Productivity Commission

Inquiry into examining the case for microeconomic reform in Australia's urban water sector

Submission

by

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1. INTRODUCTION

1.1. The Context

The Productivity Commission (Commission) has been requested by the Commonwealth Government Assistant Treasurer to "undertake an Inquiry into examining the case for microeconomic reform in Australia's urban water sector" (the Inquiry). According to the Terms of Reference for the Inquiry (ToR)[1], the Commission is to report on "opportunities for efficiency gains in the structural, institutional, regulatory and other arrangements in the Australian urban water and waste water sectors", on options to achieve the identified efficiency gains, and on a proposed work programme including implementation plans for the options. (ToR, p. 1)

The Commission's Inquiry comes at a key time in the evolution of the urban water sector in Australia. Most large major urban water systems have seen significant investments in response to drought, and water prices are increasing. Some governments are making decisions on removing water restrictions. The end of recent drought conditions will provide an opportunity for considered reflection on recent experience and its implications for reforms that could improve efficiency in future.

1.2. The Authors

This submission has been prepared jointly by Larry Ruff[2]and Geoff Swier,[3] both of whom have extensive experience with the reform of 'public utility' sectors; both also participated in the Commission's Melbourne Workshop on 27 October. Detailed CVs for the authors are attached.

Larry Ruff has been engaged by the National Water Commission (NWC) to review assessment reports on the NWC's Pricing/Economic Reform and Legal Frameworks/Property Rights topics. This joint submission to the Commission contains some of the same ideas and recommendations contained in Larry's NWC reports.

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1 Terms of Reference from the Assistant Treasurer to the Productivity Commission dated 22 July 2010 (ToR)

2 Larry Ruff is a special adviser to a globally based consultancy, Market Reform. Larry developed the spot market and contracting concepts first used in the England and Wales electricity Pool twenty years ago, advised on the design of the New Zealand electricity market and the original Victorian electricity market that evolved into the Australian national electricity market, designed the market clearing logic for the Victorian gas market, and has been involved in the design of electricity markets around the world.

3 Geoff Swier, a director of Farrier Swier Consulting, was a leader of the team that managed the design and implementation of the electricity and gas markets in Victoria. He has been a consultant to the water industry in Victoria, NSW, Queensland and Western Australia. He was previously a member of the Australian Energy Regulator.

1.3. The Purpose and Scope

The purpose of this submission is to provide input to the Commission's Inquiry based on our experience in the urban water sector in Australia and in the reform of similar network industries[4] in Australia and internationally. Accordingly, it is not a comprehensive review of the entire discussion on urban water reform, but focuses on key issues in which our specific experience and perspective might be of interest and value to the Commission. It deals primarily with potable water supply and considers other parts of the urban water cycle – e.g., waste water and storm water – only to the extent that these affect potable water supply.

This submission is Personal in Confidence. If the Commission considers that it would be useful to make aspects of this submission publicly available, we are prepared to discuss this at a later stage.

2. THOUGHTS ON THE COMMISSION'S APPROACH

At the risk of appearing presumptuous, we begin by offering some thoughts about how the Commission might define its approach and focus its advice to be of most value to those interested in urban water reform. Later sections of this submission develop some of these thoughts further.

2.1. The Commission's Audience(s)

The direct audience for the Commission's findings and advice from this Inquiry is clearly the Commonwealth Treasury and the Council of Australian Governments (COAG), in particular the Premiers, Water Ministers and Treasurers of the various States and Territories. But the COAG processes involve a wide range of officials, ranging from policy agencies, managers and regulators of government-owned water utilities, through environmental policy makers and regulators, to officials responsible for competition and general economic policy. The Commission may have advice for many of these sub audiences, and should tailor its findings and recommendations accordingly.

Commonwealth Ministers will decide how best to respond at the national level to any findings and recommendations from the Commission, but State Ministers will make the key decisions at the levels where any reforms will be implemented. The Commission can help State Ministers deal with the practical and political challenges they will face by providing a clear and credible case for any recommended reforms as well as advice on how the challenges and risks can be managed.

The details of reform will be implemented by officials and water business managers. Consultants, academics and policy analysts have played and will continue to play various roles in developing urban water reform ideas. These audiences would all benefit from a roadmap that helps clarify the objectives and framework for reform and identifies the more important economic technical issues.

2.2. Objectives for *Reform*, not (Only) for the *Sector*

At the Melbourne Roundtable, the Commission presented a list of possible policy objectives for the urban water sector – security of supply, economic efficiency, etc. – and invited discussion about whether these were the 'right' policy objectives. We respectively suggest that the Commission, in an Inquiry into the case for microeconomic reform of the urban water sector, should seek to define policy objectives for such microeconomic reform, not policy objectives for (or at least not *only* for) the urban water sector *per se*.

The ultimate objectives of microeconomic reform stated in the ToR relate to "efficiency gains". The Commission should formulate some more-specific penultimate objectives that reform should accomplish in order to improve efficiency. For example, one objective *for reform* should be a clear statement of objectives *for the sector*. The Commission should consider recommending that Government and water sector officials responsible for the sector jointly develop a statement of the sector's objectives, perhaps in the form of an 'objects clause' as included in the National Electricity Law and the National Gas Law, and as recommended by the Commission itself in its 2004 review of the Gas Access Regime.

As another example of an objective of reform, as opposed to an objective of the sector itself, the Commission might propose something like 'enhancing the independence of the sector in managerial and technical matters'. Another might be 'introducing competition in the form and to the extent it is cost-effective to do so'. A statement of such objectives of urban water reform could be very useful in judging the completeness and likely effectiveness of any suggested list of specific reforms in the sector.

2.3. The 'One-Size-Does-Not-Fit-All' Trap

We certainly agree with the Commission's stated view that there is no 'one size fits all' approach to urban water reform. The case for and approach to implementing microeconomic reform depends on the specific situation; what makes sense for a metropolitan area with a large interconnected water grid may not make sense for a regional city dependent on a single source of supply. But in our experience, 'one size does not fit all' often is little more than code for 'we do not want to change the way we do things here'.

Incumbents in large organisations, whether public or private, often say that reforms that have worked well elsewhere will not work or are not worthwhile in their specific case; this has certainly been true in the various electricity and gas reforms in which we have been involved. But then, when the structures and concepts and processes that have worked elsewhere are carefully tailored to this specific situation, they can and do work, with positive results.

