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US funding for critical infrastructure training

The Water Environment Federation has been given a \$1.7 million grant by the US Department of Homeland Security to implement a three-year comprehensive training programme addressing 'interdependencies between the water sector and other critical infrastructures'.

Building on its current water sector security programme, WEF will look at the interdependencies inside and outside the water sector to engender and enable effective partnerships to advance prevention, protection, response, and recovery from 'incidents of national significance'.

The training will focus not just on water and wastewater utilities but also on managers from other related critical infrastructure sectors and local government officials

WEF executive director Bill Bertera noted: 'WEF has been a leader in providing all size water

sector utilities with security and emergency response training and we are particularly pleased to cooperate with DHS on this innovative programme.

'Many of the nation's critical infrastructures are dependent on the water sector, and we are dependent on them. Addressing this relationship is key to reducing loss of life as well as minimising the economic, social, and other impacts on the nation should an incident occur.'

The training programme will use a series of webcasts and other distance learning tools, stakeholder symposiums and regional training sessions/workshops to target stakeholders across the US.

The training programme will build partnerships with, and provide information to, water sector utility managers and their counterparts in transport, energy and other key sectors. ●

No immunity for Northern Ireland's new water company

Friends of the Earth has announced that the UK government is expected to back down from a plan to provide immunity from prosecution for the directors of the soon-to-be started Northern Ireland water GoCo (government-owned company).

The government had announced that the GoCo, due to emerge from the Northern Ireland Water Service in April 2007, would not have crown immunity from prosecution, following an EC ruling that this breached European law. This meant that many believed the GoCo would be able to be fined for pollution offences. However, the government subsequently replaced the Water Service's original status with 'corporate immunity', to protests from environmental groups.

Friends of the Earth officially complained to

the EC, which has now taken the first step towards legal action to remove the corporate immunity substitute.

Friends of the Earth's Northern Ireland director, John Woods, said the organisation expects a full retreat from the Department of Regional Development on the issue, adding: 'Friends of the Earth does not believe the new water company should be prosecuted immediately for the many highly-polluting sewage works it will inherit, but the European Commission agrees with us that it is completely wrong to grant immunity from prosecution.'

'It is up to the environmental regulator to decide when to prosecute. It is completely unacceptable that EHS should operate with one arm tied behind its back.' ●

UN report underlines spending needs

The UNDP's 2006 Human Development report, Beyond scarcity: power, poverty and the global water crisis, warns that concerted international action is needed to end this 'silent emergency'.

'When it comes to water and sanitation, the world suffers from a surplus of conference activity and a deficit of credible action,' noted lead author Kevin Watkins.

National plans and a global action plan with active buy-in from the G8 countries are both needed, he added.

Governments should spend 1% of GDP on water and sanitation, the report says, adding that water should be made a human right, and that everyone should be entitled to at least 20 litres/day. Governments should go beyond

'vague constitutional principles' in enabling legislation to achieve this goal.

National water and sanitation spending is dwarfed by military spends, the report notes. In Ethiopia, the military budget is 10 times the water and sanitation budget, and in Pakistan it is 47 times higher.

The report also calls for an extra \$3.4 billion to \$4 billion each year, doubling current aid, to bring the water and sanitation MDG within reach.

As progress requires large, up-front investments with a very long payback period, innovative financing strategies are essential, the authors say, adding that this would be money well spent.

The total cost of meeting the MDG is estimated at \$10 billion a year. ●

EDITORIAL

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

Publishing Assistant
Oisín Sands
osands@iwap.co.uk

Water Utility Management International is a new publication focusing on the needs and interests of senior water utility managers. The aim of this publication is to provide those heading water and wastewater utilities with an international reference point on the strategic issues affecting their organisations. Water Utility Management International will also be of value to consultants and others following developments in this area.

Presented in a newsletter format, Water Utility Management International will contain news, interviews, and in-depth briefings on topical issues. Other articles will take an executive briefing approach or be based on landmark case studies. Regular themes for articles will include financing, investment, regulation and personnel matters. There will also be a central theme of achieving efficiency in water utilities, encompassing topics such as benchmarking, billing, tariffs, IT and service standards.

For more information, visit:

[www.iwapublishing.com/
template.cfm?name=iwapwumi](http://www.iwapublishing.com/template.cfm?name=iwapwumi)

PUBLISHING

Publisher
Michael Dunn

Water Utility Management International is published four times a year (March, June, September, December) by IWA Publishing. Statements made do not represent the views of the International Water Association or its Governing Board.

IWA Publishing
Alliance House,
12, Caxton Street,
London SW1H 0QS, UK
Tel: +44 (0)20 7654 5500
Fax: +44 (0)20 7654 5555
Email: publications@iwap.co.uk
Web: www.iwapublishing.com

SUBSCRIPTIONS

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

2006 price (4 issues):
£165 / €249 / \$329
(IWA members: £150 / €225 / \$299)

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

Or visit: [www.iwapublishing.com/
template.cfm?name=iwapwumi](http://www.iwapublishing.com/template.cfm?name=iwapwumi)

Design & print
Original design: John Berbuto
Printed by Ashford Overload, UK

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

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European support for Mozambique capital

The European Investment Bank is to provide funding for a major water project in the Mozambique capital, Maputo.

The Maputo Water Supply serves the Greater Maputo area, which has 1.7 million inhabitants. Some 48% of the city's population live in absolute poverty and just 40% have access to adequate drinking water.

The EIB project will significantly increase the population with access to safe drinking water and therefore help to move Mozambique closer to achieving its MDGs on water, health and poverty eradication.

The project has four key aims. The first is to increase installed production capacity to ensure a constant supply to the 730,000 people connected to the existing water supply system (which does not provide a 24-hour supply) and increase the population served by the international operator by 467,000 people in 2010 and

by an additional 145 000 by 2014.

The second goal is to improve the system's performance by reducing unaccounted for water from 60% to 40%.

Thirdly, the project will expand the water supply in the poorer peri-urban areas on the outskirts of the city with the support of small local private operators, extending the services to an additional 110,000 people.

Lastly, the work will also improve the promoter's capacity and financial sustainability, which will contribute to the improvement of water services in all of the cities under its responsibility.

The loan is provided under the Cotonou agreement, which provides a mandate for the EIB to lend funds for projects that aim to reduce and ultimately eradicate poverty in African, Caribbean and Pacific states. ●

Ofwat warning on future price reviews

Philip Fletcher, chair of economic regulator Ofwat, has warned the water industry in England and Wales and its investors not to assume that the regulator would reach similar conclusions either on the cost of capital or financial indicators at the next price review in 2009 as it did in the most recent review.

The economic regulator noted that it would 'take account of all market evidence in reaching its decisions to ensure that customers' bills were no higher than necessary'.

New Ofwat chief executive Regina Finn added that the new board structure would enable Ofwat to take a fresh look at regulatory issues, though there would be no 'changes for changes' sake.'

Ms Finn said: 'We need to take a long-term approach to the way we regulate and expect the companies to do the same in their planning. This will ensure that we safeguard not only the interests of today's customers but also those in the future.'

On competition, Mr Fletcher noted its development had been held back by constraints in the new water supply licensing regime, including the small size of the market. It was now time for a re-think and Ofwat would be raising with government the issue of how to encourage competition in the water sector.

In the meantime, Ofwat has released a letter from Regina Finn to government that warns of 'little or no progress' in the development of competition.

The letter to environment minister Ian Pearson adds: 'To date no customer has switched water supplier and it

is our view that the water supply licensing (WSL) regime as it is currently constructed many not deliver on our promise to promote effective competition.'

The factors identified are first the size of the open market – with a high threshold level for entry, only around 2300 customers are eligible to switch suppliers.

The second is the very small profit margin available as a result of applying the mechanism for calculating access prices to the incumbent's network.

'With low volumes of customers and potentially very low margins, new entrants could argue that it is difficult for them to make a viable business case, even if they are efficient,' the letter continues.

Other confounding factors include the fact that the regime prevents Ofwat from setting or approving terms or conditions of access agreements unless a licensee specifically requests intervention in relation to a specific case for a specific customer. So far no disputes have been received.

In addition, Ofwat notes, 'it is not clear to players in the market how the WSL regime and/or the older 'inset' appointment mechanism can facilitate the effective competition that would deliver benefits to customers'.

On these grounds, Ofwat has asked for a review of the regime ahead of the set 2008 review date. It warns: 'We are concerned that the uncertainty and the constraints in the regime will only add costs for all parties who are trying to make the regime work (new entrants, incumbents and Ofwat) while delivering little in the way of benefits to customers.' ●

AUSTRALIA: Perth desalination plant starts operation

A new AUD\$387 million (\$301.5 million) desalination plant built by Multiplex Group and Degremont at Kwinana has begun supplying the western Australian city of Perth with 130MLD of water, providing 17% of the city's needs. The plant makes Western Australia the first state to utilise desalination as a major public water resource. The plant is the largest in the southern hemisphere and the third largest in the world.

UK: Ofwat names guilty three in customer service decline

Reporting on a decline in customer service levels among the water companies of England and Wales, Ofwat has noted that poor performance and suspect data from Severn Trent, Thames and Southern Water caused the percentage of written customer complaints not dealt within the ten day target to soar almost tenfold. With their figures included, the percentage

rose from 0.31% to 3.08% in a year. The percentage for billing enquiries not dealt with within five days also rose, from 0.48% to 4.44%. Without the figures from these companies, the industry's performance on these two measures was 0.14% and 0.42% respectively. The three were also close to the bottom of the table, above only Northumbrian Water, for performance on water supply, sewerage service and customer service. Wessex Water came top.

GLOBAL: Online resource for utility regulation unveiled

A comprehensive body of knowledge on utility regulation has been made available online at www.regulationbodyofknowledge.org/. This website offers a resource for practitioners, researchers, students, and anyone interested in utility regulation. By providing summaries of key concepts and links to over 300 references and case studies, the resource increases awareness of regulatory best practice.

Business

CHINA: Cascal buys major stake in China Water

Cascal, a Biwater subsidiary, has bought 87% of the China Water Company's shares from Thames Water, Sime Darby (Hong Kong) and two minority shareholders. China Water has offices in Hong Kong and Shanghai and owns majority stakes in four water service companies in China based in Xinmin and Qitaihe, in the north, Yanjiao, which is near Beijing, and Fuzhou in the south east. The water service companies are all joint ventures with local water companies or development zones.

UK: SSE opts to become water competitor

Scottish and Southern Energy, which owns Southern Electric, Scottish Hydro Electric and Swalec, has asked Ofwat permission to become a water industry competitor, offering water services to large users. SSE has said it views this as 'the best way of dipping our toe in water'. Chief executive Ian Marchant noted: 'With a strong presence in two of the three core utilities, it makes sense to look at the best way of completing the set.'

SAUDI ARABIA: German SMEs look for water sector business

A group of water and wastewater-related SMEs from Germany has been meeting in Riyadh, the capital of Saudi Arabia, for talks on cooperation in the sector. The delegation was due to meet various ministries, authorities and an estimated 80 companies. Procedures for privatisation have begun in five major cities - Riyadh, Jeddah, Dammam, Madinah and Al Khobar - which account for 50% of the kingdom's total water consumption.

JAKARTA: New company given green light for takeover

Singapore-based PT Aquatico will shortly begin operating Jakarta's western water concession after the government agreed to allow it to buy the shares of the existing operator, PT Thames Pam Jaya. Aquatico, which belongs to a consortium of Indonesia's ReCapital Advisors and Glendale Partners, guaranteed that it would not increase water charges to consumers after the change of management and that it would not sell its shares for at least the next five years. Aquatico has till the end of November to comply with all the government's requirements, or the government has noted that it will begin to assess the next investor in line, Australia's Macquarie Bank.

MALAYSIA: Pahang-Selangor water transfer project gets green light

Malaysia has announced that the delayed Pahang-Selangor raw water transfer project will resume in 2007 at a cost of MYR3 billion (\$824.3 million), less than previous estimates. The delay is ascribed to the need to review the process for appointing the consultant and contractor. The appointment of a consultant is due to be completed by the middle of next year, with work beginning at the end of 2007. The five-year project will involve construction of the 2180MLD Langat 2 water treatment works and a 45km distribution tunnel.

MALAYSIA: Water board to invest in water treatment upgrade

Malaysia has announced that the Perak Water Board will invest MYR767 million (\$210.8 million) to build and upgrade the state's water treatment systems. The upgrade is expected to increase the water supply from 1225MLD to 1595MLD, and reduce non-revenue water from 30% to 20% by 2010 by replacing or repairing pipework. Facilities to be built include the Sungai Kinta dam and water treatment works at Tanjung Malim, Larut Matang and Kerian.

SOUTH AFRICA: Rand Water announces spending plans

Africa's largest potable water supplier, South Africa's Rand Water, has announced plans to spend over ZAR2.5 billion (\$344 million) over the next five years on upgrading and refurbishing its distribution infrastructure. New chief executive Themba Nkabinda said that the company believed that it could generate most of this financing itself, but that it might need to source funding from the private sector towards the end of the period.

RUSSIA: Vologda looks for improvement partner

The Vologdagorvodokanal company, which provides water and wastewater services to both households and industry in the city of Vologda in Russia is looking for a suitably-qualified financial, legal and technical consultancy to prepare and assist it with implementing a financial and operational performance improvement programme. The overall objective is to provide financial, legal and operational advice including an update to the corporate development plan; drafting and assistance in negotiating and concluding a service agreement between the city and the company; development of a tariff-setting policy; and completion of an initial financial, legal and operational analysis with some implementation assistance.

