipalities. The same is valid for the investment plans of other utilities. The more insight that is available in priority areas the better the opportunities are to discuss upfront the wisdom of proposed investment plans and the possibilities to combine these.

Knowledge of the priority areas makes a win-win situation possible, resulting in a more effective investment plan.

New insight into the relation between failures and CML

A concrete example of new insight provided by the model is that an increase in failures does not necessarily mean an increase of the associated CML. Although it is very clear that the CML is defined by the number of affected customers and the interruption duration, the general assumption within Vitens was that an increase of failures will lead to an increase of the CML. However, a careful selection of pipes to be replaced can result in an increase of failures without an increase of the CML. This can be understood by considering the consequence of failure in the model. Failure of a pipe with a higher

number of affected customers is deemed of higher consequence and the model allows a user to attribute the number of affected customers in case of failure to each pipe. Those pipes with a relatively high number of affected customers will get a higher replacement priority, resulting in a strengthening of the main distribution infrastructure and thus a relatively low CML due to failures.

Another concrete example of insight obtained is the realisation that an increase of the investment budget may initially result in a higher CML and thus may have a negative impact on overall service performance of the utility. The act of preventative replacement of pipes causes disruptions in service delivery to customers and this needs to be balanced against the expected improved performance (i.e., the prevented failures) of the newly installed pipes. This requires more detailed analysis of the reasons for prioritisation of pipes for replacement, otherwise the objective of reducing total CML at minimum cost may not be achieved. These insights are very useful to objectify the lively discussion about investments and KPIs throughout the organisation.

Lesson learned: strategic investment horizon must be comparable to lifetime of pipes

Initially the plan was to perform the model study with a 35-year horizon, which was initially deemed to provide sufficient insight for long-term planning. However, after the initial results were studied it was decided to expand the horizon to 100 years. The reason for this was that from the initial results it was apparent that some long-term trends will only manifest themselves over very long timescales, but are almost impossible to manage once the situation occurs. As an example, consider the scenario that almost no Capex is spent to replace aged pipes. This is a common scenario in developing countries for example, but underinvestment is also a problem in many developed countries. Initially this can be managed by spending more Opex (for repairs) and as we have argued before, the CML performance can be kept at very acceptable levels for a very long time by careful prioritisation. However, in the long run even this optimised strategy will run out of steam as Opex will eventually rise to unsustainable levels. Such a situation must be prevented as it would require extreme Capex levels to rectify and in addition would mean a prolonged period of very

low services levels (i.e. very high CML) due to this planned replacement of pipes on top of the already deteriorated performance (high unplanned CML due to failures) of the distribution grid.

These long-term effects that manifest themselves on timescales of the effective lifetime of pipes (~100 years) must be taken into account to keep the grid performance sustainable in the long run. Too short investment horizons carry the risk of burdening future generations with unmanageable investment levels and very poor distribution grid performance, whereas timely and relatively modest adjustments to Capex levels may prevent this in a painless manner.

Reinforcement of the data improvement processes

The investment forecast study described in this paper also revealed the degree of availability and quality of the required input data. This proved to be a complicated and time consuming part of the project. Part of the data required considerable adaptation in order to make it fit for use. Also part of the data was hard to collect, of unknown quality and some required data was not available at all. It drew attention to the fact that the data quality and availability needed further improvement and it has reinforced the data improvement processes. This study makes the gaps in data processes visible and concrete, which forces the company out of abstraction into tangible results. The awareness of the relevance of data quality and availability has been further increased, which leads to accelerated progress of the improvement processes. This in turn will further increase the maturity of the asset management process.

Discussion and conclusion

The work described in this paper provided very valuable results. Primarily with respect to its core goals, but in addition substantial benefit was derived from the process itself which forced the organisation to revisit the effectiveness of decision making processes as well as data collection and management.

The most important results of the study are that for the first time Vitens has obtained insight into the relation between its investment strategy and the long-term KPIs. In addition, Vitens has increased its knowledge of the strong and weak spots of its distribution network with a depth of understanding that was

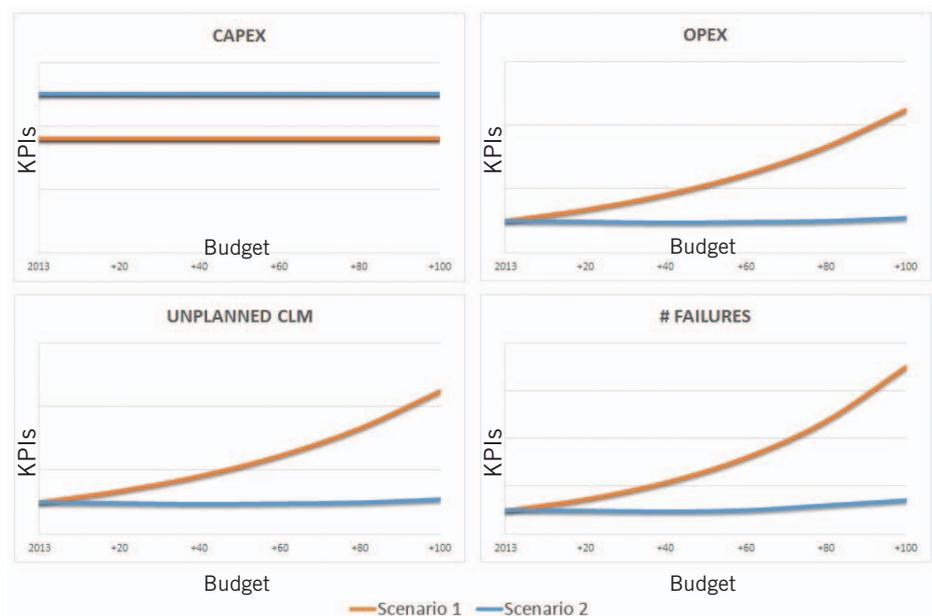


Figure 6: Example of relationship between investment and KPIs. Scenario 1 – maintaining current investment level; Scenario 2 – investment required to maintain current KPIs at the same level.

not possible before. The explicit modelling of both probability and consequence of failure allows for much more balanced decision making, which puts long-term sustainability of high quality service delivery to Vitens' clients centre stage rather than minimising pipe failures. The project has reinforced the identification of critical steps in the data improvement processes, which will lead to further professionalisation of asset management practices within Vitens.

The core scope was executed in only three months, which made it necessary to make some compromises with respect to model sophistication. However, even with that limitation the model goes way beyond anything Vitens has had available in the past and it has already proven invaluable both in terms of objectifying discussions, translating strategic goals into concrete management decisions and actions, and providing a means to clearly communicate the rationale behind the decisions taken to the stakeholders.

Even more importantly, the model provides an effective steering model which can easily accommodate further improvements. If more reliable data becomes available, insights into parameters that should be taken into account improves or strategic goals and / or KPIs of the organisation change, they can be incorporated and their consequences can be established in an objective and impartial manner. It can therefore be used as an engine for continuous process improvement within Vitens.

