

Urban Water Services Solutions, Problems and Options

A number of bodies have advocated reform of urban water service delivery in recent times, including removal from local authority ownership and control. Water services are estimated to have a replacement cost of about \$33 billion, with annual operating expenditures of \$1.7 billion and annual capital expenditure of about \$1.1 billion (SPM Consultants, 2009, pp.63-71).

This article describes some of the reform proposals that have been made; considers what, if any, problems there may be with current arrangements for water services delivery; develops some criteria against which to assess reform options; and discusses the strengths and weaknesses of different reform options against those criteria. Different options have different strengths and weaknesses: if reform is to occur, decision makers will need to

consider what their policy priorities are in choosing which option to pursue.

Reform proposals

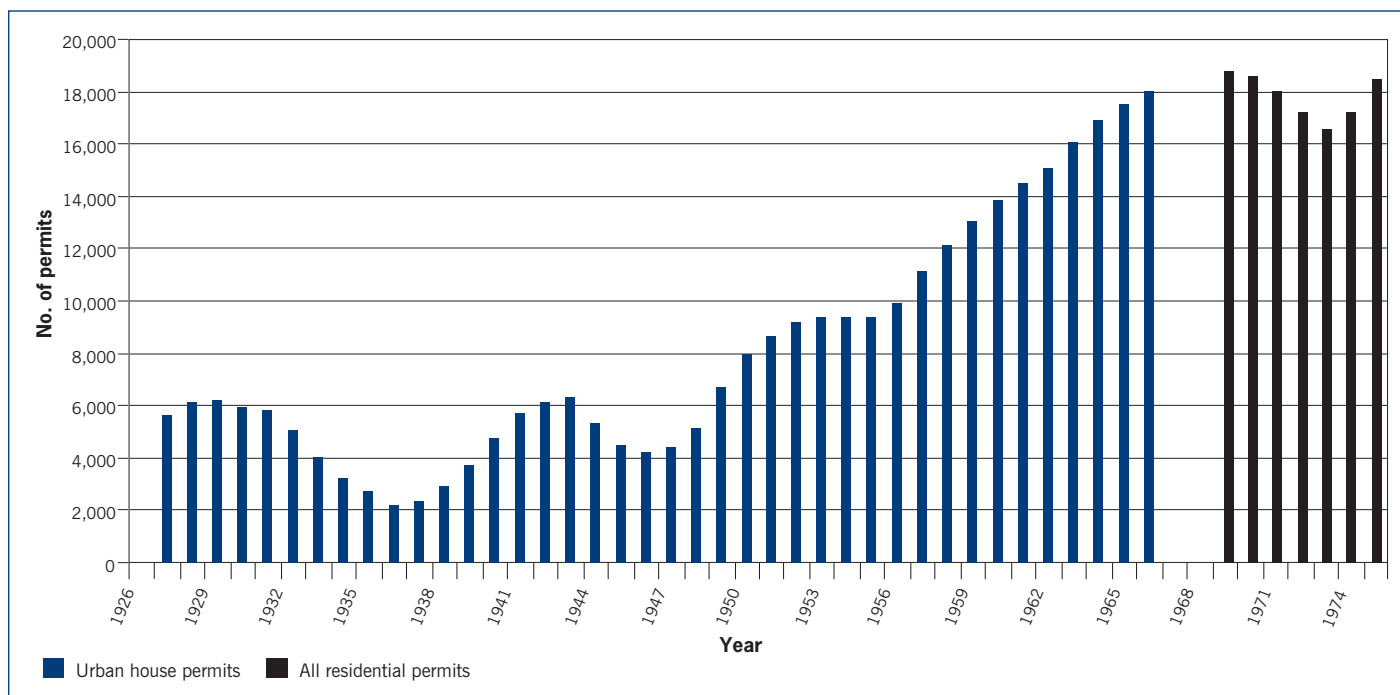
Reform proposals have included those of GHD Ltd and PricewaterhouseCoopers (2008), the Turnbull Group (2009) and the Land and Water Forum (2010). Common features of these proposals are the delivery of urban water services by corporate bodies, with a central regulator and

universal metered charging to promote demand management. Typically these models are expected to be more efficient than the current model of local authority delivery, which results in 67 service providers to constituencies ranging in size from 1.48 million people (Auckland city) to 640 people (Chatham Islands).