Loans and tenders

UKRAINE: EBRD provides Crimea Black Sea clean-up funding

The EBRD is to provide a loan of up to €6 million (\$7.9 million) to the municipal water and wastewater utility of the Communal Water and Wastewater Management utility of the South Coast of the Crimea, which is owned by the Autonomous Republic of Crimea in Ukraine. The loan would be used to finance priority capital investments to improve the municipal water and wastewater infrastructure and services in the city of Yalta and a number of smaller municipalities along the south coast called Great Yalta, the most famous resort area in the Crimea. The investments are expected to contribute significantly to decreasing the level of polluting discharges into the Black Sea.

INDIA: ADB provides infrastructure loan to Karnataka

The ADB is to help the Indian state government of Karnataka to rehabilitate existing urban infrastructure and construct new systems in the north of the state, through a multi-tranche financing facility of up to \$270 million. This accounts for around 60% of a \$440 million investment programme supported by the state government and other agencies. In the north of the state, the water supply is often infrequent and water quality is usually poor, and the sewerage and drainage systems are inadequate. Investments planned under the programme include water supply and sewerage systems, as well as drainage.

BOLIVIA: World Bank provides urban infrastructure assistance

The World Bank's is to provide financial assistance for Bolivia from the International Development Association (IDA) worth some \$140 million over the next two years, and has also approved a \$30 million interest-free credit to improve access to basic services by the urban poor in Bolivia's major cities. The urban infrastructure project will focus on La Paz, the country's capital, the adjacent city of El Alto and Santa Cruz, Bolivia's largest city.

Some of the work will focus on expanding sewerage coverage. In the case of Santa Cruz, the project will work with the city's largest sanitation cooperative, SAGUAPAC.

NIGERIA: African bank announces water and sanitation spend

The African Development Bank is to spend \$75 million on water and sanitation projects in Nigeria in 2007. The project, to be undertaken in collaboration with the federal government, was announced during the celebrations for WaterAid Nigeria's 10th anniversary.

INDONESIA: ADB provides private-sector focused infrastructure loan

The ADB's infrastructure reform sector development programme (IRSDP) is to offer over \$428 million in loans and grants to the Indonesian government to help improve the investment climate and tap the power of the private sector to meet Indonesia's huge infrastructure needs. The funds will be supplemented by a \$7.6 million grant from the government of The Netherlands for a project development facility. About 50 million people in Indonesia have no access to treated water, and close to 200 million have no direct access to a phone or sewage network.

VIETNAM: ADB supports water and sanitation projects in smaller towns

Some 114,000 households in Vietnam's central region will have improved water supply and sanitation and enhanced community health thanks to a project supported by a \$53.2 million loan from the ADB. Most recent investment in the country's infrastructure has been in Hanoi and Ho Chi Minh cities, with small and medium-sized towns in the poor central region being neglected. The project will develop and expand water supply in Ca Na, Gia Nghia, and Ninh Hoa to improve access to safe water for around 58,000 people and reduce the risk of public exposure to waterborne and water-related pathogens. In six towns, drainage and wastewater treatment works will be undertaken to protect 461,000 people from flood damage and water-related diseases.

Finding the funds – the challenge for water

The Millennium Development Goals and the World Water Vision are laudable and commendable, but delivering the colossal investment that is required in global water and wastewater infrastructure presents the ultimate challenge. New institutional and financial models must be found, writes **PAUL GARRETT**.

A conference in London last month held by the Institution of Civil Engineers brought together water professionals, policymakers and financiers from all over the world to examine the funding challenge for water and sanitation worldwide, and new and emerging funding mechanisms.

David Lloyd Owen, managing director of investment advisor Envisager, began the conference with a look at the size of the challenge in the developing – and developed – world (see also article opposite).

In Europe he noted that European Union Directives continue to drive spending. Key Directives are the Water Framework Directive, Drinking Water Directive, Bathing Water Directive and Urban Waste Water Directive. There is uncertainty over the ability of new accession states to comply with Directives any time soon – estimates for additional capital expenditure costs for the accession states range from €22-25 billion for water and €15-17 billion for wastewater, rising to €26 billion for full compliance.

Current capex spending per annum for the western European member states is currently €30 billion, compared to €1.7 billion for the accession states.

The situation is worse in the Americas. In the USA and Canada Owen said water and wastewater infrastructure has suffered from 50 years of underinvestment, plus demographic shifts from town centres to suburbs. 45% of drinking water pipes were classified as 'poor' or worse in 2002, and in 1996 only 57% of US wastewater was treated 'adequately'. US capex spending needs to rise by \$3-19 billion per annum for 20 years.

In Latin America he said the poor quality of water and wastewater infrastructure was now a competitive impediment compared to Asia. Most advanced with its water investment was Chile; Brazil and Mexico, he said, had 'grand plans – but funding challenges, often mired in politics'. Total capex spending for the Americas is currently \$26.7 billion a year - \$20 billion of which is in the US alone.

In Asia the picture is dominated, unsurprisingly, by China. It is spending \$15 billion a year on water and wastewater projects.

Winpenny of Wychwood Economic Consulting echoed the positive contribution private sector finance can bring. He said that Integrated Water Resources Management can help to attract the finance needed for the global water sector to function well.

He said that if resource management, environmental stewardship and governance – policymaking and institutional capacity – could be seen to be working, financing would be attracted to the sector.

There was, he said, a clear link

Different financial models, said Winpenny, were appropriate in different countries, depending on history and geography; and financing systems reflected institutional diversity. What all financing shared was the need to be adequate, sustainable and affordable, and the ability to deliver appropriate levels of service, environmental quality – and price.

Finally, Tony Clamp of Industry Funds Management gave his assessment of how water projects are funded. His organisation is a specialised investment funds management company owned by Australian Superannuation Funds, managing \$7 billion with a focus on long term investments in social and economic infrastructure assets in Australia, Europe and North America.

He said the emergence of infrastructure funds was a sign of how water sector financing was changing. Financial investors were seeking to acquire growing interests in utilities in established markets. In developing markets, though, it was a different story and there new types of financing would probably be required. These would include concessions, as seen in Dar es Salaam in Africa, and BOT projects, as seen in Ajman in the Middle East.

Funds such as Macquarie Bank have led the way, notably acquiring water companies in England.

So the conclusion from the day seemed to be that finance from the private sector was out there – providing the water sector worldwide can demonstrate the good governance that perhaps has at times been lacking in the past. There are funds out there that seek to invest billions of dollars in infrastructure projects – why not water and wastewater worldwide? ●

The conclusion from the day seemed to be that finance from the private sector was out there – providing the water sector worldwide can demonstrate the good governance that perhaps has at times been lacking in the past.

Japan, Korea Australia and New Zealand combined are spending \$20 billion.

As for the developing world, estimates of the amount of investment needed vary from \$370 billion to \$552 billion.

Where is this money to come from? Owen identified four current financing sources – tariffs, debt, the state, and aid. Added to this must come private funding. He said the private sector can and will make a real difference in funding flows, but in developed economies spending on water needs to move on from 'technocentrism' to targeted spending and incentives for utilities and technologies that deliver efficiency, while in developing economies the private sector needs to rethink its philosophy of engagement with the various NGO lobbies.

In another paper James

between the attraction of more finance and improvements to governance of the sector. Past investment has disappointed expectations – physical infrastructure has often proceeded ahead of reforms in policies and institutions.

He concluded that across the world there were a number of financing methodologies that worked well. He cited France, with municipalities responsible for water and wastewater, but services provided by the private sector via concessions; the Netherlands, a financially autonomous public sector mode; England and Wales where private equity leverages finance and South Africa, where the industry is politically coherent with subsidies from government, large users and loans from a Land Bank and some commercial banks.

Projecting long-term funding needs

An ambitious new report has assessed the water supply and sanitation capital investment needs for over 50 countries around the world, the extent to which these needs can be met by tariffs, and the prospects that private sources of funding could fill the gap. **KEITH HAYWARD** reviews the report.

As a former equity analyst, Dr David Lloyd Owen knows well the minds of those seeking to invest private capital. In a new report, he has applied this background and his knowledge of the water sector to set out the potential for external, or private, funding to be used in meeting global water supply and sanitation needs over the next 20 or so years.

The report, 'Financing water and wastewater to 2025: from necessity to sustainability', is substantially based around Lloyd Owen's modelling of the spending and investment needs of the sector and on his assessment of the potential for a range of financing options.

At the heart of the work are the outputs of Lloyd Owen's Capital Expenditure for Water and Wastewater Totals (CEWWT) model. This factors in basic information such as population and access data along with estimates of, for example, the costs for extending services and for rehabilitating data. Capital spending forecasts are then prepared under three different scenarios, ranging from a high spending forecast in which all targets are met down to a low spending forecast where there is significant scaling back from objectives.

Capital spending scenarios are set out for 59 countries, grouped into five different regions. Overall forecast spending is set out in Table 1. Alongside this, Lloyd Owen has made an estimate of operation and maintenance (O&M) costs for each country so that total expenditures can be calculated.

On the revenue side, population, GDP, household income, and affordability limits are combined to assess total revenues in each country.

These two sets of figures are then used to predict the balance of forecast revenues and expenditure for each country under the high, medium and low capital expenditure scenarios (see Table 2). As the

report notes: 'The central spending forecast, when applied to affordable and acceptable tariffs, points to an external funding need to US\$1,768 billion n between 2006 and 2025... Given the constraints on tariffs and aid for the less developed economies, significant new sources of funding will be needed to fund this work.'

Lloyd Owen then goes on to look at the potential for external financing from the financial markets and financial products to address the revenue-spending gap he identifies.

Here again high, medium and low scenarios are developed at country level for each source of funding. These have been developed by considering potential deal flows, the potential suitability for private sector finance, and the timing of market conditions.

The different sources of funding evaluated are:

- corporate bonds
- municipal bonds
- syndicated loans
- development banks and the European Investment Bank
- concession project finance
- Private Finance Initiative (UK model) project finance
- structured corporate debt
- structured finance

These sources of funding are complemented by EU grants and Official Development Assistance, and the total anticipated funding is set out in Table 3. These values can be compared with those in Table 2 to establish the extent to which it is likely external financing will meet the gap between spending requirements and revenue. Lloyd Owen summarises the findings by stating: 'While Europe and North America appear to have their potential external funding needs satisfied, this is not currently the case for the rest of the world.'

One country of particular note is Japan. According to Lloyd Owen's assessment, the country has a medium scenario capital spending

forecast of a massive US\$325 billion for 2006-2025. Furthermore, after assessing revenues and O&M costs, the medium scenario revenue-spending gap is put at US\$539.9 billion for 2006-2025. 'Developed Asia is affected by Japan's policy of using state funding for infrastructure development; if this were to end, it would transform market requirements,' Lloyd Owen notes in the report. 'In Latin America, the gap reflects the region's current political climate, while non-ODA and Development Bank funding for the developing economies continues to be affected by currency risk and sub-sovereign debt issues.'

The report concludes: 'It is

evident that there is some scope for these markets to be further developed and expanded through further financial innovation, especially in addressing potential risk issues. This in turn would benefit from a broad consensus amongst politicians and special interest groups that operating these services on a cost recovery basis is the most effective form supporting new sources of funding.' ●

Financing water and wastewater to 2025: from necessity to sustainability
David Lloyd Owen
Thomson Financial. ISSN: 0953-0223.
Standard price: £795 / US\$1447 / HK\$11227
Contact: neil.clasper@thomson.com

Table 1 - Forecast capital spending in countries covered, 2006-25

US\$bn	Low	Medium	High
Europe	647	802	928
North America	445	585	935
Latin America	81	106	130
Developed Asia	389	458	527
Rest of World	286	363	451
Overall	1,848	2,341	2,960

Source: 'Financing water and wastewater to 2025: from necessity to sustainability', Dr David Lloyd Owen, p10.

Table 2 - Revenue-spending gap in countries covered, 2006-2025

US\$bn	Low	Medium	High
Europe	267	399	522
North America	65	98	428
Latin America	57	80	101
Developed Asia	589	658	730
Rest of World	369	448	522
Overall	1,350	1,683	2,303

Source: 'Financing water and wastewater to 2025: from necessity to sustainability', Dr David Lloyd Owen, p6.

Table 3 - Aggregated forecasts for funding flows, 2006-2025

US\$bn	Low	Medium	High
Europe	250	296	372
North America	242	298	449
Latin America	28	53	86
Developed Asia	17	30	53
Rest of World	114	157	211
Overall	451	834	1,171

Source: 'Financing water and wastewater to 2025: from necessity to sustainability', Dr David Lloyd Owen, p56.

Improving water utility management and performance in developing countries

The many water utilities in developing countries generally face similar management difficulties. **JULIE FISHER, SAM KAYAGA** and **JOSSES MUGABI** report on the interim results of a capacity-building project initiated by the Water Utility Partnership for Africa which show the benefits that can be achieved by taking a partnership approach.



Public urban water utilities in developing countries face enormous challenges, especially in Africa, in providing water services for their rapidly-growing urban populations. Many of these challenges are caused by poor utility management practice and the fact that there is often no commercially-oriented culture to drive performance improvements.

Private sector participation has been seen as a possible way of addressing these issues, and in Africa this has involved contracting multinational water companies to run water utilities. However, there is still strenuous debate amongst policy makers and water sector professionals about the degree to which this offers sustainable improvement to public utility performance. There is therefore interest in alternative, innovative approaches, characterised by inter-organisational partnerships between the private and public sectors and civil society.

The success of a capacity-building project initiated the Water Utility Partnership (WUP) for Africa (see Box 1). In this venture, international experts worked closely with the participating utilities, facilitating the identified areas of capacity building within those institutions using a participatory approach. There are important policy lessons emerging from this initiative in relation to utility management and opportunities for scaling up these approaches to other utilities.