As a logical consequence of these insights, Vitens has decided to implement the steering model in its core asset management business process now, as a first step as part of the investment planning decisions process. ●

Note

¹ *P-Aware* by LNEC (Portugal), www.aware-p.org/np4/home; *Care-W* by Sintef (Norway) Computer Aided Rehabilitation for Water Networks www.iwapublishing.com/pdf/contents/isbn1843390914_contents.pdf

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About the authors:

Reinder van den Brink-Bil is a Policy Adviser in the Asset Management Department at Vitens NV, Swolle, The Netherlands.

Eelco Trietsch is in the Asset Management Department at Vitens NV, Swolle, The Netherlands.

Fred van Laarhoven is a Policy Adviser in the Asset Management Department at Vitens NV, Swolle, The Netherlands. Email: fred.vanlaarhoven@vitens.nl.

Tjibbe Bouma is CEO at Quasset BV, Hilversum, The Netherlands. Email: tjibbe.bouma@quasset.com.

Luc Stakenborg is CTO at Quasset BV, Hilversum, The Netherlands. Email: tjibbe.bouma@quasset.com.

Asset management frameworks for smaller organisations – benefits and lessons learned

Since the launch of PAS 55 in 2004 its implementation has largely been by major infrastructure companies across the water, power and transport sectors. With the recent launch of International Standard – ISO 55001, **TIM KAY, CRAIG ROBERTS** and **OLIVER PARSONS-BAKER** explain that the benefits of implementing these standards are equally applicable to smaller AM companies.

While many organisations have pursued alignment or certification to the PAS 55 standard (now replaced by ISO 55001) since its inception, certification has generally been sought by large-scale utility sector organisations. This, amongst other factors, has fed the perception amongst the international asset management community that PAS 55 is only the preserve of large-scale organisations with significant asset bases.

This paper argues that smaller asset- or service-centric organisations such as airports, ports, municipalities and local authorities are potentially missing out on considerable benefits of implementing formalised asset management frameworks by overlooking PAS 55 or the new ISO 55001.

For smaller asset-intensive organisations, which do not necessarily have recourse to significant resources with the constraints of small teams and relatively low budgets, there are significant opportunities that can be realised through the implementation of a robust asset management framework. Smaller companies by their very nature have shorter chains of command, better intra-company communication and a more visible willingness and cohesiveness to work as a team, which can result in greater efficiency and business benefits. Furthermore, the impacts of those efficiencies are more keenly felt. A smaller asset base means that there are fewer options for workarounds and any major overhauls or asset replacements can constitute a significant portion of an investment programme. In these circumstances it is imperative that any expenditure is rigorously justified, optimised and planned.

The concept of asset management belonging to large utilities with an enormous, diverse asset base is losing way to a recognition that the benefits

apply to others too, and the size of these organisations is more likely to be a beneficial factor rather than a hindrance.

The first example is Southampton International Airport Ltd (SIAL) – a regional airport in southern England. However, with over 80% of the staff at the airport employed by more than 30 external companies, the need for integrated stakeholder management became clear. Factor in links to the mainline rail network and a cruise liner terminal with two million passengers annually, and it started to get more complicated. The authors helped SIAL by identifying areas of good practice to build upon and disseminate, while updating their areas of weakness. Alignment with global best practice is part of SIAL's vision to become Europe's leading regional airport by 2015.

The second example is the Izmit Domestic and Industrial Supply Project, which consists of a dam, water treatment plant, 150km of transmission mains and six pumping stations, and supplies the Izmit region to the east of Istanbul in Turkey. The treatment plant and other facilities are managed by Akifer Su under contract to Izmit Su as part of Turkey's only build-operate-transfer (BOT) scheme. Black & Veatch has supported Akifer Su, the operator of the Izmit Domestic and Industrial Supply Project, by undertaking regular assessments of their operations against good utility practice and providing recommendations for improvement.

The journey to asset management best practice for Southampton Airport

SIAL's asset base reflects a long history since the first flight in 1910 when the aerodrome was part of North Stoneham Farm Meadows, through the First and Second World Wars and including the historic 1936 inaugural flight of the Supermarine Spitfire designed by local aviator RJ Mitchell.



Tim Kay



Craig Roberts



Oliver Parsons-Baker

The diverse and rich nature of records regarding the asset base had to be collated and made accessible, including those retained within the collective memories of the long-standing workforce. Along with this, one of the biggest issues identified as part of the early gap analysis was that key policies and strategies were not consistently followed and communicated. To make best use of this legacy information and facilitate implementation of the PAS 55 improvement programme it needed to integrate with current workflows. This was dealt with using a unified SharePoint-based facility accessible through a secure gateway. After updating the documents in line with PAS 55 and taking lessons-learned from other industries, the SharePoint site was used as the primary platform to share information around the business.

Recognising this and the wider need to enhance asset ownership, SIAL appointed Asset Stewards for areas and activities commonly seen as separate from the airport's physical assets, which encouraged all employees to understand the true scope of the asset base and how their daily working practices impacted upon other teams and the commercial success of the airport. Whilst these roles had been identified as part of an earlier improvement initiative, PAS 55 helped to define the role and gave the mandate to the stewards to drive wider improvements.

Asset Stewards also enable peer-to-peer coaching and training, and enable asset management change to be framed in a language appropriate to particular roles and individuals, which is much more effective than a traditional academic approach. This model works particularly well for smaller organisations, in which the 'core team' of champions is relatively small. This makes knowledge sharing between the core team much easier, aided by pre-existing team dynamics, which are an important part of smaller organisations

with longer-serving employees.

SIAL's own workforce is supported by a wider team of some 1200 people employed by over 30 companies, all of whom are integral to supporting the airport's 'Breeze Through' mission that aims to allow passengers to access and transit the airport effortlessly. The Asset Stewards, numbering fewer than ten, provided the focal point required to drive the whole organisation forward. As an organisation, SIAL had recognised that asset management was not a function of just one department and the Asset Steward model assisted with not only spreading the message but in sharing the workload involved in implementing PAS 55.

The airport operates under four key areas of focus: Safe, Secure & Sustainable; Great Passenger Experiences; Team Southampton and Profitable Growth. This ethos is deeply embedded within the Southampton Airport culture and it was therefore decided to associate asset management excellence around the corporate vision. Although PAS 55 required explicit links to the overall vision, such was the strength of the branding and ethos within the airport that the PAS 55 programme was aligned much more explicitly than would normally be the case. One of the ways in which Southampton Airport communicated with its employees was to run asset management roadshows and these built upon the vision as a way of bringing a degree of familiarity to the audience, and demonstrating that the 'new' elements of asset management that were being introduced did not mark a shift in focus, but rather were a means to support the achievement of existing goals.

These roadshows demonstrated the linkage between the airport vision 'To be Europe's leading regional airport' and the role individuals had to play in realising the vision and associated benefits. This approach resolved both the 'What's in it for me?' and the 'What can I do to help?' questions to great effect and sought to do so without undue reference to asset management. This route was taken to demonstrate that the underlying principles of asset management are frequently in place in daily life and to disassociate the practice of asset management from any particular role or department, reinforcing the view that it is an integral part of the organisational philosophy.

Benefits

The benefits this process and the resulting certification have brought are many. SIAL made a significant step in the PAS 55 journey and while appreciating that certification in and of itself is not the end goal, benefits realised as a result of the process include: being able to demonstrate robust investment processes; increased confidence in the richness of systems and contingency plans; and greater clarity on accountabilities and the understanding of the interfaces between the airport and their suppliers.