Outside these specific proposals, the Royal Commission on Auckland Governance recommended that water services for Auckland be delivered by a single, council-controlled organisation, putting day-to-day management of water services outside the control of elected representatives in that city (Royal Commission on Auckland Governance, 2009, pp 567-611). The government's National Infrastructure Plan evaluated water infrastructure as the worst managed of the five sectors it considered. In particular, it evaluated the regulation of the sector, investment analysis and funding mechanisms as ineffective (New Zealand Government, 2011, executive summary). The plan did not distinguish between urban and rural water services, however. It is not clear to what degree these problems were perceived as universal

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Figure1: Residential building permits-five year rolling average



Source: Data extracted from New Zealand yearbooks. Until 1965 the yearbooks distinguished between residential building permits in urban areas and others. From 1965 they recorded all residential building permits without distinguishing those issued in urban areas.

or specific to particular sub-sectors of the water services industry.

At the same time as New Zealanders have been considering these matters, the Australian Productivity Commission has released a two-volume report on its inquiry into Australia’s urban water sector (Productivity Commission, 2011). Reform advocates, therefore, have many alternatives available to them.

What is less clear from the discussions to date is what the problem is with the present arrangements; or, alternatively, what is the opportunity being missed. Also missing is an analytical framework which allows the strengths and weaknesses of different options to be tested. And before digging into those issues, it is important to define the scope of the services being discussed.

Typically, urban water services are regarded as three networks: a water supply network, a sewage disposal network and a stormwater network. In a few cases stormwater and sewage disposal share a common network. However, this is quite rare in New Zealand. From a policy perspective it may be better to view them as two: an integrated water supply and sewage disposal network and a separate stormwater disposal network. The reason for viewing water supply

and sewage disposal as one network is that almost every appliance from which water is supplied to a property is placed immediately over a connection to the sewer network: e.g. a kitchen sink, a dishwasher, a shower. Obviously, some water supplied does not make it into the sewer network – for example, water used for gardening, or, in a business setting, water incorporated into a manufactured product. However, most water supplied to properties is subsequently removed and treated through the sewerage network.

Stormwater can be thought of separately for two reasons. The first is that the water/sewer network is used exclusively for services to private properties. Stormwater networks are used both by private properties and also by public properties, especially roading networks. The second is that demand for stormwater services is primarily determined by climate, rather than by human activity and decision. These characteristics create significant differences between stormwater and the other networks in terms of policy options and issues around demand management and regulation. For this reason, the remainder of this article limits its discussion to options for managing water supply and sewage disposal services.

Problem identification

Evidence of problems or significant deficiencies in the delivery of these services is hard to come by. The major reason for this is that these services are currently delivered by local authorities, and to date no comprehensive national monitoring regime has been considered necessary. Local authorities are accountable to their communities, not to central government, and until recently have not been required to separately report on these services in their planning and reporting documents.

A variety of potential problems can be identified. One relates to the cost of providing these services to small communities, many of which may be lacking in wealth. For example, ratepayers in the community of Benneydale, in the Waitomo District, pay \$1,400 per annum each for their water supply and a further \$1,000 each for sewage treatment and disposal (rates for other services are on top of these charges). This is despite a government subsidy of 95% of the capital cost of their water supply upgrade. In larger communities ratepayers would typically pay somewhere between \$500 and \$1,000 for these two services in total. Given costs of this magnitude, it is not surprising that councils are cautious before they invest in improving

the standard of these services to small communities.

Another potential problem lies in the possible need to replace ageing pipes. Figure 1 shows residential building permit data from 1926 to 1974. From 1926 until about 1948, residential building permits fluctuated between roughly 4,000 and 6,000 annually. In the post-war period there was a steady increase in residential building permits through to the mid-1960s, when they settled at about 16,000–18,000 annually.

Normally councils do not fund the cost of the initial reticulation installed when subdivision occurs. This cost falls to the developer and is passed on to homebuyers in the purchase price of their property. The cost passes to the ratepayer when the second generation of reticulation is installed. Council accounting policies typically show useful lives for water services reticulation to be from 60 to 100 years. With 60 years having passed since the commencement of the post-war increases in house construction, the data suggests that councils are now entering a period in which they will need to increase their expenditure on reticulation renewals from previous levels. This cost will be most burdensome for communities that initially grew after World War Two but whose growth has since stabilised or declined. In communities that have continued to grow there will be a broader rating base to support the additional expenditure.