Management challenges facing water utilities

There are a great many water utilities in developing countries, varying in size, organisational culture and operating environment. Generally though, the management difficulties they experience are often very similar. A basic problem is that their inefficient working practices create limited access to services for the poor.

In extreme cases, over half of the water produced is lost, due to both physical and administrative shortcomings. Additionally, low revenues mean that operating costs are often not adequately covered, and there is no scope for expanding service coverage. To compound these problems, utilities have not yet developed a strong commercial approach.

In a climate of alarming population growth in many urban centres, it is clear that water utilities have to address these issues urgently, implementing strategies both for improving the effectiveness of their own operations and meeting customer needs.

Many managers of water utilities in developing countries do not follow

Box 1 - Water Utility Partnership for Capacity Building Africa

The Water Utility Partnership (WUP) is an organisation established to help water utilities in Africa to improve their performance and achieve economic and environmentally sustainable service delivery. WUP works by building partnerships among African water supply and sanitation utilities and other key sector institutions, to create opportunities for sharing experiences and capacity building. In order to achieve its objectives, WUP, supported by the Swedish International Development Agency (SIDA), initiated a project in 2001 aimed at improving utility management and reduction of unaccounted for water (UfW). This project formed part of WUP's Action Programme designed to meet its objectives of improving utility performance, improving services to the urban poor and creating a framework for collaboration among water utilities and various training and research organisations. The project provided support to six water utilities in six African countries of Uganda, Kenya, Tanzania, Lesotho, Benin and Congo. At the heart of this project was a novel partnership of international expertise and participating utilities, which allowed for capacity building using participatory approaches. Severn Trent Water International (STWI) (UK) in association with the Water Engineering and Development Centre (WEDC), Loughborough University (UK) constituted the consultancy and back-stopping team.

Further details may be obtained from project web pages at the WUP and WEDC websites: www.wupafrica.org/activities.html#activities and wedc.lboro.ac.uk/projects/new_projects3.php?id=225

good management practices as can be seen by the lack of clarity in their organisational mandate and mission, inadequate management structures and systems for effective delegation, as well as poor human resources capacity and customer service.

Part of the solution lies in maintaining effective management information systems, so that utilities can understand the extent of the problems they face and have a mechanism for monitoring and evaluating progress. At the moment, data is not collected in a systematic way, so there is a shortage of the information necessary to design improvements and make decisions about the associated investment costs

A response to the challenges through a capacity building partnership approach

The most important benefit from building partnerships among water utilities and other sector institutions is the opportunity to share experiences and for capacity building. In particular, the WUP project has shown that a well-designed capacity building partnership (CBP) between water utilities in developing countries, international experts, and training and research organisations can have an immense impact in terms of building critical management skills.

These partnerships are based on the premise that utility staff have in-depth knowledge of the local situation and any relevant barriers to progress that may exist at an organisational level. Added to this is the extensive knowledge of best practice from different parts of the world brought by those with international expertise.

This combination, applied in a participatory fashion with external consultants or training organisations acting as facilitators, enables utility managers to think strategically about the way forward.

What are the key lessons for policy makers?

The most important lesson emerging from this approach is that donor support for water utility reform in

Table 1 - Key performance indicators for Mwanza urban water and sewerage organisation (MWAUWASA), Tanzania, for 2002/03 to 2005/06.

Indicator	2002/03	2003/04	2005/06
Water produced/yr (000m ³)	14,279	14,337	14,280
Unaccounted for water	57%	50%	40%
Water supply area coverage	70%	72%	82%
Customer base (no. of connections)	14,515	16,303	21,340
Metered connections	76%	89%	97%
Staff per 1000 connections	14	12	10
Operating ratio	0.85	0.96	0.8
Days receivable ration	206	180	120
Revenue collection efficiency	94%	95%	97%

Adapted from Mihayo, Z. and Njiru, C. (2006).

Africa can be successfully delivered through a capacity building partnership. Conversely, the traditional 'consultancy' approach, in which international consulting organisations

efforts to improve utility performance. Box 2 shows a performance improvement plan framework, which is designed to be further adapted and developed by utility managers to reflect specific organisational circumstances. The overall aim is to develop comprehensive strategic work plans addressing a variety of management issues, in order to improve utility performance and enable the utility to achieve its short, medium and long-term objectives.

The use of a variety of capacity building tools was found to aid the learning process. These included on-the-job training, lectures, group discussions, peer review of presentations, field visits and practical exercises, conference papers, workshops, benchmarking exercises and on-line support.

Where there is a high level of senior management responsiveness and buy-in to the project, the evidence suggests there is maximum improvement in utility performance. Table 1 shows the progress made by Mwanza urban water and sewerage company during the project period, as shown by key operational performance indicators. Resources spent on advocacy, education and mobilisation at this organisational level should be given more priority in future.

Scaling-up the capacity building partnership approach

Although donor-supported investment has provided assistance for decades, still many low-income countries, particularly in Africa, cannot finance the level of water and sanitation

Two important contributory factors to this change were the exposure of participants to concepts and applications of contemporary water utility management that were largely new to them, and the provision of a novel environment for the exchange of ideas and adaptive learning.

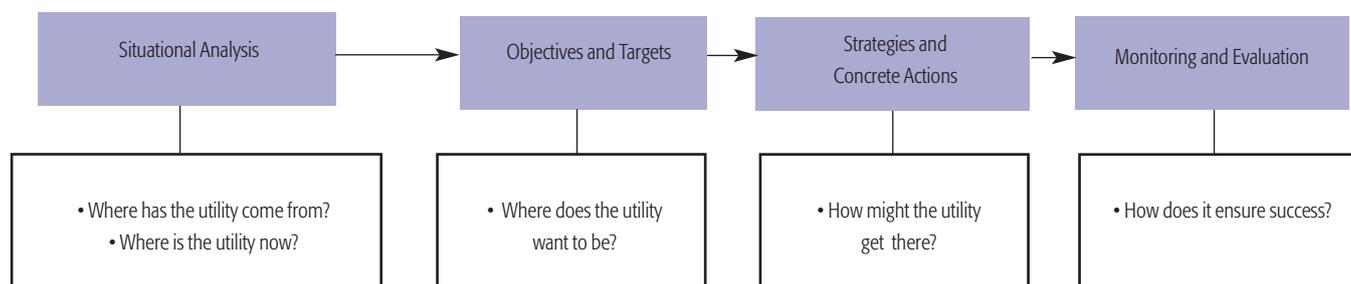
or individuals are recruited as technical advisors on a long-term basis to evaluate, design and implement the reforms is not only less cost-effective, but offers less in terms of a learning experience for local staff.

The results of the WUP show how local capacity building has the potential to improve the performance of water utilities where private sector participation often fails. Even through a short two-week training module, which was an integral element of the project, significant improvements in the capacity and attitudes of those participating were evident.

Two important contributory factors to this change were the exposure of participants to concepts and applications of contemporary water utility management that were largely new to them, and the provision of a novel environment for the exchange of ideas and adaptive learning.

A fundamental lesson for water utility managers is that comprehensive strategic planning is a critical part of

Box 2 - Strategic planning framework for utilities



services demanded.

Experience shows that inadequate service provision is mainly caused by management-level and institutional deficiencies. Partnerships with multinational water companies are currently promoted as an alternative management option, but they have not provided the level of improvement anticipated in many countries, with some contracts having to be terminated prematurely.

This being the case, public utilities will continue to dominate water service provision in many developing countries for the foreseeable future. Therefore alternative approaches to reform must be developed in order for service delivery to improve. Interim results from the project initiated by the African Water Utilities Partnership (WUP) show that capacity building partnerships offer a real opportunity to address management deficiencies and help utilities to adopt a commercially-oriented culture.

Conclusions

The capacity-building partnership concept demonstrated in this project clearly shows that this participative approach can have an immense impact on building critical management skills. The most important emerging policy lesson is that water utility reform is better delivered through such a partnership than through the traditional consultancy approach. A key lesson for water utility managers is that comprehensive strategic planning using the performance improvement plan framework is crucial to improving utility performance. ●

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About the authors:

Both Julie Fisher and Sam Kayaga are assistant programme managers at the Water, Engineering and Development Centre (WEDC), Loughborough University. Josses Mugabi is a research scholar at Loughborough.
Email: jfisher1@lboro.ac.uk

Development of national wastewater tariff guidelines for China

China's rapid urban development has sparked a need for equally rapid water and wastewater system development and a rethink about how costs are recovered. **MAX CLARK, CHI-RONG HUANG** and **SHENG-BIN LIU** report on draft guidelines produced to help this process.

Draft national guidelines on wastewater tariffs have been developed for the People's Republic of China (PRC) as part of a technical assistance study funded by the Asian Development Bank (ADB) and sponsored by the country's Ministry of Construction (MOC).

The draft guidelines and supporting institutional, legal, and regulatory policy recommendations are based on detailed evaluation of wastewater management in four case study cities – Chongqing, Changzhou, Tangshan, and Zhangjiakou – which provided a good perspective for formulating the guidelines. The full documentation for the guidelines and study reports is available on the ADB web page (www.adb.org/Projects/Wastewater-Tariffs/). The views expressed here are those of the authors, and not necessarily those of either the ADB or MOC.

Financing for wastewater systems is a significant issue in China, which needs large capital investments in water pollution control because of its rapid urbanisation, its water resource shortages (particularly in northern China), the heavily polluted state of most of its lakes and rivers, and its economic restructuring, which places additional financial responsibility in the hands of local governments and utility service providers.

Capital investment in urban wastewater facilities has been running at about 15 billion Yuan (\$1.9 billion) annually in recent years. Cities need tariff revenues both to cover operation and maintenance costs and to provide a

proportion of the initial capital costs of developing new wastewater systems.

The study focused on promoting the financial sustainability of municipal wastewater management agencies / enterprises in China, through proposed tariff structures that will provide assured cost recovery through revenues obtained from users and beneficiaries of the wastewater systems.

This strengthened revenue source would be an improvement over the politically-uncertain funding and subsidies available from municipal budgets. Wastewater tariff reforms are part of much broader economic and structural reforms taking place in China.

The study, undertaken in 2002 to 2003, took place during a phase of rapid development within China's municipal wastewater systems, illustrated by comparing national statistics for 2001 and 2004. In just three years, the number of municipal treatment plants increased from 452 to 708; the number of cities served from about 200 to 364 (out of 661 in total); and the percentage of wastewater receiving treatment increased from 35% to 45%.

This figure for treated effluent is seven to nine times higher than a decade earlier. The total annual volume of municipal wastewater produced has declined from 42.8 to 35.6 billion cubic metres, half of which is generated by industry. This reduction is attributed partly to fluctuations in demand, in response to increases in water supply and wastewater prices, and partly to water efficiency improvements and

This paper was presented at the IWA World Water Congress, Beijing, China, 10-14 September 2006, at a special session run by the Water Environment Federation.

water restrictions imposed on industry.

The number of cities that now have wastewater tariffs has increased from approximately 300 to 475, and the remaining cities are being urged to implement tariff systems as their wastewater treatment projects are approved and implemented.

Methods

A review of the wastewater sector in China was undertaken to identify potential improvements in tariff structures and institutional arrangements. This also provided a perspective on the need for and status of water pollution control, and current plans and targets for municipal wastewater collection and treatment.

The review paid detailed attention to the existing institutional and legal framework and the existing regulations that govern the setting, approval and collection of wastewater tariffs.

Typically, wastewater companies were formed to provide a commercial utility service, but their financial autonomy was hampered by institutional arrangements. Typically, water supply companies collected their revenues, which were transferred to municipal finance bureaus, and only sufficient money to pay the actual cash expenses was finally received by the wastewater company. Price Bureaus often set tariff levels in a political process that resulted in insufficient revenues and a need for subsidies from the municipality.

The institutional arrangements and tariff structures developed during the study took into account a review of international best practices and experience in the US, Canada, the UK, Germany, Singapore, Australia and Japan, adapted to the circumstances in China. In each country several cities were studied, including Los Angeles and Boston in the US.

Wastewater service providers examined included public agencies such as the Massachusetts Water Resources Authority in Boston, and private companies such as Thames Water, which serves London and some surrounding areas in the UK.

Relevant policies, objectives and structures for wastewater tariffs were identified as essential to the development of national guidelines. Financial, social and administrative factors or criteria for the policies and objectives were spelled out in relation to financial sustainability and full cost recovery, economic efficiency, price equity in accordance with the 'polluter pays' principle, administrative efficiency and good governance, and affordability and universal access.

In general, the study involved developing sufficient detail on each topic to provide guidance to cities to

supplement existing policies and regulations, which generally did not have sufficient detail.

The study benefited from the active participation of representatives from the four case study cities, and from the MOC, the State Environmental Protection Administration (SEPA), the National Development and Reform Commission, the Ministry of Finance and the legislative committee of the People's Congress. Interim results from the study were reviewed by these agencies and ADB representatives, and discussed at three workshops. The resulting feedback and review comments were incorporated into the final results of the study.

Results and discussion

The tariff guidelines aim to support the evolution of wastewater agencies in becoming self-sustaining, commercially-based autonomous enterprises, and to help the government to become a service regulator rather than a micro-managing service provider. Improvements in tariff structures and institutional arrangements will also lay the foundation for future private/public partnerships, as the municipalities recognise the need for additional sources of capital, expertise, and management efficiency.

Draft guidelines were the key result of the study. Key policies incorporated into the tariff guidelines include adoption of the 'polluter pays' and 'beneficiary contributes' principles, and a commitment to increase user charges progressively to achieve full cost recovery (subject to affordability and local circumstances).