The key to achieving good practice asset management was building upon existing good practice within the organisation. This meant that the cultural challenges of ownership and buy-in were more easily overcome, as nothing was replaced; rather it was refined, tweaked and aligned. Furthermore, the scale of the airport, coupled with strong leadership, meant that the organisation was able to achieve these benefits quickly and more than a year later it is continuing to realise the benefits.

As part of extending the benefits of asset management, the airport plans to extend the envelope to include partners and to bring the lessons learned to other airports within the group, particularly around implementation and some of the communications methods employed at SIAL.

Continuous improvement

SIAL has communicated and shared the certification of its systems to PAS 55 with employees and their partners within the airport. This has enhanced the Asset Stewards' role and enabled a greater awareness of the benefits of continuous improvement. This will promote an enriched understanding of assets and the benefits of appropriate management, embedding of processes and a greater alignment with the four key focus areas.

During the period leading to certification it was recognised that the customer's perception of the airport experience included many aspects that were not directly within the control of SIAL. The role of partners is vital in this relationship and it is envisaged that the approach and the ethos of asset management will be extended to include partners.

Asset management best practice in Izmit

The Izmit Domestic and Industrial Water Supply Project is structured on a BOT basis and delivered by a special purpose

company named Izmit Su A. Ş. (ISA Ş). From the start of commercial operations in 1999 the operation & maintenance contract was managed by Thames Water International, but this transferred to a new company, Akifer Su Hizmetleri Tic. Ltd. Şti (Akifer), in 2009. The project consists of Yuvacik Dam, Izmit Water Treatment Plant, six pumping stations and a 150km-long transmission pipeline. At the end of the 15-year concession in 2014 the project will be handed over to Kocaeli Greater Municipality.

Since 2010, Black & Veatch has provided independent review services to Akifer, providing an annual assessment of its operations against an experienced global view of good utility practice. B&V opted to align these reviews to the PAS 55 standard as a broad framework for 'good utility practice'. This includes a review of processes and procedures, risks and control measures, change management, communications, maintenance methodologies and control systems that were in place to assess whether Akifer's operations are in line with good utility practice. Many other utility organisations successfully use PAS 55 as a basis for their asset management systems without ever seeking certification, using it for guidance only, and aligning this work to that framework ensured breadth of scope and appropriate rigour.

As a supply operator Akifer benefits from relative stability, with none of the complex organic growth that distribution organisations must manage. This has enabled a focus on operating relatively few assets very well. Maintenance is risk-based and due to the risk-averse nature of the company this often means more frequent maintenance than the manufacturer's minimum recommendation. Condition monitoring is applied to most assets with the more critical items – large pumps, for example, are monitored online, which enables real-time analysis and response. Given the operating context this low appetite for risk is appropriate and in line with good asset management practice.

The aversion to risk manifests itself in a number of other ways, such as quality monitoring. Akifer has an enviable 100% compliance record for water quality. This is, in part, due to the level of testing above and beyond any contractual requirements. Being an isolated system, there is little contingency so maintaining quality is essential. The luxury of feeding supply from alternative sources is often

reserved for larger organisations.

Whilst a notable volume of work is outsourced in common with many other utilities, the same contractor has been in place for 15 years, with many of the same individuals involved since the outset. This extension of the collaborative work ethos into the supply chain has paid off, as the contract employees have emotionally invested in the success of Akifer and there is clear evidence of their thinking beyond contractual terms in a way that rarely happens in larger organisations.

The impacts of external influences on Akifer, be they political, environmental or geotechnical, are challenging, and have contributed to the culture in many ways. The drive to fully comply with contractual obligations regardless of the challenge is interesting and is a culture which feeds through the whole organisation.

Benefits

The fact that Akifer began with a suite of brand new assets at the beginning of its contract meant that it was able to apply good practice from the very start. The small workforce – around 100 employees – with a very low turnover has helped to develop a strong culture, which in turn leads to very effective collaborative working. The siloes visible in many larger organisations do not exist in Akifer.

The company is relatively risk-averse, reflecting both the complex politics which surround the project and the geological instability which threatens the project. This has led to very effective risk management and contingency planning. The rigour that this requires has transferred elsewhere, with a very proactive approach taken to what might be considered minor maintenance – painting and weeding, for example. Whilst these do not have a material impact on asset performance they are good indicators of the wider maintenance approach and the culture of the workforce.

Long-term planning in a short-term contract is not normally considered, but such is the emotional investment of the workforce in the project that many hope to continue working there whatever happens in terms of ownership, and as such the normal tail-off towards the end of a contract has not been seen.

Continuous improvement

Akifer has taken on board recommendations throughout its operation, including

those from B&V to align more closely with internationally-recognised asset management standards, and is very proactive at implementing change. Systems are in place for suggesting improvements both to the way assets are operated and to the assets in general. These are above and beyond the normal condition and performance criteria. Examples include changes to procedures to improve health & safety, moving assets to make them easier to maintain and bringing in additional monitoring systems as technology improves.

This is supported by an extremely collaborative culture, which ensures that, despite some locations being geographically remote from the main office, the same systems and processes are applied consistently across the organisation.

What next?

With the contract under which Akifer operates set to end, the future is uncertain. What is clear, however, is that the foundations have been laid for a successful future. The basic building blocks are in place: well-specified and maintained assets, a stable and knowledgeable workforce and effective integrated systems. The asset management framework has not been formally aligned to any particular standard, but is comprehensive and – crucially – works well in the context of the culture and operating environment, and has been improved through close alignment to PAS 55.

ISO 55001

With the recent launch of ISO 55001 for asset management in January this year, many within the industry are wondering what happens next. The UK's Institute of Asset Management is predicting as many as 5000 organisations will seek ISO 55001 certification within the first five years – a five-fold increase from the number currently estimated to be certified against PAS 55. Whilst there are not yet any accredited bodies to provide this certification, many organisations are beginning to realign their systems to the new standard.

This brings with it a challenge as the increased uptake and wider recognition will surely mean that there is a race to certify and not be left behind. However, part of the wider recognition is that the smaller organisations, hitherto either unaware of PAS 55 or under the assumption that it is not applicable to them, may begin to realise that there are parallels

with the existing management processes and specifications they employ.

This shift to smaller companies is not confined to the traditional asset-intensive sectors – over recent years the delegates lists of key industry conferences has seen an increase in new entrants from the facilities management, manufacturing and service sectors. This can only increase as recognition widens and asset management continues its evolution from a western niche to the global mainstream.

Conclusion

For the smaller asset-intensive companies with the constraints of small teams and relatively low budgets, there are significant opportunities that can be realised through the implementation of a robust asset management framework. Smaller companies by their very nature have shorter chains of command, better intra-company communication and a more visible willingness and cohesiveness to work as a team, which can result in greater efficiency and business benefits. Furthermore, the impacts of those efficiencies are more keenly felt.

