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**A FRAMEWORK FOR EVALUATING WATER SYSTEM
OWNERSHIP AND MANAGEMENT ALTERNATIVES**

A Group Project submitted in partial satisfaction of the degree
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As authors of this Group Project report, we are proud to archive it on the Bren School's web site such that the results of our research are available for all to read. Our signatures on the document signify our joint responsibility to fulfill the archiving standards set by the Donald Bren School of Environmental Science & Management.

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The Group Project is required of all students in the Master's of Environmental Science and Management (MESM) program. It is a four-quarter activity in which small groups of students conduct focused, interdisciplinary research on the scientific, management, and policy dimensions of a specific environmental issue. This Final Group Project Report is authored by MESM students and has been reviewed and approved by:

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ABBREVIATIONS

ACWA	Association of California Water Agencies
AIC	Akaike Information Criterion
ALJ	Administrative Law Judge
AMSA	Association of Metropolitan Sewerage Agencies
AMWA	Association of Metropolitan Water Agencies
AWW	American Water Works, a subsidiary of RWE-Thames Water
AWWA	American Water Works Association
BMP	Best management practice
CAW	California American Water Company
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CII	Commercial/Industrial/Institutional water customers
CIP	Continuous Improvement Program
CPUC	California Public Utilities Commission
CTO	City of Thousand Oaks
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
CWA	Clean Water Act
CWS	California Water Service Company
DHS	California Department of Health Services
DWR	California Department of Water Resources
DWSAP	Drinking Water Source Assessment and Protection program (CA)
EPA	U.S. Environmental Protection Agency
GAO	U.S. General Accounting Office
GASB	Governmental Accounting Standards Board
GATS	General Agreement on Trade in Services
GATT	General Agreement on Tariffs and Trade
GOAE	General Office Allocation Expense
HCF	Hundred cubic feet (a measure of water volume)

IDB	Industrial development bonds
IOU	Investor-owned utility (privately owned)
LAO	Legislative Analysts Office, California State Legislature
MFN	Most-favored nation (GATS)
MGD	Million gallons per day (a measure of water volume)
MWD	Metropolitan Water District of Southern California
NAFTA	North American Free Trade Agreement
NAWC	National Association of Water Companies
NCPPP	National Council for Public-Private Partnerships
NRC	National Research Council
O&M	Operations and maintenance
OII	Order to Institute Investigation (CPUC)
OIR	Order to Institute Rulemaking (CPUC)
ORA	Office of Ratepayer Advocates (CPUC)
PIF	Plant Investment Fee
PPP	Public-private partnership
PVC	Poly vinyl chloride
ROA	Return on assets (net income over total assets)
SEC	Securities and Exchange Commission
SWP	California State Water Project
SWRCB	State Water Resources Control Board (CA)
SDWA	Safe Drinking Water Act
UWMP	Urban Water Management Plan
WTO	World Trade Organization

ABSTRACT

The private sector is playing an increasing role in water service provision, whether through conversion of public water utilities to private ownership, or more commonly through outsourcing contracts between public entities and privately owned service providers. In the politically charged environment of municipal governance, a systematic evaluation of alternatives can help improve the outcome of such decision-making processes. Our project develops a framework to assist public sector decision-makers with evaluating four scenarios for changing the ownership and/or management of retail water distribution systems:

1. Implementing operational and management changes to improve the efficiency of a public water system, referred to as a Continuous Improvement Program (CIP)
2. Purchasing the assets of a private water system, transferring ownership to a public entity (municipalization)
3. Contracting out the operation and maintenance of a public water system to a private company, also known as a public-private partnership (PPP)
4. Selling the assets of a public water system, transferring ownership and operating responsibility to a private company (asset sale)

Using a set of ten management objectives applicable to water utility operations, the framework identifies key considerations under each scenario and recommends actions to improve results.

EXECUTIVE SUMMARY

INTRODUCTION

Water utilities in the United States are facing the staggering cost of maintaining aging system infrastructure, meeting the demands of population growth, and complying with increasingly stringent water quality regulations. The Congressional Budget Office estimates annual investment needs for drinking water systems to be between \$11.6 and 20.1 billion over the next 20 years [1]. To compound the problem, water is frequently under-priced. A 2002 survey by the General Accounting Office (GAO) estimates that for 29 percent of drinking water utilities, user charges do not cover the full cost of providing the service [2].

Most people in the U.S. are served by publicly owned water systems, but the fiscal pressures facing local governments have led some municipalities to look to the private sector for the financial and technical resources necessary to expand systems, address deferred maintenance needs, and upgrade infrastructure to meet new water quality standards [3]. At the same time, since the 1980s the U.S. water industry has been transformed by corporate consolidation among the nation's largest investor-owned utilities (IOUs), and the arrival of multinational corporations specializing in utility management [4].

The shift towards increasing private sector involvement in water supply and services has not been without controversy. Public opposition to privatization in cities like Stockton, California, have brought the issue much media attention and sparked public debate. In addition, some policy makers are concerned about the potential for foreign-owned water utilities to use international trade agreements to circumvent environmental laws or other regulatory requirements [5]. In some places, concerns about private ownership of local water systems have led to public acquisition of utility assets, an action which we term "municipalization."

Public and private firms face different constraints and incentives in the operation and management of water systems. Given these differences, when deciding to replace one ownership model with another, it is important to systematically evaluate alternatives and establish a basis for decision-making that provides the best potential for meeting local needs and priorities.

OBJECTIVE

The purpose of this project was to conduct analysis and develop a framework to assist municipal decision-makers with evaluating ownership and management alternatives for retail water distribution systems. The framework is included as Appendix H.

Rather than recommending one ownership model over another (which is problematic given the wide diversity of circumstances and priorities at the local level), our framework is intended to promote a systematic decision-making process, identifying potential tradeoffs between different management objectives and recommending

actions to improve performance, whether the decision outcome is public ownership, public-private partnership, or private ownership.

APPROACH

Decision-making framework

Our framework focuses on four scenarios for changing the ownership and/or management structure of retail water distribution systems:

1. **CIP:** Implementing operational and management changes designed to improve efficiency at a public water system
2. **Municipalization:** Purchasing the assets of a privately owned water system, transferring ownership and operating responsibility to a public entity
3. **PPP:** Contracting out the operation and maintenance of a public water system to a private company
4. **Asset sale:** Selling the assets of a publicly owned water system, transferring ownership and operating responsibility to a private company

Our framework takes into account the economic, policy, social, legal, and environmental considerations of such decisions. The framework is intended to promote systematic evaluation of ownership and management alternatives for local governments seeking to provide efficient, high-quality water service in California and across the country.

Management objectives

To identify the key considerations and trade-offs associated with each decision scenario, we established a set of ten management objectives that decision-makers may wish to consider in determining which ownership/management model best addresses local priorities. The management objectives considered in our decision-making framework are: operational efficiency, system reliability, water quality, customer satisfaction, local control, local accountability, rate affordability, water conservation, supply reliability, and public acceptance.

Our framework assesses the performance of each decision scenario – CIP, municipalization, PPP, or asset sale – in addressing each of the ten management objectives. Where applicable, the framework recommends actions that can be taken to improve attainment of a given management objective under the respective decision scenario.

Research components

Our decision-making framework is informed by four primary research elements: 1) a comparative analysis of the public and privately owned water systems operating in the City of Thousand Oaks, California; 2) legal research conducted by students at the University of California Los Angeles School of Law in two policy areas potentially affected by water system privatization; 3) interviews with water sector experts; and 4) a review of relevant literature.

RESULTS

Thousand Oaks case study

Our research identified two primary differences between the public and privately owned water utilities in Thousand Oaks: 1) the privately owned water providers operate with greater efficiency than the public utility on three of the four indices of operational efficiency we evaluated; 2) the publicly owned water provider charged significantly lower rates than the privately owned water providers for the 15-year period we examined. There was no significant difference between the providers on the basis of infrastructure investment and condition, water quality, water conservation, or customer satisfaction.

Legal research

The research conducted by our partners at the UCLA School of Law indicates that though there is limited potential for foreign-owned water companies to file suit against domestic regulations under the General Agreement on Trade in Services (GATS) or the North American Free Trade Agreement (NAFTA), it is unlikely that such suits would prevail, particularly if the regulations in question apply equally to U.S.-owned and foreign-owned companies.

Foreign or domestic corporations that do not trade on the New York Stock Exchange or file reports with the Securities and Exchange Commission (SEC) are exempt from the financial accountability protections afforded by regulations such as the Public Company Accounting Reform and Investor Protection Act of 2002 (Sarbanes-Oxley). For municipalities entering into public-private partnerships with such companies, there may be limited opportunity to include financial accountability and transparency requirements in contractual provisions.

Literature review and interviews

Three of the ownership/management alternatives – CIP, PPP, and asset sale – have a significant potential to increase operational efficiency, system reliability, water quality, and customer satisfaction, depending on local conditions prior to the decision point, and how the ownership/management change is implemented. With municipalization, transaction costs and the potential for decreasing economies of scale creates particular difficulties for attaining these management objectives.

Local control and accountability are highest under public ownership (the CIP, municipalization, and PPP alternatives). The advantages of increased local control and accountability under municipalization may create sufficient incentives to counter potential disadvantages in terms of transaction costs and decreasing economies of scale.

Public acceptance is most problematic with the two privatization alternatives, PPP and asset sale, due to ideological considerations, reductions in local control and accountability, and the potential for rate increases and staffing reductions.

RECOMMENDATIONS

The results of our Thousand Oaks case study, legal research, expert interviews, and literature review informed our conclusions for the management objectives considered in our decision-making framework as summarized below:

- **Operational efficiency:** There is a significant potential for public utilities to increase operational efficiency, creating additional benefits for their customers
- **System reliability:** Public utilities can increase support for adequate infrastructure investment through increased financial transparency and public outreach
- **Water quality:** Regionalization may benefit small public utilities with insufficient local resources to comply with water quality standards
- **Customer satisfaction:** Customer satisfaction is most affected by service, rates, billing, the customer's experience with their provider's telephone call center, and their perception about their provider's community involvement
- **Local control:** It would be more difficult for a foreign company to use GATS to challenge domestic regulations governing water service provision than NAFTA, which only applies to Mexican or Canadian-owned companies
- **Local accountability:** Domestic and foreign-owned water providers not subject to Sarbanes-Oxley may be held to different standards of financial transparency and accountability
- **Rate affordability:** Publicly owned utilities have several advantages that may allow them to charge lower rates for water service
- **Water conservation:** Water conservation should be promoted at the regional or state level, due to lack of incentives at the local level
- **Supply reliability:** Publicly owned utilities may have increased opportunities to address water supply through regional coordination with other public agencies
- **Public acceptance:** Our public opinion research in Thousand Oaks indicates no strong preference for public or private water utility ownership. Strong sentiment against foreign ownership of water utilities should be addressed through public outreach in cases where privatization involves a foreign-owned water company

The decision-making framework included in Appendix H provides a more detailed description of our findings, and an overview of potential tradeoffs between different ownership and management alternatives for retail water distribution systems.

1 INTRODUCTION

1.1 PRIVATIZATION DEFINITION

Privatization, as applied to water supply and service provision, is an imprecise term that spans a range of ownership and management alternatives. Much confusion stems from the fact that privatization can take many forms. In their 2003 assessment of water privatization in the U.S., the NRC describes four major privatization alternatives:

(1) Private provision of various services and supplies such as laboratory work, meter reading, and supplying chemicals; (2) private contracting for water utility plant operation and maintenance (both 1 and 2 are often referred to as “outsourcing”); (3) negotiating a contract with a private firm for the design, construction, and operation of new facilities (this option is referred to as design, build, and operate, or DBO); and (4) outright sale of water utility assets to a private company [6].

Options 1 through 3 are frequently described as PPPs. In the U.S., full privatization – Option 4, where public water utility assets are sold outright to a private company – is far less common than instances of public-private partnership [7]. By contracting with a private company for provision of specific services, the public utility retains asset ownership and some degree of influence over water system operations. This analysis focuses on Option 2, where a private company operates and maintains a water distribution system under contract with a public entity, and Option 4, where a public entity sells its water system assets to a private company. We use the term “privatization” to encompass implementation of either of these alternatives.

1.2 THE PRIVATIZATION DEBATE

Recent controversies regarding water privatization in cities such as Atlanta, Georgia, and Stockton, California, have sparked public debate. Critics of privatization raise concerns that water is not simply an economic good, and that it should not be treated as a commodity on the open market. They argue that water is a human right, and control over water resources should remain in the public sector.

On the other side of the debate, proponents of increasing private sector participation in the water industry argue that inefficient management of public systems has resulted in poor service, inefficient water use, and waste of public resources. According to its proponents, privatization brings technological, managerial, and operational efficiencies that result in lower rates and better service for water customers.

In Section 2, entitled Background, we provide an overview of the U.S. water supply sector, and discuss the key economic, policy, and ideological components of decisions regarding ownership and management of retail water distribution systems. Lastly, we discuss the importance of our Thousand Oaks case study in constructing a framework for evaluating decisions regarding public versus private ownership/management of retail water distribution systems.

2 BACKGROUND

2.1 OVERVIEW OF THE U.S. WATER SUPPLY SECTOR

2.1.1 History

Private companies have a long history of providing water supply services in the U.S. Most Americans living in cities received their water from private enterprises until the late nineteenth and early twentieth centuries, when municipal governments began acquiring water utilities across the country [8]. In California, private water providers date back to the 1800s. Despite the historical precedents of Spanish law and colonial policy that made water supply a municipal responsibility, cities such as Los Angeles and San Francisco looked to private companies to provide water to their citizens [9]. In Los Angeles, the city signed a 30-year contract with the privately owned Los Angeles City Water Company in 1868, hoping that the company would be able to protect the growing population from disease and fire by providing a clean, reliable, and plentiful supply of water. However, relations between the city and the water company deteriorated over the course of the contract, in large part due to service problems, claims of excessive profits made by the private company, and legal disputes over the company's diversions from the Los Angeles River. After the lease expired, the city decided to operate the system itself [10].

In San Francisco, the privately owned Spring Valley Water Company operated for decades until end of the nineteenth century, when the company was unable to keep up with the needs of the rapidly growing city. Fauconnier writes, "San Francisco residents were greatly dissatisfied with the private utility's performance, characterized by high rates, poor service, and insufficient supply" [11]. Ultimately, the California legislature responded by approving a modified city charter requiring municipal ownership of utilities, and the city was able to acquire the private system.

Nationwide, the Progressive movement of the late 1800s and early 1900s spurred the trend of water utility municipalization as part of a larger effort to promote strong government, both in order to address economic problems brought on by the depression of 1893, and water supply problems caused by droughts occurring across much of the West [12]. Where previously the number of privately and publicly owned water systems had been roughly equal, by the 1900s publicly owned water works began to predominate [13]. The pervasive historical trend of municipalization is evident in water system ownership patterns today, and California is no exception. The California Department of Water Resources (DWR) recently reported that of the 2,850 water agencies operating in the state, only 195 (approximately seven percent) are IOUs [14].

2.1.2 Current challenges

Since the 1990s, rising costs of maintaining aging water system infrastructure, supplying burgeoning populations, and complying with increasingly strict state and federal water quality standards amid tightening municipal budgets have led many

local governments to consider new alternatives for financing water system operations [15]. In particular, the country is facing the staggering costs of upgrading aging water system infrastructure. The Water Infrastructure Network, in their report entitled *Clean & Safe Water for the 21st Century*, documents the need for significant future investment in water and wastewater infrastructure in the U.S.:

America's water and wastewater systems face an estimated funding gap of \$23 billion a year between current investments in infrastructure and the investments that will be needed annually over the next 20 years to replace aging and failing pipes and meet mandates of the Clean Water Act and Safe Drinking Water Act ... New solutions are needed to what amounts to nearly a trillion dollars in critical water and wastewater investments over the next two decades [16].

The Congressional Budget Office made a similar projection of the country's water system infrastructure investment needs: "For the years 2000 to 2019, annual costs for investment will average between \$11.6 billion and \$20.1 billion for drinking water systems and between \$13.0 billion and \$20.9 billion for wastewater systems" [17].

Adding to the funding shortfall for infrastructure investment, increasingly stringent regulatory standards create new challenges for water system operators. The 1996 Safe Drinking Water Act (SDWA) amendments imposed stricter health and safety requirements that in many cases required investment in new treatment technologies. According to the U.S. Environmental Protection Agency (EPA) which administers the Act, \$34 billion is needed to meet SDWA-imposed standards [18]. At the same time, the SDWA does not authorize a federal grant program for the funding needed to meet these new mandates [19].

Compounding the funding gap is the fact that water rates often do not reflect ongoing and future infrastructure investment needs. According to the NRC privatization study, "Economists generally agree that water and wastewater services are frequently under priced" [20].

The financial pressures discussed above have led many local governments to look to the private sector as a source of new capital and technical expertise. In many cases, privatization has been viewed as a way to obtain the financial and technical resources necessary to expand systems, address deferred maintenance needs, and upgrade infrastructure to meet new water quality standards. In 1999, the National Association of Water Companies (NAWC) commissioned the Hudson Institute to survey 29 instances of water system privatization across the U.S., including nine asset sales, several limited contracts for specific services such as billing, and three long-term operating and maintenance contracts [21]. According to the NAWC, "62 percent (18) of the facilities studied indicated a financial issue was the primary reason for privatization. The most common issues included cash flow problems (deficits) or excessive operating costs and a backlog of capital investment requirements" [22]. The second most common reason for privatization cited in the survey was concerns about regulatory compliance, with 35 percent (10 projects) indicating that regulatory

compliance was the primary driver for privatization [23]. Survey respondents in this category either had a history of compliance violations, or they wanted to “shift responsibility for meeting regulatory requirements to the private sector” [24].

In addition, a 1997 change in the U.S. tax code facilitated the expansion of long-term operations and maintenance contracts between municipalities and private service providers. The tax code revision extended the length of time that a contract may be awarded to a private company without compromising the tax-exempt status of municipal bonds used for infrastructure investment from five years to twenty years [25].

2.1.3 Industry trends

The last 30 years have seen two dominant trends among privately owned water utilities in the U.S.: one is a general consolidation of utility ownership under the larger IOUs; the other is an increasing market presence of foreign-owned multinational corporations.

According to the NAWC, the quest for economies of scale has propelled ownership consolidation in the water industry in recent years: “Driven by increasing infrastructure and system enhancement requirements, the industry is consolidating into a smaller number of large companies who can realize better economies of scale and pool the capital resources necessary to fund development and SDWA compliance costs” [26]. From 1982 to 1993, the number of water systems serving fewer than 3,300 people decreased by 8 percent, while the number of systems serving more than 3,300 people skyrocketed by 41 percent [27]. The results of the most recent EPA Community Water System Survey indicate that this trend continued through 2000, as the number of systems serving more than 3,300 people grew by an additional 20 percent [28].

Most people in the U.S. get their water from utilities serving more than 100,000 people, though these large systems account for less than one percent of the total number of community water systems nationwide. Eighty three percent of the country’s community water systems serve 3,300 people or fewer [29]. The opportunity for further industry consolidation may very well exist given the number of small systems currently operating in the U.S. However, such opportunities are likely to depend upon the geographic proximity of smaller systems to larger IOU service areas. In these cases, the larger IOU may benefit from increased economies of scale through “tucking in” – adding smaller systems to existing service areas.

During the 1980s and early 1990s many of the world’s largest water corporations engaged in aggressive expansion in the U.S. and abroad. This expansion was both horizontal, involving acquisition of smaller utilities in the same line of business, and vertical, involving acquisition of specialized companies whose products and services are needed to operate water utilities. These specialized companies include financing groups, manufacturers of filtration equipment, water treatment chemicals, or other

specialized equipment [30]. In the battle to increase market share, mergers and acquisitions occurred at a breakneck pace.

There are significant signs that the expansion of water industry multinationals is slowing in some markets, including the U.S. and many developing countries. Industry analyst Steve Maxwell notes:

Although the trend to greater consolidation continued, 2003 may be remembered as the year in which the much-ballyhooed “foreign invasion” of recent years began to reverse directions. After practically tripping over each other in the rush to acquire assets during the late nineties, many of the major European water companies began to shed major U.S. water businesses during the year [31].

Several economic factors contributed to this retraction, including currency instability here in the U.S. and the currency crises in Asia and Argentina. The largest French water companies, Veolia Environnement and SUEZ, have reassessed the way they will approach future waterworks contracts, particularly in developing countries. It is possible that the slowdown in the expansion of foreign corporations into the U.S. market will pave the way for further expansion and consolidation of domestic water companies like Aqua America (formerly Philadelphia Suburban Water).

Appendix A follows the restructuring trends of three of the world’s largest multinational water companies: Veolia Environnement and SUEZ of France, and RWE AG of Germany. The recent histories of these companies are indicative of major industry trends, particularly as they relate to the U.S. market. These brief histories illustrate the rapid pace of mergers and acquisitions that accompanied the expansion of foreign water corporations into the U.S. and other global markets during the 1990s, and subsequent divestitures after the financial crises of 2002.

2.2 ECONOMIC CONTEXT

2.2.1 Natural monopoly and public good characteristics of water

Water has many characteristics of a natural monopoly, as significant barriers exist to establishing competitive markets for water service and delivery [32]. Water treatment and delivery is infrastructure-intensive, involving high sunk costs that create barriers to market entry by new firms. According to the NAWC, “the nation’s water systems maintain about \$5 of gross assets for every \$1 of revenue” [33]. Strict water quality and health regulations create legal barriers to market entry as well. The substantial infrastructure requirements make direct competition problematic; it would be inefficient for multiple systems to duplicate infrastructure in order to compete for the same customer base. Competition also occurs when there are substitutes for the good in question, a condition that is clearly lacking in the case of water [34].

The argument is frequently made that water is a public resource, and thus should not be subject to provision on the open market, but should rather be held in trust by government for the benefit of the public. Water is essential to life and for vital public services such as fire fighting. Even when the costs of providing water cannot be recovered through user fees, society benefits from ensuring reliable access to clean drinking water for all members of the population [35]. It is important to distinguish between a public resource and a public good, as water is often mistakenly referred to as a “public good” – an economic term with an exact definition. The economic characteristics of a public good are that consumption is non-excludable and non-rivalrous, meaning consumption of the good by one party does not preclude consumption by another party. The classic example is national defense. “Free riding” incentives – incentives to consume the good without paying for it – mean that public goods are typically provided by the government rather than on the open market [36]. Water is clearly rivalrous and excludable, so it is not a public good. However, the public interest is served by ensuring equitable access to water, so water clearly has characteristics of a public resource. As a result, many feel it is government’s responsibility to guarantee access to water for all citizens.

Due to water’s natural monopoly and public resource characteristics, in the U.S. there is a long tradition of public ownership of water utilities, and privately owned water utilities are highly regulated to prevent abuse of monopoly powers (see Appendix B for a description of the regulatory structure for privately owned water utilities) [37]. However, Fauconnier illuminates a recent shift in perception of water from a public resource to a private good, which in many instances underlies the argument for privatization: “[T]he idea has taken hold that industries exhibiting natural monopoly characteristics on the surface may in fact be restructured in order to introduce competition, and hence incentives for high performance and fair treatment of customers” [38].

Advocates of full privatization – sales of public water systems to private companies – assert that government regulation of private firms protects customers from monopoly abuses just as effectively as public ownership does, if not more so. Even if this is the

case, the public may feel that local ownership of a public water system gives them greater influence over decision-making and thus greater accountability than they would have under a centralized regulatory body. As Fauconnier points out, this perception has been a central concern for opponents of privatization in several prominent cases in California, including opposition to California American Water Company's bid to acquire the public Santa Margarita Water District in 1995 [39]. Despite a history of mismanagement at the public utility, Fauconnier writes:

[The privatization opponents'] stance hinged on the fact that water service, because of its natural monopoly characteristics, would require strong oversight, and that it was unclear that the [C]PUC would carry out those oversight responsibilities better than the voters of southern Orange County [40].

2.2.2 Economic efficiency

The privatization debate often centers on competing claims over which water system ownership model has the potential for greater economic efficiency. Economic efficiency is desirable because it maximizes “the welfare that consumers derive from their consumption of goods and services, or the benefits they derive from the exchange of goods,” which economists term “consumer surplus” [41].

Two economic theories lie behind the argument that privatization of any industry will increase economic efficiency: one is public choice theory, and the other is property rights theory. Public choice theory applies most directly to arguments for PPPs, and property rights theory applies primarily to arguments for asset sales.

2.2.2.1 Public choice theory

According to public choice theory, service provision in the public sector is a monopoly with inherent incentives towards oversupply and inefficiency that stems from the bureaucratic nature of public agencies [42]. Typifying this viewpoint, Savas asserts, “since most city agencies are monopolies, their staffs are automatically in a position to exercise that monopoly power for their own parochial advantage – and efficiency is rarely seen as an advantage” [43]. The remedy for this problem is for the public agency to solicit bids from private firms to provide the services formerly provided by the public entity itself, introducing competitive forces that will counteract bureaucratic inefficiency.

With respect to the water supply industry, advocates of public choice theory claim that even though direct competition is not possible at the consumer level, competition occurs during the contract bidding process associated with the PPP model of privatization, ensuring that the contract is awarded to the firm that can provide the contracted services at the lowest cost.

Several factors make the potential efficiency gains from competitive bidding under PPPs more problematic. There are strong arguments in the water industry for preferring long-term contracts over short-term contracts, because long-term contracts

create better incentives for the contractor to invest in infrastructure and capital projects that have significant up-front costs and delayed payoffs. The longer the term of the contract, the more limited the opportunities for competition via the contract bidding process, which in turn limits the potential for efficiency gains from competition [44].

Once a contract has been awarded, true competition during subsequent bid processes may be compromised by information asymmetries between the initial bid winner and competing firms, high transaction costs associated with a change in service providers [45], and the existing relationship between the original contractor and the contracting agency [46]. In markets where firms are jockeying to increase market share, competition may be compromised by political influence on decision-making processes, under-bidding on contracts, and payment of inflated concession fees – a condition that Beecher terms “ruinous competition” [47].

2.2.2.2 Property rights theory

According to property rights theory, an ownership effect makes private firms inherently more efficient than public entities. Braadbaart describes the theoretical rationale behind this argument:

The reasoning is that private ownership entails an incentive structure that differs significantly from, and produces more economic welfare than, public ownership ... [U]nder private ownership, the interests of society – economic welfare maximization – are better aligned with those of the firm’s owners/managers than is the case under public management. At the heart of [this] argument are two disciplining forces to which private firms are subject but from which state-owned enterprises are thought to be insulated, namely competitive markets for property rights and capital [48].

To summarize Braadbaart’s analysis of property rights theory arguments in favor of private sector efficiency, managers of private firms are more accountable for management decisions because the firms are directly owned by shareholders, and shareholder value will decrease in the face of bad management decisions. In addition, private sector managers are held accountable by the threat of bankruptcy or acquisition. In capital markets, private firms are rewarded for profitability and penalized for losses – an additional incentive for efficiency maximization. In contrast, ownership shares in public agencies cannot be bought and sold, governments are usually unwilling to let inefficient public agencies go bankrupt, and public firms may face capital markets distorted by political decision-making [49].

A related argument for the greater efficiency of private firms in monopolistic industries is that excess profits or monopoly rents accruing to private firms are distributed to shareholders. In contrast, there is no such requirement for public firms, so the incentive exists to consume the surplus within the organization, typically through excessive staffing or investment in facilities. Such an incentive is referred to as X-inefficiency [50].

Financial scandals like those at Enron and WorldCom show the limitations of private sector accountability. At the same time, many experts argue that public agencies operate under conditions that afford them an efficiency advantage over private firms. Public sector advantages include tax exemptions, the ability to issue low-interest bonds for financing capital projects, greater access to federal funds, eminent domain power, and the ability to develop more flexible and creative rate structures because they are self-regulated [51].

2.2.2.3 Economies of scale

In the water industry, economies of scale offer a potential opportunity for increasing efficiency under both the PPP and asset sale models of privatization. As Boyne points out, “If a private organization produces a service in more than one locality, then its scale of output is bigger than the municipality itself can reach” [52]. This means that particularly for small municipal systems, privatization may decrease operating costs as the private firm takes advantage of the economies of scale created by merging a small service territory with a larger one. By acquiring new service areas, a private company may achieve savings through reducing duplicative treatment and storage facilities, consolidating purchasing, reducing staff redundancies, and centralizing departmental functions like customer service and laboratory analysis. In addition, operational expertise can be shared across service areas. The largest multinational water companies like Vivendi and Suez Lyonnaise des Eaux have substantial research and development capacity that small municipalities may be unable to match [53].

2.2.2.4 Evaluating efficiency

The literature contains no consensus about whether public or private firms have an “absolute efficiency advantage,” to borrow a term from Dore et al. [54]. For every argument that private firms are more efficient [55], there is a counter-argument in favor of public sector efficiency [56]. Furthermore, there are several convincing meta-analyses of the water industry that make the case that neither public agencies nor private firms have an absolute efficiency advantage, and much depends on local operating conditions and the regulatory environment [57 and 58]. In his book, *The Privatization Decision*, Donahue reviewed eight studies that tried to isolate the significance of public versus private management on the efficiency of water utilities. His summary of the review concludes that “the weight of the evidence, then, favors the conclusion that there is no tendency for private water utilities to be any more productive” [59].

The fact that there is no clear efficiency advantage in either the public or private sector may be due to the unique nature of water service provision. Due to water’s natural monopoly characteristics, and the wide variability in operating costs that result from the unique demographic, geographic, hydrologic, and climatologic characteristics of different service areas, it is impossible to say that one water system ownership model will always be more efficient than any other. However, it is possible that privatization – either through PPPs or asset sales – could increase the efficiency

of certain operating functions by increasing economies of scale. Efficiency assessments of different ownership models must always be grounded in an understanding of local service area conditions, economies of scale, and the operational capacity of the private company.

2.3 POLICY CONTEXT

2.3.1 International law and controlling authority

As a result of corporate consolidation in the water industry over the past decade, foreign multinational corporations now own some of the largest private water firms in the U.S., as described in Section 2.1.3. Some policy makers and legal authorities are concerned about whether local law or international law has controlling authority over the operations of these foreign-owned water utilities. Although there has yet to be a case in which this has occurred, this concern stems from the possibility for an international trade agreement such as GATS or NAFTA to be used to trump local or state laws regarding water rights, water quality, or water management. Anna Blackshaw, a consultant on international trade policy with the California legislature, stated:

We are deeply concerned about the implications of GATS negotiations on California groundwater and essential services ... The very design of this agreement turns on its head the long-established notion that government regulation plays a vital and positive role in economic growth and long-term sustainability. Under the models proposed in the GATS agreement, accountability and public protection take a back seat to the interests of deregulation and privatization [60].

In their 2004 report entitled *Seawater Desalination and the California Coastal Act*, the California Coastal Commission echoes this concern:

The home country of the multinational could challenge the state's regulatory requirements under GATS, possibly subjecting the state's regulatory requirements to legal challenge at the international level ... [E]ven with these provisions [environmental protections under NAFTA and GATS], thus far, and with one limited exception, all decisions on challenges to environmental laws under NAFTA and GATT [predecessor to the WTO] have favored the multinational corporations [61].

In their draft report on issues surrounding seawater desalination, the California governor's Desalination Task Force expressed a similar sentiment: "A growing concern exists about whether private entities that are subject to, or covered by, international trade agreements may be exempt from all or some state and local regulations" [62].

Section 5.1 of our report discusses the findings of the UCLA School of Law students who investigated the question of whether international trade agreements could be used to undermine domestic regulations in the context of multinational corporations providing water-related services in the U.S.

2.3.2 Financial transparency and accountability of private companies

Following the dramatic collapse of Enron, WorldCom, and other corporate financial scandals, public trust in corporate finance and accounting practices was severely undermined. In an attempt to restore investor confidence, Congress enacted Sarbanes-Oxley in 2002 [63]. Sarbanes-Oxley applies to companies that have securities issued under the SEC or are otherwise required to file SEC reports, and contains sweeping reforms for issuers of publicly traded securities, auditors, corporate board members, and lawyers. It adopts provisions intended to deter and punish corporate and accounting fraud and corruption, threatening severe penalties for violations [64]. By increasing the transparency of corporate finance and accounting practices, Sarbanes-Oxley is designed to improve the quality of information available to investors.

Privately owned water utilities in the U.S. that are publicly traded or required to submit reports to the SEC must comply with the provisions of Sarbanes-Oxley. By increasing the transparency of corporate accounting and finance practices, this law provides a measure of protection from corporate malfeasance to municipalities engaged in PPPs with such companies, as well as to customers served by IOUs. At the same time, some foreign-owned water utilities and domestic companies not required to file with the SEC may be exempt from Sarbanes-Oxley compliance. Section 5.2 of our report discusses the findings of the UCLA School of Law students who investigated the applicability of Sarbanes-Oxley to domestic and foreign companies engaged in water service provision in the U.S., and describes contractual measures that may be taken by municipalities entering into partnerships with private companies not subject to the provisions of Sarbanes-Oxley.

2.3.3 The Stockton privatization controversy

Mayor Gary Podesto's efforts to contract out the operations and maintenance of the City of Stockton's water, waste water, and storm water services has been one of the most hotly-contested instances of water privatization in the U.S. What happened in Stockton highlights the potential pitfalls of flawed municipal decision-making processes and the importance of public acceptance to decisions regarding water privatization.

In 1999, the City of Stockton hired the Massachusetts-based company Alternative Resources Inc. (ARI) to recommend whether the city should privatize its water, waste water, and storm water systems [65]. ARI concluded that the city could save approximately \$175 million over the life of a \$600 million, 20-year contract with OMI-Thames [66]. Their findings on cost savings were questioned by the Pacific Institute's researcher, Gary Wolff, who believed that the contract would actually cost the city \$1.7 million dollars over the contract term [67]. ARI's cost-savings estimates came under further scrutiny when opponents discovered that ARI is a member of the National Council for Public-Private Partnerships (NCPPP), whose mission is to "to serve as an advocate of public-private partnerships" [68].

The high cost of the proposed contract was enough to capture the attention of Stockton citizens and local media outlets [69]. But local groups were more concerned with the lack of transparency surrounding the city's decision to privatize than with the scope of the contract. Sylvia Kothe, chair of Concerned Citizens of Stockton, said Podesto resisted public information requests and prevented her group from seeing corporate proposals a month before the City Council selected a bidder for the privatization contract [70]. In response, Concerned Citizens of Stockton (CCoS), along with other grassroots organizations, gathered 18,000 signatures for a ballot initiative calling for voter approval of any city contract over \$5 million relating to the operation of the city's public utilities [71]. However, city officials approved the contract before the ballot initiative went to vote.

After the city entered into the contract with OMI-Thames, grassroots organizations immediately tried to get the contract nullified. CCoS tried to get the decision reversed via voter referendum, but they did not get enough votes in the required amount of time. CCoS then partnered with two grassroots groups – Sierra Club and the League of Women Voters – and sued the City of Stockton, saying it had not adequately addressed the environmental implications of the new contract through California Environmental Quality Act (CEQA) review [72]. Stockton argued that it did not have to comply with CEQA provisions because the contract with OMI-Thames was part of the regular operations and management of the municipal utility and as such is exempt from CEQA review. In October 2003, a judge agreed with the citizen groups, saying that Stockton had erred by not performing a CEQA analysis on the effect the new contract would have on the environment [73]. In his ruling, the judge wrote, “The administrative record herein shows that it is not only ‘reasonable foreseeable’ [sic] but virtually certain that during the twenty-year term of the contract, RPI [OMI Thames] will expand wastewater facilities storm water capacity [sic] and drill new water wells to serve existing and future users. Such endeavors cannot avoid having a substantial impact on the physical environment ... [S]uch foreseeable changes must receive adequate CEQA analysis. This cannot be done with an exemption” [74]. Stockton appealed the decision and the initial ruling was set aside. Now Stockton is fully engaged in the contract with OMI-Thames.

There are many instances of successful PPPs, and many IOUs operate water systems in the U.S. without controversy. However, Stockton serves as an excellent example how important it is for decision-makers to address public acceptance before any effort to privatize municipal water systems is implemented. Mayor Podesto and the Stockton City Council did not adequately engage the citizens of the Stockton in the decision-making process. As a result, public outcry was far stronger than anticipated, and the city became embroiled in a costly lawsuit [75].

2.3.4 Municipalization in Montara

In a few highly publicized instances in California and across the country, local governments have decided to municipalize privately owned water systems operating in their jurisdiction. In Montara, a small town south of San Francisco, water system

infrastructure had deteriorated under private ownership, and residents complained about inadequate water pressure and declining water quality while rates continued to climb [76]. California American Water Company purchased the Montara system in 2002, shortly before its parent company, American Water Works (AWW) was acquired by the German multinational, RWE-Thames Water. The town vigorously opposed the merger, fearing further rate increases and declines in service, and filed for eminent domain, passing a \$19 million bond measure to finance municipal acquisition of the water system. The California Public Utilities Commission (CPUC) conditioned its approval of the RWE-Thames acquisition on settlement of the eminent domain suit, and Montara municipalized the water system at a cost of \$11 million [77]. Other cities around the state, such as Felton and Claremont, have recently launched similar municipalization efforts, in most instances motivated by concerns about service quality and fears of increased rates under private ownership. Given the high transaction costs associated with such an action – not the least of which may include the cost of legal battles with private companies resisting the proposed acquisition – it is important to evaluate the decision to municipalize as carefully as the decision to privatize.

2.4 IDEOLOGICAL CONTEXT

From the debate surrounding water privatization emerges a deceptively simple question: should water be purely a public resource, with equitable access guaranteed by the government, or can it be traded as a private commodity? Proponents of the public resource argument assert that water is essential for life, and should not be subject to the motives of profit-seeking companies. They view water as a human right, and believe control over water resources should remain in the public sector. Encapsulating this belief is the United Nations Committee on Economic, Social, and Cultural Rights' General Comment on the right to water. It begins, "Water is a limited natural resource and a public good fundamental for life and health. The human right to water is indispensable for leading a life in human dignity. It is a prerequisite for the realization of other human rights" [78].