However, there are several features of the present system that ensure funding will be available for this purpose. They include the balanced budget requirement of the Local Government Act 2002 and the requirement to produce audited long-term plans. From 2012 each major infrastructure service must be separately reported upon, with financial forecasts (in a standard format) specific to that service. The Secretary for Local Government is required to prepare a set of standard non-financial performance measures for these services also, although these are not in force for the 2012 long-term plans.

A third potential problem is that demand is being poorly managed. A charging model where the amount of service consumed has no influence on

the cost to the user encourages excessive use. This in turn will require investment in service capacity that is inefficient. A simple response to this would be to introduce meters for these services. Universal metering occurs in Auckland, Whangarei, Tauranga and Nelson, as well as in other, smaller communities. However, proposals to introduce it elsewhere usually arouse quite passionate opposition. Some is based on a belief that this is the first step towards privatising

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water services and some is based upon fears for those on low incomes.

Much of this debate is ill-informed, because actual analysis of the costs and benefits of metering is rare. A rigorous study of the benefits of demand management techniques was conducted by Smith et al. (2010). This study examined Tauranga City Council's decision to introduce universal water metering in 2002. This deferred the development of a new water source for the city costing about \$70 million in 2009 values by approximately 15 years. The study found benefits with a net present value of \$53.3 million in 2009 dollars. The benefits to the council were split fairly evenly between capital and

operating costs, since the deferral also resulted in cost savings from items such as reduced electricity consumption which applied both to water and to wastewater treatment (Smith et al., 2010, pp.29-30).

These problems are issues about financing and investment. Māori have a quite different perspective. Issues of water use and abuse have been a major concern to Māori. Of the first 25 reports issued by the Waitangi Tribunal, 11 focused specifically on alleged Treaty breaches over waterways and harbours.

A particular issue for Māori is the discharge of sewage effluent into water. This is unacceptable to Māori as it debases water spiritually. Māori have a strong preference for land-based disposal of wastewater. This problem is compounded in coastal areas because Pākehā prefer disposal sites to be away from beaches and areas that can be used for recreation. Therefore, Pākehā tend to favour disposal sites along rocky coastlines. However, those coastlines are often prolific in shellfish and kaimoana and therefore very important to Māori. Taylor comments, 'the cultural value of kaimoana is important because it maintains tribal mana and standing' (Taylor, 1984, p.26). With so much Māori land having been alienated, traditional rights to coastal fishing grounds are particularly important to Māori.

A more recent articulation of Māori values about water is in the Land and Water Forum report. It comments:

We have recognised that the relationship between iwi and freshwater is founded in whakapapa, that freshwater is recognised by iwi as a taonga of paramount importance, and that kaitiakitanga – the obligation of iwi to be responsible for the well-being of the landscape including water and waterways – is intergenerational in nature and has been and may be expressed and given effect to in many different ways. (Land and Water Forum 2010, vii)

A respected Māori leader, Mark Solomon, says: 'Iwi Māori believe water is not only a source of food and physical sustenance, but a source of mana and spiritual sustenance, being linked to and

reflective of the well-being of Iwi Māori. Water was, and is, also critical to the economic survival of iwi, particularly in relation to both customary and commercial fisheries, papakāinga and housing, as well as horticultural and agricultural land use.' He continues, 'the health and wellbeing of water resources, in all their forms, is inextricably linked to the health of Iwi Māori.' Further he comments: 'How and by whom, decisions are made in relation to natural resource, including freshwater, are pivotal issues for Iwi Māori as they materially affect environmental outcomes, and the ability of Iwi and hapu to exercise their mana and kaitiakitanga, and that 'the role of Iwi Māori as treaty partners must be recognised and provided for through effective participation and involvement at all levels of decision-making over fresh water resources: local, regional and central government' (Solomon, 2010, 43, 44).

Any reform of governance arrangements for urban water services has potential implications for Māori which may need to be considered in evaluating options.