A smaller asset base means that there are fewer options for workarounds and any major overhauls or asset replacements can constitute a significant portion of an investment programme. In these circumstances it is imperative that any expenditure is rigorously justified, optimised and planned. Systems, be they for works management, maintenance planning, or risk management, for example, tend to be off-the-shelf products that are used around the world in a number of sectors. Whilst the same applies for some larger organisations, there has been a notable tendency towards bespoke solutions, which are harder to change in line with new information requirements and can be so well embedded within the company's IT estate that when change is required it is so complex that it becomes a last resort.

The concept of asset management belonging to large utilities with a substantial, diverse asset base is losing way to a recognition that the benefits apply to others too, and the size of these organisations is more likely to be a benefit than a hindrance. Line of sight, or alignment as the concept is referred to in ISO 55001, is a key tenet of asset management systems. The larger the organisation, the harder it is to maintain this, as the inevitable complexities and management layers dilute the meaning.

Implementation of an asset management system, whatever the starting point, is as much a transformation exercise as a technical one. Embedding cultural change is essential to maintain progress and for larger companies this is much harder. The smaller, more nimble, end of the industry is, in the authors' experience, likely to benefit from reduced complexity, longer-serving staff who hold the respect of their peers, and simpler systems and processes. The scale of investment programmes make every project a potentially large and significant one for which an overspend could seriously impact on the company's profitability. Larger companies can reorganise programmes, and when

capital expenditure is nearing £1 billion (\$1.7 billion) per year in the UK, a saving of a few hundred thousand pounds makes little impact overall –but this could make all the difference to those running programmes under £10 million (\$17 million) a year.

The benefits of implementing a robust asset management system apply equally to all companies with assets to operate and maintain, regardless of size. Arguably, however, the impacts of those benefits are felt more strongly in the smaller organisations with more to lose by getting asset management wrong, and it is in these organisations that a robust asset management system is easier to both implement and sustain. ●

About the authors:

Tim Kay is an Asset Management Improvement Programme Manager at Black & Veatch Ltd, Redhill, Surrey, UK. Email: kayt@bv.com.

Craig Roberts is an Information and Asset Management Technical Director at Black & Veatch Australia Pty Ltd, Melbourne, Victoria, Australia. Email: robertsc@bv.com.

Oliver Parsons-Baker is an Asset Management Consultant at Black & Veatch Ltd, Redhill, Surrey, UK. Email: parsons-bakero@bv.com.

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REFORM

Kosovo water sector management reforms

Over the past 14 years, Kosovo's water sector has seen significant reforms taking place with the aim of increasing service efficiency, improving investment and restructuring management. **BATON BEGOLLI** and **AFRIM LAJÇI** discuss the reform process and the lessons learned.

Kosovo was devastated by the 1998/1999 war and preceding decade of isolationism and systematic discrimination. Prior to the sector reforms of 2000, Kosovo's water sector was characterized by a lack of guiding policy, very low cost recovery, poor human resources both in terms of quality and quantity, and little or no investment for network rehabilitation and expansion. The lack of clearly defined roles and jurisdictional responsibilities led to both policy gaps and duplication of efforts.

Over the past 14 years Kosovo has experienced radical water sector reforms, transforming from 30 municipally-owned water companies to seven publicly-owned Regional Water Companies (RWCs), accompanied by a power struggle between the municipalities and central institutions pushing for water sector reforms. These reforms included completing the legal framework, establishing national institutions and sector regulators, setting management oversight of water services, developing tariff setting policy, rural integration, introducing benchmarking, clarifying asset ownership, clarifying the role of municipalities in the sector,

introducing corporate governance, establishing co-ordination platforms, and so on.

Need for water sector reform

There were 30 water companies in 1999/2000, of which 23 offered a range of other municipal services. 52% of the population was connected to water services and less than 30% to sewerage networks, and there was no wastewater treatment. The need for capital investment was considerable, yet there was insufficient sector funding by the government. There was ineffective sector co-ordination, inadequate local capacity and inefficient resource use.

Process of reform

Water sector reform in Kosovo was intended to develop a new water management culture at the water utility level, leading to transparent water utility administration that is accountable to water users and ultimately in compliance with the integrated river basin management approach.

To begin the restructuring process, the first step was to separate the utilities into core sector services. The water utilities were then consolidated into seven RWCs. The consolidation was motivated



Baton Begolli



Afrim Lajçi

by: the creation of larger entities, which would benefit from economies of scale; reducing the number of entry points and equally distributing donor support; and establishing a larger customer database, thus ensuring a non-discriminatory tariff policy in the broader service areas.

The consolidation is not the end result; it is the first vital step towards creating water utilities that can fund themselves and provide a better service to the residents of Kosovo. It will allow RWCs to receive grants and loans for infrastructure investment. Ultimately, the aim is to consolidate them further into four regional utilities.

During 2007/2008 the RWCs were incorporated as joint stock companies. All RWCs are central publicly-owned enterprises with the government of Kosovo as the shareholder. Some of the municipalities challenged the process, but have over the years returned into the

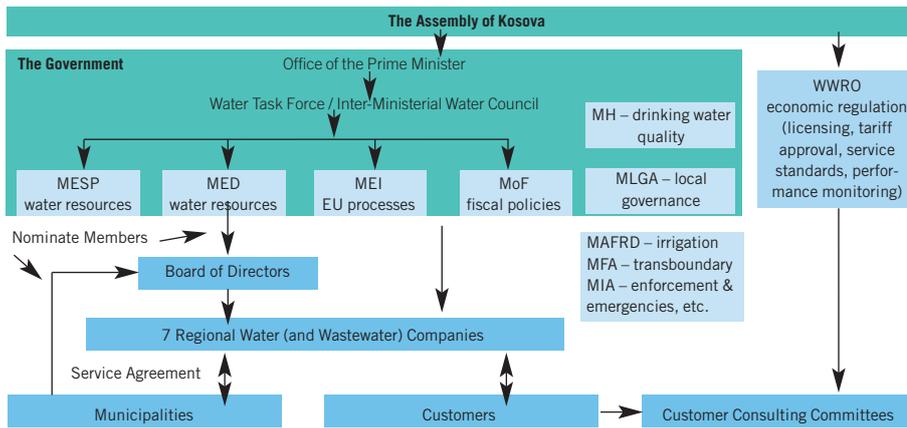


Figure 1: Institutional relationships – water sector

regional scheme.

Recently, the law was amended to allow for equal municipal representation on the Board of Directors. A mechanism of 'service agreements' between the RWCs and municipalities is used to establish the responsibilities and obligation of the parties.

An independent regulator, the Water and Wastewater Regulatory Office (WWRO), was established, which is responsible for licensing water companies, setting water tariffs and service standards, monitoring the performance of service providers and protecting customer rights.

The move towards a sector-wide approach was perhaps the most radical of the reforms proposed. It followed recognition of the disadvantages of implementing development activities through discrete projects. Previous activities were generally donor-driven and were often piecemeal, with approaches varying depending on the actors involved. This caused duplication and led to inefficiencies in the government system, thus reducing the benefits of investments and decreasing the sustainability of the water and wastewater services.

