DECEMBER 2011
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Economic regulator outlines more outcome-focused approach

Ofwat, the economic regulator of water and sewerage services in England and Wales, has published its long-awaited consultation on the future framework for price limits, which commits the regulator to a more hands-off, strategic approach, encourages companies to set high-level outcomes, and gives responsibility and accountability for delivering them to the companies themselves.

The document sets out a roadmap for the regulatory approach to develop 'so the sector can continue to deliver for customers in decades to come'.

As well as setting outcomes in consultation with customers and stakeholders, companies will be set 'proportionate, targeted and tailored incentives' to encourage them to deliver these outcomes efficiently and effectively.

The document also commits to 'strengthened customer engagement' and setting separate retail and wholesale price limits. These separate price limits will be 'focused on the distinct characteristics of the relevant business', with the wholesale price containing a sub-limit around certain network services to enable fair access to core network services.

Ofwat aims to minimise 'unnecessary complexity and burden' in the process, the document notes, consistent with its primary duties to customers and enabling companies to finance their functions.

The paper explains that the regulator is moving to a more outcome-focused approach, allowing the companies to focus on what they really need to achieve and determine the most efficient and effective way of achieving it.

Because companies will be being held to account for outcomes and not the means of delivering it, Ofwat hopes that there will be more scope for innovation.

The options Ofwat sets out are:

- Keep things as they are
- Keep the current approach with better targeted and stronger incentives
- Create retail and wholesale price limits, with a sub-limit in the wholesale element covering network and treatment activities
- The above point, but with a resources sub-limit covering abstraction and water resource provisioning
- Full price and accounting separation of all parts of the value chain

The regulator estimates that the proposals in its set of preferred options would deliver efficiency savings of between £1 billion and £2.5 billion ($1.6-3.9 billion), calculated over 30 years. ●

Report critical of Canada's source water protection efforts

Green pressure group Ecojustice has produced a 'drinking water report card' for Canada that finds only 'marginal' improvements since the last report in 2006, in terms of the quality of water treatment, drinking water standards, and testing requirements, and gives the federal government an 'F' for its water-related efforts.

The five-yearly Waterproof 3 report did, however, find 'noticeable improvement' in the number of jurisdictions enacting standards and requiring testing for chemicals. It notes that 'some form of public testing is required by more than half of Canadian provinces and territories, as opposed to four in the last report'.

However, it notes, only British Columbia, Newfoundland and Labrador, the Northwest Territories and Ontario provide a statutory right to make a complaint about drinking water concerns that must be investigated.

The report also found a 'critical deficiency' in the consistency of drinking water advisories in Canada. It noted: 'There is no central repository for drinking water advisories in Canada and many provinces also lack a registry. There are no standard criteria or procedures for conveying warnings about drinking water safety. The terminology and availability of information vary considerably between provinces, regions and even local health units.' ●

LS *See Analysis, p7*

European utility refinancing prospects modest for 2012

The sovereign crisis remains a key issue for Europe's utilities, with refinancing likely to remain modest in 2012 before a significant increase in 2013 and 2014, according to European bank Société Générale.

In its Utilities 2012 outlook report, subtitled 'Brave old European utilities are doing the job', the bank reports a focus on financial discipline, securing strong liquidity and, in the medium term, 'challenging asset disposals' and a weakening of business risk profiles.

A number of factors are cited across the board, such as 'very aggressive' bank credit facilities, and management decisions to instigate financial discipline measures to reduce debt, which has dampened the bond market.

Veolia Euro bonds are downgraded to 'sell' from 'buy', though the report generally notes utility shares and bonds 'do offer some safe haven characteristics and reasonable yields'.

The report warns that 'utilities are easy targets for taxes' given the current financial climate, with Germany and Spain so far creating utility-specific taxes. Finland has also announced a possible €170 million ($227 million) windfall tax on nuclear and hydro production, or a tax on uranium consumption.

The largest utilities are implementing and some are upgrading disposal plans for their non-core assets, the report notes, adding: 'Interestingly these disposals aim at reducing debt, not returning extra value to shareholders.'

It adds: 'Large utilities are evolving towards a new business model that might not help to enhance their credit profile. It consists of selling regulated networks and focus development outside Europe into higher growth markets, such as LatAm, Asia, India, Russia, Turkey... regions where political risks might develop in the long term as the industry matures.'

The pass-through of carbon dioxide costs is a political issue that should increase in importance in 2012, the report predicts. During Phase III of the EU Emissions Trading System, utilities will pay for 100% of carbon dioxide allowances and allocation volumes will be reduced by 1.74% per year to meet the EU's 2020 target for carbon dioxide reduction.

The report mentions Veolia's 'unexpected profit warning', noting that its water division also suffered in France and the UK, though the company was still able to reduce its net debt thanks to positive free cashflow after disposals. Suez Environnement, by contrast, enjoyed 'buoyant' commercial activity across all three divisions, it adds. ●

Southern Nevada utility defends water use reduction record

The Southern Nevada Water Authority (SNWA) has hit back at a report by the Pacific Institute that criticised the utility's efforts to reduce water use – initiatives that, the utility stresses, have already yielded a 30% reduction in per capita water use.

Following direct testimony by Pacific Institute president Peter Gleick, which claimed SNWA conservation efforts were 'weak and inadequate', the utility's attorney identified a number of areas in which the report, 'Hidden oasis: water conservation and efficiency in Las Vegas', 'grossly overstated additional potential water resources that may be gleaned through additional conservation'.

The report was prepared at the behest of an 'activist group' opposing the utility's applications for renewable, unused groundwater in east-central Nevada, SNWA says.

It notes: 'Interestingly, under questioning, Gleick – a co-author of the report – conceded that he had not even looked at the SNWA water conservation plan he criticised.'

SNWA environmental resources director Zane Marshall said: 'The Southern Nevada Water Authority has clearly demonstrated its commitment to water conservation, but this group had an obvious agenda in opposition to the SNWA's applications and misused water use information to suit its pre-determined conclusions. It isn't fair or reasonable to criticise the residents of the Las Vegas valley, who have been exceptionally committed to conservation.'

SNWA says that among the report's 'more egregious errors' was the treatment of indoor water as a consumptive use. It points out that 'unlike most metropolitan areas in the United States, the Las Vegas valley captures and recovers virtually every drop of water used indoors'.

This means that, while there are a number of benefits to be derived from low-flow shower heads and other fixtures, 'indoor water savings do not in any way extend the community's water supply', SNWA notes.

It also complains that the report also attempted to compare Las Vegas water use to other cities, including Seattle, Washington, 'with no attempt to adjust for annual rainfall, temperature or other key climatic factors'. ●

Hacking investigation reveals legitimate use

A controversial claim that an Illinois utility had had its SCADA system attacked by a hacker with a Russian IP address, who destroyed one of its pumps, has finally been debunked.

It transpires that the remote access to the system was a legitimate user who was on holiday in Russia and had logged on to check the system data. Repair staff working on the failed pump examined the logs on the SCADA system, saw the Russian IP address next to the staff username, and wrongly concluded that the staff member could not possibly be in Russia.

The repair staff passed the information to the US Environmental Protection Agency as a precaution, who alerted the Illinois Statewide Terrorism and Intelligence Center.

After a week of reports that swept across the globe claiming the pump had been destroyed by a hacker, the Department of Homeland Security finally announced that there was no evidence of a hack and the pump had simply done what pumps sometimes do, and burned out. ●

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Bank support for United Utilities climate change investment

The European Investment Bank (EIB) has provided £400 million ($535 million) in funding for what it called 'ambitious investment' by the UK's United Utilities (UU) that will improve water supply and wastewater management that will take account of predicted climate change and demographic developments.

The funds will be directed at individual schemes to improve potable water quality and enable more energy-efficient wastewater treatment, and will include support for projects that take account of the potential impact on water and wastewater of extreme weather events and climate variability over a 25-year period. This will also form the first phase of UU's current capex programme (2011-2015).

Simon Brooks, the EIB vice president responsible for the UK, said: 'Large-scale specialist investment that addresses risks from a changing climate is essential to ensure clean tap water and safe wastewater management for future generations. The European Investment Bank is committed to ensuring that long-term investment by UK water companies can best prepare for climatic uncertainties, alongside increasing energy efficiency in the sector.'

One of the projects that will benefit from the funding is the £100 million ($157 million) Sludge Balanced Asset Programme (SBAP) project at Manchester's Davyhulme WWTW. The scheme will provide enhanced sludge digestion, resulting in a cleaner soil conditioner that can be recycled to farmland, as well as large volumes of biogas that will be used to generate green energy via combined heat and power engines.

WWTPs at 12 locations will also be upgraded to generate heat and electricity.

In Penrith and Irthington, treatment capacity will be increased to cope with local population growth and ensure compliance with new environmental standards.

The funding will also support flood alleviation schemes, increasing the capacity of sewers during heavy rainfall, which will help to remove flood risk for nearly 800 properties. In addition, the programme will improve water quality in rivers and along the coastline by upgrading sewer overflow points and building 101 new stormwater detention tanks. ●

AECOM restructuring alongside Romanian contract wins

AECOM has announced that it has restructured its water business in Europe and is now operating as a single water operation, combining its consultancy and design-build operations throughout Europe.

The restructured business will be led by Graham Howells, AECOM's managing director for water, Europe.

The consultancy says: 'Responding to industry's growing preference for an integrated service offer, the restructuring will enhance AECOM's ability to provide clients with a range of complementary services and delivery options. AECOM will become one of a small group of consultant-contractors who can design, build, operate and maintain water and wastewater infrastructure in Europe. This marks the next step in the harmonisation of AECOM's consultancy and design-build businesses.'

The restructuring will also consolidate the unification of AECOM's water business activities across several markets, bringing the company's water businesses in Ireland, Romania, Spain, Turkey and the UK under a single management system.

The company also recently announced that it is expanding its water business in Romania following a succession of multi-million-euro wins. The main objective of the contracts is to ensure compliance with European Union legislation and standards in the field of water supply, collection and water and wastewater treatment.

Through two separate contracts awarded by SC Aquabis and SC Apa – Canal Sibiu, AECOM is providing a number of services across the counties of Sibiu, Brasov and Bistrita-Nasaud.

These comprise extensive project management, including planning and financial advice, sludge strategy, leakage control, wastewater management, operational maintenance and project implementation in accordance with the EU financing memorandum; preparation of tender documentation in compliance with Romanian and EU legislation; design and technical assistance during the execution of works; bid-stage technical assistance; development of a hydraulic modelling system; masterplan updates; development of a GIS asset database; and stakeholder management and publicity.

A third contract win has been awarded by SC Compania Aquaserv to an AECOM-led joint venture formed with Safege and Tractebel Engineering. The scope of work mainly consists of supervision of 16 working contracts for drinking and wastewater systems in the counties of Mures and Harghita, including works supervision activities and quality control both during and post construction. ●

water utility management INTERNATIONAL

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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.

PUBLISHING

Publisher
Michael Dunn

Water Utility Management International is published four times a year by IWA Publishing. Statements made do not represent the views of the International Water Association or its Governing Board.

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W: www.iwapublishing.com

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

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SUBSCRIPTIONS

Water Utility Management International is available as either a print or an online subscription.

2011 price (4 issues):
£212 / €320 / $423
(IWA members: £181 / €271 / $344)

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Or visit:
www.iwaponline.com/wumi/default.htm

ISSN (print) 1747-7751
ISSN (online) 1747-776X

IWA Publishing

Approval for Aqua Maine acquisition

The Connecticut Water Service announced recently that the US State of Maine Public Utilities Commission has approved the acquisition of Aqua Maine, a subsidiary of Aqua America.

Connecticut Water announced back in July that it had reached an agreement to buy Aqua Main in a transaction estimated to be worth $53.5 million, but approval was only granted recently.

The commission agreed a settlement that gives regulatory approval for the purchase, concluding that the acquisition 'is in the best interest of customers'.

Aqua Maine will change its name to The Maine Water Company, and the agreement entails it not seeking a rate increase for any of its divisions in 2012, and that there will be no short- or long-term rate or service impacts due to the ownership change.

The commission had however approved significant rate increases of around 9% in three of Aqua Maine's divisions back in October teamed with a reduction of the amount of water included in the minimum base charge.

One key stipulation under the agreement to the purchase was that the customer information system and all customer service policies and procedures remain in effect under the new regime.

When complete, the transaction will give Connecticut Water an additional $33.7 million rate base in Maine and increase its customer base by 18%, making it the largest US-based, publicly-traded water company in New England, with 106,000 customers. ●

EBRD participation in Tajikistan

The European Bank for Reconstruction and Development is providing up to $7 million to Tajikistan to support the country's efforts to supply clean, safe water.

After the successful refurbishment of the water supply system in the north and south of the country, the bank has announced its participation in the Central Tajik water project, for new clean water projects in four additional cities at the request of the central government.

Tajikistan is a country rich in water resources, the bank explains, though the quality of the water supplied to citizens is often dangerously low with intermittent supply, particularly in the summer, which leads to outbreaks of waterborne disease, and many people refusing to pay their water bills.

Clean water is one of the EBRD's priorities in the country, according to the new country strategy. The new EBRD loan with a sovereign guarantee to the Khojagii Manziliyu Kommunali State Unitary Enterprise will be on-lent to water companies in Gissar, Shachrinav, Somoniyon and Tursunzoda.

The overall project cost will be met by supplementary grants. The EBRD Shareholder Special Fund has approved a grant of $2.6 million for the project. The EU Investment Facility for Central Asia is considering a grant of €6 million ($8.1 million) for the same project.

Significant technical cooperation, funded by the EBRD and international donors, will help the water companies improve their performance.

Lin O'Grady, EBRD's Deputy Director for Municipal and Environmental Infrastructure, said: 'We want to bring innovation to Tajikistan in terms of financing, including financing municipalities together with other big international financial institutions and donors. Improved quality and supply of water will stimulate the payment of water bills, helping the water companies to become self-reliant.' ●

Wastewater investment for Tehran

The utility providing wastewater services to Iran's capital, Tehran Wastewater, has agreed an €240 million ($320 million) loan from the Islamic Development Bank for wastewater projects. The loan will be used to construct two waste-water treatment plants in the Tehran region, according to local news agencies.

Asghar Riyazati, Tehran Wastewater's managing director, told local press that the organisation will need around $1.2 billion to modernise the wastewater collection and treatment facilities in Tehran. The World Bank has already provided an initial $145 million loan for the capital's wastewater collection system.

Veolia wins Montauban concession

Veolia Water has won a nine-year public service concession for water production and distribution from the Montauban municipality in France. The contract is worth an estimated cumulative revenue of €46 million ($61.5 million). The municipality wants to improve its service performance for targets such as leak reduction, and these targets have been included in the contract.

Veolia Water will also implement remote meter reading, which will enable it to warn customers in real time of abnormal consumption patterns. Montauban has also set a target for the operator to reduce the price of water by 5%.

Chinese consultation on urban drainage and wastewater

The Chinese government has released a draft regulation on urban drainage and wastewater treatment for public consultation. The draft rules promise an increase in the budget for building drainage and wastewater networks and treatment facilities, and encourage non-public investment in the sector, according to local press.

According to the draft, once the construction plans for the projects are adopted, they should be strictly implemented instead of using the land for other purposes. Stormwater and wastewater networks should be separated in all cities, and the government will work to update old combined systems.

Both institutions and individuals will have to discharge wastewater into the urban sewerage networks in line with government requirements. Wastewater for major locations such as hospitals, restaurants and construction sites will have to process their wastewater before discharging to sewer, and will need certificates of discharge from the government to do so, the draft document says. Construction projects should not affect the operation of wastewater networks or treatment facilities, it adds.

Funding for Brazilian wastewater treatment

The Inter-American Development Bank has approved a $452 million loan to improve sewage collection at Baía de Guanabara, one of Brazil's best-known tourism landmarks.

The funds will allow the Rio de Janeiro state government to advance implementation of the sanitation programme for the municipalities of Baía de Guanabara, a region that is home to 10 million people.

The programme is part of the Sanitation Pact, a plan approved in April aimed at expanding sewage collection to 80 percent of the state's population by 2018.

Tri-Tech subsidiary wins Indian wastewater contracts

Turnkey engineering solutions provider Tri-Tech has announced that its subsidiary, Tri-Tech Beijing, has won contracts worth a total of $42 million from Bihar Urban Infrastructure Development Corporation.

The work will encompass engineering, procurement and construction of three sewerage collection system and wastewater treatment plants for Hajipur town ($19 million), Begusarai town ($12 million) and Buxar town ($10.6 million) in the state of Bihar, India.

Leakage and maintenance failings in England and Wales

The 2011 levels of service report from England and Wales' water and sewerage economic regulator Ofwat warns that although companies continue to deliver good levels of service to most consumers, there are still areas for concern.