Such arguments are bolstered by the assertion that private companies are inherently greedy and corruptible, motivated by a desire to control this "blue gold" for monopolistic purposes and exploit the public interest. Maude Barlow and Tony Clarke write, "Corporate control of the world's water resources and distribution systems is a threat to the well being of humans around the world because water is fundamental to life" [79].

At the same time, pro-market advocates like the Reason Public Policy Institute agree that though water is a vital resource, "along with most other vital things, the market has proved exceptional at providing it. The closest analog is food, which the market provides, as it does medicines and healthcare" [80]. Proponents of increasing private sector participation in the water industry argue that inefficient management of public systems can result in poor service and waste of public resources. They argue that if properly managed and conducted with appropriate levels of government oversight, privatization can bring benefits such as increased efficiency and environmental compliance [81].

When the arguments for and against water privatization are grounded in ideology, the debate becomes a question of battling value systems, and common ground between opposing viewpoints is difficult to find. At the same time, it is important to recognize that this issue plays out differently in the U.S. than it does in developing countries. Here, stringent environmental laws and long-standing regulatory structures exist to protect the public interest. Watchdog groups monitor the activities of private industry, and local communities are often vocal advocates for their own interests. In developing countries, where many lack the most basic access to clean water and sanitation, local governments often do not have the resources to provide adequate oversight of monopolistic industries. This report focuses on the implications of decisions affecting ownership and/or management of water utilities in the U.S.

2.5 THOUSAND OAKS CASE STUDY OVERVIEW

2.5.1 Importance of the Thousand Oaks case study

Arguments in favor of either public or private ownership/management of water utilities should be grounded in conclusive data regarding comparative advantages and disadvantages of ownership alternatives. However, it can be difficult to make equitable comparisons between public and privately operated water systems. Donahue summarizes the problems inherent to many studies that attempted such comparisons:

[Water utilities] differ by factors such as size and dispersion of the population served; in the scale and age of their capital equipment; in costs paid for labor, machinery, water, energy, and finance; in the quality of available water supplies; and in how much they treat the water before pumping it to customers [82].

In Thousand Oaks, California, three water utilities – one public and two private – own water system infrastructure and deliver water to residents and businesses in different parts of the city. The public system is a municipal utility owned and operated by the City of Thousand Oaks' Department of Public Works (CTO). One private system is owned and operated by California American Water Company (CAW) and the other is owned and operated by California Water Service Company (CWS). The case study analysis in Thousand Oaks is an important component of our research because it provides a unique opportunity to compare public and private water utilities operating under similar baseline conditions. All three systems:

- Own their water system infrastructure
- Have a similar geographic location and identical climate
- Purchase 100 percent of their potable water supply pre-treated from the same wholesaler under an identical rate structure

Our analysis compares operational efficiency, system reliability, environmental management, and customer satisfaction for the three water providers in Thousand Oaks. Significant differences between the public and private systems in Thousand Oaks are used to augment our decision-making framework, supporting our findings and recommendations for the ten management objectives impacted by decisions regarding ownership and management of retail water distribution systems.

2.5.2 Water system ownership history

The City of Thousand Oaks is located twelve miles inland from the Pacific Ocean in the Conejo Valley of Ventura County. The city's elevation varies from 900 feet to 1,820 feet above sea level [83]. As of 2003, CAW serves 19,212 connections in the western part of the city, CTO serves 15,192 connections in the central and northern sections, and CWS serves 7,500 connections in the eastern part of the city.

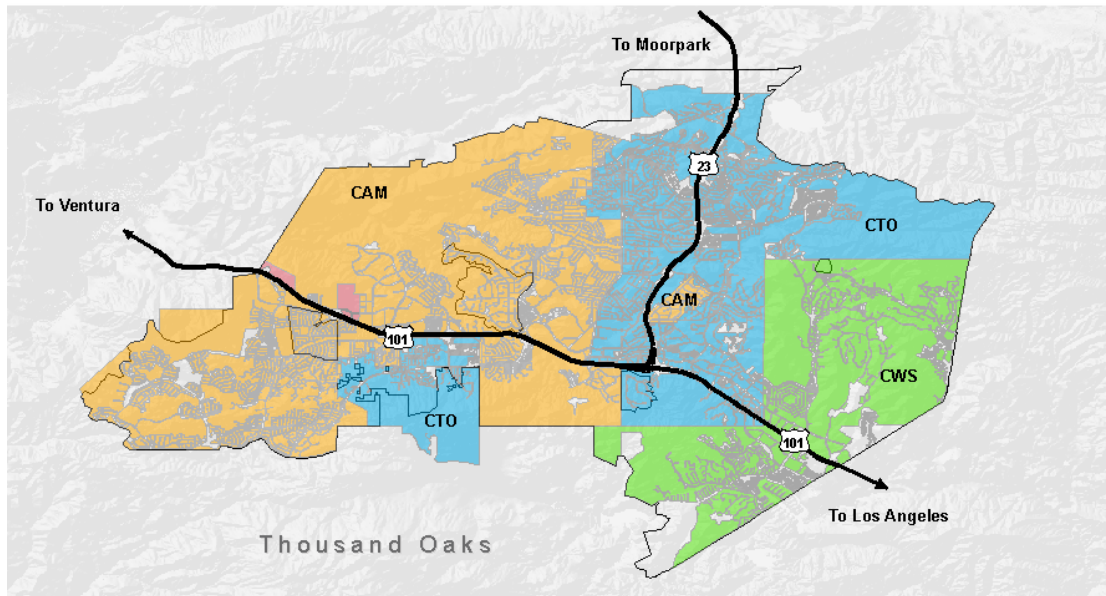


Figure 1: Map of utility service areas in Thousand Oaks

The city’s history provides some insight as to how Thousand Oaks came to have three water utilities serving its residents. During the 1800s, the Conejo Valley was used by vaqueros (Spanish herdsmen, or cowboys) to raise cattle. The valley remained relatively uninhabited until the late 1800s, when individual ranchos were established throughout the area. The community grew significantly after the Janss Corporation, a prominent local developer, invested in thousands of acres of farmland in the early 1900s. Janss later built schools, churches, shopping centers, and other businesses to serve the area’s growing population [84]. As was common practice at the time, developers in the Conejo Valley established small private water companies to serve new housing developments. Once the developments were completed, the developers would typically sell their water systems either to mutual associations established by residents, or to private water companies seeking to consolidate larger service areas [85]. Table 1 shows the timeline for the development of the three water utilities in Thousand Oaks.

Table 1: Timeline of the development of Thousand Oaks water utilities

Year	Event [86]
1800s	Vaqueros run cattle through the virtually uninhabited Conejo Valley
Late 1800s	Individual ranchos are established throughout the Conejo Valley
Early 1900s	Janss Corporation purchases 10,000 acres of farmland in the Conejo Valley [87]
1900s	Janss Corporation invests in Conejo Valley community development
1947	Thousand Oaks Cooperative Water Association becomes Waterworks District No. 6 (the District) under County jurisdiction

Year	Event [86]
1950s	The Janss Corporation forms the Village Water Company (the Village) to service Janss' residential developments
1950s	California Telegraph and Water purchases the Village from the Janss Corporation
1958	Ventura County approves management of the District by a Board of Directors
1960s	The Westlake Village neighborhood is developed through a partnership between Prudential Insurance Company and the American-Hawaiian Steamship Company
1964	The City of Thousand Oaks is incorporated
1966	Authority over the District is transferred from Ventura County to the City of Thousand Oaks
1967	AWW (CAW's parent company) purchases California Telegraph and Water, acquiring the Village District [88]
1968	A portion of the Westlake Village neighborhood within Ventura County is annexed to the City of Thousand Oaks
1969	The District is merged into the City of Thousand Oak's water department <i>Current CTO management is established</i>
1972	A second portion of the Westlake Village neighborhood within Ventura County is annexed to the City of Thousand Oaks
1981	The Los Angeles County portion of the Westlake Village neighborhood is incorporated into the City of Westlake Village
1983	California Water Service Company acquires the water system for the Ventura County portion of the Westlake Village neighborhood from Westlake Water Company [89] <i>Current CWS management is established</i>
2001	RWE proposes merger with AWW
2002	California Public Utilities Commission approves merger of RWE-Thames Water with AWW <i>Current CAW management is established</i>

The following sections provide a brief history of each of the three utility service areas in Thousand Oaks.

2.5.2.1 City of Thousand Oaks Department of Public Works service area

The Old Town section of Thousand Oaks was originally served by the Thousand Oaks Cooperative Water Association. In 1947 the Thousand Oaks Cooperative Water Association became Waterworks District No. 6 under county jurisdiction. The District remained under county control until 1958, when it received approval from the county to become autonomously managed by a local board of directors. In 1966, two years

after the City of Thousand Oaks was incorporated, the District became a subsidiary of the new city government. Thereafter, the city became responsible for a number of small mutual water companies that had been acquired by the District over its twenty-year history. Three years later, Governor Reagan signed legislation to formally merge the District into the City of Thousand Oaks' water department.

2.5.2.2 California American Water Company service area

In the 1950s, the Village Water Company was formed by the Janss Corporation to serve the company's new developments. California Telegraph and Water later bought Village from the Janss Corporation. In 1967, AWW acquired California Telegraph and Water, and CAW is a wholly-owned subsidiary of AWW [90]. In 2001 RWE-Thames Water, owned by German multinational RWE AG, announced plans to acquire AWW, then the largest privately owned water company in the U.S. Despite protests from the City of Thousand Oaks and other communities around the state, the CPUC approved this merger in December 2002.

2.5.2.3 California Water Service Company service area

The Westlake Village neighborhood of Thousand Oaks was part of a planned community developed in the 1960s by a partnership between Prudential Insurance Company and the American-Hawaiian Steamship Company [91]. Westlake Water Company was formed to serve the new neighborhood. As the Westlake community developed, it straddled the Los Angeles and Ventura County line. In 1968 and 1972, the Ventura County portions of the Westlake community were annexed to the City of Thousand Oaks, while the Los Angeles County portion was incorporated into the City of Westlake Village in 1981. In 1983 CWS, a subsidiary of California Water Service Group, acquired the Thousand Oaks portion of the Westlake water system [92].

2.5.3 Water supply

CTO is the only provider in Thousand Oaks that maintains groundwater wells: there are four groundwater wells in their service territory, but one is no longer in use. None of the groundwater wells provide potable water. One irrigates a golf course, one irrigates a street median, and one is used for irrigation at City Hall [93].

Nearly all of the water that CTO, CAW, and CWS distribute to residents and businesses in Thousand Oaks comes from the California State Water Project (SWP). Appendix C contains a brief overview of the SWP. SWP water is allocated to Thousand Oaks through Calleguas Municipal Water District (Calleguas), a publicly owned regional water wholesaler under contract with the Metropolitan Water District of Southern California (MWD), which contracts directly with the SWP for a portion of its water supply.

MWD is the SWP's largest contractor, supplying the City of Los Angeles as well as providing wholesale water to many municipal water districts in Southern California, including the City of Thousand Oaks via Calleguas. Since Calleguas relies almost entirely on MWD for their supply, MWD is the key agency for ensuring supply

reliability in Thousand Oaks. According to their 2000 Urban Water Management Plan (UWMP), MWD's supply in 2000 consisted of 1,200,000 acre-feet of Colorado River water purchased from the U.S. Bureau of Reclamation, 750,000 acre-feet of water from the SWP, and 340,000 acre-feet from local sources such as Diamond Valley Reservoir [94]. These figures illustrate that MWD relies more heavily on the Colorado River system than the SWP. It is unlikely that a single year reduction in delivery from the SWP to MWD would have a significant impact on MWD, considering that it has the Colorado River and local storage as additional supplies. However, if there were a multiple year reduction on the SWP and reductions on the Colorado, then MWD would have to rely heavily on local storage and perhaps institute additional conservation measures.

Calleguas was formed in 1953 with the goal of supplying water to the growing population of Ventura County [95]. The district today serves the communities of Oxnard, Camarillo, Thousand Oaks, Simi Valley, Moorpark, and others. Calleguas purchases its entire supply of SWP water from MWD, and sells this water to the three water purveyors in Thousand Oaks at wholesale rates. According to Calleguas' 2000 UWMP, the district plans to receive 113,500 acre-feet of water in 2005 from MWD, and 120,000 acre-feet from MWD in 2010. One hundred percent of the water Calleguas receives from MWD is SWP water via the San Francisco Bay Delta [96].

The water Calleguas receives is treated by MWD at their Jensen Treatment Facility in Granada Hills. Calleguas stores some of the water it receives from MWD in Lake Bard, which is used to meet short-term demand fluctuations and emergency supply needs. Before delivering water to its customers, Calleguas re-treats the water in a five-stage process that involves pre-treatment with ozone, coagulation, flocculation, deep-bed filtration, and disinfection with ozone, chlorine and chloramines. Thus, the water that Calleguas delivers to its retail water providers in Thousand Oaks is fully treated. For that reason, any differences in water quality between the three providers in Thousand Oaks would most likely be attributed to differences in the water providers' distribution infrastructure.

In Thousand Oaks groundwater is scarce and low in quality due to soil conditions that leach high quantities of sulfides into the water [97]. A small amount of local groundwater is used for irrigation, but it must be diluted before application. It is not feasible to treat the limited availability of highly mineralized groundwater for potable use, so the city relies entirely on the SWP for its potable water supply.

2.5.4 Wholesale water rates

As background for the Thousand Oaks rate analysis in Section 4.1.2 we provide a brief overview of the wholesale water rates that each retail water provider pays, as determined by MWD and Calleguas.

2.5.4.1 MWD

MWD adopted a two-tiered rate structure on January 1, 2003. According to MWD, the two-tiered structure was implemented to “encourage local water agencies to efficiently use all local supplies and to continue to invest in cost-effective conservation and additional local resources like water recycling and desalination” [98].

MWD also has a readiness-to-serve charge, which is intended as a revenue source for recouping a portion of the principal and interest payments on non-tax supported debt service that has been issued to fund capital improvements. In other words, it is a charge paid by the MWD member agencies to ensure that there is sufficient funding for MWD to pay for capital projects. In addition, MWD has a capacity reservation charge, which is intended to recover costs incurred to provide distribution capacity and meet “peak day demands” [99].

2.5.4.2 Calleguas

Beginning January 1, 2003, Calleguas mirrored MWD’s two-tiered rate structure in the wholesale rates charged to its member agencies, including the three retail water providers in Thousand Oaks (see Table 2). The capacity reservation charge (the Capital Construction Surcharge shown in Table 2) is based on the customer’s peak weekly flow from the prior year during the period May 1 to September 30. The capacity charge is used in order to fund new capital projects needed to meet peak demand [100]. The readiness-to-serve charge (the O&M Surcharge shown in Table 2) is intended to recover the readiness-to-serve charge paid by Calleguas to MWD.

If an agency has signed a Calleguas purchase order in advance, the agency can purchase 90 percent of their base demand at Tier 1 rates. This amount is called the “Tier 1 annual limit.” Base demand is calculated as the agency’s highest firm demand for the fiscal years 1989-90 through 2001-02. Agencies are charged at Tier 2 rates for water purchased in excess of the Tier 1 annual limit. Agencies that do not submit a purchase order are charged the Tier 2 rate for water purchases that exceed 60 percent of their base demand. All three providers in Thousand Oaks have signed purchase orders with Calleguas.

Table 2: MWD and Calleguas rate structures

**CALLEGUAS MUNICIPAL WATER DISTRICT
WATER RATES & CHARGES
2003-2005**

	Eff. January 1, 2003	Eff. January 1, 2004	Eff. January 1, 2005
MWD Rates			
Tier 1 Supply Rate (\$/af)	\$ 73	\$ 73	\$ 73
Tier 2 Supply Rate (\$/af)	\$ 154	\$ 154	\$ 154
System Access Rate (\$/af)	\$ 141	\$ 163	\$ 152
System Power Rate (\$/af)	\$ 89	\$ 60	\$ 81
Water Stewardship Rate (\$/af)	\$ 23	\$ 30	\$ 25
Treatment Surcharge (\$/af full-service)	\$ 82	\$ 92	\$ 112
CMWD Rates			
O&M Surcharge (\$/af)	\$ 21	\$ 22	\$ 41
Capital Construction Surcharge (\$/af)	\$ 53	\$ 58	\$ 63
SUMMARY			
Tier 1 Rate (\$/af)	\$ 482	\$ 498	\$ 547
Tier 2 Rate (\$/af)	\$ 563	\$ 579	\$ 628

3 APPROACH

3.1 WATER SYSTEM OWNERSHIP AND MANAGEMENT ALTERNATIVES

The framework developed in this project (see Appendix H) is designed to assist public sector decision-makers in evaluating four scenarios for significantly changing the ownership and/or and management of retail water distribution systems:

1. **CIP:** Implementing operational and management changes designed to improve efficiency at a public water system
2. **Municipalization:** Purchasing the assets of a privately owned water system, transferring ownership and operating responsibility to a public entity
3. **PPP:** Contracting out the operation and maintenance of a public water system to a private company
4. **Asset sale:** Selling the assets of a publicly owned water system, transferring ownership and operating responsibility to a private company

Each of these scenarios is described in greater detail below.

3.1.1 Scenario I: Continued public ownership with CIP

A public water utility may implement a CIP in order to increase operational efficiency, reduce projected rate increases, comply with increasingly strict water quality standards, or become more competitive with private companies proposing to operate the system at lower cost. According to the Association of Metropolitan Water Agencies (AMWA), the recent trend towards deregulation of various utility industries has motivated public water agencies to become more competitive:

The urgency for competitiveness in the water industry is a natural extension of recent trends towards deregulation and competitiveness ... Public service in general is increasingly challenged by generic demands for lower cost and higher performance. This trend is motivating a very basic reassessment of public service provision, and a focus on reinventing government and reengineering public service [101].

Gauging how many public water utilities across the nation are engaged in CIP programs is beyond the scope of this project. However, the AMWA manual on increasing public sector competitiveness was the product of surveying more than 100 public water utilities nationwide [102].

A CIP can involve implementing new *work practices*, changing or streamlining *organizational structure*, or implementing new *technology*. These types of changes can be implemented together or separately, but typically are interrelated. For example, if a utility changes its organizational structure by eliminating redundant positions, the staff reduction is likely to affect the work practices of remaining employees. Examples of changes in work practice include implementing a preventative maintenance schedule and hiring personnel to administer it, cross-

training staff to take on additional responsibilities, or developing an incentive program to spur employee performance. An example of a change in organizational structure is a shift from numerous specialized staff to fewer staff that are cross-trained in several areas of utility operation. An example of a change in technology is the introduction of a computer-based management or monitoring system. Our decision-making framework is intended to assist with CIP evaluation that involves a comprehensive reorganization of utility operations, significant changes in work practices, and/or major technology acquisition.

3.1.2 Scenario II: Municipalization from private to public ownership

The municipalization scenario applies when a public entity buys or otherwise assumes the assets of a water system that was previously under private ownership. This scenario occurs infrequently, but a few cities in California have recently considered or actively pursued such an option. The IOU may not be a willing seller, in which case the acquisition may be pursuant to an eminent domain suit filed by the municipality. As a result, the municipalization alternative often involves high transaction costs. According to Beecher, there are multiple reasons that cities may choose to pursue municipalization:

The key reasons seem to be: concerns about high water rates and desire to control rates and rate design, desire for control over local water resources, interest in achieving tax and financing advantages, interest in reducing or “keeping” the profit to spend elsewhere, and – somewhat amazingly – an interest in shifting from ownership to contract model of privatization [103].

Section 2.3.4 describes municipalization of the water utility in Montara, California.

3.1.3 Scenario III: Public-private partnership

Under a PPP, a public entity contracts with a private company to provide specific services related to utility operation and management. The public entity retains utility asset ownership. The NCPPP defines a PPP as:

[a] contractual agreement between a public agency (federal, state or local) and a for-profit corporation. Through this agreement, the skills and assets of each sector (public and private) are shared in delivering a service or facility for the use of the general public. In addition to the sharing of resources, each party shares in the risks and rewards potential in the delivery of the service and/or facility [104].

There are numerous of examples of PPPs in the water industry. Some are small in scope, such as cases where a utility contracts with a private company to provide limited services such as customer billing. Other PPPs are more comprehensive, such as a contract to operate a wastewater treatment plant. Our decision-making framework is concerned with evaluating large-scale contracts for the operation and maintenance of retail water distribution systems. An example of this type of PPP

would be the contract between the City of Indianapolis and Veolia Water North America for operation and management of the municipal water system.

3.1.4 Scenario IV: Asset sale from public to private ownership

The asset sale scenario pertains to instances where a public entity sells off all water system assets to a private company, transferring ownership and operating responsibility to the private sector. Though asset sales are not as common as PPPs, one recent example is the sale of the water system assets of the City of Coatesville, Pennsylvania, to Pennsylvania American Water Company, a subsidiary of AWW.

3.2 MANAGEMENT OBJECTIVES

To identify key considerations associated with each decision scenario, we established a set of ten objectives that decision-makers may wish achieve in adopting a new ownership or management model for their water utility. This set of objectives was developed through interviews with industry experts, public officials, and through our literature review. The objectives we identified are: operational efficiency, system reliability, water quality, customer satisfaction, local control, local accountability, rate affordability, water conservation, supply reliability, and public acceptance. The following sections provide a brief definitional description of each objective, and discuss indices that can be used to evaluate water utility performance under each objective.

3.2.1 Operational efficiency

In this analysis, operational efficiency is defined as short-term system input per short-term system output. For our purposes, “short-term” is considered to be one year. Operationally efficient systems will minimize input for a given level of output. We used four metrics to evaluate the operational efficiency of the public and private water systems in Thousand Oaks: 1) operating ratio (annual operating expenses divided by annual operating revenue), 2) annual operating expense (less uncontrollable costs) per customer connection, 3) labor expenses per customer connection, and 4) salary per employee category. We evaluate the outcome of our efficiency analysis by conducting an analysis of provider rates, to assess whether greater operational efficiency is reflected through lower water provider rates.

3.2.2 System reliability

System reliability addresses long-term infrastructure investment, planning, and other asset management practices. Financial performance can be an indicator of system reliability because systems that are not performing well financially have a greater incentive to defer maintenance [105]. The two indices of financial performance assessed in this study are: 1) return on assets (net income over total assets), and 2) debt ratio (total liabilities over total assets).

In addition, systems that plan and invest in infrastructure maintenance on a multi-year basis and have advanced systems for tracking infrastructure conditions are likely to be more reliable than those that primarily consider short-term infrastructure needs. We

used four operational indices to assess system reliability in our Thousand Oaks case study: 1) unaccounted-for water, which is the amount of water purchased from the wholesaler minus the amount billed to customers minus non-revenue water (water used for system flushing, fire department use, and charitable donations), expressed as a percentage of total water purchases, 2) number of distribution system breakdowns (main breaks) per unit of annual output, 3) annual maintenance expenditures per length of pipe, and 4) average water pressure at residential customer connections. Other indices to consider include the utility's average age of pipe, and assessing whether the utility uses GIS or other technology to track infrastructure condition.

3.2.3 Water quality

In retail water distribution systems, water quality is most influenced by the source of water supply, but may also be influenced by the level of infrastructure investment. Water quality may also be related to operational efficiency considerations such as staff per connection. This analysis considered the following water quality metrics in our Thousand Oaks case study: 1) number of water quality violations issued by the California Department of Health Services (DHS) per year, and 2) the number of DHS citations for not meeting monitoring or reporting requirements per year. In addition, tracking customer complaints about water taste, odor, or appearance could also be used as water quality indicators.

3.2.4 Customer satisfaction

Decisions regarding water system ownership and management may also impact customer satisfaction. Through our survey research in Thousand Oaks, we determined five elements of utility operation that have the largest effect on overall customer satisfaction: service, rates, billing, the customer's experience with their provider's telephone call center, and the customer's perceptions about their water provider's community involvement (see Section 4.4.10.) We measured customer satisfaction through a mail survey where we queried customers on their satisfaction with a number of factors relating to utility service on a five-point scale. In addition to the most significant factors mentioned above, we also asked respondents to rate provider performance on water pressure, conservation, and how well their provider informs customers about planned service interruptions.

3.2.5 Local control

The extent to which the local public agency retains management decision-making authority can be an important consideration in evaluating alternative water system ownership and management models. Some models remove decision-making authority from local jurisdiction; others have the opposite effect. Indices used to assess local control include whether the public entity retains decision-making authority over rates, utility budgets, capital expenditures, conservation programs, personnel decisions, and water supply planning.

3.2.6 Local accountability

We define accountability as responsibility for the outcome of management decisions. Four questions should be considered in assessing accountability with respect to different water system ownership models: 1) Does the ownership model clearly assign accountability, or is it ambiguous? 2) Is accountability primarily in the public or private sector? 3) To what degree can the municipality or utility customers affect utility management decisions? and 4) To what extent does the municipality retain legal and financial liability for the outcome of water system management decisions? Some models decrease local accountability for management decision outcomes, and others have the opposite effect. Indices used to assess local accountability include whether there is a local forum for water customers to participate in decision-making processes such as rate-setting, and whether the municipality retains liability for environmental violations, worker accidents, or system failure at the water utility.

3.2.7 Rate affordability

Affordability of rates may be more or less important to decision-makers depending on the demographics of the customer base, cost of providing water, and size of rate base. According to the EPA, the simplest metric to assess rate affordability is the ratio of annual user charges to median household income, expressed as a percentage [106]. An additional level of detail would involve scaling the metric for local socioeconomic conditions such as unemployment, ideally measured against state or national benchmarks.

3.2.8 Water conservation

The California Urban Water Conservation Council (CUWCC) has developed a set of 14 best management practices (BMPs) to assist water utilities in implementing water conservation programs [107]. Indices used in our Thousand Oaks analysis to assess water conservation include: 1) unaccounted-for water expressed as a percentage of total water purchases, 2) per capita water use, 3) whether the provider has signed on the CUWCC's Memorandum of Understanding (MOU) for implementing conservation BMPs, 4) whether the provider files annual BMP implementation reports with CUWCC, and 5) reported implementation of CUWCC BMPs. Additional indices – if data is available – include per capita indoor water use, whether the provider uses an increasing tiered rate structure, and annual volume of recycled water sold [108].

3.2.9 Supply reliability

Different water system ownership models may have different capacity and mechanisms for addressing water supply reliability, and ability to secure additional water supply. In addition, supply-related concerns may be more or less of a factor in decision-making, depending on supply availability, reliability, and whether the municipality has authority for addressing supply issues in a given area. Indices for assessing supply reliability include: 1) volume and type of storage capacity (surface, tank, and groundwater), 2) timeline for water supply planning efforts, 3) a qualitative

assessment of how thoroughly the utility's UWMP is completed, 4) whether regional supply coordination efforts exist, and 5) whether water supply planning efforts are coordinated with local land use planning efforts. As Calleguas has primary authority for ensuring supply reliability in Thousand Oaks, we did not evaluate supply reliability in our Thousand Oaks case study.

3.2.10 Public acceptance

There are potential differences in the degree of anticipated public support for decisions to implement a new water system ownership and management model. Indices for public acceptance are qualitative and subjective. For instance, does the management decision cause a significant degree of public opposition? This analysis includes a discussion of potential barriers to public acceptance, and actions that can be taken to increase public support for the model that is selected.

3.3 DATA SOURCES

Our decision-making framework is informed by four primary research elements: 1) a comparative analysis of the public and privately owned water systems operating in the City of Thousand Oaks, California, 2) legal research conducted by students at the UCLA School of Law, 3) interviews conducted with water industry practitioners and public officials who have had experience with the four decision scenarios we evaluated, and 4) a review of relevant literature. These elements are described in greater detail below.

3.3.1 Thousand Oaks case study

A key part of our research uses the City of Thousand Oaks, California, as a case study to evaluate the major differences between public and private water system operations and management. A unique situation exists in Thousand Oaks where a publicly owned and operated water utility operates in the same city as two privately owned and operated water utilities. Through our comparative analysis of operational efficiency, system reliability, environmental management, and customer satisfaction at the three utilities, we are able to draw a number of conclusions to inform our decision-making framework.

3.3.2 Legal research

Our research partners at the UCLA School of Law participated in the semester-long Frank G. Wells Environmental Law Clinic, performing in-depth legal research into two areas: 1) the potential for international trade agreements such as GATS or NAFTA to trump local or state laws regarding water rights, water quality, or water management, and 2) the implications of U.S. regulations promoting financial transparency such as Sarbanes-Oxley to water privatization. Given the recent history of corporate consolidation in the water sector, and the fact that leading industry players are German and French-owned multinational corporations, these topics were particularly germane to our research. In addition, questions of corporate financial transparency and controlling authority of international law affect the sections of our

framework that deal with the management objectives of local control and accountability, as well as public acceptance under the two privatization scenarios (PPP and asset sale).

3.3.3 Practitioner interviews

We conducted a series of interviews with public officials and utility managers from cities that had recent experience with CIP implementation, privatization, or municipalization. We also interviewed executives from some of the largest private water companies operating in California and across the country. In addition, we consulted with other water sector experts, including regulatory officials, staff from nongovernmental advocacy and research organizations, and lawyers with expertise in contract law, water law, and international trade law.

3.3.4 Literature review

We conducted an extensive literature review to find other studies concerning the financial, organizational, and operational differences between public and private water systems, emphasizing case studies in California and the U.S., but also drawing on international examples such as the United Kingdom, France, Bolivia, and the Philippines. We reviewed the publications of relevant trade associations dealing with the topic of water privatization, and we also sought case studies describing the processes used by municipalities to evaluate water system ownership and management decisions.

4 THOUSAND OAKS CASE STUDY RESULTS

4.1 OPERATIONAL EFFICIENCY ANALYSIS

In our Thousand Oaks case study, our consideration of operational efficiency focuses on evaluating the amount of resources used to provide water service. As defined in Section 3.2.1, the efficiency analysis focuses on short-term system input per short-term system output. It is important to note that we have attempted to separate our consideration of operational efficiency from other aspects of utility performance such as system reliability, environmental management, and customer service, which are evaluated in Sections 4.2 through 4.4.

There are many possible measures of operational efficiency; our goal was to choose a combination of metrics that would allow a meaningful comparison of public and privately owned water systems. It is important to note that due to the fundamental differences between the public and private sectors, it is problematic to draw conclusions from efficiency comparisons in the same way that one would when comparing private firms.

In the following sections we discuss the limitations of each operational efficiency metric, the results of using these metrics to compare the three utilities in Thousand Oaks, and the conclusions that we draw from the comparison. The efficiency metrics we examined are:

1. Operating ratio (annual operating expenses divided by annual operating revenue)
2. Annual operating expenses (less uncontrollable costs) per customer connection
3. Labor expenses per customer connection
 - Total labor expenses per customer connection
 - District payroll expenses per customer connection
 - Non-district labor expenses per customer connection
4. Salary per employee category

Following the discussion of operational efficiency, we present a water rate analysis for the three utilities. We examine whether greater operational efficiency corresponds with lower rates for the three Thousand Oaks utilities, as a potential benefit of greater efficiency could be lower rates.

4.1.1 Operational efficiency metrics

4.1.1.1 *Operating ratio*

Operating ratio is typically calculated by dividing annual operating expenses by operating revenues. It is one of several generally accepted ratios that measure a company's operational efficiency, such as net profits to gross income, sales to cost of

goods sold, and net profit to net worth. A lower operating ratio may be one indication that a company is operating more efficiently. Although operating ratio is a good metric to compare the performance of two private companies, this metric does not apply equally to public entities. Like many public utilities, CTO's water department is set up to achieve an operating ratio of approximately one. The municipal utility does not operate with the goal of maximizing profit from water sales, but rather aims to ensure that revenues cover the cost of providing service. Therefore we would expect the operating ratio comparison to reveal that the two private companies have lower operating ratios than CTO, highlighting a fundamental difference between private and public enterprises.

We collected data on annual operating expenses and revenues for fiscal years 1998-99 through 2002-03 for each utility in Thousand Oaks. The results of our operating ratio comparison are shown graphically in Figure 2 through Figure 5.

Figure 2 shows the trend in each company's operating ratio relative to the others for the period studied. Several observations stand out from this figure. The first is that CAW has a significantly lower operating ratio for the period than the other providers. Second, CTO's operating ratio has been near one for the period. As expected, CTO is operating at the level where revenues approximately equal expenses. Another observation is that CWS is operating relatively closer to CTO's operating ratio than to CAW's. Additionally, there is a single year, 2001, where CWS' operating ratio exceeded one, meaning that their revenue was less than their expenses for that fiscal year. According to Don Jensen, General Manager for the Westlake District (the company's Thousand Oaks service area), in 2000 and 2001 the company experienced delays in getting needed rate increases approved by the CPUC [109]. CWS filed for a rate increase in 2001 but the increase did not go into effect until September 20, 2003.

Figure 3 through Figure 5 show the individual operating ratios for each water provider during the study period. These figures are useful for examining what happened to each provider's efficiency from year to year. The large drop in CTO's operating ratio in 2003 was due to a combination of factors, but primarily because CTO placed approximately \$456,000 in an employee retirement fund in 2002 in response to a new requirement to set aside retiree benefits [110]. The following year, CTO only added \$74,000 to the fund, leading operating expenses to decrease significantly from the previous year. The retirement account expense was in accordance with a Governmental Accounting Standards Board (GASB) requirement that went into effect in June of 1999 [111]. (See Appendix D for more information on GASB and its impact on public sector accounting practices.)

In Figure 4, we can see that CAW's operating ratio is decreasing over the study period, except for a slight rise in 2002. Over the period, CAW achieved a 12 percent decrease in its operating ratio. Examining Figure 5 reveals that the operating ratio for CWS rose to a level above one for the year 2001 and then began to decrease again in 2002.

Examining the operating ratio comparison in Figure 2, it appears that CAW was operating most efficiently over the period. Since this metric is more meaningful when comparing two private utilities, it must be used in combination with other metrics of operational efficiency that can be more easily normalized across public and private systems.

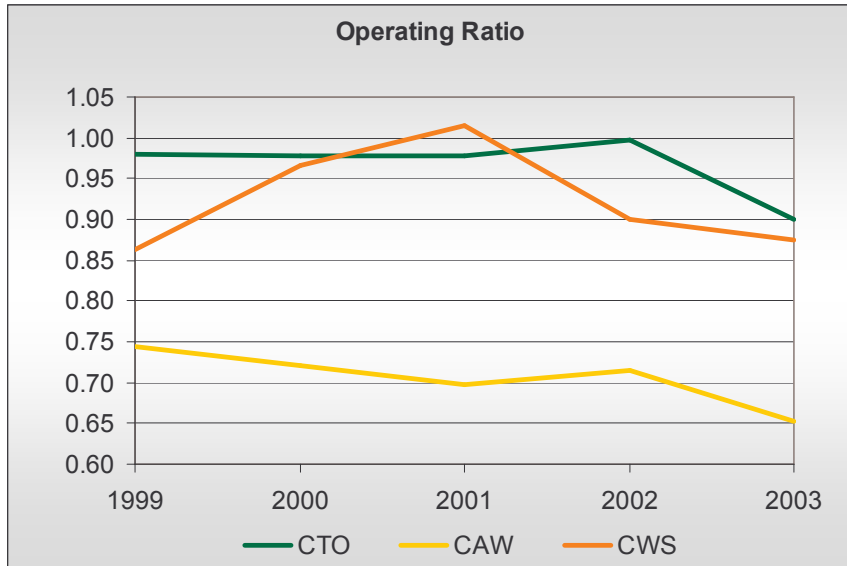


Figure 2: Operating ratio for Thousand Oaks water providers, 1999-2003¹

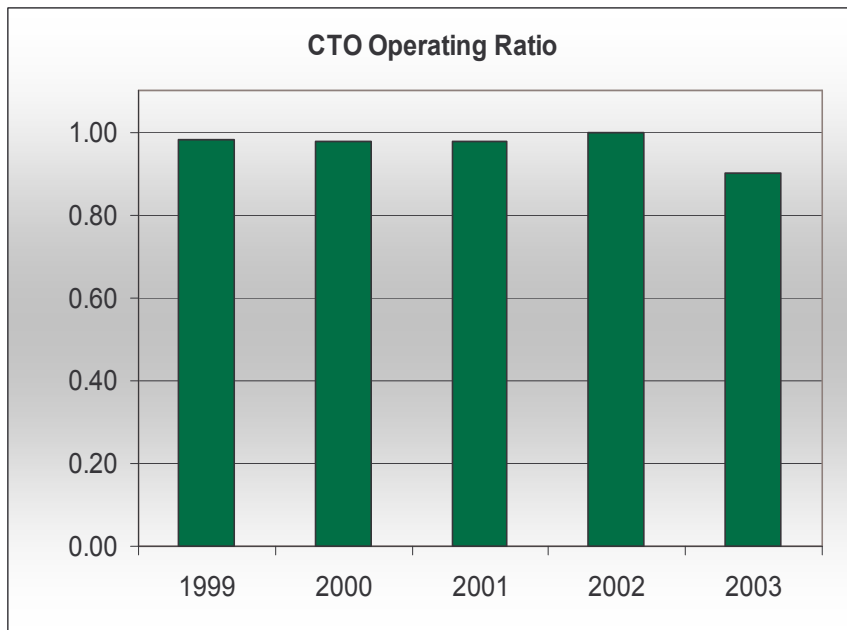


Figure 3: CTO operating ratio, 1999-2003

¹ Operating ratio is annual operating expenses divided by annual operating revenue

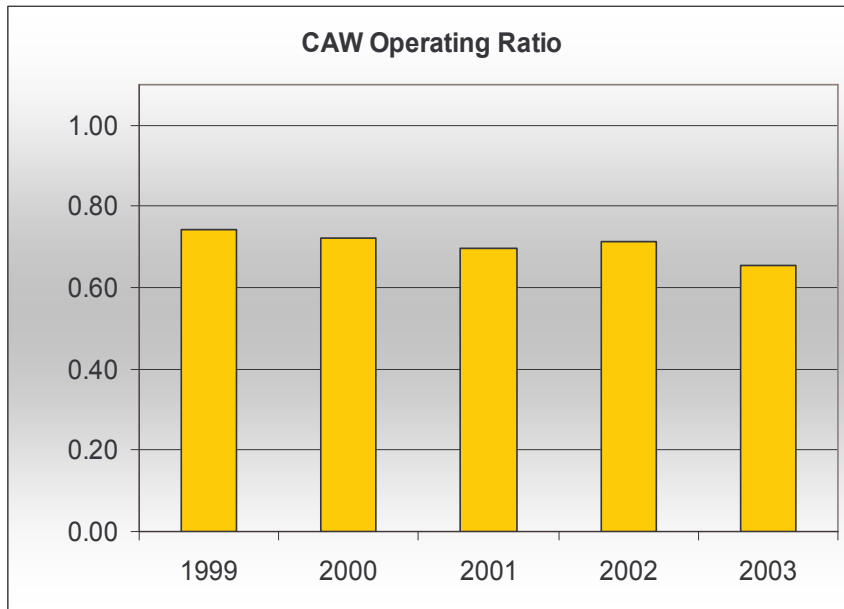


Figure 4: CAW operating ratio, 1999-2003

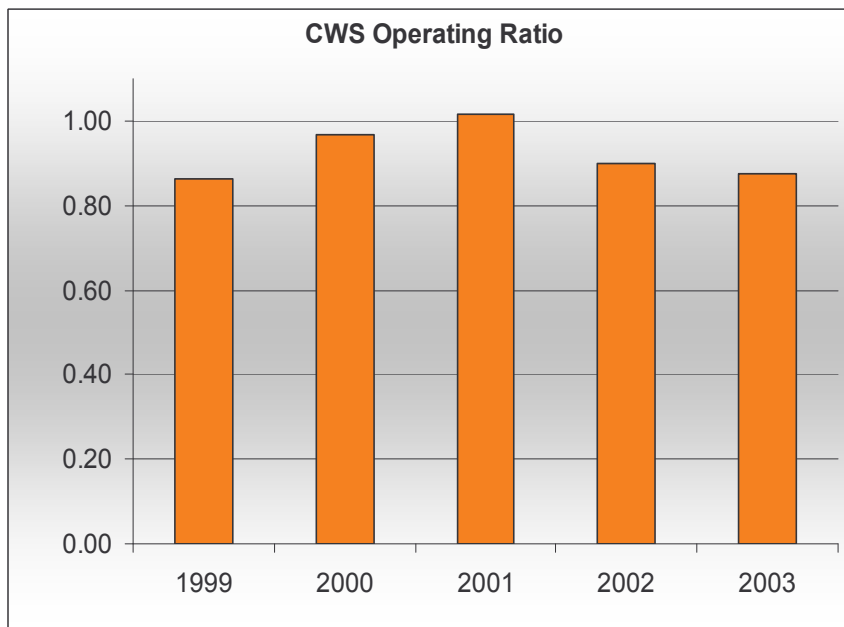


Figure 5: CWS operating ratio, 1999-2003

4.1.1.2 Annual operating expenses per customer connection

The second operational efficiency metric we examined is annual operating expenses per customer connection. We deducted uncontrollable costs – the cost of purchased water, purchased power and purchased chemicals – from annual operating expenses

in order for the metric to be a better reflection of operational efficiency. In addition, we do not include payroll expenses as part of annual operating expenses. (Sections 4.1.1.3 and 4.1.1.4 discuss personnel and payroll-related efficiency metrics.) Dividing annual operating expenses by the number of connections served normalizes the data allowing more equitable comparison across all three utilities. The number of connections refers to the number of residential water meters that are served by each utility. Expenses per connection is a better way to normalize the data than expenses per volume of water sold, as connections are not tied to lot size or other factors influencing water use.