Roles and responsibilities

The institutional setup pre-independence presented a mosaic of responsibilities within institutions that were separately accountable to the government, for example the Ministry of Environment and Spatial Planning (MESP) was responsible for water resources and UNMIK (Kosova Trust Agency) was in charge of water utilities. Post-independence, Kosovo experienced the demise of international institutions and their responsibility in the water sector. The Ministry of Economic Development assumed the role of managing the RWCs. MESP retained the management of water

resources, which are now owned by the State. The Ministry of Local Governance Administration has completed the decentralization process, resulting with new municipalities, which was wrongly assumed that it would add to the continuous administrative challenge by municipalities to central water utility management, and futile attempts to decentralize them. In fact all newly established municipalities have joined or are in the process of joining the RWCs. The Ministry of Health, through the Institute of Public Health, is gradually strengthening its role in drinking water quality monitoring. The Ministry of Foreign Affairs (MFA) is yet to realize its role in the ratification of international water treaties, given that Kosovo's four main basins are all transboundary waters. Then there are also other institutions or agencies that impact water issues.

In this institutional labyrinth, water becomes a major ingredient of various development policies, affecting many stakeholders, in particular the RWCs, municipalities and population at large, whose interests have tried to be preserved by WWRO.

The Prime Minister has acknowledged the importance of water as being a common denominator for many development issues and key to successfully resolving those challenges. Due to the inter-relatedness of water issues across so many different institutions and sectors, the Prime Minister's Office recognizes the need for an inter-institutional approach, so that progress can be achieved in engaging the stakeholders in the earliest stages of water development policies.

To this end, the government established a Water Task Force (WTF) that has recently transformed into an Inter-Ministerial Water Council (IMWC). The IMWC provides the forum for collecting and evaluating the positive experiences in the water sector, but also the drawbacks

in implementation, communication and cooperation. Furthermore, it provides a platform for the development of policies for reforming the water sector considering different perspectives, from water users to water providers.

Lessons learned

Several lessons have been learned during this reform process. The first is that it is inherently political and requires the full commitment of its policy makers to correctly balance financial and political objectives. Government leadership is crucial to success, and government-led reforms are always likely to be more effective. Defining the role of the owner and reforming the overall external environment is also important to achieve success, and it is important that the sense of ownership and responsibility for the sector reform extends beyond the government. This requires the continuous participation of sector stakeholders in the reform process and independent input to balance possible conflicting objectives.

Other lessons learned are that fundamental reforms are not a quick fix and cannot be substituted by private sector participation, and there must be an adherence to financial sustainability objectives. Improved access to and delivery of basic services is central to economic development and improving the welfare of the citizens. A strong and effective water and sanitation sector is an attractive investment for both government and external support agencies.

Finally, certain decisions are best left to utility managers, customers can be an important voice for improving performance, over-ambitious targets can reduce the effectiveness of sector reform, and a population of two million cannot sustain commercially many water companies, so at some time in the future further consolidation will have to be implemented. ●

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About the authors:

Baton Begolli and Afrim Lajçi are Water Policy Advisors at the Kosovo Prime Minister Office / Swiss Cooperation Office. Email: Baton.Begolli@rks-gov.net / afrim.lajci@rks-gov.net.

Use of regulatory tools for fostering transparency and efficiency in the water services sector: the Kosovo experience

The reform of Kosovo's water sector has included changes to the economic regulation of water utilities in an effort to improve transparency and efficiency in the sector. **AFRIM LAJÇI** and **BATON BEGOLLI** outline the regulator tools used to promote these two aspects.

Although the term 'regulation' is very often used for describing just the economic regulation of water services, it is important to note that economic regulation is only one of three main aspects of water services regulation, the other two being environmental regulation (effluent standards) and health regulation (drinking water quality standards).

The economic regulation of water services in Kosovo was introduced in 2003 when the Central Regulatory Unit (CRU) was established as a body in charge of enforcing the regulation of public services, including energy, telecommunication, water and solid waste, aviation, railways and mines and minerals. This embryonic structure shortly evolved into six independent sectoral regulatory authorities, the Water and Waste Regulatory Office (WWRO) being one of them. The responsibility for the environmental regulation of water services was, on the other hand, vested to the Ministry of Environment and Spatial Planning. This responsibility involves the allocation of water resources to various users through the use of water permits, as well as setting and enforcing effluent standards. Finally, the authority responsible for drinking water quality regulation is the National Institute for Public Health, which sets and enforces quality standards for drinking water supplied by water utilities.

Regulatory tools for the fostering of transparency and efficiency

Transparency and efficiency are the two principal aspects of a water sector where economic regulation plays a crucial role. This comes from the monopoly nature of these services and, hence, the need to ensure customers that the operation of water utilities is transparent and accountable. Likewise, customers expect the regulator to mitigate potential negative impacts on operating efficiency resulting from the absence of market competition.

Based on its regulatory mandate established under the legal framework and on good regulatory practice, WWRO

uses three principal tools to promote transparency in the water sector and to improve operational efficiency of water companies: setting efficiency targets through the tariff process; comparing the performance of water companies and ranking them based on this comparison (benchmarking); and publication of an annual report on water companies' performance.

Setting efficiency targets

WWRO sets efficiency targets for the water companies through the tariff approval process, which, since 2009, has been done for a three year period. Prior to that, during the first four years of its existence (2005–2008), WWRO set tariffs on annual basis.

As part of the tariff approval process, WWRO challenges water companies' submissions, in particular concerning the proposed operating efficiency (operational costs) and commercial efficiency (revenue collection). WWRO determines the efficiency improvement expectations, both in terms of operating costs and revenue collection, based on comparative analysis of the water companies' submissions.

As a practical illustration of the process, during the last tariff-setting process (2012–2014), WWRO set operating efficiency targets which provide for a 12% reduction (amounting to €2.07 million (\$2.9 million)) of annual operating costs compared to the water companies' original proposals. At the same time, WWRO set bill collection efficiency targets for 1.8% higher than those proposed by RWCs – this improvement in revenue collection performance resulted in the tariffs being approximately 10% lower than what they would otherwise have been without such improvement.

It is important to note that WWRO regards water companies' business plans, upon their scrutiny and approval, as a 'contract of obligations' in exchange for tariff approval. The performance of the water companies in terms of achieving the agreed targets is monitored continually (on a three-monthly basis) and reported. A crucial issue, however, is

enforcement of the efficiency targets, i.e. what are the options available to WWRO if a RWC fails to achieve the agreed efficiency improvements? In the case of operational costs, efficiency improvements are already enshrined in the approved tariffs, whilst concerning the revenue collection efficiency, WWRO either refers failures to the government (in its capacity as the owner), or penalizes the inefficient water company by approving lower tariffs than those agreed in the tariff determination process.

Benchmarking

WWRO started to measure the performance of water companies in 2006 with the purpose of stimulating competition among water companies by comparing their performance based on selected indicators and ranking them. In addition, the actual performance of each water company and of the entire sector was compared with the previous year.

Initially, WWRO started the benchmarking process by using five key performance indicators (KPIs), namely: water quality; water supply continuity; service coverage; unit operating costs; non-revenue water; and collection efficiency. These were considered to be indicators which the water companies have considerable control over and which, taken together, best represent the overall level of service provided by each water company. In 2010, WWRO introduced a new, significantly different, framework for the measurement of water companies' performance, which is focused on outcomes that have a direct impact on customers, such as: water quality; service reliability; cost efficiency; etc. This was deemed necessary in order to measure performance not only against past years, but, more importantly, against the levels of performance agreed between WWRO and water companies in the tariff setting process.