The report brings some good news, but six companies failed to meet their leakage targets – Anglian, Dwr Cymru, Northumbrian's North East operating area, Severn Trent, Southern and Yorkshire.

The report also identifies seven companies that need to do more to maintain their underground infrastructure: Anglian, United Utilities, Northumbrian, Severn Trent, Southern, Veolia Water Central and Yorkshire, and warns of a high number of supply interruptions to customers, with particular concerns about Severn Trent.

As a result of Ofwat's concerns, Yorkshire Water has agreed to spend around £33 million ($53 million) of its own funds tackling leakage and improving its pipe network. Southern Water will return £5 million ($8 million) to its customers for failing to deliver its planned leakage reductions. Ofwat has also put Anglian, Dwr Cymru, Northumbrian – North East, and Severn Trent on report for their leakage failures.

Contract award for Manila wastewater plant

OTV, a subsidiary of Veolia Water Solutions & Technologies, in partnership with civil contractor Sta Clara, have won a $62 million dollar contract to design and build Manila Water Company's Marikina North wastewater treatment plant.

The wastewater treatment plant has been designed for a treatment capacity of 100,000m^3/day.

A new sludge dewatering facility will also be provided, as well as an odour treatment system and noise abatement measures. The new plant is due to be commissioned in 2013.

Support for Rosvodokanal investment across Russian cities

The European Bank for Reconstruction and Development has provided a R1.5 billion ($48 million) loan to Rosvodokanal (RVK), Russia's biggest private sector water operator, to upgrade the services it provides to five million people in seven Russian cities and to fund further regional development projects.

This funding will be matched by a loan of a further R1.5 billion which Russia's Bank for Development and Foreign Economic Affairs, Vnesheconombank, will advance as part of a fund-raising operation for RVK closely coordinated with the EBRD.

The EBRD advanced an initial R1.5 billion ($48 million) loan to RVK in 2008. Since then, the utility has invested some R5 billion ($160 million) in its water company assets, an unprecedented financial commitment in today's Russian water sector, the bank notes.

The EBRD notes: 'In the local market where there is little private sector interest in funding infrastructure projects for longer than five years, the EBRD's 13-year loans provide the long-term finance essential for such an ambitious programme of capital expenditure projects to modernise the supply of drinking water and treatment of sewage.'

RVK's programme of work focuses on upgrading and constructing water extraction facilities, modernising and extending water networks, energy efficiency improvements, installing automated control systems, and improving wastewater collection networks and treatment facilities.

The proceeds of the new EBRD loan will in the first instance finance investments in three important regional centres: Tyumen, Tver and Orenburg. ●

Service improvements for Buenos Aires

The Inter-American Development Bank (IDB) has approved a loan for $200 million to expand and improve water and sanitation services in Buenos Aires and its suburbs.

The loan is the second in a conditional line of credit for up to $720 million approved by the bank. An initial $200 million loan in 2008 funded investments by the Argentine government to reduce the gap in water and sanitation coverage by 18% and 11%, respectively, in Greater Buenos Aires between 2006 and 2010.

With this second loan, the government will continue to expand these services in priority suburban areas such as La Matanza, Morón, Hurlingham, Tigre, and Lomas de Zamora.

The expansion of sanitation services includes construction of wastewater networks in the municipalities of Tres de Febrero, Hurlingham and Ituzaingó that will benefit 110,000 people, the expansion of a treatment plant in Hurlingham to benefit 300,000 people, and the construction of a collector and pumping stations in Tigre to increase system capacity for an additional 280,000 inhabitants.

The project includes a plan for reducing unaccounted water by minimizing losses, ensuring continuity of service, and reducing operating costs by optimizing distribution. These measures will save about 7500 cubic metres of water daily.

In addition, the programme will rehabilitate water networks and improve operations of a purification plant in General San Martin, which serves a population of 4.8 million. This project will increase water production by 150,000 cubic metres per day.

The programme will be carried out by Agua y Saneamientos Argentinos, the utility responsible for service provision in Greater Buenos Aires. ●

Suez reduces net profit for 2011

Suez Environnement has reduced its target for net profit in 2011 to €300 million ($415 million) from €425 million ($568 million) after taking a charge related to what is being called 'adverse weather and social problems' in construction of a desalination plant for Melbourne, Australia.

Suez booked a total charge of €185 million ($247 million) after a full review of the construction of the plant, it said in a recent statement. This is on top of an €52 million ($70 million) charge already included in the first half of the year.

The utility will, however, book an extra €40 million ($53 million) net profit from the sale of its controlling stake in utility Bristol Water Group.

Over the first nine months of the year, earnings before interest, taxes, depreciation and amortization rose to €1.85 billion ($2.47 billion) from €1.7 billion ($2.27 billion) the previous year, while revenue for the period increased 8.3% to €10.98 billion ($14.68 billion) from €10.14 billion ($13.56 billion) in 2010.

The annual dividend has been maintained at €0.65 ($0.87) per share. ●

Pressure group offers scrutiny of Canadian performance on source water protection

The latest five-yearly 'Waterproof 3' assessment by Canadian green pressure group Ecojustice offers an assessment of how the country is progressing with implementation of source water protection measures as well as other measures to ensure safe supplies. **LIS STEDMAN** reviews the assessment.

The latest 'Waterproof 3' report from green pressure group Ecojustice looked for the first time at source water protection (SWP) and found what the groups says is a 'staggering disparity' between jurisdictions in terms of the number of water sources and percentage of populations receiving water from systems protected by legally-binding SWP. These range from none at all in Alberta, the Northwest Territories and Nunavut to a high of 92% in Prince Edward island. Some provinces are on track to create 100% coverage for SWP in the coming years, the report predicts.

The report notes that the federal government's record for the protection of drinking water 'continues to worsen'. There has been little improvement in the quality of water in First Nations communities and no progress on the legislative front, it points out.

Ecojustice also warns that the federal government 'is putting ideology before public health by making some drinking water improvement funds available only on the condition that local municipalities engage in public-private partnerships. Government should make these resources available to all systems and prioritize distribution based on need.'

The 'right to water' may force the federal government to finally begin fulfilling its responsibilities under Canadian law, the authors suggest.

The 'right to water' may force the federal government to finally begin fulfilling its responsibilities under Canadian law, the authors suggest.

The federal government was given a lowly F in its report card for what is seen in the report as multiple failings. Only Ontario received an A, because it has the most well-funded and ambitious programme to protect source water, and its standards for water treatment, testing and reporting are as strong or stronger than other jurisdictions.

In detail, Alberta gets a C-, down from a B in the last report, with a note that the province 'has ranked well in Waterproof reports for strong treatment and testing provisions. Those efforts have remained at a consistent level while other jurisdictions continue to improve.'

British Columbia remains at a C+, with a note that its 'legislation related to treatment, testing and contaminant standards is weaker than most other Canadian jurisdictions'. Manitoba moves to B+ from C+, with an observation that it has 'significantly improved requirements for treatment and testing' and recently enacted a robust statutory scheme to create SWP plans.

New Brunswick moves from C- to B+, due to improved standards for water treatment and testing, and a long track record for SWP.

Newfoundland and Labrador moves from D to B, for its improved water standards and testing requirements, and the Northwest Territories lost ground from a C+ to C with a note that it has 'improved water treatment standards but has not implemented an operator certification programme'.

Nova Scotia moves to A- from B, for a long-standing SWP programme, and strong measures for drinking water treatment, standards and testing. Nunavut moves down to a D from a C as it has not engaged in SWP planning and the report warns that its standards for basic disinfection 'are weaker than most Canadian jurisdictions'.

Ontario goes to an A from A-, with the report labelling it as having the most well-funded and ambitious programme to protect source water, and standards for water treatment testing and reporting 'as strong or stronger' than other Canadian jurisdictions.

Prince Edward Island moves to B- from C-, for a long-standing SWP programme and improved treatment, testing and reporting standards. Quebec slides to B- from B+, because its SWP planning efforts are not as advanced as other jurisdictions, though the report notes that its standards for water treatment, testing and reporting are very strong.

Saskatchewan remains at B-, with a 'robust' SWP planning programme, but final plans that are not legally-binding. Yukon slides to D+ from C-, having engaged in some SWP efforts and bringing into force a number of proposed improvements to its drinking water regulatory regime.

The federal government remains at a lowly F grade, with the report observing: 'The Federal Government has made little progress in improving water in First Nation's communities. Budget cuts for Environment Canada and other agencies will likely hinder water protection efforts.

'The Federal Government is using drinking water funding to push an ideological agenda by making some funding only available to water systems that engage in public-private partnerships.'

The report recommends that all provinces and territories should create SWP plans, noting: 'Where SWP forms part of a larger planning process, it should be explicit that drinking water has the highest priority for water use and that other land uses will be limited or prohibited as necessary to protect drinking water quality.

The plans should be 'science based, widely inclusive, and receive provincial approval and commitment through which the plan becomes legally binding'.

On treatment, testing and distribution, the government should commit to reviewing and implementing as appropriate the recommendations of the Walkerton Commission of Inquiry, the report says. Disinfection should be required for all source water supplies. Filtration or an equivalent treatment should be required for surface water supplies and groundwater supplies subject to the influence of surface waters.

Utilities should report test results, it says, along with missed sampling and equipment failures, to provincial or territorial agencies. Suppliers should periodically prepare 'right to know' reports for their customers.

The federal government is warned not to make proposed cuts to critical environmental monitoring and key staff positions in Environment Canada, and urged that cuts already made be reversed. ●

A private sector perspective

The latest edition of the Pinsent Masons Water Yearbook offers its annual insight into private sector activity in the water sector worldwide. **KEITH HAYWARD** spoke with its author, **DR DAVID LLOYD OWEN**, about the ongoing rise of regional and national companies in the market, the changes in financial investor interests in the sector, and the indication that 2011 has not been a good year for contracts.

Much of the value to be gained from the annual perspective of private sector activity offered by international law firm Pinsent Masons' Water Yearbook comes from the evolution of the global picture that emerges from the analysis prepared by its author, Dr David Lloyd Owen. This year it is worth noting a change over a somewhat shorter timescale: the report appears to flag up something of a recent stalling in activity. It takes time for details of contracts to filter through, and in any case data for the current year only runs to the end of August, but it seems clear that 2011 has not been a good year for private sector gains, with only eight new contracts identified (see Table 1).

'I'm reading between the lines here, but I do suspect one of the things has been [that] generally getting finance together for projects has been a bit harder for everybody,' comments Lloyd Owen. 'We saw in 2008/2009 there was a bit of a sag and then in 2010 things bounced right back up and people thought things were getting better, but the mood for a lot of this year has been a lot more anxious. That's purely an impression.'

But in other ways the report continues its longer term charting of developments. The current estimate for the number of people served by the private sector is put at at least 909 million worldwide, representing 13% of the global population. The overall number of companies and countries involved has changed little over recent years but both have continued to rise marginally, with 167 companies in 31 countries identified, with the most marked increase having been in the number of companies from advanced developing countries. The revised forecast for the number of people expected to be served by the private sector in 2015 is 1192 million people, or 16% of the population, with the proportion projected to rise to 21% by 2025.

One of the trends that the report continues to highlight is the way private sector provision has shifted away from so being heavily dominated by just a few companies. The total population served by the 'big five' of Suez, Veolia, Saur, Agbar and RWE is broadly similar to what it was a decade or so ago, but now represents around 30% of the total supplied by the private sector, rather than the 70% it represented a decade ago.

'There has been a shift from global / quasi-global water companies to more localised, either regional- or national-based companies,' says Lloyd Owen.

Lloyd Owen highlights one of the reasons behind this. '[It is] probably because, for example, the problem with using hard currency for debt and repaying it with a soft currency, and sub-sovereign debt, has not really been solved satisfactorily. The problem is, when you have a concession running for decades, the chance of big perturbations between a hard and a soft currency simply cannot be ignored…. If you can get your funding in the same currency as your tariff's being paid, that takes out a huge risk element, and I think that's one of the things which we are reflecting.'

> ***'It's up to funders to appreciate that a properly managed water project usually can present a very low risk in most countries.'***

A result of this is that there has been less international funding coming into a sector with what are considerable needs. 'There are ways of dealing with this, but at the moment I'm afraid I find the financial and government sectors extremely reluctant to take them on,' comments Lloyd Owen.

He adds a further reason for the shift in the make-up of the sector: 'The other one is there's definitely been a tempering of global ambitions anyway by major companies, and we know that both Suez and Veolia are certainly pondering their strategy because they've both had quite a tricky year.' This said, it should be noted that both of these companies have increased the total population they serve over the last decade. 'I don't expect to see any huge withdrawals, but certainly they are looking at everything with a very critical eye,' continues Lloyd Owen. 'Then of course the likes of RWE, Saur and so on and so forth have wound down their international activities and [are] concentrating much more on their home markets. But

Table 1: Water operators with financial sector parent companies

Operating company	Private equity / bank
ESSCO (Chile)	Aguas Nuevas (Chile)
Utilities Inc (USA)	AIG (USA)
Cambridge Water (UK)	Alinda Infrastructure Fund (USA)
South Staffs Water (UK)	Alinda Infrastructure Fund (USA)
Rosvodokanal (Russia)	Alpha (Russia)
Bristol Water (UK)	Capstone (Canada)
Park Water (USA)	Carlyle Group (USA)
South East Water (UK)	CDP Quebec (Canada) / Westpac (Australia)
East Surrey Water (UK)	Deutsche Bank (Greman)
Fingestion (France)	Emerging Capital Partners (USA)
Southern Water (UK)	JP Morgan (USA)
Aquarion (USA)	Macquarie (Australia)
Thames Water (UK)	Macquarie (Australia)
ANSM (Chile)	Ontario Teachers' Pension Plan (Canada)
ESSBIO (Chile)	Ontario Teachers' Pension Plan (Canada)
ESSEL (Chile)	Ontario Teachers' Pension Plan (Canada)
ESVAL (Chile)	Ontario Teachers' Pension Plan (Canada)
AWG (UK)	Osprey Acquisitions (Canada)
Kelda Group (UK)	Saltaire Water (UK)
SAUR (France)	Séché Environnement, CDC and AXA (France)
Portsmouth Water (UK)	South Downs (UK)
Mid Kent Water (UK)	Westpac (Australia)

Source: Based on Pinsent Masons Water Yearbook 2011-2012

of course there's still business to be done, and that has created a void for more local and regional players to come in.'

Lloyd Owen adds at this point that one result of the shift is that, in his opinion, the world is missing out on access to considerable expertise. 'It's a pity that that's being lost, but perhaps what we'll see in the future in compensation will be much more exporting of consulting and support and technical assistance and so on and so forth; so I do hope that's not a one-way street.'

A changing company landscape

'We are now starting to see a new generation of companies stepping up their activities,' continues Lloyd Owen. Here he points, for example, to Spain's FCC Group, which now serves more than 28 million people and owns Aqualia, and to Singapore's SembCorp, which acquired Cascal last year. 'They're now on their way to becoming quite a significant player in the long run,' adds Lloyd Owen.

Allied to this, in this year's publication Lloyd Owen draws attention not just to the huge level of activity that has been underway in China but to the other large countries of Brazil, Russia and India also. 'It is evident that the BRIC acronym has an increasing global resonance as well. In particular, India and Russia are now developing at a rate which may not have been foreseen a few years ago,' he states in the publication. Lloyd Owen notes therefore what he describes as 'single country entities', such as SABESP in Brazil, which serves over 26 million people, and China's Shanghai Industrial Holdings, Beijing Capital and Beijing Enterprises Water, each serving in the region of 20 million, as well as Chongqing Water Group, which has a potential customer base already in excess of 30 million.

'One of the things people are really starting to understand now is that every city, not just every country, but every city has its own individual characteristics when it comes to water,' says Lloyd Owen. 'Companies, to do good business in other countries and other markets, really do need to be able to get a very tight handle on what the local factors they're dealing with are. It is not a one size fits all market to say the very least.'

These differences arise from the local resource, political, economic, social, and geographical circumstances. 'I think [the] degree of localism that we're now seeing reflects the understanding [of] the distinctive nature of every individual water contract,' adds Lloyd Owen.

Financial sector interests

One of the other areas in which Lloyd Owen has highlighted developments in the latest publication is the extent to which what are essentially financial investors now hold water companies. He notes 21 companies that are now owned in this way (Table 2), in France, USA, Chile, Russia and the UK, and points out that Canadian companies have stakes in two English, three US and four Chilean companies, stating in the report: 'This counts as a trend.'

Some companies are held by private equity investors, but Lloyd Owen contrasts this type of interest with that, say, of Australia's Macquarie, which has declared a long-term intention for its control of the UK's Thames Water. 'It very much depends on individual circumstances,' says Lloyd Owen. 'We had this rather manic period a few years ago, of private equity companies buying water companies in the hope of selling them on at a quick profit… A few did certainly make some very good returns a few years back; today that's not the case. I suspect in the general we've seen a shift from relatively short-term investment deals into much longer term ones.'