The operating expense, payroll, and water sales data for each provider is shown in Table 3. Figure 6 presents annual operating expenses less uncontrollable costs for each provider, and Figure 7 presents the same data after it has been normalized by each utility's number of customer connections.

Several facts are clear from the data shown in Table 3. First, CTO has the highest annual operating expenses by a wide margin. CTO's operating expenses ranged from approximately \$740,000 in 1999 to over \$1 million in 2003. In 2003, CTO's operating expenses were approximately five times higher than CAW's, which has the lowest operating expenses for the period studied.

Even after normalizing the data by dividing operating expenses by the number of customer connections, CTO still has the highest operating expenses per connection. In 2003, it cost CTO \$71.78 for each connection served, compared to \$10.41 for CAW and \$47.16 for CWS. This represents an approximate difference of 85 percent between CTO and CAW.

CAW's operating expenses decreased over the period studied from a high of \$400,499 in 1999 to \$199,971 in 2003. CWS' operating expenses increased from 2000 to 2001. As discussed above, CWS applied for a rate increase in 2001, but did not receive it until September 20, 2003.

Figure 7 shows that CTO's operating expenses per connection are significantly higher than the other providers, and increased throughout the study period. CAW's operating expenses per connection are the lowest and decreased over the period. For CWS, there was a slight rise in the metric between 1999 and 2000, and then it leveled off through the rest of the period.

Table 3: Payroll and expense data, 1999-2003

Provider	Year	District Personnel ¹	Total Operating Expenses ²	Residential Connections	Total Operating Expenses per Connection	Payroll per Connection	GOAE per Connection	Total Labor Expenses ³	Labor Expenses per Connection
CTO	1999	28	\$745,838	17,577	\$52.45	\$113	\$55	\$2,399,321	\$169
CTO	2000	30	\$904,573	17,925	\$62.24	\$117	\$58	\$2,549,010	\$175
CTO	2001	31	\$869,715	18,524	\$69.00	\$120	\$64	\$2,711,653	\$184
CTO	2002	31	\$953,647	18,884	\$63.48	\$132	\$71	\$3,053,228	\$203
CTO	2003	30	\$1,081,374	19,212	\$71.18	\$137	\$75	\$3,224,250	\$212
CAW	1999	18	\$400,499	14,221	\$22.79	\$44	\$91	\$2,374,416	\$135
CAW	2000	18	\$361,610	14,534	\$20.17	\$42	\$101	\$2,565,676	\$143
CAW	2001	17	\$365,369	14,742	\$19.72	\$42	\$106	\$2,726,075	\$147
CAW	2002	17	\$298,243	15,022	\$15.79	\$44	\$111	\$2,927,993	\$155
CAW	2003	17	\$199,971	15,192	\$10.41	\$40	\$90	\$2,500,282	\$130
OWS	1999	9	\$245,629	7,300	\$33.65	\$64	\$96	\$1,211,562	\$166
OWS	2000	9	\$347,434	7,350	\$47.27	\$67	\$106	\$1,306,352	\$178
OWS	2001	9	\$364,800	7,400	\$49.30	\$69	\$116	\$1,402,376	\$190
OWS	2002	9	\$346,800	7,450	\$46.55	\$70	\$118	\$1,401,352	\$188
OWS	2003	9	\$353,700	7,500	\$47.16	\$72	\$120	\$1,437,730	\$192

1. District personnel data is full time employees (FTE) rounded to nearest whole number
2. Total annual operational expenses, less cost for purchased water, chemicals, and power (does not include payroll but does include maintenance expenses)
3. Total labor expenses = payroll + GOAE

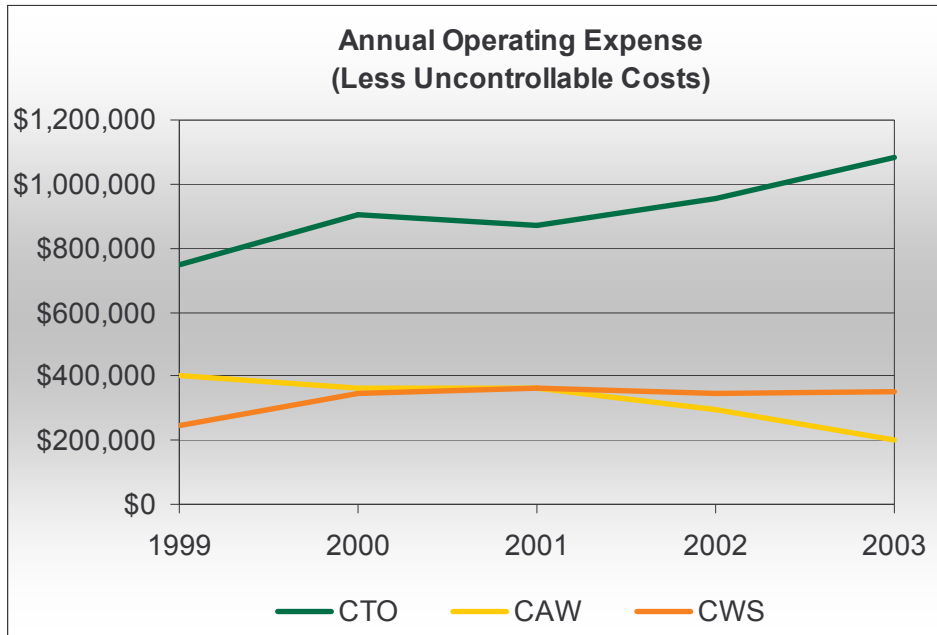


Figure 6: Annual operating expenses (less uncontrollable costs), 1999-2003

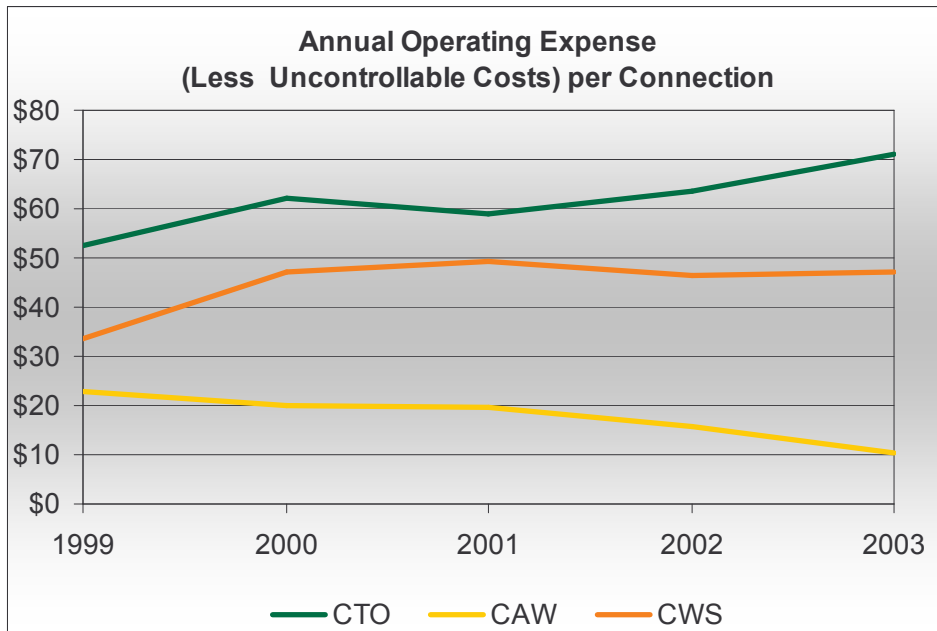


Figure 7: Annual operating expenses per customer connection, 1999-2003

4.1.1.3 Labor expenses per customer connection

We used three metrics to analyze assess how each utility uses labor to serve its customers. The first metric measures total labor costs per customer connection, which includes payroll for employees working in Thousand Oaks as well as the cost of services for employees from outside the Thousand Oaks utility operation, either in other parts of the company for CAW and CWS, or other municipal departments for CTO. The second metric, district payroll expenses per customer connection, measures each utility's cost of labor for Thousand Oaks water utility employees only. The third metric, non-district labor expenses per customer connection, measures labor allocations from outside the Thousand Oaks utility operation to serve customers in Thousand Oaks.

The two private utilities in Thousand Oaks are each district operations, meaning that they are the local division of larger companies that are operating in multiple areas throughout the state or the nation. These companies use a centralized labor model. Each district operation is staffed only by those employees that are essential to daily operations. The company employs additional staff in various capacities as part of its central operations that periodically provide services to district operations, including legal services, accounting, laboratory analysis, financial planning, and rate management. Labor centralization is an example of how large IOUs use economies of scale to increase operational efficiency. Much of CAW's labor centralization occurred in the 1990s, years before the merger of AWW with RWE-Thames Water. Following the merger, RWE continued the consolidation and instituted flatter management structures at its subsidiaries [112].

Just as CAW's and CWS' district operations in Thousand Oaks receive services from elsewhere in the company, CTO also receives services from other city departments. The district operation of each private company expenses the services it receives from elsewhere in the company via an expense item called the General Office Allocation Expense (GOAE), which appears in Table 3. At CTO, GOAE is handled slightly differently; the water department has a separate program called "business administration" that takes into account all the services received from other departments. The budget of the business administration program includes the cost for purchased water. Therefore, CTO's value in the GOAE column is the total budget for the business administration program less the cost of purchased water.

Table 3 lists payroll and GOAE data for each utility. The total labor expense column is the sum of the GOAE (non-district labor expenses) plus the district payroll. This value should reflect the total amount spent by each utility on labor to serve their customers in Thousand Oaks. The total labor expense values are then normalized by the number of connections served.

Figure 8 shows the trend in total labor expenses per connection for the three Thousand Oaks water providers from 1999 to 2003. CTO has the highest total for each year and shows a trend of increasing expenses per connection over the period.

CWS has the next highest total per year, and also shows an increasing trend. CAW has the lowest total labor expenses per connection, and after an increasing trend from 1999 to 2002, shows a drop in expenses per connection after 2002. It is unclear why this drop occurred. It is possible that CAW's total labor expenses per connection decreased due to increasing utilization of economies of scale from the company's larger operations. It is also possible that CAW could be scaling back its labor investment in Thousand Oaks. Further research would be required to determine the reasons for this drop.

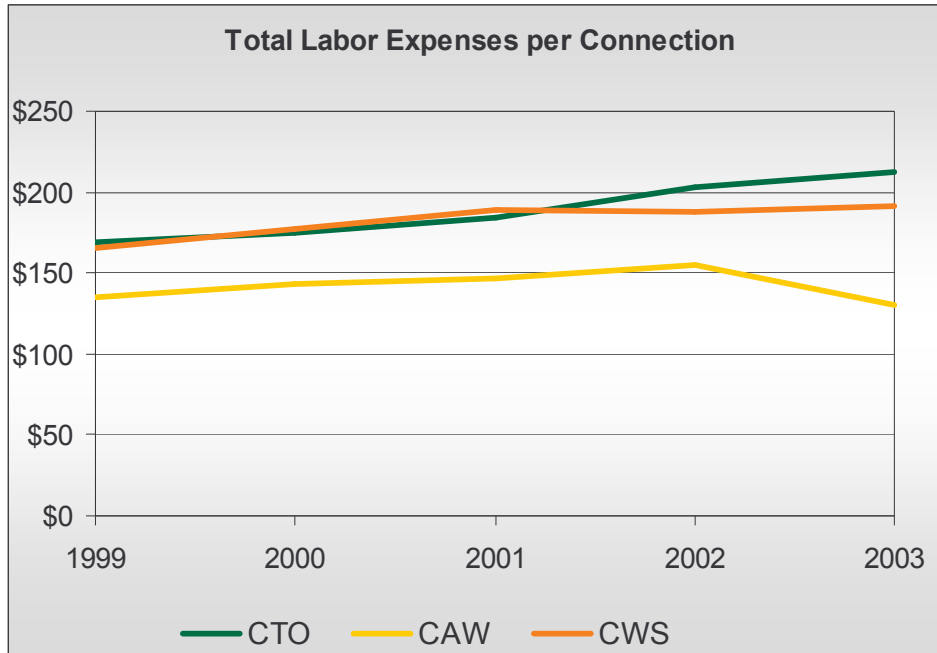


Figure 8: Total labor expense per customer connection, 1999-2003

Figure 9 shows the trend in each utility's district payroll expenses per connection for the same period. CTO has the highest district payroll expenses per connection, and CAW has the lowest.

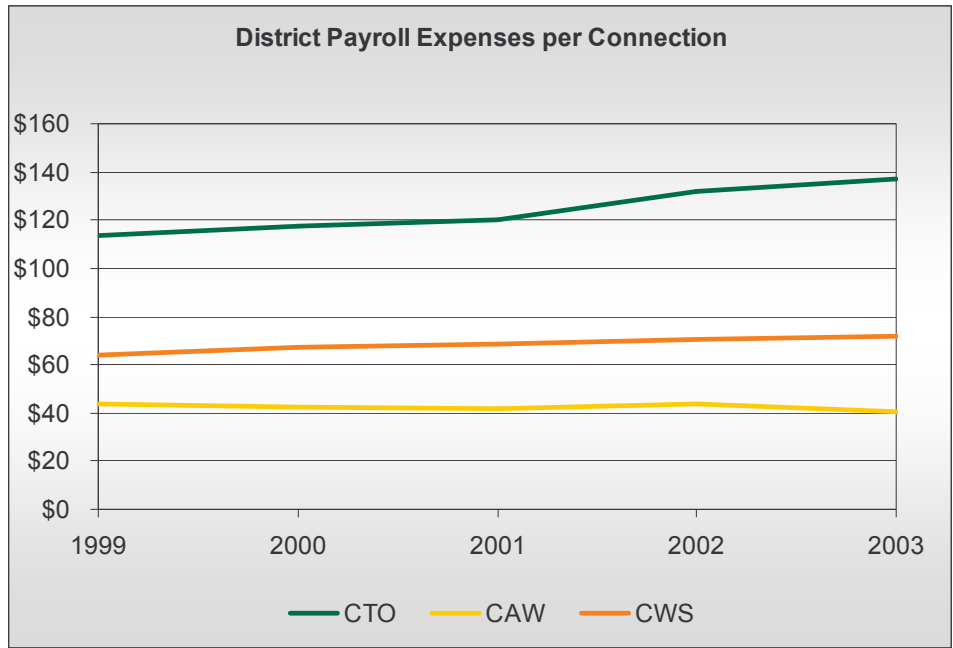


Figure 9: District payroll expenses per customer connection, 1999-2003

Figure 10 shows the trend in each utility’s non-district labor expenses per connection for the same period. CWS has the highest non-district labor expenses per connection, followed closely by CAW, and CTO has significantly lower non-district labor expenses per connection than the two IOUs.

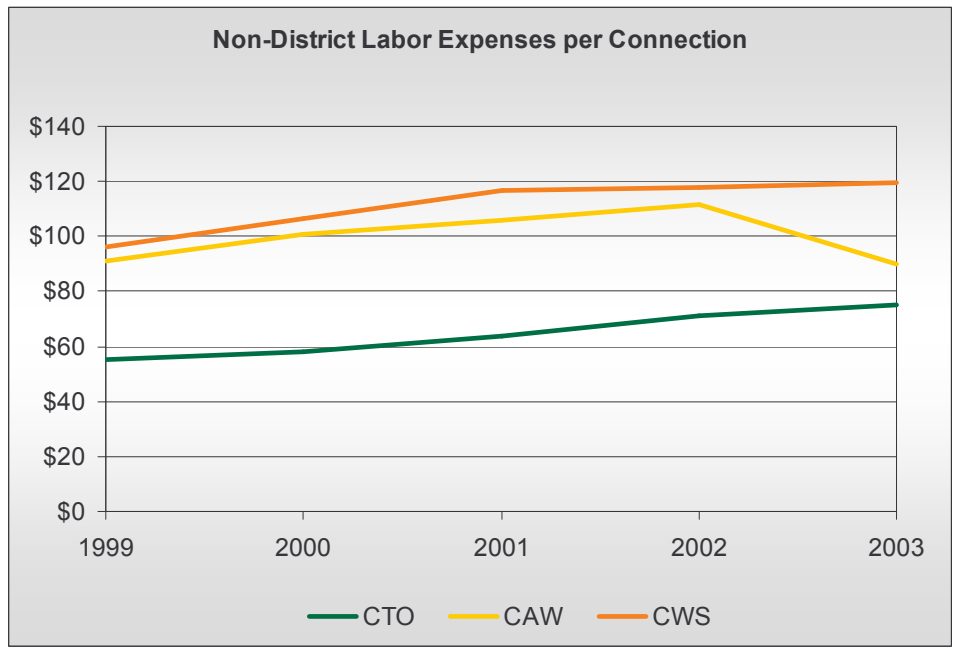


Figure 10: Non-district labor expenses per customer connection, 1999-2003

Comparing Figure 9 and Figure 10, it is apparent that the public utility uses labor differently than the two privately owned utilities. It is likely that the private companies have higher non-district labor expenses per connection than CTO because they employ a centralized labor model. In contrast, CTO has higher district payroll expenses per connection and lower non-district labor expenses per connection than the other providers. This represents the fact that the majority of CTO's labor comes from within its own water utility, rather than from other municipal departments.

4.1.1.4 Salary per employee category

In this section we compare the annual salary for various categories of employees for each utility in the year 2004. Table 4 summarizes the common employee types for each utility and the corresponding annual salary. (Listed salaries are actual salaries, not ranges or averages.) This comparison is valuable because employee salary is a cost that is controllable by each utility. In other words, salary is something that is essentially a management decision, not an outside uncontrollable factor such as the price of wholesale water or power. Setting a lower salary for various employee categories is one way that management could potentially reduce operating costs and improve operational efficiency. At the same time, it should be noted that a lower pay-scale could hurt the utility's ability to attract highly qualified personnel.

In Table 4 the employee categories are grouped into blocks based on whether the position is field (categories 1-5), office (categories 6 and 7), or management (categories 8-11). In certain categories (for example, the utilities maintenance supervisor) the title that each provider assigns to a given position is listed; we have matched up titles to reflect positions that perform similar duties. The salary data we present does not include benefits due to data availability and the difficulties of comparing public versus private sector benefits packages. In addition, it is difficult to quantify intangible benefits such as differences in job security between the public and private sectors.

For the field categories, CWS has one position that is fulfilled by two positions at CTO and CAW. This is the position of district superintendent (category 1), which for CWS appears to be an aggregate of categories 1 and 4. As a result, CWS' salary for the district superintendent position is higher than either the utilities maintenance supervisor (CTO) or operations superintendent (CAW).

For the office categories, CWS has two employees that serve the role of both secretary and customer service representative. CWS' salary for these employees is higher than either the customer service representative or secretary position at CAW and CTO.

In the management category, the primary management position for the two private utilities is the operations manager (CAW) or district manager (CWS). CTO has four management positions, with the director of public works as the primary manager. It should be noted that all of the CTO management positions are in charge of duties throughout the public works department, not just the water department. For the

primary management category, category 8, CTO has the highest salary, followed by CWS, then CAW. For both private companies, management duties have largely been assumed by the corporate offices and kept to a minimum at the district level. Thus, categories 9 through 11 are positions that the private companies fill at the corporate level.

Overall, CWS has the highest salaries for non-managerial positions, CAW has the next-highest, and CTO has the lowest. For managerial positions, CTO has the highest salaries but the management positions at CTO are fulfilling duties in other public works departments. CAW also only has one district-specific management position which is at a significantly lower salary than the district management position at CWS. Overall, it appears that CAW is fairly efficient in terms of utilizing non-district management and having the lowest salary for their one district management position. CTO appears fairly efficient in terms of having relatively low salaries for their field positions. CWS has a minimum number of employees in the district, but has the highest relative salaries for these employees.

The results of our salary comparison are contrary to the conclusions made by Donahue in his assessment of public versus private utility pay scales:

Government pay scales are also quite compressed. Lower-level civil servants sometimes earn more than their private sector counterparts, while senior officials generally make less [113].

The discrepancy between the assessment made by Donahue and our findings in Thousand Oaks may be attributable to the fact that CTO management staff are paid relatively more than CAW and CWS management staff because they have responsibilities to other divisions of the city's public works department. Sharing management positions between different public works divisions is one example of how CTO uses economies of scale to increase operational efficiency, despite its spatially-limited jurisdiction.

Table 4: Annual salaries by employee category, 2004

Category	Position Category	CTO	CAW	CWS
	Field			
1	Utilities Maintenance Supervisor/Operations Superintendent /District Field Superintendent	\$63,960	\$65,798	\$75,000
2	Meter Reader	1	\$45,406	\$49,656
3	Utility Worker	\$38,400	\$45,282	\$48,852
4	Utilities Maintenance Crew Leader/Operations Supervisor	\$47,958	\$61,524	2
5	Water System Operator/Pump Operator/ Operations Specialist	\$45,648	\$47,091/ \$50,420	\$52,824
	Office (non-management)			
6	Secretary	\$46,794	\$37,836	\$47,628 ³
7	Customer Service Representative	\$40,356	\$45,406	\$47,628 ³
	Management			
8	Public Works Superintendent/ Operations Manager/ District Manager	\$99,216	\$76,903	\$95,000
9	Public Works Director	\$139,610	4	4
10	Deputy Public Works Director	\$120,598	4	4
11	Assistant Public Works Superintendent	\$85,717	5	5

- 1 CTO does not have a meter reader position as their customer service representative performs meter-reading duties.
- 2 CWS did not list this employee category
- 3 CWS secretary category performs similar function to customer service representative
- 4 These employee categories are filled by individuals at corporate headquarters, not in-district
- 5 This employee category was not listed by CWS or CAW

4.1.2 Retail water rate comparison

A water rate comparison between public and private utilities can be difficult due to differences in rate structures, charges, and financing used by public and private enterprises. Direct rate comparisons may be misleading if one does not account for these differences in the analysis. Even if one attempts to account for the differences, equitable comparisons may be impossible due to differences in service area geography, and differing costs of wholesale water, energy, or chemicals. Despite some of the inherent problems with a public/private rate comparison, we present a rate comparison for the public and private utilities operating in Thousand Oaks. Thousand Oaks permits a legitimate comparison for several reasons: 1) each utility is under the same wholesale water rate structure, 2) each utility pays the same wholesale price for electricity, 3) the utility service areas are geographically similar, and 4) major differences in rate structure and charges can justifiably be ignored.

The results of this analysis will test the assertion that greater operational efficiency leads to lower rates. In Section 4.1.3 we discuss whether the results from the Thousand Oaks efficiency and rate analysis support this argument.

4.1.2.1 Wholesale water purchases

As described in Section 2.5.3, all three providers in Thousand Oaks obtain their entire potable water supply from Calleguas. All three utilities are currently under purchase orders with Calleguas, which entitles them to a larger volume of water at the wholesaler's Tier 1 rates.

According to records from Calleguas, in 2003 CTO purchased 12,137.3 acre-feet at the Tier 1 rate and 1,292.6 acre-feet at the Tier 2 rate. CAW purchased 16,457.4 acre-feet at the Tier 1 rate and 1,881.7 acre-feet at the Tier 2 rate. CWS purchased 16,457.4 acre-feet at the Tier 1 rate and 228.3 acre-feet at the Tier 2 rate.

4.1.2.2 Rate structure

Appendix B discusses the regulatory structure governing the rate-setting process for IOUs. In California, the standard rate design for privately owned water utilities is broken into the *quantity rate*, which is the rate per unit of water purchased, and the *meter charge*, which is the monthly charge for the water meter, irrespective of quantity used. A company recovers 50 percent of their *fixed costs*, such as infrastructure, from the quantity rate and 50 percent from the meter charge. They recover their *variable costs*, such as purchased water and power, from the quantity rate.

The City of Thousand Oaks is responsible for setting the rates for its municipal water utility. According to Don Nelson, Director of Public Works, if a rate increase is necessary to cover operating costs, he will place an item on the City Council agenda with justification for the needed increase [114]. The City Council must then vote to approve the increase. Like the IOUs, the public utility typically recovers half of its fixed costs from the meter charge and half from the quantity rate. Rate increases for

CTO have been averaging approximately 1.3 percent per year for the quantity rate and approximately 1.7 percent per year for the meter charge over the period 1992-2005. These increases are due to increases in costs of labor, energy, equipment, materials, and wholesale water and energy rates.

CTO has several rate structure components and financing mechanisms that the private companies do not have. The municipal utility has a quantity rate, a meter charge, a plant investment fee (PIF), and a lift charge. The main difference between the private company rate structure and the city rate structure is the use of PIFs and lift charges. The PIF is a one-time charge based on meter size that is imposed on new water meter connections, and it is intended to cover the infrastructure costs imposed by a new water customer [115]. The current PIF charge is \$2,635 for a residential meter (5/8 by 3/4 inch). PIF fees are deposited into an account that is solely used to fund new capital improvement projects [116]. The lift charge is an additional charge that CTO applies to customers who live in areas where topography dictates that their water must be pumped uphill. The lift charge is currently \$13 per HCF of water per lift stage required for each household. The two private companies do not have a separate lift charge for pumping water uphill.

Given the differences in rate structures between CTO and the two private utilities, we must consider whether an equitable rate comparison is possible. For example, do CTO's PIF charges skew the rate comparison? We must consider our primary objective of the rate analysis, which is to compare water rates with operational efficiency to determine if greater efficiency leads to lower rates. Our operational efficiency metrics were concerned with short-term system input per short-term system output. Since PIF fees are deposited into a dedicated fund for capital improvement projects and are not used to decrease annual operating expenses, they do not relate to short-term efficiency.

Lift charges are a pass-through cost. In other words, CTO passes on the added cost of pumping water uphill to the specific ratepayers who require this service. Thus, these pumping costs do not affect the base rates paid by all CTO customers. This rate structure is different than the private company rate structure, where the cost of pumping water uphill to certain customers is spread out over the whole customer base. In Section 4.1.2.3, we discuss whether the lift charges create a significant difference between CTO's quantity rate and the quantity rates charged by the two private companies.

4.1.2.3 Rate analysis

The results of our rate comparison are shown graphically in Figure 11, which depicts each provider's meter charge, and Figure 12, which depicts each provider's quantity rate. These figures show the current, historical and projected water rates for the period 1992 through 2007.

Figure 11 shows that CAW has had the highest meter charge over the majority of the period studied. For the period 1997 to 2004, CAW's meter charge was \$10.70 per

month (for a 5/8 by 3/4 inch meter, the typical size for a residential meter). During the same period, CWS charged \$8.50 per month for a residential meter. CTO charged \$6.95 per month from 1997 through 2002, \$7.95 in 2003, and \$8.95 in 2004. However, in 2005 CWS' meter charge increased to \$10.70 per month, which is higher than CAW's rate under the negotiated settlement reached under their most recent CPUC rate case. Under the agreement, CAW reduced its rates by 9.6 percent as of January 1, 2005. This reduction reduced the meter charge from \$10.70 to \$9.67 per month. The figures in this section reflect the terms of CAW's rate case settlement.

Dave Stephenson, Manager of Rates for CAW's parent company, indicated that the recent rate decrease will be applied to both the quantity rate and the meter charge [117]. According to a memorandum written by the City of Thousand Oaks City Manager's Office, CAW's 2005 rate decrease will "save [CAW]'s 20,000 Thousand Oaks water customers an estimated \$1,892,200 per year" [118].

Under the terms of the rate case settlement, CAW's rates will increase slightly in 2006 and again in 2007 by 0.23 percent. This corresponds to a meter charge increase from the current level of \$9.67 per month to \$9.69 for 2006 and \$9.71 in 2007.

With respect to the quantity rate, Figure 12 shows a similar pattern as with the meter charge: CAW has the highest quantity rate for the period studied, followed by CWS and CTO. For the period 1997 to 2003, the quantity rate per HCF of water was \$2.04 for CAW, \$1.77 for CWS, and between \$1.57 and \$1.67 for CTO. Under the settlement agreement, CAW's quantity rate drops from to \$1.85 per HCF for 2005. CWS' quantity rate increased from \$1.77 per HCF in 2004 to \$1.88 in 2005. This puts their quantity rate at a higher level than CAW's for 2005.

For both the meter and quantity charges, CTO currently and has historically provided the lowest rates to its customers. The maximum rate differential between CAW and CTO for the period studied was between 1997 and 2002, when there was a \$3.75 (35 percent) difference in the meter charge and a \$0.47 (23 percent) difference in the quantity rate. The current rate differential between CAW and CTO is \$0.72 (7 percent) for the meter charge and \$0.18 (10 percent) for the quantity rate.

Over the 12 year period from 1992 to 2004, CTO's quantity rate increased by \$0.29 (17 percent) and their meter charge increased by \$2.00 (22 percent). For the same period, CAW's quantity rate increased by \$0.77 (38 percent) and their meter charge increased by \$2.20 (21 percent). CWS' quantity rate increased \$0.43 (23 percent) and their meter charge increased by \$2.80 (26 percent).

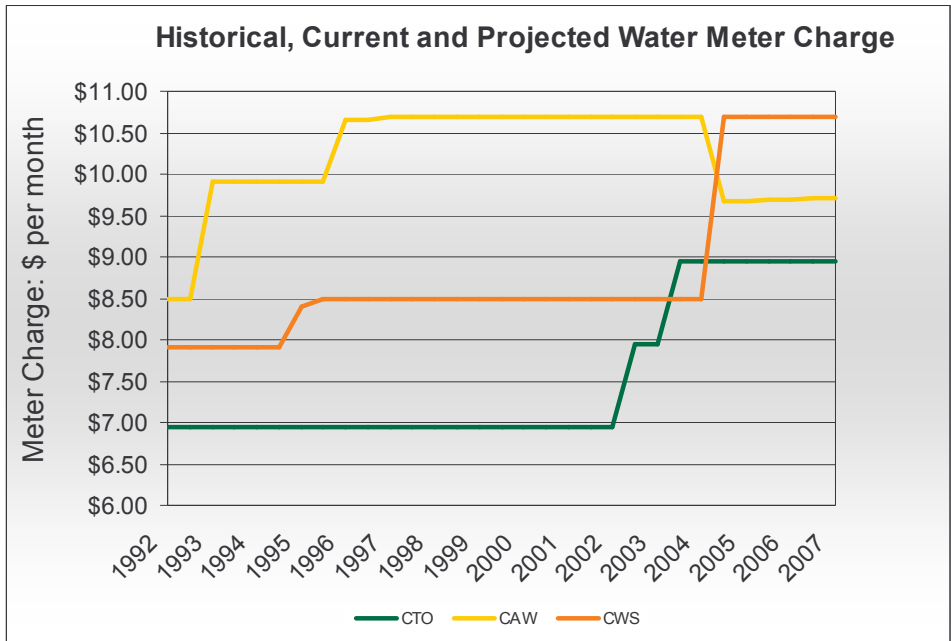


Figure 11: Water meter charges in Thousand Oaks

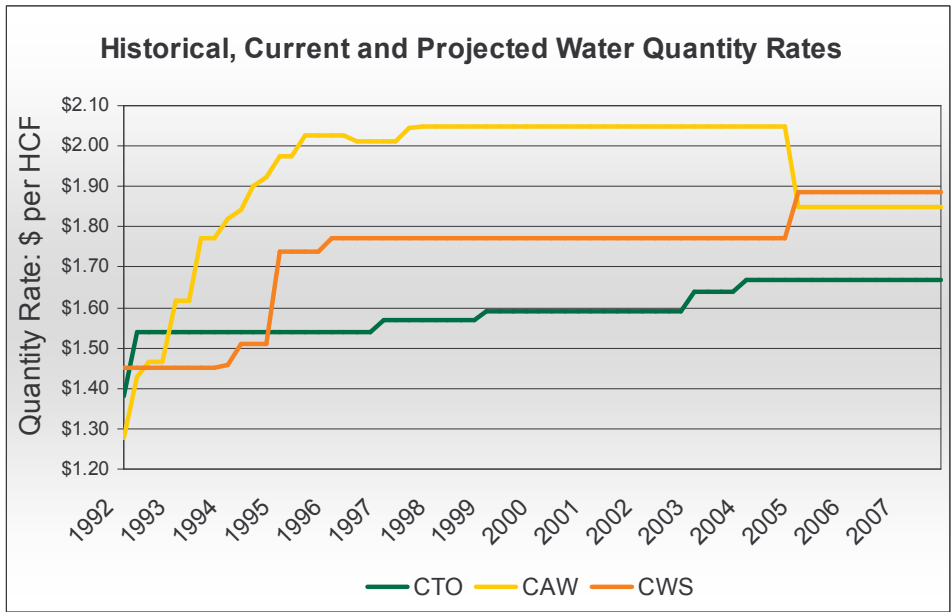


Figure 12: Water quantity rates in Thousand Oaks

Table 5 shows the revenue received by CTO for its lift charges for the years 1999-2003, as well as the amount their quantity rate would be if the lift charges were spread across their entire customer base instead of being paid only by those customers who require the pumping service. To calculate this amount, the lift charge revenue received by CTO each year was divided by the total water sales for that year. The resulting amount is called the “lift charge factor” in the table. Then the lift charge factor was added to CTO’s quantity rate for that year. In this way we show what the quantity rate would look like if CTO spread their pumping costs across their customer base, as CAW and CWS do.

Table 5: Influence of lift charge on CTO’s quantity rate per year

Year	Annual lift charge revenue	Lift charge factor	Original quantity rate	Quantity rate plus lift charge factor
1998/99	\$291,042	\$0.08	\$1.59	\$1.67
1999/00	\$320,835	\$0.08	\$1.59	\$1.67
2000/01	\$324,147	\$0.08	\$1.59	\$1.67
2001/02	\$407,473	\$0.10	\$1.59	\$1.69
2002/03	\$433,690	\$0.11	\$1.64	\$1.75
2003/04	\$651,223	\$0.15	\$1.67	\$1.82
2004/05	\$590,500	\$0.14	\$1.67	\$1.81
2005/06	\$641,100	\$0.15	\$1.67	\$1.82
2006/07	\$653,900	\$0.15	\$1.67	\$1.82

For the years 1999 through 2007, Figure 13 shows each provider’s quantity rates (as shown in Figure 12) with an additional line showing the effect of adding the lift charge factor to CTO’s quantity rate. (Note that due to data availability, the Figure 13 graph does not cover the entire time period shown in Figure 12.) In comparing CTO’s quantity rate with and without the lift charge factor, it is apparent that differences in how public and private utilities structure their rates make an apples-to-apples rate comparison more complex. But even with the lift charge incorporated, CTO’s quantity rate is still lower than that of the private utilities, except in 2004 when CTO’s quantity rate plus lift charge factor exceeded CWS’ quantity rate for a one-year period.