Public reporting on water company performance

WWRO prepares and publishes annual reports on the performance of water companies. The report includes informa-



Pristina, the capital of Kosovo. Over the past decade Kosovo's water sector has been undergoing significant reform. Credit: vlas2000 / Shutterstock.com.

tion from relevant areas of performance such as operational and financial aspects and customer services. Publicly reporting on the performance of water companies is important, primarily because it makes the operation of these companies more transparent and their management more accountable by providing objective and comprehensive information via KPIs on their financial and operational performance. In the report, stakeholders, and in

particular consumers, can closely see the performance of their service provider for the current and previous years, and the performance of any service provider compared to other service providers in Kosovo.

Conclusion

Over the past ten years since the introduction of economic regulation of water services in Kosovo, on the whole there have been qualitative improvements, particularly with regards to transparency, but also in the operational efficiency of water companies. The promotion of transparency in tariff setting, regular and detailed information for customers on the performance of water companies, customers' involvement in important issues, public pressure on water companies for efficient operation and the introduction of competition have all undoubtedly had a very tangible effect on transparency and efficiency.

However, the key issue remains regarding enforcement, i.e. what actions should the regulator take when water companies

fail to meet efficiency targets? The application of financial penalties or incentives which may be effective in the case of private utilities is deemed to be less effective in the case of public utilities. Hence, in addition to public pressure ('naming and shaming'), the option of introducing performance agreements between water companies and the government (as the owner of water companies) with WWRO efficiency targets included is being considered by relevant stakeholders (i.e. the government and WWRO). ●

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About the authors:

Baton Begolli and Afrim Lajçi are Water Policy Advisors at the Kosovo Prime Minister Office / Swiss Cooperation Office.
Email: Baton.Begolli@rks-gov.net / afrim.lajci@rks-gov.net.

REVENUE

Developing efficient revenue collection in Kosovo's water utilities

Despite significant structural changes to Kosovo's water sector, revenue collection is still a major issue that needs to be overcome for further development to be achieved. **ILIR RODIQUI** outlines how changes in management and customer service are key to increasing revenue collection and improving water supply delivery.

Over the past 15 years Kosovo's water sector has achieved a number of improvements and structural changes. However, levels of unaccounted-for water indicate that water services in Kosovo still have some way to go and changes in the coming period are crucial for further development.

Water losses are the weakest point in the performance of Kosovo's Regional Water Companies (RWCs). Since 2009, non-revenue water (NRW) in these companies has remained unchanged at approximately 57% on average. All stakeholders in Kosovo's water sector are aware of the high NRW levels, but have difficulties in finding ways to reduce them. Since 2007, two strategies for dealing with water losses have been prepared, coordinated by the Water and wastewater works association of Kosovo (SHUKOS), but few visible

improvements have been reported.

It is also a crucial time for water resource availability, with this approaching summer being a very uncertain time for water supply in Kosovo's capital, Pristina. A decrease in precipitation for five consecutive years and a lack of snow last winter mean local water supplies are at a critical level. According to the Pristina Regional Water Company, water reserves have been estimated at being enough for four months with supplies restricted to 50%.

Water scarcity has two main negative impacts on revenue collection. First, droughts lead to increased water restrictions, which lower the quality of services and willingness to pay, and second, during a water crisis utilities are focused on the problem of production and neglect other operational measures. This was obvious in the recent drought situation in Kosovo when all water institutions

were concerned with water reserves, but completely ignored consumption levels and problems with service performance. If institutions coordinate to educate the public with regards to water scarcity, this could have a positive impact on consumers' awareness about drought. A better control of NRW also means fewer restrictions to supply, which positively influences water quality and increases customer satisfaction, confidence in the supplier and willingness to pay.

Unaccounted-for-water and revenue collection influence one another; a better control of water loss leads to cost savings and the establishment of operational mechanisms that increase overall service performance, including revenue collection. This is crucial in Kosovo RWCs where the performance level of operational management for processes related to water supply, water consumption and water payments is improving only very

slowly, with revenue collection only rising from 61% in 2006 to 70% in 2013.

This article is a summary of studies¹ that have attempted to discover why Kosovo's RWCs are struggling to effectively collect revenue. Supporting information was collected by interviewing key staff in Kosovo water sector institutions and seven RWCs. The aim was to examine operational processes based on the principles of Business Process Management (BPM)².

Revenue collection

The best way to investigate revenue collection is by viewing it as being a holistic problem. Each RWC has been investigated regarding its core revenue collection activities and appropriate flow-charts were developed. The models developed have enabled the identification of:

- Discrepancies in the functioning of the operations related to revenue collection
- Areas of intervention for improving operability
- The importance and role of the BPM tool for a water utility

Governance

Figure 1 illustrates the workflow of the main business processes related to revenue collection in Kosovo's RWCs. This aims to present the situation where the revenue collection system as such is functional, but there are various irregularities in performance. Research results indicate five broad problem areas:

- The executive chain between governmental bodies, boards and top management of RWCs are lacking accountability
- Internal management is dominantly focused on technical problems
- Customer departments are reactive problem solvers
- Inspections, although declared as being regular activities, are not very effective
- The disconnection policy might have a negative effect on the whole process!

Although at the highest levels the institutional set-up of Kosovo's water institutions has been comprehensive, fully independent administration of water services has yet to be achieved. Until now the Kosovo government has not prioritized water issues enough and water supply organizations are influenced by political decisions, courts are ineffective and the whole system of governance lacks appropriate leadership.

