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by

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Abstract

In the recent past, local governments in Australia have placed increasing reliance on developer charges as a means of financing urban infrastructure, especially in New South Wales (NSW). Water and sewerage provision represent an important case study of developer charges policy in NSW. This paper examines the water and sewerage infrastructure reform proposals put forward by the NSW Independent Pricing and Regulatory Authority (IPART), and then assesses these IPART proposals from an economic efficiency perspective.

Key Words: urban infrastructure finance; developer charges; user charges; local government; water and sewerage; development servicing plans; New South Wales IPART

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Despite decades of relative neglect by policy analysts, there is at last a rekindling of interest in the question of infrastructure.[1] Given the magnitudes involved, this is hardly surprising. For instance, Swan *et al*. have observed that infrastructure in Australia '… makes up 46 per cent of all public sector investment, 7 per cent of all private sector investment and 25 per cent of total investment.[2] At the same time, it makes up about 6.4 per cent of the Australian workforce'. A significant proportion of this investment is devoted to the provision of water and sewerage.

In the recent past, local authorities have placed increasing reliance on developer charges as a method of financing infrastructure, particularly in New South Wales (NSW). This is especially true of water and sewerage. For example, in 1995-96, water and sewerage accounted for 23 per cent of revenue from developer charges in NSW, exceeded only (and marginally) by roads (24 per cent) and open space contributions (26 per cent).[3] There is thus an urgent need to evaluate both existing practice in water and sewerage developer charges policy in NSW and proposed reforms to existing practice. This latter issue forms the subject matter of the present paper.

The paper itself is divided into three main parts. Section 1 focuses on the reform proposals advocated by the NSW Independent Pricing and Regulatory Tribunal (IPART) and Section 2 is devoted to an evaluation of these reform proposals from an economic efficiency perspective. The paper ends with some brief concluding remarks in Section 3.

1. PROPOSALS FOR REFORM OF CHARGING PRACTICE IN NEW SOUTH WALES

1.1 Institutional background

Under the NSW *Independent Pricing and Regulatory Tribunal Act 1992*, IPART is empowered to either determine maximum prices, or a methodology for setting maximum

prices, for specified government monopoly services in NSW. The Tribunal determines maximum prices for water for the four metropolitan water agencies (Sydney Water Corporation, Hunter Water Corporation, Gosford City Council and Wyong City Council). In the case of developer charges levied by these four agencies, the Tribunal has chosen to determine a methodology for fixing maximum 'prices' (charges). This has been done because determining a methodology rather than an actual charge enables charges to reflect the differing costs of servicing developments in different areas.[4]

The institutional processes to devise a methodology for developer charges began in 1993 with the establishment of a Working Party on Developer Charges. The Working Party published *Developer Charges in the New South Wales Water Industry* in September 1994, which reflected their considerations. In June 1995 the Tribunal set up a further body, the Water Industry Forum on Developer Charges, to advise on the practical implementation issues of using the methods suggested by the Working Party. [5]

A firm set of principles and procedures was finally handed down in December 1995 in *Determination No. 9 - Sydney Water Corporation, Prices for Developer Charges for Water, Sewerage and Drainage Services*. Similar determinations were given to the HWC, Gosford City Council and Wyong City Council in 1996. A primary requirement of implementing the new methodology is the preparation of formal Development Servicing Plans by each agency. [6]

For non-metropolitan NSW local water authorities, IPART was requested to examine the feasibility of establishing a set of principles for the pricing of water which, if adopted, would standardise the pricing practices of these authorities.[7] A report on pricing principles was presented to the Premier in September 1996. This report contained recommendations regarding developer charges. In particular, the report recommended that local councils use an approach similar to that being considered for metropolitan authorities. A working party comprising representatives of the NSW Department of Land and Water Conservation (DLWC) and representatives of local government was established to facilitate implementation of IPART's recommendations.[8]

1.2 A description of IPART's proposed principles and procedures

The main objectives of the new methodology proposed for NSW by IPART have been set out by Warner as follows:

> [D]eveloper charges should:
> - involve full net cost recovery from the beneficiary;
> - reflect variations in the cost of servicing different development areas;
> - avoid 'double dipping' or charging new entrants twice;
> - cover infrastructure expenditures which can be clearly linked to the development in question and are able to be reliably forecast;
> - include ancillary costs;
> - be applied to existing and fringe areas alike;
> - be calculated in a clear and transparent manner so that developers can understand and assess the calculated charges.[9]

Some of the key principles and procedures to be followed in the implementation of the methodology are described below.[10]

1. Only efficient costs to be recovered.

   Developers are to be charged only for the technically efficient cost of supplying water and sewerage services. If there is reason to believe that technologies are not efficient, an adjustment must be made.

