valued at replacement cost. And practically, the adoption of DORC on the grounds that it approximates Tobin's concept of replacement cost ignores the reality that there is no market for used assets of the type in question and hence no way in reality of replacing the diminished capacity of existing assets... the market discipline purportedly inherent to DORC valuation is on this view more a product of economic sophistry than economic logic or good sense." One might add that usually there are statutory monopoly rights of way involved and that the only way to enter such markets is to have the legislature grant cabling or easement rights (as Optus and Telstra had, to the chagrin of Sydney homeowners with a view). For this reason, entry is only possible on the ground floor, that is entry is timeless, and timeless DORC is really DAC.

For example, to charge today's users on the basis of a higher replacement cost of assets which historically cost much less pre-inflation is to transfer an inflation gain from users to owners, where in the past the users could have had that gain by using a bond issue floated by a semi-government infrastructure provider such as the Sydney Water Board. There is both inter-temporal inequity and inefficiency in forcing today's users to pay costs of infrastructure for tomorrow's users (which could be financed by a bond issue at the relevant time), especially when there is no guarantee such infrastructure will ever be needed or built (eg land telephone lines in the outback may be replaced by satellite technology)

5.12 Depreciated Optimized Replacement Cost (DORC)

The argument for replacement cost rests on the idea that DORC signals to users the marginal cost of their current use of resources and is therefore economically efficient. As Vickrey puts it "Since changes in present usage cannot affect costs incurred or irrevocably committed to in the past, it is only present and future costs that are of concern in the determination of marginal cost. Past recorded costs are relevant only as predictors of what current and future costs will turn out to be. The marginal cost of ten gallons of gasoline pumped into a car is not determined by what the service station paid for the gasoline, but by the cost expected to be incurred to replace the gasoline at the next delivery." (William Vickrey *Marginal- and Average Cost Pricing* in Eatwell et al editors, The New Palgrave Vol 3, Macmillan,1987 p 314).

But, as Vickrey (an advocate of marginal cost pricing) would recognize, to use this kind of argument to support prices based upon DORC for sunk capital is incorrect. You either sell gasoline now or later (one use precludes the other) but a gas pipeline is available for use both now and later and a failure to use it now does not prolong its life later. There is no economic reason to stint usage of a pipeline now through higher charges simply because in 50 years time it will cost more to replace it. If the pipeline has no alternative use and there is no capacity constraint, there is no economic efficiency reason for not pricing at (minimal) marginal cost. There may be an argument for average cost pricing to recover financing costs but this is an argument more in favour of DAC as a pricing principle than DORC.

5.13 What is DORC?

The DORC concept suffers from a lack of conceptual clarity. One can distinguish between the concepts of incumbent DORC and new entrant DORC. The concept of replacement cost depends on who is doing the replacing.

But there is a further conceptual problem with DORC. If one is trying to replicate the outcome of a competitive market, there is always free entry. A new entrant can acquire the resources necessary to enter the industry on the same terms and conditions as incumbents. If DORC is based on the replacement costs a new entrant would face *now* then it is *not* replicating a competitive market outcome. To replicate a competitive market outcome, it is necessary to assume that the hypothetical new entrant can acquire resources on the same terms and conditions as the incumbent. In other words, the incumbent should not be allowed a competitive advantage through the mere facts of time and history. One should assume that the hypothetical new entrant had the same market opportunities as the incumbent.

In the case of a competitor to a long established utility, one should assume the new entrant entered the market at the same time and had the same opportunities. Only by abstracting from time and assuming simultaneous entry on the same terms and conditions, can one replicate competition. Under this entry hypothesis, it is reasonable to assume that a new competitor would have behaved just as the utility has behaved: that is to say DORC reduces towards DAC, once one removes the anti-competitive bias of time and history. In other words in the timeless economic world of perfect competition, DAC (less any technological obsolescence) is the measure of competitive cost. Thus "timeless" DORC is DAC adjusted downwards for any actual costs which could be saved by using newer techniques of production. Such a concept of DORC may seem somewhat metaphysical but it highlights the abstractions that DORC involves.

5.14 Is DORC necessary for capital maintenance?

One argument for DORC is that, when it is higher than DAC, depreciation based on DORC ensures that charges are sufficient to pay for system replacement. However, this argument is confused. There is no legal obligation for any infrastructure owner charging depreciation on any DORC basis to set aside those depreciation allowances in an escrow or trust fund earmarked for system replacement. There is nothing to stop depreciation allowance cash flow being paid out to shareholders as dividends or invested elsewhere.

There is a further problem with charging the current generation of infrastructure users for the costs of infrastructure that will be used by future users. There is no reason why the next generation of infrastructure users cannot be expected to pay for their own costs through a future infrastructure bond issue.

5.15 IPART and other criticism of DORC

It may be noted that even regulators, such as NSW IPART, have expressed some reservations on the use of DORC. In the case of electricity, Cost Reflective Network Pricing (CRNP) has been put forward for pricing of networks. The CRNP approach is based on allocating fixed and operational and maintenance costs among users based on use of the system, with users (not generators) paying the bulk of transmission charges.

The CRNP approach has been criticised by many market participants, including by the NSW Independent Pricing and Regulatory Tribunal (1996) ""There are two important aspects (of CRNP) from the viewpoint of economic efficiency. Firstly, the capital component is essentially based on the recovery of sunk costs, notwithstanding that the assets are valued at replacement cost with some optimisation. Secondly, it involves an allocation of fixed and joint costs between users based on a form of fully distributed cost modelling. From an economic perspective, recouping sunk or past fixed costs has no economic merit because it fails to provide signals to users about the current costs of providing the network service. Network prices resulting from the CRNP approach do little to signal network prices for future investment. The CRNP approach does, however, fulfil financial requirements. The recovery of past costs needs to be flagged as a financial and equity matter rather than being attributed to economic efficiency. The Tribunal is concerned that in recovering sunk costs on a complex allocation of the usage of assets, the CRNP approach introduces substantial variations in charges which need not reflect economic costs."

5.16 Asset valuation: DORC inconsistencies

5.16.1 DORC not used to measure income for tax

Indexation of the tax system to allow for current cost accounting is not used in the tax system. Notwithstanding the advocacy of the Matthews Committee in the 1970s, it was felt that it was not appropriate to measure business income by adjusting for the impact of inflation on operating costs without taking into account its effect on asset revaluation gains.

It might also be noted that the concept of coupon depreciation is encountered in tax law for building structures where depreciation is based, not on the purchase price paid for an asset by its current owner, but on the construction cost incurred by the original owner who created the asset. If depreciation were allowed on the market value (as in the USA) buildings could be depreciated several times over. DORC is not tolerated in the tax law: wherever depreciation is allowed on a revalued asset, the revaluation surplus has to be counted as income or capital gain.

It may be noted that the Ralph Review of Business Taxation has proposed a model of company income which takes into account all forms of realised gain and leaves open the possibility of bringing unrealised gains to account as income.

5.16.2 DORC not used to measure resource rents

Depreciated actual cost (DAC) is used for resource rent tax (RRT) because the tax is based on actual cashflows: they are not allowed to be written up retrospectively. Allowing utilities to revalue their capital investments upwards understates the monopoly rent component of their cashflows. Esso/BHP are not allowed to do a DORC revaluation on their cashflows invested in Bass Strait before taxable resource rents are computed - why should infrastructure owners be treated differently?

5.16.3 DORC not used to measure land value

In the case of estimating site value for rates, the relevant concept is the salvage value of land - sunk capital improvements such as drains or pipes are ignored and treated as having been recouped after, say, 15 years, (see Scott (1986)): this is the opposite of DORC, it is a statutory recognition of the scrap valuation principle for sunk capital.

In valuing land and improvements it is often the case that improvements have no value and that all the value is attributable to the salvage value (site value) of land. Take for example the NSW State Office Block. At the time of demolition, it would have been quite wrong to attribute *any* value - let alone a DORC value - to an office block which was not wanted. What was wanted was the site and that was what had value. In the same way, it is wrong to use DORC to give a value to a utility owner's investment (which may have been long since recouped) when in fact the value of the enterprise may really lie in its monopoly land rights such as exclusive easements (which may have been obtained by statute at no cost).

5.16.4 DORC is subjective

In *Utility Asset Valuation and the Problems with DORC* by Professors D J Johnstone and M C Wells (July 1998), replacement cost based valuations were described as "multiple, subjective and at worst completely arbitrary choices, and hence cannot be reproduced by an independent valuer." DORC is in practice impossible to replicate and depends on arbitrary assumptions - is it greenfields DORC, incumbent DORC or timeless DORC? What is the DORC valuation of easements or other land rights grated gratis by statute?

5.16.5 DORC is asymmetric

Assets are revalued to count depreciation costs but revaluation gains are not counted as income. This need not be the case, but as DORC has been used in practice, windfall revaluation gains have been incorporated in initial capital bases.

5.16.6 DORC not adopted by accounting profession

In traditional historic cost accounting, only actual incurred costs are brought into account as ordinary profit or loss. Losses from revaluation of assets are not treated as actual, incurred, costs: instead depreciation is based on spreading the actual historic cost of an asset over time.

Since the 1970s and, especially during periods of higher inflation, there has been greater interest in alternative accounting treatments based on current replacement cost accounting.

