PRICEWATERHOUSECOOPERS

URBAN WATER PRICING – ASSET OPTIMISATION

1. Introduction

PricewaterhouseCoopers has prepared this paper for the Queensland Competition Authority (QCA) on asset optimisation in the water industry in response to a brief to discuss:

- the appropriate economic framework for optimisation;
- ideal optimisation outcomes, constraints to achieving any such ideals, in terms of practicability or cost-effectiveness;
- optimisation in the context of price regulation of water services; and
- approaches to optimisation applied in other regulatory jurisdictions.

This paper reflects PricewaterhouseCoopers' research and experience in respect of asset valuation and optimisation in the water industry, as well as other regulated industries. Where relevant it refers to third party reports and publications, including a draft discussion paper prepared by the Queensland Department of Local Government and Planning (DLGP) entitled '*Optimisation as Part of the Asset Valuation Process*', hereafter referred to as the DLGP paper.

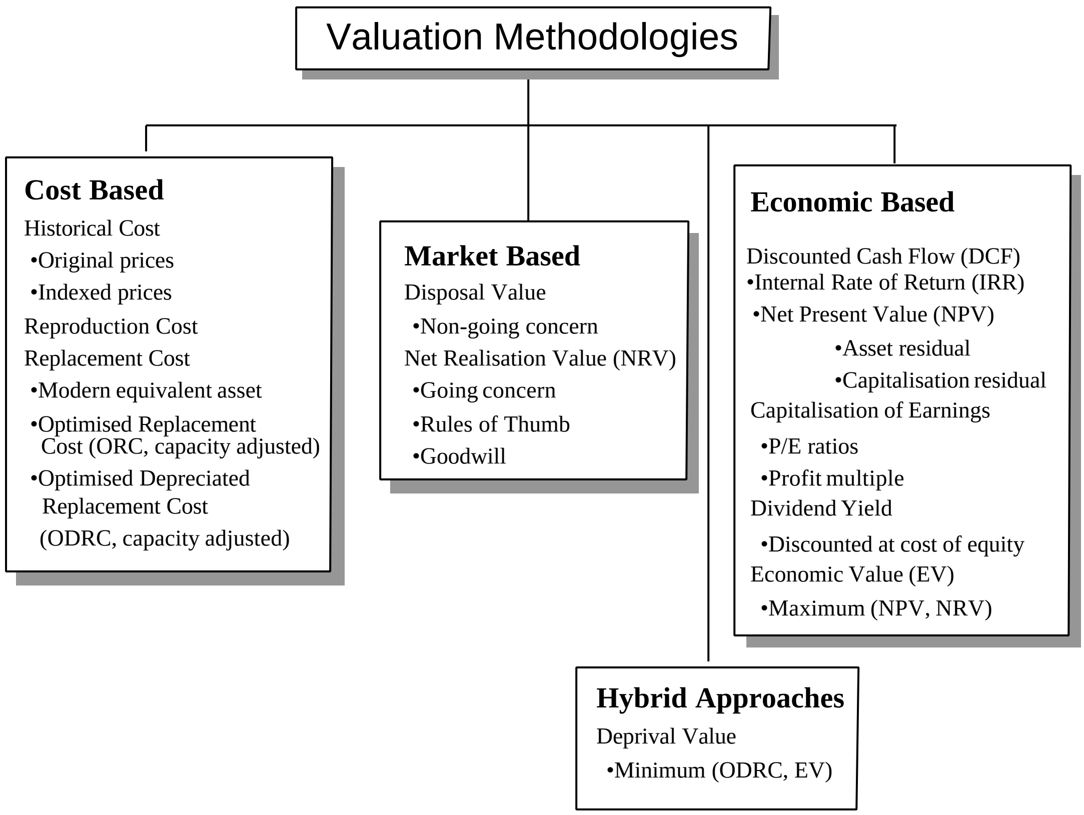
2. Asset valuation and the economic framework

The issue of physical asset valuation for utility businesses is of critical importance because the asset base is usually the key determinant of the those businesses' performance which can drive revenue requirements and prices. It is necessary for the regulator to play a role in asset valuation because, as distinct from a competitive environment where market forces determine demand, prices and hence asset values, the provision of services by utility businesses is not often contestable.

Unfortunately, economic theory does not provide an unambiguous rule for valuing these assets. As potential entrants set price equal to long run marginal cost, the threat of entry provides a sufficient incentive for the incumbent firm to price close to the economically efficient price level, where price is equal to long run marginal costs. Therefore, if the asset base (on which prices are based) is kept equal to long run marginal cost, prices will also equate to this. Theory suggests only that economic efficiency criteria will be satisfied where assets are valued somewhere between the lower bound of scrap value and the upper bound of the costs incurred by an efficient new entrant (bypass cost).