2. Demand management and water conservation assumptions.

   IPART's guidelines require that projections of demand for water per household (or wastewater discharge per household) should take into account the demand management objectives of the water authorities.[11] Where developments incorporate features which reduce demands on water, sewerage and drainage infrastructure, developer charges should be reduced accordingly. Examples of such features are the design of on-site systems, the inclusion of development or special building covenants, etc.[12]

3. Development servicing plans.

   Water authorities levying charges are to prepare 'Development Servicing Plans' (DSPs) for each catchment or geographic area in their jurisdiction. DSPs are to include, among other things, the following information:

- a summary of the contents of the DSP;
- relevant land use planning information;
- extent of the catchment/supply zone;
- extent of services required to be staged over the anticipated development period;
- estimates of future capital and operating costs;
- standards of service that will be provided and design parameters;
- estimates of lot and dwelling production including demographic assumptions;
- the calculated developer charge and how it is projected to move through time;
- a reference to other relevant DSPs.[13]

The DSPs and the models used in calculating developer charges are to be made available to the development industry and the community generally.

4. Calculation of charges to use the Net Present Value approach.

An essential requirement of the guidelines is that future streams of revenues and costs be compared using net present value (NPV) techniques. Further details on procedures are provided below under 'Method of Calculation of Charges'.

5. Choice of discount rate.

The Tribunal recommends that the appropriate discount rate to use in the NPV calculations in respect of assets which have yet to be built is nine per cent. For assets which have already been built but have not yet reached full capacity, the Tribunal recommends use of a discount rate of three per cent. In explaining this difference in the recommended discount rates, it is argued that the lower rate of three per cent 'reflects that these investments are sunk'. [14]

6. Identification of relevant assets.

IPART guidelines state that water authorities may obtain contributions for 'providing, extending or augmenting services which the developments will, or are likely to, require'. [15] The DSPs are to demonstrate the nexus between the development and the assets required to service the development. The use of the word 'providing' conveys the intention that existing assets (that is, those 'already in the ground', and which contain excess capacity to serve the developments) are to be included in the charge.

There are three exceptions to this rule in the guidelines. Observing that a change in land use may mean some existing assets will have far greater service capacity than will ever be used, it is then specified that an asset is to be excluded if:

- its capacity is unlikely to be fully utilised over its planning horizon;
- the service capacity was created before 1970;
- the service capacity was made available by changes in land use.[16]

Where assets are to be shared between different development sites, or between existing users and new development, they are to be apportioned between users. The apportionment should be based on each group's expected utilisation of capacity.

7. Valuation of assets.

Assets are to be valued at replacement cost. The replacement value should reflect the costs of continuing the existing service with a 'modern equivalent asset' (MEA method). The Tribunal argued that current costs should be used in order 'to better signal the true costs of the services provided'.[17]

8. Inclusion of holding costs.

The IPART method of calculation proposes that the interest costs of funds used to finance an asset (and the interest foregone if equity finance is used) be treated as a cost of the project.

9. The method of calculation of charges.

There are two stages in the method of calculation of charges proposed by IPART. The first stage is the calculation of 'the capital charge'. It is perhaps best demonstrated using a hypothetical example.

The following simple example is adapted from the IPART workshop on developer charges.[18] The assumptions of the example are set out in Table 1. The development for which a charge is being calculated is of size 250 ET. (An ET or 'equivalent tenement' unit is the average demand for the service from a single dwelling on one allotment. Medium density houses or flats and non-residential dwellings are then

expressed as proportions of multiples of this standard unit.) The infrastructure assets which will serve the development, as well as continuing to serve existing users, are listed in Table 1. The discount rate is assumed to be three per cent. The age of the asset is included in Table 1 to indicate that 'period to full capacity', one of the key parameters of the calculation, is not years from 1997, but years since the asset was constructed. For example, the dam has been in operation 19 years and has 21 years of use left, but the figure which is relevant to the calculation of a charge is the expected total period to full capacity of 40 years.

Another point of possible confusion concerns the concept of the 'yearly asset take-up rate' compared to the development site-take up rate. The development site take-up rate is assumed to be constant at 50 ET per year. The asset take-up rate is different from this because these assets are shared with other users who will also take up ETs per year. The way to calculate the yearly asset take-up rate for any asset is to divide the full capacity of the asset by the period to full capacity. For example, the annual asset take-up rate of the first sub-main is $\frac{5\,000}{17}$ = 294.1 ET per year.

Table 1.
Assumptions of Hypothetical Example to Demonstrate IPART Calculation Methodology.

Development size: 250 ET

Development take-up rate:

Year	ETs	ETs to date
1996	50	50
1997	50	100
1998	50	150
1999	50	200
2000	50	250

Discount rate: 3 per cent.