Of Macquarie's involvement, Lloyd Owen notes: 'There's no doubt that Macquarie sees Thames as a decades-long investment and one which they believe that they can get a regular stream of dividends from.'

He can see the value in this type of involvement with water sector. 'I guess that at that sort of level, so long as you can get it right, you could probably get a better what you might call yearly pay-out from a water utility than you might from a portfolio of bonds,' he says.

This is not to say that any enthusiasm for the water sector on the part of financial investors such as infrastructure funds is likely to extend to, say, project-based investments. 'As things currently stand it's a much more challenging market to go directly into that, and generally speaking attempts to develop that sort of financial model have not been a success,' says Lloyd Owen. 'When you are looking at individual projects [there is] quite a different sort of risk profile than what you get in a toll road project and so on and so forth. And the water project market, compared to other infrastructure sectors, is rather more political and rather smaller. The size of projects, generally speaking, is pretty small compared to the infrastructure-type projects we normally see. It's only really attractive to infrastructure funds when they're very substantial projects and we haven't seen many of those in recent years. The problem really is that a great deal of the contracts are of quite a compact nature and until that changes, that's going to remain a difficult area to do business in.'

Certainly wider financial sector interest in the water sector is going to be tested over the coming period, particularly as the traditional key market of Europe enters further into its period of austerity. 'It all depends on being able to get hold of funding,' comments Lloyd Owen. 'Unfortunately market sentiment is, generally speaking, very difficult at the moment and that is the great challenge.' That said, Lloyd Owen offers what could be seen as an opportunity for the sector: 'It's up to the funders also to appreciate that a properly managed water project usually can present a very low risk in most countries. Generally speaking, in Europe and America [the] default rate on water bonds, for example, is exceptionally low.' ●

To download the Pinsent Masons Water Yearbook 2011-2012, visit www.pinsentmasons.com.

Table 2: Private sector contracts awarded 2001-2011

Year	Water		Sewerage		Both		Total contracts
	Contracts	Served	Contracts	Served	Contracts	Served	
2001	18	25.9	11	26.5	31	42.4	60
2002	13	15.7	14	11.6	20	24.7	47
2003	33	38.5	26	24.4	25	50.7	84
2004	46	32.7	48	23.6	23	52.9	117
2005	41	42.5	41	35.4	19	70.1	101
2006	27	33.5	41	26.2	12	50.7	80
2007	41	39.2	45	22.2	11	54.6	97
2008	35	22.6	69	31.5	16	46.1	120
2009	21	10.1	52	20.3	6	29.5	80
2010	18	22.4	52	29.5	8	51.1	78
2011	3	4.5	4	2.3	1	5.7	8
Total	296	287.6	403	253.5	172	478.5	872

Population served in millions of people. 2011 figures are those identified up to the end of August 2011.
Source: Based on information presented in Pinsent Masons Water Yearbook 2011-2012

A lighter touch for water and sewerage service regulation

Ofwat, the economic regulator of water and sewerage services in England and Wales, has recently released its consultation on the future framework for price limits, which outlines a more customer-inclusive approach to service provision and a move towards increasing competition. **LIS STEDMAN** spoke to **KEITH MASON** about Ofwat's vision for a more flexible approach to service regulation.

Keith Mason, the financial director of Ofwat, explains that the regulator's proposed new approach to methodologies and tools is part of a pattern – before the last review, at the same period in the AMP (asset management plan) cycle, a consultation on the methodology for AMP 5 was published.

The new consultation, he says, has two elements. 'What this is trying to say is that these are principles we might use for a number of reviews. For the precise methodology for the next review, we will do a detailed consultation in October 2012 that we will finalise in March 2013. The companies will have opportunities to look at the math from next October. We may want to test some things early with workshops, but this will vary according to the area.' Given the detail in the new framework paper, the companies will 'probably have got a bit more insight' he notes.

In terms of the likely methodologies and tools, he says: 'Of the themes we've got running through the framework paper, the key one is about simpler and better incentives'. Ofwat describes the current system in the paper as 'too inflexible, opaque and potentially confusing', but Mason notes that setting wholesale control will involve 'quite a few' methodologies from the past, 'providing they meet the simpler, sharper test'. He says: 'People have raised the issue that companies are too focused on achieving specific outputs and not how to achieve over time the things that customers want, such as reliable drinking water, and accurate and frequent billing. Focusing on outputs may mask innovation.'

Another key theme of the methodology is getting the companies to involve their customers. All of them, and Ofwat itself, have done customer surveys, but Mason observes that these 'can be quite difficult to interpret. Companies will say to us, "you can't cut that project, our customers want it" – we don't want to get into that. We are saying involve customers in the business planning process earlier. We are looking to see how good their customer engagement is, and the customer reaction to it.'

This would involve customers looking at the entirety of the company programme and the price tag and if the response is enthusiastic then, Mason says: 'We may have slightly less scrutiny providing customers are happy – they are paying the bills – and the programme meets EA and DWI outputs. We will use a lighter touch.'

This strengthened customer engagement will take the form of local customer engagement forums. 'It will be for the companies to decide how they want to do it, but the local Environment Agency and CC Water would definitely need to be involved,' says Mason. 'The forum would need a strong, independent chair to pull everything together – this is a role to make sure engagement happens fairly, that the company has dealt with the views or has said, if it couldn't, why.'

The process is based on outcomes, he says, 'because these are longer-term measures. The companies will have to look at where they want to go and how they move towards this, and set milestones along the way. It is here at the milestones that we will be able to see if they are on track to deliver. If not, we have still got powers to ensure they do, but we will only be using them to ensure they deliver.'

The companies have always been tasked with delivering their programmes, Mason notes, but have relied on Ofwat to set the direction – the new approach will turn this on its head, and the companies will be responsible for charting their own course to their agreed outcomes.

The paper also contains elements (as does the newly-released Water White Paper from Defra – the UK Department for Environment, Food and Rural Affairs) to encourage competition – setting separate prices for wholesale and retail services being the main strand. Mason notes that although competition has not yet really taken off 'it is not for the want of trying'. He adds: 'The moves towards competition have been small and have been incremental. The last was in 2003, and what really scuppered that was the process set down in black and white in the legislation and the playing field being slightly slanted towards the water companies and away from the entrants. When it was done in that way nobody would take it up – companies would not make a margin or a profit.'

The Water White Paper commits to reducing the size of customer that can take part in competition to 5Ml/year, the lowest level possible without additional legislation, but also to take this down to zero eventually. 'What we are doing to separate out the retail price will work in the same way to encourage competition for efficient companies,' Mason explains. 'It is about establishing a level playing field.' Separate price controls will be an incentive in their own right, he adds.

The proposed water trading mechanism and optimizing the use of networks are areas where Ofwat felt incentives were needed, according to Mason. 'The level playing field will make sure an incoming company can get the same deal as an incumbent putting water into the network or taking it out. It is easy for people with their own networks and that are an integrated company.' It is about having incentives to treat everyone equally, he says.

Water trading will make sure any surplus will have a beneficial use – possibly making more profit by making a bulk supply, and ensuring the company that receives the bulk supply is not penalised, Ofwat will want to ensure people are not trading in areas where there is water scarcity, says Mason. 'Or rather, we do not want to be making a scarce situation worse. This could be done by having a notional charge – where water is scarcest, it is most expensive to abstract, so companies are incentivized to look at the cheapest sources first.'

Another area where an incentive needs to be built in is customer service – Ofwat launched the Service Incentive Mechanism (SIM) at the last review, and is pleased with the result. 'Companies seem to be reacting properly to it and we want to keep it,' Mason notes.

Ultimately, the paper is intended to reduce the regulatory burden, provide the companies with room to innovate and generate more competition in the market for business customers, as well as better, more responsive customer service. Mason concludes: 'The regulator can step back and do the job of regulating rather than getting involved in the nitty-gritty.' ●

See: **www.ofwat.gov.uk**

Management of change:

coping with non-revenue water in a Georgian water utility

For many years, chronic water losses have been a hallmark of the Georgian water utility Batumi Tskali, and a change of attitude was needed at all levels within the utility in order to understand that non-revenue water (NRW) reduction requires everyday monitoring and control as well as pipe repair and replacement. **MONIKA KONATAR** and **MATTHIAS HITZEL** outline the work undertaken by external consultant MACS to facilitate change within the utility, particularly with regards to staff attitude, and how a steering group of employees at different levels, once this change had been accepted, provided a nucleus to encourage use of initiative and a proactive approach to NRW reduction across the utility.

Batumi is the third biggest city in Georgia, with approximately 130,000 inhabitants, and is located in a sub-tropical environment on Georgia's Black Sea coast. Water supply and wastewater disposal services have been in place since the establishment of the city in the late 19th century, as some of the older parts of the current water and wastewater network show. It is no surprise that these sections are now severely deteriorated and need urgent replacement. Moreover, pipes laid in the 1970s and '80s are also in bad shape, due to poor maintenance during the Soviet era. Until quite recently, non-revenue water (NRW) has been reaching levels of around 90%, based on the measured water production and water billed to utility customers. Even though this high level of NRW is hard to imagine, it is a reality.

Although the water supply in Batumi has always been provided by one utility, the institutional setting of this company has changed a lot over time. For some time the utility was run by the central government, before being transferred to the municipality, and then being recentralized under the government of the Autonomous republic of Adjara. In 2006 this utility was liquidated to enable the foundation of a new municipal water utility with a clean balance sheet and no inherited accumulated debts and accounts receivable. The process was supported by MACS, an international consultancy from Germany which specializes in water as well as energy, which carried out a feasibility study in the framework of German-Georgian financial cooperation.

Based on this feasibility study the municipality of Batumi decided to implement a comprehensive municipal water and wastewater infrastructure rehabilitation programme, co-financed by Germany's KfW Development Bank. The programme started in 2007 and is currently ongoing.

From the start of the project MACS has assisted the municipality and the municipal utility (Batumi Tskali) in strengthening institutional and personnel capacities. The technical rehabilitation concept foresees the replacement of the deteriorated water and wastewater networks, the rehabilitation of reservoirs and pumping stations, and the construction of a wastewater treatment plant.

During the first phase of the project a focus had been laid on strengthening and sustaining institutional structures, management capacities and improving the commercial viability of the utility. For the past two years activities have been directed towards improving the technical operation of the network and treatment facilities.

Executive summary

Georgian water utility Batumi Tskali had been experiencing water loss of up to 90% from its deteriorating network, some of which that has been in place since the 1800s, with poor maintenance during the Soviet era contributing to pipe deterioration. In 2006, Batumi Tskali was liquidated to form a new municipal water utility, with support from German consultancy MACS leading to the implementation of an ongoing infrastructure rehabilitation programme.

This programme involves the rehabilitation of old water assets, and construction of new network sections and a wastewater treatment plant, but also includes a focus on strengthening institutional structures, management capacity and the utility's commercial viability. This holistic approach seeks to equip the utility with the capability to manage water loss in the long-term.

The MACS approach has been to apply change management to the utility – a series of planned steps to encourage positive change, particularly with regards to staff attitudes and performance. Staff attitudes were influenced by the management style of the Soviet era, with a top-down structure creating a separation of organizational levels and a highly autocratic leadership style. This led to utility staff working within a 'comfort zone' of only performing actions received through orders from the top, and the opinions of management regarding the lack of viability of water loss reduction actions having a strong influence on all staff in the utility.

As part of the actions to address this, a steering committee was created at the beginning of 2010, which brought together staff from different levels within the utility – management, middle managers, and the NRW team responsible for daily activities. A large shift in attitude was required from the steering group, from traditional practice to a more proactive practice, and resistance to change was at first experienced within this group, and from utility staff as a whole. The general opinion was that the new network would solve all NRW problems, so further actions regarding NRW reduction in both the old and new networks were unnecessary.

To ease the transition within the utility towards a new way of thinking, MACS focused on increasing adaptability to change through increasing awareness of NRW reduction. This included meetings, training sessions, monitoring of activities regarding operation and management, and the development of an action plan. The change was measured both at a technical level and a psychological level. It was seen that younger staff were more ready to accept change once they were given support and knowledge of how the programme worked. Also, once screening was undertaken of NRW loss in the new network, a change in attitude occurred within the steering committee as they saw that high losses were possible even from recently rehabilitated sections. This has formed a foundation for change, which is now being built upon.

The emphasis is on assisting the utility with the development of a strategic plan and the implementation of performance assessments for existing technical and commercial staff. The programme also includes the training of staff to improve the operation of the new state-of-the-art facilities. However, due to the very high NRW levels in Batumi, the strategic focus of the assistance of the technical branch is currently on NRW reduction.

MACS understood that the appropriate way to tackle the problem of high NRW levels cannot just be limited to detecting leaks, removing obsolete pipes and conducting flow and pressure measurements, as this approach might lead to short-lived improvements, but it would provide no basis for sustainability. Instead, a holistic approach has been followed by applying change management principles to all levels of the utility, and beyond. NRW, particularly if it has such dramatic dimensions, is understood not only by utility managers, but also by key municipal representatives as well. Even ordinary citizens who see leaks in the streets understand that action has to be taken.

Batumi's old town. Credit: T Dederichs.

Change management: mindset of staff at Batumi Tskali

During Soviet times, Batumi's water and wastewater utility was relatively well managed and well equipped. This was due to the fact that Batumi was a tourist destination, known all over the Soviet Union, and the quality and quantity of water resources were never a real constraint. Moreover, under communist rule operation costs, particularly energy and staff costs, were not considered a real cost item. The collapse of the Soviet Union however impacted on the utility's management, with the brand new wastewater treatment plant being abandoned. During this period of over 15 years, operational expertise and experience was not requested, and hence disappeared almost completely. What was most needed during this time of neglect was a talent for improvisation in order to maintain the continuation of the water supply, even if only at a rather low level.

Starting institutional development from a situation like this needs a clear-cut plan and a lot of patience. Even if the change concept is theoretically feasible, the rehabilitation of the infrastructure will take several years. During this period the utility needs a strategic and creative coexistence of proper operation and maintenance of the old network (an improved operation and repair regime) and an up to date operation and maintenance regime for the new network sections brought into operation. The rapid and accelerating pace of change on the operational front also requires significant changes amongst utility staff.

Therefore, a change management approach focusing on reduction of NRW in the utility Batumi Tskali was initiated. In this context, attitudes toward change – the benefits of change and the competence of employees implementing the change – were very important.

MACS applied change management as a systematic, analytical approach to enable business 'transformation' by encouraging positive changes. This included increasing competences as well as productivity, while improving staff performance. The approach uses a sequence of carefully planned steps or activities that a change management team or project leader can follow to create a platform for change within a project.

As part of the change management approach, a NRW steering group was created at the beginning of 2010. This group now has the responsibility to oversee the NRW project and guide its implementation. The steering group consists of the top management, the middle managers of the related technical and commercial departments, and the NRW project team responsible for daily operational activities. This has generated important momentum for the utility, as it represents a new, proactive way of working that did not exist before. During the Soviet period a hierarchical pattern of communication dominated, which was characterized by a strictly formal 'top-down' information flow. Establishing the steering group was a new concept for the utility as it had never experienced personnel from different organizational levels being put together, allowing all staff to contribute to the decision making process.

The NRW reduction programme – as a part of the overall organizational change process – was introduced during the first steering group meeting. However, despite agreement from all participants on the importance of NRW reduction, it became clear that when the implementation process started and the work plan was developed, utility staff had an obvious lack of understanding of the NRW reduction programme. Delays were experienced in achieving the requested performance levels, and the change concept was only slowly producing the expected results. This slow development indicated that there was resistance towards the new procedures and routines.

From a psychological point of view, resistance is a natural human reaction to change. It occurs because change creates uncertainty in the face of experiencing something new and unfamiliar. For the steering group, this change required a big shift from the 'traditional' practice, symbolized by strong 'command control' management style, to a more 'proactive' practice. As the main leadership style was highly autocratic, staff were not involved in decision making. Their opinions were not taken into account, and they only performed actions that were received

through orders from the top. As a consequence, staff languished in a comfort zone. Leaving this comfort zone brought uncertainty, which is based on fear of the unknown. As implementing comprehensive NRW activities requires additional knowledge and learning new skills, it is natural that staff resisted stepping out of the comfort zone. The old ways were simply more secure and 'worked well' in the past. For that reason, over many years no proper experience in the management of a functioning water supply network had been acquired and extremely high loss levels have been accepted.

When the transition actually started, many workers had a certain set of working habits and attitudes toward organizational change. NRW was perceived as a disease that would be cured through building a new network through a donor-funded rehabilitation programme. Once the new network was finalized, it was expected, losses will disappear. From the utility employees' perspective, any further actions regarding NRW reduction in the new and also in the old network were unnecessary.