It is not the Commission's job to make detailed recommendations about what 'size' reforms should be implemented in each urban water system in Australia. But when the Commission states a general objective for urban water reform it should also, as far as practical, identify ways in which that objective might be accomplished in different situations. For example, if the Commission concludes that 'enhancing competition' should be an objective of reform, it could/should point out that the costs and benefits of introducing competition ***in*** the market in an urban water system will depend on (among other things) the size of likely new sources of

economic supply relative to the size of that system, but that even small systems can at least promote competition ***for*** the market.

2.4. The Role of Cost-Benefit Analysis

The ToR asks the Commission to subject reform options to "rigorous cost benefit analysis, including using quantitative assessments to the fullest extent possible". Again, we agree with the general objective of such a request. But we have found in practice that too much emphasis on quantitative cost-benefit analysis can be another obstacle to effective reform.

Quantitative cost-benefit analysis is certainly useful for analysing options that will have limited and relatively well-defined effects, but becomes less useful the more the options will – and are even intended to – have subtle and wide-spread effects. In particular, the main objective of microeconomic reform is to create economic incentives that will encourage many positive actions and innovations throughout the sector, with ultimate effects that cannot be predicted in detail much less quantified in advance. Requiring that advocates of such reforms identify and quantify all their future effects is likely to impede or even kill the reforms.

In our experience with microeconomic reform, insistence on rigorous, quantitative cost-benefit analysis is often the last bastion of the *status quo*. Integrated monopolies typically oppose efforts to introduce competition by saying that there is no need for competition, that if there are any good ideas out there the monopoly is already considering them or will be glad to do when/if it learns about them, and that advocates of reforms should be ignored unless they can identify and quantify future benefits that exceed the clear immediate costs. Then, after competitive reform occurs, innovative ideas and processes 'come out of the woodwork' to change – and usually improve – the sector in ways nobody predicted.

It would, of course, be foolhardy to push ahead with costly and untested reforms based only on blind faith in economic theory. Advocates of any proposed reform should be required to show that it can be implemented with costs and downside risks that are commensurate with plausible benefits and upside potentials. They should be required to address the objections and define ways to mitigate the adverse effects.

For example, advocates of competition ***in*** the market for urban water, which has never been tried, should define a phased and adaptive implementation strategy, in which initial steps with modest costs and potentially offsetting benefits in their own right could inform decisions about how – and whether – to take the next steps.[5] Reforms that can be formulated, tested and implemented in such a low-risk way should not be rejected at the outset just because it is not practical at that time to show quantitatively that the benefits of full implementation would exceed the costs.

[5] As a noteworthy aside, the competitive restructuring of a network monopoly that started the wave of such reforms twenty years ago did not fit this model of prudent reform. Prime Minister Margaret Thatcher announced that the England and Wales electricity system would be privatised as a restructured competitive industry within two years, even though at that time nobody knew how, or even whether, competition in electricity could be made to work at all.

2.5. The Importance of Real Experience

Real events in the real world can be more informative and convincing than any economic theory or cost-benefit analysis. The Commission should study the microeconomic reforms and experiments now taking place in various parts of Australia (and elsewhere where relevant, although in general Australia is ahead of the pack in water), particularly those involving competition, and use these to illustrate its conclusions and recommendations.

The most important microeconomic and competitive innovations to date have been in smaller, regional water authorities. For example, as noted at the Commission's Melbourne Workshop, Victoria's Coliban Water has provided transportation services to some of its customers that have purchased water in the temporary rural water markets, and has been trading in the rural water market on its own account. These activities illustrate the value of trade between rural and urban markets and (as discussed further below) have implications for the possibility of competition and how it might be implemented within urban markets.

Another example, cited in the Commission's Issues Paper, is the creation by Gladstone Area Water Board (GAWB) of tradeable contractual water entitlements. Analysis of this innovation - and the extent to which it may improve efficiency - could shed light on what is needed to create meaningful competition within an urban water system.

A common feature of the Coliban and GAWB experiences is that, in those cases, network management issues are not complex, or at least have not emerged yet, perhaps because drought conditions have created excess network capacity. One of the key questions in analysing such arrangements should be their workability under a wide range of supply, demand and network conditions.

Another feature shared by Coliban and GAWB is that the organisations are relatively small and flexible and there is proactive leadership from the board and management. Change seems to be more difficult for the large, more complex metropolitan water utilities. It may be that fostering effective change in smaller regional water utilities is a good way to develop experience and confidence that in time will flow over to larger metropolitan water utilities.

3. THE POLITICS AND PROCESS OF REFORM

Water is not electricity or gas, but all three are regarded as essential commodities, require networks with strong natural monopoly elements, and – largely as a result – have traditionally been supplied by vertically integrated monopoly 'public utilities' under government ownership or regulation. Meaningful microeconomic reform of any such monopoly utility always involves some combination of breaking up or at least 'loosening' the vertically integrated structure and using various forms of competition to improve the economic efficiency of the resulting parts. The politics and process of such a reform programme are much the same whatever the technical or economic details of the sector.

This section outlines some of the political and process lessons the authors have taken away from their extensive experiences in reforms of electricity and gas monopolies. Section 5 below outlines some technical and economic lessons from those experiences that may be

relevant for water. The discussion here assumes that a political decision has been made to significantly restructure the sector.

3.1. The Politics of and Objectives for Reform

The first steps in the process of reforming/restructuring a monopoly utility sector should be to identify the problems that need fixing, set the objectives of reforms to fix them, and define the types and extent of reforms needed to accomplish those objectives. This is essentially what the Commission has been tasked to do in this Inquiry. Some thoughts on how the Commission should do this are presented in Section 2 above and are not repeated here.

Reforming a monopoly public utility always has a significant political dimension. Experience clearly shows that significant reforms are seldom successful without strong leadership from the top. Such leadership is needed both to provide the resources needed for significant reforms and to overcome the inertia of incumbents and the pressures from special interests. The clearest successful examples of this proposition are the Victorian electricity and gas reforms that were driven by the Kennett/Stockdale government. The clearest unsuccessful example is the California electricity market disaster.[6]

Although political leadership from the top is essential, the implementation authority must be vested in the appropriate level of government. One reason the national electricity and gas reforms in Australia were effective was that the Commonwealth focussed on gaining agreement to reform principles, desired outcomes and monitored milestones, but left the detailed definition and management of reforms to State governments. The message for any urban water reform programme should be clear.