Under current cost accounting, assets are revalued in accordance with their replacement cost and depreciation is charged as a cost on the revalued asset amount. The merit of current cost accounting is that it ensures management charges itself of the true cost of using up capital assets. But it should also be noted that current cost accounting also brings into account as income or gain any revaluation gains on assets. While these are not treated as part of operating profit, as Edwards and Bell (1961) recognise, they should be treated as part of the overall profits of the firm.

In *Utility Asset Valuation and the Problems with DORC* (July 1998) Professors D J Johnstone and M C Wells argue that replacement cost valuations mean that consumers "have paid once already through past prices and will now pay again for the same assets, even though there is no immediate replacement, through the effect of the depreciation and opportunity cost components of the pricing equation. It can even be argued that consumers will pay three times, in that some of the operating and maintenance costs reimbursed to the utility investor (through the pricing equation) will likely go towards capital improvements rather than expenses."

> *"...what does seem to be unjustifiable is the apparent lack of a coherent approach to the issue of 'current value' accounting in the non-business (government) sector. There seems to have been no concerted effort to draw lessons from the ultimately unfavourable attitude of business. The various regulations give the impression of as many ad hoc choices, sometimes leading to possibilities of opportunistic accounting policies, sometimes resulting in figures which even the entities involved have difficulty interpreting." (Camfferman, K. "Deprival Value in the Netherlands: History and Status" Abacus 34 (1998), pp 18-27)*

Clearly those who have promoted the drift of both DV and ODV into the public sector have either not heeded that experience with CCA, DV and related concepts in the private sector, or did not know of it. If it is the former, then the public sector reformers must be considered to suffer a certain lack of candour (Clarke, F L "DV and ODV in Australia" *Abacus* 34 (1998) pp 8-17) Source: Johnstone, D.J. and Wells, M.C. 1998.

"RC based accounting has been promulgated at all levels within the Australian public sector. In 1994 the Steering Committee on National Performance Monitoring attempted to institutionalise this framework through its publication and wide dissemination of a set of asset valuation guidelines closely resembling those of the various CCA (current cost accounting) proposals put forward by the accounting profession in the 1970s. This publication (the 'red book') is seen within the bureaucracy as an 'accounting standard' for the public sector, but does not have this credibility within the accounting profession as a whole nor within the much more extensive accounting literature. To the contrary, the "red book" seems to be the product of a bureaucratic process wherein the end was more important than the means. In coming down in favour of RC accounting, without the least qualification nor any vague reference to the academic and professional history of this valuation framework, the 'red book' is lacking in intellectual foundation and integrity. It is remarkable that rather than building on existing knowledge, the 'red book' in effect suppresses that knowledge. To some extent, it is likely that this is a consequence of those involved in formulation of the red book's guidelines simply not being aware of all that had gone on one or more decades beforehand. Accounting reforms in the public sector are a much more recent and almost unprecedented phenomenon, and it is understandable if the public sector as a whole has little 'corporate memory' of the earlier debate. It is essential, however, that the 'red book' be seen in the light of this apparent collective ignorance, and that its deficiencies be at least known if not corrected. (For detailed critical review of the 'red book' see Johnstone, D J and Gaffikin, M J R, "Review of the Asset Valuation Guidelines of the Steering Committee on National Performance Monitoring of GTEs", Australian Accounting Review 6 (1996) pp 50-56)." Source: Johnstone D.J. and Murray M.C. 1998

5.16.7 DORC not used by investment analysts

DORC is not used for analyzing financial returns by stock market analysts. At the end of the day what counts is the after-tax rate of return, normally computed in nominal terms. What counts for investment analysis is the internal rate of return on actual cashflows or whether the NPV of cashflows satisfies a hurdle rate of return

5.16.8 DORC not used in asset owners' financial accounts

In measuring distributable profit, DORC is ignored, as new investments can be financed in the future. Asset owners are not constrained in dividend policy by the "capital maintenance" requirements of DORC.

5.17 DORC and income measurement

The WACCs used by regulators appear to use a return to equity securities which includes capital gains - that is to say, a return which includes the stock market's capitalization of realized *and unrealized* undistributed capital gains liable to be earned by the companies. If one is awarding a rate of return which is supposed to take these gains into account then their existence should be recognized also in the regulator's computation of the revenue stream being earned by the utilities.

Otherwise, if the asset holding gains are not to be recognized as revenue by the utilities, it is invalid to allow return on, or return of, capital based on an inflated capital base. That is to say, if capital bases are written up through DORC valuations, those revaluation gains should be counted as part of any regulated revenue stream.

5.18 DORC not applicable to all assets

DORC is commonly not used for some assets, such as buildings or easements. Market value or acquisition cost is used instead.

Inconsistency in application of DORC may be seen, for example, in the decision of IPART of New South Wales in respect of rail asset valuation (IPART 28 April 1999), Recommendation 10 on asset valuation methodology: "For the purposes of the NSW Rail Access Regime, the assets owned by the Rail Access Corporation *(other than Corridor Formation Assets and land)* (emphasis added) should be valued using a depreciated optimised replacement cost methodology (DORC) applied retrospectively from 1 July 1999."

5.19 DORC and rights over land

A serious issue is the valuation of land used in infrastructure. This includes the treatment of land rights such as rights of way, air space and easements. Historically these were, and often still are, granted to infrastructure providers for no payment on the basis that the infrastructure serves a public purpose and its provision should not be held to ransom by the demands of individual landholders. Parliaments have not seen it as socially efficient for landholders to demand rents from infrastructure owners laying networks over their land or engage in blocking behaviour. Landholders have usually had to grant access.

But the pricing of access is a two-way street. Historically, Parliaments have usually limited landholders' claims to compensation for disturbance only. Where the Crown has used its powers of compulsory acquisition to create or impose easements or rights of way without paying landholders, what basis is there for a corporatised or privatised successor public utility to claim that the value of its rights of way or easements should be included by regulators in its capital base and that the value should be set at replacement cost (to reflect increases in land values)? If landholders cannot demand rents and have to allow access to infrastructure owners at marginal cost why should infrastructure owners not face the same obligation to provide access at cost only?

There have been contradictory approaches taken by regulators to treating the value of easements as costs. In the NSW Independent Pricing And Regulatory Tribunal's Report 'Pricing For Electricity Networks And Retail Supply', electricity easements were valued at actual cost and considerable discussion of the issues was undertaken to support that decision, rather than using alternative valuation methods such as DORC (Depreciated Optimised Replacement Cost). The Tribunal said "Electricity easements are generally granted in perpetuity. ... The restrictive nature of easements (eg, being an easement only for electricity distribution lines) may mean that they do not have value to any other entity. The Tribunal considers that including a market value for existing easements in the initial asset base is of no economic benefit. ... The issue of the treatment of easements highlights the difference between the assessment of the DORC from the perspective of a potential new entrant and that of the incumbent. For the incumbent, existing easements formerly acquired will not need to be replaced. Hence, such costs will not form part of the forward looking costs of maintaining and replacing existing capacity."

On the other hand, the ACCC has taken a different approach and allowed the value of easements to become part of the regulated cost base. In the Commission's 'Draft Statement of Principles For The Regulation of Transmission Revenues', the ACCC said "The contribution to the RAB [regulated asset base] should be based on the actual cost to the TNSP [transmission network service provider] of obtaining the easement rights updated periodically in line with what would be the DORC based valuation of easements, (page 45) ... The advantage of this approach is that the valuation remains comparable to costs faced by a potential entrant while maintaining cost of service pricing which takes full account of the social cost of the resources employed (page 46)."

Many would question whether any opportunity cost is involved where easements have no alternative uses. For example, a naturally occurring river serves the same purpose of transporting water as a man-made aqueduct but one suspects few persons, if any, would argue that a water authority should be able to adopt a DORC valuation of the river channel based on its (aqueduct) replacement cost and charge that "cost" to water users. Many would also question the proposition that an incumbent owner needs to be allocated additional revenue (through revaluation of easements) so that its "costs" (of existing easements) should be comparable to those faced by a (potential) new entrant. To provide the "owners" of easements (which have been acquired at generally very low or zero costs) with a DORC valuation is equivalent to providing a monopoly rent in perpetuity.

5.20 DORC and the inflation gain

The traditional method of financing public works was for governments to borrow, build the infrastructure, and pay it off through a sinking fund accumulated from taxes or user charges. One effect of this procedure was that infrastructure users were not charged more merely because the cost of replacing the asset may have risen – that was an issue for a later generation of users and another sinking fund. A result of insisting on replacement cost pricing is that users are now deprived of this inflation saving and may be seen as being exposed to retrospective price increases based on notional rather than actual, historic, costs: the inflation gain goes to asset owners rather than users.

But why should the gain from inflation accrue to the asset owner rather than users? If the infrastructure were publicly provided and funded by loan finance to be redeemed out of a sinking fund, the inflation gain would accrue to the users. Why should inflation be treated as a real cost to the infrastructure owner for regulatory purposes, when that cost will only be incurred in the future and can be charged then to tomorrow's users?

5.21 Why property rights are a red herring

In our view, when a person gains access to services produced by another person's infrastructure under Part IIIA of the *Trade Practices Act* 1974, neither the Commonwealth nor the person who gains access acquire property rights within the meaning of section 51(xxxi) of the Commonwealth *Constitution*. The mere acquisition of a right to use something, or of services, does **not amount to an acquisition of property rights** for the purposes of section 51(xxxi) of the Commonwealth *Constitution*.

