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SUBMISSION

Review of Water and Wastewater Industry Structure and Pricing in Greater Sydney Metropolitan Area (ref: 04/587)

With reference to IPART's 6 May 2005 invitation for the public to make submissions to the above Review and the Terms of Reference associated with the Review, I submit:

- 1. Terms of Reference: 1, 2.i.i, 2.i.v, 2.i.vi, 2.i.vii, 2.i.viii, 2.i.ix, 2.i.xi, 2.i.xii .**

My submission concerns methodological points regarding the relationship between economics-finance-environment and the IPART Issues Paper, "Investigation into Water and Wastewater Service Provision in the Greater Sydney Region", May 2005, ISBN 1 920987 22 3. I believe my submission affects all of the above listed items in the Terms of Reference in a non-trivial way.

The NSW State Government (Government) has pursued a dual policy agenda, namely (a) ecologically sustainable water management (Sydney Water Act 1994, Water Management Act 2000, Metropolitan Water Plan, 2004) and (b) micro-economic reform (State Owned Corporations Act, 1989; Metropolitan Water Plan, 2004, IPART Issues Paper, May 2005).

The micro-economic reform pursued by the Government during the past 10 years or so consists of institutional changes that translate into a 'simulated competitive market' for Sydney Water, which I call a 'pseudo-market'. The creation of the pseudo-market involved the establishment of the Water Catchment Authority in 1998, which sells water to Sydney Water (making Sydney Water a 'price-taker' in its major input market) and the establishment of IPART (making Sydney Water a 'price-taker' in its major output market). Furthermore, Sydney Water was 'corporatised' with the Treasurer being the shareholder, who 'expects' a rate of return on assets (making Sydney Water a price-taker in financial markets). The objective of ecologically sustainable water management was pursued by means of environmental performance reporting. Sydney Water reports on its financial and environmental performance (Sydney Water, Annual Reports). There are a few complications arising from the fragmentation of the wastewater management and private sector involvement, which I'll ignore here because they do not contradict the point I am trying to establish in my submission.

The foregoing summary of micro-economic reform is written from the perspective of theoretical models in Economics concerned with non-dictatorial resource allocation systems. This literature is more widely known as general equilibrium theory. The models

in this body of literature have common elements, known as *primitives* {agents, objects of choice, technology, endowments, institutional environment}. Two primitives are taken as axiomatically given, *preferences* of one type of agents, called *consumers* (ie non-dictatorial) and one type of endowments, called *natural resources* (boundary of Economics as distinct from, say Theology). The models differ in the specific assumptions made about a *primitive*.

1.1 The outcome of the Government's policy initiatives is summarised in the Terms of Reference: "Sydney Water has made significant efficiency gains, leading to lower prices for its consumers. At the same time, Sydney's demand for water now exceeds the sustainable yield of its catchment."

1.1.1 I assume the above quoted statement in the Terms of Reference on the outcome of the policies pursued by the Government is consistent with the data collected, namely financial and environmental reports.

1.1.2 I submit that the conclusions derived from the methodology underlying the Governments policies are not consistent with empirical observations:

Observation 1: The statement "Sydney Water has made significant efficiency gains, leading to lower prices for its consumers" contains the testable hypothesis that prices for its consumers have been lowered. Appendix 1 contains consumer (household) water price data for the period April 1994 to May 2005. During this period, the variable cost increased from \$0.65 to \$1.013 per kilolitre and the annualised fixed cost declined from \$148 to \$70.4. The monetary cost declined for households with an annual consumption below 194 kilolitres (about 540 litres per day). For everybody else the monetary cost of water has increased. The lowest annual consumption I could find in my (2-person + visitors household) data series since 1994 is 242 kilolitres per annum. I could not have possibly benefited from the alleged 'efficiency gains' even if I could have maintained the minimum consumption level. I have to reject the hypothesis that there have been 'efficiency gains leading to lower prices for consumers.