3.2. Defining Clear Objectives for the Sector

As discussed in Section 2.2 above, the Commission can/should propose objectives for *the reform process*, one of which should be the definition by political and sector leaders of a clear set of objectives *for the sector*. In our view water sector decision makers are often bound by or required to consider many objectives, policies and principles that can be ambiguous, inconsistent or even unworkable. The Commission has previously argued the importance of clear sector-specific objectives and suggested these be incorporated in an 'objects clause' in the law governing the sector.[7] This approach was accepted by

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[6] The initial impetus for electricity restructuring in California came from the Public Utilities Commission (PUC), not the political leadership of the State. The PUC had ways to 'persuade' the utilities to 'do something,' but no effective way to control what they did, with the result that the utilities, large customers and traders such as Enron took over the market design process. Once those parties had agreed the design among themselves, they struck a (literally) back-room deal with political leaders who had not been involved in the process and did not understand the substance of the reforms. The result was a disaster. California has since implemented a more successful electricity market.

[7] "Ministers, regulators, tribunals and the judiciary responsible for implementing and enforcing regulatory arrangements are guided by objectives, often in the form of an objects clause. The

governments and led to such clauses being incorporated into the National Electricity Law[8] and the National Gas Law.

We recommend that the Commission consider calling for a similar objects clause for the urban water sector. Objectives that are binding on decision makers can be a powerful driver for more efficient and consistent regulation and reform implementation. An objects clause for urban water should include objectives related to the interests of the public as consumers of both water and 'environmental services'.

Economic and service objectives

As an example of objectives related to the interests of consumers, consider the objects clause for the National Electricity Market[9]:

> The objective of this Law is to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to-
>
> (a) price, quality, safety, reliability and security of supply of electricity; and
>
> (b) the reliability, safety and security of the national electricity system.

The emphasis given to "long term interests of customers" encompasses the aspects of electricity that are of primary concern to consumers – sustainable prices, and high standards of quality, safety, reliability and security of supply.

Environmental Objectives

The environmental parts of an objects clause for the urban water sector should not suggest that water system managers and regulators can or should make trade-offs between water supply and environmental objectives. At the operational levels relevant to urban water system management and regulation, environmental values can and should be defined by some combination of constraints and demands for environmental water determined by 'higher' environmental and political authorities. An objects clause for the urban water sector should refer to cooperating with the processes that define environmental standards and water demands and to complying with environmental standards and meeting water demands efficiently.

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more clearly specified the objectives, the more effective is the guidance to regulators." *Productivity Commission Review of the Gas Access Regime, Inquiry report, August 2004*

[8] Geoff Swier was a member of three person expert panel providing advice to the Ministerial Council of Energy on the definition of the objects clause for the National Electricity Law and the National Gas Law.

[9] Section 7, National Electricity (South Australia) Act 1996

3.3. Managing Reform and Governing the Sector

Once it has been decided politically to restructure a monopoly sector, effective implementation and decision-making processes for the reform programme must be put in place. And one of the main objectives of the reforms should be to put in place equally effective processes for the reformed sector. Without such processes in place both during and after the reform process, the reforms can be ineffective – or worse.

Clear responsibilities, delegation and resources for reform

Authority to make implementation decisions should be vested in a well-defined group, with a high-level official – e.g., the State Treasurer, in the Victorian cases – having final say. Detailed design should be delegated to a full-time team with the authority and budget needed to get high-quality independent expert advice. Active advisory committees should be established to get technical and economic information and advice from those now in the sector and from potential new entrants, but neither incumbents nor potential entrants should make policy decisions or dominate the work programme.

If a complex sector is being significantly restructured, computer modelling will usually be required, both to inform debate and decision-making and to educate and train a wide range of stakeholders including technical experts, market operators, industry managers and senior policy makers.[10] Such tools were indispensable in the early stages of electricity and gas market reform in Australia and elsewhere. The same approach should be considered for design, testing and education about the details of competitive urban water market design.

Institutional and governance arrangements for the sector

An important objective of microeconomic reform should be to create institutions and governance arrangements that encourage good decision-making in and for the reformed sector.[11] The overarching principle is that policy, commercial, ownership and regulatory functions should be clearly separated in competent and accountable entities. The continuing success of the electricity and gas industries in Australia owes much to the quality of the decision-making processes that were put in place during the reforms.

Good managerial decision making processes involve:

- transparently defined reliability / system security objectives
- robust processes to assess needs (e.g., demand forecasting, quality assessments, etc.)
- consistent reliable data to inform urban water market operations and planning
- identification and analysis of all feasible options, with none rejected prematurely

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[10] The authors were involved in developing computer simulation tools for the Victorian and National Electricity markets and the Victorian gas markets. Market Reform is presently undertaking early-stage work of a similar nature in the urban water sector.

[11] Where reforms have failed, most notably the California electricity market reforms of the late 1990's, the root cause has been poor institutional and governance arrangements.

- transparent and rational criteria for assessing alternatives
- good business case and risk assessment processes
- effective processes to choose delivery strategies
- where appropriate, use of competitive processes to ensure efficient costs
- timely decision making
- good corporate governance processes.

At the core of this decision making process is a high level of technical and managerial competency, and appropriate systems of incentives and accountabilities.

The institutional and governance arrangements in the Australian National Electricity Market provide a good example of what the reform process should aim for. These arrangements allocate decision-making responsibilities logically and clearly among government ministers, professional managers and technical experts, incorporate a high level of transparency and are designed to work well in stressful situations as well as in normal times. They have been quite successful.

Put simply, the governance arrangements in the reformed sector (and during the reform process as well) should be designed on the principles that 'managers should manage' and should be accountable for their managerial decisions, while politicians should make the political decisions for which they will ultimately be accountable to the voters.

4. IMPROVING EFFICIENCY IN URBAN WATER

The Commission is to report on the "opportunities for efficiency gains in ... the Australian urban water and wastewater sectors." (ToR, p. 1) Such opportunities should be sought, not only within the urban water utilities *per se*, but in related parts of the sector that now do or in the future could supply or compete with the water utilities; for example, there could be significant efficiency gains in the urban water sector if there were more rural-urban trade and fewer rainwater tanks. Efficiency in the urban water sector, so defined, is discussed in this section in each of the three commonly-used headings of productive, allocative and dynamic efficiency.

