

# EMERGING COMPETITION IN WATER AND WASTEWATER INDUSTRIES

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## ABSTRACT

Privatization efforts in government owned water and wastewater systems have expanded rapidly in recent years as operating costs, technical requirements, and capital outlays have escalated. Maximum economic welfare can be achieved only if competitive elements are introduced. Feasible possibilities include franchise-bidding, franchise bidding with modified rate regulation, and contracting out. The government agency itself can become a competitive bidder. Contracting out has become the major mode of injecting competition and, if managed well, can be an effective device to reduce costs and improve the quality of service.

industries have moved the market toward greater aggregate economic welfare.

Most public water systems began as private, profit-motivated companies in the nineteenth century. However, major water quality problems often leading to outbreaks of typhoid and cholera, and problems in fighting fires in rapidly growing urban centers persuaded government to begin the takeover of water systems. Subsequently, as local governments sought to extend public water supply to areas outside the more affluent enclaves of the city that could afford water service, most early companies could not manage to simultaneously cover the cost of extending service while maintaining affordable rates to full-paying customers and earning a profit. Thus, by the end of the nineteenth century, more than 200 communities had shifted from private to public ownership (Westerhoff, 1998) and publicly owned and operated local monopoly had become the dominant model for service delivery. In 1997, public water system monopolies served 86 percent of the population and generated 85 percent of total water system revenue (See Table 1).

## INTRODUCTION

Competition is beginning to intrude into industries that have been used as classic examples of monopoly. Water and wastewater have joined long-distance telephone, electric utilities, and small city commercial airline service in the erosion of monopoly market structures. The consequences of the introduction of competition in these

**Table 1: U.S. Community Water Systems by Ownership Type, Population Served, and Annual Revenue**

Ownership	Number	% of Total Number	% of Total Population Served	Annual Revenue (\$Billion)
Public	21,789	43%	86%	22.2
Private	16,540	33%	13%	3.7
Ancillary	11,960	24%	1%	N/A

Source: 1995 Community Water System Survey, U.S. Environmental Protection Agency, 1997

**Table 2: U.S. Wastewater Publicly Owned Treatment and Collection Systems in 1996**

Treatment Facilities	% of Total Population Served	Collection Systems	Annual Expenditures, including capital** (\$Billion)
16,024	71.8	20,670	\$23.6

Sources: *1996 Clean Water Needs Survey*, U.S. Environmental Protection Agency, 1997;

\*\*U.S. Bureau of the Census, *State and Local Government Finances by Level of Government: 1994-1995*

Similarly, the United States (U.S.) wastewater industry evolved primarily in response to the public health threat posed by water pollution. In order to guarantee the full recognition of negative externalities and the installation of appropriate treatment facilities, local governments assumed the ownership and operation of wastewater systems. Table 2 shows that publicly-owned systems serve 71 percent of the U.S. population.

However, some movement toward injecting competition into these monopoly markets began to occur by the mid-1980s and accelerated in this decade. In the late 1980s, it was estimated that only 100 to 200 water and wastewater facilities were under contracted operation—the major form of competition Association of Metropolitan Sewerage Agencies and Association of Metropolitan Water Agencies (AMSA/AMWA, 1998). By 1997, a survey of just 14 major industry contractors found that the number of contracted facilities had grown to 1,200, located in 44 states and Puerto Rico. Some industry observers predict that contracting will grow in the range of 20 to 30 percent in the next five years.

#### **FACTORS AFFECTING THE U.S. MARKET AT THE END OF THE 20TH CENTURY**

Monopolies, especially those in the public sector, resist change as the status quo confers benefits on public officials, public employees, public managers, government unions, and private sector input suppliers (see Seidenstat, 1997). Several factors, however, have begun to accelerate the opening up of these monopolized markets.

More stringent federal environmental and public health regulatory standards, Clean Water Act requirements that escalated costs substantially, and the drastic reduction in federal government construction subsidies have created major problems for local governments. Injecting private sector competition offers to minimize these costs while enabling the systems to achieve the technical sophistication and the capital investment required. Moreover, enormous capital outlays will be required in

the near future as facilities built with large government subsidies in the 1970s and 1980s require replacement.

At the same time, the federal government’s restrictive policies toward the use of public-private arrangements have been softened. Changes in the law relating to the sale of public systems to private investors and the U.S. Treasury’s change in tax regulations supporting long-term contracting have removed some major economic obstacles to using private providers.

#### **OBSTACLES TO ENTRY**

Historically, these markets contain elements that have led to a monopoly market structure. The presence of significant scale economies, major capital outlays required, the likely duplication of pipe collection and distribution systems, and government’s concern about the maintenance of quality in an existing water/wastewater market as manifested in laws and regulations remove the typical form of competition: the enlargement of the number of sellers in an existing market via entry.

