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Sydney's Water—A Suitable Case for Private Treatment?

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Until recently Sydney's water was captured, stored, treated, and reticulated by Sydney Water, a state-owned corporation. Sydney Water had been a statutory authority, the Sydney Water Board, until it was corporatized in 1995. The water supply system, designed in the nineteenth century and restructured in the mid-twentieth, drew on raw water that was of good quality by world standards, and until 1989 treatment went little further than screening, disinfection, and fluoridation. But water quality guidelines were becoming more stringent, and Sydney's raw water was coming under increasing stress.

After establishing that consumers were willing to pay for maintaining the quality, the board decided to contract for a privately built, owned, and operated (BOO) system for water treatment. Responsibility for harvesting and storing raw water and delivering treated water would remain with the board (and later, Sydney Water). Several factors persuaded the board to adopt the BOO system for water treatment. It faced major capital outlays to upgrade and expand wastewater treatment capacity. There was a growing likelihood that it would be corporatized, making a "delegated service" approach involving the private sector and providing access to a full range of international technology attractive. And the subsequent involvement of seventeen consortia in the "tournament" for the market revealed a level of competition likely to produce outcomes that the board, relatively inexperienced with filtration systems, would find difficult to match.

In 1993 the board contracted with two consortia—Australian Water Systems and North-West Transfield—for two water treatment plants. A third contract, for two more plants, went to another consortium, Wyuna Water, in 1994. Today these plants treat all the drinking water consumed in Sydney except for small quantities treated in several small facilities owned and operated by Sydney Water.

The private sector's involvement in treating Sydney's water came under increased scrutiny after widely publicized water quality alerts were issued in 1998. Tests of water treated at the largest plant showed apparently dangerous levels of the parasites cryptosporidium and giardia (which can cause human intestinal illnesses), and the Department of Health issued three separate "boil water" alerts, in July, August, and September 1998. The government later initiated a wide-ranging inquiry into the contamination (the McClellan inquiry). This inquiry led to changes that will affect Sydney Water's relations with the treatment companies.

This analysis of the Sydney experience through the bidding process and into the operations phase may provide insights for other agencies contemplating private provision of water treatment services. And these insights may be sharpened by what has been learned through the inquiry.

Choosing the operator

Once the decision had been made to involve the private sector in providing treatment systems, important questions arose about how many contracts should be awarded and what restrictions should be placed on successful tenderers. The board determined that three contracts would be awarded for the four proposed treatment systems, combining the two smallest systems under a single contract. The successful bidder for the largest project would be ineligible to tender for the other two. Under the protocol

for accepting bids, only bidders that had not successfully bid for one of the other contracts, and that met the minimum acceptable technical standards, would be considered.

The initial allocation of bargaining power under these procedures partly determined the basis for any negotiations required during the life of a contract. For example, if it became necessary to expand plant capacity during a contract, the water treatment company would need to renegotiate water tariffs to recover its expansion costs. By opting for several operators, the board gained access to information from each that can be used as a benchmark in assessing the performance of the others and in negotiating tariff adjustments. It also gained access to a wider range of water treatment technologies, strengthening its hand in future expansions and upgrading.

This approach has costs, however. For example, the successful bidders for the second and third contracts may not have been the lowest-cost bidders meeting the board's minimum technical specifications. And if firms could win all three contracts, they might offer more attractive bids, reflecting size economies and any expected benefits in subsequent bargaining. The board minimized the cost to the system of this exclusionary protocol by awarding the largest of the three contracts first.

The winning bidder for the largest plant, the Prospect plant, was the lowest cost by a substantial margin. But the selection process gave no extra weight to tenderers that could offer superior quality. The overriding consideration appears to have been the capacity to meet Sydney Water's specified requirements at the minimum price. This emphasis on price over quality has been one source of the recriminations that followed the contamination.

Two other factors affected the selection process. The board prepared its own reports and design plans, giving it a fallback option should the BOO approach have to be abandoned for some reason. The detailed process specification in these studies, later provided to the tenderers, yielded important time and cost savings to those that were successful. The board also established a capability to assess bids and negotiate the final terms of water treatment agreements, incurring substantial costs in setting up a new legal and commercial "infrastructure." The board wanted to be able to deal with the risk-sharing implications of the BOO path, and the board's legal advisers had recommended that it cover contingencies in great detail and anticipate a wide variety of specific events that could affect its risks.