In order to break down this argument, the steering group was confronted with the potential risks that could arise if proper operation of the network was not undertaken. It was highlighted that inappropriate operation usually leads to a further increase of the loss level, which will have negative consequences for ensuring the sustainability of the utility. As the construction of the new network was almost finished it was stressed that operating the network without addressing water losses will only initiate a vicious cycle of further inefficiency. Moreover, it was communicated that they have to work with an external advisor that could provide the necessary support to ensure the stable operation of the network.

Despite all these facts, the steering group strongly defended its arguments. At this point the situation in the old network was not convincing enough to change the utility's approach. On the contrary, resistance became even stronger knowing that the construction of the new network was almost complete. Additionally, the lack of understanding within the management made it difficult to motivate the NRW project team to do their job on a daily basis and provide the means to successfully and sustainably reduce NRW. The team believed that finding illegal connections and repairing the many leakages would only create additional, unnecessary costs and waste time, as the old network would soon be replaced by the new one.

Flow measurement by the Batumi Tskali NRW project team at a water supply transmission main. Credit: M Konatar.

From this perspective, personal consideration dominated and significantly biased the interpretation of the importance of NRW reduction. It was demonstrated that utility staff would behave in a way believed to be acceptable to the management and other colleagues, and would only hesitantly break ranks for fear of being rejected by the group. During the Soviet period, it was not safe to speak openly or share personal ideas or thoughts and the management had a strong influence on shaping employees' attitudes. For instance, it was very difficult to convince the staff that comprehensive leak detection activities were necessary for achieving a broad overview of the situation in the network. The more the staff expected the new network to solve all NRW problems, the more they were reluctant to report on leakages. The reason for this was the pressure put on them from the management level, which was avoiding having clear results that could reveal the reality of the leakage situation. Also, regular leakage reports would have invalidated the management's claims that the situation was 'absolutely acceptable'. Such information would have only led to additional work and justifications. In the utility, unwritten rules contributed to the accepted communication patterns, which had to be followed in order to keep an important status in the utility. Losing one's status meant losing important privileges and also security, as it was regarded as a proof that you were not respecting management decisions or management itself.

Taking into consideration all these facts, one could conclude that the attitude portrayed above was a big threat to the utility's growth. Maintaining a stable environment requires constant monitoring and adjustment as conditions change, and adaptable staff are also important. Influenced by many different factors, the environment was rapidly changing on daily basis, but the staff remained indifferent. As the gap between their perspective and the real situation widened, the staff remained trapped in their outdated, traditional approach, thinking that the new reality would not require any further interventions or adjustments on their part.

While looking for ways which could spark progress in the utility, MACS realized that Batumi Tskali's 'immature approach' regarding operation and maintenance of the network was the key for the further development and adjustment of the change management approach.

Change management: the MACS approach

In the presence of so many constraints and sizeable risks, MACS had to devise an approach that would enable a smooth transition and not provoke further rejection. When the NRW programme

was introduced, things came to a halt in Tskali. Even though employees understood the necessity for change, there was an atmosphere of confusion and resistance. MACS had to evaluate which direction the process was headed and what kind of measures we could apply to steer it. In this context, change management was used as an analytic framework, which provided MACS with an understanding of why people behave in a certain way.

When confronted with change, people may go through different intellectual and emotional stages, e.g.: resistance, acceptance, understanding, and commitment. Knowing exactly at which stage of change we are and what kind of situations and problems can be expected gives us the possibility to adjust our approach to new conditions quickly and take necessary actions in order to make a gradual shift from one stage to another. Looking from the theoretical perspective, change is about mobilizing people to move from thinking and behaving in way A to thinking and behaving in way B. In practice this movement is not easy to achieve. It is a complex and very sensitive process, as it is about changing people and their mindset. It requires a two-way dialogue between the external advisor and the utility staff, supported by appropriate communication, giving examples and providing adequate knowledge, listening to issues, evaluating the feedback and making adjustments.

As evident resistance had already been found, the next step was to find a way to make people act in order to bridge the gap between perceptions and the actual situation with respect to NRW reduction. As the utility's key staff were already involved by being part of the steering group, the goal was to steer the group dynamics in a direction that would ensure a stable continuation of the NRW reduction programme. Therefore, MACS focused on finding a way to increase the adaptability towards change through developing an organizational culture based on a readiness to accept change. This could be achieved by increasing awareness of the importance of NRW through active involvement of the steering group (or staff) in shaping a shared understanding of the general meaning of NRW reduction.

In this regard, several key activities were defined:

- To build up appropriate knowledge about the reduction of NRW, through introducing a comprehensive set of theoretical and practical trainings at the top management and middle management level
- To increase communication at all levels by organizing frequent meetings centred around the topic of NRW reduction
- To assist staff in setting up task priorities by developing an action plan
- To monitor (supervise) activities regarding operation and maintenance in the network at the technical and psychological level

Most importantly, the change progress was measured along two separate dimensions: a technical dimension and a psychological dimension.

At the technical level a detailed monthly water balance (comprehensive overview) was developed as the main progress measurement system.

At the psychological level the progress was measured through structured observations and informal interviews on a frequent, sometimes daily basis. In this regard, an employees' performance evaluation sheet was developed, which addresses the most important areas on the work place, like: interactions / communications, personal behaviour, planning and organizing, quality and quantity of work, leadership, required technical knowledge.

Structured evaluation was used as a basis for measuring the progress on the four already mentioned focus points. The main reason why MACS chose the approach of informal interviews was that the staff showed strong resistance and fear to more direct communication, such as formal interviews and questionnaires. The latter would only create tension and further problems, as utility employees would perceive MACS as an authority that only want to check (examine) whether the employees' meet the job requirements or not. Therefore, MACS had to develop relationships based on trust and support, on a common level. It had to avoid being viewed solely as external advisors that evaluate people and make personnel decisions.

In addition, MACS learned that formal communication would not provide relevant and correct answers. As the strong relationship component plays a very important role within the staff, responses would likely present an idealistic and misleading picture of the work atmosphere. MACS wanted to develop a relationship based on trust, showing that the main aim was to provide the utility with adequate support in steering the NRW process in the right direction. In order to get people to 'unlearn' old habits and to learn new skills, behaviours and attitudes, it was important to reduce uncertainty and stress and try to develop and promote the feeling of trust. In this respect, accompanying group members during their work day became an important segment of the approach in order to get a clear picture of the reality of their work practice and the staff's knowledge. By implementing comprehensive observations the staff's progress was monitored, and based on that further adjustments and development of the approach was assessed.

In close cooperation with the group members an action plan was

Implementation of water supply pipe laying works by contractors. Credit: T Dederichs.

developed; clear goals were established in an appropriate time framework. Based on staff needs for achieving the established goals, a training plan was developed to cover these needs. During this process it was noticeable how the change process influenced staff's behaviour in the group. As different generations of people were involved, the younger people, that started their careers during transition period, which is based on competition, showed a more favourable attitude towards change than older people influenced by Soviet tradition. The more support and knowledge the younger staff received during this process, the more they became aware of the programme's importance. The change was not perceived as a threat, it was perceived as an opportunity for building up skills and good practice.

The younger staff started to be active, trying out new behaviours and new procedures. They started to 'search for the meaning of NRW' by making their own choices and decisions, trying different approaches and testing new behaviours. The younger staff were encouraged to use their own initiative by giving feedback and mentoring, and by emphasizing that they will not be punished if they make mistakes.

As the rehabilitation process was improving fast, a large part of the new network was ready for taking over and operation. As part of the NRW reduction process, the steering group agreed that appropriate measurement should be taken in order to screen the situation in the new network. For the steering group this was an important moment in order to prove that everything is under control.

However, what the steering group found was something that discredited their own beliefs. The arguments supporting the steering group's former approach fell apart while the measurements proceeded. During the newly introduced night measurements, the NRW team discovered high losses in a part of the network that had only recently been rehabilitated. The result of the measurement was unexpected and shocking for the steering group: it showed very high night flow in the new network that could not be explained by a normal consumption pattern.

This revelation turned out to be the tipping point for the steering group, which broke the cycle of resistance and forced them to become more active and show more initiative. In the course of the overall NRW process that had developed the sensibility to NRW, management and utility staff realized that with the old passive approach nothing would be changed. A mere rehabilitation of the network proved not to be sufficient; coping with NRW had to be a continuous activity and part of everyday maintenance. Utility staff had to be actively involved at all levels by applying new knowledge through testing different approaches. Furthermore, staff became aware of the fact that if a large amount of supplied water is lost, meeting consumer demands will be very difficult. Since this water yields no revenue, heavy losses also make it harder to keep water tariffs at an appropriate level. Considering all these facts, the steering group has started a series of activities in order to deal with current circumstances. In this context, we could conclude that there was a gradual shift away from resistance. As key staff entered the phase of 'understanding' a foundation was finally laid for the utility to create change from within.

The steering group became the nucleus of this foundation and its attitudes, behaviour and activities have undergone a significant change. However, while there is now a foundation for change, the process is not yet beyond the point of no return. There may remain a number of gaps and incongruities which have to be dealt with. Not everything is fully settled and further adjustments need to be made to correct specific points and harmonize the whole. To reap the benefits of this change, it is necessary to review the new situations, to identify any remaining shortcomings and to correct them. Furthermore, more emphasis must be placed on active involvement of other departments in the case for change.

It is important to note that the tipping point could only be reached because the steering group followed – despite their initial resistance – the change process assisted by MACS' key activities. With continuous monitoring and a sensitive approach, the steering group and the utility's staff had to be assisted in questioning their own assumptions and beliefs. Now that the old mindset is put under question, there is a large chance that a solid foundation for future change has been laid.

Lessons learned

Change management is not a mere application of training tools in a given cultural context. Change management rather provides for an analytical framework and a starting point for reflections on how to understand people and their approaches. It is an approach to understand people's and organizations' way of thinking – and to make predictions on how they behave when confronted with new tasks.

Change will only occur when existing practice is discredited, while new alternatives are welcomed, in most cases under the impetus of an external factor.

Finally, the way how external advisors can influence the change management process is by applying a combined approach – psychological monitoring and technical advice. These dimensions have to go hand in hand. External support has to be very carefully administered in order not to increase resistance – by relying also on informal communication channels and building up trust. ●

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The Philippine Water Revolving Fund: *mobilizing private funds for public service delivery*

The Philippine Water Revolving Fund (PWRF) was conceptualized as a financing mechanism that leverages public with private sector funds in order to address the large number of Filipinos that have no access to a treated water supply. Here, **MARY JOY JOCHICO** and **ALMA PORCIUNCULA** review the experience of mobilizing private finance for public service delivery, the barriers to financing that had to be overcome, and the achievements to date.

Access to clean water in the Philippines remains far below its potential – rather than being an issue of water supply, it is instead access to finance compounded by a lack of compelling regulation that represent the largest constraint to increased coverage of water service delivery. At present, only 44% of Filipinos have access to household piped water, 10% have access to community faucets providing treated water, while the remainder of the population uses either untreated point source water or buys it from local vendors. The demand for water will never evaporate, and on the supply side, water service providers (WSPs) operate as natural monopolies within their municipalities. With such market dynamics, why has private sector financing for water service expansion remained so elusive in the Philippines?

This question was at the heart of USAID's Philippines Water Revolving Fund support program (PWRF-SP), which began in 2005 with the goal of increasing access to clean water by mobilizing private financing for water utilities. Traditionally, utilities have been funded by customer payments and an imperfect mix of public and donor monies. Long-term strategic planning at the utility level was complex at best, and at times an exercise of futility. Private Financial Institutions (PFIs) had no interest in the sector for a myriad of reasons, including weak financial and operational capacity at utilities, unclear utility creditworthiness, political risk tied to regulatory issues, and insufficient knowledge of the dynamics of the water utility marketplace. Through a holistic project design focused squarely on catalyzing private financing for the water

The Philippine Water Revolving Fund support program has helped secure safe drinking water for over two million Filipinos. Credit: PWRF-SP.

Executive summary

Many people in the Philippines still do not have access to a piped water supply, a situation arising from a lack of financing, unclear utility creditworthiness, political risk tied to regulatory issues and private financing institutions' (PFIs) lack of knowledge of the water sector marketplace. In order to address this, USAID (US Agency for International Development) set up the Philippines Water Revolving Fund support program (PWRF-SP) in 2005.

The PWRF-SP has four core financing interventions – the Water Revolving Fund mechanism, the LGUGC (Local Government Unit Guarantee Corporation) Credit Rating System, training on water project appraisal and technical assistance for project preparation. The PWRF mechanism allows for the co-financing of loans to utilities between private and government financing institutions, mitigating much of the risk for PFIs and providing a channel to attract private financing into the water utility marketplace. LGUGC plays a critical role in the use of the PWRF by providing a guarantee of up to 85% of a PFI's financial exposure, and serving as an interlocutor between PFIs and utilities. To address the lack of knowledge within PFIs of the water market, project appraisal training and a guidebook were put together, in order to engage them, along with LGUGC and the Development Bank of the Philippines, in an exercise to evaluate financially viable water investment opportunities. Technical assistance for project development and transaction support provided help for utilities to develop new projects for PFIs to invest in, providing knowledge on available financing facilities and the mechanics behind assembling a proposal to access commercial funding.

This set of technical products and training have led to as of the end of October 2011, the financial closure of 21 water supply projects, with a total cost of US$95 million, of which US$58 million came from commercial bank funds. These projects will provide safe water access or improved services to over two million Filipinos, and the financing structure for water sector projects has been changed to where private banks are now major players. USAID, through the PWRF-SP, is now addressing long-term policy issues needed to deepen and sustain investments in the sector, and is assisting the Philippine Government to establish a rationalization programme for the allocation of public resources, as well as looking into the potential of investment from pension funds.

utility sector, PWRF-SP accelerated the natural process of market development and helped transform the trajectory of financing water service delivery in the Philippines.

Constraints

In 2004, the idea of PFIs competing to finance a water and sanitation project in the Philippines was almost unthinkable. The state of water financing during this time was neatly summed up in a 2004 report (see box). Lacking an understanding of the sector and averse to taking risks in an unfamiliar market, PFIs simply refused to deal with water service providers. This unfamiliarity was brought about by both a lack of technical knowledge in evaluating water projects and an unclear and un-tested institutional and legal environment where the water utilities operate.

At the same time, a huge financing backlog in the sector compelled the Philippine government to look for ways to mobilize private sector funds. The government passed Executive Order 279 in 2004, which in part set the financing policy for the sector. Specifically it directed the shift of creditworthy water utilities to market-based sources of financing, which began the push to leverage public funding with private resources for water service delivery.

PWRF-SP interventions

Guided by this momentum, USAID and the Japan Bank for International Cooperation (now Japan International Cooperation Agency) worked in partnership with the Department of Finance to design a revolving fund for water supply and sanitation projects that leverages official development assistance with funding from PFIs. The revolving fund itself provided a facility to entice PFIs to enter the water sector, but to fully catalyze its use, the PWRF-SP supported complementary activities focused on minimizing risk and increasing understanding of water utility business models, and facilitate a robust deal flow. The sections below outline the following core PWRF-SP financing interventions:

- Water Revolving Fund Mechanism
- Local Government Unit Guarantee Corporation (LGUGC) credit rating system
- Training on water project appraisal
- Technical assistance for project preparation

Constraints on the private financing of water projects

- Regulations effectively block PFIs from initiating and nurturing banking / credit relationships with local government units
- Conservative lending practices of PFIs are not suited to the long-term financing needs of water districts

Source: 'Analysis of constraints to mobilizing private sector financing for water supply and sanitation projects in the Philippines' (2004). Prepared for USAID under the FORWARD Task Order.

Water Revolving Fund Mechanism

Water utilities in the Philippines have traditionally been funded by a mix of government (GRP) and donor funds Official Development Assistance (ODA). Creditworthy utilities accessed financing via government financing institutions such as the Local Water Utilities Administration (LWUA), Development Bank of the Philippines and Land Bank of the Philippines, using re-lending schemes of ODA funds. The remainder was supported by internally generated funds, some donor assistance monies, and in the case of local government units (LGUs), from internal revenue allotment. The system lacked performance incentives and the market-oriented rigor involved in competitive business investment planning. Moreover, public financing was grossly inadequate when considering the investment needs of the sector. The logical recourse is to tap private financing market, which currently is highly liquid, therefore has good appetite for new markets, and is operating under a low interest rate regime.

From a business case perspective, water utilities offer an attractive set of characteristics for private financing institutions. They are natural monopolies with regards to market access, require little to no marketing, and enjoy a permanent demand associated with the provision of a human need. Water supply in the Philippines, while increasingly facing the pressures of a growing population, is relatively abundant, and consumer willingness to pay for access to clean water is firmly established. So why, then, were PFIs so reluctant to enter the water utility marketplace?