Water and wastewater industries generally qualify as natural monopolies as one optimal sized treatment plant would monopolize the market since the output of a minimum efficient size firm would equal or exceed total demand at present prices. Also, doubling the volume of water transmitted would not double the transmission costs, causing unit transmission cost to decline with volume.

Capital costs are extremely large for these systems. For example, just for the replacement of water mains and other distribution system infrastructure, the American Water Works Association (AWWA) estimates required spending of \$325 billion over the next 20 years. (AWWA, 1999). Similarly, in the wastewater field the U.S. Environmental Protection Agency estimates that in the light of the Clean Water Act, required infrastructure spending will be a minimum of \$332 billion over the next 20 years. A recent study shows that \$10 to \$12 of capital

investment are required for each dollar of revenue generated in the water industry compared to just \$3 to \$4 of revenue for electric utilities and \$3 for telephone companies (Haarmeyer, 1994).

## **MODES OF INJECTING COMPETITION**

Given the structural conditions in the water and wastewater industries, monopoly emerged as the favored market structure for public policy makers, especially in light of the growing concern for public health and a cleaner environment. In the water industry a limited number of franchises were awarded to private companies but regulation proved to be a complex state function. With the concern for the level of rates, the difficulty of regulating private monopolies, and the attractive economic rents available to public officials, government owned and operated enterprises emerged as the norm for wastewater operations as well as for many local water markets.

By the 1980s, however, it became clear that there were operational deficiencies in public operation. Rates were rising, water quality was not always acceptable to many customers and to environmental groups, and sometimes subsidies from the general fund were necessary. By the 1990s, rising capital costs, associated with larger facility replacements and stricter federal quality requirements, and the necessity to introduce and manage a more complex technology required a new approach to the operations of water and wastewater systems. Government decision makers were pressed to find alternatives to the present system.

The general approach that began to be followed was to depend more on the private sector to design, build, and manage systems. At the same time, it became clear that improved operations and lower costs would require the injection of competition in the context of a monopolized market structure. Alternatives were available to local governments that ranged from injecting competition in the awarding of franchises to competitively awarded contracts to private operators. The following sections discuss the alternatives.

### Common Carrier Network

The most extreme proposal that seems to have little support in the U.S. (although more likely to be discussed in some other countries) is to treat the local pipe distribution system as a common carrier. The concept is to use common carrier regulation, as was used for oil pipelines and as is being tried in telephone and electrical utility markets, as a device to allow and encourage entry (Webb and Ehrhardt, 1999).

As used in a local water market, the pipe system would serve as a conduit along which competing water treatment plants would send their product to a customer. The owner of the distribution network would charge the supplier for the water placed in the system. The network owner would bill water delivered to customers and the collections would be remitted to the supplying company. Competition for customers would be rate-based.

Government regulation of retail rates would no longer be necessary. The network system would lead to lower rates, however, only if there were no significant scale economies for treatment plants. Such systems to be effective would have to meet other requirements:

1. a relatively large market area so that there would be sufficient demand to warrant more than one optimal treatment plant;
2. suitable sources of supply and locations for multiple treatment plants;
3. comparable water quality from the competing treated water suppliers.

Although theoretically feasible, this technique presents some major technical and administrative difficulties. In water systems, there may be only one viable source of supply that could not be easily shared or efficiently distributed among several treatment plants. Mixing water of different characteristics and quality may present some major problems in maintaining mandated water quality. Administratively tracking the flow of water for billing purposes potentially poses high transaction costs.

For wastewater systems, significant scale economies may preclude the use of several suboptimal plants. Further, the mixing of the wastewater in the collection system would preclude plant specialization, an important way to cut costs, and require all plants to be able to treat all varieties of waste.

In addition to these technical and administrative complexities, the vested interests inherent in the present systems would present a major political obstacle to installing a common carrier system. Not only would the present economic rents be permanently lost but also the stranded costs that exist in both privately and publicly owned systems would have to be compensated.

If entry by means of a common carrier network is ruled out for administrative, economic, or political reasons, then to inject competition would be restricted to those techniques that could simulate competition without having more than one existing product supplier in a given geographical market.

Since a significant percentage of the water supply and practically all of the treatment of wastewater now comes from government-owned systems, the injection of competition focuses on the public sector. However, reforming the existing privately owned water monopolies is not a trivial issue but this paper will not address that issue except to argue that some of the methods associated with privatizing public systems may be applicable to reforming public regulation of private monopolies.

The objectives of injecting competition either in the context of existing facilities or the installation of new facilities are usually stated as follows:

1. restrain or lower rates
2. improve product quality
3. maximize innovation and technological updating of facilities
4. minimize capital costs

#### Franchise Bidding

Reverting to past practice in the water industry, local governments can exercise the option of offering a franchise for a local area. Private providers will compete for the rights to operate an exclusive system. However, competitive bidding for the acquisition of monopoly rights would not necessarily provide the benefits of lower rates or better service. The traditional technique for regulating monopolies in the U.S. has been to subject them to the supervision and control of a government agency. Such public regulation has not necessarily been effective in achieving the goals of minimizing rates and providing high quality service.