Section 51(xxxi) of the Commonwealth *Constitution* confers power on the Commonwealth to make laws with respect to:

> *[t]he acquisition of property on just terms from any State or person for any purpose in respect of which the Parliament has power to make laws.*

There are 3 cases which provide authority for the proposition that the use of property by the Commonwealth or a third party does not amount to an acquisition of property. Those cases are:

- *Australasian United Steam Navigation Co Ltd v Shipping Control Board* (1945) 71 CLR 508;
- *Australian Capital Television Pty Ltd v Commonwealth [No 2]* (1992) 177 CLR 106, Brennan J (McHugh J concurring on this point) at 166-167, and Dawson J at 198 - 199; and
- *Smith Kline & French Laboratories (Aust) Ltd v Secretary, Department of Community Services & Health* (1991) 28 FCR 291, the Full Federal Court at 306.

For present purposes, the most relevant of these 3 cases is the *Australian Capital Television* case. In that case the High Court considered the validity of Part IIID of the Commonwealth *Broadcasting Act* 1942. Section 95Q of the Act required broadcasters to make available free of charge units of time for election broadcasts to a political party, person or group to whom the Australian Broadcasting Tribunal had granted such time.

Australian Capital Television submitted that the free time requirement constituted an acquisition of property otherwise than on just terms and was therefore invalid because it was inconsistent with the requirements of section 51(xxxi) of the Commonwealth *Constitution*.

Justices Brennan, Dawson and McHugh rejected the argument advanced by Australian Capital Television. Their Honours held that neither the Commonwealth nor the beneficiaries of the free time acquired property rights by the operation of Part IIID of the Commonwealth *Broadcasting Act* 1942.

Justice Brennan held that unless the Commonwealth or some other person acquires a proprietary right under the impugned law, there will not bean acquisition to which section 51(xxxi) may fasten. His Honour cited with approval the following statement of Justice Mason in the *Tasmanian Dam Case* 170 (1983) 158 CLR, at 145:

> *The emphasis in s 51(xxxi) is not on a "taking" of private property but on the acquisition of property for purposes of the Commonwealth. To bring the constitutional provision into play it is not enough that legislation adversely affects or terminates a pre-existing right that an owner enjoys in relation to his property; there must be an acquisition whereby the Commonwealth or another acquires an interest in property, however slight or insubstantial it may be.*

Justice Brennan found that:

> *[u]nder Div 3 of Pt IIID, broadcasters are statutorily bound to provide free broadcasting time to the political parties and other groups and persons to whom free time units are allocated. It is immaterial to the validity of Pt IIID that broadcasters are denied the right to broadcast what they wish during free time, or that broadcasters must use their property to provide election broadcasts during free time, for neither of these effects creates, extinguishes or transfers property. It is immaterial that Pt IIID reduces the value of a broadcaster's licence which is a form of property for the beneficiaries of the free time provisions acquire none of the rights or privileges conferred by a broadcaster's licence. The beneficiaries acquire a statutory right to have their election broadcasts transmitted free of charge. That is a right to the services of the broadcaster; it is not a proprietary right. As neither the Commonwealth nor the beneficiaries acquire rights that are "property" within the meaning of the term in s 51(xxxi), the challenge to the free time provisions on the ground that they effect an acquisition of property otherwise than on just terms fails.*

Justice Dawson noted that, although the term "property" in section 51(xxxi) should not be narrowly construed, there must be an acquisition of a proprietary nature before the section can have any application. His Honour stated (at 199):

> *While the licence may be in the nature of property, what is done under the licence is not. What the holder of a licence does under his licence is to broadcast and, in my view, it cannot be said that by requiring a licence holder to cease broadcasting certain material or to broadcast certain material free of charge there is an acquisition of property on the part of any person. The licence which may be regarded as property remains. All that occurs is that certain services which the licence holder is able to provide for reward cannot be provided or must be provided without reward. The plaintiffs stress that by being able to broadcast advertisements they are able to earn substantial sums of money. No doubt that is reflected in the value of the licence. But the service which a licence holder provides in the form of the broadcasting of advertisements cannot, in my view, be regarded as property however valuable the reward for that service. Conversely a broadcaster does not surrender anything in the nature of property (although he does lose revenue that would otherwise be earned on the provision of the service) when he is compelled to broadcast material free of charge. Broadcasting is the provision of a service, not property. Even if the purchase of the service can be regarded as the purchase of broadcasting time, that involves no acquisition of property of any kind. Nor does it carry the matter any further to regard s 95Q as conferring a right upon those who may take advantage of the free time which the section requires a licence holder to make available in an election period. If it be a right, it is personal rather than proprietary because it is of a temporary nature and may not be assigned.*

The *United Steam Navigation* case concerned the validity of a Commonwealth law which allowed the Commonwealth to requisition ships and, if the ship was damaged or lost while requisitioned, required the Commonwealth to compensate the owner of the ship in accordance with a prescribed methodology.

United Steam Navigation's ship had been requisitioned by the Commonwealth and, while requisitioned, was lost to enemy bombing in waters north of Australia. United Steam Navigation alleged that the prescribed methodology for calculating how it was to be compensated was inconsistent with section 51(xxxi) of the Commonwealth *Constitution*.

Chief Justice Latham (with whom Justice McTiernan agreed) held at 521:

> *If ... [the charterer] acquires only a right to use the ship - a right to use her carrying capacity ... there is no demise, but only a contract for services.*

The Chief Justice concluded that, under the terms of the requisition, United Steam Navigation retained control of the management, navigation and handling of the ship and, as a consequence, the Commonwealth did not acquire property in the ship (at 524-525).

The other judges reached the same conclusion (Justice Rich at 526, Justice Starke at 527 and Justice Williams at 528).

In the *Smith Kline* case, the Full Court of the Federal Court rejected the applicant's argument that the Commonwealth's use of its confidential commercial information for proper administrative purposes was an acquisition of property otherwise than on just terms. The Court noted that the commercial information was not "acquired" by the Commonwealth because Smith Kline retained ownership of the information and the full rights of user.

Recommendation 4 Regulated Assets to be Valued at Depreciated Actual Cost (DAC)

The national access regimes recognise that the value of assets for regulatory purposes is the Depreciated Actual Cost (DAC). Users must pay only once for assets based on actual construction costs amortised over reasonable asset lives. Maintenance of assets should not trigger revaluation.

Of course the foregoing argument is of little value if the underlying information about the cost of constructing, financing and maintaining assets is not disclosed to the regulator or interested parties.

In other juridictions, notably the US and UK, asset owners are required to maintain regulatory accounts. The purpose of these accounts is to provide financial information about regulated businesses for use by the regulator, industry, investors, users and other stakeholders. The UK is moving towards a common regulatory accounting framework. The UK Regulators in their consultation paper outlining the role of regulated accounts in October 2000 (Director General of Electricity and Gas Supply, 2000) suggested that the practical applications of regulatory accounts are:

- *"monitoring performance against the assumptions underlying the current price control;*
- *informing future price control reviews;*
- *assisting in the detection of certain anti-competitive behaviour such as unfair cross-subsidisation and undue discrimination at levels of disaggregation appropriate to the relevant market;*
- *assisting in comparative competition;*
- *assisting in monitoring financial health; and*
- *improving transparency in the regulatory process, regulatory accounts are the main source of regular, published and audited information about regulated companies."*

In the case of the Access Undertaking for the NSW Network submitted by AGL Gas Networks, the original Arrangement was submitted on 5 January 1999 but it was not until September 2000 that the Access Arrangement was approved by IPART. During this period users did not have the benefit of lower charges that were eventually approved. Part of the delay was taken by arguments on the valuation of the cost base, determination of the regulatory cost base, determination of relevant operating and maintenance costs. Had AGL prepared and published a set of sufficiently detailed regulatory accounts the information requested by the regulator in the draft decision and subsequently released and revised by AGL in over many months would have been available to the process at the outset.

Recommendation 5 Asset Owners to Maintain Regulatory Accounts

Owners of regulated assets must maintain prescribed regulatory accounts. Information that the regulator reasonably requires in order to form a view on an access arrangement must be submitted by the applicant in a form that is standardised, comprehensive and complete.

6 Optimal pricing principles: nature of the problem

6.1 Optimal pricing principles: nature of the problem

The fundamental problem faced by regulators of utility infrastructure providers is that because of economies of scale the marginal cost of additional network usage is generally much lower than the average cost. Once infrastructure exists, it is optimal that it be priced at short run marginal cost (SRMC) in the absence of congestion but if regulators were to insist upon short run marginal cost pricing, the utility (especially if it were capital intensive) would operate at a loss and no one would be found willing to invest in providing the infrastructure at a loss.

There is a paradox: the social returns from infrastructure investment may be very great, yet the private rewards from providing it at an optimal price are likely to be negative. So no one would build it. On the other hand, if allowed to charge whatever the market would bear, many private investors would race to capture the chance to create a natural monopoly infrastructure project. With limited opportunities for duplication they could reap handsome super-normal monopoly profits while stinting the fullest social use of the infrastructure. The paradox is thus that the "right" SRMC price for infrastructure means no one will build it but free competition is likely to be unstable competition that throws up an exploitative monopolist. So regulation tends to occur where there is monopoly infrastructure to make sure that the prices charged by the monopolist are such as to yield him only a normal or reasonable profit on investment.