Despite this effort, at least one influential official review (the state auditor general's 1996 annual report) has suggested that at least for the largest plants, the resulting contract leaves substantial residual risk with Sydney Water and its owner, the state government.

The water treatment tariff structure

Details of the water treatment tariffs under the contracts have not been fully revealed, but the tariff structures for all plants are understood to be similar. The tariff structure agreed for the Prospect plant has two parts. First, an availability charge is fixed, independent of the volume treated, to cover about 80 percent of the financing, establishment, and fixed costs incurred by the water treatment company in the timely construction and operation of the plant. Penalties are charged in the event of breakdown. Second, a usage charge is set as a megaliter rate that declines with quantity. The agreed tariffs are subject to change if the treated water falls short of the quality specified in the contract or if the raw water supplied for treatment either exceeds or falls below the range of quality established over the previous twenty-five years. This tariff structure has important implications for risk sharing.

Risk sharing

The board put the tariff structure in the benchmark tenders to provide what it considered adequate protection for the financiers against the financial risks associated with the projects' large fixed costs, while leaving the consortia

to bear risks relating to volume-related operating costs. It priced treatment at cost at the margin to protect consumer interests. And as the following paragraphs show, the board structured the water treatment agreements according to the principle that risks should reside with the parties best able to assess and manage them.

Completion and commissioning risks

The water treatment company was responsible for completing the project on time and to specifications that met agreed acceptance tests demonstrating that the plant was ready for continued use at the required capacity. The water treatment agreement assigned the completion and commissioning risks to the water treatment company through the availability part of the tariff (set at US$38,240 a day for the Prospect plant), which was based on the fixed costs expected under timely completion of construction.

Market risks

Although the fixed availability charge in the tariff partly insures the water treatment company against plant usage that falls short of the designed capacity, the company otherwise bears the risks of fluctuating demand from Sydney Water by agreeing to meet all demand. The contract specified that Sydney Water must assist the water treatment company in designing capacity to meet demand by providing information on its demand management strategy, including demand projections for the next two, five, and ten years. This requirement is supported by the exclusive right conferred on the treatment company to supply treated water to existing service areas.

Granting exclusive rights to treat water for a designated market involves tradeoffs. The government—through the board—has tied its hands with respect to competition for the contract-winning treatment plants, including competition from recycled water for nonpotable uses that Sydney Water might have otherwise supplied to some users. But the contracts should reflect this exclusivity in the terms offered by the treatment companies. Because the full terms of the contract are not public, however, the effects of the exclusivity cannot be assessed.

If the board's demand projections miss the mark in future years and capacity increases are called for, the contract provides for tariff adjustments to shift the risk arising from inadequate projections away from the water treatment company. Shortfalls in projected growth in water sales will leave the treatment company's net revenues at risk.

Performance quality and quantity risks

Risks relating to quality and quantity performance lie with the water treatment company as long as they do not involve plant expansion, in which case the risks would be shared through a renegotiated tariff. If the water treatment company fails to meet quality standards or required volumes, Sydney Water has recourse to three measures: tariff reduction or nonpayment, step-in rights, and termination of the contract. Monitoring provisions give Sydney Water the right to satisfy itself that the water treatment company is operating and maintaining the plant in accordance with the water treatment agreement. If Sydney Water finds that the company is failing to do so, it will notify the company, which must respond with an action plan to be agreed upon. The company will carry out approved quality tests whose results will be subject to audit, and Sydney Water will have the right to conduct its own tests. Disputes over results will be settled by a third party.

These aspects of the contract came under the spotlight in 1998, with inconclusive results from water quality testing at the heart of the contamination crisis that embroiled Sydney Water and the Prospect plant.

Upstream risks

Initially Sydney Water was responsible for operating and maintaining assets "upstream" of the treatment process. These included the catchment, the river systems within it, and any canals, pipelines, dams, and reservoirs used in storing

and reticulating the raw water. In announcing its catchment management policy during the bidding process, the board committed itself to a set of environmental standards to reduce uncertainty for tenderers. As explained below, the 1998 contamination scare led to reassignment of the catchment management responsibilities—to a newly constituted Sydney Catchment Authority, separate from both Sydney Water and the treatment companies. The creation of this new player will add another layer of contractual responsibilities and regulatory requirements, as Sydney Water will purchase its raw water from the Catchment Authority and have it treated by the private treatment companies.