Observation 2: The statement "Sydney's demand for water now exceeds the sustainable yield of its catchment" is also not supported by the evidence provided on the bills sent by Sydney Water. With reference to Appendix 1, there were water restrictions in Sydney from November 1994 throughout 1995 and part of 1996 and again from early 2003 onward with increasing severity. The data available to me shows that Sydney's demand for water has exceeded the sustainable yield of its catchment for about 10 years.

Observation 3: While Sydney Water has improved on the percentage of water wasted via leakages in the water mains system by about 1%, the resulting percentage (a little under 10%) is considered by many as too high. I am not technically qualified to offer an independent opinion on this matter. However, I do know that there are electronic (as distinct from accounting) monitoring systems of oil pipelines. These systems are used to prevent or minimise environmental pollution from oil leakages. I venture to say that a 10% leakage rate in oil pipelines would constitute a major environmental catastrophe and such a catastrophe has been prevented. Water leakages per se do not constitute direct environmental damage. The damage is indirect – not enough water for flushing the river system. I don't know how much money Sydney Water would require to reduce the water leakages but I do know that whatever the amount is, it is a positive amount and it is the

amount by which the financial returns to ‘the shareholder’ have been overstated in ‘real terms’. That is, too much money has been given to ‘the shareholder’ (Minister) and not enough to ‘the environment’ (Minister).

Observation 4: Sydney Water is not the only ‘agent’ with a water leakage problem. I had one too in an outdoor toilet that was effectively ‘out of sight’ and not used. None of the compulsory water restrictions would have stopped the wastage and the price increases did not provide the appropriate signal either. A real resource is required to systematically collect and analyse data. The real resource is human time. But time is a very scarce commodity among Sydney residents who work long hours and under ever more deteriorating working, road, rail, hospital, public school conditions to meet the demands of the ‘shareholders’.

Observation 5: It is conceivable to reduce household water consumption for consumers like my household (without requiring new technological infrastructure for Sydney such as for example vacuum suction toilets linked to waste recycling plants to supply ‘some’ electricity’ with some more coming from solar power). For example, a ‘household’ lives in an older style apartment (1 bathroom instead of the modern 3), takes Christmas, Easter and annual holidays in a resort in Queensland, takes the washing to a laundry, eats out a lot, uses the shower facilities in an inner city ‘health centres’, drinks a cappuccino on the way back to the apartment, cools the apartment with an air conditioning (instead of cooling down with a dip in the pool), travels by car to the beach, washes the car at a garage, etc. Would this alternative lifestyle really reduce water consumption per head of population? Would this alternative lifestyle really assist in reducing air pollution, traffic congestion, demand for health services and corrective services? And, how would this high-density city lifestyle impact on storm water? How many ‘old apartments’ are left? How would it affect Queensland’s ‘economy’ versus NSW’s ‘economy’ as measured by the ‘shareholder(s)’? I can’t find data in any of the policy papers or elsewhere, which would allow me to answer these questions in a somewhat satisfactory manner. However, these questions are relevant for discussions of ‘efficiency gains’ that can be related to micro-economic models in which ‘allocative efficiency’ and ‘operational efficiency’ are well defined, and ‘dynamic efficiency’ can be sensibly interpreted (ie general equilibrium models).

1.1.3 In summary, the policy measures pursued by the NSW State Government since 1994 have been impotent regarding both ‘efficiency gains’ as defined in the Terms of Reference and in terms of environmental objectives. Furthermore, this has happened despite the ‘paper mountain’ of reports and audits.

1.2 I submit that the economic conceptual framework contained in the IPART Paper, May 2005, sections 3 and 4, is inappropriate to deal with the policy objectives:

1.2.1 Ecologically sustainable development cannot be separated from an economic analysis of water and waste water management. The study of Economics is concerned with the material (physical) welfare of humans. Water and waste water are quite clearly part of the physical environment. Moreover, water is an *essential commodity* for humans and for plants and animals, which in turn affect the material welfare of humans in an essential (survival) manner. Similarly, wastewater management is important for health and health is important for the physical survival of humans and all other living things, which in turn are important for humans.