PFIs admittedly had little knowledge of the water utility marketplace, yet some did have a proven track record of lending to LGUs for revenue generating infrastructure projects such as slaughterhouses, bus terminals, and hospitals (it is important to note that these LGU loans are general obligation loans and are backed up by pledge of annual internal revenue allotment from the national government). However, water districts, as autonomous government owned and controlled corporations (GOCCs) were different. Their revenue streams are tied to tariffs that are approved by a government entity, LWUA, which also had the power to grant waivers for private financing deals. This meant lending to water utilities involved an increased level of political risk in the eyes of PFIs. Other barriers to PFI entry into the utility financing marketplace were:

- Mismatch between PFI loan term limits and water utility long-term repayment models (15-20 years)
- Need for a cash-flow lending model since utility collateral is largely inaccessible (underground)
- Lack of readiness by utility managers with regards to business planning
- Risk, both an existing political risk as well as a perceived risk borne out of a lack of market information

The Philippine Water Revolving Fund

Following a detailed market assessment that teased out these and other market constraints, USAID, JICA, and the Department of Finance engaged a constellation of stakeholders to establish the first water revolving fund in the Philippines.

According to its design and implementation framework: 'The PWRF creates a long-term alternative to the current financing schemes that rely heavily on relending of official development assistance (ODA). It features the mobilization of domestic financing, initially from private banks and eventually from the broader financial and capital markets. Engaging private sector participation in water sector financing provides the means to mobilize the additional funding needed to meet water utilities' long-term investment needs, and require utilities to adopt more market-oriented business practices and develop more creditworthy and financially viable projects.'

The PWRF mechanism is simply a co-financing arrangement, by the Development Bank of the Philippines using, for its share, a JICA loan backed by a sovereign guarantee from the Philippine Government, and internal funds of private financing institution. The co-financing element comes when PFIs fund anywhere from 25-50% of a loan to a water utility – the resulting financial mechanism mitigates a substantial share of the PFI's risk and provides a channel to attract private financing into this new marketplace. By blending concessional and PFI financing, the PWRF mechanism offers:

- Affordable pricing - the resulting blended rate is lower than pure commercial financing would be for a 15-20 year tenor loan in an unproven market.
- Longer maturity – the loan to end borrowers has up to a 20-year tenor. To enable this, the structure includes a liquidity mechanism that provides the PFI an option to pre-terminate the loan on the tenth year. The PFI gets a credit-risk guarantee and is assured of a balloon payment equivalent to the outstanding balance of the loan from a stand-by credit line provided by the Development Bank of the Philippines and the Municipal Development Fund Office (for LGU loans).
- Alignment with PFI best practices - the PFI loan is taken at market terms, meaning that lending decision criteria and due-diligence are in line with each financial institution's lending practices. Thus, PFIs are not asked to compromise any of their terms to participate in the PWRF.
- Credit-enhancing guarantee – private financing institutions can apply for credit risk guarantee that covers up to 85% of their loan, which is provided by a private domestic guarantee corporation, the LGU Guarantee Corporation (which is backed up by a co-guarantee of the USAID Development Credit Agency of up to 50% of the Local Government Unit Guarantee Corporation's (LGUGC) exposure.

The PWRF mechanism itself created a platform to encourage PFIs to enter the water utility financing marketplace. However, realizing that financial mechanisms alone would not catalyze investment USAID's PWRF-SP supported development of two additional market enabling tools: a risk rating system and a project finance guide; as well as provision of technical assistance to water utilities in the updating or upgrading of project feasibility studies.

Pipe laying for drinking water supply. Credit: PWRF-SP.

LGUGC Credit Rating System

The Philippines' Local Government Unit Guarantee Corporation (LGUGC) exists to help mobilize private sector funding for municipal economic development. Backed by the GRP and USAID's Development Credit Authority, the LGUGC is a key partner in the PWRF equation with regards to credit enhancement. In each transaction, it provides a guarantee of up to 85% of a PFI's financial exposure – in the case of a default the LGUGC ensures the continuation of the amortization payments to the lender.

The LGUGC played a critical role in catalyzing use of the PWRF. Serving as an interlocutor with PFIs, it helped familiarize them with how to do business in the service delivery arena with LGUs and how to work with the Development Bank of the Philippines. Its guarantee, enhanced by the USAID co-guarantee, emboldened PFIs to lend to an unfamiliar market and enabled them to price competitively. Perhaps most importantly, the LGUGC helped create a risk rating system that added a deeper political risk dimension to PFI's traditional screening criteria.

To build this credit rating system the PWRF-SP contracted CRISIL, a subsidiary of Standard and Poors. The credit rating system is at par with international standards. It covers economic base, political, management, technical and financial risk assessment. It thus provides a comprehensive outlook on the creditworthiness of the borrower. The LGUGC credit rating of guaranteed borrowers is now de-rigueur and is an essential component of the credit appraisal.

The response of PFIs is summed up in this quote: 'BPI now applies two risk rating measures on water utility loans. The first system examines the paying capacity of the LGU and leans toward financial and managerial factors. The second is the LGUGC rating systems, which more effectively measures the political and regulatory risk that a financial institution finds more difficult to capture. By combining the two credit rating systems, we can offer more competitive rates to water utilities, and we are even beginning to apply a similar system to other sectors.'

The LGUGC credit rating system provides an independent and transparent lending standard, and allows utilities to understand how to improve credit scores and access cheaper financing. The rating system itself complemented the PWRF mechanism by offering more than a financial guarantee; it also gave PFIs a tool to better understand the marketplace. Along the same lines, the PWRF-SP helped PFIs understand the project financial viability through training on water project appraisal, complemented by publication of the Water Project Appraisal Guide.

Water project appraisal training and guidebook

With the revolving fund mechanism and an associated credit rating system in place, the next element in the financing realm was skills building in the area of water project investment appraisal. While many PFIs were eager to enter the market, the majority had no prior experience lending to water service providers. As the foundation of project finance sits in understanding business models, the PWRF-SP took this gap in knowledge as an opportunity to engage PFIs, the LGUGC, the DBP, and Water Districts in an exercise to evaluate financially viable water investment opportunities.

Prior to drafting the formal project appraisal guidebook, the team conducted a series of nationwide trainings on 'How to evaluate water projects' to familiarize bank officers with the technical, institutional, and financial dimensions of lending to water service providers. Modules covered:

- Technical concepts such as water supply development, hydrology, non-revenue water reduction, metering, tariffs, project design, among others
- Institutional landscape, including a primer on laws, regulations, and policies impacting the sector

- Financial appraisal, which incorporated forecasting on revenues, operations, and maintenance, as well as modeling payback periods and return on investment

The PWRF-SP team led training sessions in strategic sites to cover regional participants from 2007 to 2008, reaching over 200 senior and junior bank account officers from various commercial and government banks and the LGUGC. The workshops included speakers from various Water Districts, and the venues themselves became a networking platform for utilities and PFI loan officers.

Additionally, the sessions became a forum at which utilities could provide feedback directly to PFIs regarding concerns with loan processing inefficiencies and collateral requirements.

The culmination of these training workshops is embodied in the Water Supply Project Appraisal Guidebook for Investors and Decision Makers. Authored by PWRF-SP in close collaboration with industry experts, the guidebook increased the confidence of PFIs to enter the marketplace by turning the many moving pieces of a utility in to a cohesive business model. Response to the investment appraisal guidebook has been extremely positive - a VP from a partner PFI recently stated: 'The PWRF Water Project Appraisal Guidebook set the industry standard for project valuation – I brought it with me when I transferred to a new institution and I regularly use it to quiz my loan officers.'

In all, the Water Project Appraisal Guidebook alongside capacity building workshops gave private financiers the hands-on training to grasp utility business models and make smart lending decisions, ultimately helping chip away at the perceived risks tied to PFI inexperience in the sector.

Technical assistance for project development and transaction support

A prerequisite to attracting private finance in any sector is sound project development. Even as PFI interest in entering the utility financing marketplace began to grow, a dearth of viable projects held back the newfound momentum. Designing bankable utility service expansion projects requires coupling the skill sets of engineers and financiers to evaluate capital expansion requirements and the revenue streams that help define the programme's ROI. While utility staff generally have such skill sets, a number of factors complicate their ability to design projects. For many utilities, simply understanding the available financing facilities and the mechanics behind assembling a proposal to access commercial financing prevented them from developing new projects.

PWRF-SP staff identified motivated utilities, designed training modules, and delivered capacity building support in project development. Trainings were fashioned around technical and financial issues, and the intersections between them. The two progressive steps of this intervention were:

- Feasibility study improvement - in a mentorship role, PWRF-SP staff helped utilities improve or update water supply feasibility studies that would feed into pre-investment needs. Key focus was placed on finding avenues to enhance the bankability of projects, including improving the creditworthiness of utilities through producing a more viable project proposal.
- Project design and accessing finance - in step with improving feasibility studies, the team then focused on supporting utilities in final project design and completing the bid documents required by financial institutions. Leveraging the project's relationships with PFIs, we involved commercial banks staff as needed at this phase of project development.

The heart of this water supply feasibility study intervention was the critical translation of hard utility investment needs into cohesive viable projects that would entice commercial bank financing. The ability to design bankable projects using language and financial analysis expected by PFIs was a fundamental step in helping utilities access private sector financing.

Collective outcomes of financing interventions

This set of PWRF-SP interventions focused squarely on minimizing risk and building project appraisal capacity to lure PFIs into the utility financing marketplace. Three technical products were produced - The Water Revolving Fund Mechanism, LGUGC Credit Rating System, Project Appraisal Training and Guidebook - that together with training and relationship building began catalyzing investment interest in the sector. Market forces reinforced the momentum as interest rates were on the downswing and liquidity was high, so PFIs were aggressively looking for new opportunities. The credit rating system and project appraisal guidebook also gave utility managers a clear-cut understanding of how to obtain competitive rates from financial institutions.

Altogether this set of PWRF-SP financing interventions helped prime the supply side of the Water Utility Financing Continuum. To date, the PWRF initiative facilitated the financial closure for 16 water supply projects, with a total cost of US$93 million, of which US$57 million came from commercial bank funds. These projects will provide some 1.8 million Filipinos with safe water access or improved service.

More significantly the PWRF development changed the financing paradigm for the sector. Private banks are expected to be main players for financing at least the creditworthy utilities and bankable projects. It also highlighted long-term policy issues that should be addressed to deepen and sustain investments in the sector. One such is the need to define the investment policy for the sector. In this regard, USAID through the PWRF Support Program is assisting the Philippine Government establish a rationalization programme for the allocation of public resources. The programme includes defining the investment policy, aligning the allocation criteria for grants and subsidies to the sector objectives and developing the long-term financing models. The financing models involve a grant window for municipalities where more than 50% of the population does not have access to safe water supply; and a leverage credit facility similar to the PWRF financing structure. With the investment policy the Government will also commit to fund the program from budgetary or ODA resources, which will be leveraged with private sector financing. ●

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Guiding the water sector to financial stability

The Organisation for Economic Co-operation and Development (OECD) has been working for years to support improvements in the financing of water supply and sanitation. A new report brings together its guidance aimed in particular at governments, utilities and municipalities, and has been released in the run-up to the forthcoming World Water Forum in Marseille, for which OECD is leading efforts on a target of having countries commit to strategic planning for water supply and sanitation. **KEITH HAYWARD** spoke with **SOPHIE TRÉMOLET**, the lead author of the report.

'Effectively this report was designed to be a synthesis of existing OECD work. Obviously they have published a lot of different reports on the topic of financing, but they needed a document that brings it all together,' comments Sophie Trémolet, an independent consultant who was the lead author of a new report from the Organisation for Economic Co-operation and Development (OECD). 'The previous reports had partial pictures of specific parts of the puzzle, and the OECD certainly feels strongly that there's an ongoing need for explaining concepts and for putting things together, so that people understand the financing issue.'

Trémolet adds: 'Partly this is in preparation for the World Water Forum, where financing has been identified as one of the Conditions for Success.' Next year's Forum is being arranged around twelve Priorities for Action. These are underpinned by three Conditions for Success, one of which is Financing Water for All, with the other two being Good Governance and Enabling Environments. Eight targets have been drafted under the Financing Water for All activity. OECD is coordinating efforts under the first of these, along with the World Bank, with the target that: 'By 2015, a number of countries are aware of and have expressed support to the concept of strategic planning for WSS (water supply and sanitation) and most of these countries have engaged in the process of developing a strategic plan or have set a clear timeline for when to do this'.

The focus of the target, of having national efforts on water supply and sanitation based on strategic financial planning, is at the heart of the guidance offered in the latest OECD report.

Beginning with the benefits

The report, 'Meeting the challenge of financing water and sanitation – tools and approaches', begins by looking at the need for financing in water and sanitation, which draws on an earlier report, 'Benefits of investing in water and sanitation – an OECD perspective', for which Trémolet was a co-author. The benefits and desirability of investing in water supply and sanitation ought to be clear enough, but governments in particular need to justify where they put valuable resources, whether they be governments considering their own countries' requirements or donor governments assessing their development assistance priorities. Resources are finite, and the water sector needs to compete with other sectors for these resources.

'The water sector is behind compared to other competing sectors such as health and education,' says Trémolet. 'We have quite some way to go in becoming much more numerical in terms of quantifying the benefits. It could be donors, it could be governments in developed countries, that are increasingly focused on value for money.

'The benefits report was produced so that all the evidence that lies about in academic papers or in quite cryptic articles would be brought together in a coherent format and made available to policymakers,' says Trémolet. Faced with the question of how to measure benefits, it includes, for example, highlighting of the work and findings of the Economics of Sanitation Initiative of the Water and Sanitation Program, which has applied an approach to assessing the cost of a lack of sanitation. 'This can be quite powerful when conducted at the country level in order to mobilise government.'

She continues: 'People talk about the benefits of water and sanitation, but in fact each different segment generates different types of benefit, which can have an impact about the choice of priority in terms of investments. So [it is necessary] to have a bit more of a sophisticated discussion about where you should invest. Also I think generally governments at the moment are very interested in quantifying those benefits.'

Trémolet adds: 'There are still areas which are matters of debate between experts. For example, is it access to sanitation or water that yields higher benefits, or is it even just hand washing with soap that yields the highest benefit?'

But the importance of such work is clear, and it is therefore highly relevant to include coverage of benefits in the synthesis document: 'There's still the need to insist on [assessing] the benefits because other sectors are doing it and because there's a need to progress thinking and to get to more refined assessments of what are the benefits from which action, from what type of investments, etc.'

Costs, benefits and the financing gap

This consideration of the benefits of water and sanitation forms part of the contextual work presented that underpins and justifies action on the central message of the report – that financing of the sector needs to be based on sound financial planning and make use of tools and approaches which help deliver such planning. There are other aspects to this contextual work too. One is an indication of the scale of the financing that is needed – for which estimates vary considerably. The other is a rethink with respect to the potential sources of financing upon which the sector can draw. This rethink, representing what is described in the report as 'a key departure from earlier concepts of Full Cost Recovery', appears in the report as a distillation of a funding framework developed in earlier reports and which includes the recognition that the basic sources of finance available are tariffs, taxes and transfers (aid) – dubbed the '3Ts'.

Trémolet explains: 'Until a few years back there was the hope that private finance would bring in financing, without stressing the fact that it was repayable finance and that, first of all, the private sector would need a return on this investment, and then also that they would not bring that investment or they would [only] do so at a very high cost, [unless] there was a predictable stream of revenue from the 3Ts.'

Where the 3Ts are not sufficient to

meet financing needs, repayable funding – loans, bonds or equity – provide the means to bridge the 'financing gap', an approach examined in last year's OECD report 'Innovative Finance Mechanisms for the Water Sector', for which Trémolet was also lead author.

Trémolet explains that her greatest input to the most recent report was on the first part of the report: 'It's more clarifying concepts, putting all the pieces of the puzzle together.' The second part of the report, where the various tools and approaches are set out, brings together OECD's review of ways it sees the outputs of its activities can make a contribution to the wider sector. 'The second part is the toolbox, and it's more showcasing the work that the OECD has developed,' says Trémolet. The guidance draws in particular on OECD's experiences of supporting countries of Eastern Europe, the Caucasus and Central Asia (EECCA), especially the experiences of work carried out through its Task Force for the Implementation of the Environmental Action Programme for EECCA (the EAP Task Force). 'A lot of these tools were originally developed in the context of this EAP Task Force, and specifically for the countries where the EAP Task Force is involved,' adds Trémolet.

Strategic financial planning

With this revised view of the potential sources of financing and the need to combine these in the context of sustainable cost recovery as a backdrop, the central message of OECD's guidance is that the sector needs to adopt a strategic approach to financial planning.