Yet marginal cost pricing is not irrelevant. Marginal cost pricing remains the economic criterion for efficient pricing. A price above marginal cost is a disguised de facto tax and will impose efficiency costs (deadweight losses) upon the economy just like any other tax. Downstream industries may be affected adversely or even rendered internationally uncompetitive. In effect, regulation amounts to finding tax-prices to be levied on users which will best cover the high fixed costs of an infrastructure system (sometimes described as funding the access charge deficit).

Price regulation of infrastructure services has emerged as a major issue in the NCP process. Phrases such as a "misallocation of resources" or "cross subsidisation" or "cost recovery" all depend on implicit, if unarticulated, theoretical reasoning.

It is therefore not surprising that a range of complex problems and regulatory processes have arisen as the traditional public sector pricing policies have given way to a new framework. On the one hand there is a desire by regulators to ensure that prices are not excessive reflecting the natural monopoly characteristics of infrastructure industries. On the other hand prices, it is argued, need to be adequate to ensure an incentive to invest (Treasury 1999).

The traditional public finance rule is that pricing for infrastructure services above marginal cost is unjustified in economic theory and amounts to a tax in the case of government provided infrastructure or the exploitation of a monopoly profit in the case of privately provided infrastructure services (BCA 1995).

This has sometimes been questioned. Is short run marginal cost pricing always optimal? It is generally conceded that a *first best* optimum for pricing infrastructure is to set price at marginal cost. This was the strong theme of Hotelling (1938) who argued that marginal cost pricing should be pursued and that infra-marginal losses be made up by taxes levied on income, estates or land. Marginal cost pricing is generally accepted as the norm for economic efficiency and can be traced back to Marshall's (1920, Vol I, p 469, 472-473, 475) suggestions for subsidising increasing returns industries to maximise consumer surplus.

Yet pricing at marginal cost for capital-intensive infrastructure generally leads to losses because fixed costs are so large relative to marginal costs. The ACCC (1998a, p xxiii) rightly sums up the central problem of utility regulation of privately owned infrastructure as "devising systems based on marginal cost principles, whilst ensuring a fair rate of return to capital".[0] It is usually quickly assumed that any losses must be met by distorting taxes or charges on either non-users or users in the form of prices above marginal cost. In other words, we have to settle for a *second best* optimum.

But is this correct? Is marginal cost pricing only suboptimal where there are "access deficits" *and* lump sum contributions are excluded? What are the suggested, real world, second-best alternatives? Advocacy of "user pays" financing of infrastructure rests in large part on the implicit assumption that no non-distorting taxes or other charges are available, and that it is equitable to make users pay for the total costs of infrastructure. For example, the Industry Commission (1993, p 180) declares that "imposition of a financial target offers an alternative to sustained losses by requiring the enterprise to price above long-run marginal cost and recover full costs including a return on capital. A financial target in this sense is simply another form of indirect taxation. The choice is essentially between taxation methods. The inefficiency involved in raising a toll above marginal cost to reduce enterprise losses must be weighed against the inefficiencies incurred elsewhere in the economy by distortionary taxes levied to finance the losses of [government business enterprises.]"

But a further question arises as to why, where there are external benefits created by infrastructure, is it efficient to have a National Competition Policy which ignores externalities by requiring all infrastructure to be financed solely by user charges in excess of marginal cost? Why should not beneficiaries as well as users be required to pay? (For example, why, in the case of electricity, should the end consumers be made to pay for the bulk of network costs while generators do not?) Is it seriously believed that infrastructure does not contribute to land values (as, for example, with the effect of a VFT on land values).

The Industry Commission has agreed with the standard academic argument that prices in excess of SRMC are taxes but has justified prices above SRMC on the basis that funding access deficits has to be made up by one tax or another so the users may as well be taxed. Is this view reasonable? Treasuries also benefit, why should they not contribute? Further, does the need to cover access deficits really justify DORC or other valuations in excess of the actual construction cost of infrastructure?

Do these alternatives permit discriminatory Ramsey pricing and opportunistic taking by infrastructure access providers of producer surplus from other industries? Is this not an analogue to the "regulatory taking" feared by infrastructure owners themselves? Are pricing principles necessary in addition to revenue caps to prevent predatory pricing which expropriates downstream investment?

6.2 Optimal pricing principles: first best short run marginal cost (SRMC) pricing

The problem of public utility pricing and provision is one of the oldest in economics. Notwithstanding an impressive list of economists from Dupuit, through Marshall and Hotelling, to Vickrey, among many others, who have advocated short run marginal cost (SRMC) pricing, the modern trend (or reversion to an older pattern) in public utility finance is towards full cost recovery from users, and uses alone, of all capital and current costs involved in maintaining infrastructure networks. In this paradigm, short run marginal cost pricing is not pursued as an efficiency goal. If there is a concept of marginal cost pricing, it is a concept of long run marginal cost pricing (LRMC) which is seen as requiring full cost recovery plus a return on capital invested.

Efficiency is thus seen as being adequately served if infrastructure investors are limited to a normal but not excessive rate of return on funds invested. In effect, regulation seeks to impose a revenue cap, an overall price *level* based on the capital invested, which leaves the utility owner with considerable discretion on how to allocate his price *structure* so as to recover a required rate of return on capital.

Vickrey (1948, p 236) warns that once short run marginal cost pricing is abandoned, the allocation of overhead costs or access deficits becomes a battle between contending interests, just as the allocation of tax burdens reflects the outcome of political contests. "Whether the operation is in private or in public hands, if rates [tariffs] are set above marginal cost in an attempt to cover the entire costs of the operation, the solution of the problem of how to fix rates [tariffs] so as to achieve this end with the least possible misallocation of resources calls, at best, for the exercise of very refined judgment, even in a milieu free from contending interests. In practice, moreover, contention by interested parties makes the achievement of a close approach to the best solution even more difficult. For example, where there are different classes of consumers, decisions as to which classes shall bear charges to cover the intra-marginal residue of costs (often loosely called 'overhead costs') will often provoke heated argument."

6.3 Pricing principles: objections to marginal cost pricing

However, some economists have attacked short run marginal cost (SRMC) pricing. It is argued in favour of "full cost recovery" and "user pays" that, even if there are non-distorting taxes available, efficiency requires that users alone pay for the fixed costs of infrastructure:

otherwise, they will ask for more than they are willing to pay for. Thus, following Coase (1946), it is argued that cost recovery from users is efficient because it prevents money being poured into infrastructure, the cost of which exceeds its total value to users.

For example, the Productivity Commission (1997 p 44-45) states that "A second criticism of Hotelling came from Coase (1946), who suggested that the external funding of the deficit could result in the maintenance of an activity for which the total value to users was less than its total cost to society to produce. Consider a situation where average cost is greater than willingness to pay (demand price) at all levels of output, so that there is no guarantee that the total value to users is at least equal to the total cost to society of providing that output. This service would not exist if cost recovery had to be achieved by a system of user charges, and in some circumstances this would be the efficient outcome. However, Hotelling's solution would allow the maintenance of such activities worth less to society than their cost."

Coase (1946, p 174) objected to Hotelling's prescription of marginal cost pricing financed by a government subsidy and urged that marginal cost pricing be financed through a two-part system of pricing imposed on users. He argued that the Hotelling solution "leads to a maldistribution of the factors of production between different uses; second, that it leads to a redistribution of income; and third, that the additional taxation imposed will tend to produce other harmful effects."

The first objection is that unless the total amounts paid by users exceed the costs of the factors of production used in a facility, one cannot be sure the facility is socially worthwhile. However, this conclusion, as formulated, ignores the possibility of external benefits which are almost invariably associated with infrastructure provision. If the objection is reformulated so that the total costs must be recovered from users *and other beneficiaries* to ensure that an infrastructure project does not draw factors into less valued uses then the objection is unobjectionable. Thus if an infrastructure project costs $100 million and its net profits at marginal cost pricing are zero it must increase the value of the land it services by more than $100 million before it can be considered worthwhile. The willingness of users to pay for the project will be reflected in their increased demand to locate themselves on the land which gives them access to infrastructure: the access charge Coase advocates to test willingness to pay then amounts to the same thing as the land rate system Hotelling argued for as a means of financing inframarginal losses.

It may be noted that Coase (1946, p 181) had to concede that user pays through "average cost pricing may prevent some things from being done which perhaps ought to be done" but contented himself with the argument that "it is also a means of avoiding certain errors in production, some of which would inevitably be made if the Hotelling-Lerner policy were followed."

Coase's arguments against marginal cost pricing were subjected to critical examination by Vickrey (1948, pp 224, 230) who commented that "It does not therefore appear that multi-part pricing succeeds in exorcising the dilemma. Either we accept marginal cost pricing ... or we accept a more or less substantial misallocation of resources ... Requiring each project to pay its own way may be the only way of making absolutely sure that the community does not persist in investing in uneconomical projects; but to adopt a policy that results in a substantial bias against undertaking increasing-return projects seems a rather costly method of insuring that errors in the other direction are avoided." To put this observation in the contemporary Australian context, the enthusiasm for "user pays" financing of infrastructure may well save Australia from "white elephant" investments but it may be even more effective in ensuring that downstream investment is prevented.