1.2.2 The economic conceptual framework in the IPART Issues Paper, May 2005, is known to me as the theory of contestable markets (eg Baumol, W., R.D. Willig, and J.C. Panzar, *Contestable Markets and the Theory of Industry Structure*, 1982, 1987). The theory of contestable markets addresses one (1 only) specific type of ‘market imperfection’, namely potentially sub-optimal resource allocation (‘allocative inefficiency’) due to ‘lack of competition’. Lack of competition is ascribed to ‘barriers to entry’ due to a ‘natural monopoly’ or actual or assumed ‘competitive advantages’ arising from public sector ownership (restrictions on foreign investment is another example). When viewed in the broader theoretical context of general equilibrium theory, the methods developed within the contestable markets framework aim to achieve ‘efficiency gains’ by means of approximating the theoretical optimum of a model of a *competitive private ownership economy with complete markets* (eg Debreu, *Theory of Value*, Wiley, 1959).

1.2.3 It is possible to think of examples where the contestable markets framework is suitable. But the problem at hand is not one of them.

1.2.4 The economic problem of ecologically sustainable development is categorically different from that addressed in the theory of contestable markets. In the first instance, it is not ‘lack of competition in markets’ which is the problem but rather it is the total absence of relevant markets (competitive or otherwise).

1.2.5 The empirical relevance of my statement that there are missing markets is acknowledged publicly in the form of environmental performance measures which are expressed in non-market (non-price) quantities (Sydney Water, Annual Reports).

1.2.6 The relevant theoretical framework for the category of economic problems associated with sustainable water management is the model of *competitive private ownership economies with incomplete markets* (eg Geneakopolos J. and A.Mas-Colell, “Real Indeterminacy with Financial Assets”, unpublished, Cowles Foundation, Yale University, 1985 ; Geneakopolos J. and H. Polemarchakis, “Existence, Regularity, and Constrained Suboptimality of Competitive Portfolio Allocations when the Asset Market is Incomplete”, in W.P. Heller and D.A. Starrett, eds, *Uncertainty Information and Communication. Essays in Honour of Kenneth J. Arrow*, Vol. III. Cambridge University Press, 1986; Magill, M. Quinzii, *Theory of Incomplete Markets*, MIT Press, Cambridge, 1996)

1.2.7 The major result from the theory of incomplete markets is that equilibria (solutions) of models of competitive private ownership share market economies are generically inefficient (that is, except for, say a sunny Wednesday between now and ‘eternity’, resource allocation is always inefficient). This result is not due to ‘lack of

competition'. This result is not due to public ownership. This result is not due to 'barriers to entry'. This result is due to 'missing markets'.

1.2.8 General equilibrium models of '*competitive private share market economies with incomplete markets*' do not provide a prescriptive solution to the 'missing market' problem. However, they assist in asking relevant questions. For example, one may ask, what is required to make 'efficiency gains'. The model's answer is: Try a non-market agent. Furthermore, this work has refocused the role of market prices in an economy, namely the coordination of decentralised decisions by many agents (people) in the economy. 'Missing markets' means that there is a coordination failure.

1.2.9 The role of a non-market agent would be to address the coordination problem, which cannot be solved by market prices (competitive or otherwise).