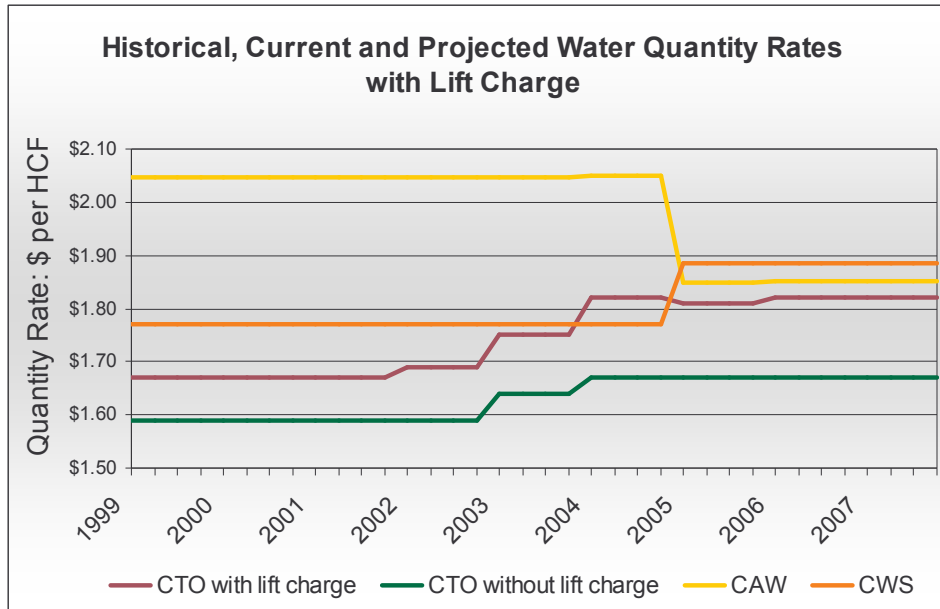


Figure 13: Water quantity rates in Thousand Oaks incorporating CTO’s lift charge

4.1.3 Conclusions from operational efficiency and water rate analysis

In presenting the conclusions from our efficiency analysis, we must be clear that operational efficiency is only one aspect of utility performance. As we have defined the term, it is purely a measure of the amount of resources used to provide water service, and does not encompass measurement of other critical aspects of utility performance such as system reliability, water quality, water conservation, and customer satisfaction. A more efficient utility does not necessarily perform better in these other areas; it merely uses fewer resources to provide water service than a less efficient utility.

Table 6 presents the overall results from our operational efficiency analysis and rate analysis, listing each provider’s rank in relation to the other providers. A rank of 1 indicates the highest level of operational efficiency and the lowest rates.

Table 6: Summary of operational efficiency and rate analysis

Efficiency Metric	CTO	CAW	CWS
Operating ratio	3	1	2
Annual operating expenses per connection	3	1	2
Total labor expenses per connection	3	1	2
Average meter charge (1992-2005)	1	3	2
Average quantity rate (1992-2005)	1	3	2

Table 6 shows that CTO is the least efficient in terms of three of the operational efficiency metrics we evaluated in Section 4.1.1, yet has the lowest water rates according to our analysis conducted in Section 4.1.2. (Because of the differences between the providers in management and non-management salary categories, we did not include salary per employee category in this ranking table.) At the same time, CTO has the lowest average meter charge and quantity rate of the three providers. The results of our analysis suggest that greater operational efficiency does not necessarily lead to lower rates in the case of privately and publicly owned water utilities.

The Thousand Oaks case study indicates that the private companies are more operationally efficient than the public utility. However, as previously noted, operational efficiency is just one way to evaluate the overall performance of a utility. In later sections we describe how the three Thousand Oaks utilities perform in terms of infrastructure investment and condition, environmental management, and customer satisfaction, which are critical components of the whole picture of public versus private utility performance.

Since water is a service industry, it is essential to consider how operational efficiency affects the water consumer. An examination of retail water rates is a primary mechanism for assessing consumer impacts. It stands to reason that *all other factors being equal, we would expect a more efficient utility to charge lower rates*. Clearly this expectation is countered by our results from Thousand Oaks, implying that all other factors are not equal. In the remainder of this section, we seek to explain the results of our operational efficiency and rate analyses and understand why rates may be higher for private water utilities despite their greater operational efficiency.

To assess the relationship between rates and efficiency for public and privately owned water utilities, we must consider whether we would expect public or private utilities to have higher rates. Beecher lists several reasons why private water utilities are likely to charge higher rates than public water utilities:

Private providers in general charge higher rates, which can be explained by profits (return on equity), taxes (all levels), financing (including availability of public funds), subsidies (often hidden), costing (including accounting and depreciation), ratemaking practices and types of charges (for example, system development and other charges by cities), and historic under-pricing by many cities (deferrals) [119].

On the other hand, NAWC asserts that the greater efficiency of private water utilities is enough to outweigh advantages afforded to public utilities:

Because we run very efficient utilities, the rates paid by customers of privately owned and operated utilities are comparable to those paid by municipal utilities, in spite of the fact that private utilities must pay taxes to all levels of government and do not have access to tax-exempt municipal bonds [120].

The NAWC's assertion does not hold for our Thousand Oaks case study, as CTO has the lowest rates of the three utilities for the majority of the period studied, even with the addition of the lift factor to CTO's quantity rate. We examine each of Beecher's reasons for higher private utility rates to determine their applicability to the Thousand Oaks providers:

- **Profits:** Publicly owned enterprises do not have the same efficiency incentives as privately owned enterprises. In the public sector, there is the incentive for revenues to cover costs, but unlike the private sector, a fundamental difference is that the profit motive does not create a drive towards efficiency maximization.
- **Taxes:** As a municipally-owned utility, CTO does not pay local property or income taxes. The only taxes CTO pays are payroll tax and an in-lieu fee of two percent of gross revenue per year from the city water department to the city general fund. (It is called an "in-lieu" fee because it is in-lieu of taxes that local businesses typically pay to the city.) Private utilities must pay corporate income tax, property tax, and payroll tax. A private utility's rate base only includes a portion of the total taxes the company pays, and it is this portion that is relevant to the question of why IOU rates might be higher than public utility rates. The equity portion of the company's rate base includes an embedded tax rate of around 40 percent of the company's return on equity. The CPUC approves the embedded amount of taxes in their rate case decisions [121].
- **Financing:** The two private water utilities do not have access to low-interest municipal bonds and typically pay a higher rate for capital financing (see Appendix D). The NRC privatization study states:

Investors in the large and highly liquid U.S. municipal bond market are exempt from federal and state income taxes on interest earnings, which substantially lowers the interest rate governments pay for borrowed capital as long as they retain full ownership control of the asset being financed [122].
- **Subsidies:** According to the NAWC, "... there are often complex and opaque municipal cross-subsidies, resulting in the customer not knowing the true cost of service" [123]. Our research shows no evidence of rate subsidization by CTO. The city water department is an enterprise fund that is separated from the city general fund and other departments.
- **Cost accounting:** The NAWC writes, "Because government budgeting and accounting is so different from business accounting, municipalities often do not know the true cost of providing water service" [124]. Our research has shown key differences in government and private sector accounting procedures which are discussed in Appendix D. However, our research does

not indicate that the differences in accounting methods would contribute significantly to CTO's lower rates.

- **Rate-making:** Because they are self-regulated, municipal utilities have the ability to develop a rate structure that addresses the specific circumstances of the community they serve. As discussed above, CTO imposes a lift charge which means the cost of pumping water uphill is only paid by those customers who require the service. The private utilities spread pumping costs throughout their customer base, so this cost is reflected in their base rates. Incorporating a lift charge factor into CTO's quantity rates brings their rates much closer to that of the private companies, but the public utility's rates are still lower. It can be argued that CTO's rate structure is more equitable, as only those customers who require the lift service have to pay for it.
- **Under-pricing:** Local political pressures may lead to under-pricing of water at public utilities. According to the NAWC, "Failure to have rates based on the full cost of service ... leads to undesirable practices such as deferred investment" [125]. To assess whether CTO is under-pricing water, we can look at the results from our operating ratio analysis. CTO's operating ratio is less than one for the period 1999-2003. This means that during this time, expenses did not exceed revenues. Despite the fact that this snapshot of annual operating expenses and revenues for a four year period does not necessarily reflect how CTO operates over the long-term, it is one indication that the public utility is in fact covering its operating costs with its operating revenues and is not under-pricing water.

One additional factor in Thousand Oaks that could potentially contribute to higher IOU rates is the franchise fee. The two private utilities are required to pay an annual franchise fee of two percent of gross revenues which is split between the City of Thousand Oaks and Ventura County. This fee is essentially payment for the right to conduct business within the city and county limits. In 2005 CAW paid a franchise fee of around \$390,000 based on estimated gross revenues of \$19,718,000. According to Dave Stephenson, CAW was listing this fee as a normal operating expense (which means that it did increase the rate base) until 2005. During the rate case settlement, CAW requested to list the franchise fee as another surcharge line item on the water bill to show their customers that they are contributing to the city and county via taxes [126]. This request was accepted by the CPUC.

Our assessment of the public and private water utilities in Thousand Oaks generally supports the claim that private utilities are more efficient, and also supports the claim that public utilities charge lower rates. Our findings from the Thousand Oaks case study are not inconsistent with Beecher's reasons why private rates may be higher. Further research could attempt to quantify the effect of each of the reasons listed above (dividends, taxes, financing, etc.) on the retail water rates charged by the privately owned water utilities in Thousand Oaks.

4.2 SYSTEM RELIABILITY ANALYSIS

4.2.1 Financial comparison

Financial performance can be an indicator of system reliability because systems that are not performing well financially are likely to have a greater incentive to defer maintenance. The two indices of financial performance assessed for the Thousand Oaks water providers are: 1) return on assets (net income over total assets), and 2) debt ratio (total liabilities over total assets).

For the purposes of this comparison, net income is comprised of all pre-tax revenues from water service provision and other revenues such as rent from property. Total assets include all utility infrastructure and other physical property owned by each provider such as land, wells, supply mains, meters, hydrants, office furniture, tools, and communication equipment. For the private companies in Thousand Oaks, net income and total asset data were drawn from the annual financial reports they are required to submit to the CPUC. CTO's net income and total asset values were drawn from the City of Thousand Oaks' annual Comprehensive Financial Reports.

Total liabilities are defined in this report as the long-term debt obligations held by each utility. CAW carries long-term debt at around 57 percent of total assets [127]. CWS carries slightly less long-term debt at approximately 50 percent of total assets [128]. CTO has no long-term debt, having paid off all its bond obligations many years ago.

Table 7 summarizes net income, total assets, and total liabilities for all three providers.

Table 7: Financial summary for Thousand Oaks water providers

Provider	Year	Net Income	Assets	Liabilities ²
CTO	1999	\$765,733	\$28,019,552	\$0
CTO	2000	\$1,533,454	\$28,181,538	\$0
CTO	2001	\$1,659,958	\$27,536,137	\$0
CTO	2002	\$1,501,711	\$29,640,923	\$0
CTO	2003	\$948,748	\$30,925,387	\$0
CAW	1999	\$5,875,923	\$44,947,700	\$25,620,189
CAW	2000	\$5,774,732	\$46,334,900	\$26,410,893
CAW	2001	\$6,097,026	\$47,990,900	\$27,354,813
CAW	2002	\$6,458,564	\$48,779,800	\$27,804,486
CAW	2003	\$6,305,662	\$52,843,900	\$30,121,023
CWS	1999	\$1,112,889	\$19,684,150	\$9,842,075
CWS	2000	\$277,949	\$19,841,554	\$9,920,777
CWS	2001	\$-119,769	\$19,808,000	\$9,904,000
CWS	2002	\$848,671	\$20,150,009	\$10,075,005
CWS	2003	\$1,444,853	\$20,713,051	\$10,356,526

² CAW and CWS carry approximately 57 percent and 50 percent long-term debt respectively based on net asset worth.

4.2.1.1 Return on assets

Return on assets (ROA) is measured as net income over total assets. A higher ROA indicates that a firm is earning a better return on its asset investments. Public utilities are not concerned with profits, but we apply this ratio to our system reliability assessment by assuming that a higher ROA means that a provider has less incentive to defer infrastructure maintenance. For the purposes of this comparison, we used net income for the municipal utility and pre-tax net income for the private utilities. This allows for a more accurate comparison of ROA among the three providers, as the city does not have to pay state or federal income taxes. We can see from Table 8 that CTO has a relatively stable ROA, with an average over the five-year study period of 0.03. In 2001, CWS had a negative ROA. According to Don Jensen, the negative ROA in 2001 was attributable to the delay in obtaining CPUC approval of a rate increase application [129]. CWS filed for a rate increase in 2001 but the increase did not go into effect until September 20, 2003, which is reflected in their ROA of 0.07 for that year. CAW has by far the highest ROA of the three providers in Thousands Oaks, averaging just under 0.13 for the five-year study period. As none of the providers has a negative average ROA for the five-year period, there does not appear to be financial incentive for any of the providers to defer maintenance.

Table 8: Return on assets

Provider	Year	ROA
CTO	1999	0.02
CTO	2000	0.04
CTO	2001	0.04
CTO	2002	0.03
CTO	2003	0.02
CAW	1999	0.13
CAW	2000	0.12
CAW	2001	0.13
CAW	2002	0.13
CAW	2003	0.13
CWS	1999	0.06
CWS	2000	0.01
CWS	2001	-0.01
CWS	2002	0.04
CWS	2003	0.07

4.2.1.2 Debt ratio

Debt ratio is measured as the firm's total liabilities over total asset value. This index gives a measure of the extent to which each provider relies on long-term debt to finance assets. In general, lower debt ratios indicate lower levels of risk, as high levels of debt create substantial interest and principal repayment burdens. At the same

time, particularly for private companies, debt ratios indicate the extent to which the company leverages debt to create returns for shareholders. To relate this index to system reliability, a higher debt ratio requires increased cash flow to service the debt, which could create a greater incentive to defer maintenance if income is erratic. A higher debt ratio also creates greater susceptibility to interest rate increases.

CTO has no long-term debt, having paid off their bond obligations, so their debt ratio is zero. This means that debt obligations are unlikely to create an incentive to defer maintenance. CAW has the highest debt ratio, as they hold approximately 57 percent of their total asset value in liabilities, and CWS holds roughly 50 percent of their net asset worth in liabilities. This indicates that CAW relies more heavily on debt to finance assets. This is not necessarily a negative, per the discussion about leveraging debt above, but CAW must dedicate a higher percentage of its revenues to interest and principal repayment. Still, neither company appears to have a significant incentive for maintenance deferral.

Table 9: Long-term debt ratio

Provider	Year	LT Debt Ratio
CTO	1999	0
CTO	2000	0
CTO	2001	0
CTO	2002	0
CTO	2003	0
CAW	1999	0.57
CAW	2000	0.57
CAW	2001	0.57
CAW	2002	0.57
CAW	2003	0.57
CWS	1999	0.50
CWS	2000	0.50
CWS	2001	0.50
CWS	2002	0.50
CWS	2003	0.50

4.2.2 Infrastructure comparison

Next we examine each provider’s infrastructure condition and investment as indicators of water system reliability. All three water purveyors in Thousand Oaks purchase their potable water supply from Calleguas (see Section 2.5.3). Calleguas owns large-diameter pipelines that transport water from their facilities to each water district in Thousand Oaks [130]. As the pipes travel to residential areas, they gradually decrease in size to accommodate the pressure needs of residential units [131]. CTO, CAW, and CWS each own the water system infrastructure in their service areas, which includes tanks, reservoirs, delivery pipelines, service lines, and meters. Delivery pipelines transport water between service lines and service lines deliver water directly to the customer.

Table 10 provides an overview of the water system infrastructure characteristics for each of the three Thousand Oaks purveyors.

Table 10: Water infrastructure characteristics for Thousand Oaks purveyors

	CTO [132]	CAW [133]	CWS [134]
Groundwater wells	3	None	None
Total length of pipeline (miles)	292	212 [135]	115
Number of meters	16,537	18,139	7,300
Service area (square miles)	14.28 [136]	20	5.5
Meters per square mile of service area	1,158	907	1,327
Average annual infrastructure maintenance expenditure	\$238,857.00 ³	\$197,933.40 ⁴	\$235,849.65 [137] ⁵

We used four indices to assess infrastructure condition and investment for the Thousand Oaks purveyors:

- 1) Unaccounted-for water expressed as a percentage of total water purchases
- 2) Number of distribution system breakdowns (main breaks) per length of pipe
- 3) Annual maintenance expenditure per length of pipe
- 4) Average water pressure at residential customer connections

4.2.2.1 Unaccounted-for water

Unaccounted-for water is calculated by subtracting metered water volume and non-revenue water volume from purchased water volume. Non-revenue water includes all water that is used for purposes such as fire department needs, pipe flushing, and charitable donations. This calculation reveals the volume of water that is lost in a delivery system through leaking pipes. Most water systems use digital meters to track unaccounted-for water. Digital meters keep track of how much water is purchased from a wholesaler like Calleguas, and compare it to how much water is actually delivered to customers. Unaccounted-for water is indicative of the strength and reliability of delivery and service pipeline in the utility service area. In addition, systems without proactive maintenance programs may be more likely to leak.

³ This value is extrapolated from the *City of Thousand Oaks & Redevelopment Agency Operating Budget FY 2003-2004 & FY 2004-2005* by adding the sum of the “Repairs and Maintenance” budget and the “Asset Replacement Funding” budget, averaged over the years 2001 - 2005. We combined these two categories to create an equitable comparison between the municipal utility and the private companies because pipe replacement as part of annual maintenance is considered to be a capital expenditure by the private companies in Thousand Oaks.

⁴ This value is an average of maintenance expenditures drawn from the *Application of California American Water Company for Authority to Adjust Rates in its Village District*, Section B, Table 3-1 R. Data was averaged for the years 1999 – 2003. David Stephenson, Western Region Director of Rates and Regulations, American Water Works Service Company, also reported in an email communication on March 7, 2005 that CAW’s annual maintenance expenditures are approximately \$200,000.

⁵ This value is an average of the “Total Maintenance” expenditures from 1995 – 2000.

According to the DHS, the percentage of water that is unaccounted-for in any given water system should be less than 5 percent [138]. A water loss of greater than five percent calls for the water system manager to search for leaks in the system and replace old mains. Other industry experts we interviewed cited higher percentages of unaccounted-for water as acceptable. Peter Gleick, president and co-founder of the Pacific Institute, suggests that an acceptable level of unaccounted-for water is between 12 and 15 percent [139].

Table 11 shows the unaccounted-for water percentages for the Thousand Oaks providers between 1997 and 2003. This data is shown graphically in Figure 14.

Table 11: Unaccounted-for water in Thousand Oaks

Year	CTO [140]	CAW[141]	CWS [142] ⁶
1997	3.61%	4.43%	4.15%
1998	5.60%	1.36%	5.87%
1999	4.13%	7.74%	5.86%
2000	2.84%	2.62%	5.29%
2001	5.16%	3.24%	5.29%
2002	0.75%	4.45%	5.29%
2003	5.84%	7.19%	5.29%
AVERAGE	3.99%	4.43%	5.29%

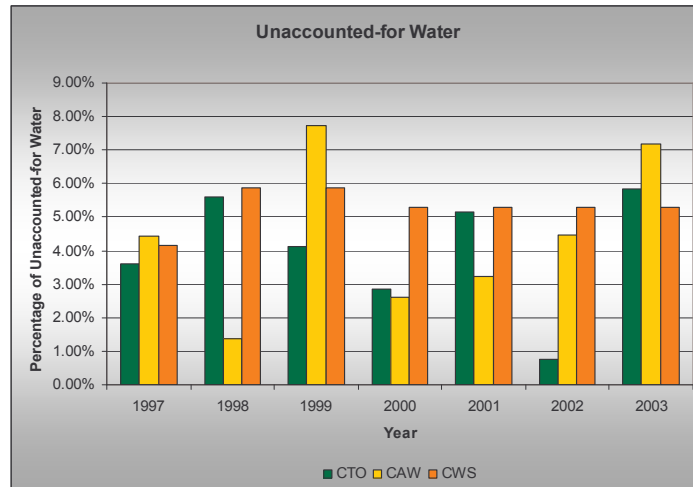


Figure 14: Unaccounted-for water in Thousand Oaks

⁶ The unaccounted-for water percentages in CWS' district for the years 1997 to 1999 were extrapolated from CWS' *Urban Water Management Plan* (2000 update), Appendix A, "Water Supply and Demand Analysis and Projections: Percentage of Total." The average percentage of unaccounted-for water between the years 1997 and 1999 was 5.29. Per Don Jensen's advice in an email communication on February 22, 2005, this averaged value was assumed to be the percentage of unaccounted-for water in 2000, 2001, 2002, and 2003 as well. This is a reasonable assumption because unaccounted-for water volume does not fluctuate significantly in CWS' district.

4.2.2.2 Main breaks per mile of pipeline

The average annual number of water main breaks per mile of pipeline also provides an indication of pipeline strength and reliability. If main breaks occur relatively frequently, a utility may be under-investing in system infrastructure or deferring maintenance. In addition, it may be a sign that the utility has a reactive rather than a proactive maintenance plan. To calculate this metric, we found the average number of main breaks per year for each provider based on data from 2001 through 2004. We then divided that average by each provider's length of pipeline, as shown in Table 10.

Don Jensen, CWS' Westlake District Manager, reported that there are approximately five to eight water main breaks in his district per year [143]. David Stephenson, Western Region Director of Rates and Regulations for CAW's parent company, reported that CAW's service area in Thousand Oaks has between one and three⁷ water main breaks per year [144]. Don Nelson, Director of Public Works for the City of Thousand Oaks, reported that there are approximately two to three water main breaks per year in CTO's service area [145]. Figure 15 shows the reported average number of water main breaks per year in each district, normalized by the length of pipe (in miles) serviced by each Thousand Oaks provider.

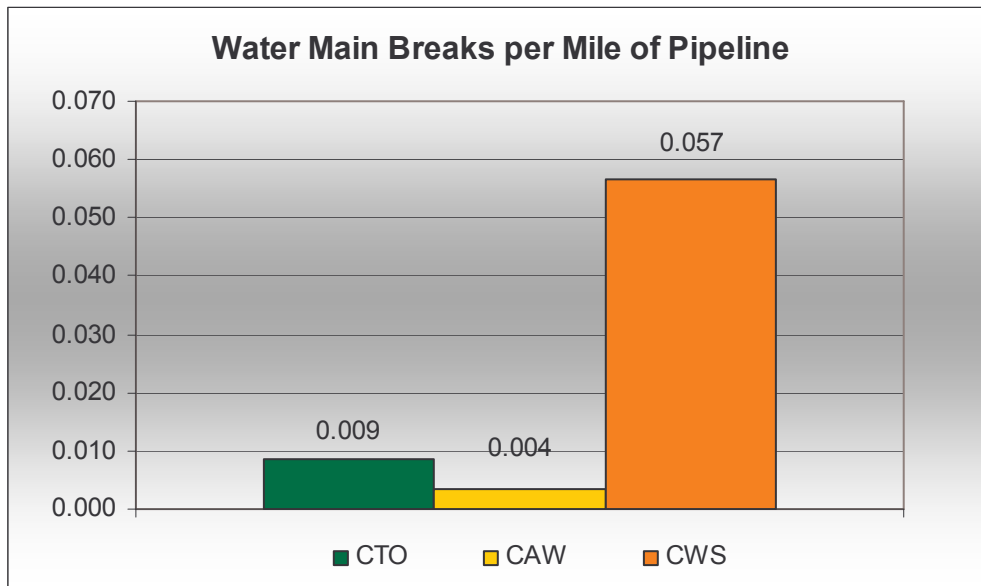


Figure 15: Water main breaks per mile of pipeline

When a water main break occurs in any of the Thousand Oaks water districts, it is usually reported to the water district office by customers who observe the problem. Each water provider has a set of procedures by which they handle these reports of

⁷ Mr. Stephenson reports that in CAW's Thousand Oaks district, there were zero water main breaks in 2001 and 2002, one water main break in 2003 and two in 2004; the average number of main breaks for the years 2001-2004 is 0.75 per year.

main breaks or other detected water system leaks. Where water main breaks are typically obvious to the naked eye, system leaks are usually detected after a system analysis is conducted in response to customer complaints about decreased water pressure.

In CTO's district, when a customer calls to report a water system problem they speak with a member of the city's administrative staff, who enters a work order into the city's computer system. The staff member then uses two-way radios to dispatch a technician. Depending on the nature of the problem, the technician dispatched may be a member of the city's Public Works Department field staff or a member of the city's water division. The administrative staff then prints out the appropriate work order and delivers it to the technician's supervisor. When the problem has been addressed and corrected, either the technician or the supervisor will record the action taken on the work order, which is then returned to the administrative staff for filing. The technician who works on a problem will also notify the customer who originally filed the report and communicate the actions taken [146].

CAW is currently in a transition period in terms of how they respond to infrastructure problems in Thousand Oaks. Currently, when a citizen reports a main break or other system problem in the CAW district, the call is answered by one of CAW's national call centers. The information is then transferred back to a supervisor in Thousand Oaks. Once the main break is located, repairs normally begin immediately. When a system leak is detected, repairs are scheduled based on the level of urgency determined by a field employee or supervisor [147]. CAW is currently instituting a program called Service First, wherein all problems reported through the national call center are routed via computer directly to local service personnel. This new process eliminates the need for a supervisor in Thousand Oaks to locate and dispatch service personnel. Instead, the CAW employee closest to any reported problem or emergency will be contacted directly by the call center and be able to respond in the shortest time possible [148].

When customers in CWS' district need to report a water system break or leak, they call their provider's district office and speak with a customer service representative if the call is during business hours. If a customer calls outside of business hours, they will speak to a person at the CWS answering service, who will follow the same steps as a customer service representative would. The district office representative communicates the reported problem to the CWS field superintendent, who either dispatches a CWS crew for repair or, after a site visit, makes a determination to call the CWS contractor. Whether the contractor is called upon depends on the given situation and the severity of the problem [149].

4.2.2.3 Annual maintenance expenditure per mile of pipeline

Average annual maintenance expenditure per mile of pipeline is a metric that seeks to normalize maintenance expenditures to allow more equitable comparison between the three systems in Thousand Oaks. The footnotes for Table 10 indicate the sources of data we used to determine average annual infrastructure maintenance expenditure for

each provider. The available data combines expenditures on infrastructure repair and replacement. It is important to note that it is difficult to assess whether these financial investments were proactive or reactive infrastructure maintenance. Infrastructure expenditures are affected by system age, cost of labor, and type of materials used. In order to draw conclusions about this metric, we rely on the AMSA/AMWA assertion that planned maintenance programs save up to 40 percent of annual operations and maintenance costs, indicating that preventative system maintenance is less costly than reactive system maintenance [150]. For that reason, we determine that a lower expenditure per mile of pipe is a more favorable indicator of infrastructure condition than a higher expenditure per length of pipe, subject to the caveats discussed above.

For the purposes of this study, we consider maintenance expenditures to include regular upkeep of water system infrastructure, including pipe replacement but excluding capital projects that do not occur on a regular basis. Due to the differences in meter density and pipeline length between the three providers, we decided maintenance expenditure per length of pipe is a more reasonable metric than maintenance expenditure per customer meter. Figure 16 shows the average maintenance expenditure per mile of pipeline for each water service provider in Thousand Oaks. Based on the discussion above, CTO has the lowest expenditure per mile of pipe, which may indicate that its system infrastructure is in the best overall condition.

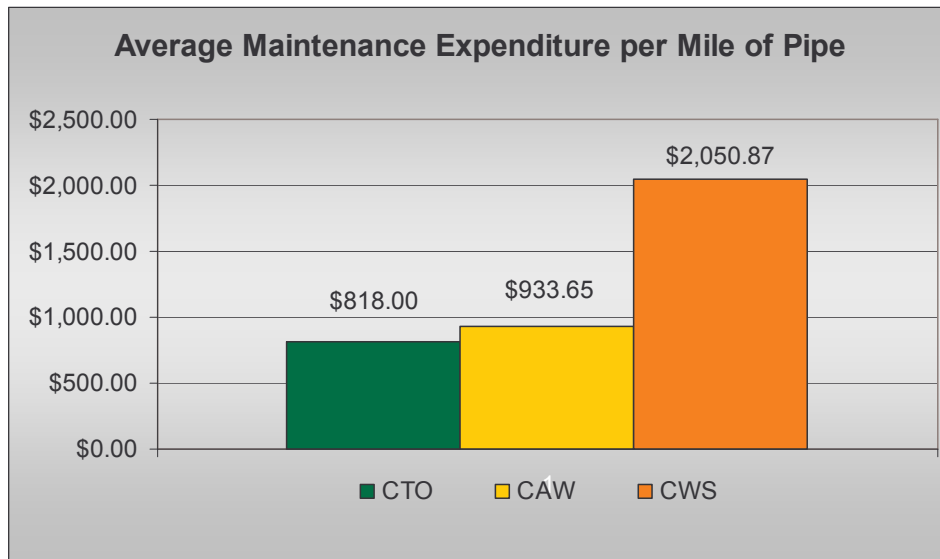


Figure 16: Average annual maintenance expenditure per mile of pipe

4.2.2.4 Water pressure

Water pressure at the point of delivery is another indicator of pipeline condition, but it is also difficult to draw clear conclusions based on this metric. Very low water pressure can be an indicator of system leaks. Extremely high water pressure could indicate that the system is subject to more wear and tear, exacerbating leaks. At the

same time, adequate water pressure is needed for fire flow and other end uses, which is why DHS has established a minimum pressure of 20 psi at the customer’s meter, with a recommended pressure of 40 psi [151].

Water system managers usually take pressure readings in specific areas, not at random locations throughout their service area. These locations are typically selected because system operators need pressure readings due to reservoirs, tanks at elevation, or booster stations used to pump water from low to high pressure areas. Customers may also call their water provider to complain about water pressure, in which case the water system manager typically sends a representative to the residence to measure pressure at the meter and in the home.

Table 12 provides a comparison of average water pressure in the CTO, CAW, and CWS districts, and shows that each water provider in Thousand Oaks meets the DHS recommendation of 40 psi at the customer’s meter.

Table 12: Water pressure comparison in Thousand Oaks

	CTO	CAW	CWS
Water pressure range (psi)	45 – 80 [152]	45 – 125 [153] ⁸	40-130 [154]
Average water pressure (psi)	62.5	85	75 ⁹
Meet DHS recommendation of 40 psi	Yes	Yes	Yes

4.2.3 Conclusions from system reliability analysis

Our financial comparison of the Thousand Oaks providers did not give any indication of incentives to defer maintenance. In addition, infrastructure maintenance schedules and procedures for responding to infrastructure problems are comparable among the three water purveyors in Thousand Oaks.

Table 13 summarizes each provider’s results for the four operational metrics we used to assess water system infrastructure investment.

⁸ David Stephenson reports that according to CAW’s 2000 *Comprehensive Planning Study*, the average water pressure in Thousand Oaks falls in the range of 45 to 125 psi, “as mandated by City of Thousand Oaks and regulated by the CPUC.”

⁹ According to Don Jensen, average water pressure on level ground in the CWS district is 75 psi, although the calculated average of 40 and 130 is 85.

Table 13: Water system infrastructure condition metric summary

Infrastructure Metric	CTO	CAW	CWS
Percentage of unaccounted-for water	3.99%	4.43%	5.29%
Annual water main breaks per mile of pipe	0.009	0.004	0.057
Annual maintenance expenditure per mile of pipe	\$818.00	\$933.65	\$2,050.87
Average water pressure, in psi	62.5	85	75

Table 14 ranks the three Thousand Oaks providers on the basis of the four infrastructure condition metrics summarized in Table 13. In constructing the water provider rankings, a rank of 1 indicates the lowest (most favorable) value for the category, and a rank of 3 indicates the highest (least favorable) value for the category. Since all three providers are above the DHS-recommended average of 40 psi, they have all received an equal ranking for the water pressure category. In addition, we have assumed that a lower maintenance expenditure per length of pipe is a favorable indicator of infrastructure condition (less need for reactive maintenance), with the caveat that this is a subjective ranking since we do not have the ability to separate proactive from reactive system maintenance.

Table 14: Infrastructure comparison

Infrastructure Metric	CTO	CAW	CWS
Unaccounted-for water	1	2	3
Main breaks per mile of pipe	2	1	3
Maintenance expenditure per mile of pipe	1	2	3
Average water pressure	1	1	1
Average	1.25	1.50	2.50

When we average each provider’s rank for the four operational indices, CTO has the lowest (most favorable) score, with an average of 1.25, followed by CAW at 1.50, and CWS at 2.50. Since maintenance expenditure per length of pipe is such a problematic metric to assess, we must be careful about drawing conclusions from this subjective ranking system.

Although the rankings shown in Table 14 are not conclusive, consideration of the individual metrics may be valuable, particularly when viewed in connection with the system characteristics summarized in Table 10. CTO has the most pipeline (292 miles), the median density of meters (1,158 per square mile), the lowest percentage of unaccounted-for water (3.99 percent), the median number of main breaks per mile of

pipeline (0.009), and the lowest average maintenance expenditure on infrastructure (\$818.00 per mile of pipe). In comparison, CAW has the median length of pipe (212 miles), lowest density of meters (907 meters per square mile), median percentage of unaccounted-for water (4.43 percent), median average maintenance expenditure (\$933.65 per mile of pipe), and the lowest number of main breaks per mile of pipeline (0.004). Finally, CWS has the lowest length of pipe (115 miles), the median density of meters (1,327 meters per square mile), the highest percentage of unaccounted-for water (5.29 percent), the highest number of main breaks per mile of pipeline (0.057) and the highest average maintenance expenditure (\$2,050.87 per mile of pipe). All three water purveyors in Thousand Oaks meet the DHS' minimum recommendation for residential water pressure.

The fact that CTO is responsible for the greatest length of pipeline and has the highest density of meters, but also has the lowest number of infrastructure problems and the lowest infrastructure maintenance costs indicates that their infrastructure condition is superior to that of the two private companies. However, all three water providers in Thousand Oaks have a very low percentage of unaccounted-for water, all three have systems in place to address main breaks as they occur, and all three are above the DHS-recommended average water pressure level at the customer meter. In addition, our financial analysis does not indicate that any of the providers have significant incentives to defer maintenance. Though CTO performs the best on our infrastructure condition metrics, we do not find that any of the providers have significant infrastructure problems, and thus conclude that there is no significant difference in system reliability between the three Thousand Oaks water providers.

4.3 ENVIRONMENTAL MANAGEMENT ANALYSIS

Our environmental management assessment of the Thousand Oaks water providers focuses on performance related to two management objectives: 1) water quality, and 2) water conservation.

4.3.1 Water quality

As described in Section 2.5.3, all three purveyors have the same source of water, purchasing their entire potable water supply from the wholesale provider, Calleguas. As Calleguas is responsible for treating the water it provides, any water quality differences between the providers would be attributable to differences in the providers' transmission systems, such as the age of infrastructure and materials used in the pipelines.

Because the water is pre-treated, the biggest potential water quality threat for the Thousand Oaks providers is nitrification occurring in storage tanks. Nitrification is the oxidation of ammonia to nitrate and nitrite. Nitrite is created when nitrate is reduced in oxygen-poor environments. It is toxic to humans because it reacts with hemoglobin and interferes with the transport of oxygen through the body, leading to diseases such as methemoglobinemia ("blue-baby" syndrome) and other health risks. There have been no nitrite violations in Thousand Oaks and water quality reports show levels well below national Maximum Contaminant Level standard for nitrites [155].

We used two indices to assess water quality in Thousand Oaks: 1) the number of DHS water quality violations per year, and 2) the number of DHS citations for not meeting monitoring or reporting requirements per year. See Appendix E for a discussion of water quality regulations in the U.S.

For the time period of searchable records at the EPA – 1993 to 2004 – only one of the Thousand Oaks providers had DHS violations. Two violations were issued to CAW during this period. One violation was issued in November of 1997 for failure to meet the Primary Drinking Water Standards for bacteriological quality: 12 of 124 samples taken were positive for total coliform (fecal negative) [156 and 157]. The second violation was a monitoring violation for failure to report one of four quarterly total trihalomethanes analyses in 2001 [158].

None of the Thousand Oaks providers has a significant history of water quality violations, and no violations have occurred in the last four years. Overall, we find no meaningful difference in water quality between the three providers.

4.3.2 Water conservation

We used five indices to assess water conservation: 1) unaccounted-for water expressed as a percentage of total water purchases, 2) per capita water use, 3) signature of the CUWCC's MOU for implementing conservation BMPs, 4) filing required CUWCC BMP implementation reports, and 5) implementation of CUWCC BMPs.

4.3.2.1 Unaccounted-for water

Reducing system leaks is a supply-side management technique that a water provider can use to improve water use efficiency. As discussed in Section 4.2.2.1, all three providers report percentages of unaccounted-for water under five percent, which is very low. On this basis, all three providers appear to be minimizing unaccounted-for water.

4.3.2.2 Per capita water use

The degree to which a provider promotes water conservation can be assessed by measuring per capita water use in its service area. Using data from each provider's 2000 UWMP, our analysis begins in 1990 and continues with UWMP projections through 2020. This period encompasses consumption patterns during the 1987-1992 drought when regulators imposed mandatory water use restrictions. Ideally we would be able to separate indoor and outdoor water use, as utilities are likely to use different strategies for reducing these types of usage. In addition, combining indoor and outdoor water use means that per capita consumption is affected by factors outside of water provider control such as lot size, type of vegetation, topography, soil type, and elevation. For that reason, an assessment of indoor water use may be a better reflection of conservation programs aimed at residential customers. On average, outdoor use accounts for approximately 50 percent of household water consumption nationwide, and may be an even higher percentage of total use in arid regions like southern California. Unfortunately, we do not have sufficient data to separate indoor and outdoor water use in Thousand Oaks.

Figure 17 shows water consumption for the three Thousand Oaks providers in gallons per capita per day (GPCD). For benchmarking purposes, we included GPCD for the nearby community of Westlake Village¹⁰ which is served by the Las Virgenes Municipal Water District [159], as well as average annual GPCD for Sacramento, California, and Albuquerque, New Mexico [160]. All three Thousand Oaks providers have per capita consumption which is lower than Las Virgenes and Sacramento, and higher than Albuquerque. Generally speaking, this indicates that consumption behavior in all three supply districts could be considered normal for the region where they are located.