Wastewater charges will be based on the volume of metered water put into the public supply, or on metered volumes of self-supplied groundwater, and can be imposed for a longer period than at present (three years) before completion of initial-phase wastewater facilities, to help with financing the construction.

All customers of an urban water supply company can be charged for wastewater, whether or not their wastewater is collected and treated, so that tariff levels can be increased gradually as the wastewater service area grows in phases. Other policies include legal classification of wastewater charges to exempt them from VAT, and prohibitions against exemptions, discounts, or delays in payment of arrears by politically-well-connected industries or institutions.

In the past, industries owned by the cities or higher levels of government were willing to pay two or three times the residential price. As market forces on industry have taken hold, industries have become less willing to subsidise

domestic users, and in fact would prefer a concessionary rate to improve their market competitiveness.

There has been a noticeable movement over the last 10 years toward charging the same prices to all users, whether domestic, commercial or institutional. The tariff guidelines give preference to a tariff structure based on the actual costs incurred by each type of customer, rather than cross-subsidising between customers.

The tariff guidelines propose that cities should, over time, consider wastewater charges to major industries that would consist of a two-part tariff, based on volume of wastewater and pollution load (COD, BOD or SS). However, the portion of the tariff associated with the pollution load was found to be relatively small compared to the volumetric charge for several of the case study cities.

As a result, a volume-based tariff is now considered to be an equitable basis for cost recovery. It was concluded that another type of two-part tariff, consisting of a fixed charge per household and a variable charge based on metered volumes, would have disadvantages in China. The high fixed charge would discriminate against poorer customers, the reduced volume charge would be less effective in encouraging water conservation, and (as has been found in other countries) a more complex tariff structure would be difficult for customers to understand and accept.

Collection of wastewater fees in a single bill with water supply charges is also recommended in the tariff guidelines, to improve the percentage of billed revenue collected, as customers in arrears want to avoid being disconnected from their water supply system.

Trial application of the tariff guidelines to the four case study cities showed that the resulting tariffs would be affordable for average-income households (with an average per capita water use) and low-income households (at lower levels of per capita water use). The guidelines propose that the combined bill for water supply and wastewater should be less than 5% of household income.

The tariff guidelines were applied to the four case study cities to check the affordability of the estimated tariffs required for full cost recovery. Under the most difficult circumstances (in the first year of operation, when debt service commences and billable volumes are lowest), the average household would pay 1.5% to 2.9% of their income in charges, while poor households would pay 2.2% to 3.6%.

Strengthening wastewater management in China requires, in

addition to an improved tariff structure, a variety of improvements to the policy and legal framework. These include:

- increased commercialisation and private-sector financing
- water management on a catchment basis, to prioritise investments and to promote appropriate effluent reuse
- improved regulatory and supervisory arrangements between municipal governments and legally-incorporated wastewater companies
- integrated wastewater management within municipalities, by eliminating district-level wastewater collection management
- strengthening SEPA's authority to monitor and regulate municipal wastewater treatment (in addition to industrial wastewater treatment)
- greater involvement by wastewater companies in industrial discharge permits and monitoring of pre-treatment for industrial discharges to municipal sewers
- provision of subsidies for the poor as part of the general welfare provisions of a city, rather than having them given or paid directly by the wastewater company

The study developed detailed recommendations on the issues related to wastewater tariff policies and structures. Financial sustainability and full cost recovery was proposed to cover cashflow needs, debt service costs, asset replacement or depreciation and an 8% rate of return on net fixed assets.

Price equity and application of the 'polluter pays' principle mean that the prices charged to each customer should be related to the actual expenses that can be traced to each customer, and should mean that eventually major industrial polluters will pay based both on wastewater volume and pollution load in accordance with the Mogden formula.

Administrative efficiency and good governance require tariff structures that are clear and understandable to customers, simple to calculate and easy to implement and operate. Affordability by households will be assured by ensuring that the combined bill for water supply and wastewater is less than 5% of household income, given a monthly water use of 14m³ for an average-income household and 9m³ for a low-income household.

Wastewater management issues were also addressed within the study. China has instigated significant environmental protection and wastewater management initiatives - monitoring, regulation, financing, private sector financing, river basin planning and joint billing of water

supply and wastewater charges.

Areas identified for improvement include:

- integrated wastewater management (with a single agency responsible for wastewater collection at district level, as well as wastewater treatment at city level)
- wastewater services being provided by an incorporated commercial enterprise rather than a municipal department
- facilitating greater private sector involvement
- developing mechanisms for regulation of public utilities' prices and performance (developing information systems, assuring transparency and stakeholder participation, developing a regulatory appeals process, and setting time limits (say, six months) for making decisions on setting wastewater tariffs.

Stakeholder discussion emphasised the need for the tariff guidelines to be practical and to give definitive advice. The agreed approach was to issue a total package of modular materials to local government with more detail than those usually issued by the central government offices in China.

The guidelines are a relatively brief document of 37 clauses, while the details, examples, and methodologies are given in a series of annexes: rationale and explanations, tariff calculation methodology, a model agreement for tariff billing and collection, penalties and administrative remedies for non-payment, and a model contract for industrial discharges to sewer networks.

The methodology for developing the wastewater tariff uses data obtained from the case study cities in a generic financial model that includes the various financial projections required (water supply sales, the volume of wastewater to be collected, pumped and treated, operating costs, investment costs and funding assumptions).

Conclusions

The rapid economic development of China is reflected in its extensive industrial and urban development, which have led to severe water pollution problems. China has undertaken an ambitious development programme for its municipal wastewater systems, but much of the financial burden for building and operating them has to be transferred to the users.

The previous socialist-style ways of setting prices for utility services are inadequate to the task, and an improved methodology for establishing equitable and affordable tariffs is

needed. The draft national tariff guidelines developed in this study can fulfil this need, and can contribute significantly toward a cleaner urban and aquatic environment in China. ●

Acknowledgements

This study was funded by the Asian Development Bank under TA 3749-PRC, and was carried out under the guidance of Bruce Murray (former ADB Director for the ADB mission in Beijing) and Amy Leung, the project officer. The lead consultant was GlobalWorks of Manila, in association with CDM International of Cambridge, Massachusetts. Ian Walker was the team leader, and Peter Jacques was the international management consultant.

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Use the ADB web page address to obtain copies of 23 PDF files that contain all submittals made under the study.

About the authors:

Max S Clark, CDM Inc, Suite 400, 523 W 6th St, Los Angeles CA 90014, USA. clarkms@cdm.com

Chi-Rong Huang and Sheng-Bin Liu, CDM International, Room 1603, No 358 West Yan An Road, Shanghai, China 200040, crh4977@yahoo.com

Challenges and opportunities: issuing water and wastewater revenue bonds in China

Financing the massive investment in water and wastewater systems required in China through the bond market creates a number of issues. **EDWARD MARKUS** and **MYRON OLSTEIN** look at the possible challenges, expectations and exciting possibilities.

The People's Republic of China (PRC) faces an enormous challenge in financing the required country-wide water and wastewater infrastructure improvements. The opportunities to improve the quality of drinking water and reduce the amount of pollution in local waterways are vast.

Many investments are being made in state-of-the-art technology both from within China and around the world to generate significant environmental improvements, but large sums of money will be needed for many years to come. The opportunities and challenges have attracted the interest of the international funding agencies, including the United States Trade and Development Agency (USTDA), the Asian Development Bank (ADB) and the World Bank. Each has suggested the use of revenue-backed bonds as another source of financing to help accelerate the pace of water and wastewater infrastructure investment.

Two agencies, the USTDA and ADB, have funded efforts to develop revenue bond issues that are able to meet international credit standards. The first study, funded by USTDA, was a financial advisory services project for the Shanghai Water Services Assets Operation and Development Company. SWAOD is a subsidiary of the Chengtong Corporation, which is responsible for the state-owned water and wastewater assets that serve urban Shanghai.

The second project, funded by ADB, is for the Nanjing water and wastewater system. The objective of these two efforts is the development of a long-term capital financing strategy that includes issuing revenue-backed bonds as one component of the overall financing plan. The authors had the pleasure of working with SWAOD to help prepare for issuing revenue bonds. The authors are now also part of the team that is working with

representatives of the water and wastewater utility in Nanjing.

This paper presents a brief overview of the methods historically used to finance water and wastewater infrastructure in China, followed by an introduction to revenue bonds. The article also provides examples of the types of things that bond investors look for in considering whether or not to invest in water company bonds – the investors' perspectives are interesting to consider because water companies in China are not accustomed to providing much of the information that investors would often look for.

The paper concludes with an overview of some of the opportunities and challenges that water companies and investors will face in the bond issuance process. We will refer throughout to water systems, though the presentation and discussion are intended to refer to both water systems and sewer drainage systems, including all treatment plants.

Historical sources

Historical sources of funds for water system construction in China include the following:

- loans from banks
- cash obtained from water system revenues
- government investments or subsidies
- proceeds from the sale of assets
- proceeds from the sale of company stock

The debt obligations of water companies are typically short-term, as noted below.

Why consider bonds as a source of construction funds?

- the need for construction funds for water systems is very large, not only in Shanghai and Nanjing but throughout China – new sources of funds are needed to meet this need particularly as local governments seek to reduce or end the subsidies

that they provide

- bank loans must be repaid or refinanced every one to three years – bonds offer the opportunity to spread the repayment period over 15 to 20 years or more
- the assets to be constructed will last for many years – matching the repayment period for bonds with the life of the assets enables future customers to contribute to the cost

Revenue bonds offer a more flexible and lower-cost method of financing long-lived assets. Long periods of time for the maturity of bond issues effectively addresses intergenerational equity concerns (as debt is repaid over the whole or a large part of the life of the asset).

It can also be argued that the discipline exerted in complying with bond covenants – debt service coverage, the widespread use of restricted reserves and so on – is a major factor in the stability and strength of utilities, such as those in the US that rely on this form of finance.

What is a bond?

A bond is a borrowing of money from an investor with a pledge to repay the money with interest. For bonds that are described as water revenue bonds or enterprise bonds, the investors will be repaid through the revenues from the water system. The money received from the sale of bonds will be invested in building or improving the assets of the water system.

The proceeds of bonds are used around the world to finance capital investments. Bonds have been used in China to finance new power generation facilities and other types of infrastructure improvements.

What do investors look for in deciding whether to buy bonds?

In general, they will seek a reasonable degree of risk compared to the return that they will receive on their investment. Water systems world-wide are generally viewed as low risk investments, since water is an essential

This paper was presented at the IWA World Water Congress, Beijing, China, 10-14 September 2006, at a special session run by the Water Environment Federation.

public service that customers are generally willing to pay for. Specifically, they will evaluate their risk by considering factors such as the following:

- strength of the projected cash flows for the water system
- adequacy of operations and maintenance
- reasonableness of the capital investment plan (CIP) and the expected sources of funds for the CIP
- pledges by the issuer to assure investors that they will be repaid
- legal mechanisms to support investors in the event that problems arise

It is interesting to consider these factors in greater detail. A few observations about the strength of the cash flows, pledges of the issuer, and legal mechanisms to support investors in the event that problems arise are presented below.

Strength of the projected cash flows

Annual revenues of the water system less the cost of operation and maintenance equals the cash available to pay back the investors in bonds, together with bank loans and other obligations – the annual payments due to investors, banks and others are collectively referred to as ‘debt service’.

The greater the amount of cash available to repay debt compared to the annual debt service, the more comfortable investors will be with the perceived cash flow risk.

It is common international practice to present to investors at least three years’ worth of historical financial information and a five-year projection of anticipated financial results.

Investors will consider the reasonableness of the financial projections including the important assumptions that were made in preparing the projections.

Pledges by the issuer

Examples of the statements and pledges that investors will look for in assessing their risks of investment include:

- the issuer demonstrates that it has the legal authority to firstly, issue bonds and secondly, pledge that the investors will be repaid
- in the event that the water company is acquired by another company, bonds will still be repaid by water revenues or paid back in full at the time of acquisition
- the issuer will not sell the assets that are generating the revenues to repay bondholders
- the issuer will not divert water revenues to other unrelated purposes, thereby diluting the cashflow available to repay

bondholders

- the proceeds of bond sales will only be used for water projects, and the issuer will explain the projects or types of projects that will be financed with the proceeds of bonds
- the issuer establishes a flow of funds that identifies the priorities for paying expenses and other obligations, including the repayment of bondholders – this is critical in the event that there are insufficient funds to make all annual payments; bond holders want to know where they will be in the order of payment – for example, are they before or after other lenders in priority?
- the issuer will adopt debt management policies that help ensure that it will not take on too much risk. Examples of such policies are: an additional bonds test (more bonds cannot be issued unless the issuer demonstrates that future cash flows will be sufficient to repay the new bonds); limitations on variable rate debt; and debt service coverage. Certain of these policies have been implemented in China by the National Development and Reform Commission (NDRC)
- the issuer establishes reserve funds in which it will deposit specified amounts and maintain such funds to repay bondholders in the event that the available funds are insufficient to make all payments
- possible backing of the issuer’s pledges with the assets of the issuer

This list presents examples of the pledges that investors will look for – there are others that can be considered. The third area to be highlighted from an investor’s perspective is the legal protection that is available to investors. Potential investors (and issuers) in bonds must consider what will happen in the event, however unlikely, that problems arise in the repayment of the debt.

Legal mechanisms to support investors

These include clear pledges by the issuer in a legally-binding document that an investor can bring to a court to enforce the investor’s rights to have the investment repaid. Another option is a legally-binding third-party guarantee to repay the bonds (such a guarantee is required for bond issuance in China, and is provided by commercial banks). One further mechanism is the ability of the legal system to provide relief for investors, including increases in tariffs, asset sales or other changes, if necessary.