1.2.10 The theory of 'implementation' (eg Groves, T. and Ledyard, J.. "Optimal allocation of public goods: a solution to the 'free rider' problem", *Econometrica*, 1977, 45, pp. 783-810; Moore, J. and Repullo, R. (1988) "Subgame Perfect Implementation", *Econometrica*, 56, 5, pp. 1191-1220; Abreu, D. and Matsushima, H "Virtual Implementation in Iteratively Undominated Strategies: Complete Information", *Econometrica*, 1992, 60, pp. 993-1008; Abreu, D. and Matsushima, H., "Exact Implementation", *J. Economic Theory*, 1994, 64, pp. 1-19; Fudenberg, D. and J. Tirole *Game Theory*, The MIT Press, 1996 contains further references) provides some guidance for the non-market agents' planning problem. Furthermore, the specialist applied area of resource economics (eg Carson, R.D., Flores, N.E. and Meade, N.E. "Contingent Valuation: Controversies and Evidence", *Environmental and Resource Economics*, 2001, 19, pp.173-210 contains references to the original literature) contains examples of approaches to arriving at 'valuations' of non-marketable commodities.

1.2.11 The *theory of implementation* involves the application of non-cooperative game theory. The aim of this theory is to design 'game forms' (called mechanisms) such that the equilibrium of the game satisfies the socially desirable properties (eg sustainable water resource management and the supply of water to the population at affordable price) but which do not require vast amounts of information by the planning authority. This sounds easier than what it is.

1.2.12 An application of the *theory of implementation* against the background of *general equilibrium models of competitive private ownership share market economies with incomplete markets* requires the development of specific models, which take the local conditions into account. Furthermore, scientific and technological knowledge are essential inputs. The modelling cannot be done by economists alone. In my experience (working with an acoustics engineer, an environmental engineer, an Information Technology graduate) the relevant economic literature is relatively more easily accessible (readable) to these people than other economic literature due to the language used.

1.3 I submit that the micro-economic reform practised during the past decade may be viewed as a social experiment. It provides relevant data to reject the economic theory on which the reform has been based. However, the data is consistent with the theoretical proposition that ecologically sustainable development cannot be separated from economics and the appropriate economic theoretical framework to start off with (at least

for democracies) are theoretical models of non-dictatorial resource allocation systems of ‘competitive private ownership economies with incomplete markets’.

2. The roles and responsibilities of participants in the industry, both Government and private sector, Terms of Reference 2.i.ii.

To the best of my knowledge, at present there is no non-market agent who seems to have the coordination task I referred to in section 1.2 above.

As outlined in section 1.1, the institutional changes made by the Government have not reduced the coordination problem (between the environment and finance). On the contrary, fragmented decision making seems to have become a bigger problem since the ‘micro-economic reform’ was introduced. (I am not quite sure how many Ministers are involved at present; I know of three for sure – Finance, Environment and Planning – there are assistant Ministers and several authorities).

At present, the environmental objectives are treated as separable from the economic objectives by means of specifying financial and environmental objectives and reporting (Sydney Water Environment Plan 2000-2005 and Annual Report 2004). I have argued that ‘nobody’ checked whether these objectives are mutually consistent. Increasing the ‘paper mountain’ of reporting by means of more reporting requirements cannot solve this coordination failure. In my opinion, the bureaucracy of ‘reporting’ may have contributed to the growing coordination failures (we can’t see the forest for the trees, which we are busy counting).

I submit that the NSW State Government should abandon its current policy, which assumes that economics is separable from ecologically sustainable development.

I submit the NSW State Government should adopt a conceptual framework that is at least logically consistent with the aim of having a ‘holistic approach’.

I submit that given the current state of lack of coordination, there is very little room for private enterprise because it is not clear which activities can be decentralised and by which mechanism.

About 20 years ago, a major coordination failure involving the oil industry in Brazil was allegedly created by the advice of applied economists. A problem solving team was created consisting of a mathematician, a physicist, and an economist (Professor Kenneth Arrow; a theoretician with expertise in general equilibrium theory). The ‘big problem’ was clarified and a solution concept was developed, to be applied. Perhaps a similar approach could be used for water and waste water management in New South Wales. The point I am trying to make is that the details of the pricing arrangements, while important at some stage, are secondary to finding a conceptual solution to the ‘big problem’.