4.1. Productive Efficiency

Improving productive efficiency in the urban water sector is a matter of giving consumers the final water-related services they value at lower cost given current technology, processes and (e.g., environmental and social) policy objectives. In principle, identifying opportunities for productive efficiency gains is a matter of defining a counterfactual in which customers receive the same final water-related services they do now but at the lowest possible cost given the same technology, etc. and comparing that counterfactual to the actual situation. A more practical approach is to compare or 'benchmark' costs across sectors internationally or within Australia; while this could be explored, we doubt that this type of analysis would be of much value given that even efficient costs for different urban water sectors depend on history, geography, etc.

The most practical way to identify opportunities for productive efficiency gains is to identify specific steps that might lower costs in a specific situation and estimate the potential cost savings. For example, in Melbourne it would be possible to estimate such things as the opportunity cost of not purchasing rural water entitlements given the higher costs of the solutions actually implemented. And it would be possible to estimate the excess costs of schemes such as mandated recycling targets and rainwater tank subsidies, which are likely to be high compared to the costs of easily identified alternatives, even without identifying the ideal least-cost alternative. Such an exercise would provide an approximate but useful estimate of the potential for improving the sector's productive efficiency and how it might be done.

4.2. Dynamic Efficiency

Improving dynamic efficiency in the urban water sector is a matter of improving the quality of investment decisions and stimulating the development and implementation of cost-effective innovations.

Improving Investment Decisions

Investment decisions in the urban water sector would be greatly improved if water utilities (and others, such as large users) had more flexibility in managing uncertainty about water inflows. High-variable-cost/low-capital-cost supply options – including improved access to temporary rural water markets – might be maintained in stand-by mode to deal with droughts. Improved scarcity pricing could reduce the economic (although perhaps not the political) cost of reducing water use temporarily, thereby making it more feasible to defer major capital investments (e.g., desalination) longer.

Decisions about such flexibility-enhancing options and about when/whether to commit to inflexible options can be informed by 'real options' analysis, which considers the value of delaying an irreversible decision until more information is available. We understand that such analysis applied to recent desalination plant decisions suggest that delaying commitments in some cases could have saved something like a billion dollars in costs (in expected present value terms).[12]

The implications of this recent experience for the Commission's Inquiry are not just that governments should use better analysis to make better investment decisions. The implications go to such matters as the value of scarcity pricing and more urban-rural water trading, which would not only lower costs during a drought but could also provide the time and flexibility needed to find and implement better investment options. More fundamentally, any reforms that reduce political influence over the industry are likely to improve investment decisions – even if such an effect is difficult to capture in a cost benefit analysis.

[12] ACIL Tasman performed such an analysis, which was reportedly available to decision makers prior to the Sydney desalination decision. Professor R. Quentin Grafton of ANU and his colleagues have produced a similar analysis, albeit perhaps too late to have affected the actual decisions.

Stimulating Efficient Innovation

The recent Cave Review[13] of competition and innovation in water markets states, and we agree, that 'in assessing the scope for, and benefits of, reform .... over the long term, on-going customer gains and environmental improvements are driven primarily by innovation'.

A number of participants at the Melbourne Workshop mentioned the importance of innovation in urban water, citing interesting experiments being undertaken in various areas. We agree that the apparent increasing scarcity of natural water and the relative immaturity of current new technologies (e.g., manufactured water) have created the potential for significant innovation in technologies and business models in the sector, and that policies to encourage innovation should be developed and implemented. But not all new ideas are good ideas – in fact, many of them may not even be new, but may be old ideas that have been given a new lease on life by bad policies. A healthy innovation process will try many ideas that are not successful in the end, but it will also have ways to identify and weed out the failures before they absorb too many scarce resources that could be used more fruitfully elsewhere.

To assess the potential for improving dynamic efficiency by stimulating innovation, the Commission could look to the literature for evidence from industry deregulation, examine the work of the Cave review and consider anecdotal evidence.[14] Innovations are by definition difficult if not impossible to predict in advance, making this an area in which benefit cost analysis of reform is particularly problematic.

4.3. Allocative Efficiency

Allocative efficiency in the urban water sector is improved by reallocating water (and all other scarce resources, for that matter) from users and uses for which it is less valuable to users/uses for which it is more valuable. The most effective way to accomplish this is to improve water pricing and remove artificial obstacles to water trading.

Improving Water (Scarcity) Pricing

In economic theory, allocative efficiency requires a volumetric or usage charge (e.g., in $/kL) equal to the short-run marginal cost (SRMC) of consumption, defined as the increase in all present and future costs (in expected discounted present value terms) caused by incremental consumption today. Water prices, particularly at the regulated retail level, almost always and everywhere fail badly to meet this efficiency criterion. This is primarily because SRMCs are volatile and difficult to calculate, so regulators typically base prices on various *ad hoc* measures of 'long-run marginal cost' (LRMC). It is understandable that they do so, because

[13] *Independent Review of Competition and Innovation in Water Markets: Final report*, Professor Martin Cave, April 2009

[14] For example the unexpected emergence of the coal seam methane industry in Australia, which is in part due to deregulation of the gas industry.

'LRMC' prices are easy to calculate, stable and more-or-less cover total costs. Their only drawback is that they are almost always 'wrong', i.e., inefficient. [15]

Even those who insist that LRMC is the efficient price 'most of the time' sometimes concede that a scarcity price might be more efficient during droughts. But the scarcity price and SRMC are always one and the same thing (when both are properly defined). It is just that the inefficiency of the LRMC price becomes obvious during a drought when the SRMC/scarcity price is so much higher.

As long as urban water supply is a monopoly function, pricing at LRMC can work 'well enough', except perhaps during droughts – and maybe even then, considering the dramatic drop in water use and apparent public approval of restrictions during the recent drought. But the inefficiency of current prices will become more costly and obvious if/as the movement toward competition continues.

As competition in and around urban water systems increases, inefficient – e.g., LRMC – volumetric prices at the wholesale level will give the wrong price signals for conservation, recycling, sewage mining, desalination plant operations and investment. There will be either too much or too little competitive entry, although the political pressure to price (e.g.) third-party access (TPA) so that it 'happens' is likely to result in too much of it – until the costs to consumers become too high and the bubble bursts. (Think roof-top solar panels in NSW.)

The Commission should make more efficient – i.e., SRMC/scarcity – pricing, particularly at wholesale level, a major theme of its reform recommendations. The objective of doing so would not be so much to get regulators to abandon LRMC for SRMC as the basis for regulated retail prices, which may always be impractical. The main objective would be to emphasize the close link between the efficiency of pricing and the efficiency of competition. It is essentially impossible to have one without the other.