In addition to the perspectives of investors in bonds, it is also very important to consider the potential

concerns of bond issuers. The next part of this article provides a few examples of the issuer concerns that should be evaluated.

Countermeasures to minimise the risk to the issuer

As mentioned earlier, water companies typically create debt management policies that will place practical limits on the issuance of debt and the purposes for which the proceeds can be used. For example, the proceeds of bonds should not be used to pay operating expenses; short-term assets such as vehicles should not be financed with long-term debt; and the debt of the issuer should not exceed a specified percentage of asset value (a current requirement of the NDRC).

We suggest that the cash method of accounting be used instead of accrual in assessing the ability of the water company to repay investors because cash pays the bills. Many water companies create long-term cashflow models – such models incorporate expected changes in operating expenses, the issuance of new debt and repayment of existing debt, proposed tariff increases and other factors to help ensure that sufficient funds will be available to repay investors.

Water companies typically provide a five-year projection in public documents to investors – we also suggest a 10-year model for internal company use to provide long-term planning.

We also suggest the creation of a monthly cash flow model to help in evaluating financial progress during each year – budgeted monthly revenues, expenses and other obligations would be tracked against actual results, and adjustments could be made where necessary during the year.

It is also suggested that deposits be made monthly to a dedicated fund to make payments to bondholders – for example, if bonds are issued in November 2006 and a payment of 1.2 million RMB (\$153,400) is due to bondholders in December 2007, 100,000 RMB (\$12,780) would be deposited each month for 12 months beginning in December 2006.

Based on the investors’ perspectives mentioned earlier in this paper and our experience in working with water companies in China and the US, the following examples of challenges and opportunities are presented for water company bond issuance.

Specific concerns that bond investors will have in China

Water companies do not have control over the process for increasing tariffs. Since tariffs are not adjusted annually, the cash flows of water companies can

result in profits and losses when looking at several consecutive years – investors like stability and profitability each year.

The ability to collect payments from customers and the ability of low income customers to afford water tariffs will be reviewed by investors – the ability to afford water tariffs can vary between cities.

There is no legal history that would illustrate how bond investors would be treated in the event that problems arise and bondholders seek remedies from the water company. And the ownership and operating structure of water companies is often more complex than in other countries – investors prefer simple structures with clear lines of authority and responsibility.

Water companies in China are not accustomed to the level of transparency and disclosure that exists in international water companies – investors want more and more information, not only at the time of bond issuance but also throughout the term of the bonds.

Reasons why investors will be interested in water bonds in China

Despite the above concerns, there are reasons why investors will nonetheless be interested in water bonds in China. There is money available within China for investment, and water revenue bonds offer long-term investment opportunities for domestic investors. The requirement of NDRC approval for bond issuance, as well as the need for a guarantee for the bonds, will limit the risk that water companies will issue unreasonable amounts of debt and will provide some comfort to investors that their investment will be repaid.

International experience has shown that people will pay for good service, and people world-wide are interested in having quality water to drink as well as clean rivers and lakes.

Finally, it is likely that the initial bond issues of water companies in China will be focused on potential domestic investors. However, over the long-term, as the water companies mature and demonstrate good financial performance, they will be likely to seek international bond investors. ●

About the authors:

Edward Markus is with Amawalk Consulting Group LLC, New York, US. Email: ektgc@aol.com.

Myron Olstein is with Black & Veatch Corporation, Gaithersburg, Maryland, US. Email: olsteinma@bv.com.

Sustainability reporting by 21 Australian water utilities: a comparison of reports 2002-03 and 2004-05

An assessment of sustainability reporting by Australian water utilities has shown that such reporting by major utilities has advanced substantially in the past few years, writes **MESCAL STEPHENS**. More utilities are reporting with greater sophistication. They have moved beyond annual reporting to sustainability reporting and more are incorporating sustainability principles into the business and not simply ‘packaging’ existing strategies for presentation. The relationship between on the ground performance and reporting is also becoming increasingly important with prolonged drought, climate change and community interest.

Sustainability reporting rates are relatively low in Australia. Across 16 OECD countries in 2005, for the top 100 publicly listed companies in each, the average reporting rate was 41 percent compared with 23 percent in Australia (DEH 2006). There is also a low level of reporting amongst government business enterprises (CPA 2005)

Three years ago a review of sustainability reporting by 21 major water utilities, serving 65% of the Australian population found that it compared very well with the reporting of Australian companies and international standards (Stephens 2004). In 2004 three of the utilities were included in the top 100 reporters in the ‘Global Reporters 2004 Survey of Corporate Sustainability Reporting’ and nearly 50 % of entries in the Association of Chartered Certified Accountants 2004 awards for sustainability reporting were from water and energy utilities.

There are many drivers for reporting.

The utilities are all owned by state or local government which influences reporting in a number of ways. State policies, regulatory requirements and legislation on sustainability, environmental protection, equal opportunity, occupational health and safety, and social welfare for example must be met. In addition some utilities must report on sustainability and/or ecologically sustainable development requirements in their enabling legislation.

The utilities are publicly visible and

reporting carries a degree of political risk. How this plays out in reporting has not been studied and would vary over time and by State but it may constrain utilities in what and how they report.

Australian accountability measurement technologies in the public sector are advanced and reporting on outputs and outcomes as well as the traditional input reporting (staffing and finances) is required (Suggett 2000). While some utilities operate under their own legislation or at one remove from government, this culture is influential.

Drying climate change, drought and population growth have concentrated attention in most States on long term water provision. It is estimated that by 2030 there will be a water deficit of 818GL annually, based on unrestricted consumption, for capital and major cities with a total projected population of 16.6 million. This figure includes allowances for conservation and recycling. A recurring theme in assessments of urban water has been the unsustainable use of the resource (Senate ECITA 2002, Standing Committee on Public Works 2002, IPART 2004, 2006) whether from high household consumption, lack of implementation of water saving technologies and techniques, relatively low price or once through use.

All are members of the Water Services Association of Australia (WSAA), the peak body of the Australian water utility industry. WSAA coordinates a national benchmarking exercise which originated in the Council of Australian Governments

This paper was presented at the IWA World Water Congress, Beijing, China, 10-14 September 2006.

Water Reform Agreement. This was directed at facilitating 'competition by comparison' but also provided utilities with techniques and a data set which made triple bottom line reporting an achievable next step. The uniform reporting of specific indicators was directed primarily at financial, operational and economic efficiency. In 2003 some sustainability indicators were added including an infrastructure leakage index, net greenhouse gas emissions, compliance with environmental and wastewater regulations and lost time injury frequency rate.

WSAA and VicWater, the Victorian Water Association, both provide utilities with a community of practice by which they can learn from each other and this has probably also been influential.

The utilities provide all or some of bulk water, retail, drainage and wastewater services. They all achieve high standards on conventional measures of performance, that is, primary service delivery objectives and system performance.

High product quality, and virtually unlimited supply at a low price have been the norm. Engagement with stakeholders in a structured and appropriate way is now more important as future supply and demand options depend on their participation to proceed. In any event communities want more involvement across the board.

What makes a good sustainability report?

There is no consensus on what comprises a sustainability report or how it should be assessed. One report counted the following as 'sustainability reports': corporate citizenship, community, triple bottom line, sustainability, environment, social/environmental/health/safety/community, environment/health, safety/environment/social, environment/community, and corporate social responsibility (DEH 2006). Another study also found a wide variation in the format and scope of both private and public sector reports (CPA Australia 2005).

What comprises a good sustainability report, by whatever name, has also changed over time.

The Triple Bottom Line was originally proposed as a new way of thinking about company performance and as a means to operationalise reporting of more sustainable practice. It was a pragmatic and productive step but invited reporting in the three 'silos' and a search for cross-cutting and 'clever' indicators, such as the ecological footprint, which would integrate them. It also loaned itself to short term

and unintegrated attempts to fit 'business as usual' practices into a sustainability framework by pigeon-holing existing data into economic, social and environmental categories.

Sustainability (UNEP 2006) identifies increasing standardisation in reporting while, at the same time, there are signs that reporting options are starting to be viewed more broadly. Ten years ago, amongst other things, there was a struggle to move from environmental or no reporting to triple bottom line reporting; from inputs and outputs to impacts and outcomes; from company set boundaries to boundaries set by stakeholder dialogue; and from single company reports to benchmarkability. Specific sustainability

One utility noted presciently in 2003 that 'best practice two years ago may become accepted practice in 2004; incremental improvement needs to be seen in the light of changing expectations, increased understanding of the complexity of many issues we are managing, and the need to continually redefine progress'.

issues were addressed such as human rights and the challenge was to integrate the triple bottom line into the organisation and gain its acceptance.

In 2003 the Victorian Water Association was pondering how to balance the three 'pillars' in their decision making and what stance to take with stakeholders, a situation expressed succinctly as 'where do organisations start?' (Harvey 2003). VicWater made the decision to promote the Global Reporting Initiative (GRI) framework as a preliminary step to introduce businesses to TBL reporting and thence to a changed culture. At that time some Australian utilities were already using the GRI Framework and others had developed their own approach to sustainability reporting, in some cases with international recognition. Since then most of the major Victorian utilities reviewed in this study have comfortably encompassed GRI reporting or an equivalent.

GRI is now the most influential format with 51 percent of Australian sustainability reports produced either 'in accordance with' or 'with reference to' GRI Guidelines (DEH 2006). The means by which stakeholders are identified and engaged and how their comments and feedback are used to shape decision-making and performance is a reporting necessity. An explanation of how business strategy links with long term sustainable development is also.

Sustainability suggests that reporting has reached a key point in its evolution. The agenda is heading towards addressing performance and its relationship to material sustainable development issues and how these are reflected in core business strategy and board involvement.

The reporting framework used

This study was started in 2003 when apart from the GRI there were few frameworks available to use for assessment. The framework used (Suggett and Goodsir 2002) was simple and appropriate for gaining a global impression of what a group of industry organisations were doing about sustainability reporting. A more specific study using benchmarked indicators, apart from taking more resources than were available, would be more granular and hence more context and time specific than a broader approach.

The framework comprised five categories based first on the incorporation of stakeholder information requirements and then expectations into the report, and second on the level of incorporation of sustainability into the business. Stakeholder 'engagement' refers to the various mechanisms which organisations use to listen to and account for the views of stakeholders, that is, people or organisations which can influence the organisation. At the highest level they are viewed as co-decision makers in forming an approach (CAMAC 2005 p34).

Since 2002, it has become more widely recognised that inclusive stakeholder relationships add value through making expectations explicit and, more broadly, when combined with accountability build trust and confidence. Top reporters now routinely provide examples of how stakeholders have influenced business decisions and processes. Additionally communication of the sustainability message is increasingly done using channels other than a report for example, through the value chain suppliers meetings and internal communications to employees

The need to incorporate sustainability into the business speaks for itself.

In the framework the stakeholder engagement is seen as a driver of sustainability so companies with a strong environmental report do not rate as highly as those with a broader sustainability agenda set partially by stakeholders.

The five categories are:

- 'Wait and see' companies were satisfied with present approaches to communication and accountability, many because there were no tried and

true approaches to adopt in 2002 and because the implications for the business of reporting were unclear or not advantageous.

- *'Need to know'* companies, acknowledged that the community has a right to know more about company performance. To meet this need, information primarily about internal organisational activities is 'packaged' and reported including standards and activities not normally included in the annual report. This could include standards imposed by environmental and health regulators; payments and concessions to disadvantaged groups; and community projects. This category also included companies which may be leaders in environmental reporting but do not necessarily see the benefit of a sustainability report.

- *'Start from scratch'* companies asked stakeholders what they wanted to know about the organisation and then collected the data to provide it. There was an alignment of the report with stakeholder expectations and both internal and external stakeholders are able to judge company performance.

- Stakeholder expectations are codified into principles which are embedded into management practice. The company '...realistically and genuinely embraces community concerns in its business strategy' (p41). Externalities such as biodiversity, stormwater and wastewater reuse may be included.

- Those businesses where sustainability is the purpose of the organisation. The success of the business depends on the commitment to sustainability values and accountability for them. Sustainability is embedded in the company's operations and it seeks to create products and services which reflect those principles.

This framework is consistent with AccountAbility's Assurance Standard AA1000 which requires an organisation to identify and understand its social, environmental and economic performance and impact and the associated views of stakeholders; and consider and respond to the needs of stakeholders in policies and practices. Both are consistent with the GRI framework.

It is also broadly consistent with Integrated Water Resource Management which requires consideration of sustainability and the rights of future generations; consideration of all stakeholders including women; an intersectoral approach which recognises the interests of different water users including environmental, social and cultural requirements; and total water cycle management.

It should be remembered that

evaluating a report is not the same as evaluating a business. The key question 'does it make a difference?', that is, is the organisation making a positive contribution to sustainability, cannot necessarily be answered from the report either.

Reporting 2002-03

In 2004 the most recent annual and environmental and sustainability reports of the 21 major Australian water utilities which reported in 'WSAAfacts' (2001) were reviewed. The aim was not to provide detailed analysis or judgement of reporting as would be done with an audit but to gain an appreciation of the approaches used in sustainability reporting and the progress they made.

Utility reports were assigned to one of the five categories based on the extent to which they engaged with stakeholders and incorporated sustainable practices into the report. Reports were also reviewed against some of the parameters from the Australian Conservation Foundation's analysis of the environmental and social performance of Australia's top 50 listed companies for example certification to ISO14001 or equivalent with independent verification; and surveys of staff perception on environmental activities of the organisation. As sustainability is about the longer term, planning for the next 20-50 years was also sought both within the sustainability report and in other documents from the utility or the state or local government owner.