¹⁰ GPCD from Las Virgenes represents average GPCD for medium and high-density housing. Low-density housing for the same district showed water use of 550-600 GPCD and was not included.

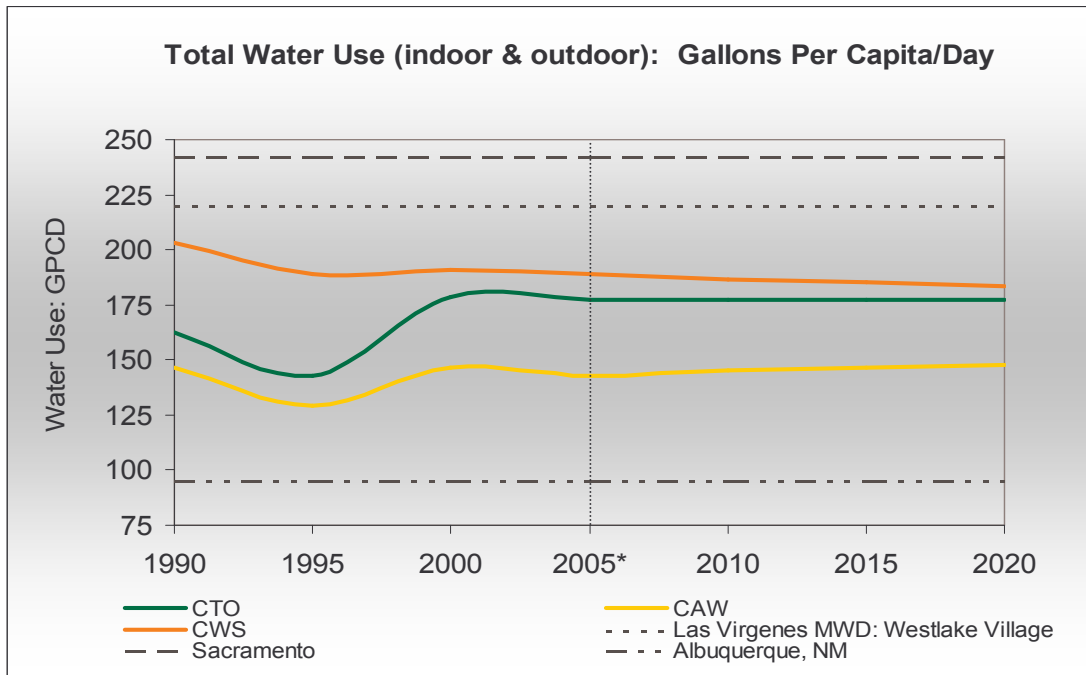


Figure 17: Per capita water use for the Thousand Oaks water providers¹¹

The significant drop in per capita use around 1995 was a reaction to conservation efforts imposed after the drought which included public information campaigns and distribution of water efficiency devices like low-flow showerheads. CAW has the lowest per capita water use, showing a reduction in GPCD from 147 in 1990 to 143 in 2005, with a peak of 146 GPCD in 2000. CTO has the median per capita water use, and is the only purveyor whose per capita consumption climbed to pre-drought levels by 2000. During the drought of 1994-1995 which impacted the southern part of the state, the City of Thousand Oaks passed several ordinances (No. 1087-NS & No. 1144-NS) aimed at maximizing beneficial water use, curtailing unreasonable use, and fostering conservation practices.

CWS has the highest per capita water use, and also displayed the smallest reduction in consumption during the drought. However, CWS shows a steady decline in per capita consumption over the period, in contrast to post-drought consumption increases at CTO and CAW. CWS' higher per capita use may be attributable to larger lot size and higher customer income.

When the CPUC imposed water use restrictions during the 1987-1992 drought, the regulatory agency allowed the IOUs to create "memorandum accounts" to make up

¹¹ All values for 2005 and beyond are projected water demand based on each agency's UWMP. The GPCD values for Las Virgenes, Sacramento, and Albuquerque are average values and do not show inter-annual changes over time. These averages are given to compare Thousand Oaks usage with per capita water use in other urban areas, including another district in the same geographic region (Las Virgenes), and a district located in a very arid climate (Albuquerque).

the loss in revenues due to imposed supply restrictions. These accounts were allowed when unforeseeable or uncontrollable circumstances affected the utilities' rate base and regulated rate of return. The IOUs used the accounts to track lost revenue so that later, with CPUC permission, these losses could be recovered in future rates. In 1994 the CPUC promulgated Decision 94-02-1-043 which closed the use of memorandum accounts. CAW specifically cites this CPUC decision in their 2000 UWMP as the reason for a recent decrease in their conservation efforts [161]. This highlights how important cost considerations are to private company decision-making. When they do not have a means for recovering expenditures on conservation programs or a regulatory mandate to conserve, the impetus for conservation may be significantly reduced.

4.3.2.3 CUWCC MOU signature

Though participation in the CUWCC is voluntary, all three Thousand Oaks water purveyors are MOU signatories [162]:

- CTO signed on December 3, 1991
- CAW signed on November 11, 1991
- CWS signed on September 26, 1991

4.3.2.4 CUWCC BMP implementation reporting

Every MOU signatory submits annual reports to the CUWCC which list the conservation measures implemented during the previous two years. For the searchable database years of 1999-2004 [163]:

- CTO has met all of its reporting requirements
- CAW has met its reporting requirements in 2000, 2001, and 2002, and is missing reporting periods 1999, 2003, and 2004
- CWS has met all of its reporting requirements

4.3.2.5 CUWCC BMP implementation

The reports posted on the CUWCC website provide BMP implementation data for all signatories; despite the fact that all three Thousand Oaks providers signed the MOU in 1991, electronic information regarding BMP implementation is only available from 1999 (information is available for earlier years at the CUWCC office in Sacramento). The 2000 UWMPs provide additional information regarding the approach each provider has taken towards BMP implementation. In this section we describe the BMP implementation data reported by each provider to the CUWCC since 1999, as well as additional information regarding conservation contained in the providers' 2000 UWMPs.

The CUWCC reports list the extent of BMP implementation and whether the purveyor is on schedule for full BMP implementation. For purveyors that signed the MOU prior to 1997 (as all three Thousand Oaks providers did) the implementation

schedule began no later than July 1, 1998 and should be fully implemented ten years from the date of signature. (For agencies that signed after 1997, implementation schedules began in July of the following year.) Once the implementation schedule begins, the requirements for BMP implementation gradually increase for several BMPs. For example, the implementation requirements for BMP 2, Residential Plumbing Retrofit Program, increase by ten percent each year until 75 percent of all single-family residences and 75 percent of all multi-family units have been fitted with low-flow plumbing fixtures. Failure to implement the initial ten percent and an additional ten percent each ensuing year would create a rank of “non-compliance” for the reporting period [164].

Exemptions from BMP implementation are formally granted if one of three conditions is met and submitted to the CUWCC within two months after the reporting period starts: 1) a full cost-benefit analysis shows that implementation of a BMP would not be cost-effective, 2) adequate funds for BMP implementation are not available, or 3) the water purveyor does not have legal authority to implement the BMP, and good faith efforts have been made to collaborate with those agencies with authority [165]. The CUWCC supplies an Excel worksheet to assist purveyors in calculating the cost-effectiveness of BMP implementation [166]. CWS was the only purveyor to show their calculations and required assumptions under which BMP exemptions were pursued.

Table 15 summarizes the CUWCC database reports on BMP implementation from 1999-2004 for the Thousand Oaks providers. BMP 10, Wholesale Agency Assistance Programs, is not applicable to the retail purveyors in Thousand Oaks.

Table 15: Conservation BMP implementation, 1999-2004 (CUWCC)

CUWCC BMP Participation Report	1999	2000	2001	2002	2003	2004
CTO: signed MOU 12/03/1991						
BMPs filed	all	all	all	all	all	all
BMP Expenses Reported	\$26,890	\$30,084	\$17,816	\$27,181	\$21,748	\$36,165
BMP 01: Residential Surveys	no	no	no	no	no	no
BMP 02: Plumbing Retrofit	no	no	no	no	no	no
BMP 03: Water System Audits	yes	yes	yes	yes	yes	yes
BMP 04: Metering and Retrofit of Existing	yes	yes	yes	yes	yes	yes
BMP 05: Landscape Conservation	no	no	no	no	no	no
BMP 06: Washing Machine Rebate	no	no	yes	yes	yes	yes
BMP 07: Public Information Programs	yes	yes	yes	yes	yes	yes
BMP 08: School Education Programs	no	no	no	no	no	no
BMP 09: Conservation Programs for CII	no	no	no	no	no	no
BMP 11: Conservation Pricing	no	no	no	no	no	no
BMP 12: Conservation Coordinator	yes	yes	yes	yes	yes	yes
BMP 13: Water Waste Prohibition	no	no	no	no	no	no
Total Expenses Reported:	\$159,884			Total # Implemented:		28
CAW (Southern District): signed 11/04/1991						
BMPs filed	none	all	all	all	none	none
BMP Expenses Reported		\$66,634	\$118,700	\$74,500		
BMP 01: Residential Surveys	no	no	no	no	no	no
BMP 02: Plumbing Retrofit *	no*	no	no	no	*	*
BMP 03: Water System Audits *	no	yes	yes	yes	*	*
BMP 04: Metering and Retrofit of Existing	yes	yes	yes	yes	yes	yes
BMP 05: Landscape Conservation	no	no	no	no	no	no
BMP 06: Washing Machine Rebate	yes	yes	yes	yes	*	*
BMP 07: Public Information Programs *	yes	yes	yes	yes	*	*
BMP 08: School Education Programs *	no	yes	yes	yes	*	*
BMP 09: Conservation Programs for CII *	no	no	no	no	*	*
BMP 11: Conservation Pricing *	yes	yes	yes	yes	*	*
BMP 12: Conservation Coordinator *	no	yes	yes	yes	*	*
BMP 13: Water Waste Prohibition *	no	no	no	no	*	*
Total Expenses Reported:	\$259,834			Total # Implemented:		27
CWS: signed 09/26/1991						
BMPs filed	all	all	all	all	all	all
BMP Expenses Reported	\$2,670	\$3,000	\$8,080	\$8,020	\$11,855	\$0
BMP 01: Residential Surveys	no	no	no	no	no	no
BMP 02: Plumbing Retrofit	no	no	no	no	no	yes
BMP 03: Water System Audits	yes	yes	yes	yes	yes	yes
BMP 04: Metering and Retrofit of Existing	yes	yes	yes	yes	yes	yes
BMP 05: Landscape Conservation	na	na	na	no	no	no
BMP 06: Washing Machine Rebate	no	no	no	no	yes	no
BMP 07: Public Information Programs	yes	yes	yes	yes	yes	yes
BMP 08: School Education Programs	yes	yes	no	yes	yes	yes
BMP 09: Conservation Programs for CII	no	no	no	no	no	no
BMP 11: Conservation Pricing	yes	yes	yes	yes	yes	yes
BMP 12: Conservation Coordinator	yes	yes	yes	yes	yes	yes
BMP 13: Water Waste Prohibition	no	no	no	no	no	no
Total Expenses Reported:	\$33,625			Total # Implemented:		37

*As of April 3, 2005, the BMP form is not complete for one or more report years.

City of Thousand Oaks

The following bullets provide a brief description of CTO's BMP implementation efforts.

- **BMP 1: Water Survey Programs for Single-Family and Multi-Family Residential Customers**
 - CTO reported non-compliance for all searchable database years
 - UWMP states that CTO considered contracting out the task, and currently provides information regarding water-saving practices to residential users
- **BMP 2: Residential Plumbing Retrofit Program**
 - CTO reported non-compliance for all searchable database years
 - UWMP states that a 1990 ordinance requires the use of efficient toilets. In 1991 CTO implemented a low-flow showerhead distribution program
- **BMP 3: System Water Audit, Leak Detection and Repair**
 - CTO reported compliance for all searchable database years
- **BMP 4: Metering with Commodity Rates for all New Connections and Retrofit of Existing Meters**
 - CTO reported compliance for all searchable database years
- **BMP 5: Large Landscape Conservation and Incentive Programs**
 - CTO reported non-compliance for all searchable database years
 - UWMP states that a program targeting large landscape conservation was stopped due to a loss of county funding. Currently, Calleguas and MWD have large landscape conservation programs which CTO encourages eligible customers to participate in
- **BMP 6: High-Efficiency Washing Machine Rebate Programs**
 - CTO reported non-compliance for 1999-2000 and compliance for 2001-2004
- **BMP 7: Public Information Programs**
 - CTO reported compliance for all searchable database years
- **BMP 8: School Education Programs**
 - CTO reported non-compliance for all searchable database years
 - UWMP states that a program exists in conjunction with MWD, though the CUWCC database shows non-compliance

- **BMP 9: Conservation Programs for Commercial/Industrial/Institutional (CII) Accounts**
 - CTO reported non-compliance for all searchable database years
- **BMP 11: Conservation Pricing**
 - CTO reported non-compliance for all searchable database years
 - CTO uses a uniform (meaning non-tiered) rate structure. Though CTO reported non-compliance, CUWCC includes uniform rates in their definition of conservation pricing: “Conservation pricing is also characterized by ... rates in which the unit rate is constant regardless of the quantity used (uniform rates)” [167]
- **BMP 12: Conservation Coordinator**
 - CTO reported compliance for all searchable database years
- **BMP 13: Water Waste Prohibition**
 - CTO reported non-compliance for all searchable database years
 - Though CTO is not in compliance with this BMP, the City of Thousand Oaks has developed two ordinances and a resolution to reduce water waste. These regulations include a set of voluntary conservation steps residents may take, mandatory installation of low-flow fixtures in new construction, and mandatory rules with increasingly stringent water use restrictions in the event that the City Council declares drought restrictions are necessary [168]
- **BMP 14: Residential Ultra Low Flow Toilet Replacement Program**
 - CTO reported compliance for 1999-2000
 - CTO was the only purveyor to report compliance in this BMP and has had a ULFT rebate program since 1997. The amount of rebates dispensed annually depends on funding availability

California American Water

The reports filed by CAW are for the 46,000 service connections in its Southern Division which covers several communities including Thousand Oaks [169]. CAW stated in its 2000 UWMP that due to conservation steps taken during the 1990-1993 drought (which lowered demand by 26 percent), 1999 marks the first time demand exceeded 1989 consumption levels [170].

CAW’s 2000 UWMP describes the following conservation measures implemented outside the context of BMP implementation [171]:

- Implementing system pressure control program to reduce flow at leaks

- Reducing leaks by replacing pipeline, averaging water loss of approximately 4.8 percent over a ten-year period

The following bullets summarize CAW's CUWCC BMP implementation efforts [172]:

- **BMP 1: Water Survey Programs for Single-Family and Multi-Family Residential Customers**
 - CAW reported non-compliance for all searchable database years
 - UWMP states that funds are not available to initiate a formal water audit program, but the company will continue to implement its informal audit program that was developed internally
- **BMP 2: Residential Plumbing Retrofit Program**
 - CAW reported non-compliance for all searchable database years
 - CAW implemented a plumbing fixture retrofit program from 1990-2000 that installed 4,111 ultra-low flow toilets and 2,000 low-flow showerheads, producing 136 acre-feet/year in savings
 - UWMP states that CAW will continue to implement a plumbing retrofit program. Non-compliance is reported if the percent of single and multi-family homes are not up to the stipulated levels described in the BMP
- **BMP 3: System Water Audit, Leak Detection and Repair**
 - CAW reported non-compliance for 1999 and compliance for 2000-2002
 - UWMP states that CAW's unaccounted-for water averages 4.8 percent, which is below the 10 percent level that requires a full water audit
- **BMP 4: Metering with Commodity Rates for all New Connections and Retrofit of Existing Meters**
 - CAW reported compliance for the years reported, 1999-2002
 - UWMP states that all customers are metered and charged a set service charge plus volumetric use
- **BMP 5: Large Landscape Conservation and Incentive Programs**
 - CAW reported non-compliance for all searchable database years
- **BMP 6: High-Efficiency Washing Machine Rebate Programs**
 - CAW reported compliance for the years 1999-2002

- UWMP states that MWD and Southern California Edison have created a program which provides rebates for those who purchase high-efficiency washing machines. CAW does not implement a separate rebate program
- **BMP 7: Public Information Programs**
 - CAW reported compliance for the years 1999-2002
 - UWMP states that public information activities have been implemented for many years
- **BMP 8: School Education Programs**
 - CAW reported compliance for the years 2000-2002
 - UWMP states that public information activities targeted at local schools have been successful and will continue
- **BMP 9: Conservation Programs for CII Accounts**
 - CAW reported non-compliance for the years 1999-2002
 - UWMP states that a CII survey and rebate program for its Village District will be proposed for inclusion in the MWD program, with implementation subject to receipt of MWD funding
- **BMP 11: Conservation Pricing**
 - CAW reported compliance for the years 1999-2002
- **BMP 12: Conservation Coordinator**
 - CAW reported non-compliance in 1999 and compliance for 2000-2004
- **BMP 13: Water Waste Prohibition**
 - CAW reported non-compliance for all searchable database years
 - IOUs are limited in their ability to implement BMP 13, as they do not have the authority to establish local ordinances. BMP 13 entails the creation of ordinances which prohibit certain practices, such as gutter flooding, single pass cooling systems in new developments, non-recirculation systems in new conveyer car washes and commercial laundry systems, and non-recycling decorative water fountains [173]. However, private companies can seek authorization from the CPUC to implement anti-wasting rules at the customer level. CPUC rule No. 11§B.3.a. permits any regulated private water utility to discontinue service “where negligent or wasteful use of water exists.” The utility must provide written notice to the customer of negligent or wasteful practices and if such practices are not stopped, after five days the company can terminate service

California Water Service Company

The CUWCC grants exemptions to water purveyors when a benefit-cost analysis shows that the implementation of a BMP program is not cost-effective. CWS was the only purveyor that reported the results from benefit-cost analyses conducted for the five BMPs which have quantifiable costs and benefits: BMPs 1, 2, 5, 6, and 9. The company sought exemption from implementing BMPs 2 and 5 based on the results of their benefit-cost analysis which showed a benefit-cost ratio of 0.6 for BMP 2 and 0.8 for BMP 5 [174]. The remaining BMPs (3, 7, 8, 10, 11, 12, and 13) do not have quantifiable inputs and outputs, thus levels of implementation were reported to CUWCC and described in the UWMP.

- **BMP 1: Water Survey Programs for Single-Family and Multi-Family Residential Customers**
 - CWS reported non-compliance for the years 1999-2004
- **BMP 2: Residential Plumbing Retrofit Program**
 - CWS reported non-compliance for the years 1999-2003, and compliance for 2004
 - Due to the benefit-cost ratio, CWS filed for exemption from BMP implementation
- **BMP 3: System Water Audit, Leak Detection and Repair**
 - CWS reported compliance for the years 1999-2004
- **BMP 4: Metering with Commodity Rates for all New Connections and Retrofit of Existing Meters**
 - CWS reported compliance for the years 1999-2004
 - This BMP has been fully implemented
- **BMP 5: Large Landscape Conservation and Incentive Programs**
 - CWS reported this BMP was inapplicable for 1999-2001 and reported non-compliance for the years 2002-2004
 - As the benefit-cost ratio is less than one, CWS is exempt from BMP implementation
- **BMP 6: High-Efficiency Washing Machine Rebate Programs**
 - CWS reported non-compliance for years 1999-2002 and compliance for 2003-2004
- **BMP 7: Public Information Programs**
 - CWS reported compliance for the years 1999-2004

- **BMP 8: School Education Programs**
 - CWS reported compliance for all years except 2001
- **BMP 9: Conservation Programs for Commercial/Industrial/Institutional Accounts**
 - CWS reported non-compliance for 1999-2004
- **BMP 11: Conservation Pricing**
 - CWS reported compliance for the years 1999-2004
 - This BMP has been fully implemented
- **BMP 12: Conservation Coordinator**
 - CWS reported compliance for the years 1999-2004
 - This BMP has been fully implemented
- **BMP 13: Water Waste Prohibition**
 - CWS reported non-compliance for the years 1999-2003
 - CWS's 2000 UWMP outlines a four-stage water rationing plan comprised of voluntary and mandatory measures. The mandatory reduction measures begin at Stage 2 where, prior to implementation, CPUC approval is obtained. Stages 3 and 4 have increasingly strict water use restrictions. CWS states their demand reduction goals for each stage and the shortage level that triggers the rationing stage [175]

Comparison of BMP implementation

Table 16 shows years of reported and corrected BMP compliance for the period 1999-2004. The difference between reported and corrected compliance stems from the providers' differing interpretations of BMP compliance. The corrected compliance numbers reflect our adjustments to correct for these differences. For example, CTO reported non-compliance for BMP 11 for the entire study period. As their uniform rate structure conforms with CUWCC's definition of a conservation rate structure, we added six years of BMP compliance to CTO's reported total. At this time, CUWCC has not posted CAW's 2003-2004 BMP report, and thus information has not been reported regarding CAW's BMP 11 compliance. However, we know CAW also continues to have a uniform rate structure so we added two years of BMP compliance to CAW's total.

The other correction regarding years of BMP implementation involves interpretation of reported compliance with BMP 8: School Education Programs. This MWD program originated in 1994 and exists within the districts of all of Calleguas' retail water providers. CTO claimed non-compliance for all years, CAW claimed compliance for all years except 1999, and CWS claimed compliance for all years

except 2001. To correct for this difference, we have added the requisite number of compliance years to bring each provider’s compliance up to six years for this BMP.

Table 16: Years of BMP implementation for the Thousand Oaks water providers

	CTO	CAW	CWS
Reported compliance (BMP years) ¹²	28	27	37
Corrected compliance (BMP years)	40	32	38

In light of our corrections, CTO has the highest number of BMP compliance years for those years where reports are available in the CUWCC database, CWS has the second-highest, and CAW has the fewest. However, we note that CAW’s BMP reports for 2003-2004 were not posted on the CUWCC website at the time this report was written.

Lastly, we compared the BMP implementation expenses reported to the CUWCC by each purveyor, as shown in Figure 18. Despite having reported the largest expenditures, CAW has the fewest BMP compliance years. As we do not have the ability to analyze where BMP implementation funds were channeled, the use of these reported expenditures may not be an accurate reflection of conservation efforts.

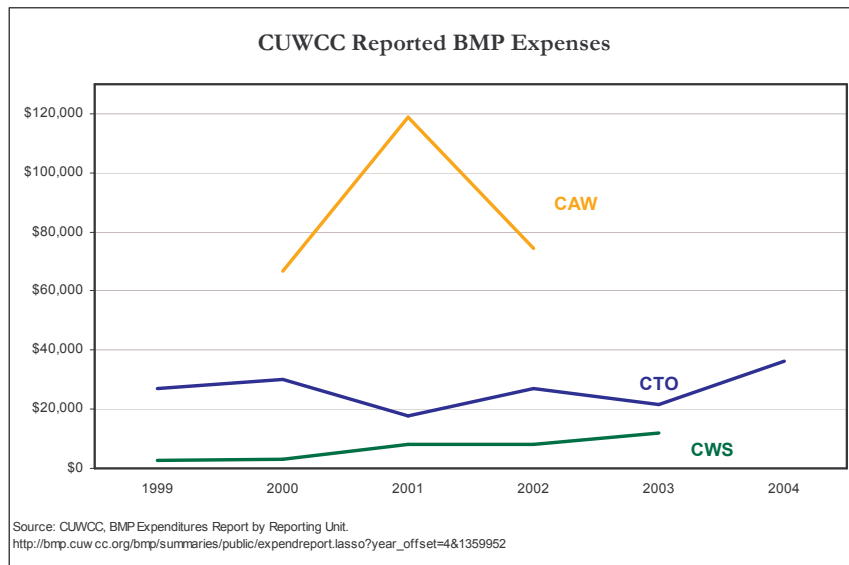


Figure 18: BMP expenses reported to CUWCC, 1999-2004

For all three providers, implementation of many BMPs appears to be contingent on procuring external funds from the county, MWD, or the state. The results from our analysis of BMP implementation in Thousand Oaks indicate the importance of state

¹² Reported compliance year totals were calculated by adding up “yes” values in the BMP implementation summary shown in Table 15.

or regional support to promote conservation at the local level. In the absence of outside funding, local water utilities may have inadequate incentive to pursue conservation efforts.

4.3.3 Conclusions from environmental management analysis

Despite CAW’s two water quality violations, overall we found no meaningful difference in water quality between the three providers that would be attributable to the condition of their infrastructure.

In Table 17, we rank the three providers for each of the conservation metrics we reviewed.

Table 17: Ranking for water conservation metrics

	CTO	CAW	CWS
Unaccounted-for water	1	2	3
Per capita consumption	2	1	3
MOU signature	1	1	1
BMP reporting	1	2	1
Corrected BMP years	1	3	2
Average	1.2	1.8	2.0

According to this ranking system, CTO does the best job of promoting conservation. However, we recognize that the ranking system is imperfect, in particular because our per capita consumption data does not take into account the differences in lot size or commercial/industrial use between the three providers. In addition, though CTO ranks second in per capita consumption, the ranking system does not reflect the fact that CTO’s per capita consumption has exceeded pre-drought levels, which is not the case for the other two providers. Overall, we do not see a significant difference in the degree to which the Thousand Oaks providers promote water conservation.

Though they rank the best on the basis of the five metrics we considered, CTO could arguably be doing more to promote conservation, particularly through implementing an increasing tiered rate structure for residential customers. Under this rate structure, customers’ basic needs are met at the lowest unit price, and the unit price increases as quantity consumption increases. In fact, the three water providers in Thousand Oaks are themselves subject to an increasing tiered rate structure from Calleguas, as discussed in Section 2.5.4. According to the environmental policy nonprofit, Western Resource Advocates:

The uniform rate structure and the decreasing block rate structure provide no price incentive for water conservation. Although a customer’s overall bill will increase as water consumption increases in both of these rate structures, the unit price for water remains constant or decreases, respectively. Thus, the consumer has little or no price incentive to conserve [176].

Thousand Oaks’ Director of Public Works explained that with the exception of times of drought, the city does not implement an increasing block rate structure for “social”

reasons – namely, the desire to avoid penalizing larger families that consume more water [177].

The question remains whether public or privately owned water providers have greater incentives to promote conservation. To this end, we should consider how decisions are made regarding allocation of resources towards conservation. CWS' UWMP addressed this question: "Non-economic factors, including environmental, social, health, customer impacts, and technological are not thought to be significant in deciding which BMPs to implement" [178]. For this private company, the sole criterion is economic. If we assume that the evaluation process is similar for most private companies, this statement may be reflective of the inherently different context between public and private water purveyors. However, our analysis did not produce conclusive evidence to support this theoretical argument. Despite the fact that CTO is municipally-owned and should theoretically be motivated by public interest considerations, CTO has not implemented significantly more aggressive conservation efforts than the two private companies.

4.4 CUSTOMER SATISFACTION ANALYSIS

In order to assess whether the public and private water utilities in Thousand Oaks provide similar levels of service to their customers, we developed a customer satisfaction survey which we administered by mail to 898 property owners in Thousand Oaks, obtaining 207 responses. A detailed description of our survey methodology and approach is provided in Appendix F.

4.4.1 Overall customer satisfaction

Overall customer satisfaction is very high for all three providers, with more than 70 percent of each provider’s respondents indicating that they are either very satisfied or somewhat satisfied with their water provider.¹³ At CTO and CWS, fewer than ten percent of respondents indicated they are either somewhat or very dissatisfied with their water provider. Response percentages for each provider are summarized in Table 18 and shown graphically in Figure 19.

Table 18: Response percentages for overall satisfaction with water provider

Provider	Very Satisfied	Somewhat Satisfied	Neither	Somewhat Dissatisfied	Very Dissatisfied
CTO	39%	33%	22%	6%	1%
CAW	42%	35%	12%	10%	1%
CWS	57%	17%	20%	3%	3%

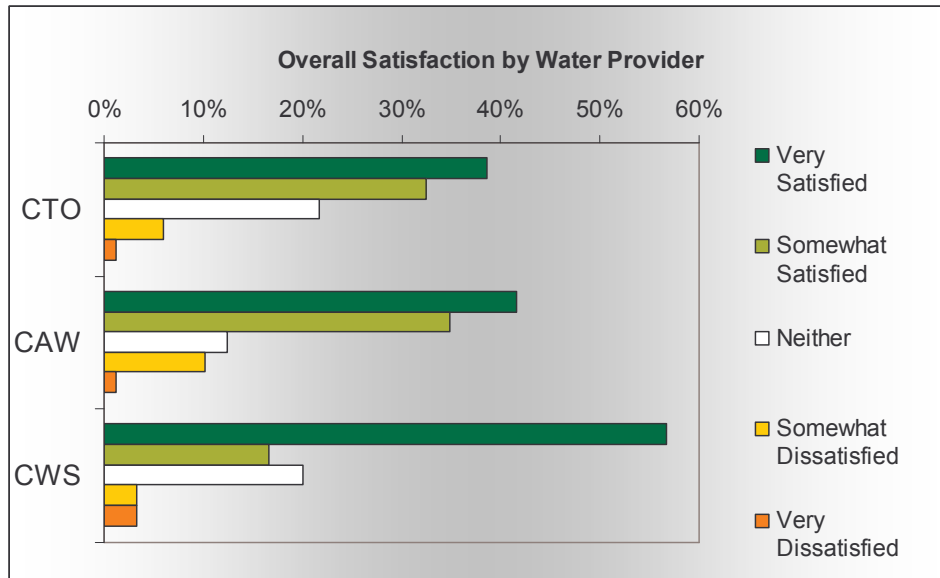


Figure 19: Overall customer satisfaction by water provider

¹³ In Section 4.4, response percentages are based on respondents who answered the question, and do not include non-responses. Percentages are rounded to nearest whole number, so totals may not equal 100.

We then asked respondents a series of questions regarding factors that might influence their overall level of satisfaction with their water provider, including questions about the provider’s service, rates, water pressure, billing, and telephone customer call center, as well as the degree to which their provider informs them of planned service interruptions and promotes water conservation.

4.4.2 Service

We asked respondents to rate the level of service provided by their water utility on a five-point scale from exceptionally good to exceptionally poor. More than 70 percent of CTO customers rated their provider’s service as exceptionally good or somewhat good, with more than 65 percent of the private water company customers giving a similar rating. Fewer than five percent of CTO and CAW respondents indicated their provider’s service was exceptionally poor or somewhat poor, with zero CWS customers scoring their provider’s service lower than adequate. Response percentages for each provider are summarized in Table 19 and shown graphically in Figure 20.

Table 19: Response percentages for water provider service level

Provider	Except. Good	Somewhat Good	Adequate	Somewhat Poor	Except. Poor
CTO	42%	31%	24%	1%	2%
CAW	35%	32%	29%	3%	0%
CWS	53%	13%	33%	0%	0%

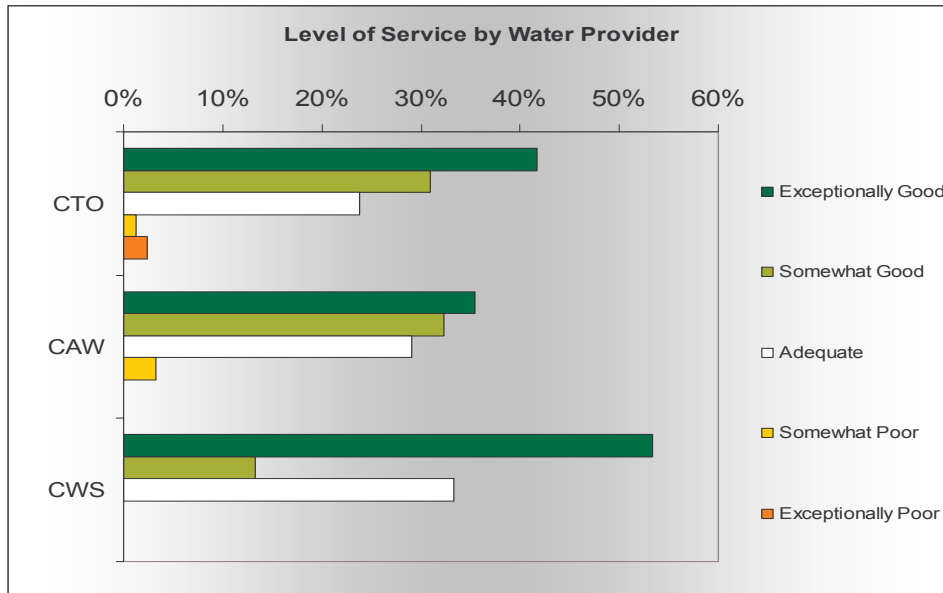


Figure 20: Level of service rating

4.4.3 Rates

In order to assess customer opinions regarding rates charged by their water provider, we asked survey respondents to indicate their level of agreement or disagreement with the statement: “I feel my water company charges reasonable rates for the services it provides.” Response percentages for each provider are summarized in Table 20 and shown graphically in Figure 21.

Interestingly, CTO customers, who currently pay the lowest rates of all three providers (see Section 4.1.2), had the highest level of dissatisfaction with the rates charged by their water provider, with almost 40 percent of respondents indicating they disagree or strongly disagree that their provider’s rates are reasonable. We thought that differences in respondent income between the three providers might account for these results. As Figure 22 shows, CTO does have a slightly higher percentage of respondents with annual income under \$50,000 (21 percent, compared with 18 percent at CAW, and only four percent at CWS). The vast majority of respondents who included income information in their survey response have annual incomes over \$50,000.

Table 20: Agreement/disagreement: “Provider charges reasonable rates”

Provider	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
CTO	4%	20%	39%	34%	4%
CAW	3%	35%	28%	26%	8%
CWS	3%	40%	37%	13%	7%

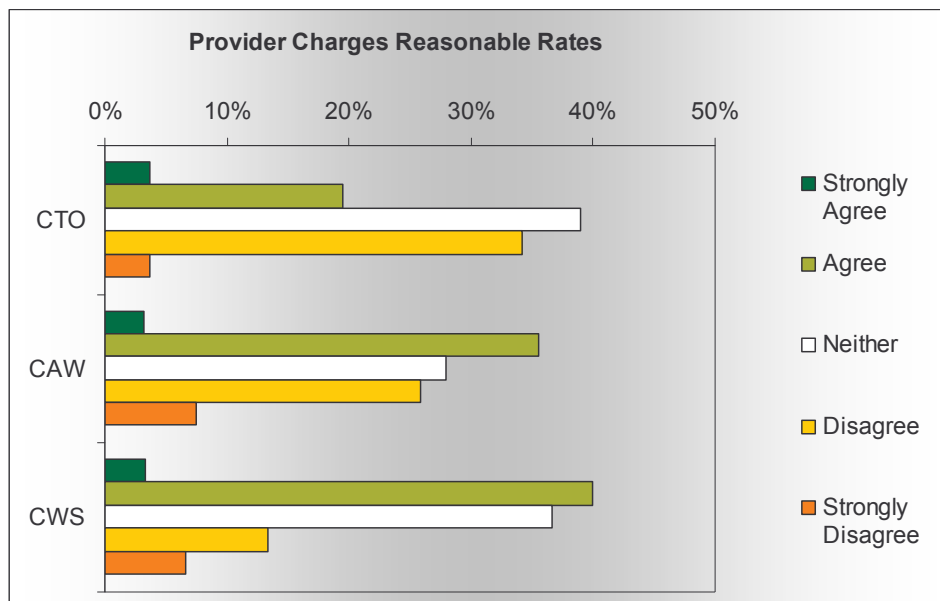


Figure 21: Customer satisfaction with provider rates

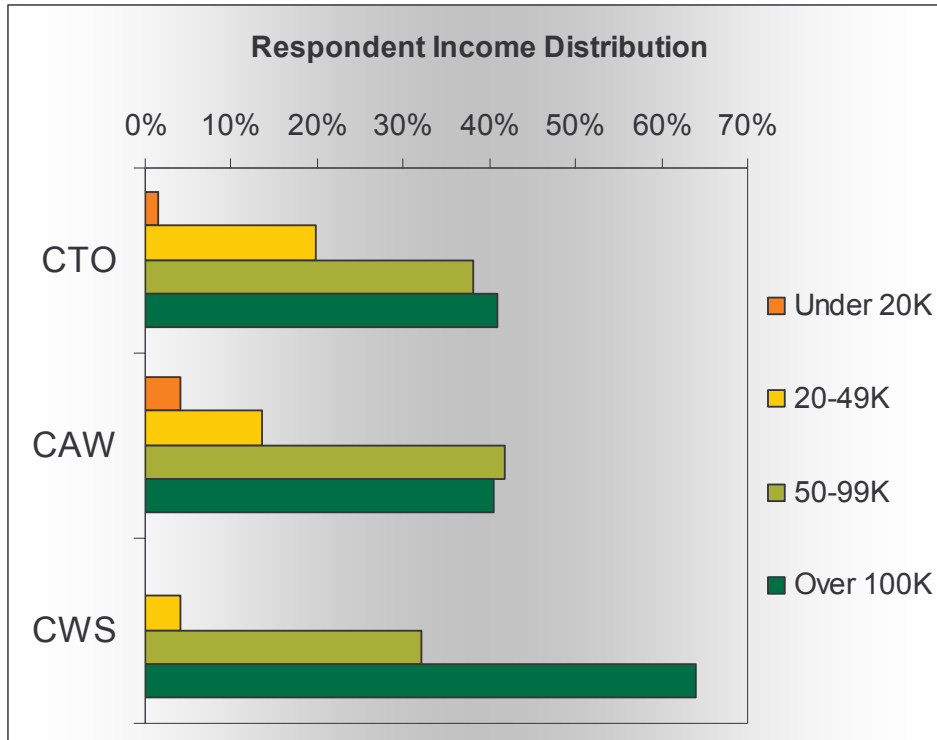


Figure 22: Respondent income distribution

4.4.4 Water pressure

In order to determine whether customers were dissatisfied with their water pressure, we asked survey respondents to indicate their level of agreement or disagreement with the statement: “Water pressure at the service address is consistently adequate throughout the day.” Response percentages for each provider are summarized in Table 21 and shown graphically in Figure 23.