Assets:

Nature of asset	Value of asset ($)	Period to full capacity (years)	Full capacity (ETs)	Age of asset as at 1997 (years)
Sub-main	1 000 000	17	5 000	2
Pump station	2 000 000	14	7 000	10
Pump station	2 000 000	23	10 000	8
Carrier main	2 500 000	14	7 000	10
Rising main	2 500 000	37	20 000	22
STP	40 000 000	14	30 000	10
Reservoir	7 000 000	15	20 000	0
Mains	10 000 000	25	20 000	10
Dam	60 000 000	40	400 000	19

Operating costs and revenues:
Income per lot ($) 250
Operating costs per lot ($) 175

Source: Hypothetical data adapted from IPART.[19]

There are two mathematically equivalent ways of calculating the capital charge. Because annual asset take-up rates are assumed constant, the first formula is:

$$\text{Capital charge per ET (X)} = \frac{\text{Capital annuity}}{\text{Asset ET take} - \text{up rate}} \qquad (1)$$

where the 'capital annuity' is given by the annuity formula:

$$\text{Capital annuity} = \frac{Vi}{1-(1+i)^{-t}} \qquad (2)$$

where

V = asset value;

i = discount rate;

t = period to full capacity.

For example, the capital charge for the first sub-main (X^1), where V = \$1 000 000, i = 0.03, t = 17 and the annual asset take-up rate = 294.1 is:

$$X^1 = \frac{\$1\,000\,000 \times (.03)}{1-(1+.03)^{-17}} \div 291.4 = \$258 \text{ per ET}$$

Secondly, when take-up rates are not constant, a more generalised formula can be used to produce the same result. This formula can be explained thus: let n be the number of ET taken up in year j where j = 1,2,3,...,J, for the period to full capacity, J years (e.g. J = 17 for the first sub-main); we know that the developer charge (X) for any particular asset, such as the first sub-main is to be a constant dollar amount each year (X^1), then in order to recover the present worth of the value of the sub-main asset, V, over the full period:

$$V = \frac{n_1 X^1}{(1+i)^1} + \frac{n_2 X^1}{(1+i)^2} + \frac{n_3 X^1}{(1+i)^3} \cdots \frac{n_J X^1}{(1+i)^J} \qquad (3)$$

which can be rearranged to give the generalised formula:

$$X^1\left(\frac{\$}{ET}\right) = \frac{V}{\frac{n_1}{(1+i)^1} + \frac{n_2}{(1+i)^2} \cdots \frac{n_J}{(1+i)^J}} \qquad (4)$$

Since asset value, V, is the present worth of the asset, and n is the number of ETs or 'output' O, in a year it will be noted that equation (4) reduces to:

$$X^1 = \frac{PW(V)}{PW(O)} \qquad (5)$$

Equation (5) is precisely the same as the formula for marginal capacity cost (MCC); that is,

$$MCC = \frac{PW(I)}{PW(O)} \text{ with } I = V. \qquad (6)$$

Since the asset ET take-up rate is assumed constant, equation (1) can be used to calculate the capital charge for each asset in this example. However, equation (4) will calculate the same charge. For example, with V = $1 000 000, n = 294.1 ET per year and J = 17, equation (4) also calculates a capital charge of $258 per ET for the first sub-main in Table 2.

The capital charge for the other assets in Table 1 is shown in Table 2. Table 2 shows that the total charge per ET for all assets serving the development site is $4530.

The second stage in the IPART calculation after the calculation of the capital charge is the calculation of what is termed a 'reduction amount'. The reduction amount is the amount by which the capital charge is reduced. It is intended to reflect the fact that any net operating surplus the agency makes in any year (that is, any surplus of income over operating costs) will be applied as a reduction against the total capacity costs. The reduction amount therefore attempts to estimate the present worth of the contribution to capital from recurrent income which will be made over the next 30 years and then reduces the developer charge by this amount. The aim of the procedure is to avoid double dipping. Table 3 illustrates the calculation of the reduction amount.

Table 2.

Capital Charge - IPART Methodology**.**

Nature of asset	Value of asset ($)	Period to full capacity (years)	Full capacity (ETs)	Capital charge ($)
Sub-main	1 000 000	17	5 000	258
Pump station	2 000 000	14	7 000	354
Pump station	2 000 000	23	10 000	280
Carrier main	2 500 000	14	7 000	443
Rising main	2 500 000	37	20 000	125
STP	40 000 000	14	30 000	1 652
Reservoir	7 000 000	15	20 000	440
Mains	10 000 000	25	20 000	718
Dam	60 000 000	40	400 000	260
Total charge:				4 530

Source: Hypothetical data adapted from IPART.[20]

From Table 2 the present worth of the difference between income and operating costs over the 30 years can be calculated as \$160 953. Because there are only five years before all the ETs on the development site are purchased, we also need to calculate an annual amount per ET sold in a year, so that when added up over the five years it has a present value equivalent of \$160 953. Using the formula at equation (4), where V = 160 953, $n_1 = 50$, $n_2 = 100$, $n_3 = 150$, $n_4 = 200$ and $n_5 = 250$ and the discount rate, i = 1.09, the reduction amount, R, calculates to \$828 per ET. The final developer charge is the capital charge X reduced by R, the reduction amount. Thus:

$$\text{Developer charge}/_{\text{ET}} = X - R = \$4\,530 - \$828 = \$3\,702 \text{ per ET} \qquad (7)$$

This charge would be indexed each year by the consumer price index.