Evaluating reform options

Criteria for evaluating reform options also need careful consideration. Promoting efficiency is clearly one criterion, although what that means needs further exploration. The Australian Productivity Commission (Productivity Commission, 2011, p.68) has identified three components of economic efficiency:

- *allocative efficiency*, achieved where resources are used to produce those goods and services that provide the greatest benefit to consumers relative to costs. Benefits in this sense include non-financial benefits such as environmental benefits;
- *productive efficiency*, achieved by the production of goods and services at least cost; and
- *dynamic efficiency*, achieved by the timely introduction of technology change to achieve more efficient production in the future. Dynamic efficiency requires that options that create an environment that is conducive to ongoing innovation be taken into account.

Since allocative efficiency includes non-financial values, debates about the level of service provided by water services can be included under the broad heading of allocative efficiency.

However, opponents of reform raise equity issues. A frequent theme expressed by those opposed to metering, corporate forms of water service delivery and the use of public–private partnerships (PPPs) is that access to water is a right. Any attempt to use commercial models for delivering water, whether by use of metering of public supplies, by using council-controlled organisations, or by any of a variety

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of methods of private participation in delivery is strongly opposed. Opponents perceive such changes as threatening the 'right' of people to an adequate water supply (see, for example, Human Rights Commission, 2010; Right to Water, 2010). Another aspect of this debate arises in respect of funding water services to small communities. Current funding arrangements ensure that whatever costs arise in providing water services, they are predominantly met at a local level through property taxes. This may result in charges that are so high that equity issues arise. Given the obvious necessity of water to life, the concern is legitimate and needs to be addressed in any reform model.

Finally, the recognition of Māori values and aspirations does not fit comfortably within either of these perspectives. They

fit more readily within a legal perspective, since they rest on rights contained within the Treaty of Waitangi. Furthermore, aspects of Māori values tend to the absolute and do not allow for the type of trade-offs that are inherent in concepts of efficiency and equity.

A reasonable model for evaluating reform options, therefore, would consider at least these three criteria of efficiency, equity and consistency with Māori values.

Using these criteria, it soon becomes evident that different reform options have different strengths and weaknesses. The following section briefly discusses specific reform options and which of the evaluation criteria they address. Options discussed are metering, PPPs, using council-controlled organisations to deliver water services, delivery by a Crown entity or entities, and possible improvements to the present model.

Reform options

Metering

Metering addresses issues of allocative efficiency. It has no impact on dynamic or productive efficiency but, as discussed earlier, raises equity issues. It may indirectly address some Māori concerns about the protection of water environments. However, it does nothing to give Māori a role in governance decisions about water. A critical issue with metering is when is the appropriate time to introduce it? Metering both requires investment capital and creates administrative costs. The benefits derived from metering need to exceed those costs. This is most likely to arise when significant capital investment in additional supply or treatment capacity can be deferred.

Public–private partnerships

Public–private partnerships come in many forms, and it is important to be clear what type of partnership is being discussed in this context. One type is a concession arrangement. This involves a private company operating a water service owned by a government agency and deriving its income from direct charges to customers. In New Zealand the former Papakura District Council entered into a concession arrangement for the supply of water

services in its district. Such arrangements are prevalent (but not universal) in France, and have been promoted in Third World countries as a means of incentivising extension of services to unconnected properties.

Empirical evidence to support the efficacy of concession arrangements is notably absent. Chong et al. (2006, p.163) tested the price for the supply of 120 cubic metres of potable water across 3,650 suppliers in France. After controlling for a large number of variables, such as population size, level of tourist demand, population density, and different source water quality requiring different levels of treatment, and excluding the effects of taxes on price, they concluded that concession arrangements resulted in higher prices (by about 15% on average), and that the difference in prices charged was statistically significant. This doesn't necessarily mean that concession arrangements are less efficient than public supply. However, if they are more efficient it highlights an equity issue about how difficult it is for public entities to capture through their contracts a sufficient share of the benefits for consumers.

A different type of PPP is one where a private company constructs a facility (in water services usually a water treatment plant or sewage treatment and disposal plant) and operates it for a long period of time, usually 20 years or more. Frequently the private partner owns and finances the plant for the duration of the contract.

Apart from the generalised argument that private service providers are more motivated to seek efficiency than public providers, a particular feature of PPPs which should encourage innovation is the fact that the model more strongly encourages providers to take a 'whole-of-life' costing approach to the design and construction of a facility. This should lead to greater consideration of likely operating costs in the design and construction process than traditional procurement achieves. As formal PPPs are relatively recent innovations, few have reached the end of the partnership and been handed on to the commissioning body for subsequent operation. Thus, formal ex post evaluation has not yet been possible.