Other considerations, including equity, the provision of appropriate incentives to utilities and potential investors, historical factors, and the individual circumstances of the utility in question therefore play an important role in establishing asset values.

As a consequence there are numerous methods for valuation of utility assets. The diagram below indicates some of the techniques available.



Under the COAG Agreements, Australian governments have given widespread support to the deprival value method of asset valuation in utility industries. This 'hybrid' approach provides that in respect of assets that are not surplus to requirements (which are generally valued at what they could be sold for) the value is measured at the minimum of:

- the Optimised Depreciated Replacement Cost (ODRC – sometimes referred to as DORC); and
- Economic Value (EV – sometimes referred to as the 'recoverable amount'). This is the present value of the future revenue stream, less operating costs, that the asset will generate.

The deprival value method has been adopted as the basis for asset valuation by SCARM, as outlined in its Water Industry Asset Valuation Guidelines (the SCARM guidelines)[1]. It should be noted that these guidelines currently remain in draft form, and have not progressed past the draft stage undertaken in 1997.

The remainder of this paper focuses on the ODRC method of asset valuation and in particular issues associated with 'optimisation' of the asset base. At the outset it should be stressed that ODRC valuations and in particular asset optimisations are relatively new endeavours and may be considered to be more of a 'developing art' than a 'science'. Indeed, as identified in the DLGP paper, the SCARM guidelines note that optimisation is a subjective process requiring best estimates with their accuracy depending heavily on the quantity of information available to the business at the time. IPART has also noted that 'the extent of optimisation is a matter for judgement' and that it is 'a matter on which there may be scope for a wide range of alternative views'. PricewaterhouseCoopers agrees with these comments.

3. ODRC and Optimisation

ODRC has been defined by IPART as "the replacement cost of an optimised system, less accumulated depreciation."[2] In theory there are three apparently simple steps to be followed in determining the ODRC of utility assets:

1. optimise the asset base;
2. value the optimised asset base in replacement cost terms; and
3. depreciate the optimised replacement cost of the asset base.[3]

The optimisation step is designed to reflect the outcomes of a competitive market and is a forward looking cost analysis approach to the valuation of assets. It is the valuation of a utility's assets if that utility were to rebuild its existing system using modern techniques, technology and assets for the replacement of the system, and which, combined with minimised operating costs, result in the optimal (minimum) cost of providing services. The optimised system should represent the least-cost, modern equivalent replacement assets which would provide the service potential of the existing assets.

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[1] IPART has issued a document criticising what it sees as the 'fundamental deficiencies' of the SCARM guidelines. However, none of the deficiencies cited by IPART relate to the optimisation process outlined in the guidelines.
[2] IPART, Aspects of the NSW Rail Access Regime Final Report, April 28, 1999, pp. 30.
[3] Energy Australia, Submission to IPART: Discussion Paper, January 1999.

Optimisation ensures that the asset base equates to the long run capital cost that would be faced by an efficient new entrant into the market, rather than the historical or other costs of the actual assets. It also assists in providing an equitable basis on which to charge prices. If the assets have been 'gold-plated' or constructed inefficiently (ie doubling up), customers should not have to pay for this. Efficient pricing signals the economic cost of the consumption of services.

A key concept associated with this form of valuation is that it is based on replacement cost and not replication cost – ie it recognises that the system will practically never be rebuilt in exactly the same configuration, over the same location, using exactly the same materials as originally utilised, thus making the system theoretically more efficient.

As many regulatory bodies have noted, an ODRC valuation of physical assets tends to produce consistently higher asset values than some other valuation methodologies, notably those based on historic costs.

4. Optimisation Issues

There are a number of practical issues which must be addressed when considering optimisation in the context of the regulation of utility businesses. These are:

- incremental versus greenfields approaches;
- capacity optimisation;
- impact of service standards;
- negative optimisation; and
- frequency of asset valuation and optimisation, and the extent of revaluation.

The first two issues will be often the most important in determining an ODRC at a point in time for a network. The last issue will be important in a dynamic sense, as it will have implications for regulatory risk and required returns. Inevitably the importance of these issues, and the degree to which they should be considered, will depend on the individual case in hand and the cost of ensuring the optimisation is as 'correct' as possible compared to the likely benefits. Clearly, when undertaking optimisation, simple sensible decision rules, for example identifying classes of assets or minimum asset values below which it is not worth optimising, will need to be adopted.

These issues are outlined in more detail below.