Table 3.

Reduction Amount - IPART Methodology.

Year	Cumulative No. of ETs	Income ($)	Cost ($)	Net Operating Surplus ($)
1	50	12 500	8 750	3 750
2	100	25 000	17 500	7 500
3	150	37 500	26 250	11 250
4	200	50 000	35 000	15 000
5	250	62 500	43 750	18 750
6	250	62 500	43 750	18 750
7	250	62 500	43 750	18 750
8	250	62 500	43 750	18 750
9	250	62 500	43 750	18 750
10	250	62 500	43 750	18 750
11	250	62 500	43 750	18 750
12	250	62 500	43 750	18 750
13	250	62 500	43 750	18 750
14	250	62 500	43 750	18 750
15	250	62 500	43 750	18 750
16	250	62 500	43 750	18 750
17	250	62 500	43 750	18 750
18	250	62 500	43 750	18 750
19	250	62 500	43 750	18 750
20	250	62 500	43 750	18 750
21	250	62 500	43 750	18 750
22	250	62 500	43 750	18 750
23	250	62 500	43 750	18 750
24	250	62 500	43 750	18 750
25	250	62 500	43 750	18 750
26	250	62 500	43 750	18 750
27	250	62 500	43 750	18 750
28	250	62 500	43 750	18 750
29	250	62 500	43 750	18 750
30	250	62 500	43 750	18 750
	Present worth of the net operating surplus over 30 years			$160 953
	Annuity per ET which will repay $160 953 over 5 years			$828
			∴ Reduction amount	$828

Source: Hypothetical data adapted from IPART.[21]

10. Housing affordability.

IPART notes that the NPV methodology will lead to some increase in the general level of developer charges above those currently being charged under existing approaches. It is not explicitly suggested that discounts be made on affordability grounds. Instead, IPART repeats that 'Full cost recovery through developer charges gives the clearest price signal about the varying costs of developing in different areas and at varying

densities and levels of service.'[22] However, IPART does mention that phasing in arrangements may be appropriate to manage impacts on housing affordability.'[23]

11. Dispute resolution.

Developer charges for water and sewerage, as determined by IPART or under section 64 of the *NSW Local Government Act 1993*, are not subject to appeal. However, a developer who is dissatisfied with how a charge has been calculated can have the dispute arbitrated under section 31 of the *Government Pricing Tribunal Act 1992*.[24] IPART also suggests that a panel of mediators be established so that mediation may be attempted before a formal dispute is declared.[25]

2. EVALUATION OF IPART PROPOSALS FOR REFORM FROM AN ECONOMIC EFFICIENCY PERSPECTIVE

The statement of the objectives of the design of charges, together with a set of principles and clearly specified procedures, provides exactly the guidance which appears to have been missing in the current practice of determining developer charges for water and sewerage. A uniform set of procedures throughout NSW would provide greater certainty for developers and assurance for local authorities. Calculation methods following the guidelines would be more transparent and open to critical inspection by all parties.

However, the strongest argument in favour of the IPART proposals, at least from the perspective of this paper, is the extent to which the methodology can be sanctioned by the theory of developer charges. Except for the issue taken here with 'the reduction amount' and to a lesser extent with the discount rate (both matters discussed below), IPART's proposals are consistent with the method of calculation of incremental costs. A systematic examination of each of the ten guiding principles in the previous section confirms this.

2.1 The recovery of efficient costs

The Tribunal's methodology recognises the theoretical point that in the absence of competition, pricing arrangements which aim at allocative efficiency do not ensure technical

efficiency or cost minimisation. Separate mechanisms (e.g. benchmarking) must be put in place to address technical efficiency in public monopolies.[26,27] In the context of setting charges for developers, the fact that the construction cost estimates should be transparent and open to critical inspection may help identify the 'gold plating' of assets, or other inefficient procedures. Benchmarking studies may also assist. Where surplus capacity exists because of poor planning or investment decisions, it is clear also that these higher costs should not be passed on to new developments.

IPART recommends that 'adjustments' should be made when a degree of technical inefficiency in operations is suspected. One problem is that it would be inherently difficult to judge precisely the right size of adjustment to allow for inefficiencies. IPART reports the SWC suggested in its 1994-95 submission to the Tribunal that an 'efficiency factor' should be applied to its assets built before 1990 to reduce charges relating to those assets by 25 per cent. It noted that 'the purpose of an efficiency factor is to recognise the impact of substantial improvements in work practices and technological change'.[28] In the event, the Tribunal determined that a reduction factor of 40 per cent is to be applied by SWC.[29] This issue is important because asset values are the main determinant of the level of developer charges. This underlines the need for transparency of cost estimates.