Vickrey (1948, p 217) stressed that "existence of a profit (or 'breaking even') may indeed show that the project has been worth while; but a level of output at which all costs are covered is normally not the best output, nor is the absence of any possibility of profit (or even of covering costs), any indication that a project would not be well worth while." And for those who are tempted by discriminatory or Ramsey pricing, Vickrey (1948 p 217) noted that "It is sometimes thought that discriminatory pricing offers a way out ... the defense of discriminatory rate-making is a familiar part of railroad and public utility literature: that discrimination can at times yield a better allocation of resources than can flat rates that must cover total costs appears to be a well-accepted doctrine. But it is something else again to show that discriminatory pricing can yield revenues covering all costs while producing as good an allocation of resources as a policy of uniform prices at marginal cost."

The question of how to finance public utilities operating at allocatively efficient marginal cost pricing remains, however, and here Vickrey (1987, pp 210-211) pointed to site rents and congestion charges. He noted the George-Hotelling-Vickrey (1977) "theorem of spatial economics which states that in a system of perfect competition among cities, the availability in the city of services and products subject to economies of scale, priced at their respective marginal social costs, will generate land rents just sufficient to supply the subsidies required to permit prices to be lowered to marginal cost. ... It is a corollary of this theorem that it would be to the advantage of the landlords in the area, *faute de mieux*, to agree collectively to pay a tax based on their land values, in order to subsidise the various utility services to enable the prices to be set closer to marginal social cost. They could expect in the long run that this action would increase their rents by as much or more than the taxes."

6.4 Pricing principles: second best solutions

At its most sophisticated, it is recognized by those designing a regulatory system that a price above short run marginal cost may have similar distorting impacts on economic welfare as a tax but this is counter-balanced by the argument that public funding through taxation also involves distortions (given the usual sorts of taxes employed). In any case, if the public sector would not invest at all (eg due to ratings agency problems) then it is better for the community to have infrastructure on a possibly inefficient user pays basis than not to have it at all.

It follows that once short run marginal cost pricing gives way as a policy goal to awarding a revenue cap, efficiency costs in the sense of deadweight losses are not a prime concern to regulators where prices exceed short run marginal cost but are below long run marginal cost.

In this second-best world we are in the domain of Ramsay pricing (charging what any particular market segment will bear). As Laffont and Tirole (2000, pp 63-65) point out, efficiency requires that any access deficit is at best made up by loading more of the deficit on the least elastic sectors. "To sum up , the overall picture is that each service should contribute toward the coverage of the firm's fixed cost in a way that minimizes the economic distortion. It would be absurd (on efficiency grounds) to charge high markups on those services for which consumers are not willing to pay much above marginal cost. Cost recovery should place a higher burden on those services with relatively inelastic demands. ... It is important to stress the "broad tax base" aspect of Ramsey-Boiteux pricing. All costs go to a 'common pool'; the resulting total cost is recovered through prices on all services. This statement implies that there may be a loose relationship between individual costs and prices; for example, a substantial part of the investment cost to provide a new service may be covered by consumers who do not benefit from this new service. There is thus no compartmentalization or earmarking of specific revenues to specific services."

In this second-best world, monopoly rents are only seen as arising to the infrastructure owner if prices produce a return in excess of a reasonable rate of return on the capital base as valued. Ramsey pricing is acceptable but is normally left to utilities to implement within a given revenue cap.

Note however that Ramsay pricing may produce a very different allocation of costs between classes of users than the traditional fixed or proportional markup on price seen in fully distributed cost schemes. This is, of course, why side constraints, such as non-discrimination rules, are often used by regulators to limit the extent to which Ramsey pricing may be applied (eg a utility owner is usually required to charge others on the same basis as he charges his own downstream affiliates).

But whether traditional fully distributed cost schemes or Ramsay pricing is employed, the amount of overhead costs or access deficit to be allocated will be heavily influenced by the valuation techniques used to determine the cost of capital used in supplying the infrastructure service. Capital costs tend to dominate the outcome of pricing decisions because they form the great bulk of infrastructure costs which have to be recovered from users.

6.5 Pricing principles: full cost recovery

The dominant paradigm of national competition policy pricing principles is *full cost recovery*. The PC (1999a, p 203) notes that the Competition Principles Agreement now requires designated businesses to ensure their prices take account of "full attribution of costs incurred in providing the goods or services".

While "full cost recovery" may sound reasonable enough, the phrase raises more than a few questions. What is cost? Actual or replacement cost? Incurred or notional costs? Recovery from whom - users or beneficiaries?

The answers to such questions are vitally important. From an industry viewpoint, NCP is meant to be about reducing costs for Australian exporters, including its export-orientated mineral industries, and increasing Australia's international competitiveness. It therefore comes as a shock to read that: "There is a widespread misconception that the NCP reforms are solely about reducing prices ... NCP reforms are aimed at more efficient pricing. In some situations, this can involve increases in user and consumer prices." (PC 1999a, p 245).

The significance of economically efficient marginal cost pricing versus full cost pricing to meet financial targets is brought out by the statement of Samuel (1998, p 8) that "it is important to note, however, that while prices should generally decline, in some cases the NCP [national competition policy] reforms could result in higher prices. .... the fundamental aim of NCP is not to reduce prices, but to promote more efficient use of resources. Prices which are too low can be just as detrimental in terms of providing incentives for people to use resources efficiently as prices that are too high."

Such statements in favour of "full cost recovery" pricing of infrastructure beg the question of what is a subsidy. Strictly speaking, any price above marginal cost is a tax, even if that price is below average cost. Thus a cost accountant may denounce as a "subsidy" a price which an economists would regard as already in excess of marginal cost - and thus a tax.

6.6 Pricing principles: the meaning of cross subsidies

The job of identifying a cross subsidy is not necessarily easy. It is not enough to show that the price being charged to a user is below average cost. So long as the user is meeting the marginal costs attributable to his use of the infrastructure there is no cross subsidy. No cross subsidy is involved where price is anywhere between short run marginal cost and full standalone cost: there is a wide "subsidy free" zone. For example, on any airline flight there will be different classes of passenger, some first-class or business class, standard economy, advance purchase economy, or standby or special corporate rate. All of these passengers will have paid different prices for their tickets but there is no cross subsidy between them since each will have covered their marginal cost (otherwise the airline would not let them on).

A further issue is that the measurement of cross subsidies on the basis of average cost is not only wrong in principle but the error would be compounded if the regulatory cost base on which cross subsidies are measured is inflated by inappropriate measurement or indexation.

Another point which needs to be recognised is that a subsidy is a negative tax. Just as the effective incidence of a tax is not the same as its legal incidence, so the effective incidence of a subsidy may not be the same as its nominal incidence. To take an example, suppose that a government were to provide roads and railways and water free of any charge to users in a given city. On the face of it, the subsidy would be given to actual users. But because new businesses or users are free to migrate to the city to take advantage of the subsidy, existing capital and labour in the city cannot permanently appropriate the benefit of the subsidy to secure permanent returns to themselves in the form of higher wages or profits than available to capital or labour elsewhere. Competition to locate in the city will mean that rents are driven up and the benefit of the subsidy will be reflected in, and captured by, land rents. Hence the analysis of a cross subsidy needs to identify the incidence assumptions behind its calculation.

6.7 Pricing principles: Ramsey pricing and price discrimination

In relation to the structure of regulated tariffs, regulators have several options. On the one hand, any form of price discrimination may be seen as unfair or inconsistent with normal market outcomes while on the other hand, Ramsey pricing (or charging what the market will bear) may be seen as the most efficient way to recoup fixed capital costs, if marginal cost pricing is ruled out.

From an efficiency point of view, Ramsey pricing does not necessarily make sense when one is talking about intermediate inputs to production. It is generally accepted that taxes on inputs to production (and that is what Ramsey pricing above marginal cost amounts to in the case of business customers of utilities) are inferior to general factor taxes or broad based taxes on *final* consumption. As Docwra and Kolsen (1993 p 114) point out, Ramsey pricing should only be applied to final goods and services, not producers' inputs. The Ramsey rule is irrelevant to intermediate goods eg you would not tax the coal used by a power station just because the power station had an inelastic demand - that demand is a derived demand from the demand for electricity which in turn is derived from demand for other goods and services.

Berg (1998b, p 74) notes that Ramsey pricing is another way of making users pay for fixed costs of infrastructure. The Ramsey approach "focuses on differential demand elasticities. Customers who have demands which are insensitive to price have few alternative sources of supply. Higher prices to these 'inelastic' demanders represent one way to obtain revenues that can be applied to shared resources (overhead costs)."

Ramsey pricing is simply a modern nomenclature for the old nineteenth century practice of "charging what the traffic will bear". It may be justified by the need to recoup fixed or common costs. The House of Representatives (Report, 1998, p 82) observed "...In practice, rail access pricing has tended to combine elements of both two part tariff and Ramsey pricing approaches. This reflects the fact that, for the most part, rail infrastructure owners in Australia have not been able to charge flat access rates that fully cover the costs of building and maintaining the track. Access charging has been effectively driven by what the market will bear for use of different segments of the interstate and intrastate rail networks." As Joy (1998, p 140) observes, if common costs "are not paid by one or more users or subsidised by government on the basis of external benefits, the facility may not be available. In practice, costs in excess of efficient costs are sometimes attempted to be recovered under the guise of Ramsey prices, which is no more than an attempt to tax a user to pay for the owner's inefficiencies." Ramsey pricing amounts to selective discriminatory taxation *of users alone* in order to fund the fixed costs of infrastructure, with varying "tax" markups above marginal cost.