Rural-Urban Water Trading

At the wholesale level, the major allocative efficiency issues affecting urban water are the artificial barriers to trade and resulting price disparities between urban and rural water. The Commission will be familiar with the arguments on this issue and will be well aware of the political problem in allowing rural-urban trade, particularly with large metropolitan water systems.

The case for market competition between rural and urban water is particularly compelling where rural-urban trade is practical with the existing infrastructure, which it often now is or soon could be, at least where irrigation water is concerned. It may be useful for the Commission to present analysis demonstrating that the small percentage of rural water needed to fill the urban supply gap even under drought conditions, combined with the large difference between rural water prices and urban water costs, should, if required for political

[15] For more on this subject, see Section 3.1 in Larry Ruff's review of the assessment reports in Topic 4, Pricing and Economic Reform, of the National Water Commission's current project on urban water reform.

reasons to, make it relatively easy to compensate the rural losers from trade and still leave the community better off.

5. COMPETITION IN A NETWORK SECTOR

Urban water is not electricity or gas, but all three are network commodities. Reviewing the policies and mechanisms that have been successful – as well as those that have been unsuccessful – in facilitating efficient competition in electricity and gas might be useful for understanding what policies and mechanisms might work for urban water – if they are carefully adapted and extended to accommodate the different characteristics of water.

Over the past 30 years or so, competitive reforms in electricity[16] have broadly moved through three steps. The first step is competition ***for*** the market, implemented as the 'single buyer model' in electricity. The seemingly logical second step is third-party access (TPA), in which the vertically integrated monopoly is kept intact but required to provide (at regulated prices) the network services a competitor needs to compete in the provision of the commodity to those final consumers eligible to 'shop' for supplies. The third step is to unbundle the utility into its naturally monopolistic and naturally competitive parts, require the residual monopoly(ies) to provide their still-regulated services to all competitors equally, and let competition ***in*** the market begin.

This section discusses the above three typical steps toward competition in a network sector and the insights that have been gained from experience in electricity. It then outlines the key breakthrough that made competition in the market possible on a network: the integration of trading with system operations.

5.1. Contracting Out and Competition *for* the Market

The initial approach to introducing some degree of competition into a network monopoly is called 'competition ***for*** the market', or the 'single buyer model' in electricity. In this approach, the investment planning process used for the monopoly continues to decide how much new capacity is needed when, and then seeks bids from competitive entities to build and perhaps own and operate the supply facilities identified by the monopoly process. The identified supply addition can be defined in more or less detail, giving the bidders less or more freedom to use their own technology and ingenuity in the design of the facility. The successful bidder may simply build the facility that the utility will own when it is finished (which is simply contracting out the construction), or it may build, own and operate the facility indefinitely (a 'BOO' process/contract) or it may own and operate the facility for some time and then transfer it to the utility (a build-own-operate-transfer or 'BOOT' process/contract).

[16] Reform in gas (outside Victoria) has usually proceeded somewhat differently for historical and technical reasons.

The benefit of such competition for the market is that it can expose some of the monopoly's design, procurement, construction, fuel supply and operating practices to competition, depending on how much freedom the bidders have in choosing technologies and designing the project. What a single buyer model does not do is expose to competition the central planning process itself, or the processes used to procure and contract the overall project. Depending on the details, such a process can even create perverse incentives, e.g., a BOOT contractor that knows it will transfer the facility in ten years may design and build it to last eleven years and then let it deteriorate as year ten approaches. There are many examples where 'single buyers' have invested excessively in new BOO/BOOT capacity of the wrong type, entered into poor contracts and/or been corrupt.[17]

5.2. Third-Party Access (TPA)

After being disappointed in the results of competition for the market via contracting out and BOO/BOOT contracts, governments seeking to put competitive pressure on network monopolies have typically turned next to third-party access (TPA). The usual result is that nothing, or at least nothing good, happens.

The theory of TPA is that the vertically integrated monopoly can be left in place to serve protected consumers while being required to make its network facilities and services available to third parties who want to compete for other customers; the only thing required is 'the right' set of TPA prices (and other access conditions) for all the monopoly services the third parties need to compete efficiently. But in practice, there are no realistic TPA prices that will result in effective and efficient competition between third parties and the integrated monopoly, or at least there is no practical way to find and enforce such prices given information asymmetries and other regulatory realities. So TPA typically accomplishes little, a conclusion that is consistent with experience in the Australia and UK water sectors.

This is not to say that TPA cannot accomplish anything. In fact, it can accomplish anything that regulators and/or politicians decide consumers should subsidise enough to make it happen, from getting a desalination plant built to getting rooftop solar panels installed – anything, that is, except creating real competition for the benefit of consumers. When subsidised TPA is put in place it often/usually creates a bubble in which the only winners are third parties who get in early and then get out before the bubble bursts.

Perhaps the most useful things about trying to implement a TPA regime are that doing so requires government to develop the various non-economic regulatory arrangements (such as a licensing regime) that will also be necessary to go beyond it, and that the frustrations and ineffectiveness of TPA can help build a political constituency for the only thing that really works: vertical unbundling.

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[17] See "The Single-Buyer Model, A Dangerous Path toward Competitive Electricity Markets". (Note No 225, Laslo Lovei, Public Policy for the Private Sector, World Bank, November 2000) The single buyer model continues to be applied in some developing countries where the system is not considered sophisticated enough for 'competition in the market' or where the main policy objective is encouraging strong investment to meet demand growth.

5.3. Vertical Unbundling and Competition *in* the Market

The best, or arguably the only, way to create effective and efficient competition in a network sector is vertical disaggregation or unbundling. The naturally competitive parts of the industry (e.g., customer services, contracting for supplies, and sales) are spun off into one or (usually better) several competing retail entities who compete with new entrants ***in*** the market for the commodity. The infrastructure monopolies are required to provide and price their services on a non-discriminatory basis to all the competitive retailers.

The key to the success of such unbundling is that the entity that controls the network is not a competitor in the market for the commodity itself, and hence – unlike the monopoly under TPA – has no incentive to make life difficult for those who are competing in the market. [18] Critics of such unbundling, including the vertically integrated monopoly, have argued (and still do) that such unbundling reduces the economies of scale, scope and coordination that justified vertical integration in the first place. They were certainly correct about this in electricity twenty years ago, before the concept of a central spot market integrated with system operations was developed and shown to be workable, as discussed next. There is still something to this argument, particularly when it comes to network planning. But such monopoly economies are often historical and static, while the main purpose of introducing competition is to get the forward-looking and dynamic efficiencies that come with innovation and better investment decisions. Any competitive reform involves costs, benefits and risks; it should be undertaken only if the benefits are likely to outweigh the costs, and with a well-considered (preferably phased and adaptive) implementation strategy to minimize the risks.