The U.S. has seen very little of transferring ownership of existing water/wastewater systems from public to private hands. One example is the sale of two small water systems in New Jersey to a private company.

France, however, actively followed the franchising path in restructuring their water systems. It recognized the limitations of traditional rate regulation. Consequently, France sought other ways of effectively injecting competition.

The French concept was to structure the bidding in terms of rates to be charged to users and the quality of the service to be provided. The winning bidder then would be responsible to a public agency whose major task would be to monitor contract compliance. If properly operated, the system offers competitive results – low prices and high quality service – in a monopolized market.

There are two variants of the French application of this model. In the concession version, the bidder finances, owns, and operates the utility. The firm operates as a private utility. The franchise is typically for 30 years. The agreement includes a formula for setting rates.

The alternative arrangement, *affermage*, is where the local government finances the facility but the private company operates the system and is responsible for providing working capital. The local government is responsible for all capital outlays. A formula fixes rates that often include a surcharge to be remitted to the government for repayment of debt.

There are several possible criticisms of this system of franchising. One reservation is that the bid package is complex and may be difficult to evaluate. More fundamental is the charge that contract enforcement is likely to be weak, especially since the contract is for a long duration; thus, some mechanism must be built into the rate bid to allow adjustments for inflation of costs and changes in technology and demand. Also if the franchise will change hands after the present term, the incumbent firm may stint on maintenance and repairs as the contract expires. Since these issues have to be dealt with and the contract is not self-enforcing, some government regulatory agency must be in place.

In response, advocates for the French model argue that these problems are tractable, especially in the case of water systems. The technology is not complicated or rapidly changing so evaluating bids and assessing performance is feasible at a modest cost. Rebidding an expiring contract can be effective since the bidders are likely to be experienced in operating franchises. The incumbent firm can be required to post a bond to insure adequate maintenance and repairs, even at the end of the contract period. The government agency would have narrow and well-defined responsibilities that would not begin to approach the level of intrusion in the market process of the traditional public regulatory authority (See Hanke and Walters, 1999 for a discussion of these issues).

#### Franchising with Modified Rate Regulation

When Britain privatized its water industry in 1989, it followed the traditional path of awarding monopoly franchises to private utilities and subjecting them to public rate regulation. However, the British recognized the limitations of public regulation. If rates are linked to costs, there is no incentive to cut costs. On the other hand, if regulators set a fixed price with no reference to costs, there is a strong incentive to cut costs but profits can soar with no benefit to the consumer. If prices are linked to what is happening elsewhere in the industry,

then a strong incentive to reduce costs below the industry average exists and the consumer benefits. The British adopted this “rate indexing” or “price capping” system.

Under the British system, rates are related to average costs in the industry, not just the average cost of the individual utility. This modified system recognizes that under traditional rate regulation if a utility operates at lower cost, its rates will be reduced to reflect the enhanced profitability. A flexible rate system is in place that allows automatic adjustment for inflation (using the Consumer Price Index) and rate of technological advance in the industry (the “k-factor”). The k-factor is adjusted every five years to reflect changing technology and is linked to the cost functions of all private water utilities. A water utility cost model is used to fix industry average costs.

Although the British system has much potential as a way of improving efficiency and reducing the costs of operations by having companies compete with the industry standard, it will not likely maximize economic welfare. Under this system, well-run companies can generate large benefits that may not be shared fairly with consumers in the form of lower prices. What seems to be missing is rate competition among private firms competing to secure a franchise.

### Contracting Out

Local governments in the U.S. generally have not used franchising in privatizing their water or wastewater systems. Turning over existing assets to private firms is fraught with potential negative political fallout from the beneficiaries of the status quo and the risk of poor performance of operators not under direct government control. Moreover, most public officials are aware of the limitations of traditional public regulation and the policy difficulties of attempting to switch to a French or British model.

At the same time, the pressure to contain costs and meet the ever-more challenging water and wastewater standards have motivated local governments to turn to the private sector for help. The preferred path is to hire private firms to operate and maintain (O&M) their existing facilities and to design, build, operate, and maintain new plants.

The evidence is that the private firms often can improve performance. They often possess greater expertise since their size and unfettered salary structure can attract the most experienced and best-qualified technical and managerial personnel. Properly structured incentives can

induce them to seek the lowest cost mode of operation. Their easy access to capital and a less restrictive operating environment support an emphasis on optimal updating of facilities, preventive maintenance, and worker training.