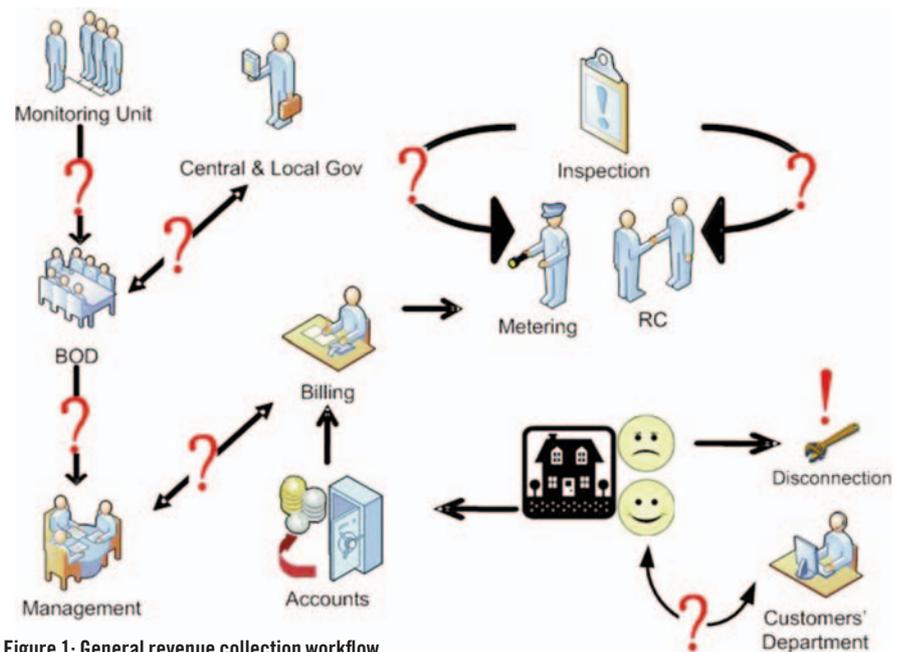


Figure 1: General revenue collection workflow

Concerning the Boards of Directors (BODs), the study found a lack of necessary professionalism and not enough capacity to follow up on corporate management activities. This results in the situation where CEOs are running companies at a mediocre level because the level of efficiency has not been challenged by the BODs. Furthermore, the government monitoring unit, Publicly Owned Enterprises Policy & Monitoring Unit (POEP&MU), has little influence on Board members who are selected through political means. In this situation, executive chains maintain the status quo due to the protectionist attitudes of the government, unclear leadership responsibilities and a lack of appropriate managerial knowledge at both the BOD and CEO levels.

With dominantly technical culture, advanced managerial functions in Kosovo RWCs are somewhat ignored. Organizational structures are not steady and responsibilities overlap. Managers spend too much time on trivial activities and are very often involved in the actions of their subordinates. There is a lack of detailed planning and analysis at all managerial levels. RWCs in Kosovo only use targets from their Business Plans and rarely set up inclusive lower-level plans and more specified objectives. Control functions are not systematic and consistent. Reporting only uses data, without detailed problem analysis. BPM of internal activities is rarely developed in Kosovo water utilities or is not used at all. Leadership is mediocre and potential

enthusiasm is seldom backed up by appropriate managerial knowledge.

Customer management

Regarding customer services, all utilities in Kosovo have established customer service departments, but their performance is not satisfactory. Utilities need to undertake a more proactive approach in dealing with customers. Currently, there is a 'responsive' approach instead of direct contact with customers through a 24-hour help desk system. This attitude creates many gaps in service provision and increases discontent amongst customers, which impacts on bill payments and water consumption.

Water consumption monitoring and network inspections are established functions in utilities, but are not very efficient due to a lack of systematic administrative procedures. For instance, inspections are carried at particular customers (with high debts), but are not regular and routine for every connection. This is because meter readers (revenue collectors) are not fully responsible for the first level of inspection, connections are not checked regularly by inspectors and customer databases are not maintained appropriately. A particular issue is the lack of network administration through zoning. Without being able to control zones through the interconnection of appropriate technical measures and administrative command, it is difficult for RWCs to identify losses in the network.

In Kosovo, the disconnection of water

Lake Badovc, which supplies the capital Pristina, is at a critical level. Credit: Ilir Rodiqi.



is seen as being the most efficient measure to increase revenue collection. For local circumstances this approach might be effective, but reliance on this measure and the neglect of other measures is not a very good strategy. Disconnection may be a temporary solution, but it will not solve internal problems in a company. This has been proved in cases where utilities tried to disconnect collective residential areas, which caused social pressure and a threat to public health. Furthermore, by relying only on disconnection, RWCs have created a managerial culture that is passive toward other appropriate management measures.

Discussion and conclusions

Kosovo's water sector and the effectiveness of its water utilities is still lacking behind EU benchmarks and we have reached the critical moment to undertake changes that will boost productivity, improve quality of service and ensure sustainability. Problems can be separated into executive accountability and capacity.

Three areas should be focused on in order to encourage change in RWCs: strict accountability measures; a clear definition of standards of performance; and a programme to improve the capacities of stakeholders.

The first measure is to improve the management structure by establishing a system that follows strictly predefined targets. Achievement or failure to achieve these targets should be rewarded or penalized appropriately with members of BOD and CEOs being accountable for performance results. Currently, CEOs have three-year contracts, which means

they are not stimulated to reach their full potential, especially in the final year of activity.

The second is to establish innovative operational standards and governance mechanisms for all stakeholders. One such tool focusing on performance indicators that was established by the Water and Waste Regulatory Office (WWRO) in 2004 became one of the most successful achievements in the sector. However, this mechanism has not changed very much since its initiation. Such instruments should be adapted to enhance their efficiency and other tools developed to strengthen the internal performance of RWCs as well as maintain inter-organizational coordination, communication and cooperation. This role of WWRO as independent body should be expanded to control the performance of RWCs not only through performance parameters but also by following up on RWC's internal activities. For instance, the regulator might require and follow-up installation and implementation of internal quality assurance systems, which is not obligatory at the moment. In order to improve revenue collection (as well as other processes), RWCs in Kosovo should use a BPM approach. For the purpose of efficient revenue collection, permanent and systematic control should be installed, including monitoring systems and stimulation and penalization schemes. Customer services need a general transformation to move from a passive approach towards active participation and dialogue about problems. Disconnection should be the last solution.

Finally, an important activity for the water services sector overall is to improve the administrative and leadership capacities of CEOs and BOD members. Without appropriate corporate management knowledge there will be very little improvement in the performance of utilities. Institutions should organize a permanent training programme for human resources development at the sector level. At the moment the donor community is leading capacity development programmes. However, it would be more effective if local stakeholders initiate and implement this as it can be done gradually, they know staff mentality and they can involve local actors. Within this system donors should play a mentoring and support role to transfer knowledge and experiences. ●

Notes

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Ilir Rodiqi

About the author:

Ilir Rodiqi is Lecturer at University of Pristina, Department of Civil Engineering and Architecture, Pristina, Kosovo. Email: ilir_rodqi@yahoo.com

Sustainable implementation of rural water projects in Kosovo

Many rural water supply projects were implemented in Kosovo after the war to improve supply coverage, but 28% of rural systems are outside the control of Regional Water Companies (RWCs) and therefore suffer from quality and supply issues and 4% are non-functional. Due to their poor condition and design, RWCs are unwilling to take on the burden of these rural systems. **AZEM KASTRATI** outlines an approach aimed at improving the sustainable design and implementation of rural water projects so they can then be taken on by RWCs for long-term operation.



Azem Kastrati

Providing safe and potable water to communities is one of the main targets of all governments. As a small country in South East Europe with an overall population of around two million people, Kosovo's water sector has gone through two different phases.

Before the war in 1999 these services were provided by municipal-owned enterprises, mostly supplying urban areas and in only very rare cases rural areas. The population in rural areas used water from wells, which in most cases did not fulfill quality and quantity requirements. After the war the donor community focused on improving the living condition of rural communities in areas where there was a lot of war damage. In the process of improving these conditions there were in the end hundreds of donor-funded water supply projects in Kosovo. Thanks to this donor support as well as co-funding from local and central government, today 61% of the Kosovar population living in rural areas has access to water supply infrastructure (CDI, 2012). Out of 613 villages with water infrastructure, 342 are connected to public water supply systems and 271 are separate systems.