Raw water supply risks

While the risks relating to the output (clean bulk water) reside entirely with the water treatment company, risks relating to the variable quality of the input (raw water) are shared by Sydney Water and the company. The quality of the raw water harvested in Sydney's catchments is only partly controllable because of storms and floods and an outer catchment that is not fully protected and is only partly developed. The water treatment agreement accounts for this partial control by specifying that, to avoid a penalty tariff under the terms of the contract, Sydney Water must provide raw water whose quality does not fall below the range established over the past twenty-five years. As originally conceived, this provision gave Sydney Water an incentive to manage its catchments so that raw water quality was at least maintained in that range. With the creation of the Catchment Authority, Sydney Water will need to shift the risks associated with raw water quality back to the Catchment Authority, where the control lies. How this will be done through a raw water tariff structure for sales from the Catchment Authority to Sydney Water remains to be determined.

Operations and maintenance risks

The risks of operating and maintaining the plant—functions that include providing staffing, skills, chemical supplies, power, process control, and disposal—reside with the water treatment company. This accords with the company's full autonomy in daily operations under the water treatment agreement. The operators expect that contracts will be renewed at the end of the contract period. This expectation and a provision allowing Sydney Water to buy the plant assets at a price based on its own evaluation provide incentives for the operators to avoid running down the assets toward the end of the contract period.

Financing and economic risks

The water treatment company carries the risks of changes in interest or inflation rates during the construction period. But once the plant is commissioned, an indexing formula will take effect that will allocate the risks of inflation and changes in operating costs between the company and Sydney Water. Few details have been revealed about this important aspect of risk sharing.

Technology risks

The water treatment company bears the responsibility for technology, which must be proven and must meet required standards and specifications. But the contract specifies that changes in water quality requirements that call for new technology will trigger a renegotiation of the tariff, thereby sharing the risks of unforeseen changes in the standards agreed to in the water treatment agreement.

The water treatment agreement specifies contractual terms for technology transfer to Sydney Water and serves as the basis for a collaborative and cooperative relationship between Sydney Water and the water treatment company. The water treatment company is expected to keep abreast of technology, perform on-site research, and share findings with Sydney Water. This expectation is formalized by a component in the negotiated tariff to cover research and development costs of the water treatment company.

Natural disasters

In an emergency, whether or not caused by natural disaster, Sydney Water has the right to take whatever action it deems necessary to safeguard the system's security and maintain supply, including bypassing the treatment plants. In such events Sydney Water will compensate the water treatment company, reimbursing access fees and treatment costs.

An independent assessment of risk sharing

In 1996 the state's auditor general drew attention in his annual report to what he saw as unbalanced risk sharing implied by the water treatment tariffs for the Prospect plant. Pointing to the high coverage of the water treatment company's fixed costs in the availability charge paid by Sydney Water, including provision for a return on capital, the auditor general concluded that Sydney Water was the de facto owner because it faced nearly all the residual risk and that it should recognize this on its balance sheets. Sydney Water challenged this view. It pointed to the substantial uncovered construction and precommissioning risks borne by the consortium that needed to be factored into the availability charge. Some clarification of risk burdens can be expected as the costs of the 1998 contamination crisis are assigned.

Regulated pricing and the BOOs

The Government Pricing Tribunal of New South Wales was established in 1992 to review and set prices for services considered government monopolies, including those of the Sydney Water Board. The tribunal (now the Independent Pricing and Regulatory Tribunal) regulates Sydney Water's prices through an incentive-based approach by capping its revenues and setting access and usage charges. Its approach to the BOO treatment plants has been cautious. The tribunal stated that it will not automatically pass on cost increases to customers and that it will pass on only increases that can be justified on economic or environmental grounds. Nevertheless, the tribunal has sanctioned progressive usage price increases for customers based on filtration contract costs.

In 1996 the price regulator determined a medium-term (four-year) path for Sydney Water's prices to its customers. It conducted a mid-term review of these prices in 1998. It has passed on the full costs of the treatment tariffs to customers so far, and has identified them as a separate item in statements of Sydney Water's revenue requirements. The increase in the per-kiloliter tariff will raise prices by about 28 percent over five years.