The guidance is directed firstly at national or regional governments. As with other tools and approaches in the latest report, this guidance draws in particular on EAP Task Force work. There are two elements to the strategic financial planning – reflecting the title of the new synthesis report, one is very much an 'approach' and the other a 'tool'. The approach is a strategic financial planning process, whereas the tool is a software programme, FEASIBLE, which can deal with the data needed to support the process.

'Strategic financial planning is the approach that the OECD is promoting as a process of engaging governments so that they think about all these boxes of the puzzle and be much more realistic when they define future targets and objectives for the development of the sector,' says Trémolet.

The strategic financial planning process is essentially a three-step process, in which a baseline scenario of initial aims and anticipated measures to achieve these is first set out, the financial feasibility of achieving this scenario is assessed, and then alternative scenarios developed through an iterative process until targets are identified along with realistic, feasible and affordable approaches to achieving them.

According to OECD, this process, supported by the FEASIBLE model, has been used to develop financing strategies in Armenia, Bulgaria, Georgia, Kazakhstan, Kyrgyzstan, Moldova, and Ukraine, in six provinces in Russia, as well as in Egypt, Lesotho and Turkey.

The OECD cites typical benefits of using this approach as including a shared understanding of issues by key stakeholders, a consensus on realistic and affordable water supply and sanitation infrastructure targets, and a more objective discussion on tariff policy. However, the report notes that factors such as the need for a champion, for full ownership by host country institutions, and for the analysis and data used to be accepted by stakeholders such as the Ministry of Finance all play a part in ensuring the strategic financial planning process is a success.

This guidance makes clear the fundamental role that national governments have to play. 'The idea is that the government should have a central role in terms of planning realistically,' says Trémolet. 'They are the ones driving the targets for the sector as a whole. Also, there is this recognition that it cannot be a full cost recovery approach, it has to be a sustainable cost recovery approach, hence the need for subsidies to compensate for the financing gap. So [governments] need to understand how much [in] subsidies needs to be provided and allocate that in as much as possible a midterm planning approach, rather than year on year with a high risk of non-realisation of these subsidies.'

Trémolet identifies a further aspect of this key role of governments. 'There's a lot of transfer of responsibilities to the decentralised governments, but not necessarily with adequate financial resources.' As part of this strategic financial planning central governments therefore need to make provision for the transfer of adequate financial resources at the local level.

Marseille, France, where the sixth World Water Forum will take place in March next year. OECD is coordinating efforts on a Forum target aimed at achieving greater use of strategic planning for financing in the sector. Credit: Boris Stroujko / Shutterstock images.

Here Trémolet points out that other targets for the World Water Forum include sustainable cost recovery being written into sector policies and ensuring local authorities can obtain access to funding.

Strategic approach and efficient operation at the utility level

This strategic approach to planning financing is carried through into the guidance offered by OECD at the utility level. To carry out such strategic planning, however, utilities need to get into considerably greater detail about the specifics of what it is they will actually need to implement. The guidance is therefore built around experiences with the use of the Financial Planning Tool for Water Utilities, which is a computerised model consisting of 34 interlinked Excel tables supported by an external database. It includes modules for aspects such as water demand, tariffs, assets, affordability, and financial gap analysis, and calculations can be carried out for a planning period of up to 20 years.

Use of the model was piloted in Bishkek, Kyrgyz Republic, in 2005 and then a refined version of the tool piloted in Armenia in 2006 and Moldova in 2007.

The tool is intended for use in particular by utility financial planning departments or specialists and, according to OECD, use of the model allows a medium- to long-term financial plan to be defined covering all financial aspects of a utility. The need for any public subsidies is identified, and use of the

process enhances the utility's credibility, particularly with owners and financial institutions.

Alongside this support on financial planning, further guidance in the report aimed at water utilities deals with benchmarking. This is an important inclusion as it recognises that the other main aspects of the guidance – the overarching picture of sustainable cost recovery, the feasible national targets, and the long-term planning for the utility – will all be shaped by the extent to which utilities make progress towards achieving greater efficiency.

Benchmarking is only dealt with briefly in the guidance, but what the report does do is highlight the availability of a practical tool, the World Bank-supported IBNET Toolkit, which utilities can turn to, as can others such as national governments who may wish to set up benchmarking schemes. 'OECD has been using it quite extensively in the EECCA countries where it is most active,' Trémolet notes, adding: 'One of the key ways of achieving financial sustainability is to improve the performance of the utilities in the first place.'

Engaging the private sector

Private sector involvement with respect to financing of water sector activities is covered by OECD's overall guidance for the sector, where it is framed as an option for bridging the financing gap between financing available in the shorter term and the expenditure that nonetheless needs to be carried out during that time. The OECD also offers guidance on private sector involvement more generally, and one of the tools it has developed in this respect is what it describes as a checklist that governments in particular can follow to help ensure they are equipped to engage with the private sector.

OECD's Checklist for Public Action was prepared in time for the last World Water Forum, held in Istanbul in 2009, but work has continued since on putting this into operation, with work in Russia, Egypt, Mexico and Lebanon, with activity recently launched in Tunisia.

The checklist itself contains 24 principles based around five what have to be regarded as challenging policy areas, essentially: deciding on what it is expected the private sector will do; providing a sound institutional and regulatory environment for infrastructure investment; ensuring public and institutional support for the approach; having the private sector involvement work in the public interest; and encouraging responsible business conduct.

Given the challenging nature of these areas, it is not surprising that OECD can point to some lessons learned to date from using the checklist. One is that there is a need for checklist-based approaches given that certain countries are committing to engaging the private sector. Especially where experience of working with the private sector is very limited, the checklist offers a starting point and can provide a neutral reference point around which dialogue can take place. Furthermore, the checklist offers a source of guidance in circumstances where national legislation may well be either under-developed or evolving.

Alongside this checklist, OECD has also developed its 'Guidelines for performance-based contracts between municipalities and water utilities in EECCA', which is aimed at municipalities seeking to put utility operation onto a contractual basis. It was again developed in the context of EECCA countries, with testing of the approach in Armenia, Kazakhstan and Ukraine, but OECD nonetheless offers the guidelines as potentially being applicable in other regions.

The guidelines deal with aspects such as contract preparation, performance indicators, tariffs and obligations of the contracting authority, monitoring of implementation, and enforcement. OECD underlines that the guidelines are not a 'ready-to-use' toolkit, but are good practices and approaches that need to be adapted to specific situations.

Wider municipal commitments

Completing the suite of tools and approaches is guidance that recognises that municipalities are important actors in this, either delivering or overseeing services but at the same time having to deliver other services. It is with this in mind that OECD has developed a multi-year investment planning tool for municipalities. This brings together elements such as revenues, operating expenditure, debt, and details of investment projects. A five-stage process is used to help the local government identify what investments it should implement over the next four to six years by establishing which offer the greatest benefits from financial, social, ecological and other perspectives.

For this tool, OECD points to its use in local governments in Russia and Ukraine, such as the City of Lutsk in Ukraine, where the top ten investments for the city were identified.

Wider applicability

That a number of the tools and approaches brought together in the latest report have been used outside of the EECCA region clearly indicates that they are applicable beyond this region, but the message is that they can be used more widely still. 'Certainly the strategic financial planning is seen as applicable to everywhere,' comments Trémolet. This may be less the case in the most developed countries who achieve adequate funding for the sector, although Trémolet adds: 'However there's no reason why it shouldn't be used as well in developed countries. In fact IBNET, for example, has information from developed countries as well.'

'The last tool, the checklist, is something that the OECD has developed to help with the dialogue with the governments that it's been dealing with, again initially EECCA countries, but I think is applicable everywhere,' says Trémolet. There has been, she says, a lack of understanding about the role of the private sector, and the checklist highlights the role of public authorities.

The guidance brought together in the report, with its focus on strategic financial planning, is therefore consistent with the World Water Forum target which OECD is taking a lead on. Whether countries buy in to the Forum process remains to be seen, but there are good prospects that such experience-based guidance will in any case be taken up more widely. Trémolet points to the way that the work done developing the concept of the 3Ts means this way of viewing financing of the sector has begun to take root, and she believes the value of the wider work is being recognised. 'If we take the central tool, the strategic financial planning, there is really a consensus I would say building at the level of various international organisations about the need for that.' ●

Comments in this article were made in a personal capacity and not on behalf of OECD.
The OECD report 'Meeting the challenge of financing water and sanitation – tools and approaches' and the preceding reports on water sector financing can be obtained from www.oecd.org/bookshop/ or from www.iwapublishing.com.

Financial sustainability in an uncertain world

The global economic crisis is one of many pressures facing water utilities that have to provide adequate funding for infrastructure. Primarily from a North American perspective, **ERIC ROTHSTEIN** and **DEBORAH GALARDI** highlight these financial management challenges.

Much has been written over the past decade about the global infrastructure funding gap and the importance of investing in infrastructure as a means of addressing other global development concerns and initiatives (Winpenny, 2003). The recent economic crisis has further challenged even developed nations' abilities to provide adequate funding for infrastructure. Though the pressure on many utilities to provide for infrastructure expansion has lessened due to slowed system growth, crucial needs remain as utilities address a backlog of system repair and replacement, current and future regulatory requirements, and the need to secure adequate water supplies and sanitation for current and future populations.

At the same time that crucial funding needs persist, today's utility financial managers also face heightened uncertainty related to future utility costs and revenues. Credit market volatility, declining water consumption, customer resistance to increased tariffs, and impacts of climate change on water supply and demand are just some of the more profound challenges. Effectively managing water and wastewater utilities through these challenges will require continued adherence to financial management best practices as well as development of strategies to address heightened risk.

Emerging risks

Economic challenges

The global economic crisis has added uncertainty to both future utility costs and revenues through impacts on credit markets, service area growth, and public acceptance to tariff increases. As capital-intensive operations, the costs to expand or replace infrastructure is generally a significant part of a utility's cost structure and a primary driver of tariff increases. While utilities in North America are currently benefitting from historically low interest rates and favourable construction costs, continued volatility in the credit markets creates uncertainty related to future borrowing costs. The economic downturn has also led to revenue volatility, as customer growth has stagnated, and some areas have experienced an actual decline in active service connections. The collapse of the housing market has also reduced revenue from development-related fees and charges, such as impact fees and system development charges, connection fees, and plan review fees. Furthermore, the risk of opposition to tariff changes has increased as personal wealth has decreased, in part due to persistent high unemployment levels.

Water consumption trends

The primary source of revenue for most water and wastewater utilities is user fees (tariffs). For most utilities, tariff designs include both fixed and variable amounts, with the latter assessed based on water use. In recent decades, the portion of tariff revenue recovered from variable (or volume) charges has increased significantly in response to enhanced billing capabilities (including metering), and concern over future water supply sources and costs, among other factors (Baird, 2010). This shift in revenue recovery from fixed to volume charges has also added greater volatility to utility revenues, as water use can fluctuate significantly from year to year, and in the last decade has been trending down in North America, in response to changes in demographics, increased use of low-flow appliances, and other factors (Rockaway, 2011).

System planning and development

Utilities across the globe continue to face a great deal of uncertainty related to the timing and scale of future system investment needed to address emerging regulatory requirements and plan for potential impacts of climate change. For example, evolving watershed management approaches mean that traditional, individual utility-centric approaches to wastewater effluent discharge limits or water supply allocations may be supplanted by, for example, credit trading regimes. Yet, credit trading protocols are yet to gain currency with many regulatory bodies, imposing acute uncertainties for individual utilities about their prospective water resource management roles and options to achieve compliance with new regulations. Similarly, with guidance on approaches to climate change vulnerability assessment recently promulgated (US EPA, 2011), some utilities are beginning to incorporate climate change adaptation into their approaches to risk management, yet the potential implications of

Executive summary

Although water and wastewater utilities are not new to risk, financial planning is often not conducted or is poorly executed, even among systems in the developed world. A short-term view with little regard to risk management or long-term infrastructure development and renewal needs has led to consequences such as the US' infrastructure funding gap. By using a strategic financial plan, a utility can: define the system-wide increases necessary to meet current and future service obligations; identify gaps between available funding and infrastructure development, renewal and replacement needs; and evaluate prospective utility system financial performance and financial integrity.

A strategic financial plan includes the use of financial policies to guide its development, specifying debt service coverage targets, as well establishment and use of reserves to meet unexpected costs, and reducing administrative costs. Operational efficiency and effectiveness is also necessary in order for a utility to continue to provide a high level of service in an unpredictable environment and reduce costs, whilst cost reduction can also be achieved through effective project delivery and debt management.

Risk management strategies provide a multi-faceted approach to achieving greater financial stability. These can be categorised into the three categories of institutional inefficiencies, revenue assurance and expense control. In North America and elsewhere around the world, separate utilities provide water, waste and, increasingly, stormwater services, leading to institutional inefficiencies. Utilities that can therefore position themselves to accept new integrated roles and responsibilities will therefore be more likely to survive in a consolidating market. Regarding revenue assurance, suggestions include developing additional fees for services that benefit a portion of a utility's customer base and building cash reserves to assure financial stability, whilst the option of expense control brings in the use of advanced technology and risk-based business practices to limit exposure to risk.


Financial planning can help stabilise a utility's finances in the face of new risks. Credit: Galyna Andrushko / Shutterstock.

climate change are far from certain or without controversy, lending additional uncertainty for utility managers.

Enduring realities and approaches

Even as water and wastewater utilities face new risks, the industry is not new to risk management. Historically, utilities have faced the potential for weather and usage patterns and economic cycles to impact revenue stability. At the same time they have been subject to increasingly stringent regulatory requirements, and the potential that project design and construction failures or natural calamities could impose service outages for customers and unanticipated repair or replacement costs. Yet despite these risks, water and wastewater utilities, at least throughout most of the developed world, have continued to provide high quality and reliable services, at generally affordable prices well below the value of service.

This track record of performance is attributable in part to effective financial management approaches and practices that continue to provide a solid foundation for those systems striving to achieve or maintain similarly high levels of performance in an increasingly uncertain world. These practices may be grouped into four general categories:

- Financial policies and planning
- O&M (operations and maintenance) expense management
- Capital project planning and delivery
- Debt management

Financial policies and planning

At the forefront is effective financial planning. This may seem axiomatic, but surprisingly financial planning is often not conducted or is poorly executed, even among systems in the developed world. In many cases, financial planning has amounted to surviving an annual and dysfunctional budget process, with little regard to risk management or long-term infrastructure development and renewal needs. The US' well-documented infrastructure funding gap (AWWA-TAF, 2001; US EPA, 2002) is certainly one consequence of this shortsightedness – and the US is by no means alone in facing profound deficits. By developing a strategic financial plan, a utility can:

- Define the system-wide tariff increases necessary to meet current and future service obligations
- Identify gaps between available funding and infrastructure development, renewal and replacement needs (which, in some circumstances, may define subsidy requirements)
- Evaluate prospective utility system financial performance and financial integrity

Conceptually, effective financial planning is a relatively simple exercise, generally amounting to the development of multi-year cash flow analyses (generally five to ten years or longer to contemplate financing requirements of major, long-term capital investment programmes) (Rothstein, 2009). A strategic financial planning model enables revenue projections under alternative assumptions related to customer account growth, billable usage, interest earning rates, varying weather and usage patterns, and other factors. Similarly, O&M expenses may be projected under alternative assumptions related to inflation of key expense items, treatment requirements, and implementation of new technologies. Finally, cash flow modelling may define the utility's optimal capital financing strategy by testing implications of the use of different forms of debt obligations (e.g., revenue bonds, loans), use of equity financing, and application of dedicated funds (e.g., reserves).

Financial policies both guide the development of viable strategic financial plans and help ensure the ongoing financial integrity of utility system operations, and therefore should be adopted (and respected) by the utility's governing board and regulators. Capital financing programmes are shown to be practicable if projected system-wide revenues exceed utility O&M expenses by margins that are more than adequate to service debt obligations. Financial policies that therefore specify debt service coverage targets (generally above requirements defined in bond covenants) convey a utility's commitment to pay creditors. Similarly, prudent utility financial management practices include establishment and disciplined use of reserves to provide a measure of security and flexibility in the event of unforeseen claims on financial resources. Finally, disciplined financial management of utility operations requires promulgation and enforcement of a wide variety of general administrative policies (e.g., spending authorization levels, inventory management) that can help prevent waste and abuse of tariff revenues and promote operating efficiency. These policies should be brief and simple, and balance needs for operational flexibility, administrative efficiency, and safeguarding of utility resources.