Since a PPP as described doesn't involve any direct effect on pricing, it appears to be neutral in regards to allocative efficiency. However, to the degree that the output specification freezes today's specification of non-price attributes into the future, it inhibits enhancements of allocative efficiency that are not reflected in pricing: for example, environmental outcomes. It does not preclude such enhancements, since the outputs can be renegotiated. However, if the private partner over-charges for enhancements, improvements in allocative efficiency will be inhibited.

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To the extent that PPPs freeze management arrangements, they inhibit any change in management structure or practice that evolves to reflect Māori values and aspirations.

Council-controlled organisations

If the concern with present service delivery arrangements is that elected representatives are not the best group of people to make most decisions about water services operations, then another option is that recommended by the royal commission for Auckland: place them in council-controlled organisations (CCOs). This leaves ownership in public hands but puts management into the hands of an appointed board. This might reduce

allocative efficiency, in that trade-offs between expenditure on water services and other local authority services would be inhibited. However, having organisations with governing bodies focused exclusively on these services might encourage a greater focus on productive and dynamic efficiency. There is no inherent effect on equity in using CCOs to deliver services, compared to direct council delivery. However, councils could look to include suitably qualified people from relevant iwi on the boards of these CCOs, which might go some way to meeting Māori aspirations to participate in governance decisions on water matters.

Crown entities

A further option is to deliver these services through a Crown entity or entities. This is the model used in Scotland, where a Crown entity, Scottish Water, provides water services to all of Scotland. However, Scottish Water is more heavily regulated than a New Zealand Crown entity or state-owned enterprise is. A separate body, the Water Industry Commission for Scotland, sets water services prices and monitors Scottish Water's investment programme: in effect, it approves Scottish Water's business plan.

A single Crown entity seems to have little incentive to enhance productive and dynamic efficiency. In Scotland, the performance of Scottish Water can be readily compared with the performance of private water utilities operating in England and Wales. This, combined with price regulation, provides incentives for continuous performance improvement. Finding suitable comparators for a monopoly water services provider in New Zealand would appear to be problematic. Furthermore, New Zealand has generally preferred a lighter-handed regulatory regime than applies to Scottish Water. If a single national monopoly were the best solution, then this would appear to raise similar issues in other utilities sectors. For example, would a single national electricity lines company be better than the present arrangement of a national grid operator and local lines companies?

A Crown entity also has problems in relation to allocative efficiency. It will need to develop a methodology for

determining the standard of service it will supply to small communities. If it adopts a national pricing structure, this will incentivise gaming for investment in uneconomic supplies. It will also remove the opportunity for local trade-offs to be made between the standard of water services supplied and other government services. However, assuming a Crown entity had a preference for charging by meter and did not have access to property taxes as a charging mechanism, it would improve allocative efficiency as metering was rolled out.

A Crown entity might better deal with equity issues than the current model. It would have the incentive to introduce nationally consistent policies for the treatment of consumers with low incomes and/or specific needs for high water usage, and these could be reinforced through the approval of its statement of intent.

A single Crown entity would not obviously facilitate Māori participation in governance decisions about water usage. This is because Māori participation needs to be at the iwi and hapu level, and a single national entity would struggle to achieve that. It might, however, have the ability to facilitate some outcomes that Māori desire, such as a greater level of land-based wastewater disposal, since it would have the scale to research and develop best practice techniques in this area.

An alternative to a single Crown entity is to have a number of regionally-based entities. Just how many would be needed to balance the various considerations is difficult to tell. However, a number of entities would allow performance comparisons to be made, which might provide stronger incentives for productive and dynamic efficiency. Depending on the boundaries chosen, it might also be possible to provide iwi with a governance role in such entities.

Improving the present model

Rather than simply abandon the present model of local authority delivery of these services, another option is to make improvements to it. Many of the changes in water services delivery overseas are in response to long-term financial neglect

by public suppliers, or to existing fiscal constraints that prevent responsible authorities from investing adequately in water services. Ensuring that the present system delivers adequate funding for investment in water services would then make change in New Zealand a matter of choice rather than financial necessity.

The present system relies on the balanced budget requirement of the Local Government Act 2002 and the auditing requirement for long-term plans, especially the requirement for the auditor to report on 'the quality of information and assumptions underlying

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the forecast information provided in the plan' to ensure adequate funding is set aside for replacement of infrastructural assets when necessary. In this sense the approach to infrastructure funding is indirect.