Local government authorities seeking O&M contractors utilize a bidding process in letting contracts. Open competitive bidding, if effectively managed, can lead to minimum feasible cost of operations and use of state-of-the-art technology that provides a high quality product. Careful specification of performance requirements contained in the request for proposal (RFP) is necessary to ensure that the bids are comparable and that the price offered is consistent with the standards of output required.

Once the contract has been let, monitoring of the contract is essential in maintaining the integrity of the process. Generally, the contract will specify that all water quality and environmental requirements are met. The government authorities must be prepared to penalize the contractor or even terminate the contract if contract provisions are violated.

Although the federal government rule changes that now allow for longer term contracts has been very helpful in inducing many private operators to bid on contracts, the time limit of the contract can be an effective device in assuring contract compliance as well. Moreover, the threat of rebidding as the contract expires means that competition over rates and service can be periodically renewed.

### Outsourcing Specific Services

In the past it was not unusual for government agencies to contract out a variety of functions that were required in providing a specific service. These were not core functions but rather tended to be supportive of the main function.

For water and wastewater companies, billing and collection, meter maintenance and reading, specialized engineering services and other activities were outsourced to private vendors. The public agency felt that the private sector had greater expertise or could perform the function at a lower cost. Often the service was put out for bid and competition among bidders secured a favorable price.

### Managed Competition

In the 1980s as local governments in the U.S. explored privatizing some of their services, it was increasingly recognized that the injection of competition could play a

key role in improving service and reducing costs. A few cities further realized that the threat of outside competition might be an effective way to provide an incentive for city workers to assist in restraining costs. Not only could privatization be used as a threatening alternative but it could also be employed as a device to foster competition between private suppliers and the city agencies. The public agency could bid on service contracts for services the city currently was performing.

This procedure became known as “competitive contracting” or, more recently, “managed competition.” Once a local government chose a government service as a candidate for contracting out, then RFP’s would be developed and bids accepted. The city agency would be a bidder. Often, if the city entity was the low bidder or the best private bid was not significantly lower than the city bid, the city agency would retain the service provision.

Since local government cost accounting is often not a very sophisticated activity, especially in the allocation of overhead costs, the issue of accurate costing by the city agency in its bidding effort soon was raised. Are the city and private bids comparable? If the city agency could ignore traceable costs, it might be able to underbid its private sector rivals.

Critics of managed competition argue that, in fact, the city agency often does underestimate costs and consequently unfairly retains the right to render services. In the process, the private firms contend that they have to expend resources and are tricked into providing free insights as to how to improve services. Moreover, the critics complain that the winning government bidder does not have to live up to the bid since no penalties are usually assessed if costs exceed the promised level. The private sector bidder would lose the contract or would have to absorb the higher costs in the form of lower profits or increased losses.

In many local governments managed competition proved to be an effective way to restrain costs and improve services. Some cities have used it effectively as a lever to reduce the wage demands and work constraints that city unions have employed. Moreover, in the climate of competition, the restructuring of government operations can be accelerated.

## CONCLUSION

The major issue in the operations of water and wastewater systems in the U.S. is not whether the facilities are owned or even operated by public or private

providers. Rather the major concern is whether the structure of the market can be made more competitive so that the technically and economically feasible outcomes are achieved.

What is often a pure monopoly market may have competitive elements injected into it in order to improve performance. Such competition can be developed either with or without direct privatization but, ultimately, the participation of the private sector is essential to make this competition work. Various alternatives exist that can be used to inject competition. However, simply allowing private utilities to take over all service areas is not considered a solution to the problem of water/wastewater system performance since the present system of rate and service regulation has several flaws.

Thus, public policy makers turn to other alternatives. Bidding for exclusive franchises based upon a price-service offer is one alternative. More traditional franchising but with modified regulation in the form of price capping is another choice.

Contracting out through bidding has become the predominant method of injecting competition. Variant forms of contracting are also employed such as outsourcing non-basic activities and allowing public agencies themselves to be competitive bidders. Contracting appears a less radical policy since it includes the retention of public ownership, a limited time frame of the contract that can involve repetitive bidding, and easier resumption of government operations if necessary.

Contracting out offers the benefits of competition while rapidly acquiring a high degree of political acceptability. Since there is mounting evidence of the superiority of private operations of privately operated systems, the future looks very promising for the spread of privatization through contracting out. The general acceptance that this is a viable public policy is seen in the case of Chattanooga. Currently serviced by a private regulated water utility, city officials are unhappy with the performance of the utility and are suing to remove the private company’s franchise. If successful, the city decision makers plan to take ownership and to contract out the operation to a private company on a bid basis.

The Chattanooga case illustrates that rapidly disappearing political resistance to using private operators to manage water and wastewater systems. The O&M alternative (and managed competition using the prospect of O&M) has become the “best practice.” Even greater use of the private sector to manage systems

appears likely. However, local governments should consider exploring other alternatives to injecting competition that might offer even greater social benefits.

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