By strongly agreeing or agreeing with the statement, more than 70 percent of CAW respondents indicated that their water pressure was consistently adequate, and 80 percent of CTO and CWS respondents indicated their water pressure was consistently adequate. A small percentage of respondents at CWS (7 percent) gave some indication of trouble with water pressure. At CTO, 15 percent of respondents indicated water pressure problems. CAW respondents gave the largest indication of water pressure problems, with 23 percent of respondents disagreeing or strongly disagreeing with the statement that water pressure was consistently adequate throughout the day.

Table 21: Agreement/disagreement: “Water pressure is adequate”

Provider	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
CTO	20%	60%	5%	8%	7%
CAW	22%	49%	6%	16%	6%
CWS	23%	57%	13%	7%	0%

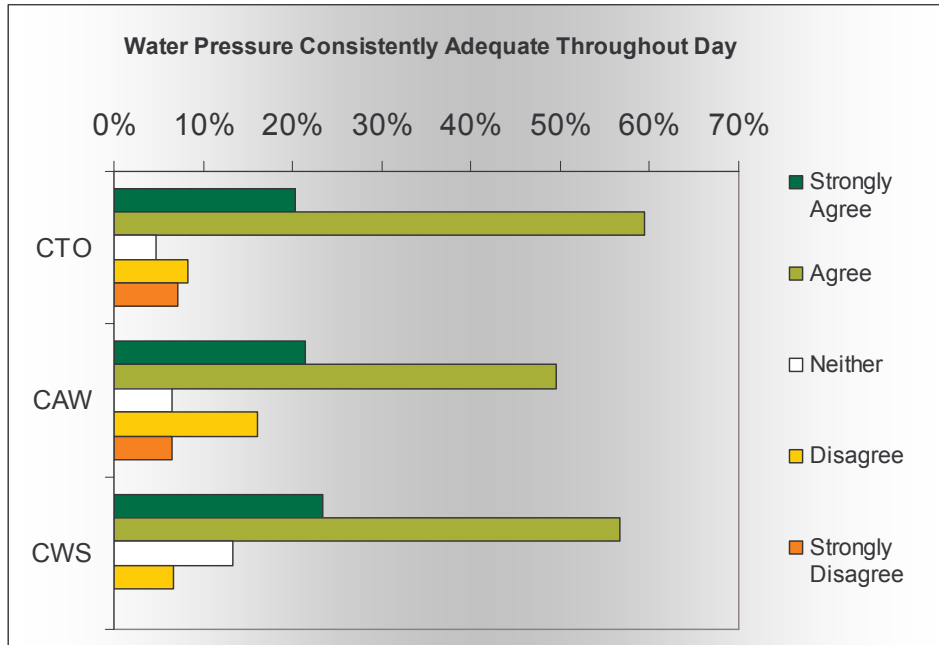


Figure 23: Customer satisfaction with water pressure

4.4.5 Informing customers of planned service interruptions

A large number of respondents indicated they neither agreed nor disagreed with the statement: “Water company informs me of planned service interruptions or changes in a timely manner,” which may indicate that planned service interruptions happen so infrequently that the question was inapplicable to most respondents. For all three providers, fewer than 15 percent of respondents disagreed with this statement. Response percentages for each provider are summarized in Table 22 and shown graphically in Figure 24.

Table 22: Agreement/disagreement: “Water company informs me of planned service interruptions”

Provider	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
CTO	6%	32%	49%	11%	2%
CAW	11%	40%	40%	9%	0%
CWS	7%	29%	54%	7%	4%

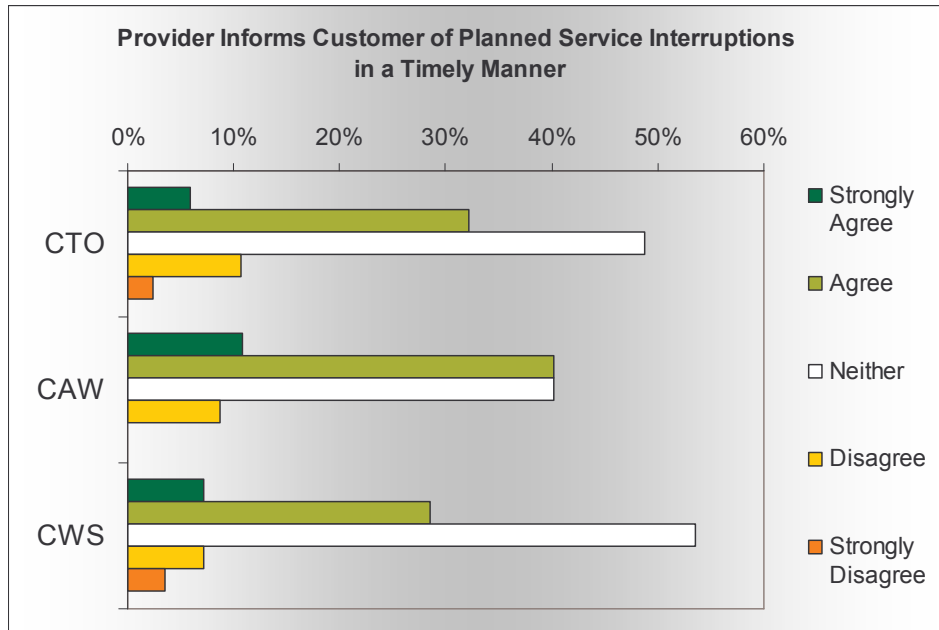


Figure 24: Customer satisfaction with provider communication

4.4.6 Promoting conservation

Our survey results indicate a potentially significant difference in customer perceptions about the degree to which the Thousand Oaks water purveyors promote conservation. Response percentages for each provider are summarized in Table 23 and shown graphically in Figure 25. Seventy four percent of CAW respondents indicated that they agreed with the statement that their water provider promotes conservation and wise water use practices, and only four percent disagreed, compared with 55 percent of CWS respondents who agreed with the statement, and ten percent who disagreed. CTO respondents rated the public system’s performance in promoting conservation less favorably, with 56 percent of respondents agreeing, and 18 percent of respondents disagreeing.

Table 23: Agreement/disagreement: “Water provider promotes conservation”

Provider	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
CTO	10%	46%	26%	13%	5%
CAW	16%	58%	22%	4%	0%
CWS	14%	41%	34%	10%	0%

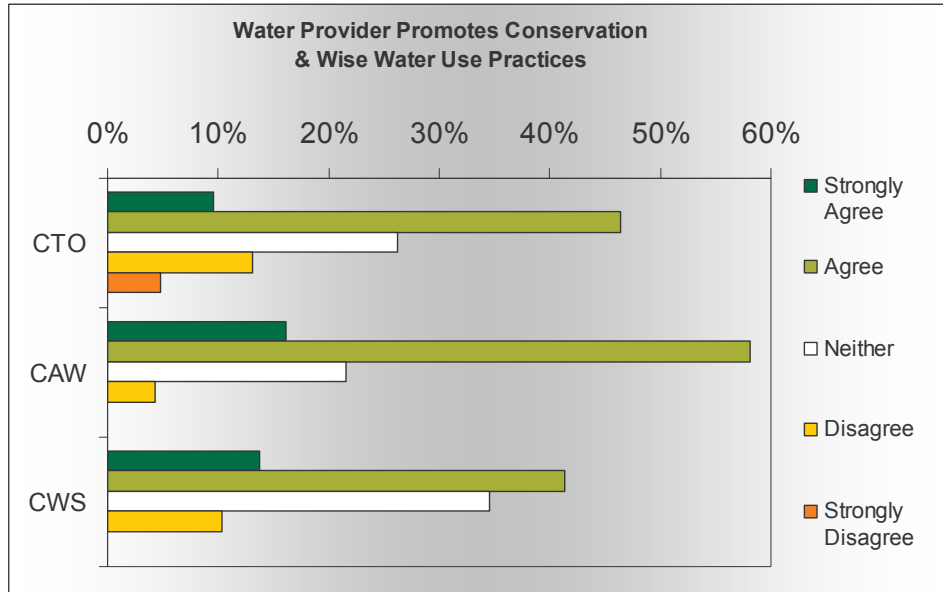


Figure 25: Customer opinions on whether provider promotes conservation

We also asked respondents to report which methods their provider has used to promote water conservation, and results are shown in Figure 26 (respondents could check as many methods as were applicable).¹⁴ For all three providers, more than half of the respondents reported receiving literature or brochures about how to conserve water. CAW had the largest percentage of respondents who reported receiving a free device such as a low-flow showerhead or garden hose nozzle (24 percent, compared with 13 percent at CTO and three percent at CWS). The survey responses appear to indicate that the private water companies use rebates more frequently to promote conservation more than the city-owned utility does, as 26 percent of CWS respondents and 20 percent of CAW respondents reported receiving rebates for installation of water-efficient appliances such as low-flow washing machines and toilets, compared with only 12 percent of CTO respondents. However, according to data reported to CUWCC, from 1999 to 2004 CTO issued rebates for water-efficient washing machines for three of those years, CWS issued rebates for one year, and

¹⁴ Percentages reported in this section are the number of respondents who checked a given method over the aggregate number of responses to Question 8 for each provider.

CAW issued no rebates during the period [179]. Therefore, we do not place much confidence in the survey responses to this question.

Seventeen percent of CTO respondents indicated their provider had not used any methods to promote water conservation, compared with four percent at CAW and six percent at CWS. CAW's high marks for promoting water conservation may relate to the fact that larger percentages of CAW respondents reported receiving rebates and water-conserving devices from their provider.

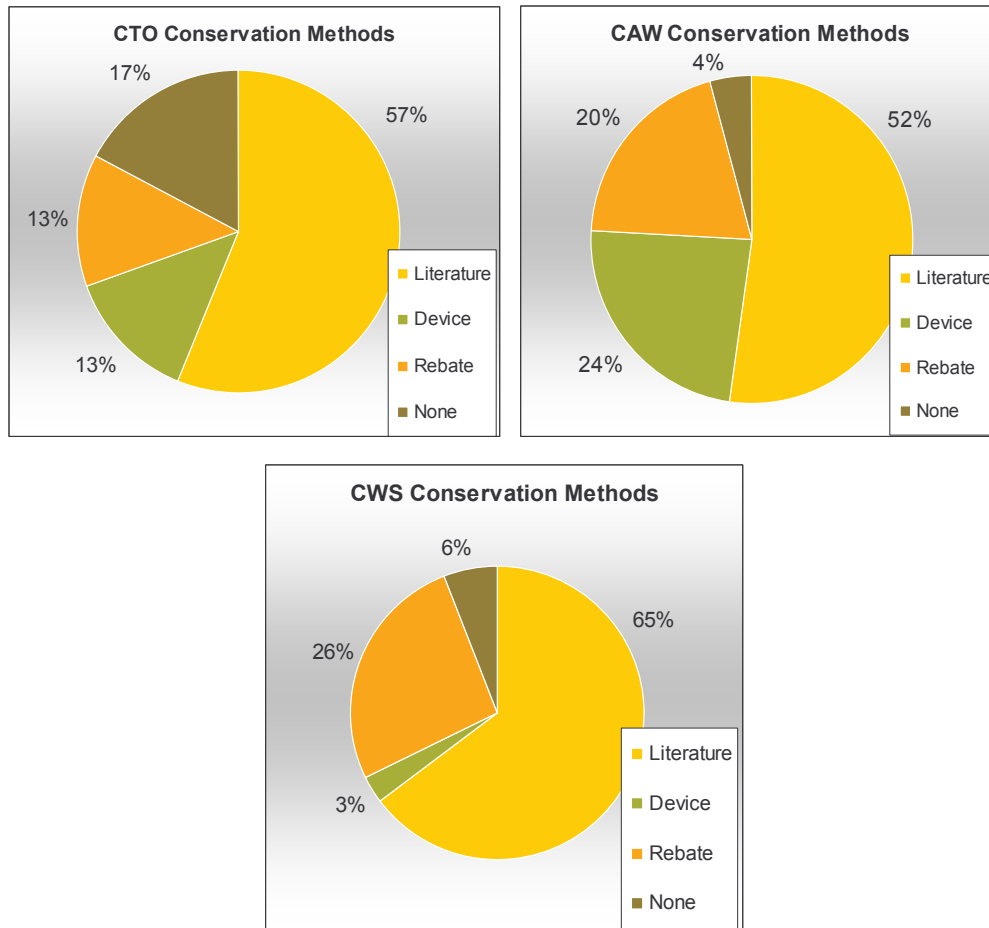


Figure 26: Methods used to promote water conservation

4.4.7 Telephone customer service system

We queried respondents who had telephoned their provider's customer service call center within the last year about their satisfaction with the system in terms of facilitating a timely resolution to their question or problem. Response percentages for each provider are summarized in Table 24 and shown graphically in Figure 27.

Table 24: Satisfaction with telephone customer service center

Provider	Very Satisfied	Somewhat Satisfied	Neither	Somewhat Dissatisfied	Very Dissatisfied
CTO	33%	53%	0%	7%	7%
CAW	25%	40%	10%	15%	10%
CWS	29%	43%	29%	0%	0%

CTO received the highest percentage of favorable responses for their customer service call center, with 86 percent of respondents indicating they were very satisfied or somewhat satisfied with the call center, and 14 percent indicating they were somewhat dissatisfied or very dissatisfied. The CWS call center also received a very favorable response, with 72 percent of respondents indicating they were satisfied with the call center, and no respondents indicating dissatisfaction. Sixty-five percent of CAW respondents indicated they were somewhat or very satisfied with their provider’s call center, and 25 percent indicated they were somewhat or very dissatisfied with the call center. Both CTO and CWS retain locally-based telephone call centers, while CAW customers are routed to AWW’s central call center in Alton, Illinois. The City of Thousand Oaks reports receiving complaints from CAW customers about call center wait times, and that call center service representatives are not always knowledgeable about local service issues [180]. Some of these concerns were voiced by residents at a June 29, 2004 public hearing in Thousand Oaks that was part of CAW’s most recent rate case filing [181]. Customers complained of long hold times and customer service representatives who were uninformed about local service problems such as an algae bloom that was causing the water to taste bad.

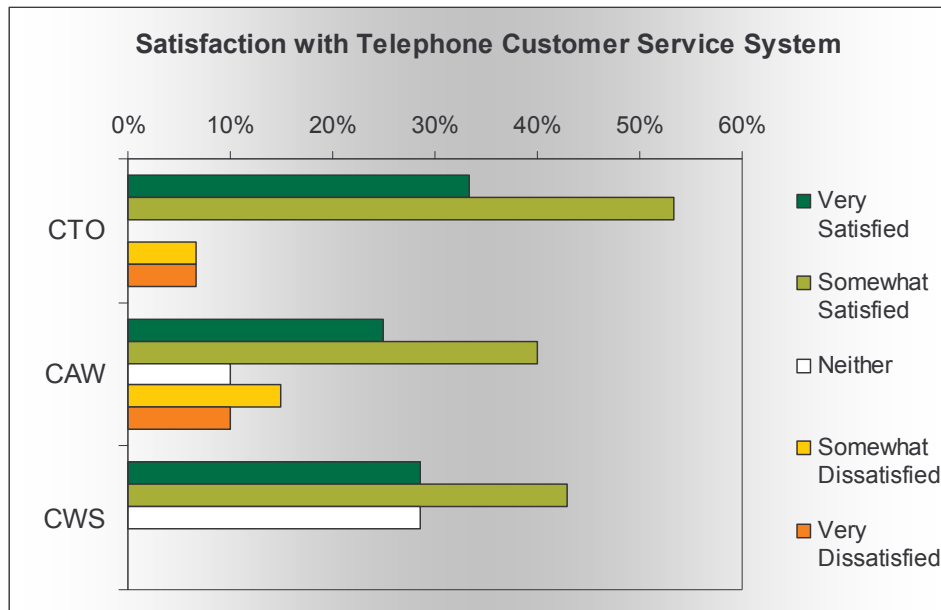


Figure 27: Satisfaction with telephone customer service system

4.4.8 Billing

We asked respondents whether they had ever received a late or incorrect bill from their water provider, and the vast majority of respondents did not indicate any problems with their provider’s billing service. CTO had the highest percentage of respondents who reported billing problems, at seven percent. Response percentages for each provider are summarized in Table 25 and shown graphically in Figure 28.

Table 25: Percentage of respondents who received late/incorrect bill

Provider	Yes	Not Sure	No
CTO	7%	23%	70%
CAW	5%	15%	79%
CWS	0%	3%	97%

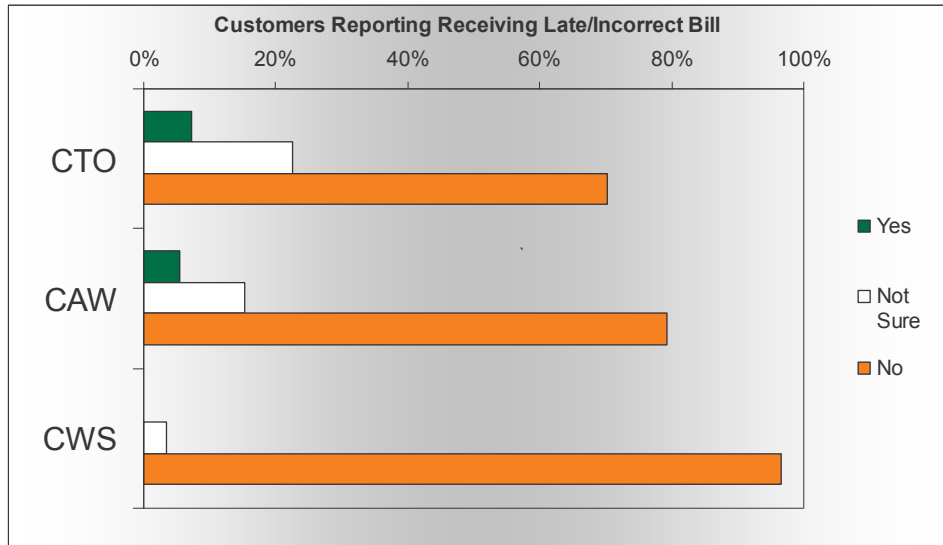


Figure 28: Percentage of respondents who received late/incorrect bill

4.4.9 Public opinion assessment

We used the customer satisfaction survey as an opportunity to explore public opinion regarding several key questions about water system ownership, namely the merits of public versus private water system ownership, as well as the issue of foreign versus domestic water system ownership.

4.4.9.1 Public versus private water system ownership

Using the five-point scale of agreement/disagreement employed on earlier questions, we asked respondents to indicate whether they agreed or disagreed with the statement that privately owned water utilities provide better quality service than publicly owned water utilities, and also whether they felt that publicly owned water utilities provide more affordable water service than privately owned water utilities. On the first question, agreement was in favor of privately owned utilities, and on the second, agreement was in favor of publicly owned utilities. By reversing the preference order,

we hoped to test the strength of respondents' convictions in favor of either public or private ownership, and identify yay-saying (the tendency of respondents to answer survey questions affirmatively). Figure 29 and Figure 30 show response percentages for these survey questions.

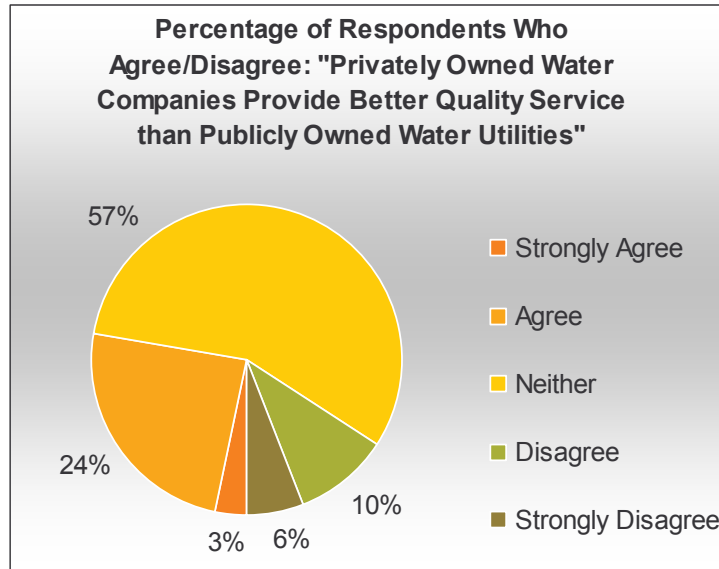


Figure 29: Public opinion: "Private companies provide better quality service"

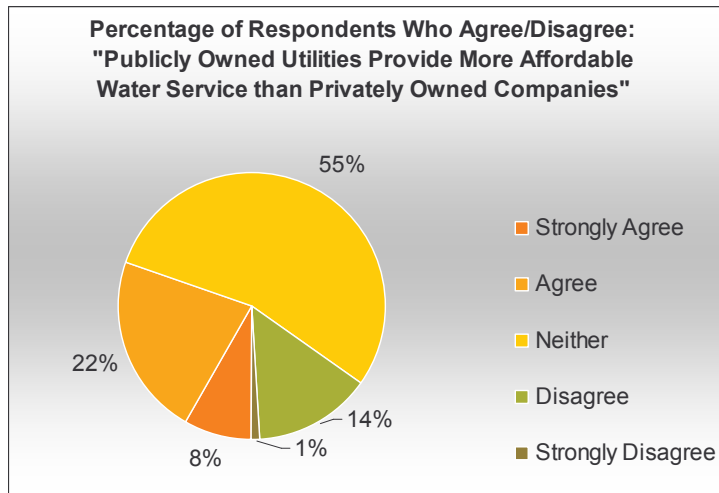


Figure 30: Public opinion: "Public utilities provide more affordable service"

For both questions, the majority of respondents neither agreed nor disagreed with the statement, indicating that public opinion does not appear to be strongly in favor of either public or private utility ownership. In addition, the second-largest response category for both questions was the Agree category, which demonstrates that opinions in favor of one ownership model or the other are not strongly held, as many

respondents favored private ownership on the first question and favored public ownership on the second question. These results may have been caused by yay-saying, and provides further support for the conclusion that in the absence of significant service problems, people are likely to be ambivalent between public and private utility ownership.

4.4.9.2 Foreign versus domestic water system ownership

In contrast with the previous questions, respondents do have strong opinions regarding domestic versus foreign water system ownership, as shown in Figure 31. Over 90 percent of respondents expressed opposition to foreign ownership of domestic water systems, with four percent expressing neither agreement nor disagreement, and five percent indicating they are not opposed to foreign ownership. These results are consistent with public outcry against acquisition of local water companies by foreign-owned corporations here in California, including in Thousand Oaks itself, Stockton, Felton, and Montara.

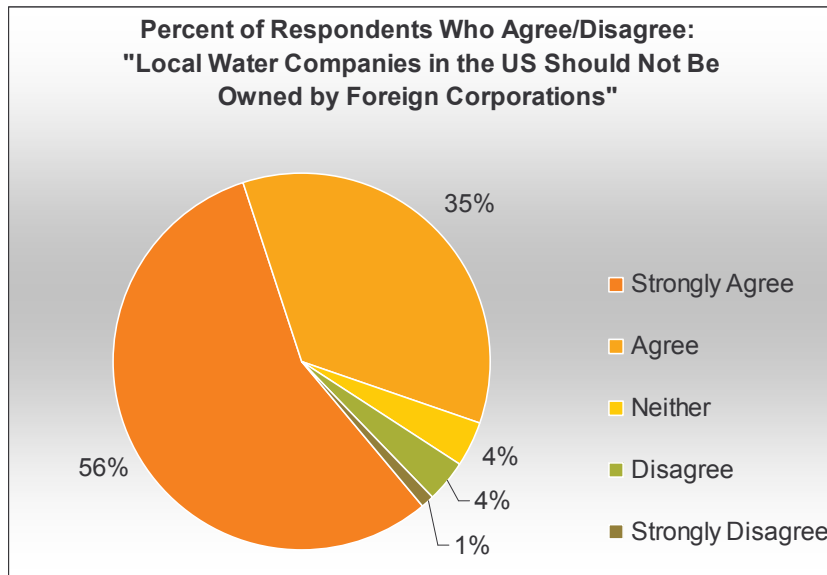


Figure 31: Public opinion on foreign ownership of water utilities

4.4.10 Factors influencing customer satisfaction

The final component of our survey analysis involved testing a series of statistical models to determine which factors contribute most to overall customer satisfaction. A key question to be answered by this analysis was whether a respondent's water provider (CTO, CAW, or CWS) had a statistically significant effect on a respondent's overall satisfaction. If it had, we could infer that there are significant differences in the level of service offered by each provider. A related question was whether overall customer satisfaction differed significantly between the public utility and the two private utilities. Lastly, these models could help us assess whether there are significant differences in customer satisfaction between the two U.S.-owned water utilities (CTO and CWS) and the foreign-owned water utility (CAW).

We began by running a full model that contained an inclusive set of explanatory variables, as summarized in Table 26 (AIC=258.6, Residual Deviance=210.6, df=130. See Appendix F for a description of model methodology). The full model provided an initial indication of which variables were more important contributors to overall satisfaction, as T-values less than -2.0 or greater than 2.0 indicate statistical significance (shown in bold).

Table 26: Full model of factors influencing overall satisfaction

Factor	Coefficient	T-Value
Provider=CAW ¹⁵	0.024	0.051
Provider=CWS	0.61	0.95
Service (Q3)	2.4	6.8
Rates (Q4)	0.51	2.0
Water pressure (Q5)	0.26	1.2
Informing customers of service interruptions (Q6)	-0.25	-0.77
Promoting conservation (Q7)	0.25	0.87
Call center satisfaction (Q11/12)	0.98	1.9
Late/incorrect bill (Q15)	1.5	1.9
Billing disputes (Q16)	-0.73	-0.94
Community involvement (Q18)	0.74	2.1
Gender (Q24)	0.83	2.0
Age (Q25)	0.076	0.27
Education (Q26)	-0.42	-1.5
Income (Q27)	-0.19	-0.91
Political affiliation=Indep. (Q28) ¹⁶	0.50	0.61
Political affiliation=No Affil. (Q28)	-0.94	-1.3
Political affiliation=Repub. (Q28)	0.66	1.4

We tested a series of models by removing variables with T-values between -2.0 and 2.0, and compared the various models using the Akaike Information Criterion (AIC) as an index of fit. If removing a single variable from a model causes the AIC to

¹⁵ For the Provider variable, customers of CAW and CWS are compared with customers of CTO

¹⁶ For the Political Affiliation variable, all categories are compared with Democrat

decrease by 2.0 or more, that variable is not significant (see Appendix F for additional explanation).

Removing the variable Provider (CTO, CAW, or CWS) from the full model decreased the AIC from 258.6 to 255.6 – a decrease of 3.0 that strongly indicates Provider does not have a significant effect on overall satisfaction. This finding supports the hypothesis that there is no significant difference in overall customer satisfaction between the three utilities.

We also tested full models similar to the model summarized in Table 26 that included Ownership (U.S. or foreign) and Provider Type (public or private) instead of the Provider variable in order to assess whether these variables had a significant effect on overall satisfaction. The T-value for Ownership was 0.40 and the T-value for Provider Type was -0.29, indicating that neither of these variables has a significant effect on overall customer satisfaction. These results are interesting because despite the strong public opinion in favor of domestic utility ownership, customers of the foreign-owned water company are no more likely to be dissatisfied than customers of the two U.S.-owned water providers. Customers of the private water utilities are no more likely to be dissatisfied than customers of the public water utility.

The most important factors influencing overall customer satisfaction were found to be service, rates, billing, the respondent’s experience with the customer service call center, and the respondent’s perception about their water provider’s community involvement. In addition, three demographic factors were found to have a statistically significant effect on overall satisfaction: gender, income, and political affiliation. (Demographic variables were included to assess whether factors beyond the water provider’s control might also influence customer satisfaction.) Table 27 summarizes the results from the statistical model that provided the best fit for our survey data, accounting for the number of parameters used to estimate the model (AIC=247.8, Residual Deviance=215.8, df=138). The Factor column lists the variables that significantly affected overall satisfaction, with a reference to the survey question testing that variable. T-values less than -2.0 or greater than 2.0 indicate statistical significance, but Q4 and Q15 were also included because removing these variables increased the AIC significantly above that of other models.

Table 27: Factors influencing overall customer satisfaction

Factor	Coefficient	Std. Error	T-Value
Service (Q3)	2.4	0.33	7.2
Rates (Q4)	0.44	0.24	1.9
Call center satisfaction (Q11/12)	0.97	0.50	2.0
Late/incorrect bill (Q15)	1.4	0.77	1.8
Community involvement (Q18)	0.85	0.31	2.8
Gender (Q24)	0.81	0.39	2.1
Income (Q26)	-0.51	0.24	-2.1
Political affiliation=Indep. (Q28)	0.36	0.80	0.45
Political affiliation=No Affil (Q28)	-0.93	0.73	-1.3
Political affiliation=Repub. (Q28)	0.67	0.46	1.5

The positive coefficients on variables Q3-Q18 indicate that as respondents' dissatisfaction with these factors increases, overall dissatisfaction also increases. For the demographic variables, female respondents tended to be more dissatisfied with water provider service than males. Overall satisfaction increased with increasing respondent income, which may occur because higher-income respondents are less concerned about water rates. Political affiliation compares each response category with Democrat, and the coefficients indicate that respondents who listed their political affiliation as Independent or Republican tended to be more dissatisfied than Democrats, and respondents who listed No Affiliation tended to be more satisfied in comparison with Democrats.

In Section 4.4.3 we noted that the survey response data appears to indicate that CTO customers are more dissatisfied with their provider's rates than CAW or CWS customers, despite the lower rates charged by the publicly owned utility. Once all the factors influencing overall satisfaction are considered, our results indicate that provider rates have a significant effect on overall satisfaction but the provider itself does not. Thus, the anomaly that CTO customers are more dissatisfied with their rates has no statistical significance when considered in conjunction with other factors influencing overall satisfaction.

The most important factor influencing a respondent's overall satisfaction was the response to Question 3: whether a respondent assessed their provider's service as "Exceptionally Good," "Somewhat Good," "Adequate," "Somewhat Poor," or "Exceptionally Poor." Question 3 responses were coded on a scale of 1 to 5, with 1 assigned to responses of "Exceptionally Good," and 5 assigned to responses of "Exceptionally Poor."

Figure 32 depicts the cumulative probability curves generated by the effect of Q3 response on overall satisfaction. The figure shows that respondents who indicated their water provider's service was exceptionally good or somewhat good had a high probability of being very satisfied overall with their water provider, and respondents who rated their provider's service as exceptionally poor had a high probability of being very dissatisfied overall.

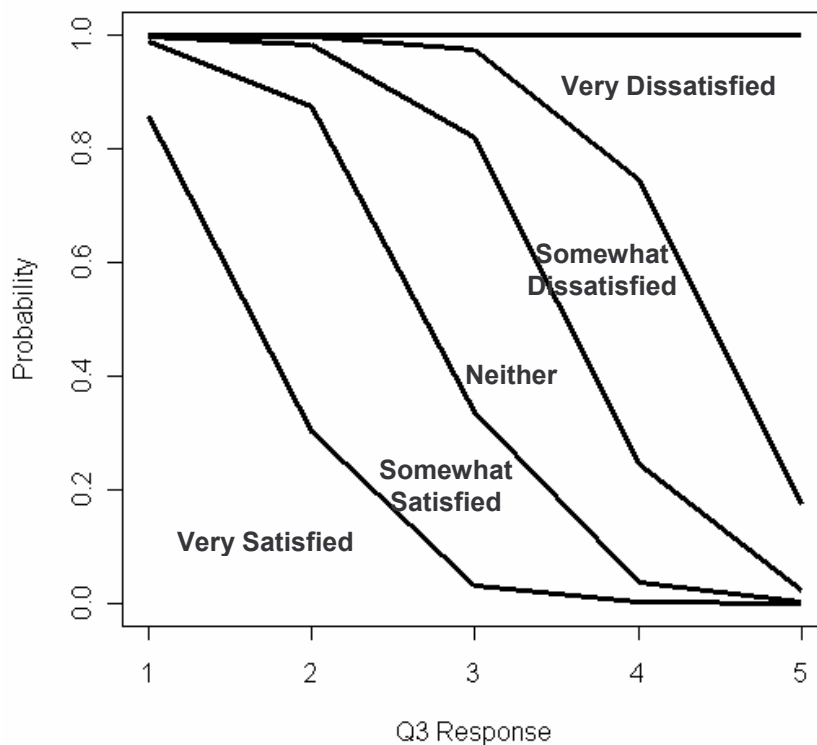


Figure 32: Effect of service rating on overall satisfaction

4.4.11 Conclusions from customer satisfaction survey analysis

Our analysis of the customer satisfaction survey results indicates that there is no significant difference in overall customer satisfaction between the three providers in Thousand Oaks. The most important factors in determining overall customer satisfaction are service, rates, billing, the customer’s experience with their provider’s telephone call center, and customer perceptions about the water provider’s community involvement. It is less obvious why community involvement of the water provider would significantly impact satisfaction, but these results suggest that public relations efforts and visibility of the water provider in the community are more important than one might expect.

In Thousand Oaks, public sentiment does not appear to be strongly in favor of public or private ownership of water utilities. This ambivalence may be attributable to the fact that none of the utilities appear to have significant service problems. Though there is strong public sentiment against foreign ownership of water utilities, this sentiment does not appear to negatively affect overall satisfaction for customers of the foreign-owned water provider (CAW).

5 LEGAL RESEARCH RESULTS

There are two key areas of legal research that inform our decision-making framework: whether international trade agreements can be used to trump domestic regulations governing water service provision, and whether the protections from corporate malfeasance provided by Sarbanes-Oxley can be extended to cover water companies that are exempt from the statute. These legal questions primarily impact the management objectives of local control and local accountability.

5.1 INTERNATIONAL TRADE AGREEMENTS

As discussed in Section 2.3.1, public officials from the California legislature to the Coastal Commission have expressed concerns about the potential for foreign-owned water providers to attempt to use international trade agreements to undermine domestic regulations governing water service provision. Given the increasing presence of multinational corporations in the U.S. water industry, this argument is commonly cited by opponents of water privatization [182]. However, to date there has been no definitive case law that decisively indicates whether such a fear is justified. This section summarizes the results of research on this question conducted by a third-year law student at the UCLA School of Law, and focuses on two international trade agreements: GATS and NAFTA.

5.1.1 GATS

Through international trade agreements like GATS, the World Trade Organization (WTO) aims to liberalize access to markets for WTO members. GATS is modeled after the General Agreement on Tariffs and Trade (GATT), which regulates goods rather than services. GATS seeks to ensure that the laws of member countries promote investment and trade in service-sector activities, including “transportation, construction, sewage, health, education, communications and tourism” [183]. Its goal is to decrease the restrictiveness and increase the transparency of domestic regulations governing the provision of such services. GATS covers regulations implemented by federal, state, and municipal authorities in WTO member countries, and also applies to measures taken by governmental bodies exercising delegated authority, such as the CPUC [184]. Members of the WTO must ensure that all regulations issued by these bodies are consistent with the rules outlined in GATS. Members who fail to honor their obligations under GATS are subject to penalties imposed by the WTO dispute resolution system [185].

The key element in GATS is for countries to make commitments to open a sector to trade. Countries are not obliged to open sectors, but can do so voluntarily and can also be requested to do so by other countries. There are four modes of service covered under GATS. Water distribution is classified under Mode 3 as a “commercial presence” mode of service, which is defined as a company setting up subsidiaries or branches to provide services in another country [186].

There are two types of obligations under GATS: specific and general. Specific obligations apply only to sectors which a country has made an express commitment to liberalize by listing it on a GATS schedule. The U.S. does not currently include water service provision under its sectors that are subject to specific GATS obligations, though the European Union's GATS negotiators have requested that many countries open their water services sectors by subjecting them to specific obligations [187]. According to Yang, "Once a WTO member commits a service sector to a specific obligation, it arguably is extremely difficult to reverse that commitment. In order to rescind a commitment, the GATS framework requires compensation such as granting market access in another area" [188]. The U.S. has made it clear that it has no intention of listing water services on its schedule of sectors that are subject to specific GATS obligations [189]. Since water service provision is not specifically listed, it is only subject to GATS' general obligations.

General obligations apply "directly and automatically" to all parties to the agreement across all service sectors covered by GATS and include the principles of transparency, national treatment, and Most Favored Nation (MFN) treatment [190].

As transparency obligations are the most straightforward and of the least concern for the question of whether international trade agreements could trump domestic laws governing water service provision, we will discuss them briefly. Transparency obligations require governments to publish all relevant laws and regulations, to establish contact points where service suppliers and other governments can turn for information about commercial and technical aspects of the supply of services, and notify WTO members of any changes in regulations that apply to services covered by specific commitments.

National treatment is a fundamental WTO principle that prohibits favoring the host country's service providers over foreign-owned service providers. MFN treatment is similar, but prohibits a member from discriminating between foreign-owned service providers from different countries [191]. In order for a domestic regulation to violate either the national treatment or MFN treatment obligations, two legal elements must be proven: "1) the regulation or law must be discriminatory, and 2) the services that are compared must be 'like services'" [192]. An outright ban on a service is discriminatory as is any regulation that results in "less favorable treatment" of a member country [193]. Determining "like services" is a bit unclear as there is no case law that meaningfully discusses the main factors that establish the likeness of two products or services. However, tax codes and tariff classifications may provide some guidance in determining "like services." For example, under Border Tax Adjustment Factors, a foreign-owned water service provider could be considered "like" a public water utility because they both provide water to customers in the same way [194].