4.1 Incremental and Greenfields Optimisation

Perhaps the key issue with optimisation is the extent to which the network in question should be redesigned in the optimisation process. There are two extremes here:

- one approach is to adopt the assumption that the network could be completely redesigned such that it has optimal planning horizon capacity and minimum operating cost. For example, it could use a completely new alignment, have a reduction in the number of assets and an increase in the load carrying capacity of these assets, and provide lower operating costs through the use of the most modern technology and equipment available. This approach is known as the 'greenfields' approach to optimisation[4]; or

- the alternative assumption is known as the 'incremental' or 'in the ordinary course of business' approach. It is based upon the premise that existing assets will be replaced using fundamentally the same techniques and configurations and not involve a total redesign of the way services are delivered, or of processes or networks (unless this is considered likely and foreseeable in the ordinary course of business). Any optimisation is limited to optimisation of individual assets or perhaps a 'regional' reconfiguration, rather than an entire system optimisation.

The greenfields approach will clearly tend to produce a lower valuation than the incremental approach, but will be more complicated and costly to derive. However, where the key aim of optimisation and the ODRC approach is to reflect the efficient cost of a new entrant (for example in competitive utility industries) the greenfields approach is more likely to do so. However, care should be taken in the application of the greenfields approach as the community's concern with environmental and planning issues has led to a substantial increase in the costs of securing new rights of way, or even an effective prohibition on asset construction in some circumstances. Thus total reconfiguration, although theoretically possible, might not be achievable in some cases.

Consistent with the objective of reflecting the outcomes of a competitive market, where costs of securing new rights of way have increased, these should be reflected in the asset valuation.

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[4] Care should be taken with the use of terminology. The terms 'Greenfields' and 'brownfields' are also used in the context of ODRC valuations in respect of the valuation (as distinct from the optimisation) stage of the process. A brownfields valuation occurs where the optimised system is valued in a way that takes account of the existence or otherwise of infrastructure such as roads and buildings. The brownfields valuation will be higher than a greenfields valuation which assumes that this infrastructure does not exist. Similarly, the term 'ordinary course of business' is also used in a valuation context as well as an optimisation context in respect of whether the replacement cost of an asset, such as a water treatment plant, should reflect whether the treatment plant is replaced on a piece by piece basis, as might occur 'in the ordinary course of business', or whether it should reflect a replacement of the treatment plant in its entirety.

Commentators have generally supported the concept of optimisation which considers the replacement of assets on an incremental or ordinary course of business approach. Accordingly, optimisation is usually carried out in a manner that is incremental on the existing network design, except in those areas identified where excess capacity over current load forecasts exists (ie: beyond an efficient planning horizon, recognising whole-of-life total asset costs – see 3.2 below) or inadequate network safety or reliability issues arise. In these areas, the approach used should recognise in-situ asset locations and alignment issues, but replace necessary network components with modern planning equivalent assets for the currently forecast load.

Although the system is not entirely reconfigured under an incremental approach, any optimisation of an individual asset must not be considered in isolation from other assets in the system.

One area of support for the concept of incremental optimisation is found in the Statement of Accounting Practice which states in paragraph 52 that:

> *"in determining current cost with reference to the most appropriate modern facility … the modern facility should be of economically available technology and should not require a redesign or re-engineering of an existing entity's plant … "*

However there are some cases where practitioners have supported more of a greenfields approach to optimisation. For example, in commenting on the optimisation of the Victorian gas distribution network, the ORG indicated support for a greenfields approach:[5]

> *"…the Applicant has proposed that the replacement cost be calculated on the assumption that the existing system is replaced today to meet the current and projected demand…[t]he Office considers the Applicant's assumption is more consistent with the valuation that would occur in a competitive or contestable market as a new entrant would always configure its plant to minimise cost. The Office, therefore, supports the optimisation assumptions made by the Applicant."*

Similarly, although the general ODRC concept was not used by IPART in this case, a report prepared by engineering firm Kinhill on the optimisation of the Wagga Wagga gas distribution network appears to have taken a greenfields approach to system optimisation.

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[5] ORG Final Decision on Access Arrangements for Multinet, Stratus and Westar, p67

4.2 Capacity Optimisation

At the core of the optimisation issue is the question of what level of currently unused capacity should be permitted to be included in the optimised asset base, and what amount of excess capacity should be optimised out. This will always be a contentious issue.

Clearly, for most utilities economies of scale and scope mean that there will be economic benefits from installing assets that both meet current capacity, as well as allow for a reasonable level of growth in demand. Such an approach will enable the long-term total cost of providing services to be minimised. Any optimisation process needs to explicitly recognise this fact by allowing for growth in demand to occur, and not optimising assets down to the level that purely meets current capacity requirements. This will ensure that utilities are not punished for making efficient investments or through the adoption of assets that were past inefficient investments. However, it is important that allowances for growth in demand not be so great that better (ie lower) overall whole of life costs might have been achieved if such assets were built with lower initial capacities to meet expected mid term demand, with future augmentation to meet demand growth beyond this period. Optimisation should act to prevent utilities from over-building or gold-plating assets in order to obtain a return on them.