5.4. The Breakthrough: Integrating Trading with Operations

Vertical unbundling maintains the economies of scale in transmission and distribution by leaving these as monopoly activities. The fear that vertical unbundling in electricity would reduce economies of scale in generation began to lose its force with the development of gas-fired combined-cycle technology, which greatly reduced the size and construction time of economical generating plant. This left only the argument that vertical unbundling would destroy the economies of diversity, coordination and reserve-sharing that vertical integration provides.

Virtually by definition, a physical action anywhere on a network can have physical effects elsewhere, so the feasibility of any point-to-point[19] 'shipment' depends on what other

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[18] One reason rural water trading in Australia has been so successful is that the rural water sector is vertically unbundled – or, more accurately, has never been vertically bundled. The rural water available for irrigation and other 'economic' uses is controlled by and traded among (mostly) private parties, while the entities that control system operations (including reviewing proposed water trades for consistency with operational and environmental constraints) do not own or trade water themselves.

[19] If it takes time to move product between two physical locations in the network, or if there is storage within the network, a point/node has both a location and a time: e.g., water is shipped

shipments are occurring at the same time. These network externalities necessitate a central operator or coordination process to assure that all scheduled shipments are simultaneously feasible given the capacity of the network. But for the same reasons, decentralised trading on a network will be at best complex and inefficient, because two parties considering a trade cannot know if the network will be able to handle the required physical shipment unless they know all the other shipments that will be taking place at the same time. Devices such as tradeable physical capacity rights can allow decentralised trading on a simple 'radial' or 'no-loops' network, but on a meshed and potentially congested network decentralised trading will produce large inefficiencies and even security problems.

This problem was first solved during the vertical unbundling and privatisation of the state-owned electricity sector in England and Wales in 1990. The key was to integrate trading and pricing with system operations. The central dispatch process that had long been used to determine a more-or-less least cost way to meet total demand was converted into a spot market that considers all potential trades simultaneously to determine a set that maximises the total 'gains from trade'. This value-maximising solution will 'clear the market', in the sense that each participant will buy/sell the quantities its bids and offers indicated it wanted to buy/sell at those prices.

The first application of this concept in England and Wales was crude, but it worked. Over the years, this basic concept has been at the heart of all successful competitive restructurings of electricity systems and complex gas systems, including those in Australia. The applications have become much more sophisticated over time, with full network models being incorporated into some market-clearing engines. But even simple versions of this idea might be adapted to water to support market trading in complex urban – or even rural – water systems.

6. HOW IT MIGHT WORK FOR WATER

A large and complex urban water system has many of the characteristics of an electricity or gas network discussed in the preceding section. This suggests that efforts to create competition on such an urban water system will encounter many of the problems and ultimately adopt many of solutions discussed there. For example, that discussion suggested that TPA is unlikely to accomplish much, or at least not much good, on a complex urban water network, and the experience in Australia (and in the UK) to date seems to confirm this.

This section first outlines a conceptual urban water market based on the vertical unbundling and integrated spot market/operational process outlined in Section 5 above, and then outlines a phased, adaptive approach that might be used to explore the development of such a market on an urban water system.

from headworks reservoir A on Monday and arrives at balancing reservoir B the following Thursday.

6.1. An Illustrative Urban Water Market

Water systems are different from electricity systems, primarily because water can be stored and, because of seasonal and uncertain inflows, must be stored for long periods. But gas systems also have storage, just over shorter (e.g., daily instead of yearly) periods. The following steps in an illustrative annual urban water market are modelled after the daily market process used in the Victorian gas market.

- The 'water year' is defined to end at the expected time of minimum storage and is divided into (say) 12 monthly pricing/scheduling periods.
- Retailers and perhaps large water users have entitlements to inflow water where and when it arrives at the dams and perhaps contractual rights to desal and other sources.
- Prior to the first month of each water year, holders of source entitlements and contracts forecast the amounts, timing and costs of water available from their various sources and decide how much water to offer to sell at what prices in each month.
- Water retailers and large users forecast their demands and decide how much water to bid to buy at what prices in each month, including bidding for end-of-year water that they want held in storage for their individual accounts until next year.
- A transparent 'water security' process involving retailers, government officials, water experts, etc., defines operational storage policies (ideally) in the form of end-of-year water value functions that reflect the inverse relationship between the amount of water in storage at the end of the year and the value of that water.[20]
- A 'water security trader' bids for end-of-year water consistent with the end-of-year water value function; these bids are treated just like any other in the market process.
- A central market/system operator clears all twelve pricing/scheduling periods simultaneously to determine water release and delivery schedules for each month, including the amount of water scheduled for end-of-year storage for each participant and for the water security trader.
- All cleared/scheduled purchases and sales are settled at the market-clearing price for the year[21] that is determined along with the schedules.

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[20] In principle, there is no need for a 'water security' process or trader as suggested here; each market participant could decide for itself how much water to store for future use or sale. The suggestion here is based on the rebuttable presumption that 'leaving it to the market' is unlikely to be politically acceptable and perhaps not economically efficient because (e.g.) long-term property rights in stored water are unreliable. The need for and details of any such water security process would obviously be a major issue in any market design process.

[21] For simplicity this discussion assumes no congestion on the network, i.e., no storages are ever completely full or empty and no transport limits are ever reached. If there is congestion the price

- Prior to the beginning of each later month in the water year, the process is repeated for the remaining months of the year, using updated forecasts of inflows, demands, etc., to determine monthly quantities and a water price for the rest of the year; if the cleared quantities in this market differ from the quantities determined by earlier monthly markets, the increments are settled at the new price.

- The inflow entitlements and the water schedules define rights to water in specific months of the year and within specific 'trading zones' on the system.[22] Market participants are free to trade these time-and-zone-specific entitlements among themselves at any time. No system operations approval is required for such trades, though validation against prudential limits may still be required.

- Establish efficient (and politically acceptable) network prices that recover the costs of the monopoly network assets with efficient – or at least not grossly distorting – charging structures.[23]

There is obviously a lot more to any such process, particularly if binding network constraints make the price of water different at different times and places. But this description should convey the basic idea.