2.2 Consideration of demand management and water conservation objectives

The guidelines recognise the potential inefficiency in the common practice of projecting water demands on the basis of existing demand at the current price. The economic theory of optimum scale holds that we should consider demand-side management (reducing the need for additional supply) equally with supply-side responses. This is to ensure that increments in supply are at least matched by consumer benefits. However, it appears that demand management is not often practiced in Australia or North America.[30] Hanke and Davis argue that one reason for this is that engineers are not trained to take allocative efficiency into account:

> Demand management through pricing has almost never been considered a means to control use and to influence investment patterns. Even when it is used, few water resource planners have realised the importance of pricing as a means to obtain information regarding the willingness of people to pay for water

> resource services. Three complementary factors contribute to this pervasive bias in water resource management and development in the United States. The first factor relates to the emphasis on engineering. Once 'requirements' are forecast, the engineer's task is to design the least costly system that will meet those requirements. An engineer is not trained to allocate resources between competing objectives but only to accept requirements. Therefore he may eliminate from the scope of his analysis concern for economic demands and nonstructural alternatives such as pricing policies... .[31]

Other factors contributing to the neglect of the demand side, according to Hanke *et al*., were the mistaken view that gross benefits could be evaluated independently of pricing (and funding) policies, and the fact that institutional incentives were not designed 'to ensure that results of public programs coincide with national efficiency objectives'.[32]

However, it would seem that the situation is now changing and advocacy of demand management is becoming more widespread. For instance, Herrington lists eleven major documents published since the mid-1980s which expound the principles and practice of demand management.[33]

The adoption of demand management principles for water and sewerage is likely to raise prices (especially if environmental costs are to be included in costs). This will reduce demand and provide incentives for the introduction of new less capital intensive technologies. Neutze[34] and Troy[35] argue that new technologies and new approaches to meeting demands are already being developed. For urban water, sewerage and drainage these include the use of rain water tanks, composting toilets, reuse of 'grey water', and on-site retention of stormwater.

Developer charges, if they are applied flexibly, can be an effective policy tool in influencing incentives to adopt technologies to conserve water or run-off. Lower charges will be justified in cases where development design will reduce the demands on infrastructure services. (In theoretical terms, marginal capacity cost will fall because planned expansions of capacity can be deferred). The fact that the IPART guidelines appear to allow for such incentives to be introduced is therefore of particular merit. However, perhaps the wording on this, that agencies should project demand for water in a way which has 'regard to corporate goals and objectives' of water authorities, could have been clearer and the implications more precisely spelt out.[36]

2.3 Development servicing plans (DSPs)

The requirement to prepare DSPs containing the specified information, together with the access to calculation models which developers will have, should improve the transparency of the calculation of charges. Public scrutiny may assist in containing costs, whilst the information contained in plans will help developers in their location choices. For the authorities and councils, the need to prepare a DSP imposes an inducement to more rational capital budgeting and planning. The linking of DSPs to other land use plans (like Local Environment Plans and Regional Environment Plans) and to councils' corporate plans should aid local level financial planning generally. Because a development site involves service providers from all three levels of government in Australia, co-ordination between service providers at different levels of government may also be improved. This difficulty in coordination is a problem in infrastructure planning in Australia which has recently been the subject of another study.[37]

2.4 The use of NPV in the calculation of charges

There is little evidence of standard NPV (or 'present worth') techniques being used in the current practice of setting developer charges.[38] Where cost or revenue streams do not take account of the financing costs or interest earned over the time periods concerned, charges cannot be accurately set to recoup asset values. The fact that the IPART approach will standardise a set of technically correct steps is therefore especially meritorious.

A recent study by the Planning Research Centre appears to confirm a general lack of sophistication of basic investment appraisal techniques at the local government level.[39] The PRC was investigating, *inter alia*, the impediments to greater state and local integration on infrastructure planning and investment in three Australian states. One of the findings of the research was that differences between state and local governments in areas such as the use of NPV techniques, investment appraisal criteria and planning horizons, among others, were 'even more extreme and severe' than between different state level agencies.[40] It is evident in the table of techniques listed by the Planning Research Centre that those used by local government had less rigour and sophistication.[41]

2.5 Choice of discount rate

There are complex issues in the selection of an appropriate discount rate for the calculation of developer charges. In principle, the discount rate to use should reflect the opportunity cost to the agency of financing the infrastructure assets. If a charge is being calculated to recoup a water agency's outlays on works for which all the funds were borrowed, then it seems reasonable and straightforward to use the interest cost of the debt as the discount rate. In practice this may involve some averaging of interest costs (and fees) over a debt portfolio of varying costs and maturities. However, if the agency uses its own equity to finance the infrastructure works, the question now arises as to what is the opportunity cost of using these funds? Is it the interest cost savings by not having to borrow the funds, or is it, as many have argued, 'the rate of return on assets commensurate with that achieved by firms in the private sector that have similar risk characteristics'.[42] If it is the latter, how is this to be ascertained?