Commentators have generally reached a landing that when considering excess capacity in relation to a particular asset, it is necessary to establish whether the lowest long-run total cost, on a present value basis, would be achieved by substituting a lower capacity asset (using currently available technology), with incremental augmentation of capacity over time, in place of the presently existing asset. If such a substitution produces a lower long-run cost, then optimisation is appropriate.

The DLGP paper suggests a 'rule of thumb' that excess capacity above peak demand[6] requirements in the 'short to medium' term (the figure of 5 years is mentioned) should be optimised out.

In theory, rules of thumb such as these are inherently flawed because different assets will have different utilisation, service standards, growth rates, opex/capex "balance" and efficient augmentation horizons and therefore the length of time for which excess capacity should be permitted should be considered on a case by case basis. For example, the economics of a particular asset's construction may be such that it is efficient to build an asset that has 10 years surplus capacity, because ongoing augmentation is difficult and very 'lumpy' investments are most economical in the longer term. In other cases, the economics of a particular asset may be such that is more efficient to build an asset with only 2 years surplus capacity, and then augment it at this time. However, to assess a

[6] It should be noted that forecasting using changes to peak demand as the key driver in optimisation is more problematic than forecasting on an annual or total demand basis due to the volatility of peak demand.

system on an asset by asset basis will clearly be overly costly and onerous and in practice rules of thumb have been proposed in some industries. For example, IPART, in its 1999 Final Report on the NSW Rail Access has supported the use of an allowance of five years demand growth forecast in the optimisation process.

An more extreme rule of thumb is to permit the optimisation to explicitly recognise all capacity which will ultimately be absorbed by the expiry of an asset's remaining life. Any further capacity (i.e. capacity which is in excess of the expected levels of demand at the time of expiry of the plant's physical life) would be fully excluded from the optimised value. Although having few economic arguments to support it, such an approach might be seen to be more appropriate in circumstances where a utility is publicly owned and historically the capacity to which assets have been constructed has been set by reference to the highest levels of demand expected to be achieved over the entire physical life of the relevant asset, rather than over a more reasonably foreseeable and cost-effective business planning horizon.

In general, any rule of thumb to be applied will need to consider the planning horizons and asset lives of the industry in question. Given that asset lives in the water industry tend to be greater than in most others, there is an argument that a relatively longer period (for example 10 years) might be an appropriate period for excess capacity not to be optimised.

In respect of assets which are not used now, and which are not envisaged to be used in the future, there is clear agreement that they should be optimised out of the asset base (although, as discussed below, it should be possible for these assets to be optimised back into the asset base at a later date if they start to be efficiently used.)

The issue of capacity optimisation assumes greater importance in areas such as the electricity industry where the regulatory changes, such as the development of a national market, may result in an increase in excess capacity on certain transmission lines. Regulators must grapple with the issue of whether and how to optimise out such excess capacity while being fair to the utilities concerned and minimising regulatory risk.

In the US regulators often apply a 'used and useful' test when optimising assets. While this simple test has intuitive appeal, the key to its application is determining what is 'useful'. Moreover, the concept of efficiency must be embodied.

As with many asset valuation methodologies, there can be elements of circularity associated with the DORC approach if taken to extremes. A DORC valuation starts with an assumed forecast level of demand growth (which is typically based on an implied – and typically the current - price). This assumed level of demand growth then determines the asset value, which in turn will influence the final price. If a final price is not commensurate with the initially assumed level of demand growth, then it would be possible for demand growth to be revisited and adjusted upwards or downwards. This in turn will affect the asset valuation and produce a different price . This cycle could continue almost indefinitely, and will be influenced by variables such as the elasticity of demand for the product, the level of economies of scale, and the final pricing structure.

As a consequence, in practice the initial estimate of demand, once determined, is generally taken to be the fixed element that breaks the circularity nexus. It likely to be rare that optimisation will have an element of iteration, unless the final price, if applied, might result in demand that is manifestly different from that originally assumed.

4.3 Impact of Service Standards

In assessing optimisation, care must be taken in the definition of required service quality or technical standards. Standards so defined must reflect both current and anticipated required levels and qualities of service. A utility should carefully identify these standards (which may relate to, for example, water and sewerage quality levels, failure rates, risk levels, continuity of services during maintenance or in emergencies etc.) as well as the implications of regulatory or legislative directives (eg: those affecting environmental or service quality). Such factors should be treated as constraints within which optimisation is to take place. In this sense a utility's estimate of the amount of optimisation required should be based on their understanding of the technical and operational requirements of the relevant industry codes, licences, rules and other industry legislation, and where not specified, good (but not excessive) engineering practice.