The argument for Ramsey pricing is put as a necessary price to pay for infrastructure availability. As Joy notes (p 140, n 33) it often amounts to "'If you want to use the railway, you must take it as it comes, and pay to cover excessive costs while we improve it!' But if these costs can be recovered by a monopolist public-sector owner, there is little incentive for it ever to make the improvements towards efficient costs." In other words, if an infrastructure owner is able to enforce Ramsey pricing, how can the paying user enforce an obligation to invest?

But even in the short run, Ramsey pricing is essentially a second best solution and may be unsustainable. Attempts to "soak" inelastic demanders may in the long run drive industry, which is so soaked, away from the jurisdiction altogether. In the long run labour and capital are mobile. In the long run Ramsey pricing can only effectively be applied to an ultimately inelastic factor of production such as land.

Larkin and Dwyer (BCA 1995, pp 67-69) observe that " it is often suggested that there is nothing wrong with public utilities seeking to cover their fixed costs by charging above marginal cost on a price discriminatory basis following Ramsey pricing rules, ie charging what the market will bear and charging higher prices to those least able to moderate their demand. There are, however, significant objections to this approach. ... Ramsey pricing does not necessarily make sense when one is talking about intermediate inputs to production. It is generally accepted that taxes on inputs to production (and that is what Ramsey pricing above marginal cost amounts to in the case of business customers of utilities) are inferior to general factor taxes or broad based taxes on final consumption. Price discrimination represents a series of selective taxes on consumers and producers thought least likely to walk away from the utility's services. ... Government bodies cannot argue for Ramsey pricing above marginal cost for essential infrastructure while simultaneously arguing that selective indirect taxes on inputs to production are distorting. .... If, as several government bodies have argued, it is desirable to remove indirect taxes on production such as the petrol excise and replace them with a broad based consumption tax, then it is not desirable to impose Ramsey prices above marginal cost upon major industrial users of essential services. .... Nor is it consistent to adopt a pricing theory for infrastructure of increasing scarcity pricing which means that infrastructure provision is being increasingly and semi-permanently rationed. ..."

6.8 Pricing principles: mark-up pricing

Some economists have argued for variations of marginal cost pricing so that a mark-up is applied to recover the fixed costs of infrastructure. Sometimes it has been suggested that long run marginal cost, rather than short run marginal cost is the appropriate test for economically efficient pricing. But economists such as Vickrey (1987, p 198) have pointed out that, if the size of investment is optimal, long run marginal cost will be the same as short run marginal cost. Eminent economists have continued to argue for public subsidies to meet the fixed costs of infrastructure, leaving users to bear only their marginal costs. But this has to be weighed up against the marginal cost of public funds.

A mark-up on the marginal cost price is essentially a form of taxation and almost all taxation has distortionary effects. The resulting changes in prices allowed when different regulatory formulae are applied may therefore be considerable.

6.9 Pricing principles: two-part tariffs

In addition to Ramsay pricing as a "second best", economists have often argued in favour of two-part or multi-part tariffs as another "second best" means of ensuring that capital cost servicing requirements are met by total regulated revenue while marginal cost of usage remains low. At its simplest, a customer pays a flat fee for connection to the network and a separate fee every time he uses the network. Ideally, the access charges cover the fixed costs of the network while the usage charges only reflect the marginal costs of usage. It is commonly argued that in order to avoid discouraging use of a network once the required capacity is in place, users should be charged a flat connection fee which covers the fixed costs of the network and then be charged marginal cost only on the volume of water, gas, electricity etc supplied over the network.

Thus the ACCC (1998a, p xvii), commenting on work by Berg, states " the essential issue is determining the appropriate method of dealing with pricing in the presence of high fixed costs and relatively low incremental costs, as is the norm in network industries. As a result, efficient pricing must involve an efficient allocation of fixed joint costs throughout their price structure. ... The challenge for managers and regulators is to devise rate structures that can efficiently address the recovery of joint costs in a competitive environment." However, an access charge imposed on users is only a *quasi* lump sum charge and does not have the efficiency advantages of a truly unavoidable lump sum charge. High access charges may mean industries simply do not locate in the area or get connected.

Two-part pricing would be efficient if the access charge never deters anyone from connecting to the network. Another problem is that if the user is producing intermediate goods or services the fixed charge component enters into his pricing structure as part of his cost of production. What was the fixed charge at one level becomes a variable cost (or quasi-tax) at another level (just as a poll tax on workers is not a true lump sum tax because it feeds into wage levels). Thus there are efficiency losses from two-part or Ramsey pricing when it is applied to producers of intermediate goods - the fixed part becomes variable downstream

Another point which might be made is that two-part or multipart pricing is a version of Ramsey pricing. Rather than discriminating between customers to place the heaviest charge on the least elastic, the service is broken into two or more parts and most of the required revenue recouped from the less elastic connection decision. It is possible to practise both at the same time, with different classes of customer being charged different access prices and different usage prices.

6.10 Pricing principles: cost recovery - long run incremental cost

In relation to infrastructure charges, ACCC (1998a, p xix) argues that "economic-cost approaches, using the more relevant TSLRIC (Total Service Long Run Incremental Cost), are the most popular. This approach involves an application of the marginal cost pricing principles advocated by Berg. More specifically, the method prices services at marginal cost, and raises the fixed costs by a fixed contribution. Demand-based prices comprise the third approach to interconnection prices." Unfortunately, this is not quite accurate. Fixed contributions are not really fixed if levied on users. Users can close down their factories and leave. Further, levying fixed charges to pay for long run cost is a form of replacement cost charging, usually a form of DORC.

A key problem of cost recovery through user charges levied by private owners of infrastructure is that access charges may create economic distortions. As ACCC (1998a, p xxi) observes "too high an access charge may encourage 'uneconomic' duplication and too low may lead to under-investment. ... access prices are constructed so as to provide a return on the provider's investment. The required rate of return for a company is the market-determined rate of return required by investors to provide capital to the company."

6.11 Pricing principles: the "efficient components pricing rule" (ECPR)

Prevention of the abuse of monopoly positions concentrates both on access and price. Mandated access is required to prevent the creation of upstream or downstream monopolies by the infrastructure owner. Price regulation is aimed at preventing profiteering and forcing monopolists to share productivity gains with consumers.

King and Maddock (1996, p 31) observe that competition through access may produce no efficiency gains if the infrastructure monopolist is able to set access charges high enough to continue enjoying monopoly rents. If interconnection pricing is set on the basis that utility providers are entitled to build in monopoly profits, then the ability of consumers and producers to obtain access to infrastructure at efficient marginal cost pricing is obviously prejudiced. In this regard Laffont and Tirole (2000, pp 166-167) note that the so-called "efficient components pricing rule" put forward by Baumol and Willig has been strongly criticized both in the USA and UK as preserving monopoly rents.

The failure to pursue first best short run marginal cost pricing as a policy objective in favour of an emphasis in competition policy on access regimes may prove, in retrospect, to have been a serious policy error. King and Maddock (1996, pp 90-92, 101) point out that "vertical separation can result in higher prices and lower sales then an integrated monopoly ... In addition, vertical separation may lead to contracting inefficiencies ... Separation can thus be costly and not very efficient ... This result is very disappointing for the Australian reform process. The objective of that process is to let other firms into downstream markets previously dominated by integrated monopolies in the expectation that this would lead to considerable social welfare gains. It is now clear that neither vertical separation nor downstream competition will necessarily produce any social advantage.... The key point is that the regime established by the Competition Policy Reform Act creates large incentives for integrated monopoly pricing. Rather than setting a regime that establishes pricing at short-run marginal cost as the preferred outcome, the Act sets integrated monopoly as a base case." In effect the criticism is that the access regime does not go far enough in pursuing economic efficiency and has left too much in the way of monopoly rents.

A devastating comment on the kind of "light handed" regulation which allows ECPR is the observation by telecommunications consultant, Paul Budde, (AAP, 10 November, 1999) that Telecom New Zealand retained 99 per cent of the local call market and that without support its rivals had no chance of using the existing telecommunications network to supply customers.

6.12 Pricing principles: Scarcity/congestion pricing

Where there is scarcity of supply or congestion in the use of infrastructure, economic efficiency in static allocative efficiency terms demands that prices should be allowed to rise in order to balance supply and demand and allocate the resource to its highest valued uses. The cost that becomes relevant is the opportunity cost set between the demands of alternative users of the facility rather than its original cost of construction. To the extent that peak load or congestion pricing results in a regulated revenue stream which does not generate supernormal profits for the infrastructure provider it may be regarded as unexceptionable.

Yet this is not the whole story. Scarcity or congestion may also be a sign that new investment is warranted on cost benefit grounds. Hence, while higher prices may be justified on allocative efficiency grounds, it does not follow that they should necessarily flow to the utility owner without an obligation to extend the infrastructure. For example, Vickrey (1987) has argued that congestion prices or scarcity rents might be required to be paid into escrow funds which could be used to expand infrastructure capacity for users. Scarcity rents are not necessary today to call into existence the already-built infrastructure and the prospect of reaping scarcity rents in the future may act as a perverse incentive for infrastructure owners *not* to invest in additional capacity. The ACCC (1998a, p xxii) notes that an infrastructure providing firm "has no incentive to reduce congestion, as the benefits are largely appropriated by the users, whilst it bears the cost of investment." Persistent congestion is a sign that the benefit cost ratio is likely to be favourable to new investment, which *should* be undertaken but will be deferred till congestion is so chronic that user charges will bear on an expanded customer base. Thus static allocative efficiency may be the enemy of dynamic efficiency and economic growth.