Environmental regulation and the contamination crisis

Critics have argued that the treatment plants reduce the incentives to improve catchment management and that better catchment management is an alternative to more intensive treatment. The tariff structure in the water treatment agreement, however, recognizes that abnormally low raw water quality will raise treatment costs for a given standard. By shifting the risk associated with poor catchment management back to Sydney Water, the tariff structure was designed to provide an incentive for Sydney Water to manage the catchment well. The agreement also provides for a discount in the tariff for raw water of exceptionally high quality. If Sydney Water had built and operated the treatment plants itself, there would also have been incentives to find efficient combinations of treating water and improving catchment management.

Since construction and commissioning of the Prospect plant and the three smaller plants, Sydney has lost confidence in the capacity of its treatment plants to deliver water of acceptably safe quality. The detection of giardia and cryptosporidium—in some cases at extremely high levels—in monitoring and testing by Sydney Water closely followed unusual climatic conditions in the catchment supplying the Prospect plant. The contract does not explicitly refer to the removal of these pathogens, relying instead on a turbidity requirement. There is little understanding of what causes a high incidence

of cryptosporidium, although both it and giardia are thought to be related to turbidity. This limited understanding appears to be reflected in the treatment contracts and is certainly emphasized in the reviews of the 1998 incidents.

The extensive inquiry that followed the contamination crisis leaves some key matters unresolved. The reasons for the high levels of pathogens found in the distribution system during the first event have not yet been satisfactorily explained, according to the inquiry report. They remain a matter of dispute between the Prospect plant treatment company, which claims the high levels were misidentified by Sydney Water's testing arm, and Sydney Water. Because of the extreme turbidity of the raw water that had to be treated at the time of the second and third events, it seems that pathogens were washed through the treatment plant. But the extreme conditions have made it impossible to establish whether the plant continued to operate efficiently and according to its design specifications.

Interestingly, no increased incidence of attributable illnesses followed the events, raising important questions about the consistency of the water quality testing procedures over time and the appropriateness and adequacy of current testing procedures.

Nevertheless, these episodes and the following analysis caused the inquiry to recommend a suite of measures:

- Separating catchment responsibilities from Sydney Water while leaving it as a distribution operator contractually tied to the treatment company.
- Revising monitoring procedures and introducing independent testing.
- Revising Sydney Water's operating license, and issuing an operating license for the new Catchment Authority with explicit health and environmental responsibilities.
- Revamping the licensing powers and responsibilities of the license regulator.
- Releasing all details of the treatment contracts other than those that would clearly damage the commercial interests of the contracting parties.

The inquiry did not recommend the costly option of augmenting the treatment plants "at this stage." Nor did it specify operating standards that set limits for giardia and cryptosporidium.

Conclusion

The BOO option adopted by Sydney Water for its new treatment plants has already received much scrutiny. Soon after the plants came on line the minister responsible for Sydney Water's operating licenses advised its price regulator of his satisfaction with the plants' compliance with most operating requirements, including national water quality standards. The price regulator established a medium-term price path that reflects the increased costs of treatment, but without committing to an automatic cost pass-through.

But the fallout from the 1998 contamination scare, the cross-claims between Sydney Water and the Prospect plant treatment company, and the contract provision for a treatment tariff sensitive to the quality of raw water will all put the contractual relationship to the test. Sydney Water, as the treated water retailer, faces large compensation payments to customers. How the costs will be shared with the treatment company and future consumers is yet to be resolved.

What were essentially bilateral monopolies created by the contracts, with Sydney Water buying treatment services and selling to customers at a regulated price, will now be further complicated by the creation of a separate statutory authority selling raw water to Sydney Water at a price to be regulated.

These events, along with earlier official expressions of concern about risk sharing, have led to a call for greater transparency in the contractual arrangements already in place. Any future concession contracts in the Australian water sector will surely be more open to public scrutiny. Sydney Water, now a corporatized and commercially focused operator—though

still state owned—may face increased ministerial interference, despite the revision of its operating license. Whether these changes together will precipitate a renegotiation of the water treatment contracts remains to be seen.

This Note is based on a longer article by the authors: "Privatising Sydney's Water Treatment," *Agenda: A Journal of Policy Analysis and Reform* 3(1): 45–58 (1996).

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