4.4 Negative Optimisation

An example of negative optimisation might occur when an asset which has previously been optimised downwards (or even deemed to be redundant and removed from the asset base completely) experiences an increase in usage. In such cases the regulatory regime should enable the asset to be re-introduced into the asset base or optimised upwards.
Some assets may have capacity ratings or other properties which do not meet current demand or provide standards of service or reliability at less than acceptable minimum requirements. In one sense these assets could also be candidates for 'negative optimisation' where they could conceivably be valued as if they were assets of higher capacity or of higher standards of engineering or service reliability.

However, a more logical approach where under engineering exists is simply to include adequate replacement capital in the forward looking capital expenditure profiles and ensure that this capital expenditure is taken into account when establishing prices.

4.5 Frequency of Asset Valuation and Optimisation

Asset valuation and optimisation is time consuming and requires substantial resources. The frequency of re-valuing and re-optimising assets, and indeed whether re-valuation and re-optimisation should occur at all therefore needs to be carefully considered as part of any regulatory regime. Such decisions will need to reflect a balance between the resource intensive nature of the work, the need to maintain accurate estimates of the economic worth of regulated assets, the appropriate sharing of risk between the regulated entity and customers, and the need to ensure utilities have the incentive to achieve efficiencies.

Three broad scenarios might be considered (all in the context of the opening asset base only):

- an approach whereby an ODRC valuation of assets is initially established, but no subsequent optimisation or assessment of replacement costs occurs (other than a CPI increase in replacement costs and adjustment for fully redundant assets). This is the approach adopted under in the gas industry and that preferred by telecommunications companies (as it reduces the risk of technological change decreasing their asset base); or

- an approach whereby an ODRC valuation of assets is initially established, with regular reviews of both the optimised system and its replacement cost. This is the approach currently favoured by the ACCC in its regulation of electricity transmission businesses under the National Electricity Code (NEC); or

- an approach whereby an ODRC valuation of assets is initially established, with regular reviews of the system's replacement cost but not its optimised form.

The first approach minimises regulatory interference and hence regulatory risk. It tends to place the risk of changes in demand, arguably unfairly, on consumers, rather than the utility. It could thus be argued to be more conducive to a relatively low rate of return being applied to that asset base.

Where a once-off ODRC valuation is to occur relatively more care needs to be taken in ensuring that the optimisation and replacement costs are 'correct' as decisions made will have long-lasting consequences.

Where ongoing optimisation (or revaluation) of assets is to occur a generally higher regulatory rate of return will be required to compensate for the increased regulatory risk associated with regulatory intervention in optimisation (or revaluation), as well as the shift of risk associated with changes in demand from consumers onto the utility. Optimisation would tend to hold a lower rate of return increase than revaluation, or optimisation and revaluation together.

Nevertheless, regular reviews of optimisation or replacement costs have the advantage of providing the ability for customers to monitor the utility and provide input to the optimisation process. Customers may be well placed to detect areas of unnecessary over-capacity and can provide valuable (although perhaps not fully objective) input to the regulator on the optimisation process and the appropriate asset base.

Regular reviews can also reduce the risks faced by a regulated entity of being burdened with an inappropriately low asset base for extended periods of time (for example, where demand for services is rapidly increasing).

A five year period between re-optimisation and revaluations in the electricity transmission sector has been proposed by the ACCC. Intuitively this interval has appeal in that it is not so frequent as to introduce undue costs or regulatory risk, but short enough such that the asset value cannot get too far out of line from the deprival value (as it might where demand increases or where the underlying asset replacement costs rise faster (or slower) than the CPI, in which cases a simple CPI indexing of asset values will underestimate (or overestimate) the true deprival value).

Similarly, IPART proposes to revise its ODRC valuation of the NSW rail access regime every 5 years (and to allow CPI increases between revaluations).

If re-valuation and re-optimisation is to occur, a further issue is then whether the optimisation analysis should occur at the same or on a different frequency to the re-valuation exercise.

It should be noted that in a competitive environments where by-pass is permitted utilities will continue to face the risk of assets being stranded, regardless of which methodology and cycle is adopted for asset valuation and optimisation.

Re-optimisation tends to be a less significant issue in industries characterised by stable demand and low levels of technological progress (such as the water sector) compared to industries such as the telecommunications sector which experience rapid technological change.

5. Asset Valuation and Optimisation in the Australian Water Industry

The following section summarises the basis on which revenue and prices have been set for different major urban water authorities in Australia. As noted, in no cases are water authorities' prices based substantially on asset values using the ODRC or ODV approach.