If a country is found to be in violation of either national treatment or MFN obligations, it may be able to justify its regulations by asserting Article XIV of GATS. Article XIV provides exemptions to national treatment and MFN in cases necessary "to protect human, animal, plant life or health" and "to secure compliance

with law and regulations not inconsistent with the provision of [GATS]” [195]. Both of these exemptions rely on the “necessity” test, which current GATS case law has interpreted to mean that domestic regulation must use the least trade-restrictive alternative to achieve a regulatory goal. Yang could not definitively conclude how this test might affect regulations in the water services context. He uses the hypothetical example of a domestic regulation banning the use of a chemical used in water treatment that is found to be a potential carcinogen [196]. A foreign-owned water company that has a long-term contract to use that chemical in its treatment processes could argue discrimination if it faces potential damages from breaking its supply contract. If there is strong evidence that the chemical is harmful, and if the ban does not create different conditions for different WTO countries, Yang argues that at least in theory the regulatory agency banning the chemical has a good case for meeting the necessity test and attaining Article XIV exemption. However, if the scientific evidence against the chemical is equivocal, and water providers from a single country use the chemical in their treatment processes, that country could have a stronger case for discrimination. Yang writes, “This is especially likely if the other circumstances indicate that the ban did not take into account alternatives to the ban, e.g. lowering the amount of the chemical in the water” [197]. In this case, the outright ban might not meet the requirement of being the least trade-restrictive regulatory alternative.

Another purpose of the GATS general obligations is to outlaw the use of non-market mechanisms such as “cross-subsidization, universal risk pooling, solidarity, and public accountability in the design, funding, and delivery of public services as being anti-competitive and restrictive to trade” [198]. Considering this purpose raises two additional hypothetical cases in which foreign-owned water companies could argue that they are being discriminated against. The first argument is that subsidies from a city’s general fund to a publicly owned utility are a form of discrimination against private companies. Theoretically, foreign-owned water companies could argue that the subsidies give an unfair competitive advantage to the public water utility. Secondly, foreign-owned water companies could argue that low-interest municipal bonds are a form of discrimination because the private companies have a higher cost of capital. However, since these conditions apply equally to all private water companies, whether domestic or foreign-owned, it is unlikely foreign water companies could successfully argue discrimination under GATS general obligations. Furthermore Yang writes, “Whether a WTO panel would consider a public and private utility as ‘like’ is unclear since the nature of the providers is dissimilar – one is public entity, the other a private company” [199].

5.1.2 NAFTA

NAFTA is another international agreement that seeks to reduce barriers to trade between the party countries: Canada, the U.S., and Mexico. Like the U.S., most water utilities in Canada are publicly owned, but increasing infrastructure investment needs are pushing local officials to consider expanding the extent of public-private partnerships [200]. Though there are currently no Canadian or Mexican-owned

international water companies, given the fast pace of multinational mergers and acquisitions in recent years it is possible that Mexican or Canadian water service companies could one day operate in the U.S. Therefore, it is important to discuss the potential effects of NAFTA on regulations governing water service provision.

Even before NAFTA was ratified, the role that NAFTA would play in water provision between countries was already a concern. Canada was concerned that they might be forced to export water to the U.S. if the U.S. demanded it. In response to this concern, the party countries issued a joint statement in 1993 that clarified the role of NAFTA with respect to water provision:

The NAFTA creates no rights to the natural water resources of any Party to the Agreement ... nothing in the NAFTA would oblige any NAFTA Party to either exploit its water for commercial use or to begin exporting its water in any form. Water in its natural state in lakes, rivers, reservoirs, aquifers, water basins and the like is not a good or product, it is not traded, and therefore is not and never has been subject to the terms of any trade agreement [201].

Following this initial concern, the issues around NAFTA's relationship to water lay dormant for several years. But with increased privatization of U.S. water utilities in the late 1990s, concerns grew surrounding NAFTA's Chapter 11 provisions and how they might affect a foreign-owned water service provider operating in this country. Some experts believe that Chapter 11 may allow a foreign-owned corporation to sue in a NAFTA tribunal if the corporation feels that their profit has been limited by a domestic regulation that increases the company's operating costs. Environmental laws such as water quality standards are one example of a regulation that could potentially cause this type of conflict.

Chapter 11 entails investor protections by establishing certain rights for entities that have invested in the country of another party member. Specifically, Chapter 11 establishes four main principles: 1) non discriminatory treatment of foreign investors and investments, 2) most favored nation treatment, 3) fair and equitable treatment, and 4) no expropriation or nationalization of foreign investments "tantamount to nationalization or expropriation" [202]. Of these four, Yang identifies "tantamount to expropriation" as the provision with the most potential to impact domestic environmental regulations with respect to water service provision [203].

Yang analyzes court cases where the "tantamount to expropriation" provision was used to challenge environmental regulations. In each case, a government that banned the import or export of a product for environmental or human health reasons was sued by the company that produced that product. For example, in *Ethyl v. Canada*, the U.S. company Ethyl sued Canada for \$250 million for banning the import of the gasoline additive methylcyclopentadienyl manganese tricarbonyl (MMT), a product which Ethyl produced that contains a known human carcinogen. NAFTA requires member countries to compensate investors when their property is "expropriated" or when governments take measures "tantamount to expropriation." Ethyl claimed that the MMT ban constituted such an expropriation. Before a NAFTA tribunal could rule on

the case, it was settled out of court for \$13 million and Canada reversed the ban on MMT. Environmentalists were concerned that Canada had been bullied into lessening its environmental standards by a private company [204].

A tribunal can determine a regulation is “tantamount to expropriation” if the regulation: “1) permanently deprives an investor of any use of an investment, 2) is motivated by discriminatory intentions, or 3) is not adopted through the due process of law” [205].

If a government regulation deprives the investor of any use of an investment, it is easy to see that the regulation fits the first criteria for determining it is tantamount to expropriation. It is more difficult to determine whether a regulation is motivated by discriminatory intentions. To reach such a finding, the tribunal will compare the host country’s treatment of its domestic and foreign investors [206]. The tribunal will determine if a regulation creates a disproportionate benefit for nationals over non-nationals or there is sufficient evidence to conclude the host country intended to favor nationals over non-nationals. For example, a foreign-owned water company may argue that because they cannot issue low-interest municipal bonds like a public utility can, they are being discriminated against by government regulation. However, U.S.-owned IOUs are similarly unable to issue such bonds, so it does not appear likely that these circumstances would be deemed to favor a national company over a foreign company.

Finally, Yang argues that a regulation is more vulnerable to a due process challenge if the regulation in question is set by a precedent from a judicial or administrative ruling as opposed to the legislative process [207]. Such a finding is unlikely since most environmental statutes that directly affect water providers, such as drinking water standards, undergo the standard legislative process and are usually incorporated only after public review and a chance for appeal.

In order for NAFTA to trump local, state, or national laws in the U.S., a company from either Mexico or Canada would have to show that regulations favor national over non-national entities. The Chapter 11 provisions of NAFTA are the most likely provisions under which such a suit would be entered. However, given that there are currently no Canadian or Mexican-owned water companies operating in the U.S., and most regulations governing water service provision would be adopted through due process, affecting domestic and foreign-owned water providers equally, we conclude that there is minimal potential for NAFTA to undermine domestic regulations governing water service provision.

5.1.3 Conclusions

At this point, it appears unlikely that foreign-owned water companies operating in the U.S. could successfully invoke international trade agreements to claim discrimination under U.S. regulation. Under GATS, water service provision is only subject to the agreement's general obligations. Our research does not address the hypothetical of what would happen if water was listed under the U.S.' schedule of specific GATS obligations. Under GATS' general obligations, the MFN and national treatment obligations are the most likely areas where foreign-owned water service providers could claim discrimination. However, the most important laws governing water service provision – environmental and public health regulations – apply equally to U.S. and foreign water companies, so claims of discrimination under GATS seem unlikely to prevail. Due to the human health implications, critical regulations governing water quality also seem likely to meet the qualifications for an Article XIV exemption.

NAFTA could also potentially impact U.S. laws governing water service provision, but there are no Mexican or Canadian water companies operating in this country at the moment. If such companies exist in the future, the most likely claims against U.S. regulations governing water service provision are claims that such laws are “tantamount to expropriation.” In order to meet the expropriation test, the law must be proven discriminatory. As discussed above, this seems an unlikely scenario given the fact that such laws would apply equally to domestic and foreign water providers.

5.2 SARBANES-OXLEY

In response to the accounting frauds associated with the collapse of Enron and WorldCom, Congress passed Sarbanes-Oxley on July 30, 2002. In general, Sarbanes-Oxley seeks to increase public confidence in corporate financial activities by improving corporate governance and audit quality. One of the law's primary mechanisms for reaching this goal is by increasing transparency of corporate finances. Sarbanes-Oxley applies to publicly traded companies on the New York Stock Exchange as well as to companies that must submit reports to the SEC. Foreign companies are exempt from the provisions of Sarbanes-Oxley unless they trade on the New York Stock Exchange or otherwise have to submit reports to the SEC [208]. Domestic companies that are not publicly traded and are not required to submit SEC reports are also exempt.

Municipalities considering public-private partnerships may seek to ensure that the private company they partner with is financially solvent, has sound accounting practices, and has leadership that can be held accountable for financial decisions. Most domestic IOUs are subject to Sarbanes-Oxley because they either have to file with the SEC, or they are publicly traded companies. However, a number of foreign companies are becoming major players in the U.S. water sector, and some of those companies are not subject to the provisions of Sarbanes-Oxley. One example is

RWE-Thames Water, which owns AWW, one of the largest water companies in the U.S. The company's accounting practices may be significantly different from the General Accepted Accounting Practices in the U.S., and they do not have the same regulatory oversight that Sarbanes-Oxley provides.

Municipalities entering into a PPP contract with a foreign company that is exempt from Sarbanes-Oxley can try to contractually bind the company to the requirements of that law. According to Kim, the potential contract could read as follows:

[Company Name] shall provide CEO and CFO certification of financial statements for each calendar quarter during the month following the end of each completed quarter. The certification shall be delivered to [City Name]. CEO and CFO certification shall be a personal attestation as to the company's compliance with the Securities Exchange Act of 1934 pursuant to all the provisions of Section 906 of Sarbanes-Oxley [209].

The biggest obstacle to including such a term into a binding contract would be the private company's lack of incentive to enter into such an agreement [210]. The private company might be more willing to negotiate on this issue if it sees the costs of doing so as minor compared to the gains it will receive. The private company may also agree to contractually abide by the policies of Sarbanes-Oxley if they believe doing so will result in an increase in increased public trust or augment its reputation as a reliable and fair service provider [211].

6 OWNERSHIP MODEL FINDINGS

In this section, we synthesize the results of our Thousand Oaks case study, legal research, expert interviews, and literature review by reviewing how each of the four decision scenarios for utility ownership and management (CIP, municipalization, PPP, and asset sale) perform under the ten utility management objectives we defined in Section 3. Where applicable, we include recommendations for improving performance. In Appendix H, we distill these findings into a framework for evaluating decisions regarding ownership and management of retail water distribution systems.

6.1 OPERATIONAL EFFICIENCY

For the purposes of this report, operational efficiency is defined as short-term system input per short-term system output, and addresses the question of resources used to provide water service.

6.1.1 CIP

CIPs can be designed to increase operational efficiency in many ways: increased organizational focus on efficiency improvement, performance benchmarking (both with other utilities of similar size, and by using detailed metrics to track the utility's own internal improvement), process streamlining, labor-management improvements such as cross-training, and acquisition of technological tools such as management information systems [212].

Operating ratio is one measure of operational efficiency. The EPA calculates operating ratio by dividing total operating revenue by operation and maintenance expenses¹⁷ [213]. Therefore, an operating ratio of less than one means that the utility is not able to cover its expenses with revenues and is operating in the red. Figure 33 shows the range of operating ratios for public and privately owned water utilities as summarized in the EPA's 2000 *Community Water System Survey* [214]. For all utility size categories but one (3,301-10,000 customers), there is a higher percentage of public systems with operating ratios below one, indicating that public systems are more likely to be operating at a deficit. In addition, there is a larger percentage of private systems with operating ratios above 1.2 for all size categories except one (over 100,000 customers).

¹⁷ According to the EPA, "Operating revenue includes water sales revenue, connection fees, and development fees. O&M expenses include employee and contractor expenses and other routine operating expenses. Debt service expense, capital expenditures, and other non-operating expenses are excluded." Note that the ratio that EPA uses is the inverse of the operating ratio metric we discussed in Section 4.1.1.1, but the concept is the same. In our analysis, a smaller operating ratio is indicative of greater operational efficiency, where with the EPA's operating ratio, larger values are indicative of greater operational efficiency.

Distribution of Operating Ratio (Percentage of Systems)					
	Population Served				
	Below 500	501- 3,300	3,301- 10,000	10,001- 100,000	Over 100,000
Operating Ratio of Publicly Owned Systems					
<1	36.2%	26.5%	14.4%	18.3%	23.6%
1 to 1.2	27.3%	19.5%	28.2%	23.4%	9.6%
>1.2	36.5%	54.0%	57.4%	58.3%	66.8%
Operating Ratio of Privately Owned Systems					
<1	33.7%	9.3%	27.0%	17.3%	6.6%
1 to 1.2	15.8%	34.1%	11.2%	16.5%	36.6%
>1.2	50.5%	56.7%	61.8%	66.2%	56.8%

Figure 33: Operating ratios for public and private water systems
Source: U.S. EPA

Our Thousand Oaks case study results show that the two private companies are operating more efficiently than the public utility. Most likely this is due to private sector incentives to maximize profits, where the public sector objective is to ensure that revenues cover the cost of providing the service. However, customers of the privately owned utilities in Thousand Oaks also pay higher rates for their water service, despite the companies' greater efficiency. These results suggest that public utilities potentially have much to gain from CIP implementation.

AMSA and AMWA have compiled an excellent guide to CIP implementation, *Thinking, Getting, Staying Competitive: A Public Sector Handbook*. This guide identifies the most common obstacles to maximizing efficiency under CIP implementation:

- Some systems may be too small to achieve meaningful efficiency improvements through CIP implementation. According to the EPA, maximizing operational efficiency is most challenging for systems serving fewer than 3,300 connections because they lack economies of scale [215]
- Civil service requirements restrict ability to achieve maximum efficiency from workforce [216]
- Legal restrictions on procurement processes and capital expenditures that inhibit efficient allocation of resources, and bureaucratic procedural requirements [217]
- Overly specialized work force and lack of cross-training creates excessive staffing requirements [218]
- Hierarchical organizational structure, or organizational structure that otherwise impedes information flow, such as keeping operations and maintenance functions separate [219]

- Lack of system automation, either due to employee resistance or lack of funds to invest in new technologies (may also be related to system size and resources) [220]

6.1.2 Municipalization

A key consideration under municipalization is the potential for decreased economies of scale that would reduce operational efficiency. Under private ownership, the system may combine functions with the company's other service areas, such as consolidated billing, customer service, or laboratory operations. Under public ownership, the municipality is confined to a single jurisdiction, and is likely to have more limited options for increasing economies of scale.

In some instances, regional coordination may be an opportunity for improving operational efficiency by increasing economies of scale [221]. According to the AWWA RF, "the consolidation of specific utility services, such as billing, utility administrative functions, planning, operations, and maintenance, can also result in significant cost savings" [222]. Consolidation benefits may include reduction of treatment costs, access to capital at lower costs, and an increased capacity to address natural resource management concerns [223]. Whether such efforts are possible depends largely on the spatial distribution of surrounding systems and also the relative size of the public water utilities involved.

In 1996 the Logan-Todd Regional Water Commission was formed in Kentucky from 12 community water systems which were facing similar challenges in the operation of their respective wholesale waterworks. This regionalization effort was successful in addressing problems of procuring reliable water supply to meet community needs, including population growth and economic development. It is worth noting that all of the managers of the individual water systems bought into the collective commission and agreed to the provisions set forth, sacrificing some degree of autonomy [224].

6.1.3 PPP

Public utilities may use PPPs to reduce operating costs by increasing operational efficiency. Eighteen (62 percent) of the facilities studied by the NAWC indicated that financial issues were the primary reason for privatization: "The most common issues included cash flow problems (deficits) or excessive operating costs and a backlog of capital requirements" [225]. Due to the importance of economies of scale to water utilities, small systems may be more likely to face these types of problems, though a recent GAO study on privatization concludes, "smaller utilities were neither more nor less likely than larger utilities to have covered their cost of providing service with revenues from user charges and other local sources" [226].

Ideally, the private company will be able to utilize economies of scale and technical expertise from multiple service areas, as well as implement process improvements that increase efficiency. Anton Garnier, CEO of Southwest Water, says that his company can typically achieve a 30 percent reduction in operating costs when they enter into a PPP contract for operation of a publicly run utility [227]. According to the

NAWC, major operating cost reductions (10 to 40 percent) were achieved at five of the PPP cases they studied.¹⁸ Cost reductions were achieved primarily through: “Installation of computerized management systems; economies of scale in purchasing equipment and supplies; and process control expertise to improve the utilization of facilities” [228].

The private contractor may be able to lower operating costs through centralizing administrative staffing functions, ordering supplies in bulk at a reduced cost, and sharing common inventory items, operators, and maintenance personnel among multiple service locations [229]. According to Garnier, the majority of the cost-savings achieved by his company under PPPs are through labor force reductions [230].

In Section 6.2.3 we discuss the importance of including contractual benchmarks for meeting short-term efficiency goals without compromising long-term system infrastructure investment needs.

6.1.4 Asset sale

An asset sale may increase operational efficiency if the transition to private ownership increases economies of scale, as discussed in Section 6.1.3. The private company may also bring increased technical expertise as specialized personnel can be shared among multiple service areas, or privatization may bring advantages from knowledge-sharing across the company. As discussed previously, the profit motive of private companies may be an important driver to maximize operational efficiency.

At the same time, our Thousand Oaks case study indicates that the greater efficiency of privately owned water utilities does not necessarily lead to lower rates for consumers.

6.2 SYSTEM RELIABILITY

System reliability addresses long-term infrastructure investment and planning, and other asset management practices. Systems that plan and invest in infrastructure maintenance on a multi-year basis and have advanced systems for tracking infrastructure condition are likely to be more reliable than those that primarily consider short-term infrastructure needs and employ a reactive maintenance program.

6.2.1 CIP

Infrastructure investment is a key factor in system reliability. CIP implementation may improve system reliability through increased focus on long-term asset management practices. AMSA/AMWA estimates that implementing a time-based preventative maintenance program improves system reliability by an average of 25 percent, and a predictive maintenance program improves reliability by an average of 70 percent. Cost savings for planned maintenance programs can be as much as 40 percent of annual O&M costs [231].

¹⁸ These five cases may include asset transfers and leases as well as O&M contracts.

The EPA 2000 *Community Water System Survey* provides some data on infrastructure investment at public and private systems, as shown in Figure 34. Particularly for small systems, publicly owned systems have a higher rate of pipe replacement [232]. This difference becomes minimal among larger systems.

Miles of Pipe Replaced During Previous Five Years as a Percentage of Total Miles of Existing Pipe, by Ownership				
Population Served	Publicly Owned Systems		Privately Owned Systems	
	Mean	Median	Mean	Median
Less than 100	26%	0%	6%	0%
101-500	14%	0%	4%	0%
501-3,300	5%	0%	0%	0%
3,301-10,000	3%	1%	9%	3%
10,001-50,000	4%	1%	2%	0%
50,001-100,000	3%	1%	1%	0%
100,001-500,000	2%	1%	2%	1%
More than 500,000	3%	2%	4%	2%

Figure 34: EPA data on pipe replacement for public and private water systems

As described in Appendix D, public utilities may have a lower cost of capital than private companies because they can issue low-interest municipal bonds that are tax-free for investors. This may provide an incentive for infrastructure investment.

At the same time, the amount of general obligation bonds that a municipality can issue is often limited by state or local regulation [233]. There may be political resistance to issuing new bonds via the voting process. Also, too much debt can hurt the municipality's credit rating, limiting its ability to borrow at a future date.

Most importantly, political pressure to keep rates low may impede needed levels of infrastructure investment under public utility ownership. Public water systems may have to compete for resources with more visible public priorities such as schools, police, or street repair [234]. In addition, municipal water departments may have to work to keep their revenues from being appropriated for other purposes. According to AWWA RF:

Another area of financial concern for many water utilities is the reallocation of water revenues to other city functions. Since water utilities are enterprise funds, municipal governments will often transfer water revenues to other city departments that are short of funding. This can occur through directly taxing the water fund or through more discreet mechanisms, such as charging extraneous fees or overcharging for inter-departmental services [235].

Effective public outreach is essential to ensuring community support for increased infrastructure investment. In addition, AWWA RF emphasizes the importance of

political skills for water managers to ensure their department's funding needs are met [236]. Increasing transparency and accountability for city finance practices may be one method of combating disincentives for infrastructure investment.

In Thousand Oaks, municipal utility ranked more favorably in comparison with the two privately owned utilities on the infrastructure condition indices we measured. But all three providers have a very low percentage of unaccounted-for water, all three have systems in place to address main breaks as they occur, and all three are above the DHS-recommended average pressure level at the customer meter. Overall, we did not find a significant difference in infrastructure investment or condition between the three Thousand Oaks water providers.

6.2.2 Municipalization

With municipalization of small water systems, economies of scale can be problematic for meeting system reliability objectives. A 1997 study by the EPA estimated that over the course of 20 years, the cost of meeting the country's water infrastructure investment needs was much higher for small systems than for medium or large systems: \$3,300 per household for those served by small systems, compared with \$1,200 per household for those served by medium systems, and \$970 for those served by large systems ¹⁹ [237].

In addition, if municipalization occurs as the result of poor service quality under private ownership, there could be a significant backlog of deferred maintenance. It is important that the city conduct an assessment of the condition of the water distribution infrastructure before acquiring the system to ensure better accuracy for cost projections. The significant up-front costs of municipalization can make adequate investment in system infrastructure more problematic.

In Montara, California, the Montara Water & Sanitary District (WSD) acquired the local water system from a private company in August, 2003. In order to finance the municipalization, voters approved the sale of up to \$19 million in bonds; \$17.5 million was actually used to acquire the system. According to George Irvin, the WSD District Manager, water infrastructure under private ownership was in very poor condition due to maintenance deferral. The Montara WSD is currently in the process of replacing pipeline throughout its water system and completing needed upgrades. In the case of the Montara municipalization, the city had a clear understanding of the water system's infrastructure condition prior to seeking bond funding. Thus, the city was able to secure an appropriate level of funding to acquire the system and initiate infrastructure maintenance programs.

Communities should consider all funding options that are available prior to attempting to municipalize their water system. Some of the options available include but are not limited to, federal or state revolving funds, bonds, or loans.

¹⁹ Cost reported in 1995 dollars.

6.2.3 PPP

The NAWC cites backlogs of deferred maintenance and capital investment needs as a primary driver for many privatization models, including PPPs [238]. However, the same study asserts that PPPs may not be the best means of obtaining private sector capital investment: “Despite recent regulations that extend the allowable contract period in O&M arrangements to 20 years, there were no significant capital expenditures in the 14 O&M and two outsourcing projects included in this study” [239].

Garnier indicated that the PPP contracts his company enters into typically establish a per-item threshold of \$1,000 to \$2,000 as the maximum the private company will pay for system maintenance or capital projects. Any capital requirements beyond that threshold are the responsibility of the municipality. NAWC concludes, “partnerships are preferred when the municipality has the ability to continue to make major capital investments” [240]. In contrast with asset sales, PPPs do not provide companies with a rate of return on their infrastructure investment because the infrastructure remains under public ownership. PPPs have the potential to increase system reliability to the extent that operational efficiency gains save public resources, which can then be used for capital investment.

Though PPPs may not be a source of significant capital investment, PPP contracts can be developed to encourage companies to take a proactive role in maintaining system infrastructure. Interviews conducted during our research have suggested that if a company is only operating in an area for a short length of time, it may be more likely to defer maintenance to maximize short-term profits. Buffalo, New York, has contracted with American Anglian for the operation and maintenance of the city’s water distribution system. The contract between Buffalo and American Anglian specifies that the company is responsible for infrastructure maintenance such as the replacement of out-dated meters and annual replacement of aging pipes. However, despite the contract provisions, employees of the water utility in Buffalo claim that American Anglian has failed to complete at least 10 percent of promised meter replacements during their initial five-year contract with the city [241].

In comparison, cities such as Indianapolis and Stockton currently have long-term PPP contracts and successful infrastructure maintenance programs. Indianapolis has contracted with Veolia Water North America for operation and maintenance of the city’s water distribution system. The 20-year contract includes specific language regarding infrastructure replacement and maintenance schedules. The city retains control of infrastructure condition by holding regular meetings with Veolia and approving all capital improvement projects [242].

In Stockton, California, the city has a 20-year contract with OMI/Thames for the day-to-day operations and maintenance of the city’s water system. The contract that developed between Stockton and OMI/Thames is thorough and well-researched. According to Mark Madison, Director of the Stockton Municipal Utilities

Department, water infrastructure maintenance under OMI/Thames is at least equal to the level attained under municipal operation, and in some cases better [243].

There are two primary differences between infrastructure maintenance under PPPs in cities like Buffalo and in cities like Indianapolis or Stockton. First, these case studies indicate that a short-term contract may serve as a disincentive to invest in infrastructure whereas a long-term contract may provide more incentive to proactively maintain infrastructure. Second, these case studies also indicate that in a PPP relationship, it is important for the city to be involved and informed about the private company's operation of the water system. In doing so, the city will be better able to ensure that infrastructure needs are met by the private company, and that the company is in compliance with their contract.

Another critical issue affecting system reliability under PPPs is the need for a thorough infrastructure assessment prior to entering into contract negotiations. The lack of a thorough infrastructure assessment is one of the most cited reasons for the failure of the Atlanta privatization [244]. United Water, the company that was awarded the contract to run Atlanta's water and wastewater systems, claimed that the city grossly underestimated necessary system repairs and maintenance costs. As a result, United Water claimed their fee proposal for the privatization contract was under-priced as it was based on faulty assumptions. A thorough infrastructure assessment will ensure that both parties understand infrastructure investment needs and can plan accordingly in the contract negotiation.

6.2.4 Asset sale

With an asset sale, the private company assumes responsibility for infrastructure maintenance and capital investment. Compared with the PPP model of privatization where utility asset ownership remains with the public sector, asset sales may involve greater incentive for the company to invest in system infrastructure. IOUs are allowed to earn a rate of return on their capital investments as determined by the state public utilities commission. As long as infrastructure investment is justifiable, the company earns a larger increment for a higher level of investment. Private companies are also insulated from political pressures to keep rates low that may create incentives for under-investment at publicly owned utilities.

At the same time, in our Thousand Oaks case study the public utility performed better than the IOUs on the system reliability metrics we evaluated. However, the quality of infrastructure in each of the three utility districts in Thousand Oaks is acceptable. Thus, we were unable to determine through this study if the deferral of infrastructure maintenance occurs more often with public or private utilities.

6.3 WATER QUALITY

In retail water distribution systems, water quality is most influenced by the source of water supply, but may also be influenced by the level of infrastructure investment. Water utility managers have very little, if any, control over the source of water, which is largely determined by geographic location and climate. Water treatment processes are established by regulatory agencies (in California, the agency would be DHS) and allow for very little flexibility in procedure. Therefore, our analysis considers only factors related to infrastructure investment in our assessment of water quality impacts from different water system ownership and management models.

6.3.1 CIP

As described in Section 6.2.1, CIP implementation may improve water quality through increased focus on long-term asset management practices. At the same time, if a municipality does not have the financial resources to adequately address infrastructure needs, CIP implementation may be an inadequate mechanism for meeting the funding gap. NAWC cites EPA data on the relationship between system size and inability to meet water quality standards: “Of the 16,439 community water systems reported as violating drinking water regulations during fiscal year 1991, 90 percent were small [fewer than 3,301 connections] community systems” [245]. The EPA currently has an affordability-based variance program that works to assist small municipal systems with meeting water quality requirements; additionally, funds are available to small systems via the Drinking Water State Revolving Fund.²⁰

Regionalization may also provide a means for small systems to address water quality concerns. AWWA RF cites Jenny Bielanski, the EPA Drinking Water Utilities Team Leader, who stated that regionalized systems, “can be better equipped to have the long-term technical, managerial, and financial capacity to comply with SDWA requirements” [246].

In the case where political pressure to keep rates low induces public officials to under-fund system maintenance, CIP benchmarking processes can be used to produce decision-making support for increasing infrastructure investment. In the NAWC privatization study, process improvements implemented by the private companies to attain compliance with water quality standards were relatively simple in four of the twelve cases studied, involving system flushing and implementing chemical dosing programs [247]. Depending on the extent of water quality problems facing the public system, achieving compliance through CIP implementation may require process improvements rather than extensive capital investment.

According to a AWWA RF survey, “Relative to customers of private water providers, customers of public water providers were more confident in the safety of the tap water they receive at home and were more likely to believe it meets all state and federal regulations” [248]. Our research in Thousand Oaks did not determine any

²⁰ For more information, visit: <http://www.epa.gov/safewater/smallsys/affordg.pdf>

significant difference between the public and private utilities in terms of water quality.

6.3.2 Municipalization

If municipalization occurs as the result of poor service quality under private ownership, there could be a significant backlog of deferred maintenance which affects water quality. In addition, the significant up-front costs of municipalization can make adequate investment in system infrastructure more problematic. Section 6.2.2 discusses the need to account for infrastructure maintenance needs in acquisition planning and financing.

6.3.3 PPP

According to the California DHS, the owner of water utility infrastructure is responsible for meeting water quality standards. Under a PPP, the public entity retains asset ownership and is ultimately responsible for standards compliance. However, the public entity is not actively participating in day-to-day management of the system. For this reason, the terms of the PPP contract should clearly define responsibility for meeting water quality standards and which entity will pay if any violations are imposed. Contractual cost-sharing mechanisms may increase coordination between the parties to address water quality issues.

The NAWC study offers promising results in terms of privatization improving compliance with water quality standards. Twelve of the 29 facilities studied were out of compliance with water quality regulations prior to privatization, and all attained compliance within one year of privatization. Four of these examples were O&M contracts. Process improvements implemented by the private companies to attain compliance with water quality were relatively simple in four of the twelve cases studied, as discussed above.

6.3.4 Asset sale

As discussed in Section 6.2.4, asset sales may involve greater potential for private sector capital investment than the PPP model of privatization. Particularly if infrastructure investment was under-funded under public ownership, water quality could improve under asset sales as the private company earns a rate of return from its infrastructure investment. Private companies are also insulated from political pressures to keep rates low that may drive under-investment in infrastructure for publicly owned utilities.

In the NAWC study, five of the nine asset sales examples were out of compliance with water quality standards prior to asset sale. Within one year, all facilities were in compliance [249].

Our research in Thousand Oaks did not determine any significant difference between the public and private utilities in terms of water quality.

6.4 CUSTOMER SATISFACTION

The AWWA RF study found: “For three basic areas of consumer satisfaction (tap water quality, overall customer service, and complaint resolution), managers overestimated satisfaction by 14 percent to 20 percent” [250]. This finding highlights the importance of regular customer satisfaction assessment.

Through our survey research in Thousand Oaks, we determined five elements of utility operation that had the largest effect on overall customer satisfaction: service, rates, the customer’s experience with the telephone call center, billing, and the water provider’s community involvement. In addition to the most significant factors mentioned above, we also asked respondents to rate provider performance on water pressure, conservation, informing customers of service interruptions, and community involvement.

The Office of Water Service in England and Wales (Ofwat), England’s regulatory agency for water utilities, uses detailed indicators to assess service performance, including requiring utilities to report the following customer service metrics on an annual basis [251]:

- *Water pressure*: number of properties where pressure is typically below the reference level of 20 meters of head at the boundary stop tap with a flow rate of 9 liters per minute, or 15 meters of head in the distribution main supplying the property. Water pressure in the U.S. is typically measured in pounds per square inch (psi), and DHS recommends a pressure of 40 psi at the customer’s meter
- *Supply interruptions*: number of properties without water for longer than 3 hours, 6 hours, 12 hours, and 24 hours, and whether such interruptions were unplanned and unwarned, planned and warned, or caused by third parties
- *Use restrictions*: percentage of population served by the company that has experienced any restrictions in using water due to hosepipe restrictions or drought orders
- *Sewer flooding*: number of properties that actually experienced flooding as well as the number of properties at risk of internal flooding from sewers due to hydraulic overloading more than twice in ten years and more than once in ten years
- *Billing contacts and response time*: annual number of billing contacts (for account queries, change of address, or requests for alternative payment arrangements) received by a company (written and telephone) and the number dealt within 2, 5, 10, 20, and more than 20 working days
- *Customer complaints*: whether justified or unjustified, the annual number of written complaints received by a company and the number dealt with in 2, 5, 10, 20, and more than 20 working days

- *Meter verification for billing*: percentage of metered customers who receive at least one bill during the year based on an actual meter reading, and number of meters that the company has not read in two years or more
- *Ease of telephone contact*: by monitoring incoming calls on the main customer contact numbers, metrics include number of responses within 15 and 30 seconds, number of abandoned calls, and amount of time all lines to the company are in use and the customer gets a busy signal

6.4.1 CIP

Our research does not indicate that public or privately owned utilities do a better job of addressing customer satisfaction, but CIP implementation may involve efforts to increase customer satisfaction. The metrics discussed above may be used to gauge current performance and determine areas where increased resources should be focused.

According to our survey results, a customer’s experience with their provider’s telephone call center significantly affects overall satisfaction. AWWA RF recommends aiming to resolve customer requests on the first call, answering calls within 20 seconds, ensuring staff coverage during lunch breaks, and better training for customer service representatives [252]. In Thousand Oaks, customers were more satisfied with the locally-based customer call centers at CTO and CWS than with the centralized system at CAW, where calls are routed to a company-wide service center in Illinois.

Our research indicates that billing accuracy and timeliness is an important contributor to overall customer satisfaction. AWWA RF recommends implementing new technologies to facilitate bill payment options, such as creating web access for billing information, interactive voice response systems, and automatic meter reading [253].

We also found that customer perceptions about their water provider’s community involvement contribute to overall satisfaction. We conclude that public relations efforts informing customers about aspects of utility operations that affect service quality are important to increasing satisfaction. The AWWA RF concurs, “communicating with customers to educate them may increase customer satisfaction” [254].

Utility size may also affect customer satisfaction. According to the AWWA RF study mentioned above, “Customers of moderate (5-20 million gallons a day [MGD]) to large water providers (50-100 MGD) were less satisfied with overall tap water quality, safety, and healthiness, when compared to customers of small water providers (<5 MGD)” [255]. On the other hand, NAWC asserts that consolidating customer service functions into larger operations can improve service quality through increasing “specialized expertise” [256]. For small public systems, such consolidation would likely involve a regionalization effort.

6.4.2 Municipalization

Problems with customer satisfaction may be a motivating factor for municipalization. It is unlikely that a municipality would incur the high transaction costs associated with municipalization if there were not already serious customer satisfaction problems under private operation of the water utility that contribute to public support for municipalization.

See Section 6.4.1 for recommendations on improving customer satisfaction under public utility ownership.

6.4.3 PPP

The NAWC cites the desire to improve customer service as a driver of privatization in several of the cases they examined [257]. They cite the benefits of consolidating customer service operations like telephone call centers and billing into central operations, bringing the advantage of private sector “specialized expertise.” Specific improvements included the extension of call center operating hours, reductions in call waiting time, and implementation of automatic billing processes that spread statement mailings over a longer time period. In addition to smoothing cash flow, this process improvement spreads customer calls over the length of the billing cycle [258]. Particularly for small public systems that do not have the resources to support dedicated customer service personnel or implement 24-hour call centers, PPPs can bring improvements in customer service.

Even for large cities, PPPs can benefit customer service if the contract establishes the proper conditions to address local needs. Indianapolis, Indiana, has a contract with Veolia Water Systems for operation and maintenance of the municipal water utility. In the 1990s, Indianapolis acquired the utility from a company called NiSource, by using its “right of first refusal” when NiSource sought to sell the utility as part of a profit-maximizing plan. After acquiring the utility assets, the city entered into a PPP with Veolia. Carlton Curry, the city’s Director of Contract Operations, claims that the customer service provided by NiSource was extremely poor, but the service provided by Veolia is excellent [259]. Mr. Curry attributes the improvement in customer service to a difference in management. NiSource used a centralized call center and their telephone switchboard was under-sized and under-staffed for the needs of its customers. In contrast, Veolia has a call center located in one of the city’s main office buildings and the company executives have regular meetings with city administration to review operations and make improvements where necessary. In conjunction with the city, Veolia also made massive upgrades to Indianapolis’ water billing system, which has improved customer satisfaction by minimizing confusion about water bills.

Our case study in Thousand Oaks supports the potential drawbacks from consolidation of customer service operations that occur when customer service staff are no longer locally based. To counter this issue, PPP contracts could require that the company maintain a local customer service center.

6.4.4 Asset sale

One of the most attractive aspects of privatization is the potential for increasing economies of scale through centralizing administrative support systems such as customer service or billing operations. This is especially important for small systems which do not have the resources to support dedicated customer service staff, a 24-hour call center, or a website where customers can obtain account information or pay bills online. Centralizing customer service functions may also involve drawbacks, as discussed above, particularly if such systems are no longer locally-based. Automated phone trees give a more impersonal response than dialing a local number staffed by a live person. The results of our customer survey in Thousand Oaks indicate that CAW customers are the least satisfied with their provider's telephone call center, and CAW is the only water provider that does not maintain a customer service call center in Thousand Oaks.

Overall, our analysis does not indicate a statistically significant difference in the level of customer satisfaction experienced by customers of the public utility in Thousand Oaks as compared with customers of the private utilities.

6.5 LOCAL CONTROL

We define local control in terms of authority over water management decisions. Some ownership models remove decision-making authority from local jurisdiction; others have the opposite effect.

6.5.1 CIP

Publicly owned utilities offer the highest degree of local control, which should not be negatively implemented by CIP implementation.

6.5.2 Municipalization

The desire to increase municipal control over management of the local water system is often a driving reason for municipalization. Since IOUs are regulated at the state level, cities may feel that state oversight of the water utility does not provide adequate protection for local interests.

In the event that the water utility considers joining with other public systems as part of its municipalization strategy (regionalization), a certain level of local control may be sacrificed.

6.5.3 PPP

Under most PPPs, the role of the private company is to perform specific operation and maintenance duties as a municipal contractor for some specified length of time, after which the municipality may choose whether to renew the contract. The municipality should identify the decision-making authority they want to retain prior to entering into negotiations with a private company. Typically, public agencies continue to set rates and authorize capital expenditures under PPP contracts.