I assume it is the Premier of NSW who decides on the boundaries of ministerial portfolios and it would be for the NSW State Government who would have the responsibility for addressing the actual problems.

3. Recent reforms in other industries with similar characteristics (Terms of Reference 2.i.iv).

'Industry'. To the best of my knowledge, there is no 'industry' which has sufficiently similar characteristics to make comparisons suitable. For example, while the electricity industry is important for economic activity, as measured by GDP, electricity is not universally essential to life but water is. This difference in importance shows up empirically in situations of natural catastrophe such as the recent tsunami. The supply of water takes precedence over the supply of electricity.

I find an 'industry' approach not very helpful. The activities of all 'industries' are interrelated. The Health 'industry' uses water and electricity (and many other 'inputs'), the water 'industry' uses electricity (and many other inputs), the electricity 'industry' may use water (and other inputs), and all of these 'industries' intersect at one stage with the education 'industry'.

The notion of an 'industry' is not even helpful for relatively simple organisations such as industrial producers. This is so because companies hardly ever fit into one industry classification but overlap with others.

'Industry' classification systems are based on output categories. Hence policy measures linked to 'industry' frameworks typically focus only on the outputs (quantities and prices) of enterprises which produce or provide the output(s) of the 'industry' to which they have been assigned. This is evidenced in the so-called 'new public sector management' literature (output performance measures, output budgeting). However, with the exception of the special case where the contestable markets theory is relevant (section 1.2) and assuming the problem is 'small' (side-effects are negligible) it is meaningless to talk about any notion of economic 'efficiency'. It is meaningless because all notions of economic efficiency, which are well defined, relate 'inputs to outputs'. (I am pretty confident that the well defined notions of economic efficiency make sense to scientists and engineers).

With reference to section 1, the special case where the industry based contestable markets theory is theoretically justifiable is the case which is empirically irrelevant for the Water Industry. It is irrelevant (in the first instance) because the actual problem is different from that assumed in the theory.

Health: Recently I came across a painstakingly thorough analysis by a medical doctor (Queensland) of a speech given a few years ago to the World Bank by the current Chair of ACCC. I found it most interesting that the medical doctor reached conclusions which are quite compatible with mainstream economics as referenced above but not with the 'industry' restructuring approach advocated by the Chair of the ACCC. In my opinion, it is sad that medical doctors seem to be so desperate with the state of affairs in the 'health industry' that they see a need to apply their analytical skills to try to make clear to readers why the 'industry-model' does not work.

Aviation: The 'industry' where I can say I have detailed knowledge is the aviation industry. Reforms started around 1988 with the splitting up of the Civil Aviation Authority into the Federal Airport Corporation (FAC) and AirServices Australia and an

air safety body. It resulted in the privatisation of airports. It is by no means clear whether this reform program was a 'success'. The corporatised FAC (Sydney) announced in 1994, with some pride, that the so called 'Third Runway' was constructed within budget and within time. About 10 years later it becomes apparent that the physical depreciation rate of the third runway seems to be much greater than that of previously constructed runways (the third runway is allegedly 'sinking'). Moreover, the federal government spent millions of dollars above budget to noise insulate more houses, there was a Senate Select Committee on Aircraft Noise in Sydney (1995), which surely cost money, Airservices Australia set out to redesign flight path ('long term operating plan'), hundreds if not thousands of Sydney residents gave up time (unpaid) to first bring the problem of aircraft noise to the attention of the government and then assist with the redesigning of flight paths. Sydney residents still suffer from aircraft noise, air pollution and there is the positive probability, no matter how small, that one day one of the aircraft will land, either on landing or on take-off, on residential properties. I don't know whether the approximately \$5 billion revenue for the federal treasury, obtained from the sale of Sydney Airport, is sufficient to cover all potential costs. All I know is that a cost benefit analysis in the Environmental Impact Statement for the Third Runway did not lead to the recommendation that the construction of the third runway is the economically most advantageous project. Only the financial (commercial value) data was considered in the decision making process on the recommendation of some hired management consultant. Scientific data was blurred with the research findings of telephone marketing surveys. As is the case currently with Sydney Water, environmental objectives were treated as separable from 'economic' data. I understand the City-Airport rail-link, a 'follow-on' project of the airport expansion, is not even financially viable.