6.2. Steps Toward an Urban Water Market

The illustrative urban water market above is based on market concepts and processes that work well in electricity and gas, but no such market has been tried in water. It would not be prudent to take any significant steps toward such a market before undertaking a lot of preparatory work. But there are things that could (and, in our opinion, should) be done now to explore the concept further in some specific cases, e.g., Melbourne. In the series of steps below, each is low-cost and low-risk if the previous steps have been successful, and is potentially useful in its own right even if the process goes no further.

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of water determined in each monthly market can be different in different future months and at different locations.

[22] The trading zones are defined by constraints on the network. In the absence of congestion there can be a single trading zone -- the entire system.

[23] Network prices must be unbundled from commodity prices if there is to be competition for the commodity. Network costs as a proportion of total delivered costs are much higher for water than for electricity and gas, so network pricing will be an even larger practical issue in water reform than it has been in electricity and gas reforms. Network costs are mostly the fixed costs of infrastructure assets, and hence should be recovered through fixed charges; in other reforms, these fixed charges have been adjusted (usually by location) to offset the effects of other price and cost changes caused by the reforms. Given all the theoretical complications and practical constraints, there are no clear 'best' or 'most efficient' charges for recovering network costs; all the available options are 'second best' at best.

Develop the Concepts and Processes Further

The first thing to do is to develop further the concept of an urban water market, most usefully in the form of an illustrative model such as the one outlined above. Concepts such as the 'security water trader' and 'end-of-year water value function' need to be discussed and tested. The commercial implications for retailers and other potential market participants need to be explored and any required structural or institutional changes identified. Industry participants need to be involved in the development process, both because they need to be familiar with the concepts and because their experience and perspectives will be essential.

Define and Allocate Tradable Entitlements to Source Water

Rights to the natural water that flows into dams should be defined and allocated, presumably free to state-owned retailers (acting as agents for smaller consumers, who have paid or will pay most of the cost of catchment systems) and through competitive auction to large consumers. Rights to desalination plants and other costly sources of water (recycling, etc.) presumably are or will be held by those who pay for it as defined by contract.[24]

Determine How Complex/Congested the Network is Likely to Be

If the water system is simple and uncongested and is likely to stay that way for some time under essentially all plausible trading scenarios, the initial water market can be quite simple, perhaps even decentralised (as rural water markets are). But if the network is congested or may become so as demand increases and/or new trading patterns emerge, then a more sophisticated and centralised market will be needed. The only way to determine what is likely to be needed is to model the specific system and test a wide range of scenarios in that model.

Use the Network Model for Pricing and Scheduling

The model developed to test for complexity and congestion can be used to determine illustrative operating schedules and water prices. If/As these become more realistic and reliable, they can be used to inform the real scheduling process (e.g., Melbourne Water's Annual Operating Plan process) and to estimate water (SRMC/scarcity) prices for retail rate design, TPA pricing, off-system purchases and sales, etc.

Develop and Test a Prototype Market Design Model

Once the concepts have been developed further, the complexity and likely extent of congestion of the specific water system has been determined and the nature of water entitlements is known, a more complete description of the market and its processes can be

[24] The basic rights should be to source water, not delivered water. A right to delivered water would be a complex combination of rights to source water and rights to delivery services, but defining rights to delivery services is very complex on a complex and potentially congested water network. An end-user with rights to source water can get a delivery contract once the mechanisms and prices for such contracts have been defined.

developed and used to create a computer model of it. Testing and learning on such a model is critical to getting it right before attempting implementation.

Decide Whether and How to Proceed Towards a Real Urban Water Market

Only after a market process has been tested and adjusted until it 'works' should a decision be made about whether or not proceed. But even if the decision is to not implement a market at this time, the models and experiments necessary to get to the decision point will probably have produced benefits – in planning, pricing, education and training, etc. – that more than offset the costs.

7. INSTITUTIONAL REFORM OF THE URBAN WATER SECTOR

Somewhat separate to any recommendations the Commission may make on competition in the urban water sector is the question of whether any institutional reform would be desirable.

Institutional reform introduced in urban water sectors over the past 15 years, and more recently, the implementation of economic regulation have been broadly working towards the clear separation of policy, commercial, ownership and regulatory functions, discussed in section 3.3.1 above. Progress in implementing institutional reform in some jurisdictions has been affected by the recent drought. With the shift back to more normal conditions, there is an opportunity to review and reinvigorate the process of institutional reform.

In our view, key policy decisions made by governments will include decisions on such things as security standards (which involve making tradeoffs between supply risk and cost).

One of the lessons of the recent drought was that inadequate risk assessment had been undertaken to ensure that, as far as possible, institutional and governance arrangements would continue to work well in stressful situations.

Another area requiring attention is institutional arrangements for information. Electricity, gas and rural water reform indicate the need for consistent reliable data to inform ongoing urban water market operations and planning as well as to support moves toward enhancing competition.

Separately, or in conjunction with any recommendations on competition, we suggest that the Commission could recommend a COAG sponsored reform process that includes the following features:

- building on existing institutional and governance principles, articulate principles for 'good' institutional arrangements in appropriate detail[25] (perhaps with the principles being applicable for classes of urban water systems[26])

[25] Development of the principles would take account of best practice arrangements in the urban water sector in Australia and internationally. Arrangements for electricity and gas would also provide guidance

- an independent review should be undertaken by each jurisdiction of its institutional arrangements against the principles
- each jurisdiction should be encouraged to publish its response to the independent review.

8. SUMMARY

The key conclusions and recommendations of this submission can be summarised as follows:

- Policy objectives for microeconomic reform of the urban water sector should be defined separately from the policy objectives for the urban water sector *per se*.
- There is no 'one size fits all' approach to urban water reform, but this should not be allowed to become an argument against reform; it is really an argument for 'sizing' reforms properly, as the Commission should/will recommend.
- Quantitative cost-benefit analysis has limited applicability for microeconomic reforms that are intended to create economic incentives with ultimate effects that cannot be predicted in detail, much less quantified in advance.
- Advocates of competition ***in*** the market for urban water, which has never been tried, should define a low-cost/low-risk, phased and adaptive implementation strategy.
- Real experience is more informative and convincing than economic theory or cost-benefit analysis. The Commission should study the reforms and experiments being undertaken in Australia, particularly in regional water authorities.
- Reforming a monopoly public utility always has a significant political dimension. Experience clearly shows that significant reforms are seldom successful and can be disastrous without strong (and intelligent) leadership from the top.
- Clear objectives are critical. The Commission should consider calling for an objects clause for the urban water sector, similar to that incorporated into the National Electricity Law and the National Gas Law.
- An assessment of the opportunities for efficiency gains in urban water should consider the following:
    - Improving productive efficiency is largely a matter of identifying and taking specific steps that will lower costs – and avoiding doing things that will increase costs.
    - Allocative efficiency would be improved if the sector had more flexible ways to manage uncertainty and scarcity, such as scarcity pricing and more urban-

[26] Differences in institutional arrangements are probably required between large and smaller urban water authorities

rural water trading, and if investment decisions were based more on the results of (e.g.) real options analysis and less on short-term political factors.