There is a competitive markets analogy to this in the cycle of mine investment. Often large capital investments in mines do not cover their full costs: whatever the hopes and expectations, mine owners will produce so long as net returns cover marginal costs. Over the life of the mine, however, it is hoped that periods of scarcity and high prices will generate quasi-rents sufficient to cover the fixed capital costs. Unlike natural monopoly owners, however, mine owners cannot prevent new investment coming on line to compete away persistent quasi-rents on investment.

6.13 Externalities including required public sector contributions (fiscal externalities)

The ACCC (1998, p xviii) argues that the recovery of joint and common infrastructure costs and community service obligations "in the likely absence of direct subsidies, *must* be made through the access charge. It is important that the regulators allow a mark-up over Total Service Long Run Incremental Cost (TSLRIC) so as to provide adequate incentive for the firm to pursue investment in scale and scope economies. ... the irreversibility of the investment is not fully recognised in its risk assessment, and therefore its estimated required rate-of-return." This is incorrect.

The Issues Paper has, quite unjustifiably, ignored the extremely important issue of externalities generated by network infrastructure. Historically, governments provided network infrastructure because it had spillover benefits for the whole economy over and above any return to private investors and these benefits justified such investments even when they would not have been commercially viable.

Economists would argue that if the total benefits from an infrastructure project exceed its total costs, then the infrastructure should be provided - whether or not user charges will meet its cost. The problem is that in many cases the infrastructure provider is unable to recoup all the benefits. The builder of a railway line, such as a Very Fast Train link between Sydney and Canberra, is unable to negotiate with and pay or charge the thousands of landholders who may be adversely or favourably affected by the provision of this infrastructure.

However, some modern views suggest that infrastructure should not be provided where it cannot pay its way through user charges alone. Joy (1998, p 133) argues that efficient railway infrastructure pricing is complicated in practice by "failure to price excess capacity optimally in the short run ... and *to eliminate the capacity in the long run* ... Where excess capacity exists, it is best to use it until the underlying assets expire, provided that all other costs are recovered.". These comments are predicated on the idea of cost recovery through user charges only, with no regard to external benefits. Capacity is assumed to be excess if short run marginal cost is less than long run marginal cost.

The problem of future infrastructure investment becomes acute where it is expected to be provided by a regulated private utility. The Commonwealth Treasury (1999, p 69) correctly warns that "Significant elements of many utility industries exhibit natural monopoly characteristics such that unregulated producers may have substantial potential to exploit market power and raise prices. Consequently, a case may be made for government involvement to protect the interests of consumers and to ensure that higher levels of output growth are achieved."

It is not only immediate users who benefit from the creation or continued existence of infrastructure. A new highway raises the value of adjacent land, sewered blocks sell for more than unsewered, town water is a plus for land values and proximity to mobile phones is a plus for business. These benefits of infrastructure are often reflected or captured in the form of location rents of land. With projects such as the Very Fast Train, the question of whether there should be mechanisms for recouping external benefits from non-user third parties needs to be raised (as was done with financing the Sydney Harbour Bridge).

The requirement that all new infrastructure not be "subsidised" by government is inconsistent with orthodox economic theory which requires that projects be undertaken if all benefits exceed all costs, including both private and social costs and benefits. Governments *should* "subsidise" infrastructure if there are compensating external benefits that the private sector cannot capture, including external benefits to government as a tax collector. Governments can internalize benefits through taxation in a way which private providers of infrastructure cannot.

In particular, the issue of fiscal externalities needs to be raised. By increasing the productivity of other industries, network infrastructure investment often generates revenues for treasuries from the increased output of downstream industries. It is not correct to implicitly assume that, without cost/benefit justified infrastructure investment, there would either be full employment or full employment of factors of production at equally high levels of return. The question of whether governments or other beneficiaries should contribute to infrastructure investment in order to reduce access costs and maximise economic growth and revenue to treasuries needs to be examined.

To the extent that external beneficiaries including treasuries contribute to the capital costs of infrastructure the cost base for setting access charges can be reduced. If access charges are reduced closer to marginal cost, there are efficiency gains as more use is made of the facility.

Recommendation 6 A National Access Regime must include Pricing Principles

A National Access Regime should seek to achieve allocative efficiency. However, pricing principles must address the real world need for infrastructure owners to operate at a profit.

Recommendation 7 Pricing Principles should Allow Returns on Reasonable Actual Investment Only

First best pricing of infrastructure would dictate pricing at short run marginal cost. However were capital costs need to be serviced, infrastructure owners should be entitled to a return on reasonable actual investment.

Nonetheless, where capital costs have already been written off or where there are external beneficiaries from infrastructure who can contribute towards the cost, short run marginal cost pricing remains the ideal.

7 Deterring Investment

Regulatory access regimes may also become an obstacle to future infrastructure provision as infrastructure stint investment to capture scarcity or congestion rents. As King and Maddock (1996, pp 106, 118) note "The potential for distorted investment incentives is a major risk with the reforms that have evolved from the Hilmer Report. Investment in new facilities may be curtailed. The threat of declaration and the requirement to provide access adds an extra risk to infrastructure projects making them less attractive to investors. Equally important, the owners of current infrastructure facilities may perceive benefits from either artificially constraining or expanding the capacity of their facilities.... In the absence of other regulatory mechanisms, it is likely that the access regime established by the Competition Policy Reform Act will result in the development of natural monopoly facilities that are too small. Negotiation, and even the determination process, are unlikely to create incentives for facility owners to expand capacity of their facilities to an economically efficient level. ... any pricing regimes that promote static efficiency for the existing network, and pass congestion rents to the facility owner, will tend to encourage under investment."

The negative effects of National Competition Policy on new investment are highlighted by the concerns of the South Australian and Northern Territory governments that an access regime might discourage private investment in the proposed Adelaide to Darwin railway. They argued that "For the private sector to commit to the project, a measure of certainty is required in terms of the use of the facility in order to protect the investment ... Potential investors in these infrastructure projects are likely to be discouraged by the fact that they are subject to a complex and uncertain access regime ...", see PC (1999, pp 237-238).

Gans and Williams (1999) have suggested that adverse impacts of access regimes on the timing of new investment might be ameliorated if the regulator sets out clear pricing principles for access which ensure that the infrastructure provider can appropriate a greater share of the rents created by his activity. They point out that (1999, p 137) "any effective regulation, to the extent that it improves the prospects for competitive outcomes, necessarily reduces overall rents that can be appropriated by a private investor – distributing them either to consumers or other firms. Thus, regulators face a dilemma: in order to assure socially efficient usage of natural monopoly infrastructure – ie competitive downstream pricing – they must necessarily reduce overall rents that can be appropriated by investors. Hence, regulators trade off competition with timely investment in much the same way as patent policy necessarily encourages inefficient use of an investment in the hope of raising the returns to private research and development." Thus potential infrastructure providers may be induced to invest by being the "first to claim the prize" of monopoly rents allowed by an understanding regulator, see also Treasury (1999, p 69).

One argument for DORC and other forms of replacement cost valuation is based on the threat of "regulatory taking." For example, the Treasury (1999, p 69) argues "However, there is a counterpart to this demand for regulation. Utility industries are capital intensive and their assets are durable, long-lived and immovable. Demands for access and 'fair' or 'non-exploitative' prices mean that investors might expect that after they have sunk their capital they would be limited in the prices they can charge and be subjected to possibly onerous obligations to supply. Therefore, the incentive to invest depends critically on expectations of the future pricing policy and must be considered by the regulator."

However, the incentive to invest depends on *ex ante* returns. DORC is not necessary to maintain the incentive to invest. Opportunistic "regulatory taking" is equally prevented by DAC. A consistent application of DAC over time is sufficient to ensure that investors are protected: after all DAC protects them against the obsolesence or losses of capital value faced by investors in other industries exposed to competition.

The argument appears open to the interpretation that existing consumers should allow themselves to be charged above efficient marginal cost pricing or perhaps even above average cost pricing in order that they can be assured that infrastructure will continue to be provided. Such a view appears to assume that future investment *will* be undertaken by the regulated utility. But it does not follow that super-normal monopoly rents should be granted *today* so that a utility *might* invest tomorrow. We would reject any suggestion that regulation on pricing should be "light handed" in order to encourage new investment: that seems to amount to an argument that users are not entitled to fair and efficient pricing of existing infrastructure for fear that no infrastructure will exist later.

We strongly question any implicit economic reasoning (which appears to be condoned by the Commission) which suggests that the extraction of monopoly rents may be a necessary quid pro quo in order to induce infrastructure investment. In relation to arguments of this kind, it may be seen as an unpalatable choice to be told that infrastructure investment will only be forthcoming on the basis that users agree to a form of economic coercion – the sort of monopoly pricing which regulation is imagined to prevent. It is not established that there is an inherent conflict between static and dynamic efficiency or that monopoly pricing is necessary to induce investment in infrastructure. This is like arguing that Christopher Columbus needed to be rewarded for the discovery of America by being given ownership of it in perpetuity. When a monopoly is offered as a prize in a "once only" competitive race, the outcome is likely to be inefficient as the winner has no reason to exploit his victory by extracting monopoly rents from users. One needs to consider *ex ante* versus *ex post* decision-making, together with the related concepts of "regulatory taking" and capital cost recovery.