ACT Electricity and Water (ACTEW)

Prices charged by ACTEW, and the asset valuation used in their determination, are regulated by the ACT's Independent Pricing and Regulatory Commission (IPARC). In May 1999 IPARC released its Price direction for ACTEW on its electricity, water and sewerage businesses. This Price direction was undertaken using the deprival value method, with the result that:

- electricity assets were valued using the ODRC methodology; and
- water and sewerage assets were valued using the Economic Value methodology.

This is due to the ODRC valuation for the electricity assets being less than the ACTEW's calculated Economic Value, with the water and sewerage assets being the opposite.

Sydney Water

To date, IPART has adopted a 'line in the sand' approach to the valuation of Sydney Water's asset base. The asset value does not presently play a key role in the determination of Sydney Water's tariffs, due to the price-cap method of regulation, but rather is used as an indicator of the financial position and value of the authority. For future regulatory resets, IPART is contemplating a move towards the use of a revenue-cap rather than price-cap, which, if adopted, will lead to the ODRC value becoming an active regulatory component. IPART has engaged consultants to prepare building blocks for the revenue-cap components.

Melbourne Water Retailers

A relatively formal review of methodologies for establishing prices set by the 3 Melbourne water retailers was conducted by the Department of Treasury and Finance approximately 4 years ago. The review considered a ODRC-based approach as one of a number of alternatives, but it was not subsequently adopted and other approaches (focussing on cash flow requirements and short-to-medium term financial obligations) were subsequently favoured. Since the review the Melbourne retailers have been subject to price reductions and a price freeze mandated by government.

It is generally understood that prices based on the ODRC methodology would be significantly higher than those currently paid by Melbourne consumers.

The Victorian Department of Treasury and Finance is understood to be currently considering approaches to asset valuation (for both pricing and reporting purposes) for the Melbourne water retailers and a more theoretically 'rigorous' approach to asset valuation, possibly involving the ODRC methodology, might be instituted following the conclusion of the existing price freeze on 30 June 2001.

Victorian Non-Metropolitan Urbans

The Victorian Non-Metropolitan Urban water authorities are required to provide financial reports including balance sheets to the Department of Natural Resources and Environment (DNRE) with assets valued on a 'replacement cost' basis. However, it is understood from DNRE that there is no single common approach to determining the methodology used to determine replacement cost and most, if not all authorities do not attempt to use an 'optimised' replacement cost.

The Non-Metropolitan Urban water authorities pay little regard to the (optimised) replacement cost of the asset base in determining revenue and prices, which continue to reflect historic approaches to pricing (again, focussing on cash flow requirements and short-to-medium term financial obligations). As with the Melbourne water retailers they also reflect the recent price reductions and freezes mandated by Government.

PricewaterhouseCoopers is aware of one Victorian Non-Metropolitan Urban water authority which has undertaken a relatively rigorous attempt to establish a ODRC valuation for its asset base. Key approaches and issues addressed by the authority in undertaking this valuation include:

- as a first step, redundant and surplus assets were identified;
- overall levels of excess capacity (on an individual system basis) were identified, using engineering judgements;
- where a discrete system was not judged to have excess capacity on an overall basis, there was a focus on whether individual system components exhibited capacity in excess of that inherent in the overall system, and the extent of that excess capacity; and
- finally, assets that were considered to be individually over-engineered or over-designed were identified and the extent of the over engineering/over-design was estimated.

Western Australia Water Corporation

WA Water Corporation adopts the ODRC methodology when valuing its assets. The Water Corporation emphasises the "replacement of the service the asset provides" rather than simply the replacement of the physical asset. In focussing on the standard of service issue the Water Corporation utilises an in-house team of engineers that periodically research best practice in water service provision internationally.

This information is then used to determine how the assets can be optimised, through replacement at the end of the assets life, having regard to:

- new technology and future trends;
- individual asset capacity; and
- optimal configuration of the network overall. The network may range from the group of assets involved in storage, delivery, treatment and the reticulation system.

Queensland

The Local Governments in Queensland are responsible for the provision of urban water to customers. To date, optimisation has not been an issue the councils have specifically focussed on. Most councils value their assets using a written down replacement cost methodology that does not necessarily address the issue of optimisation. Some councils are partially addressing the optimisation issue through incorporating future trends in supply and changes in technology into the "replacement cost" calculation involved in this methodology.

South Australia

SA Water reports balance sheet asset values according to the deprival value approach. Assets are generally valued according to their ODRC, however there appears to have been no rigorous attempt at system optimisation and in most cases modern equivalent assets have been identified without consideration of whether the existing asset would be required in an optimised system. The only exception to this is understood to be where two tanks at a water treatment plant were optimised into a single, larger tank.