In compliance with Kosovo laws and regulation, only Regional Water

Companies (RWCs) are licensed by the Water and Wastewater Regulatory Office to provide public water supply to consumers. There are seven RWCs providing these services to consumers in urban and rural areas; out of 613 rural water systems, 440 are managed from these seven licensed RWCs. The remaining 173 (28%) of rural water systems are 'illegally' operated by the community or assigned persons who are not qualified or licensed to provide public water supply services. These systems are not reliable, the water quality is not monitored and interruptions to water supply are very common. The Swiss Cooperation Office in Kosovo is supporting the Kosovo government in its effort to integrate these rural systems into their respective licensed RWC areas, but the seven RWCs are not willing to take over the management of these rural systems because of their inappropriate design, inappropriate execution of the work and current poor technical conditions.

Of the 28% of rural water projects not managed by RWCs and the 4% of rural water systems that are non-functional, most were donor funded projects implemented through NGOs or contractors. An inappropriate method of implementation resulted in their failure and additional investment (around €3-5 million (\$4.2-7 million) is now needed for their rehabilitation.

The USAID co-funded Small Infrastructure for Water and Sanitation (SIWS) project, which began in September 2008 and will be completed on 31 July 2014, has been set up to install, rehabilitate, expand and upgrade water and sewage systems in four municipalities of Kosovo. The NGO International Relief & Development (IRD) implemented the SIWS and subcontracted part of the activities to the Kosovar NGO

Community Development Fund (CDF). By looking into these failed projects, SIWS developed a model for sustainable project implementation (Figure 1).

Key areas for sustainable project implementation

The aim of the SIWS project is to provide water supply services to communities in rural areas where the coverage was lower than the average level of water supply in other municipalities. The SIWS project reviewed the municipal and RWC development plans and informed the RWCs of the possibility of donor support for their water projects.

For successful project implementation, the SIWS programme has identified the following key elements: transparency; openness; following and fulfillment of legal, environmental and financial rules of local and central government; involvement of all stakeholders from the beginning and throughout the process; continuity; commitment; clear division of responsibilities and obligations; quality of executed work; supervision of the work; monitoring and evaluation; inspection and testing of the system before handover to the licensed institution / company for operation and maintenance; and post project monitoring and evaluation.

The project model identified a series of steps to help sustainable project implementation. This begins with the use of a Memorandum of Understanding (MoU); a general agreement between the municipality, RWC and IRD with regards to potential water projects and which signals commitment by the parties to sign further specific agreements for the co-financing of agreed-upon water projects. As agreed in the terms of the MoU the implementing partner will identify and perform a prefeasibility study of water projects to be implemented through the programme,



The Small Infrastructure for Water and Sanitation project has enabled access to potable water for 47 villages in rural Kosovo. Credit: IRD/SIWS.

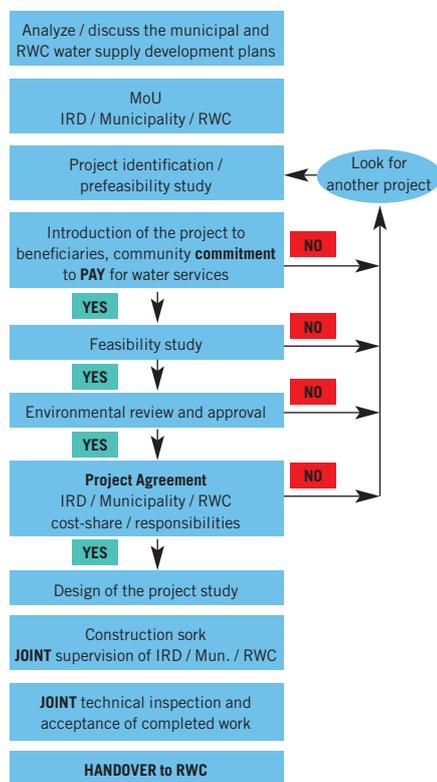
and the identified projects are then introduced to the municipality, RWC and the beneficiary community. At this point it is key for the continuation of the project that the community confirms that it will pay for water services.

A feasibility study then defines the technical, design and financial parameters of the projects. The study also defines the life of the project, its sustainability and the cost, including operational and maintenance costs, which should be affordable for the RWC and its customers. An environmental review and assessment is then used to confirm that the water project will comply with all environmental conditions, before a project agreement is signed where the parties agree to cooperate on the financing, development and implementation of the project within the SIWS programme and accept the responsibilities and obligations listed below.

Project agreement

Under the project agreement, IRD with regards to its role in the SIWS project uses resources donated by USAID and the Swiss Cooperation Office (SCO) and

Figure 1: Method for sustainable project implementation



- List of Acronyms
 IRD International Relief and Development
 CDF Community Development Fund
 MoU Memorandum of Understanding
 RWC Regional Water Company

contribute to the design, construction and supervision of the project on behalf of the RWC and support the RWC and the municipality with technical assistance. IRD tenders for work as necessary and carries out a full technical and environmental feasibility study for the project prior to design and construction, as well as ensures all guarantees with regards to suppliers and manufacturers of materials and equipment throughout the project. IRD also provides technical information to the municipality to allow it to obtain permits and permissions in advance of construction work and provides acceptance and handover certificates to the RWC on completion of the project.

The RWC meanwhile is expected under the agreement to provide all necessary data to IRD, its contractors or partner organizations, provide technical input and assistance to the project to ensure acceptance of the project on completion, liaise with IRD with respect to development of the project and participate in tender evaluation and selection committees. The RWC also comments on and approves the technical aspects of project proposals and designs, is responsible for obtaining a water permit for the water source if necessary, and registers all new water supply customers in a customer database. The RWC then ensures that all new customers are connected to the new water supply via a functioning water meter, reads the meters, issues bills and collects revenues, and operates and maintains the infrastructure to a high standard to ensure its sustainability for the project's design life.

Finally, the municipality is responsible for the preparation and obtaining of construction permits for the project as well as any necessary land rights or permissions and other necessary local government permits. It also encourages the responsible use of water and payment of water bills by the community benefiting from the project and organizes and encourages the participation of the project's beneficiary community in the development of the project.

After completion of construction work the installed water systems are tested and disinfected under direct supervision of the appointed team from IRD, the municipality and the RWC, which also inspects all of the completed construction work. After completion of any required reparations, IRD issues the subcontractor a Certificate of Substantial Completion and the system is ready to be utilized and



handed over to the RWC.

The RWC is responsible for the coordination and organization of an internal technical acceptance committee, which should be formed immediately after the completion of construction, to inspect the works and to agree to the acceptance of the handover of the works to the RWC. A final financial account for the project is then prepared on completion by IRD Kosovo and copies distributed to all parties involved in the cost share.

Conclusion

The IRD / SIWS model of sustainable project implementation was applied in four municipalities in the service area of the three largest RWCs. In addition, through SHUKOS, the model was also introduced to another 33 municipalities in Kosovo in four other RWCs. All water supply projects implemented through SIWS program are functioning and sustainable, and 47 villages are now benefiting from new water systems. This model for sustainable project implementation can serve as model for other projects to be implemented in this region and every installed water system should provide water supply to consumers for at least 25 years. ●

References

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About the author:
 Azem Kastrati is IRD's Chief of Party for the Small Infrastructure Water and Sanitation programme, Prishtina, Kosovo.
 Email: akastrati@irdglobl.org.