Strategic financial planning and policy development are effective tools for both developing utility systems attempting to become financially self-sufficient and for advanced systems implementing major capital programmes. For example, in Egypt the national regulatory agency and holding company are currently engaged, with USAID (US Agency for International Development) support, in the development of financial planning models for individual subsidiary companies as well as the national holding company. These models will help determine tariff designs and levels to reduce and eventually eliminate Government of Egypt subsidy of the water and wastewater sector (USAID, 2011). In North America, the Sewerage and Water Board of New Orleans recently completed a strategic financial planning process to support its ongoing recovery from the aftermath of Hurricane Katrina and historic under-investment. (RFC, 2011). At the same time, the City of Atlanta recently requested schedule relief

for completion of its wastewater Consent Decree obligations, using a strategic financial planning model to demonstrate the limits of available capital financing (Atlanta, 2010).

Operations and maintenance expense management

Fundamentally, financial sustainability for water and wastewater utilities is grounded in the means by which services are delivered under conditions that – perhaps more so than other utility services (e.g., telephone, electricity) – are acutely unpredictable. For example, significant field operations expenses are incurred dealing with buried assets, often with limited information about what else may be buried in close proximity. Water and wastewater treatment operations face variances in influent stream quality over which the utility often has limited control, whether due to variable climatic conditions or illicit dumping of wastes. Nevertheless, because of the essential nature of water and wastewater service, utilities are called upon to deliver services with exceptional reliability and resilience.

For water and wastewater utilities to fulfil these expectations and preserve their financial integrity, a focus on operational efficiency and effectiveness is of paramount importance. Gone (if ever really present) are the days in which the capital-intensive nature of water and wastewater utilities allowed less concern with operational efficiency. Fortunately, recent business practice and technology advances have brought forward a wide range of opportunities to realize significant operating efficiency improvements. For example, treatment process optimization studies often identify means to meet or exceed water quality regulations while reducing usage of costly chemicals and electricity. Instrumentation and control systems may enable reductions in staffing levels and improve monitoring of system operations. Computerized maintenance management systems (CMMS) may help vastly improve the efficiency and effectiveness of field operations through measures as simple as revised routing or field crews to limit travel times between jobs.

These opportunities have been and will continue to be well documented in the water and wastewater utility industry as dedicated professionals strive to advance their organizations. However, like financial planning, it is not always the case that these initiatives are incorporated into a cohesive strategy to preserve and protect the financial integrity of the utility. As utility costs rise and the consequences of adverse risks become more pronounced, it is incumbent upon utility management to do so – and to continuously re-examine operating protocols to identify emerging opportunities. In doing so, utilities are often well served to employ benchmarking efforts to gauge their performance relative to their peer utilities and other entities performing similar activities and processes. (Cabrera et al., 2011; Berg 2010)

Capital project delivery

Similarly, as water and wastewater utilities are peculiarly capital intensive (Water Research Foundation, 2009), even among utility service providers, it is of profound importance for long-term financial sustainability that capital projects are delivered cost-effectively. Benefits continue to be at least two-fold. To the extent that utilities fund capital projects from current operating revenues, cost-effective project delivery will help mitigate tariff increases; to the extent that projects are debt-financed, lower cost delivery will temper the long-term burden of debt service obligations.

As with utility O&M, best practices, technology innovations and integration of traditionally separate project delivery phases offer important opportunities for capital cost savings. Among the most effective of practices is value engineering. As noted by the American Water Works Association: 'Value engineering will result in suggestions for the elimination of unnecessary features, use of alternative materials, changes in operating processes, changes in construction methods, and possibly verification of the project's immediate need' (AWWA 2008, p22). Technology innovations leveraging advanced computing capabilities also have pervaded every aspect of capital project delivery from use of multi-dimensional design programmes to real-time monitoring of construction activities. Finally, and perhaps most significantly, growing acceptance of integrated project delivery models that reduce or eliminate barriers between those responsible for project design, construction and operations have brought risk management and cost savings to the forefront of capital programme management. As with management of operations and maintenance expenses, capital project delivery innovations and best practices are well documented and continuously evolving (Baird, 2011, EFAB, 2008). Yet again, while it is an enduring reality that financial sustainability is supported by cost-effective project delivery, best practices are often less a reflection of conscious financial management and customer service strategy than individual project managers' appetites and aptitudes.

Debt management

The need for astute, proactive financial management has never been more clearly evidenced than over the past several years as capital markets have convulsed time and again. These dynamics have underscored the enduring reality of the merit of conservative approaches to debt management – limiting use of variable rate debt instruments, leveraging access to subsidized capital financing, and funding debt service reserves that appropriately secure debt obligations. Fortunately, these practices are characteristic of most water and wastewater utilities in North America, if not globally, which has insulated the industry somewhat from the most acute manifestations of the global economic crisis. Perhaps the most notable US exception being Jefferson County, Alabama, that filed for bankruptcy protection in the aftermath of a series of calamities, including extensive use of Auction Rate Securities (Young, 2009).

Risk management strategies

While most water and wastewater utilities have fared relatively well through recent economic difficulties, the prospect of long-term stagnation and the inherent risks that characterize the industry suggest a review of available risk management strategies. These risk management strategies may be broadly categorized into three categories:

- Institutional efficiencies
- Revenue assurance
- Expense control

Institutional efficiencies

Among the profound reminders of the recent economic crisis is that functioning markets are ultimately intolerant of inefficiencies and under-performance. For most water and wastewater utility managers, the associated risks of this intolerance are gauged within existing institutional structures. Threats are perceived as relating to challenges to one's ability to deliver services at costs comparable to one's neighbour utilities.

Few consider institutional change – the prospect of not having dozens of neighbour utilities – though doing so proactively may be the most prophetic (and politically challenging) of risk management strategies.

Separate water and wastewater utilities serve nearly every community in North America – resulting in literally thousands of individual utility entities – while in many other countries, a handful of separate utility enterprises serve whole populations. (US EPA, 2007). In many communities, separate utilities provide water, wastewater and increasingly stormwater management services despite growing recognition of the need to manage water resources by respecting interactions across watersheds that are not defined by municipal jurisdictional boundaries or our historical definitions of services. While these institutional inefficiencies may be most dramatic in North America, symptoms of similar institutional excess litter the global water services market.

These institutional inefficiencies present important challenges for an industry faced with rising costs and increasing risks – and also important opportunities. Those utilities that recognize that the status quo is ultimately unsustainable, and position themselves to accept new, highly integrated roles and responsibilities are more likely to survive and thrive in a consolidating market. Several successful or transforming utilities offer useful examples. Louisville Water Company (US) has acquired a number of small water service providers in its region, and even offered to provide wholesale water service to Lexington, Kentucky, some 75 miles away (120km), both to more fully utilize available treatment capacity and extend its regional reach (Miller, 1998). Halifax Regional Water Commission recently accepted assets and responsibility for delivery of wastewater and stormwater services as well as provision of potable water, resulting in it becoming the first – but likely not the last – regulated water, wastewater and stormwater utility in Canada. Forged by the crucible of crisis, both the cities of Atlanta and New Orleans have moved to embrace an integrated water-wastewater-stormwater framework. Utilities that dare to consider existing institutional structures as malleable manage what may typically be viewed as threats or risks as opportunities.

Revenue assurance

Among the strategies being used by utilities today to manage revenue risk are: changes to tariff design to promote revenue stability; implementation of new charges for service; improved consumption forecasting tools; and reserve management.

One of the many realities of the recent economic crisis has been heightened resistance to tariff increases. Therefore, utilities are looking for ways to stabilize existing revenues, as they face continued uncertainty about consumption trends and service area growth. A recent focus has been on modifying the balance between fixed and variable charges. Many water utilities like the City of Tucson, Arizona (US) and the City of Winnipeg, Manitoba (Canada) have historically generated less than 20 percent of their annual tariff revenues from fixed charges. Both cities recently embarked on plans to increase the fixed portion of the rates incrementally over the next few years. Beyond meeting revenue stability objectives, increased fixed charges (relative to volume charges) may be justified on grounds of cost accounting (given that large portion of the utility's costs are fixed, including debt service) and cost causation (many costs like fire protection, customer service and billing are not influenced by potable water use).

While revenues for potable water and wastewater management services will likely continue to be the primary source of funding for most utilities, revenue (and equity) may be enhanced by development of additional fees for service that benefit a portion of the general customer base. This may be particularly helpful in cases where the utility is mandated to provide particular services – like in the case of cross connection control programmes. On a larger scale, North American utilities that previously funded stormwater programmes through wastewater rates or ad valorem taxes, are implementing separate charges for these programmes. As with potable water charges, utilities should regularly review their other fees and charges to ensure continued revenue sufficiency.

Recent publications have provided insights into the specific variables leading to reduced water consumption in North America (Rockaway, 2011). Changing demographics and increased use of low-flow plumbing fixtures have and are likely to continue to reduce per capita water use. The loss in personal income and wealth, coupled with the continued need for tariff increases to fund system requirements will also likely put downward pressure on water consumption. While development of sophisticated econometric models to forecast future consumption is generally not feasible for most utilities, refinement of water consumption forecasting techniques – using a combination of local historical customer class usage trends, regional population forecasts, and national studies on price elasticity and usage trends – will inform the development of financial plans, and allow for sensitivity analysis for risk management. Even with improvements to consumption forecasting, and enhancement to revenue stability through modified tariff design, utilities still run the risk of unanticipated expenses or revenue shortfalls. Reserve policies tailored to a utility's unique circumstances and risk exposures may help assure financial sustainability despite prevailing uncertainties. This was demonstrated, for example, in the early stages of the recent financial crisis when downgrades to bond insurers required many utilities in the United States to cash fund debt reserves on existing debt. This was a challenge that faced the City of Salem, Oregon (US), but as a result of years of planning and building cash reserves, the city was able to backfill its debt reserves without additional short-term tariff increases. The City of Winnipeg, Manitoba (Canada) has long used capital reserves to smooth tariff increases and reduce long-term borrowing costs. The city establishes reserve accounts when large-scale expansion or regulatory driven improvements are identified, and then funds these accounts with a portion of tariff revenues earmarked for such purpose. Through careful monitoring and adjustment of funding levels, Winnipeg has been able to significantly reduce the cost of projects through significant equity funding.

Expense control

Risk management is perhaps most closely associated with limiting and controlling unforeseen expenses while planning for their potential incurrence. Risk insulating planning practice involves use of conservative assumptions about prospective costs and carrying of appropriate reserves. Yet, utilities are increasingly able to limit their exposure to the actual incurrence of unforeseen expenses using both advanced technology and risk-based business practices. In terms of technology, utility

information systems have ever-improving capabilities to alarm problems with system facilities before losses are incurred. Equipment advances can help avoid employee injuries and limit losses that could otherwise challenge financial sustainability (to say nothing of furthering the moral imperative to safeguarding utility staff). Risk-based decision-making is being institutionalized as evidenced by the rise of asset management over the last decade with its focus on assessment of asset condition and criticality, and prioritization of maintenance activities (as well as asset renewal and replacements) based on associated risk indices.

As noted, risk management practices have also extended to delivery of capital projects where explicit risk allocation is a fundamental attribute of alternative project delivery mechanisms. Utilities are now, more than ever before, able to define what design and construction risks they will bear, and what will be transferred to their contractors. In addition, utilities are increasingly taking a risk-based approach to the definition and selection of projects to be funded. For example, Green Bay Metropolitan Sewerage District (US) employed Monte Carlo simulations in a biosolids management alternatives evaluation process to evaluate the risks associated with key assumptions related to future electric costs, growth in system loadings, and other factors. (Sigmund, 2010). Structured project prioritization methods that consider prevailing risks are an integral part of the capital programme development processes of many utilities and becoming standard practice (AwwaRF, 2000).

Conclusions

Water and wastewater utility managers have faced a variety of risk factors for generations. Recently, new risks may have emerged (e.g., climate change) and others may have become more acute (e.g. economic stagnation). Utilities that consciously evaluate and actively manage risks as a fundamental component of their financial strategy and decision-making process, not only will be better positioned for long-term success and sustainability, but may also enjoy immediate benefits in terms of credit ratings and reduced costs of capital. Fundamentally, water and wastewater utilities are natural monopolies – and enjoy economies of scale that generally enable cost-recovery at pricing below the value of service. These basic economics mean that tried and true financial management practices and embrace of proactive risk management strategies will enable capable utilities to survive and even thrive in increasingly turbulent times. ●

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The billion dollar master plan to address Nairobi's water woes

In order to address severe water shortages in Nairobi as well as its satellite towns, a US$1 billion master plan has been presented to stakeholders of the city's utility Athi Water Service Board. **MBUGUA NJOROGE** reports on the scenarios being considered in order to increase resources for the city, and how this will also provide a wider economic benefit to Kenya.

Persistent water woes in Nairobi will soon be a thing of the past, when the US$1 billion Nairobi Water Master Plan is implemented. The master plan, which was presented in August 2011 to the stakeholders of Athi Water Service Board (AWSB), which provides water services to Nairobi, provides a 24-year blueprint (2011-2035) and hopes to alleviate current water problems in the city and 14 satellite towns (see Table 1).

Nairobi houses about three million people and hosts an additional two million who come in and out daily. It also generates almost 50% of the nation's gross domestic product (GDP). The water supply problems therefore not only impact the health and welfare of the city's many millions of residents – rich and poor alike – but also relate to a huge cost for the nation's economic base, including its industrial and service sectors.

Currently, the city has a daily shortage of 200,000m³ of water and needs a minimum of 80,000m³ per day to meet the demand of its residents. The master plan ultimately seeks to deliver over 750,000m³ per day additional capacity of water supply to augment the current water supply, that stands at about 410,000m³ a day.

The Water and Irrigation permanent Secretary Eng. David Stower said that the government and stakeholders have been lagging behind in addressing the shortage, but made assurances that the ministry has put in place corrective measures aimed at combating the crisis: 'As you are aware, Kenya is classified by the UN as a chronically water scarce country,' he said. 'The current level of water resources is low at only 15%.'

He added that the Ministry of Water and Natural Resources has earmarked 25 large dams for completion by 2015, which

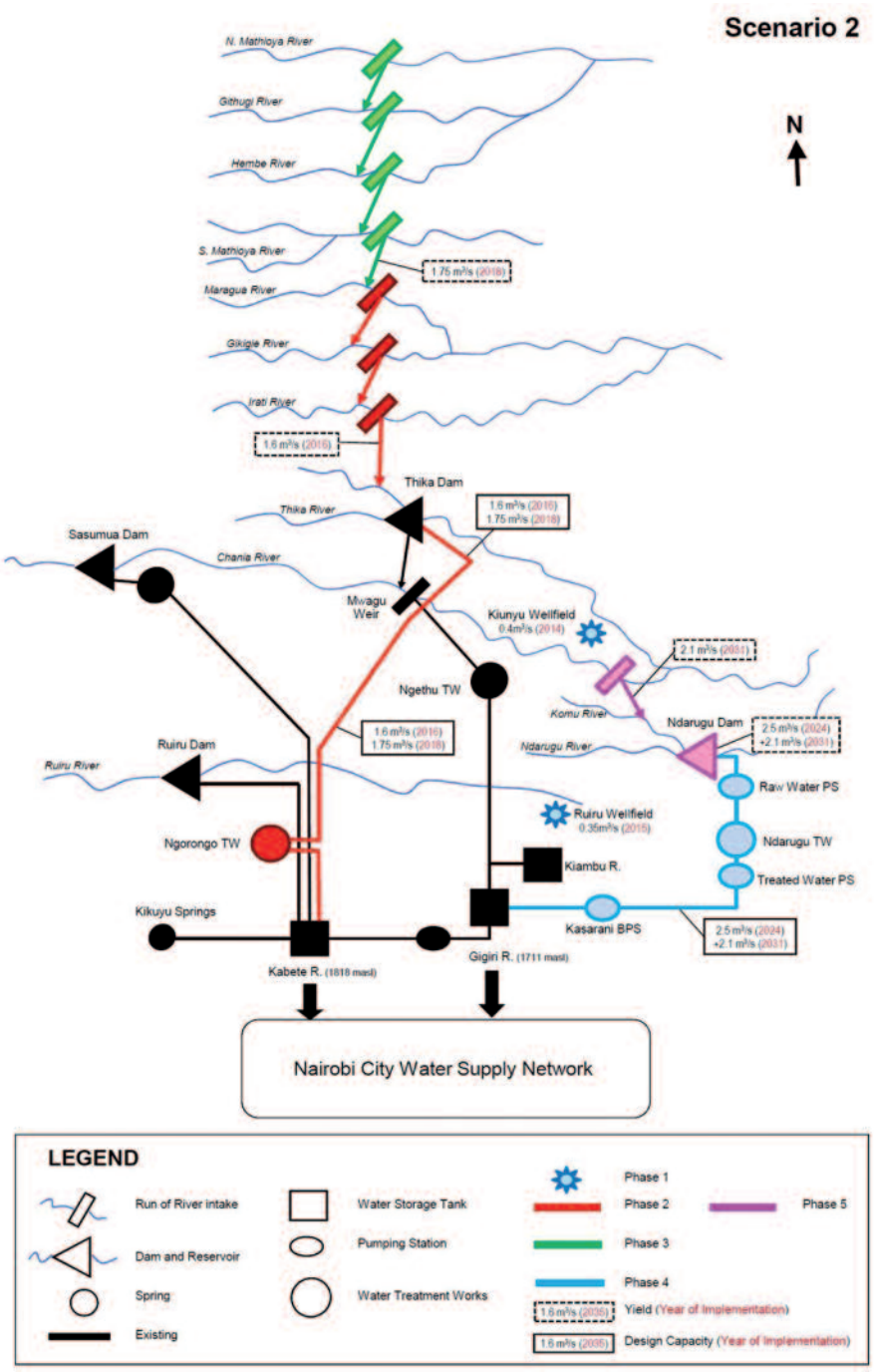

Figure 1: Schematic of senario 2 of the Nairobi Water Supply Master Plan

will support irrigation projects and flood control devices. He added that the government has invested heavily in allocating resources towards the creation of water schemes.