SA Water's prices are not based on the deprival value of assets and because SA Water is not subject to independent regulation, price movements tend to reflect short-term financing requirements, changes in inflation and political realities. It is likely that if prices were to be based on the deprival value of assets then significant increases would be required.

6. Asset Valuation and Optimisation in other regulated industries

The following sections identify how optimisation techniques have been used in the context of asset valuation and regulation in the Australian gas, electricity and rail industries. The key point to note is that regulators have generally been loathe to commit to a single asset valuation methodology, and that the individual characteristics of the industry and entity at hand should play the most important role in determining the most appropriate valuation methodology.

Having noted the above, valuable direction on optimisation in regulated industries is likely to come from the ACCC's proposed guideline on ODRC valuations in the electricity industry (see section 5.1 below). However, as the ACCC does not intend to provide the guideline until the end of 2002 substantial debate on this issue is likely to continue until then.

6.1 Asset Valuation and Optimisation in the Electricity Industry

ACCC Draft Statement of Principles for Regulation of Transmission Revenues

Key direction on asset valuation and optimisation in the electricity industry is being provided by the Australian Competition and Consumer Commission (ACCC) in respect of its regulatory responsibilities in the National Electricity Market (NEM).

Arrangements for the operation of the NEM are set out in the National Electricity Code (NEC). The NEC provides for the ACCC to regulate transmission revenues on a progressive basis, with effect from 1 July 1999. Provisions in the NEC relating to asset valuation place a cap on the initial asset base equal to the asset's deprival value. Unlike the Gas Code (see5.2 below), the NEC provides that the asset base can be reviewed (including re-optimised) going forward.

The ACCC has released a Draft Statement of Principles for the Regulation of Transmission Revenues. In this Statement the ACCC suggests that it is open to the use of the ODRC valuation of the asset base, but that this should represent a maximum value. Indeed, the ACCC further suggests that " no single asset valuation methodology will provide a uniquely appropriate valuation in all cases…"[7].

The Statement provides a summary of the ACCC's views on optimisation, as outlined below[8].

> *"Optimisation provides the market discipline of write-down of inappropriate investment or assets susceptible to by-pass. Optimisation may provide for the removal of an amount from the capital base to:*
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> - *ensure that assets which cease to contribute in any way to the delivery of services are not reflected in the capital base; and*
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> - *share costs associated with a decline in capacity on that part of the network.*

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[7] ACCC, Draft Statement for the Regulation of Transmission Revenues, 1999, p 48
[8] opt cit p43

Discretion is available in deciding how the optimal system configuration should be determined. Even in the absence of alternative technologies there is an issue as to what level optimisation should be considered and whether it should be done in respect of each item of infrastructure or on a system-wide basis. There is clearly an important trade-off in the level of detail considered and the cost of conducting the evaluation. The concept of a [Modern Engineering Equivalent] *for identifiable segments or modules of infrastructure is a practical application of this trade-off. For the most part it is expected that technological change will manifest itself through incremental reductions in the cost of* [Modern Engineering Equivalents].

Generally, a top-down approach, which considers infrastructure from a system-wide perspective is important since it allows major differences from existing infrastructure to be quickly identified. Moreover, the top-down approach can more readily accommodate the impact of new or alternative technologies, For example, an optimal solution may do away with existing types of infrastructure and may involve a totally different transport mechanism or product to satisfy associated final demand in end markets. Such solutions may only be apparent when the customer base and services provided are considered in the broadest possible perspective.

Further, in relation to optimisation there is an issue of timing. This occurs because capital expenditures are based on demand projections for certain periods of time. Overbuilding of the system may well be a reflection of anticipated growth in demand, The question for the valuer therefore is what level of overbuilding should the optimisation consider, based on projected demand growth ? The options include considering only current demand, that is paying no attention to future growth, or some other length of time."

The Statement also directly draws specific attention to the matter of optimisation of the value of easements, but concludes that it would seem appropriate to value the optimised portfolio of easements as an integral part of the broader optimisation assessment.

The Statement also conveys the ACCC's intention to provide guidelines on the conduct of ODRC valuations, including the matter of optimisation, by 31 December 2002.

6.2 Asset Valuation and Optimisation in the Gas Industry

Owners of natural gas transmission and distribution pipelines throughout Australia are regulated in accordance with the *National Third Party Access Code for Natural Gas Pipeline Systems* ('the Gas Code').