The regulatory codes quite naturally require regulators to have a regard to the incentive to invest in, for example, gas networks. The incentive to invest depends on *ex ante* rates of return. Strictly speaking there is no need to pay a return to, or index the capital returns to, sunk capital as though it were free to get out of the ground and go elsewhere. That is not to say that a regulator should opportunistically strip investors of any returns on sunk capital, since future investment would be prejudiced if the expected *ex ante* returns were seen to be retrospectively expropriated *ex post*.

But incentives to invest are not affected if the regulator awards no return on capital where that capital has been recouped by depreciation allowances and does not allow multiple recovery of costs through asset revaluations. The use of replacement cost-based depreciation takes into account a notional and unrealised cost to investors, without equally bringing to account, as a cost offset or gain, the corresponding holding gains on existing assets

So long as the utility is allowed a hurdle rate of return on its actual costs (as opposed to notional, revalued or inflated costs), there should be no deterring of investment and investment has increased during coverage of access regimes.

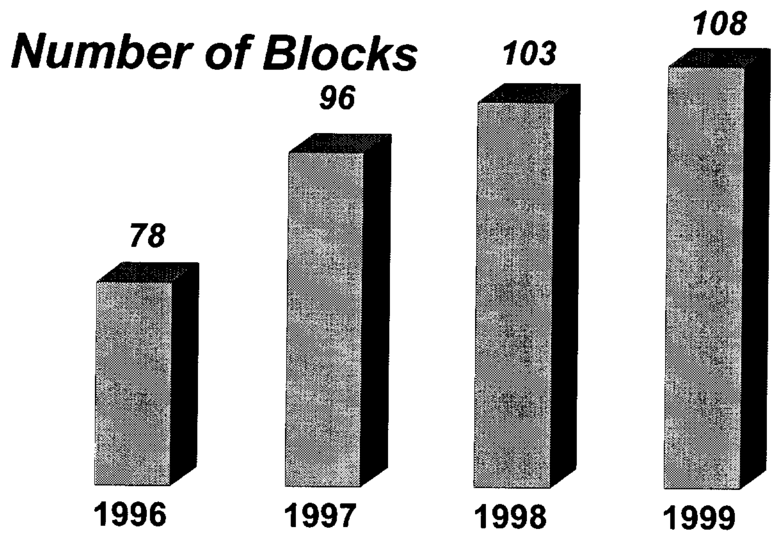
Case Study 3 Increasing Upstream Competition

One of the objectives of regulating access to natural gas pipelines is to provide a competitive upstream gas supply market. Regulated access at fair and reasonable prices facilitates upstream competition by:

Providing access to markets, independent of the incumbent gas supplier thus the incumbent supplier, who may be seeking to protect a related gas transmission business, or gas production business, cannot control access to the market.
Providing access at fair and reasonable prices, thus providing some certainty over the costs of delivering product (gas) to the market. This assists the assessment of the economics of exploration.

The upstream development process involves a number of sequential steps - acreage acquisition, seismic, interpretation, exploration and appraisal drilling, marketing and development - with a cycle time of typically 5 years. The Gas Pipelines Access Code was adopted by CoAG in November 1997, and progressively legislated over the past three years. It is therefore premature to draw any firm conclusions on the success or otherwise of regulated access in facilitating upstream competition. However, there are some leading indicators of enhanced activity. The diagram below shows the number of upstream concessions held in Victoria (onshore and offshore) by companies other than BHP or ExxonMobil. These show a significant increase over a period when oil prices were flat or declining.

Upstream Concession Victoria 1996 - 1999 (Excluding Esso and BHP)



Source: Encom Technology

There has also been increased activity on a number of potential gas field developments in or adjacent to Victoria, including Kipper, Patricia/Baleen, Sale and Yolla.

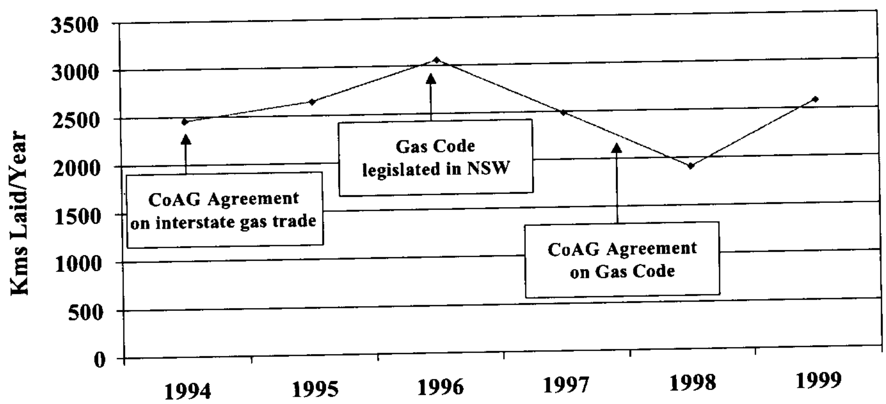
It is too early for policy makers to declare success in this area, but the early signs are encouraging.

As demonstrated in the case study below the evidence does not suggest that the access has been a deterrent to investment in gas pipelines.

Case Study 4 Impact of Access on Pipeline Investment

The natural gas pipeline access code (the Code) was substantially completed by 1996, and NSW passed legislation in 1996 to apply the then draft Code. This enabled access to proceed in this State without delay while the Code was finalised. CoAG agreed to adopt the Code in November 1997. Thus the policy environment for new pipelines (transmission and distribution) investment has been known for some 3-4 years. BHP has seen no evidence that investment in pipelines is being deterred by the Code. This is borne out by the statistics shown below:

New Gas Pipelines in Australia



Source: AGA

Indeed, there is some new pipeline investment that is directly attributable to the introduction of access. BHP developed the Eastern Gas Pipeline project on the basis that access would be available to the existing NSW gas distribution system. The pipeline would not have been built without access. Thus the Eastern Gas Pipeline is a $450 m project that has been directly facilitated the Code.

The fact that access has had no negative impact on pipeline investment in Australia should be no surprise. This is consistent with experience in the USA and in Canada, where pipeline investment has thrived notwithstanding in a more rigorous and onerous regulatory environment.

In the downstream sector, open access has encouraged a large number of new entrants into the market. New retailers have been created and established brands have been re-imaged to compete in the retail market. Competition has resulted in price reductions, as each segment of the market has become contestable.

Case Study 5 Open Access is Increasing Customer Choice and Changing the Market

The outcome of regulated access to monopoly energy infrastructure has led very significant changes in energy retailing and the structure of the market. For example, there are 23 licenced retailers of electricity in NSW and ten in South Australia. Large energy consumers now have the opportunity to decide what level of service they require to most efficiently run their business and shop around for the most competitive price.

In the small business and domestic sectors of the market, a number of companies such as AGL and Pulse Energy are moving to become multi-product suppliers and drive efficiency and hence price reductions through becoming a households or business single point of contact.

These changes in the structure of the utilities market must over time lead to increased competitiveness and consumer welfare.

Recommendation 8 A National Access Regime must not distort the principle of open access nor condone capture of monopoly rents in the name of encouraging investment

The National Access Regime must not condone the extraction of monopoly rents as a necessary quid pro quo in order to induce infrastructure investment.

8 Effective and Efficient Regulation

8.1 The Purpose of Regulation

If the purpose of the National Access Regime is, as argued in Section 3 above, to enhance the international competitiveness of those sections of the Australian economy that rely on infrastructure, the goal of the regulator is to ensure that the Access Regime is both effective and efficient.

The regulator has a greater responsibility than simply deciding between the competing interests between the infrastructure owner and the other interested parties making submissions in response to an access arrangement. The regulator has a duty to be informed about the issues and an obligation to ensure that he or she is fully informed of the circumstances governing a particular arrangement.

The Office of Gas and Electricity Markets in the UK understands this broader responsibility (http://www.ofgas.gov.uk/about/responsibilities.htm 13 December 2000).

> *"Our main tasks are to:*
>
> - *Promote competition in all parts of the gas and electricity industries by creating the conditions which allow companies to compete fairly and which enable customers to make an informed choice between suppliers;*
> - *Regulate areas of the gas and electricity industries where competition is not effective by setting price controls and standards to ensure customers get value for money and a reliable service."*

8.2 Regulation must be Effective

There has been debate over the desirability of "light handed" or "incentive' regulation versus "heavy handed" cost of service regulation.

Berg (1998a, p 38) observes several possible approaches to price regulation of utilities. In particular, he notes "Cost-of-service regulation (including return on rate base regulation) provides an opportunity to cover costs. It also provides companies with an incentive to over/under invest in plant, inflate costs, and cross-subsidise. ... Price cap regulation provides companies with incentives to cut costs. ...[but] service quality and infrastructure development may suffer. However, incentives to over-invest in capital and to cross-subsidise are less than with cost of service regulation."

Berg (1998a, p 40) also notes that "Traditional cost-based regulation in the U.S. involved a bottom-up approach: costs were aggregated and service prices reflected the results of complex (and arbitrary) cost allocations." Both forms of regulation have problems. Depending on what costs are allowed in working out the rate of return on investment, a