Stower noted that the government is aware of the rising population and the corresponding demand for the availability of resources, and called on the private sector to chip in and assist in addressing the crisis. He added that the situation is further complicated by rainfall variability and increasing pressure on land and water resources. According to a UN report, Kenya has less than 1000m³ of water per capita of renewable freshwater supplies.

'We have heard that Kenya's endowment for water is very limited. Let me put this into perspective,' stated Dr Rafik Hirji, a World Bank Senior Water Resources specialist. 'Basically, for every glass of water each Kenyan has, each Ugandan has six glasses and each Tanzanian has five glasses. It simply means that while Kenya celebrates its amazing sprinters and marathon runners (its fantastic endowment), water remains a limited endowment. Your neighbours can afford to throw away and waste four to five glasses of water per person and still be at the same level as a Kenyan. This fact that water is a scare resource cannot be changed. Kenya simply needs to learn to value and manage its water resources. It currently [does] not.'

He added that even as Kenya houses the largest water aquifer in the Horn of Africa that lies in Daadab area, the country has the largest water deficit in the region. Hirji said the situation is complicated by the cyclic changes in climate that have seen recurrent droughts being experienced and compounded by continued reduced investment in water supplies and storage infrastructure.

Water sources – available options

The Chief Executive Officer of the Athi River Water Services (AWSB) Eng. Malaquen Milgo said that the planning for Development of Future Water Resources for Nairobi and its satellite towns involves a comparison between the availability of known sources and projected water demands.

'Six main scenarios have been established based on potential sourced under [the] context of meeting the water demand for Nairobi up to year 2035,' he said. 'These scenarios have been prepared in view to meet the water demand of Nairobi City without considering the surrounding areas for which other local water resources are considered.'

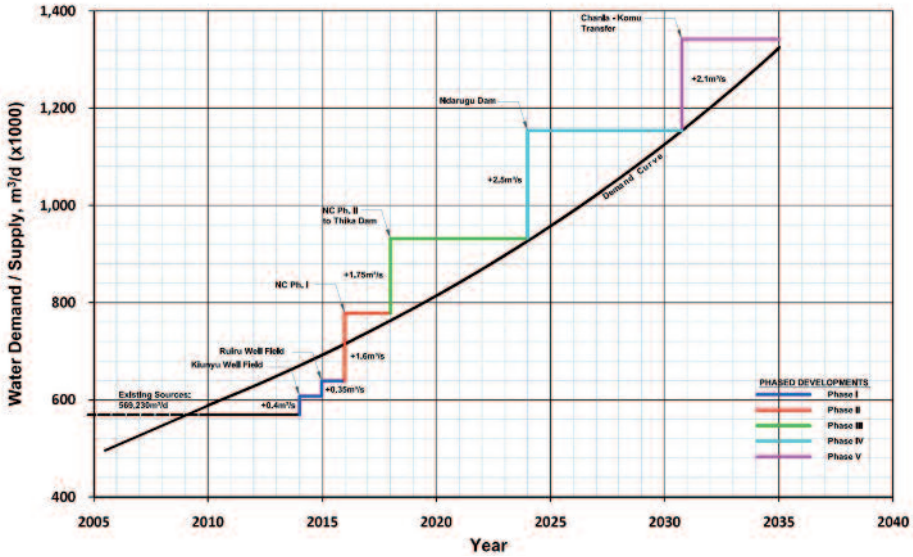

Figure 2: Nairobi Water Supply Master Plan – water demand forcast and design horizons for proposed interventions – senario 2

The scenarios are: Northern Collector Phase I with different sub-alternatives (whole collector from Maragua river to Thika reservoir, from Irati river to Thika reservoir only); diversion from South Mathioya to Maragua river to supplement Maragua reservoir (see Figures 1 and 2); Northern Collector Phase II either connected to Northern Collector I to supplement the supply to Thika reservoir or to Maragua 4 reservoir; Ndarugu 1 Dam on Ndarugu river; and diversion from Chania river to Komu river to supplement Ndarugu 1 reservoir.

There is also a plan to exploit two well fields in Kiunyu in Gatanga and Ruiru, with potential yields of 34,560m³/day and 30,240m³ respectively.

The French Development Agency (AFD), which has been working in partnership with the World Bank and AWSB, has announced that it will

Table 1: Nairobi's satellite towns

No.	Satellite town	District
1	Kikuyu	Kikuyu
2	Ruiru-Juja	Ruiru and Thika West
3	Kiambu	Kiambu East
4	Karuri	Kiambu East (Kiambaa)
5	Githunguri	Githunguri
6	Mavoko Municipality (Athi River)	Machakos
7	Ngong Township	Kajiado North
8	Ongata Rongai	Kajiado North
9	Thika	Thika West
10	Gatundu	Gatundu
11	Limuru	Kiambu West
12	Lari (Uplands and Kimende)	Lari
13	Tala-Kangundo	Kangundo

Table 2: Yield of existing water sources

Source	Yield (m³/d)	Yield (m³/s)	Remarks
Sasumua Reservoir	56,000	0.65	Existing
Chania River / Mwagu Intake	104,000	1.20	Existing
Ruiru Reservoir	21,000	0.24	Existing
Kikuyu Springs	4000	0.05	Existing
Ndakaini Dam (Thika 6 +kiama + Kimakia)	225,000	2.60	Existing (70 Mm³ Storage).
Total available yield	**410,000m³/d**	**4.74m³/s**	

Table 3: Proposed potential new water sources

Source	Yield (m^3/d)	Yield (m^3/s)	Remarks
Proposed groundwater wellfields in Kiunyu & Ruiru	64,800	0.75	
Proposed Northern Collector – Phase I	138,240	1.6	Diversion and transfer from Irati, Gikigie and Maragua Rivers
Proposed Northern Collector – Phase II	151,200	1.75	Diversion and transfer from South Mathioya, Hembe, Githugi and North Mathioya rivers
Proposed Maragua 4 Reservoir	45,792	0.53	The yield of Maragua dam is dependent on cross basin transfer and varies for different scenarios
Proposed Ndarugu 1 Reservoir	397,440	4.60	With Chania-Komu River Transfer (300Mm^3 storage).
Total potential yield	**797,472 m^3/d**	**9.23m^3/s**	

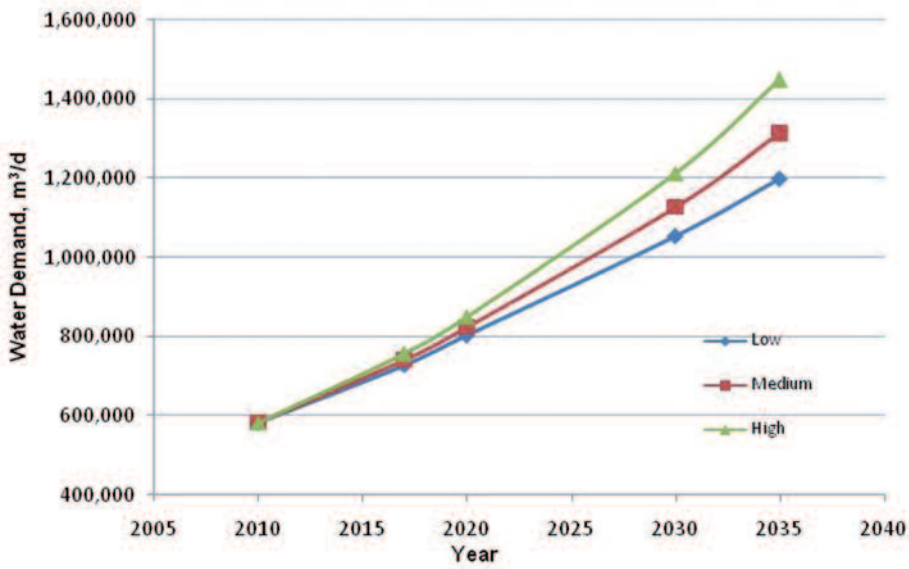

Figure 3: Water demand for high, medium and low population projections scenarios – Nairobi City.

undertake a feasibility study into financing part of the future system, most likely part of the downstream infrastructure of Phase 2 of the Northern Collector.

AWSB's chairman Hon. Reuben Ndolo meanwhile has said that the Water Master Plan project is vital and its value will be measured by the changes it will bring to the millions of water consumers in Nairobi. 'Its impact will be felt in the informal settlement of Nairobi's metropolitan region, and rural areas within Nairobi,' he said.

He also said that this will go on to feed into the local economy through the skills and labour by those who will be involved in the construction work. He stated that the project will open up areas which have not been served with basic infrastructure such as roads, water and electricity, adding that the aspirations of Vision 2030 such as economic growth, and accessibility to basic human needs such as education, health, water and sanitation, are the conditions of joint endeavours to bring development and prosperity. ●

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Mbugua Njoroge is the Corporate Communications Manager of Athi Water Services Board, Nairobi, Kenya.

Software solution enables the collection of GIS data in the field without network connectivity

Science Applications International Corporation (SAIC) has announced the release of GeoRover Mobile, a new software solution enabling the collection of Geographic Information System (GIS) data in the field, with or without network connectivity, in addition to traditional functionalities. SAIC says that GeoRover can be used to collect and edit field data for use by, for example, utilities with remote assets.

The application is a programme that resides on mobile devices (phones or tablets) that operate using the Android platform and integrates available global positioning system (GPS) and Wi-Fi networks to provide current location data and other information. The application enables users to create waypoints, track logs and routes when connected to an internal or external GPS, including Bluetooth, to obtain real-time connection.

'We are pleased to provide customers with mobile GIS solutions for the Android platform, delivering the ability to visualize map content while collecting

data even in the most remote locations,' said John Thomas, SAIC senior vice president and business unit general manager. 'This new technology demonstrates SAIC's ability to offer cutting edge mobile solutions helping solve difficult problems.' ●

www.georover.com

Wachs in-pipe inspection provides valuable visuals

Wachs Water Services recently completed the inspection of several metallic water mains ranging in size from 6 to 12 inches (21-30cm) for a utility in Canada. The Investigator condition assessment system gained access to the mains via fire hydrants and provided CCTV footage and acoustic leak detection without disruption to service.

The inspections confirmed that the majority of the buried assets were still in good condition; however the most useful piece of information for the utility was the positive identification of severe tuberculation in one of the mains which was causing low pressure issues in a portion of the distribution network. The utility will use the pipeline condition assessment information to help prioritize capital expenditures. ●

www.wachsws.com

Grundfos Remote Management rolled out to 45 countries

Grundfos Remote Management, an internet-based telemetrics system that provides municipal utilities with operation information of wastewater and water supply systems has now been launched in 45 countries worldwide, says Grundfos.

If a utility's pumping installations are spread over a wide area, monitoring and control tasks can be performed through using Grundfos Remote Management from a PC rather than through an onsite visit, and for renovation of sewers and water mains decision-makers can use the performance data collected from pumping installations to prioritise and plan both routine maintenance tasks and larger renovation projects, says the company.

Grundfos Remote Management allows users to upload an aerial photo or map, and drag-and-drop installations to their actual location. From a PC anywhere an operator can log on to the system and determine the course of action to be taken. If, for example, a motor protection unit has been activated, the pump can be restarted online.

Changes in pump performance can be tracked using trend graphs automatically generated by the system. This can give an indication of wear or damage in the installation. Service and maintenance can be planned based on the actual condition of the installation components rather than 'time since last service', says the company. ●

www.grundfos.com

Australian utility uses Bentley modelling software

Bentley Systems has announced that Westernport Water, a utility in the state of Victoria, Australia, is using Bentley's WaterGEMS water distribution modelling software, integrated with Open Spatial's geographic information system (GIS) and Control Microsystems' supervisory control and data acquisition system (SCADA), to cost-effectively operate and manage more than $43 million in water assets. The SCADA system allows field-measured data to be brought directly into WaterGEMS using the modelling software's SCADAConnect and Darwin Calibrator modules. The SCADAConnect technology with real-time updates will save Westernport Water approximately $80,000 in calibration costs, says Bentley.

Richard Zambuni, Bentley's global marketing director, said: 'The WaterGEMS water model will help deliver additional savings to Westernport Water through effective leak detection by measuring and identifying non-revenue water. As a result, Westernport Water is aiming to achieve a 25 percent reduction in water losses. In addition, reducing water losses means that less water will need to be pumped to customers to achieve the same level of service, limiting the utility's carbon emissions.'

SCADAConnect can use both historical and real-time data, so the model has tables of previous values for trending and projections. Therefore flow, pressure, and tank-level data for each demand zone can be fed on a real-time basis, enabling the system to model real-world conditions, says the company.

Bentley has also announced that it has acquired UK-based Pointools Ltd, a provider of point cloud software technology, in order to integrate point cloud processing throughout its product portfolio. Bentley says that point clouds can serve the function of an 'as-operated' 3D model for infrastructure assets. ●

www.bentley.com

Meeting the Challenge of Financing Water and Sanitation

Tools and Approaches
Author: Organisation for Economic Co-Operation and Development (OECD)

The investments needed to deliver sustainable water and sanitation services, including the funds that are needed to operate and maintain the infrastructure, expand their coverage and upgrade service delivery to meet current social and environmental expectations, are huge. Yet, most systems are underfunded with dire consequences for water and sanitation users, especially the poorest. Providing sustainable drinking water supply and sanitation services requires sound financial basis and strategic financial planning to ensure that existing and future financial resources are commensurate with investment needs as well as the costs of operating and maintaining services. Some of the key messages of this report are:

- Water supply and sanitation services generate substantial benefits for the economy
- Investment needs to generate these benefits are large in both OECD and developing countries
- Tariffs are a preferred funding source, but public budgets and ODA will also have a role
- Markets-based repayable finance is needed to cover high up-front capital investment costs
- Strategic financial planning and other OECD tools can help governments move forward

OECD and IWA Publishing, November 2011
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Development of the Integrated Urban Water Model

INFR4SG09c
Author: Sybil Sharvelle

The challenges of addressing the needs of aging water and wastewater infrastructure require new management approaches. Traditional municipal water management practices may not be the most cost effective solutions. Savings may be realized through the adoption of new integrated water management concepts such as treated wastewater effluent and / or greywater reuse, rainfall harvesting, etc. Determining which water management practices are best suited to a particular urban area can be a difficult task as costs, climate, and population characteristics vary across regions.

The Integrated Urban Water Model (IUWM) has been developed by the Urban Water Center at Colorado State University to aid urban planners and utility managers in the assessment of which water management practices may prove most beneficial to their communities. The model is native to the Windows operating environment and includes a graphical user interface through which the user can easily add information about their region and assess the potential benefits of the included water management practices.

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21st Century Water Municipal Issues and Concerns: Literature Review

INFR5SG09a
Author: Neil Weinstein

Ten years into the 21st Century, municipal and county leaders are facing significant water challenges, including: high water use rates; population growth; aging infrastructure; and the impact of climate change. With federal funds for water infrastructure increasingly scarce, the economic burden for infrastructure improvements falls on local governments, who, even before the recession, struggled to ensure adequate funding for operating and maintaining water systems.

These challenges are no longer contained within the traditional confines of water 'issues', but are intertwined with energy, development, infrastructure, and overall issues of sustainability. Faced with the convergence of inadequate infrastructure that needs a large economic investment, persistently low water quality, and the anticipated impacts of climate change, municipalities have begun considering alternative water infrastructure investments.

This literature review provides information on the most urgent water issues of the coming century, as identified by WERF, and a discussion of the materials available to guide officials, regulators, and managers in the use of low impact development and green infrastructure to address these issues.

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Water Loss Europe 2012 will see presentations and discussions on the latest developments, strategies, techniques and applications of international best practices in non-revenue water management. This is the first regional water loss event to be held by the IWA's Water Loss Specialist Group and will focus on a wide range of topics, including pressure management, NRW and European Commission policies, financing, software, and leakage detection and modelling.

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