The Gas Code provides for an initial capital base to be established for each regulated pipeline. Section 8.10 of the Gas Code provides broad principles for establishing the initial Capital Base and suggests that it should lie between a historic cost value and the value resulting from the application of the ODRC methodology. The Gas Code does not suggest how the ODRC methodology is to be applied or how the asset optimisation should be undertaken.

Once the initial capital base is established it is then adjusted mechanistically over time to reflect capital expenditure, inflation and depreciation. Aside from these changes, and in contrast to the approach in the electricity industry, the Capital Base is not reviewed or 're-optimised' over time, with two exceptions.

The first exception is that an element of 'optimisation' is introduced in that the regulator can require the capital base to be reduced in respect of redundant capital (which is defined as an asset that ceases to contribute in any way to the delivery of Services). However, this relatively restrictive definition of redundant capital (which allows an asset to be used sparingly, or even only in a reserve capacity, but still maintain its value in the asset base) ensures that the value of any redundant capital will in most circumstances be minimal. An asset that is removed from the capital base on the basis of being redundant can be re-introduced to the asset base at a later date if it subsequently starts contributing to the delivery of services.

The second exception is that capital expenditure on an asset is not automatically added to the capital base where it does not pass an 'economic feasibility test'. If the asset fails to pass the test and does not have certain other attributes, only that part of the capital expenditure that passes the test may be added to the capital base. The remainder of the capital expenditure may be placed in a 'speculative investment fund' and subsequently added to the capital base when use of the asset increases such that the test is passed.

Final decisions on access and compliance with the Gas Code have been made by the ACCC and ORG (in respect of the Victorian gas transmission and distribution assets) and IPART (in respect of Great Southern Network's (GSN's) Wagga Wagga gas distribution network).

The ACCC and ORG endorsed an initial Capital Base determined in accordance with the ODRC approach. The ODRC valuations were undertaken by consulting engineers Gutteridge Haskins and Davey (GHD) and subsequently reviewed by consultants engaged by the ORG. The ACCC and ORG endorsed key assumptions made by GHD including:

- that the optimised system should take account of the existence or otherwise of infrastructure such as roads and buildings (ie a brownfields approach to valuation); and

- that the network would be built instantaneously to a configuration that is optimal for existing and projected demand (as distinct from an assumption that the network has grown incrementally as it would in the normal course of business). The ORG believed that this approach is more consistent with the valuation that would occur in a competitive or contestable market as a new entrant would always configure its plant to minimise costs.

The effect of optimisation of the transmission system was to reduce its replacement cost by 9%.

In contrast, IPART elected not to use an ODRC approach to the valuation of GSN's Network. Instead, IPART has chosen to use a combination of methodologies combined with ODRC to conclude that a specified figure of $28m. This method is referred to as a 'line in the sand' approach.

6.3 Asset Valuation and Optimisation in the Rail Industry

IPART has addressed the issue of optimisation in the rail industry in its 1999 Final Report on the NSW Rail Access Regime. In the report IPART details arguments for the need to have regard to a range of asset valuation methodologies, and also includes a discussion of the key asset valuation methodologies and their associated merits.

As noted elsewhere in this document, IPART has supported the use of an ODRC approach to the valuation of the relevant rail network, and in doing so:

- supported the use of a five year period between ODRC valuations; and
- supported the use of an allowance of five years demand growth forecast in the optimisation process.

IPART also emphasised the sensitivity of the ODRC valuation to the use of either the greenfields or brownfields replacement cost valuation approaches and suggested that both greenfields and brownfields valuations should be considered when undertaking valuations.

7. Conclusion

The use of deprival value and in particular ODRC has been accepted by both Australian Governments and regulators as one of a number of legitimate methods of valuing utility assets.

The calculation of ODRC is a subjective process, and is likely to remain so in the future. There is still much debate about matters such as the incremental versus greenfields approach to optimisation, whether assets should be re-optimised over time, and to a lesser extent regarding the amount of excess capacity that should be optimised out.

However, recent regulatory decisions by the ACCC, the ORG and IPART are having the effect narrowing the amount of subjectivity and should ultimately lead to relatively consistent approaches to optimisation being adopted if not between, then within industries. Regulators now appear to have sufficient confidence in optimisation techniques and the ODRC approach to use it as the basis for establishing prices in the gas, electricity and rail industries.

Experience with the use of ODRC in the water industry is less than in gas, electricity and rail, perhaps reflecting the reduced level of competition in the water industry. PricewaterhouseCoopers is not aware of any Australian water authority that uses ODRC as an integral component of determining prices and revenues, although some authorities do use ODRC valuations for reporting purposes. The reluctance to use ODRC for pricing purposes may reflect more the price shocks that might be expected, rather than any fundamental differences in regulatory regimes or uncertainties about the economic justification or practical difficulties in undertaking optimisation.