Some have argued that the use of private sector rates of return is not logical. For example, Staunton and Hagan argue as follows:

> [T]he proposal [to pay dividends to governments based on rates of return to equity] implies that capital should only be expended on projects which generate a profit. This seems to contradict the very reason why the government is providing capital (to the exclusion of private investment) in the first place, i.e. govern-ment projects have a social purpose which renders them less profitable and unlikely to be securely supported by private enterprise. Logically, it is ridiculous to argue in terms of the opportunity cost of *private* capital. ... Realistically and logically, it is the opportunity cost of *other government* projects which is the concern of policymakers, i.e. the cost of *public* capital.[43]

In a discussion paper prepared for the Water Industry Forum on developer charges, Groom adopts the line that the cost of equity can be estimated by reference to a margin over the risk free rate, such that:

$$\text{cost of equity} = \text{risk free rate} + \text{risk margin.}\ ^{44}$$

The risk free rate is usually taken to be the yield on long term Commonwealth Bonds. The risk margin is determined by Groom using the Capital Asset Pricing Model (CAPM). It includes a *market risk premium* which is estimated from the average return in the stock

market to holders of listed stocks, and a relative risk factor which reflects 'non-diversifiable' risks, such as those that are driven by the general trends in the economy.[45] At the time, Groom's analysis recommended a floor for the real discount rate of seven to nine per cent.[46]

Although Groom's paper determines a discount rate with apparent objectivity and by reference to a widely accepted model (CAPM), it also draws attention to the fact that the analysis does not allow for the specific risks associated with the water industry. It is noted that there are differences in the risks of government-owned monopoly agencies and privately-owned companies in competitive markets. The former risks are identified by Groom. The discussion also raises the question of whether the discount rate for developer charges should really require the development of risk factors specific to new development, rather than those for the business of the water agency as a whole, or those identified through the CAPM method. If so, allowance would have to be made for the fact that more frequent calculation of developer charges lessens this risk.

It is clear that question of an appropriate discount rate is problematical. However, the two major concerns of the present paper with the discount rate proposals of IPART are not related to either the method or even the number arrived at, but with the fact that *two* discount rates were deemed appropriate, and with the fact that the second of these emphasises *future* capital expenditures when the latter should not be in the calculation at all.

The justification given for two rates is that a lower rate can be used for past expenditures to reflect the fact that 'these investments are sunk'.[47] However, assets which have planned excess capacity which will be taken up in the future (as distinct from unforeseen excess capacity which is unlikely to be used) are not 'sunk costs' in the usual sense. There is no theoretical justification for a separate discount rate for 'sunk costs'. It is suggested here that the point is perhaps political obfuscation and that the real reason a three per cent discount rate was chosen was because of the 'added advantage' which IPART itself notes: namely, that 'the lower discount rate assists in the management of the impacts of the new approach without adversely affecting future investment or locational decisions'.[48] Rather than confuse the issue by pretending to have a theoretical justification, especially when a supporting discussion paper has analysed extensively the issue of the choice of the discount rate making no mention of 'sunk' costs, it would be better for IPART to admit their concern to avoid sharp increases in developer charges.

The second problem relating to IPART's guidelines on the discount rate is the question of why *future* capital expenditures are included in the calculation of developer charges at all. It might at first be thought that if a development site was currently using an asset which was to be replaced in a few years by another asset, then the cost of the future asset might be included in the charge. However, on close analysis, it is clear that development must be charged *either* for the current asset *or* the future asset, but not both. To charge for both would be double counting. The key to understanding why this is so is to appreciate that so long as the asset which is being replaced is valued at its replacement value (or more technically, its Modern Equivalent Asset value) it will not make any difference which asset is used for the calculation, but it should not be both. The only justification which might be given for including future assets in the calculation, for a limited time period ahead, is to save the administrative workload of having to recalculate charges each time new assets are brought on stream for new development.

In sum, IPART should recommend only one discount rate. It may be lower than an 'objectively' calculated one if there will be sharp rises in developer charges which would be better gradually phased in, and future capital works for a short time ahead should only be included in the charge if there are significant administrative savings from so doing.

2.6 Identification of relevant assets

The guidelines make it clear that pre-existing assets which contain planned excess capacity to serve development are to be included in the charge. In discussion of this issue, the Tribunal first considers, then rejects, the argument that these assets should be excluded on the grounds that they are 'sunk costs' (despite what was said about the discount rate).[49] The sunk costs argument is, of course, analogous to the short run marginal cost (SRMC) versus long run marginal cost (LRMC) argument in infrastructure pricing. SRMC pricing is rejected here, particularly for lumpy urban infrastructure services, not least because it implies that there is no cost in the use of excess capacity when that capacity is already in place. This view fails to recognise that where excess capacity is deliberately planned because demand is growing over time, the cost of these assets is not 'sunk'. There is a marginal capacity cost associated with the use of such infrastructure. It is, of course, the extent to which the output increment required by development necessitates a rescheduling or reoptimising of least cost investment

plans; at the very least, the extent to which planned expansions must be brought forward in time.