Insurance: See HIH Royal Commission

Education: I am not aware that there have been any 'efficiency gains' in the 'education industry' as a consequence of the activities of 'public sector management experts'. However, there is much talk about 'dumbing down', 'falling standards' and an overburdening bureaucracy.

Attachment Sample: Sydney Water quarterly bills, household sector

Account date	Price per kilolitre of water	Service Charge	
		Water	Sewerage
April 1994	\$0.65	\$37.00	\$108
July 1994	\$0.65	\$37.00	\$109.59
October 1994	\$0.65	\$37.00	\$109.59
January 1995*	\$0.65	\$37.00	\$109.59
May 1995*	\$0.65	\$37.00	\$109.59
July 1995*	\$0.65	\$37.00	\$109.59
October 1995*	\$0.70	[\$20.00]	[\$65.75]
February 1996*	\$0.70	\$20.00	\$65.75
April 1996*	\$0.70	\$20.00	\$65.75
July 1996*	\$0.70	\$20.00	\$65.07
October 1996	\$0.76	\$20.00	\$67.90
January 1997	\$0.76	\$20.00	\$67.90
April 1997	\$0.76	\$20.00	\$67.90
July 1997	\$0.76	\$20.00	\$70.10
October 1997	\$0.80	\$20.00	\$70.10
January 1998	\$0.80	\$20.00	\$70.10
May 1998	\$0.80	\$20.00	\$70.10
July 1998	\$0.80	\$20.00	\$71.40
October 1998	\$0.80	\$20.00	\$71.40
January 1999	\$0.80	\$20.00	\$71.40
April 1999	\$0.80	\$20.00	\$71.40
July 1999	\$0.85	\$20.00	\$72.60
October 1999	\$0.90	\$20.00	\$72.60
February 2000	\$0.90	\$20.00	\$72.60
April 2000	\$0.90	\$20.00	\$72.60
July 2000	\$0.90	\$20.00	\$72.60
October 2000	\$0.90	[\$18.75]	\$77.50
January 2001	\$0.925	\$18.75	\$77.50
April 2001	\$0.925	\$18.75	\$77.50
July 2001	\$0.925	\$18.75	\$79.78
October 2001	\$0.9338	\$18.75	\$79.78
February 2002	\$0.9338	\$18.75	\$79.78
April 2002	\$0.9338	\$18.75	\$79.78
July 2002	\$0.9338	\$18.75	\$82.09
October 2002	\$0.9422	\$18.75	\$82.09
February 2003#	\$0.9422	\$18.75	\$82.09
May 2003#	\$0.9422	\$18.75	\$82.09
July 2003#	\$0.9422	\$19.16	\$84.65
October 2003**	\$0.98	[\$19.13]	[\$84.63]
February 2004**	\$0.98	\$19.13	\$84.63
May 2004**	\$0.98	\$19.13	\$84.63
August 2004***	\$0.98	\$19.42	\$86.68
November 2004***	\$1.0130	[\$19.40]	[\$86.66]
February 2005***	\$1.0130	\$19.40	\$86.66
May 2005***	\$1.0130	\$19.40	\$86.66

* Drought. Water restrictions introduced on 1 November 1994; Phase 3 in force from 9 January 1995; all restrictions lifted by October 1996. % of Operating Storage available: 67.7; 67.4; 71.9; 71.8; 68.1; 70.6.
#Voluntary water restrictions; ** Mandatory water restrictions; *** New Mandatory water restrictions