For seven of the twelve utilities which provided a sustainability or TBL report, it was a first step towards more comprehensive reporting. The utility moved from a TBL report (information reported in three social, economic and environment sections) in the previous year to an integrated sustainability report, or from an environmental report to a sustainability report. For example South Australian Water's 'Sustainability Report 2003' was the first attempt to match outcome performance measures to the GRI. The utility established a Sustainability Advisory Group to the board.

Six of the utilities aligned with stakeholder expectations. They obtained stakeholder views and incorporated them into reporting. Hunter Water's 'Community and Environment Report 2002-03' was their first integrated report. Their Ecologically Sustainable Development (ESD) objectives are mandated by legislation. The then current 43 indicator set was developed with assistance from a community consultative forum and community feedback was incorporated into them. The indicators were refer-

enced to the Commonwealth State of the Environment Reporting System and were approved by the Minister for Energy and Utilities as shareholder. Highlights were details of aquifer extraction and dam environmental release, water consumption by sector and the development of a climate model. An Integrated Water Resource Plan for the ensuing ten years showed the trade-offs that would need to be made to meet drought and defer a major new source.

Six utilities were categorised as 'packaging', that is acknowledging that the community needed to know more than was included in annual reports. Two were 'packaging plus' in that the utility had a community advisory committee on either the environment or sustainability and so received some input contrasted with more comprehensive stakeholder input. A further six provided an environmental report in addition to the annual report.

Four utilities used the GRI Guidelines and they were all independently verified.

Reporting 2004-05

By 2004-05 water issues had become top of the public agenda with water restrictions of some kind imposed by most utilities in response to continued drought causing drastically reduced water storage levels.

This caused increased recognition of risks and the importance of how they are portrayed to the public. Central Highlands Water wrote that 'the [sustainability] report should cover likely future direction of things that impact on people, foreshadowing issues such as price trends, water availability, biological quality, and the possibility of dual water supplies'.

There were also policy and regulatory changes. Greenhouse gas reporting was required in at least one State for example, and the first round of price setting by the economic regulator occurred in another. Some utilities continued down the sustainability reporting path while others reconsidered their position.

Both the reporting and the comparison with previous years was coloured by increased experience and expectations. One utility noted presciently in 2003 that 'best practice two years ago may become accepted practice in 2004; incremental improvement needs to be seen in the light of changing expectations, increased understanding of the complexity of many issues we are managing, and the need to continually redefine progress'.

Annual reports have come full cycle and now only two produce a conventional style report with some

others now producing integrated sustainability reports styled 'annual reports' (see Table 1). Seventeen utilities produced sustainability reports in 2004-05 plus one further report from 2003-04. Of these four 'packaged' internal information for an external audience and two more produced an environmental report in addition to, or included in, the annual report. Eight asked or had asked previously stakeholders what they wanted to know from sustainability reporting and produced this information. Five included stakeholder concerns in business principles.

Reporting has become more sophisticated and reflective of climate shift and other concerns previously outlined. Eight utilities now have a long term plan (20 years or more), and/or contributed to the long term water planning processes of their State. Five have an environmental or sustainability committee of the board. Five have a 'green' board member either designated as such or as an ordinary member with environmental qualifications. Seven are accredited with ISO14001. Three included explicit risk assessments.

The GRI Guidelines are used to some extent by eight. Three were independently verified by URS and one by GHD.

Taken with the routinely high standards of water quality supplied, high system performance and other aspects of core business reported in WSA facts, high standards of governance, and reporting requirements required by the States on equal opportunity, and occupational health and safety, the additional move towards greater recognition of sustainability reflects well on utility performance generally. This is all the more so because sustainability and/or environmental reporting by Australian companies is uncommon.

Does sustainability reporting 'work'?

As stated earlier, there may be a difference between reporting and actual performance: 'However high the 2004 assessment scores, the focus is still on reports rather than action' (UNEP 2004). This survey pointed out that boards do not grasp the links between governance and sustainability; the need to go 'beyond compliance' which is in part to meet consumer expectations; and the ability to identify, assess and manage priority non-financial issues. It would be expected that utilities which sought stakeholder input into reporting, incorporated sustainability principles into their business, and have independent verification are not simply reporting. To this extent, reporting 'works' but the question is

Table 1 - Sustainability reporting of 21 utilities

Category	2002-03	2004-05
Wait and see (Financially based annual report)	3	2
Need to know ('packaging' or an 'environmental report')	12	6
Start from scratch	6	8
Stakeholder concerns included in business strategy	-	5
The Business of the Business	-	-

the tip of an iceberg.

One review found that neither stakeholders, that is, investors, nor management used sustainability reporting to inform judgements and actions (IPART 2004a, p.11). Another found that in two successive years 'reputation enhancement' (DEH 2006) was the most frequently cited reason by Australian companies for producing a sustainability report. However some major public companies are 'searching for ways to understand the boundaries of their non-market role and the non-functional outcomes for which they are accountable' (Suggest and Goodsir 2002, p.2). In public perception these boundaries are moving out from the organisation, that is, the 'transactional environment' – that area between the internal (within control) and external (outside control) boundary – is widening.

For example, in a deliberative forum held by one State on water supply and resource management, none of the recommendations referred specifically to the operations of the State's major water utility. This would not have been the case if the core business had been unsatisfactory and the water was expensive, unreliable or unsafe. Forum participants were concerned with least cost planning, consumption targets, water sensitive urban design, social and regional equity, recycling, pricing to include externalities, community education, sustainability and long term planning for future water supply.

These views are consistent with those of social science. As citizens and taxpayers people want to know what the long term plan is and where they can contribute rather than last minute 'fixes'. They want demand management linked to supply and the economics. They may be willing to pay more if they can see their values being incorporated rather than simple continuation of the same strategy. (Nancarrow 2006). That is, in terms of the reporting framework, stakeholder values and concerns about sustainability are incorporated into the management principles of the business.

There is a direct connection between reputation and credibility in the case of water utilities. Trust in a

water utility is interwoven with fairness and equity as well as perceptions of risk to self, family and environment. This directly influences people's assessment of the system and through that their acceptance of the service (Porter N.B. et al 2006).

Water utilities are possibly in an exposure class of their own. This is probably even more so of government-owned bodies which, while they could be operating at arm's length, must protect their own reputation but also that of the government of the day. If water restrictions for example are to be successfully used, then they need to be seen as good policy and not lack of government foresight in responding to drought. The converse is probably true also. If political processes do not address the social, environmental and economic outcomes that most people want, then the utility will probably bear some of the backlash. As citizens we need to reach consensus about the environmental, social and economic goals of urban water systems that we want. The tension between the political, the utility and the voters/consumers is not resolved by one group alone. In this context, a robust and clear sustainability report can enhance debate and provide assurance that the utility is on the ball.

Does it all add up and make a difference? Can we be at least confident that we are heading in the right direction? By using national economic and social accounting and other matrix methods such as input output analysis, SESAME, (an integrated economic and social accounting system) and NAMEA (national accounts matrix including environmental accounts), cross impacts can be analysed and interrogated.

In a once off research exercise based on generalised input output analysis for Australia, Foran et al (2005) examined ten sustainability indicators. These provided a macro-landscape of against which sectors could be compared. The most recent data was from the mid 1990s. For the water supply, sewerage and drainage sector, greenhouse gas emissions, primary energy use and imports were lower than for the economy-wide average. Social indicators of employment generation, income and government revenue were below the national average suggesting government subsidy of water delivery at that time.

This study introduces a quite different perspective on sustainability. Boundaries for environmental performance indicators (that is, suppliers, suppliers of suppliers etc) are almost impossible for a single company to determine compared with environmental management indicators

which refer to the extent to which a company can directly influence its environmental management. Input output analysis can be used to determine the environmental performance of all upstream suppliers with triple bottom line impacts. This method accounts for the full upstream supply chain of an economic entity such as a company or sector and the multipliers can be used by single organisations wishing to report on wider impacts.

Comparison with sectoral analysis provides some insights. For example, the on-site (direct effects) of operational greenhouse emissions are about 20 percent of the total emissions for the sector taking into account suppliers, suppliers of suppliers and so on. Structural path analysis show that 24% of the total greenhouse gas emissions are from the water, wastewater and drainage sector itself while another 25% is from electricity supplied to it. These figures are valuable, first because they show what sustainability reporting for a single organisation using a conventional idea of accountability would not include. Second they point to future directions that need to be taken for sustainability. Sustainability reporting also focuses on down stream effects such as demand management, ecofootprints and on site impacts. This approach, while limited now, shows potential which could improve with fluency and better and more current data. This could include ecosystem health which would reflect the resilience of the system.

One conceptual problem for the future is inclusion of subjective benefits from water. These are manifold ranging from 'lifestyle' obtained from watering gardens through to implied spiritual and cultural benefits from, for example, a 'no new dams' policy or regional reluctance for interregional transfers. They are not included in the sustainability ledger now but could be in the future (see Moran et al 2004).

From a different perspective, there is a continuing debate on whether adoption of sustainability for corporate responsibility improves financial performance (see CAMAC 2005 pp.19-31). Early identification of social and environmental risks enables alternative courses of action to minimise prospective loss and avoid reputational damage. One difficulty is that quantification of costs to companies is easier than measuring resulting intangible benefits, but as just mentioned, alternative metrics and techniques are being developed.

Conclusion

Sustainability reporting by water utilities has advanced substantially in the last two years as evidenced by the

number of utilities which are reporting and the greater sophistication with which they are doing it. This is being propelled by State initiatives and policy, awareness of future water shortages, and increasing community interest. Return to financial reporting alone is probably untenable.

Utilities also need a context of planning and deliberative processes, which is not now routine, to reach consensus about the future environmental, social and economic goals of urban water systems. Citizens have to decide what they want from them, within a context of holistic State water planning.

Lastly, tools are becoming available which add a new dimension to the question of whether sustainability reporting reflects sustainability. ●

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About the author:

Mescal Stephens is at the Australian Research Centre for Water in Society, CSIRO, Private Bag 5, Wembley WA 6193, Australia. Email: mescal.stephens@csiro.au.

Multi-level financial analysis of residential water and wastewater rates and rate-setting practices

This paper was presented at the IWA World Water Congress, Beijing, China, 10-14 September 2006, at a special session run by the Water Environment Federation.

There is considerable difficulty in comparing real customer billing rates across utilities with widely varying structures and billing practices. **JEFF HUGHES, SHADI ESKAF** and **RICH THORSTEN** look at a project in North Carolina that has enabled a valid comparison to be made.

North Carolina's government-owned water and sewer utilities collected over \$1.4 billion dollars from their customers in 2002¹, yet they still reported backlogs of funding requirements: recent 20-year capital need estimates exceeded \$11 billion dollars (North Carolina Rural Economic Development Center, 1998).

North Carolina utilities use many different rate strategies and practices under an economic regulatory framework that has few rate setting standards (NCLM, 2002; Hughes, 2003). These different strategies and structures have financial impacts on revenue stability and customer expenditures. Different rate strategies influence resource use differently and, conversely, efforts to affect resource use (for example, conservation) have unique revenue impacts depending on a utility's rate

Table 1 - A sample of rate surveys in the US

Survey authors	Year	Survey area	Response rate	Sample size	Consumption levels for calculated bills (per month)
American Water Works Association (Lafferty & Lauer)	2005	Nationwide	NA	202	7500 gallons
Draper Aden Associates	2004	North Carolina	25%	78	5000 gallons
Fitch Ratings	2004	Nationwide	NA	51	Service area average
GA Municipal Association	2005	Georgia	31%	92	5000 & 10,000 gallons
NC League of Municipalities	2002	North Carolina	65%	247	0, 3,000, 10,000, 25,000, 100,000 & 1,000,000 gallons
Raftelis Financial Consultants, Inc. and AWWA	2004	Nationwide	~30%	256	0, 500, 1000, 1500 & 3000 cubic feet for 5/8-inch meter, plus four other non-residential consumption amounts

* 1000 gallons = 3785 litres

structure and customer base.

In addition, different rate structures have a fundamental impact on how revenue requirements are allocated among customer classes and customers with different usage patterns. An emerging issue for many utilities is how to mitigate the impacts of rates on low-income customers – a utility's rate structure can play a major role in determining the amount low-income customers must pay to meet their basic needs.

Despite the importance of these relationships, little analytical work has been done to examine rates and rate setting in the context of the impact they have on a utility's financial health, customer expenditure and resource use on a state-wide basis. The research outlined in this paper begins to address that knowledge gap.

This paper presents the results of an extended research project to study rate-setting practices and the impact rates and rate setting practices have on residential and utility finances throughout North Carolina. This analysis sheds light on the financial impacts – at state, utility and household levels – of policy options currently being considered by local governments, state regulators and funding agencies, for example state-wide conservation efforts or changing the eligibility criteria for different sources of funding.

This research incorporates rate structures from 360 government-owned water and wastewater utilities with financial and socio-economic analysis. The methodology and application of this project differs from previous rate studies. For the first time, we have created a model that uses rate information to calculate residential expenditure for water and/or wastewater in different household types served by all of the different systems.

The model enables us to calculate bills based on any quantity of water consumed by the household, unlike other research which typically computes and compares these figures at discrete consumption levels (for instance, 6000 gallons/month (22,710 litres/month)). The paper then combines rate data with information from existing financial and environmental databases maintained by other agencies to compare household expenditures with, firstly, social indicators such as the community's median household income and, secondly, with financial indicators such as the utility's operating revenue stream.