The IPART discussion appears to recognise these points. Emphasis is also placed on the need for forward looking price signals. For example, the Tribunal noted that:

> As capacity of some system components is approached, the costs involved in bringing forward the next increment of capacity may exceed the costs of existing assets used by the development. If so, developer charges should reflect future incremental capital costs to provide a better locational cost signal.[50]

Exceptions to the rule that pre-existing assets servicing new development should be included in charges are then specified in the guidelines. Although it is not stated explicitly by IPART, the conditions specified are exactly those for which there would be no long run marginal capacity cost incurred. That is, where excess capacity occurred by accident or unforeseen planning error, and it is unlikely that it will ever be taken up within the current planning horizons.

The guidelines recommend the inclusion of headworks in calculation of charges. The justification given for this is that the inclusion of headworks costs ensures that developer charges will provide better locational signals between regions.[51]

2.7 Valuation of assets

Asset valuation methods for fixed water supply and sewerage assets involve either methods based on original construction (or historical) costs or those based on estimates of replacement costs (termed 'current' costs). *Economic* valuation of an asset has little to do with the historical costs of an asset. The economic life of an asset (and, in the case of developer charges, the period to full capacity) is influenced by trends in demand for the service, in development of new technologies, and in other influences on cost, such as environmental factors. Asset value and amortisation of an asset depend on these future oriented variables. These will be captured only by valuation methods based on replacement costs. The method of asset valuation proposed by IPART is one such method. The value is assessed not by attempting to cost the same asset of similar size but by valuing the cost of a modern version of

the asset which would perform the same service. This allows both for technological change and a reoptimisation of the scale of the asset to the service required.

Modern accounting theory certainly accepts that the objective of asset valuation is to find the 'true economic value' of an asset.[52] However, it is evident that past practice has been biased towards historical cost based asset valuation.[53,54] The SWC, for example, changed the basis for valuation of its fixed assets from historic cost to depreciated replacement cost only in 1993-94.[55]

However, although the principle of the method of asset valuation is clear, the practice of arriving at an estimate can be anything but straightforward. Conceptual and practical difficulties do arise (see Staunton and Hagan[56] for a discussion of some of these conceptual problems with regard to water assets). Moreover, 'tricks' can be used to manipulate values.[57] It might be argued against the IPART method for calculation of charges that since asset valuation is the main determinant of the charge, the method is too vulnerable to subjective valuations. However, asset valuations are required for purposes other than developer charges calculations. They are essential for insurance purposes and they are increasingly employed as a tool for efficient financial management. For example, the calculation of economic income earned in a year and estimates of rates of return.[58] Rather than abandon efforts to base developer charges on economic asset values, it would seem to be more constructive to improve the estimates that are made.

2.8 Inclusion of holding costs

IPART's proposal to treat interest as a component of the capital cost of assets accords with the preferred way interest costs should be included in the measures of marginal capacity cost. When holding costs are to be included in asset cost determination there are at least two ways of incorporating them. One alternative is to calculate a charge on the value of the asset when works are constructed and then escalate this charge each year by the assessed interest cost for that year. The charge will therefore increase over time the later a developer comes to a site. The chief difficulty with it, is that it may lead to what is termed the 'sterilisation' of land. Compared with the alternative approach of estimating the rate of take-up of lots and time to full capacity then spreading the total estimated interest cost equally among the expected number of developments, the former method has a lower initial charge and an increasing

charge the longer the time to full capacity. Clearly, there may be a point at which no further development of a site occurs, even though there is planned capacity in the infrastructure service, because the initial charge of alternative sites is cheaper. For this reason and also simply for equity reasons, methods which spread the holding costs (such as IPART's) are to be preferred.

2.9 The method of calculation of charges

The estimate of the reduction amount requires that water prices be forecast thirty years ahead. It also requires, in theory, that the operating costs of assets attributable to users in the development site be separately identified. It is clear that the exercise of estimating the reduction amount cannot ever be anything more than a broad attempt to accommodate the important principle that new developments should not 'pay twice' for infrastructure capacity. But it is not the inevitable unreliability of the estimate that is the major concern. It is contended here that the reduction amount weakens the proposed method in a far more serious way.

There can be no doubt that the central objective of the proposed methodology (as has been emphasised throughout IPART's reports on developer charges) resides in 'giving the right locational signals to reflect development costs [which] encourages resources to be spent in areas where they produce the most efficient outcomes'.[59] This objective is repeated in the opening paragraph of the 1997 version of IPART's *Guidelines for Methodology to be used in Calculating Developer Charges* where it is said *inter alia* that upfront developer charges need to:

- provide better signals for resource allocation and usage;
- provide better signals to reflect the environmental effects of urban development ... .[60]