- The scope for and benefits of reform should be assessed recognising that long-term and on-going customer gains and environmental improvements are driven primarily by innovation.
- The Commission should make efficient pricing (i.e. SRMC/scarcity pricing rather than LRMC pricing) a major theme of its reform recommendations, primarily to emphasize the close link between efficient pricing and efficient competition; it is essentially impossible to have one without the other.

- Policies to introduce competition into network sectors such as electricity and gas usually evolve in the following series of steps:
  - The first step is competition ***for*** the market, through contracting out and BOO/BOOT contracts. Such contracting can expose some of the monopoly's decisions and processes to competition, but does not get at the fundamental issues and has had at best a chequered history.
  - The second step is third-party access (TPA). This typically accomplishes little, or at least little good, as shown by experience in the Australian and UK water sectors. But TPA can get governments to take steps that are necessary to go beyond it, and can build a political constituency for the only thing that really works: vertical unbundling.
  - The third step is arguably the only thing that works on a complex network: vertical unbundling to create competition ***in*** the market.
  - The key concept for the success of vertical unbundling and competition in a network market is the integration of trading and pricing with system operations.
- Market concepts that have been useful for electricity and gas networks can be adapted to water and might be useful for creating water markets in large urban systems and perhaps even the more complex rural markets, while still respecting the unique challenges of water systems. An annual water market modelled on the daily Victorian gas market is outlined to illustrate the basic idea.
- A prudent approach to exploring to a large urban water system (e.g., Melbourne) could involve:
  - A series of steps, each low-cost/low-risk, and potentially useful even if the process goes no further.
  - Development of concepts, information and tools at each step that would be useful for (e.g.) retail and TPA pricing and analysis of operating and trading options.

  - A decision after each step about whether and how to proceed to the next, leading eventually to a real water market only if and when this turns out to be practical and useful.

- Institutional reforms in urban water over the past 15 years have moved toward clearly separating policy, commercial, ownership and regulatory functions. With the shift back to more normal conditions, there is an opportunity to review and reinvigorate the process of institutional reform. The Commission should consider recommending a COAG-sponsored review of institutional issues in urban water that would:
  - build on accepted institutional and governance principles to define specific criteria for 'good' institutions and governance in urban water
  - require each jurisdiction to undertake an independent review of its institutional arrangements against the criteria, and encourage them to publish the results.

[The authors' CVs follow as annexes]

Annex 1

DR LARRY E RUFF

Dr. Larry Ruff is an internationally recognised expert on the restructuring of electric and gas utilities to create competition and on the operations of the resulting competitive markets. Since early 2009 he has undertaken work to explore how this experience could be applied to microeconomic reform of urban water systems.

He is currently an independent consultant and a senior advisor to Market Reform, a consulting firm specialising in energy and environmental markets. Previously, he has been a vice president with CRA International, a Senior Vice President with NERA, and a Managing Director of Putnam, Hayes & Bartlett Inc.

Dr. Ruff lived in London for two years during the privatisation of the England and Wales electric supply industry, advising the Government, Regional Electricity Companies (RECs) and Independent Power Producers. He played a key role in the design of the pricing, regulatory and contractual framework, which amongst other things led to the creation of the initial Power Pool.

Following the successful implementation of the England and Wales electricity reforms he advised governments, market operators and utilities in Australia, New Zealand, the United States, Canada, Europe, the former Soviet Union, the Indian subcontinent, and Latin America on competitive restructuring.

Dr. Ruff advised the Energy Projects Division, Victorian Treasury, on the overall structure and operations of the Victorian electricity market, which eventually formed the basis for the Australian National Electricity Market. He was also the principal Gas Market Advisor to the Victorian Treasury where he developed the concept, now in operation, of an independent gas transmission system operator that uses a spot market to provide open access to the pipeline system.

In 2009 Dr. Ruff led an internal project for Market Reform to explore high-level economic and market concepts concerning the operation of an urban water market.

Current projects include

- Preparing review assessment reports on Pricing/Economic Reform and Legal Frameworks/Property Rights for the National Water Commission (NWC)

- Assisting Market Reform develop an economic optimisation model for an Australian regional water utility

Education: Bachelor of Science (Physics) with Honours, California Institute of Technology, 1963; and a Doctor of Philosophy (Economics), Stanford University, 1968.

Annex 2

GEOFF SWIER

Geoff Swier is a director of Farrier Swier Consulting. He has 25 years experience working in Australia, New Zealand and Asia focusing on microeconomic reform, water reform, and establishment of competitive energy markets and privatisation. He is also a director of Trustpower (NZ). Previously he was a part time member of the Australian Energy Regulator (2005-2008).

Geoff played a leading role in the Victorian electricity industry reforms in the period 1994 to 1999 and led policy and planning work for the reform of the Victorian gas industry.

Geoff was previously an economic adviser to the New Zealand Minister of Finance, Roger Douglas (1984-1987) and an adviser to the New Zealand Minister for State Owned Enterprises (1990).

He has worked in the Australian water industry since 2002 where his clients have included Queensland Water Commission, Murray Darling Basin Authority (MDBA), Melbourne Water, Department of Sustainability and Environment (Victoria), Sydney Water, Water Corporation, National Water Commission, IPART, ACCC, Essential Services Commission, and Water Services Association of Australia (WSAA).

Examples of recent water reform work include:

- Independent Review of the ACCC's water trading rules advice for the MDBA (2010)
- With Stratelytics, a US consultancy he collaborated in preparing two reports for WSAA on the use of Real Options analysis techniques for Urban Water Resource Planning (2007)
- Prepared a report for the Water Corporation (Western Australia) on industry structure options and models (2006)
- Undertook a review of relevant experience on promoting greater competition and urban water markets as input to the Victorian Competition and Efficiency Commission's Inquiry into Reform of the Metropolitan Retail Water Sector (2007)

Geoff Swier holds a Masters of Commerce (Economics) from the University of Auckland, 1981.