Methods

Water and sewer services in North Carolina are provided by utilities

operating under a range of institutional and ownership models. Measured in terms of customers, government-owned utilities, including municipal systems, county systems, sanitary districts and authorities, dominate the water and sewer market. Non-governmental utilities include both not-for-profit and for-profit entities.

All units of government in North Carolina must submit annual financial information (but not rate information) to the state's local government commission (LGC) within the Department of the State Treasurer. For-profit utilities are overseen by the state's Public Utilities Commission and have similar reporting requirements. Not-for-profit utilities are not required to submit data to a centralised source.

The authority to set rates for government-owned utilities resides with their local governing board.

For the first time, we have created a model that uses rate information to calculate residential expenditure for water and/or wastewater in different household types served by all of the different systems.

State statutes provide very minimal guidance, resulting in a wide range of rate-setting practices throughout the state. For-profit water and sewer providers must have all rates and fees approved by the Public Utilities Commission.

The state's for-profit water and sewer sector is dominated by a handful of large providers that operate systems across the state. In most cases, these companies maintain a single tariff that covers all of the communities they serve. Financial information is aggregated for these multi-community systems, making community-by-community analysis almost impossible.

The decision about what utilities to include in the study was based on several criteria including the number of customers served, the availability of rate and finance data, and the ability to analyse information on a community-by-community basis. For these reasons, the researchers focused on government-owned utilities and large not-for-profit corporations.

The North Carolina League of Municipalities (NCLM) identified 412 water and/or sewer municipalities in 2005. Using the list of counties, sanitary districts and water/sewer authorities that reported water/sewer financial data to the Local Government Commission for June 2003, 103 'active' non-municipal utilities were also identified (LGC, 2005). In addition, 27 not-for-profits serving a total of over

300,000 people were identified from data collected by the consulting teams working on a state-wide water planning effort referred to as Water 2030 (2005). Information on the state's 10 largest for-profit water and sewer utilities has been collected and will be analysed in subsequent phases of the research.

Analysis of the rates for fiscal year 2005-06 was conducted for a total of 360 utilities. In order to collect the necessary rate information, the Environmental Finance Center (EFC) collaborated with the NCLM to collect rate schedules for approximately 225 utilities. Follow-up phone calls made by the EFC and NCLM staff to another 150 municipalities that participated in the North Carolina League of Municipalities' 2005 water and sewer rate survey (NCLM, 2005) yielded rate information for another 135 municipalities.

This research represents, to the authors' knowledge, the first attempt to standardise rate information across hundreds of utilities and automate the process of computing the residential customer charges for water and sewer based on continuous quantities.

In previous rate surveys (such as NCLM, 2002; Raffelis and AWWA, 2004; see Table 1 for a sample of rate surveys), the common practice of computing customer billings was to either require the respondent of a survey to specify the monthly customer bill for a few (usually three or four) pre-selected quantities of consumption (for instance, at 0 gallons, 3000 gallons and 6000 gallons (0 litres, 11,360 litres and 22,710 litres)), or request the rate schedule from a utility so that the researchers would themselves manually compute the customer bill for a few pre-selected quantities of consumption.

Aside from the time-consuming nature of computing customer billings manually, both methods have the same fundamental limitation when analysing results: due to the nature of rate structures, where rates are often not uniform between two consumption quantities, it is impossible to accurately determine the customer billing between the pre-selected quantities simply through linear interpolation.

This means it becomes difficult to compare different utilities' residential customer billings at consumption quantities other than those pre-selected by design which, for most utilities, do not include their customers' average consumption level. The main advantage of using a computer model to automate the process of computing the customer billings is the ability to almost instantaneously determine the bill for any

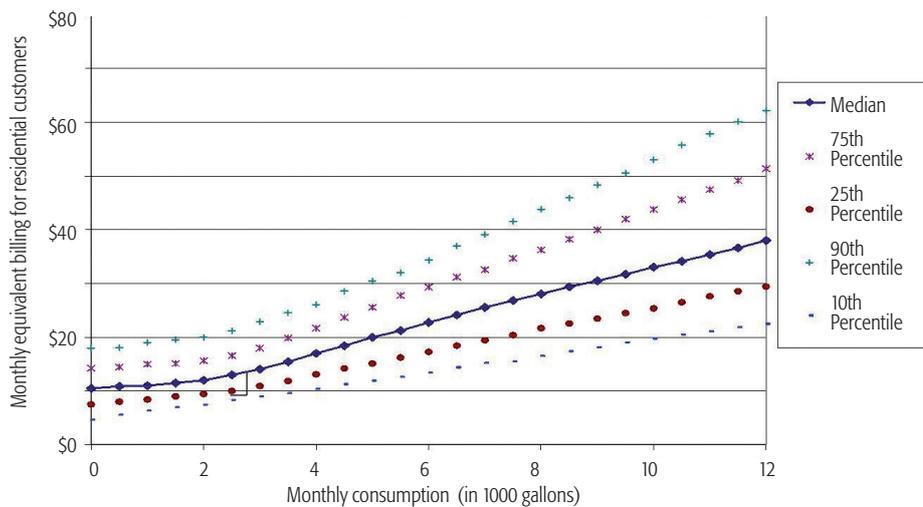


Figure 1
Water utilities' residential billing for internal customers in 358 NC communities

quantity consumed for hundreds of utilities. This allows for better and fairer comparisons across utilities' bills based on each utility's average consumption level.

The EFC examined dozens of rate schedules and identified the key common variables needed to design the model. Key information included water and sewer variable rates, block ranges and rates, constant or meter-based fixed charges, quantity-based minimum charges and their corresponding quantities, billing periods and whether a utility charged different rates for customers outside their service boundaries.

The EFC designed the database and worked with NCLM staff members to enter the necessary information from each rate schedule into the database.

The scanned rate schedules varied greatly in form and structure. A spreadsheet model was then developed to compute the water and/or sewer monthly-equivalent billing using the data exported from the database and input variables such as the type of bill (water, sewer or combined), the high or low season, bills for customers residing inside or outside the city limits, the meter size at the dwelling and the quantity of water billed per month for the household.

Each input variable is categorical except for the quantity consumed, which is a continuous variable. After the user enters in the consumption amount and descriptive variables, the model generates results in output tables for all the utilities. The programme automates the process of reading and

understanding the rate structure for each utility and computing the residential customer billing for any quantity of water consumed for all utilities in the database.

Several important data cleaning steps were required for quality control. The first step was a logic check included after the data was entered into the database. This specified 62 queries, many of which contained several sub-queries, to check that data are entered only in the valid fields based on selections made in other fields. For example, there should not be any data in the fields for block rates if the utility has a uniform rate structure, and consequently the uniform rate must be greater than zero.

This step was important in detecting transcription errors as well as systematic errors to identify where additional staff training was needed. Data cleaning also helped to eliminate errors that would have caused the spreadsheet model to miscalculate the residential customer billings.

The quality check step included randomly selecting 20% of the utilities and manually computing their water and sewer bills from their scanned rate schedules for four discrete quantities of water consumed per month (0 gallons, 3000 gallons, 6000 gallons and 12,000 gallons (0 litres, 11,360 litres, 22,710 litres and 45,420 litres)), for customers both inside and outside their service areas, and comparing the results with the output of the computer model. The aim was to achieve 100% accuracy.

The EFC also collected supplemental utility and household financial information that could be analysed with the rate information. Audited utility financial information for government-owned utilities, including data on operating revenues, operating expenses, capital expenses and outstanding debt, was obtained from the state's Local Government Commission (LGC, 2005).

Population and income data were obtained from the 2000 US census. EFC also obtained recently-completed information from the Water 2030 study, which allowed the researchers to cross-check some of their results and gain access to new sources of information such as geographic and watershed location data.

Results and discussion

Residential billing results

Table 2 shows the breakdown of utilities surveyed based on institutional models and service provided. Of the 360 utilities analysed, 346 served water customers in 358 areas (including semi-autonomous county districts with unique rates) and 280 served sewer customers in 283 areas; the

¹ Includes 12 county districts that are charged different rates to the rest of the areas served by their utility.

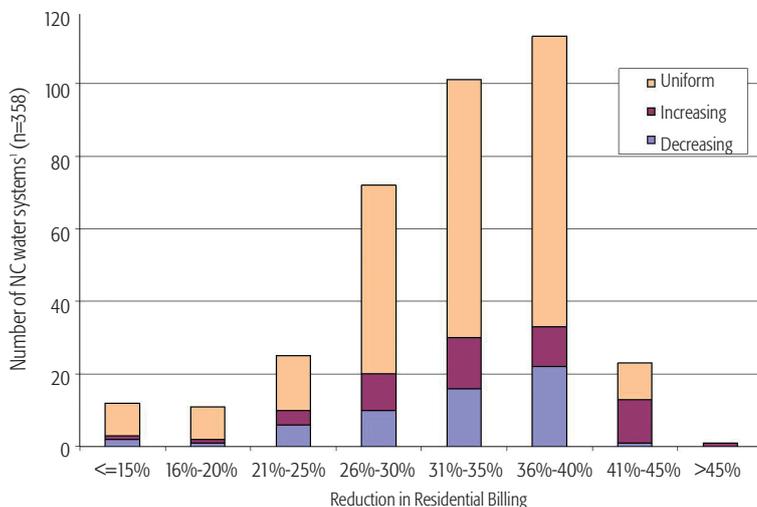


Figure 2
Reduction in residential water billing from 10,000 gallons/month 6000 gallons/month (37,850 litres to 11,360 litres) (40% reduction in consumption), by type of commodity rate structure

majority of utilities served both water and sewer customers.

The model was used to calculate what utilities would charge their customers at different monthly consumption levels from 0 to 12,000 gallons (0 litres to 45,420 litres) in intervals of 500 gallons (1893 litres). Figure 1 shows the median charge for water by utilities at different consumption amounts. The median amount charged for 3000 gallons (11,360 litres) among utilities across the state is \$14.08. In addition, households served by 90% of the utilities in the sample were found to pay less than \$22.87 for the same 3000 gallons.

The variation in what utilities charge across the state becomes higher in absolute and percentage terms as consumption increases. At 12,000 gallons (45,420 litres) per month, 25% of the utilities charge more than \$51.38, while another 25% charge less than \$29.43.

Financial impacts

The concept of full cost pricing is often cited as an important financial management goal for utilities. The US Environmental Protection Agency (EPA) identifies full cost pricing as one of its four principal pillars to sustainable infrastructure (EPA, 2005).

Raw rate information from almost all rate surveys says very little about full cost pricing. Without additional financial information, it is impossible to know whether a utility's rates cover the actual cost it incurs to provide a service. Even with financial information, determining the extent to which rates cover full costs is extremely difficult due to the diverse reporting practices.

Studying the operating ratio (operating revenue to operating expenses) from the audit reports of the LGC provides some insight into the prevalence of full cost pricing in North Carolina. Table 3 shows the operating ratio for a sample of utilities with similar monthly rates – all of which fall into the lower spectrum of rates in North Carolina. The finance data show that not all low rates are created equal, and that many of the utilities have set rates at levels that do not cover their financial needs.

These models also allow researchers to project utilities' sensitivity to changes in consumption patterns and analyse the effects of different rate structures on the magnitude of revenue changes. Figure 2 simulates the revenue impact of a large drop in consumption from 10,000 gallons / month (37,850 litres/month) to 6000 gallons/month (22,710 litres/month), as might be the case during drought years when conservation mandates are

enforced in the summer.

Although actual revenue decline depends on the number of residential customers who would be affected by the conservation mandates and on the number of commercial, industrial and other non-residential accounts, this chart provides a rough estimate of the decrease in residential-attributable revenue for different utilities across the state.

In general, most utilities will experience a 31% to 40% drop in revenue for this 40% drop in consumption. However, some utilities may experience a greater drop in revenue, while many others have a rate structure in place that provides a buffer against this change in consumption patterns.

It is evident that decreasing blocks and uniform rates produce, in general, less of a shock to revenues than increasing block rates. On the other hand, even increasing block rate structures, which are generally believed to cause at least or greater than a 1:1 drop in revenues, can be designed in a way that restricts the drop in revenue to a lower ratio. In these cases, the use of minimum and fixed charges, minimum quantities and block cutoffs greatly affect the vulnerability of a utility's revenues to changes in average consumption.

Impact on low-income customers
While an imperfect measure of community affordability, the use of water and sewer expenditures as a

percentage of a community's median household income remains one of the most common indicators of affordability. Funding agencies set grant criteria based on acceptable (or unacceptable) percentages of median household income (MHI) that are used for water and sewer services. The large sample size in our survey allows us to study the impact of current rates on hundreds of North Carolina communities using these traditional measures.

Figure 3 (over page) shows the percentage of median household income currently spent for 6000 gallons (22,710 litres) of water and sewer service across the state. Several state grant programmes use 1.5% of median household income as the break point for grant eligibility. Until now, the lack of state-wide data on actual rates has made determining the impact of this important criterion difficult. The large number of utilities (clearly a majority) that qualify for affordability assistance may be a sign that this eligibility criterion needs to be adjusted. The figure also shows that many 'wealthy' communities with median household income levels as high as \$50,000 would also qualify for assistance.

Other funding programmes use different criteria that can also be tested and analysed. For example, the US Department of Agriculture's rural development programme uses a two-tier test for grant eligibility. No utility with a MHI above \$38,175 can

Table 2 - Number of participating utilities with rate data for FY 2004-2005.