The balanced budget requirement results in local authorities setting aside a sum equal to their depreciation expense for capital purposes. However, as the auditor-general has previously commented, 'the depreciation charge over the life of an asset will equal the renewal cost of the asset only by chance' (Auditor-General, 2000, p.21). In addition, the present legislation doesn't

require the depreciation funding to be applied to asset replacement, or even to the particular service concerned. There is nothing to stop councils using the funds to acquire new assets the public desire, even if that compromises their long-term ability to fund future asset replacement.

Relying on the balanced budget requirement and the ODRC (optimised depreciated replacement cost) method of valuing assets to fund asset replacement is obviously substantially better than ignoring the issue, but it does not provide a complete solution. One possible approach would be to require councils to prepare forecasts covering a period of three or four decades of the funding needed for water services asset renewals, and to specifically set aside the required amount for that purpose. The money would be ring-fenced and could not be spent for the acquisition of other assets. If that approach produced an operating deficit, that could be acceptable. This approach would distinguish between accounting and funding. It would tackle funding issues directly, rather than relying on accounting methods to achieve outcomes they are not designed for.

Allied to this approach could be a formalisation of the requirement to produce and publish asset management plans. At present their statutory foundation is tenuous, lying only in the auditor-general's interpretation of the reporting requirements for long-term plans. Any dilution of the long-term planning requirement could undermine the asset management planning process in local government.

To summarise, the present financial management system has considerable strengths and has ensured significant funding for investment in water services since it was introduced. However, it does take an indirect approach to ensuring adequate investment in local government infrastructure, including water services, and a more direct approach may be better still.

While local authorities are not direct competitors and therefore have no incentive to hide information from each other, they also have no particular incentive to collaborate. Indeed, where parochialism is strong, co-operation can

be shunned for fear that it is a signal that adjoining councils should amalgamate.

Given that the most effective way to improve allocative efficiency is water metering, the industry could develop tools to help councils evaluate when introducing metering is cost-beneficial. At the moment, councils tend to introduce metering as a last resort when supply is extremely constrained. However, as the earlier discussion showed, metering not only defers capital investment, it lowers operating costs for both water and sewage treatment. Evaluation of the benefits of metering is therefore more complex than simply a decision about capital investment. At the same time, if the industry wants to overcome objections to metering, it could also develop tools for social impact analysis of metering and best practice guidance around rate remission and other social assistance policies to go with metering decisions. These might counter the fears of some metering opponents and make its introduction more politically acceptable.

There are several actions the local government sector could advance to improve productive efficiency in water services delivery. A key issue is

determining the optimal time at which reticulation should be replaced. As pipes age, the quality of service will deteriorate, but knowing when it is more efficient to replace a pipeline than repair it is not obvious. The true cost of either option needs to include the costs to consumers of planned and unplanned interruptions, also. Economic analysis of that kind is not routinely undertaken by local authorities, yet there is no obvious incentive for the private sector to carry out this research since it is unlikely to generate a product with a large market potential.

The second action is to explore collective purchasing options. This might be especially useful in the purchase of treatment plant equipment, which will typically involve imported equipment produced in small production runs. This would involve the sector sharing investment plans and co-ordinating approaches to that. It is noteworthy that central government is rediscovering centralised purchasing after largely abandoning it in the reforms of the 1980s.

The third is to examine the potential of shared services for delivering water services to small communities. Local authorities are gradually developing

shared services approaches throughout New Zealand, although on a somewhat ad hoc basis. Shared service models could achieve productive efficiencies without trading off the allocative efficiency inherent in local decision making.

A fourth potential area for improving productive efficiency would be to develop techniques for evaluating whole-of-life costing in treatment plant investment. It seems absurd to resort to PPPs as the only effective way of linking treatment plant design and operating cost considerations.

Conclusion

To conclude, there are a variety of ways in which water services delivery could be reformed or improved. Different options have different strengths and weaknesses. A key issue is whether perceived shortcomings in the present service delivery arrangements are of such significance that substantial reform is warranted. The reporting arrangements that have prevailed to date make this difficult to assess. Changes in those reporting arrangements which will commence with the 2012 local authority long-term plans may go some way to improving reporting on these services.

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