Throughout the discussion of the guidelines, where it is suggested that something should be done one way rather than another, this same underlying objective of the methodology is repeated. For example, when considering methods of asset valuation, it is argued that current costs should be used because these will 'better signal the true costs of the services provided'.[61] Similarly, in discussion of methods of charging and the notion that charges should look forward, it is argued that 'developer charges should reflect future incremental

capital costs to provide a better locational cost signal'.[62] On the issue of lowering charges on the grounds of housing affordability, IPART again repeats that 'full cost recovery through developer charges gives the clearest price signal ...' and that it is inappropriate to 'allow efficient pricing signals to be distorted' by attempting to contain impacts on affordability.[63]

Notwithstanding all the emphasis on efficient locational signals, the Tribunal suggests a reduction amount to deal with double dipping *which must significantly distort cost signals*. The estimation of the reduction amount involves parameters to which there attaches a good deal of unavoidable uncertainty. The size of the reduction amount will also depend on the size of the net operating surpluses a water agency *chooses* to run. Agency after agency across the state will reduce their 'carefully calculated' locational signals by reduction amounts of varying sizes which will not relate in any way to the costs of service. There seems little point in carefully fine tuning the capital charge, which is supposed to be sending an economic message relative to other capital charges, if all water agencies can make individual policy choices which reduce the charge for their own area. Clearly, differences between charges will no longer reflect just cost differences between areas. They will reflect some amalgam of cost differences; differences due to forecasting assumptions in the estimation of the reduction amount; and individual council policy on how much of the asset costs are to be recovered by upfront versus recurrent charging.

It would appear that the central theoretical pillar on which the whole set of procedures is based is destroyed unless some way can be found either to deal with double dipping by alternative means or at least to standardise the reduction amount in some way. For the metropolitan areas, IPART independently determines income through the determinations issued on prices and they also monitor the costs of water agencies. It is possible that some standard policy on the reduction amount might evolve so that differences in developer charges between agencies will reflect relative (if not absolute) differences in costs. In non-metropolitan areas, the problem appears to be particularly difficult. There are more than 120 separate water agencies each with the power to set their own price levels which will in turn reflect the size of charges.

An alternative to subtracting a reduction amount off the capital charge is to subtract annually from the water bill to areas which have paid a developer charge, an amount which reflects the net operating surplus in a year. In an annual bill, the amount to be deducted would

be ascertainable with a good deal more certainty. It could simply be deducted from the lump sum amount if water bills are structured that way, or offered as a rebate on user charges if there is no lump sum component. Dealing with double dipping in this way would initially place demands on the design of information systems which facilitate billing arrangements, but it is unlikely to be a technically daunting requirement given the capacity of current computing systems.

The advantage of calculating the reduction amount along IPART lines is that the calculation itself becomes a quick one off adjustment to the capital charge. It is accurate in principle, if not in practice, and no further administration is required. However, if that same administrative convenience weakens the primary theoretical justification for calculating charges in the first place, then it would certainly appear that alternative mechanisms for dealing with double dipping need to be explored.

2.10 Housing affordability

It can be argued there that there is a compelling logic in the contention that the main concern of infrastructure utilities should be with efficiency issues in service provision and that distributive policy is best addressed by institutions which focus exclusively on equity issues. However, if subsidies are given it can be argued that they must be transparent in the accounts of the agency. IPART has taken a similar approach in the guidelines. It is argued, for example, that any 'manipulation' of the charges to alleviate the impact on affordability must be done in a way which preserves the transparency of the calculation.[64] It is also stated quite categorically that financial hardship matters are best addressed elsewhere.[65]

3. CONCLUDING REMARKS

This paper has evaluated the methodology which IPART has proposed for use in NSW to replace existing practice.

There are many points at which the guidelines provided by IPART and the principles of economically efficient charges coincide. Examples include: the suggestion that adjustments to charges may be necessary so that only minimum efficient charges are reflected; (this

recognises that allocative efficiency is not the same as technical efficiency); the exhortation to heed demand management and conservation objectives in water and sewerage agencies (so that flexible charging can reward developers for containing infrastructure service impacts in development design); the use of DSPs (which will greatly improve the transparency of existing practice and may also assist in improving coordination between service providers at different levels of government); the encouragement to councils to use improved investment appraisal techniques; the asset valuation methods suggested by IPART (which will capture, in principle at least, the economic valuation of assets); holding costs will be spread equitably between developers in the method suggested by the Tribunal and possible sterilisation of land avoided; and finally, of course, the actual technique suggested for calculating the first stage of the charge is a theoretically valid method of calculating long run marginal capacity cost.

Despite this firm grounding in economic efficiency principles, the main area where IPART's recommendations are deficient is in the suggested approach to double dipping. Here, the recommended method will cause arbitrary and individually varying reductions to be made to the capital charges otherwise carefully calculated by councils. The approach appears to profoundly contradict the theoretical rationale emphasised many times in the IPART documents; that is, to improve the locational signals indicated by the size of charges in different geographical areas.

On a less important matter, issue has also been taken here with the rationale given for recommending two discount rates. We have argued that only one rate should be used. Moreover, future capital expenditures beyond those currently being built to service a development should not be included in the calculation.

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