Service provider	Water and sewer	Water only	Sewer only	Total
Municipality	245	30	9	284
County ¹	13	18	1	32
Authority	3	2	0	5
Districts ²	4	10	4	18
Not-for-profit	1	20	0	21
Total	266	80	14	360¹

¹ Several county systems operated in semi-autonomous county districts with separate rate schedules. There are 11 additional districts served by the county systems and two additional areas served by district systems that have different rates than the rest of the service area of their utilities. These areas are treated as individual records, increasing the number of 'rate service areas' to 373 for many of our analyses.

² Districts include sanitary districts, water districts and metropolitan water/sewer Districts.

Table 3 - Comparison of operating ratios for seven utilities with monthly combined water and sewer billings of \$30 to \$31 (at 6000 gallons (11,360 litres) consumption per month)

Water and sewer billing for 6000GPM	Operating revenues/expenses ratio
\$30.00	0.86
\$30.40	1.11
\$30.60	0.91
\$30.64	0.88
\$30.65	0.91
\$30.73	0.77
\$30.80	1.02

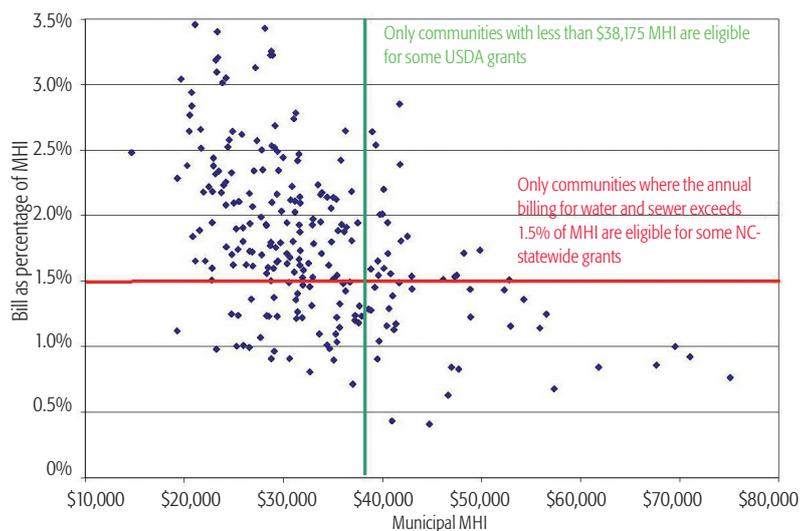


Figure 3
Annual combined water and sewer residential billing at 6000 gallons/month (11,360 litres) as a percentage of median household income (MHI) of the municipalities within which 248 utilities provide water and sewer services.

receive grants (although they are eligible for loans). In addition, a utility must also charge at least \$29 per month for 5000 gallons (18,930 litres) of water before it becomes eligible for grants.

Of the 285 water providers in our sample with municipal MHI and water rate data, 10 (or 4%) would be eligible for grant funds. This type of analysis provides insights into both household affordability and funding criteria to help meet the needs of the poorest communities in North Carolina.

Conclusion

This paper represents a unique, in-depth analysis of rate structures on household billing at multiple units of consumption. Households pay comparatively similar prices for water and sewer service in North Carolina at low levels of consumption, but there is considerable variation as consumption increases.

While many equate higher rates with higher costs, our results among a small set of utilities with similar average household bills indicate that cost recovery appears to depend on other practices besides rate setting.

This research also modelled the effects of conservation conditions on utility revenues in the state. While utilities with increasing block tariffs generally face greater reductions in revenue as a result of these conditions, other rate structure factors – such as the use of fixed charges and the design of minimum and block cut-off amounts of consumption – can help shield a utility from dramatic decreases.

Finally, our analysis of affordability found that, while there is an approximate inverse relationship between municipal household income

and residential billing as a percentage of MHI, utilities' rate structures show a wide degree of variation in this relationship. This complicates the use of using affordability standards. Differences in state and federal standards for community eligibility result in affordability criteria that may exclude some poorer communities (defined by median household income) while including other, wealthier ones. ●

Acknowledgement

Partial funding for this research project is provided by the NC Water Resources Research Institute, the Urban Water Consortium, the NC League of Municipalities, the Environmental Protection Agency and the UNC School of Government. Special recognition is given to the NC League of Municipalities for providing assistance in data collection and entry during the initial phase of this research.

End notes

¹ Based on the authors' calculations on data received from the Local Government Commission (2005).

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About the authors:

Jeff A Hughes (jhughes@sog.unc.edu) is Associate Director of the Environmental Finance Center, University of North Carolina at Chapel Hill. Shadi Eskaf (eskaf@email.unc.edu) is with the Department of Environmental Sciences & Engineering, UNC Chapel Hill. Rich Thorsten (rthorste@email.unc.edu) is with, Department of City and Regional Planning, UNC Chapel Hill

Skills support for management in eastern Europe

One of the biggest challenges facing water utilities is the need to improve management capabilities. **KEITH HAYWARD** looks at lessons from a project supporting local authorities in eastern Europe.

There are two related management skills central to the operation of well-running water utilities – those of project planning and programme management. Only with capacity in these areas can utilities scope and execute the work they must undertake to maintain and upgrade infrastructure.

These are just the skills that a project in eastern Europe has been helping to develop within local authorities. The work is not focused on the water sector as such, dealing more generally with how local authorities just beyond the EU's borders can work with their neighbours within it to access EU funding. Nonetheless, it highlights the needs of public administrations of this region.

The work is being undertaken in the context of the EU's Neighbourhood Policy. This seeks to consolidate the ways in which financial support is provided to countries bordering the EU. The initial programmes under the Neighbourhood Policy have run from 2004–2006. Subsequent support is to be provided under the EU Neighbourhood Partnership Instrument for cross-border cooperation, which runs from 2007–2013.

Local and regional authorities in particular can seek funding under these programmes. What the support work has been doing is develop the project planning and programme management skills of the applicants so that they can successfully seek funding and get projects off the ground.

The initial focus of the work has been on project proposals. A project, the Regional Capacity Building Initiative (RCBI) headed by consultan-

cy MWH, started in May last year and has run to the end of 2006. This work has provided support to the western, border regions of Belarus, Moldova, Ukraine and the Russian Federation for funding submissions under

'It's easy for a municipality to deal with one project, a small one, even though they are not so well trained and prepared, but when they have a hundred, then it becomes a real problem.'
Sophie Papalexioiu

Neighbourhood Policy programmes. Project offices have been set up in Moldova, Ukraine and the Russian Federation, supported by the company's Brussels office.

Consolidation of activity is one feature of the EU's Neighbourhood Policy, but there is another change also, as Veronica Vann, who has been heading MWH's RCBI team, notes: 'Another quite marked shift is that they're encouraging the involvement of the people, the actual beneficiaries of these programmes, to be involved with the development of the programme.'

With that in mind, Vann highlights the main areas where difficulties arise for those developing project proposals: 'It is actually while doing the analysis in the first place to identify the problems; then to develop projects or to generate good project ideas to address those particular issues; and then to develop those project ideas into sound project proposals. So this has been the focus of our support.'

The overall thrust then is of bringing

sufficient rigour to the process in order to secure funding. 'The people in these areas know very well what the priorities should be,' says Vann. 'We need to provide the support that creates the bridge between their local knowledge of what the problems are and what is needed from the side of the EU to be able to support them to address those problems.'

Such an approach is needed so that those providing the funds can be confident the support will achieve the desired aims. 'It is not just the EU, it is any kind of funding body,' says Vann. 'Not only does it have to be in a good format, it has to be a well thought out project proposal so that it will actually achieve what it is proposing to achieve, that it will actually solve the problems that it is supposed to solve.'

The aim of the EU programmes is to support cross-border development projects. Given this cross-border focus, water-related projects have been prominent amongst the proposals for which the RCBI has been providing support. According to Vann, they have included projects to develop wastewater treatment plants that would be of cross-border benefit. There has also been cooperation to improve the environment of the Western Bug river basin, which is shared by Ukraine, Poland and Belarus. Another, initiated by Ukraine, has been to address dumping of waste that affects a transboundary river.

While project proposals have been the initial focus, work under the RCBI has since been extended geographically, to include Georgia, Azerbaijan and Armenia, and to bring in a programme management dimension. This programme management extension links the RCBI activity with the 2007–2013 EU Neighbourhood Partnership Instrument and takes the local involvement a stage further, to involvement with shaping the overall programme. 'What we're really focusing on there is supporting participation by the local authorities and the central authorities from the neighbouring countries in the programming process,' says Vann. It has also involved providing support for stakeholder consultations.

The support provided

Sophie Papalexioiu, MWH director of institutional capacity development, explains the approach taken to providing support under the RCBI. 'Even though they have a good idea of what the priorities are in the regions... they don't go through the logical cycle of where the problems are and what needs to be done in order to cover those problems. Very often they jump

the problem and go to the needs, and sometimes it's not correct.

'The seminars and training programmes we give really teach them how to work among themselves, to find out, and to involve all the stakeholders in finding out, what the problems are. We do that with a kind of mixed approach where we have some theoretical training and presentation, but more importantly we work with the people. We organize workshops in which they all take part and we actually have very few presentations. We help them to take their own issues at these workshops and seminars and solve them with the help of our tools and methods and experience so that the next time they can do it themselves, hopefully.

'We also encourage a lot work on the job and in a very structured and planned way. For instance, at the end of a workshop we get all the participants to set out an action plan of the things they are going to do tomorrow... The objective is to equip them with all the necessary resources, systems and tools that are required for them, not only to identify their problems, but to find the solutions and also to implement them.'

Papalexioi contrasts this with other approaches that are often taken. 'What we have seen is that classical technical assistance doesn't really work because what it means in practice is that the consultant flies in, looks around, and writes a report, which usually lands in a cupboard somewhere... At the other end is the classical training where people are taken away from their work for a week... The problem is the ownership and the thing which is difficult for them is to relate what they are being taught about to their daily work. That is what we are really trying to do, sit as close as possible to them and be as close as possible to them to ensure they relate everything to their daily work.'

And she believes the recipients of the training really benefit the approach: 'I think they really feel that with this approach we set them free – they don't feel caught in a system where they have to call the consultant again and again, although mind you they do!'

Capacity needs of the water sector

Papalexioi adds a further comment about the needs the RCBI work is addressing: 'It's easy for a municipality to deal with one project, a small one, even though they are not so well trained and prepared, but when they have a hundred, then it becomes a real problem.'

This comment reflects the challenge faced by the water sector in the more general eastern European region, where EU directives are driving change. Benny Aerts heads MWH's

water sector work in eastern Europe. He notes that the EU Water Framework Directive in particular, with its focus on management at the river basin level, is driving regionalisation in the sector: 'This means that they have to set up regional operating companies that could be either municipal operators joining forces or larger towns and cities who have to join with neighbouring cities or towns. This means that quite some investment needs to be done in the wider area, therefore project preparation and programme management is key... not only to meet their own tasks, but also to have access to funding.'

The point is that the shift to considering wider areas means there is a need, for example, to undertake feasibility studies, undertake master-planning and prepare financial analyses for a larger area and over a longer timeframe. This brings the need for programme management and project preparation skills to the fore. 'I think it's key for them to think along those lines,' comments Aerts. Different countries in the region are at different levels of development, but overall Aerts sees there is a general need for countries to develop their own capacities: 'Countries still have a long way to go. Until now they needed a consultant for this, but I think it's clear that they have to build capacity to do it on their own in the future... So the involvement of international or Western consultants will decrease, and we are moving faster towards those situations in Romania and Bulgaria than we probably could have expected.'

This said, such a change represents a significant challenge. 'One aspect which is still not really being addressed is that we are working here in the public sector,' says Aerts. 'Change management is key of course and the driver for change should come from the internal management. To have good people in those management positions is an issue. Most of the time they are not well paid or they are there for a couple of years and then they go to the private sector. They have to reduce staff and they have to deal with too many problems at the same time. You have to bring them to the stage or the level where they need to be. I think in every situation, every public body, and it can be different from city to city or from town to town or from region to region, [needs] a tailor-made approach, but based every time on the same principles and tools.'

Securing funding in the water sector

Just as the RCBI work reflects the wider need for management skills in the water sector, its focus on obtaining

access to EU funding reflects the wider issue of the central need for funding in the water sector and the need to interact with funding bodies. MWH in its institutional capacity literature cites an assessment of the EU Phare support programme which found that 90% of development project failures were due to lack of public administration capacity. This puts institutional capacity at the heart of any efforts to provide investment support in the water sector.

'Strategic planning capacity is essential,' comments Sophie Papalexioi, adding that management capacity is also needed later and links back to the planning capacity. 'Let's assume we have identified the issues on which they want to spend the money. That is materialized in projects. These projects need to be very well managed otherwise projects are driven in the wrong direction and don't bring the expected results. And those results of course need to be very well identified in the context of this strategic planning.'

Papalexioi identifies a further issue that can arise: 'If there's no capacity the money sits in the bank account. There are many, many examples of that, and this is the worry of both the IFIs (International Financial Institutions) and of the recipients. [Recipients] know very well that they have to demonstrate their capacity to identify strategic issues so that they can access the fund. It's also the worry of the IFIs because they don't want to allocate resources to issues that will never be implemented.' There can also be a run of allocations shortly before funding periods end. 'There is a pressure for disbursement, which is of course not leading to quality results.'

And Papalexioi feels the RCBI work illustrates well how such issues can be addressed: 'This is exactly what we are working on. We are helping regional and local authorities to be prepared for making sound and efficient use of the funds allocated by the European Commission.' ●

For more information see:
European Neighbourhood Policy
http://ec.europa.eu/world/enp/welcome_en.htm

Regional Capacity Building Initiative
www.rcbi.info

www.mwhglobal.com