It is possible that private companies have a negotiating advantage over public entities, due to their experience from other contract situations and the resources they have to hire seasoned legal professionals. According to George Irving, District Manager for the Montara Water and Sanitary District, private companies are generally “very conversant in acquisition and corporate strategy,” which may give them an advantage over public agencies in negotiations [260]. For many cities entering into PPPs, it may be the first time they have negotiated such an arrangement. The public entity representatives entering into negotiations should be well-versed in local management priorities and prepared to negotiate a contract to address those priorities. Some municipalities have hired outside consultants experienced in bid solicitation and contract negotiation when there is insufficient local expertise to address their needs.

Although contract management can be labor and time-intensive, it should be a priority because a well-managed contract will enable a more effective PPP relationship. The municipality should plan for appropriate staffing to address contract management needs.

The retention of decision-making authority is important for water utility operations during the term of the contract, as well as utility operation after contract expiration. If either party decides not to renew the PPP contract, the public entity must be prepared to either seek another contract partner, or to resume municipal operation and maintenance of the water utility.

With proper contractual provisions and enforcement the municipality retains oversight of the private contractor’s operations, in contrast to the asset sale model of privatization. However, there may be difficulties with the municipality reassuming management of the water utility following the expiration of the contract.

6.5.4 Asset sale

Decisions regarding rates, infrastructure investment, staffing, and customer service operations can have the greatest local impact. Public decision-makers may oppose all forms of water system privatization due to fears about loss of local control, and the asset sale is the privatization model that removes the greatest amount of decision-making authority from local jurisdiction.

Asset sales are likely to reduce public access to significant decision-making processes such as rate-setting, as such decisions are no longer made in local venues like city council meetings. Public utilities commissions often offer public forums, but they

may not be held locally. In California, the CPUC holds public meetings (when possible) in the city where a major rate case is being heard. The public meeting is usually held in front of an administrative law judge who hears commentary from the regulated utility as well as members of the public and other stakeholders. It is debatable whether the CPUC as a regulatory entity performs as well representing the needs of local ratepayers compared to the accessibility provided by local ownership and regulation, but such questions were beyond the scope of our research project.

For asset sales involving foreign-owned water companies, there is the potential for international law to trump domestic regulations. The results of legal research conducted by our partners at the UCLA School of Law indicate that the legal case for using NAFTA in this way is stronger than it is for GATS, especially since water is not listed under the U.S.' specific GATS obligations. However, NAFTA is not currently an issue since there are no Mexican or Canadian-owned water utilities operating in the U.S. No examples currently exist of either law being applied in this way. In addition, in the event that foreign-owned water companies filed suit against domestic regulations under GATS or NAFTA, such suits are unlikely to prevail if the regulations in question apply equally to U.S.-owned and foreign-owned companies.

6.6 LOCAL ACCOUNTABILITY

We define accountability as responsibility for outcomes of management decisions. Accountability is also a complex management objective to assess because a public decision-maker may be interested in increasing or decreasing local accountability, depending on his/her priorities.

6.6.1 CIP

Under the CIP model of continued public ownership, the clearly accountable party is the municipality, which plays both the role of service provider and regulator. Public ownership provides accountability as local citizens have the opportunity to directly participate in decision-making processes through attending city council meetings or other local public forums. CIPs could be designed to encourage community participation and use the opportunity to identify community priorities.

At the same time, the political pressure surrounding public utility management decisions can make such direct accountability problematic. According to the NAWC, “the common government interest in putting money into more politically ‘visible’ projects such as education, law enforcement, roads, bridges, port facilities and subway systems often places water projects near the end of budget prioritization” [261]. The answer to this problem lies in the area of public outreach and effective communication. AWWA RF writes, “getting consumers to foot the bill [for infrastructure investment needs] will be all the more difficult, and implies a need for better communication” [262]. Kevin Wattier of the Long Beach Water Department writes, “the key to preventing artificially low water rates is to continually stress investment and long-term decision-making is in the best interests of the residents” [263].

For decision-makers interested in decreasing public sector liability for utility operations (environmental violations, worker accidents, etc.), the CIP alternative does not address this objective.

6.6.2 Municipalization

Another reason for municipalization commonly cited by its proponents is that locally owned and regulated water utilities have greater accountability to the community. Citizens concerned about the rates or quality of their water service can hold publicly elected officials directly accountable for problems at the local utility. Local ownership also provides easier and more convenient access to decision-making forums. Conversely, this increased accountability should be considered by decision-makers evaluating municipalization, and they should be fully prepared to take ownership of whatever challenges operation of the water utility may present.

A drawback to such direct access is the political pressure that may create incentives for a public system to under-price water or under-invest in system infrastructure (see Section 6.6.1). As discussed above, the remedy for this problem is effective public outreach to communicate funding needs.

6.6.3 PPP

According to regulatory expert Janice Beecher, PPPs blur lines of responsibility and decrease accountability as the public entity serves as both the regulatory body overseeing the private contractor's operations, and the contractor's client [264]. In contrast with asset sales, there is no third party regulator or dispute mediator that is removed from the contractual relationship between the public entity and private contractor. In addition, Beecher cites the use of "concession fees" – monies paid by the private company to the public agency upon bid approval – as further complicating accountability. Two of the 14 O&M contracts reviewed in the NAWC privatization study involved concession fees [265].

At the same time, from the public manager's perspective a PPP could bring greater accountability than the asset sale privatization model as there is a clear contractual obligation for the private company to meet well-defined performance specifications [266]. Such an advantage is entirely dependent upon the efficacy of the contract document in assigning responsibility and establishing performance metrics, and creating contract management mechanisms to ensure performance goals are met.

If a municipal decision-maker is concerned about liability from utility operation such as environmental violations, system malfunctions and worker accidents, the PPP model of privatization would not shield the public entity from liability as much as an asset sale model would. In California, DHS lists the owner of water utility infrastructure on the required water quality permit, which is valid for the lifetime of the system. Therefore, if a city owns the system infrastructure and a private company operates and maintains the infrastructure, the city is still liable to DHS for any water quality violations [267].

6.6.4 Asset sale

Compared with the PPP model of privatization, asset sales offer less potential ambiguity with respect to accountability. Asset sales are preferable in Beecher's analysis because they involve a third party regulator that is removed from any contractual relationship between municipality and private water company. In Thousand Oaks, we witnessed how the municipality intervened in a CPUC rate case when it had concerns that local interests were not being adequately addressed by private company operations.

The more clearly-defined separation of accountability between the public and private entities does not necessarily imply that there will be sufficient local accountability to meet decision-makers' objectives. Asset sales decrease local accountability in terms of decreasing public access to decision-making processes, as described in Section 6.6.1 above. However, participation in public utilities commission rate cases or other regulatory proceedings can provide some measure of accountability.

Compared with a PPP, an asset sale offers less accountability from the public manager's perspective as there is no contractual obligation for the private company to meet well-defined performance specifications [268]. In some instances, intervention in public utilities commission rate cases may be sufficient to address local interests. In other cases, the municipality may be able to enter into a franchise agreement with the private company.

At the same time, municipal decision-makers may find advantages in asset sales in terms of limiting municipal liability for management of the local water system. If the municipality wishes to reduce potential liability for environmental violations, worker accidents, or other outcomes of utility operations, asset sales provide the best way of accomplishing this goal.

6.7 RATE AFFORDABILITY

Affordability of rates may be more or less important to decision-makers depending on the demographics of the customer base, cost of providing water, and size of rate base.

Though water rates in the U.S. are increasing faster than the rate of inflation, they generally remain affordable. In 2000, the water and wastewater rate survey conducted by Raftelis found that water rates increased 6.5 percent and wastewater rates increased 10.1 percent from the company's 1998 survey, while the consumer price index rose only 4.1 percent during the same period. However, the median affordability percentage for an "average" water and wastewater customer with 1,000 cubic feet (7,480 gallons) of usage was 0.49 percent and 0.55 percent respectively, well below EPA's affordability guideline of 2 percent [269].

6.7.1 CIP

In many cases, water rates may be lower under public ownership. According to Janice Beecher:

Private providers generally charge higher rates, which can be explained by profits (return on equity), taxes (all levels), financing (including availability of public funds), subsidies (often hidden), costing (including accounting and depreciation), ratemaking practices and types of charges (for example, system development and other charges by cities), and historic underpricing by many cities (deferrals) [270].

Our Thousand Oaks rate analysis supports this conclusion, but also highlights the importance of considering rate structure differences in comparing public and private utility rates. Because they are self-regulated, public systems may develop rate structures that address the affordability needs of their community, implementing their own “lifeline rate” structure that addresses local demographics. They also can design rate structures to incorporate pass-through charges such as CTO’s lift charge for pumping water uphill, which can serve to lower their base rate.

In the instance where CIP implementation involves significant capital investments or acquisition of new technologies, a rate increase may be required. Publicly owned waterworks may choose to spread out costs over a period of time and/or issue bonds to raise the capital needed for CIP implementation, thus limiting the potential for “rate shock.” AWWA RF recommends public outreach efforts to communicate the need for rate increases, and suggests that consumer resistance against higher rates may be less than expected [271].

The rate affordability indices discussed in Section 3.2.7 may also be used to quantify customers’ ability to pay for current and expected change in rates and potential eligibility for an extension and/or variance in meeting federal drinking water standards.

6.7.2 Municipalization

Municipalization may be driven by the desire to increase local control over water rates, and concerns that private companies are over-charging for water. In the unincorporated areas of Ashtabula County in Ohio, ratepayers took action in 1996 towards municipalizing the water system after water rates increased by approximately 33 percent. The county Board of Commissioners intended to stabilize rates, and in 1999 decided not to renew its 20-year contract with the company then operating the system, Aqua Ohio [272].

At the same time, since municipalization often involves asset acquisition, significant transaction costs, and potential backlogs of deferred maintenance, capital investment needs could lead to rate increases. Currently municipalization is being considered in Felton, California, and a bond measure is necessary to finance the proposed purchase.

Although rates may increase, citizens are prepared to pay more for water in exchange for securing the benefits of local system ownership: “Felton residents say costs [of municipalization] would eventually be of little difference as the company pursues rate increases” [273].

Other advantages and areas of concern with respect to rates under public ownership are similar to those discussed in Section 6.7.1.

6.7.3 PPP

Under a PPP, the municipality retains rate-setting authority, so many of the issues and advantages associated with public ownership are similar to those identified under the previous sections.

As discussed in Section 6.2.3, problems arose under the Atlanta PPP over infrastructure investment needs. If the parties do not undertake a thorough infrastructure assessment during contract negotiation, unexpected costs could lead to requests for unanticipated rate increases. It is important that a thorough infrastructure assessment be conducted before the parties enter into a PPP, so that both parties understand infrastructure investment needs and can plan accordingly in contract negotiations.

According to the NAWC study, asset sales have been used more frequently than PPPs to avoid or reduce projected rate increases. Of the 14 PPPs they studied, only one city entered into a short-term contract when faced with projected rate increases of 37 percent, and the study does not indicate how much projected rate increases were reduced, or over what time period, merely stating, “rates limited following privatization” [274]. We take this to mean that after privatization, rate increases were less than pre-privatization projections.

Private companies may have more aggressive bill collection strategies than municipal utilities. When Buffalo, New York, entered into a five-year contract with American Anglian in 1997, one of the first actions taken by the company was to initiate an aggressive policy to collect unpaid bills. American Anglian’s bill-pay policy involved a 21 percent interest rate on unpaid bills, which the company was allowed to retain [275]. NAWC cites reduction of delinquent accounts as a potential benefit of PPPs [276].

6.7.4 Asset sale

With an asset sale, regulatory authority for rate-setting is transferred from local government to the state public utilities commission. In California, the CPUC does not currently have a statewide rate affordability program such as a life-line water rate requirement. Life-line rates are set on a district-by-district basis due to the unique requirements of local demographics [277].

Several factors could lead rates to increase under an asset sale. In Section 6.7.1 we discussed the reasons that rates may be lower under public ownership, as we found in our Thousand Oaks case study. Consequently, asset sales may lead to higher rates in

the long term. Particularly if the public system had a significant amount of deferred maintenance, the private company might need to make large capital investments which would be passed on to the rate base. On the other hand, according to the NAWC study:

IOUs in this study have been able to control and in some cases eliminate the anticipated rate increases by lowering operating costs and implementing capital expenditure programs. In most cases, these operating cost savings were used to cover the cost of capital improvements and avoid rate increases [278].

Our Thousand Oaks case study demonstrated the potential for increasing operational efficiency at the public utility, which supports the NAWC argument.

In order to avoid potential rate increases under asset sales, the IOU may be obligated to keep rates fixed for a certain amount of time under conditions of the sale. This was the case when the City of Coatsville, Pennsylvania, sold its water system to Pennsylvania American Water Works. As a condition of the sale, the private company was required to freeze rates for three years after the time of the sale [279].

6.8 WATER CONSERVATION

Different water system ownership models may have different incentives to promote water conservation, though there is always a fundamental tension between the utility's business objective of selling water and the social objective of efficient water resource use.

6.8.1 CIP

CIP implementation may bring increased focus on water conservation, depending on local priorities. Water use efficiency may be improved indirectly under CIP implementation through improved system monitoring and increased infrastructure investment that reduces unaccounted-for water. Implementing preventative or predictive maintenance programs under CIP implementation is likely to reduce the amount of water lost through system leaks. In addition, because they are self-regulated, municipal utilities have the opportunity to establish conservation rate structures such as increasing tiered rates. At the same time, social or political factors may discourage public utilities from implementing conservation pricing, as we saw in Thousand Oaks.

Our Thousand Oaks case study provided evidence that state or regional efforts to promote conservation are essential to increasing local incentives. As public systems are not regulated at the state level, they are not typically subject to state conservation requirements except possibly in times of drought.

In Thousand Oaks, the public utility does not appear to promote water conservation significantly more than the privately owned companies, despite performing the best in the combination of conservation metrics we assessed. In our customer survey, CAW had the highest rating from its customers in promoting conservation, with 74 percent of respondents agreeing that their provider promoted water conservation, compared

with 56 percent of CTO respondents. The private companies primarily evaluate cost considerations in determining whether to implement conservation BMPs. Public entities may theoretically be motivated by public interest considerations in addition to cost considerations.

6.8.2 Municipalization

Municipalization involves a transfer of regulatory authority from the state level to the local level. Depending on the extent and efficacy of the public utility commission's mandatory conservation programs for IOUs, and the priorities of the municipal agency, this transfer could result more or less emphasis on conservation.

Our research has not produced data regarding how municipalization might affect water conservation, and issues and advantages under public ownership are probably similar to those identified under Section 6.8.1.

6.8.3 PPP

Under a PPP, water conservation is likely to depend on the priorities of the public entity, so issues and advantages under this alternative are similar to those identified under Section 6.8.1.

In addition, contracts can be developed that encourage the private company to take a proactive role in maintaining system infrastructure. For example, long-term contracts and specific infrastructure maintenance requirements seek to ensure that the contractor uses proactive management techniques to reduce unaccounted-for water, to the benefit of water efficiency. To reduce the potential for confusion regarding which entity is responsible for conservation efforts, the contract should specify this delegation of responsibility.

6.8.4 Asset sale

With an asset sale, regulatory oversight of water conservation is transferred from local government to the state public utilities commission. In cases where water conservation was not a management priority under public ownership, this transition may result in greater emphasis on conservation. In California, the CPUC develops district-specific conservation rules that IOUs must adhere to, depending on supply availability. These rules may be more or less stringent than what a municipality may implement on its own. At the same time, IOUs may only implement water conservation programs when there is funding available from the CPUC to implement them, or if there is an economic benefit associated with BMP implementation [280].

As discussed above, the public and private water utilities in Thousand Oaks do not appear to be significantly different in their efforts to promote conservation, though public entities may have a greater incentive to consider the public interest in deciding to implement conservation measures, where private firms are primarily motivated by cost considerations.

6.9 SUPPLY RELIABILITY

Different water system ownership models may have a different capacity for addressing water supply reliability and capability of securing additional water supply. In addition, supply-related concerns may be more or less of a factor in decision-making, depending on supply availability, reliability, and which entity has authority for addressing supply issues in a given area.

6.9.1 CIP

Our research does not definitively address the issue of whether public or privately owned water utilities are more effective in addressing long-term supply issues. In California, the majority of the state's water supply infrastructure is under public ownership, so there may be greater opportunities for public water utilities to pursue regional supply coordination. According to AWWA RF, "A primary driver of regionalization is to optimize drinking water supplies to meet increasing customer water demands ... A regionalization process allows utilities to restructure water rights agreements to the benefit of the entire region" [281].

In Thousand Oaks, we saw some examples of coordination between the public wholesale and retail utilities to address supply. The municipal wastewater treatment system and Calleguas, the regional water wholesaler, collaborate on the Conejo Creek Diversion Project. Under this program, the city sells their treated wastewater to Calleguas, which then sells the water to agricultural customers for irrigation. This program is designed to reduce groundwater pumping for agricultural use. In the event of a drought, Calleguas will grant the City of Thousand Oaks rights to additional potable supply in the amount of half of the volume of treated wastewater that they provided under this program.

Another potential advantage to public utility ownership is the possibility of coordination between municipal land use and water supply planning efforts, though our Thousand Oaks case study did not address this issue.

Lastly, in California, public water agencies have better access to state funding for water supply projects (see Proposition 50 discussion in Appendix G).

6.9.2 Municipalization

Whether municipalization has the potential to increase supply reliability is dependent upon local circumstances. Potential advantages for public systems in addressing water supply are the same as those identified in Section 6.9.1.

6.9.3 PPP

Under a PPP, the municipality retains asset ownership, so public-sector advantages in addressing water supply planning should be the same as those discussed in Section 6.9.1. In addition, the private contractor may be able to provide additional expertise for supply management decisions. Some of the PPP contracts that Southwest Water enters into require the contractor to develop an annual supply plan for the their municipal client [282].

6.9.4 Asset sale

Asset sales may decrease the potential for regional coordination to address issues related to supply reliability, and private companies may have less access to public grant funding for supply-related projects than public agencies. At the same time, NAWC cites water supply projects as attractive prospects for private capital investment [283].

6.10 PUBLIC ACCEPTANCE

There are potential differences in the degree of anticipated public support for decisions regarding ownership and management of retail water systems. This analysis includes a discussion of potential barriers to public acceptance for the four decision scenarios below, and discusses actions that can be taken to increase public acceptance.

6.10.1 CIP

Since the system remains in public hands, CIP implementation is unlikely to cause significant negative reaction on the part of the public. The goal of CIP implementation – increasing public utility efficiency – is likely to draw broad support. Some degree of public dissatisfaction may arise if the CIP identifies the need for significant capital expenditures that would be passed along to ratepayers. AWWA RF recommends public outreach efforts to communicate the need for rate increases, and suggests that consumer resistance against higher rates may be less than expected [284]. In addition, if CIPs involve staffing assessments that lead to labor reductions, some public resistance may occur.

6.10.2 Municipalization

It seems unlikely that municipalization would occur without significant community support for the initiative. In Montara, citizens had to pass a \$19 million bond measure before the city could attempt to acquire the water system. In Felton, the grassroots group, Friends of Locally Owned Water, has launched petition drives to support public acquisition of the water system. At the same time, community members often support municipalization because they believe public ownership will provide lower rates in the long term [285]. The extent to which the municipality can finance the acquisition in order to avoid rate shock is critical to ensuring public support. As

discussed in previous sections, effective outreach is the key to promoting acceptance of municipal expenditures.

6.10.3 PPP

Public resistance to water privatization extends to PPPs as well as to asset sales. Resistance may be rooted in ideological arguments that profit-driven companies should not “control” a life-giving resource, which can create a politically volatile atmosphere around the decision. In Stockton, California, the mayor and the city council did not adequately engage citizens in the decision-making process to privatize its water and wastewater systems. As a result, public outcry was far stronger than anticipated, and community activists sued the city. In order to minimize or avoid public resistance to PPP implementation, it is crucial that the community be involved in the decision-making process leading towards a PPP. The public should understand the purpose of the PPP, and the steps that are taken to protect the public interest during contract negotiation and implementation.

Community members are often concerned about the potential for job losses with the establishment of a PPP. The PPP contract may specify protection of local jobs for a certain period of time, or prevent the private contractor from decreasing the existing work force except by attrition [286]. Both parties should consider the effect of such labor provisions on projected costs savings.

6.10.4 Asset sale

Water privatization is and will continue to be a politically divisive issue due to the ideological factors discussed above. Asset sales have a higher potential for public opposition because of the decrease in local control and accountability, particularly over sensitive issues like water rates and utility staffing. Again, conducting effective public outreach campaigns and promoting community involvement in the decision-making process may increase acceptance.

Public acceptance of asset sales may be even more difficult to achieve if the private company is a foreign-owned corporation. In Thousand Oaks, the city protested to the CPUC in hopes of preventing the acquisition of American Water Works by RWE. According to Deputy City Manager Scott Mitnick, “Never before have ... water companies been owned by companies outside of the U.S. It’s just unprecedented. You are allowing profits to flow out of the state and out of the country” [287]. The negative perception of ceding control over a vital resource to a foreign company, despite the fact that the company is still regulated by domestic laws, is a difficult one to overcome. In our survey of Thousand Oaks water customers, over 90 percent of respondents indicated opposition to foreign water utility ownership. At the same time, customers of the foreign-owned utility were no less satisfied with their water service than customers of the domestically-owned utilities. Effective public outreach to communicate the regulatory protections afforded by U.S. law is especially critical when asset sales involve foreign-owned water companies.

7 CONCLUSIONS AND RECOMMENDATIONS

7.1 CONCLUSIONS

7.1.1 Thousand Oaks case study

Our comparative analysis of the public and private water providers in Thousand Oaks determined that the private companies operate more efficiently than the public utility for three out of the four efficiency indices we examined. Public firms may not have the same economic incentives to maximize efficiency as private firms (see Section 2.2.2), but there is also no reason that a public utility could not equal or surpass private-sector efficiency if efficiency improvement was a management priority. At the same time, the private utilities' greater efficiency does not mean their customers pay lower rates for water. The municipal utility charged lower meter and quantity rates for the 15-year period we analyzed. There are many reasons that may contribute to the private companies' higher rates, but additional research would be required to assess the relative importance of each factor that contributes to the rate differential.

To assess each provider's performance in terms of system reliability, we compared infrastructure investment and condition. The fundamental financial differences between public and private enterprises do not appear to produce vastly different outcomes in terms of infrastructure condition. Though the municipal utility performed the best under the four indices of infrastructure condition we measured, interpretation of some of these indices is problematic, so we do not place much weight on the value of the subjective ranking system we used. To the extent that all three providers meet DHS goals for unaccounted-for water and water pressure, we do not find a significant difference in system reliability between the three Thousand Oaks water providers.

Our analysis of water quality and water conservation efforts by the three providers also found no significant difference. In addition, implementation of specific conservation BMPs appears dependent upon outside funding sources for all three providers, indicating that water conservation may best be addressed at the regional or state level.

The results of the customer satisfaction survey we conducted indicate that there is no significant difference between the three providers in terms of overall customer satisfaction. In Thousand Oaks, public sentiment does not appear to be strongly in favor of public or private ownership. Though there is strong public sentiment against foreign ownership of water utilities, this sentiment does not appear to significantly affect overall satisfaction for customers of the foreign-owned water provider in Thousand Oaks.

In summary, the primary differences between public and private water utilities appear to lie in the areas of operational efficiency and rates. For the other aspects of utility performance we assessed – infrastructure investment and condition, water quality, water conservation, and customer satisfaction – all three utilities in Thousand Oaks appear approximately equal. The results of our Thousand Oaks analysis indicate that

the private water utilities use fewer resources to attain the same level of performance as the public utility, yet charge higher rates.

7.1.2 Legal research

The research conducted by our partners at the UCLA School of Law indicates that though there is limited potential for foreign-owned water service providers to file suit against domestic regulation under GATS and NAFTA, NAFTA provides more direct legal mechanisms for challenge than NAFTA. At the same time, we conclude it is unlikely that such suits would prevail, particularly if the regulations in question applied equally to U.S.-owned and foreign-owned companies.

Foreign or domestic corporations that do not trade on the New York Stock Exchange or file reports with the SEC are exempt from the financial accountability protections afforded by regulations such as Sarbanes-Oxley. One of the largest water companies operating in the U.S., American Water Works (owned by German conglomerate, RWE AG), is exempt from Sarbanes-Oxley. For municipalities entering into public-private partnerships with such companies, there is limited opportunity to include financial accountability language in contractual provisions.

7.1.3 Interviews and literature review

Our interviews with water sector experts and our literature review augment our findings from the Thousand Oaks case study and provide additional support for our decision-making framework.

Three of the ownership/management alternatives – CIP, PPP, and asset sale – have a significant potential to increase operational efficiency, system reliability, water quality, and customer satisfaction, depending on local conditions prior to the decision point, and how the ownership/management change is implemented. With municipalization, high transaction costs and the potential for decreasing economies of scale create particular difficulties for attaining these management objectives.

Local control and accountability are highest under public ownership (CIP, municipalization, and PPP). The advantages of increased local control and accountability under municipalization may create sufficient incentives to counter potential disadvantages in terms of transaction costs and decreasing economies of scale.

Our research supports the conclusion that private utilities' advantages in terms of operational efficiency do not necessarily correspond to lower retail water rates. In addition, public utilities have the added advantage of being able to customize rate structures that meet the demographic needs of their communities.

It is not possible to generalize how water conservation and supply reliability are likely to be affected by the four decision scenarios, as much depends on local circumstances and management priorities.

Public acceptance is most problematic with the two privatization alternatives, PPP and asset sale, due to ideological considerations, reductions in local control and accountability, and the potential for rate increases and staffing reductions.

7.2 RECOMMENDATIONS

Our research objective was to develop a framework to assist municipal decision-makers with evaluating ownership and management alternatives for retail water distribution systems. Our framework is intended to promote a systematic decision-making process, identifying potential tradeoffs between different management objectives and recommending actions to improve performance under each decision scenario.

The results of our Thousand Oaks case study, legal research, expert interviews, and literature review informed our conclusions for the management objectives considered in our decision-making framework as summarized below:

- **Operational efficiency:**
 - There is a significant potential for public utilities to increase operational efficiency, creating additional benefits for their customers
- **System reliability:**
 - Public utilities can increase support for adequate infrastructure investment through increased financial transparency, public outreach, and an effective communications strategy
 - Development and management of PPP contracts should consider infrastructure investment needs and allocate cost-sharing appropriately
- **Water quality:**
 - Regionalization may benefit small public utilities with insufficient resources to address water quality standards compliance
- **Customer satisfaction:**
 - Customer satisfaction is most affected by service, rates, service, rates, billing, the customer's experience with their provider's telephone call center
 - Public relations efforts and visibility of the water provider in the community contribute to customer satisfaction, with important implications for public acceptance of decisions affecting water system ownership and management
- **Local control:**
 - It appears unlikely that international trade agreements can be used to circumvent domestic regulations governing water service provision

- **Local accountability:**
 - Domestic and foreign-owned water providers not subject to Sarbanes-Oxley may be held to different standards of financial transparency and accountability. There is limited potential to address this issue through contractual remedies
- **Rate affordability:**
 - Our results support the hypothesis that public utilities are likely to charge lower rates than private utilities
 - Even in the absence of a contractual relationship between the private company and the municipality, municipal intervention in public utilities commission rate cases can affect the outcomes of such cases
- **Water conservation:**
 - Water conservation should be promoted at the regional or state level, due to lack of incentive at the local level
- **Supply reliability:**
 - Regional coordination between publicly owned utilities may provide opportunities to address long-term water supply needs
- **Public acceptance:**
 - Our research into public opinion in Thousand Oaks indicates no strong preference for public or private water utility ownership
 - Strong sentiment against foreign ownership of water utilities should be addressed through public outreach in cases where privatization involves a foreign-owned water company

The decision-making framework included in Appendix H provides a more detailed synthesis of potential tradeoffs between different ownership and management alternatives for retail water distribution systems.

7.3 RECOMMENDATIONS FOR FURTHER STUDY

The Thousand Oaks case study was particularly valuable in terms of comparing the outcomes of decisions that lead to either public or private ownership. However, our case study was not able to specifically address temporal aspects of decision-making such as transaction costs or other factors that come into play during the decision-making process. We recommend additional research to assess the importance and magnitude of these temporal factors for the four decision scenarios we evaluate.

APPENDIX A: WATER MULTINATIONALS

A.1 VEOLIA ENVIRONNEMENT

Veolia Environnement (VE), one of the largest multinational water companies, employs over 200,000 people in more than 100 countries. The company's primary markets are in France, which accounts for 42 percent of annual sales, the rest of Europe, which accounts for 31 percent of annual sales, and the U.S., which accounts for 20 percent of annual sales [288]. VE is headquartered in Paris, France, and consists of four divisions: Veolia Water, Onyx, Dalkia, and Connex. These four divisions focus on water, waste, energy, and transportation respectively. Veolia Water has 77,723 employees world-wide, with 2,900 employees in North America operating 400 industrial and municipal facilities [289].

VE has its origins in an 1853 French imperial decree which created the Compagnie Générale des Eaux (CGE). In 1980 CGE created Omnium de Traitement et de Valorisation to consolidate its subsidiaries specializing in the design, engineering, and construction of equipment for water and wastewater treatment [290]. In 1998 CGE changed its name to Vivendi, later becoming Vivendi Universal after acquiring Seagram, the owner of entertainment conglomerate, Universal [291]. In 1999 Vivendi created a new division, Vivendi Environnement, to further consolidate the four divisions that work within the environmental fields of water, waste, energy, and transportation.

In 2002, Vivendi Universal was operating under enormous debt and a declining credit rating, partly as a result of international currency instability [292]. The company began to withdraw capital investment in Vivendi Environnement in order to concentrate on media and communications and decrease its debt, reducing its ownership stake in Vivendi Environnement to 20 percent by the end of 2002 [293]. In 2003, Vivendi Environnement changed its name to Veolia Environnement to mark its full separation from Vivendi [294].

VE's most significant business activity in the U.S. was the 1999 acquisition of USFilter for over \$6 billion [295]. USFilter is the largest water company in North America, and consists of two business groups: Water and Wastewater Services and Products, and Water and Wastewater Systems [296]. The former focuses on designing and manufacturing equipment used in water and wastewater treatment, and the latter provides water and wastewater treatment services, including contracts to design, build and operate water treatment facilities [297]. USFilter's Water and Wastewater Systems division is currently under contract to provide water or wastewater services to approximately 600 communities across the country. According to Maxwell, USFilter was "king" of the U.S. water industry throughout the 1990s, acquiring a multitude of smaller companies including Culligan and Everpure [298]. But in 2003, VE announced that in order to focus its North American business on long-term contracts for municipal and industrial clients, it would begin to sell off a number of its subsidiaries [299]. As part of the sell-off, USFilter sold extensive farmland holdings

in southern California and associated water rights to the Imperial Irrigation District in the first half of 2004 [300]. In June of 2004, US Siemens purchased USFilter from VE [301].

A.2 SUEZ

The multinational corporation SUEZ is comprised of two major divisions: Energy and Environment. SUEZ Environment employs 82,900 people and provides drinking water services for 91 million individuals worldwide.

Getting its name from the company's involvement in the construction and operation of the Suez Canal between the Red and Mediterranean Seas, Compagnie Universelle du Canal Maritime de Suez was established in 1858 [302]. One of SUEZ's businesses, Société Industrielle des Transports Automobiles (SITA), was founded in 1919 in Paris; another, Degrémont, was founded in 1939. In 1958, Compagnie Universelle de Suez became Compagnie Financière de Suez. In 1982, Compagnie Financière de Suez was nationalized by the French government. This lasted only five years until Prime Minister Jacques Chirac was elected in 1987, defeating the Socialists and implementing a national privatization program [303]. After another name change in 1990, Compagnie Financière de Suez became Compagnie de Suez. After merging with Lyonnaise des Eaux in 1997, the company became Suez Lyonnaise des Eaux. And in 2001, the company changed its name to SUEZ and became listed on the New York Stock Exchange.

In June of 2002, SUEZ reorganized itself into two divisions: Suez Environment and Suez Energy. Within Suez Environment there is a further division between waste and water services. Suez Environment's divisions include Ondeo, Degrémont, and SITA [304].

Ondeo provides services related to water resource management, including production, treatment and distribution of drinking water, as well as water-related services for industrial clients. Ondeo has contracts to provide water and wastewater treatment services to 2,750 local authorities through thirteen subsidiaries world-wide, including United Water in the U.S. [305]. Degrémont focuses on water treatment plants including design, construction, products, and related services. SITA is primarily involved in waste management services. The company's 2002 restructuring divided all three of their businesses between those that service the municipal and public sector – Suez Environmental Local Services (SELS) – and those that service commercial and industrial contracts – Suez Environment Industrial Services (SEIS) [306]. Some observers have noted that this reorganization is indicative of a growing recognition in the water industry that different expertise is required for servicing the public versus the private sector.

SUEZ's involvement in the U.S. water market originated from a merger in 1994 between United Water Resources and General Waterworks Corporation. SUEZ, known at the time as Suez Lyonnaise des Eaux, became a principal shareholder of

United Water. This merger made United Water Resources the country's second-largest investor-owned water service company.

In 1999 Suez Lyonnaise des Eaux acquired two American companies: Nalco (for \$4.1 billion), the world's largest provider of chemical water treatment services and products, and Calgon (for \$425 million) which supplies water conditioning chemicals [307]. In 2000, United Water became a wholly owned subsidiary of Suez Lyonnaise des Eaux when Suez purchased the company for \$1.02 billion [308]. One year later, SUEZ added U.S. Water to its American holdings when it purchased the company from Bechtel Enterprises Holdings, Inc. and United Utilities Plc. of Great Britain. SUEZ then merged the company into its subsidiary, United Water [309].

Like Veolia, in 2003 SUEZ began a corporate reorganization to reposition the company out from under massive debt. Their plan involved selling off assets, reducing costs, restructuring its utility businesses into either SELS or SEIS, and reducing its investments in developing countries by 33 percent [310]. When United Water's contract to run Atlanta's municipal water system collapsed in 2003, it was the first time a subsidiary of one of the major multinationals walked away from a municipal concession in the U.S. [311]. In his paper, *Water Multinationals in Retreat*, David Hall of the University of Greenwich proposed that the company's focus on generating immediate cash-flow will reduce its investment in long-term municipal service contracts like the failed Atlanta contract, as such concessions typically involve high initial costs and deferred profits [312].

A.3 RWE AG

RWE AG is a large German utility conglomerate. The company's core strength is providing electricity in Germany, but with 132,000 employees and annual net sales exceeding €46 billion (\$59,629,063,000 US), RWE AG ranks among Europe's largest industrial corporations [313]. In the last few years, it has begun to reposition itself as a "multi-utility," focusing on electricity, gas, water and waste, while retaining significant operations in other business areas unrelated to the utility industry [314]. Until 1997, German municipalities held a majority of voting shares in RWE, and they still own 35 percent of the company [315].

RWE AG had almost no water interests before 1997. In that year it became a partner with Ondo in a joint venture which bought 25 percent of Budapest Water Company in Hungary [316]. In 1999 it formed another joint venture, this time with Vivendi and insurance company Allianz, to buy half of the Berlin water company, Berlinwasser. In September 2000, RWE AG purchased Thames Water, then the largest water company in the UK [317]. Since then, RWE AG's existing water operations in Budapest and Germany have been merged with Thames, and RWE AG's water division is called RWE-Thames Water [318].

Thames was created in 1973 as the publicly owned Thames Water Authority after the merger of a large number of UK water companies into geographically-defined public water authorities [319]. In 1989, the UK privatized Thames along with the rest of its

public water utilities [320]. Thames is currently the UK's largest water company with 13 million customers. Between 1989 and 2000 the company expanded internationally, with varying degrees of success.

RWE became a major player in the U.S. water distribution sector in January 2003 when it acquired AWW [321]. With this acquisition, RWE now claims to be the world's third biggest water supplier, behind French companies Vivendi and SUEZ.

APPENDIX B: ECONOMIC REGULATION OF PRIVATE WATER COMPANIES

B.1 STATE REGULATION

Forty-five states have established state regulatory bodies to oversee the economic activities of regulated monopolies, including privately owned water utilities, operating in their jurisdiction [322]. Such bodies may be called public utilities commissions, public service commissions, or commerce commissions, and the activities they regulate vary from state to state. Some public utilities commissions, like Maryland's, even regulate the activities of publicly owned utilities serving customers outside municipal boundaries [323]. All public utilities commissions oversee the rates charged and revenues generated by private water companies, and many require filing of annual financial statements and operating reports, have approval authority over mergers and acquisitions, mediate disputes, and allow customers to register complaints about their water provider [324]. A public utilities commission's regulatory authority is generally restricted to situations where a private company owns the water system, and these bodies do not typically have any oversight over public-private partnerships, where the public agency typically retains rate-setting authority. The assumption is that the public entity will provide regulatory oversight for the activities of the private company through contractual terms and conditions.

B.2 CALIFORNIA REGULATION

The CPUC is a state agency that is in charge of regulating privately owned utilities, including electric, water, telecommunications, natural gas, railroad, rail transit, and passenger transportation companies. The CPUC's general mandate is to assure that California utility customers receive services that are safe, reliable, and at the lowest rate possible, while at the same time allowing utility investors to earn a fair rate of return.

B.2.1 CPUC history

The CPUC originated as the Railroad Commission in 1911. The original purpose of the commission was to ensure that rules and regulations of the railroad industry were not discriminatory and that all the fares and services were applied equally to all citizens. The commission's jurisdiction was expanded in 1912 when the state legislature passed the Public Utilities Act. Under this act, natural gas, electricity, water, and telephone service became regulated under the commission. The Railroad Commission was renamed the California Public Utilities Commission in 1946.

Currently, the CPUC's Water Division regulates all investor-owned water companies. It does not have jurisdiction over municipal utilities or special purpose districts. There are currently 144 water companies regulated by the commission that serve a total of 6.8 million customers statewide [325]. The CPUC not only participates in water rate cases, but also authorizes health and safety clean-ups and treatment facilities.

B.2.2 Organizational structure

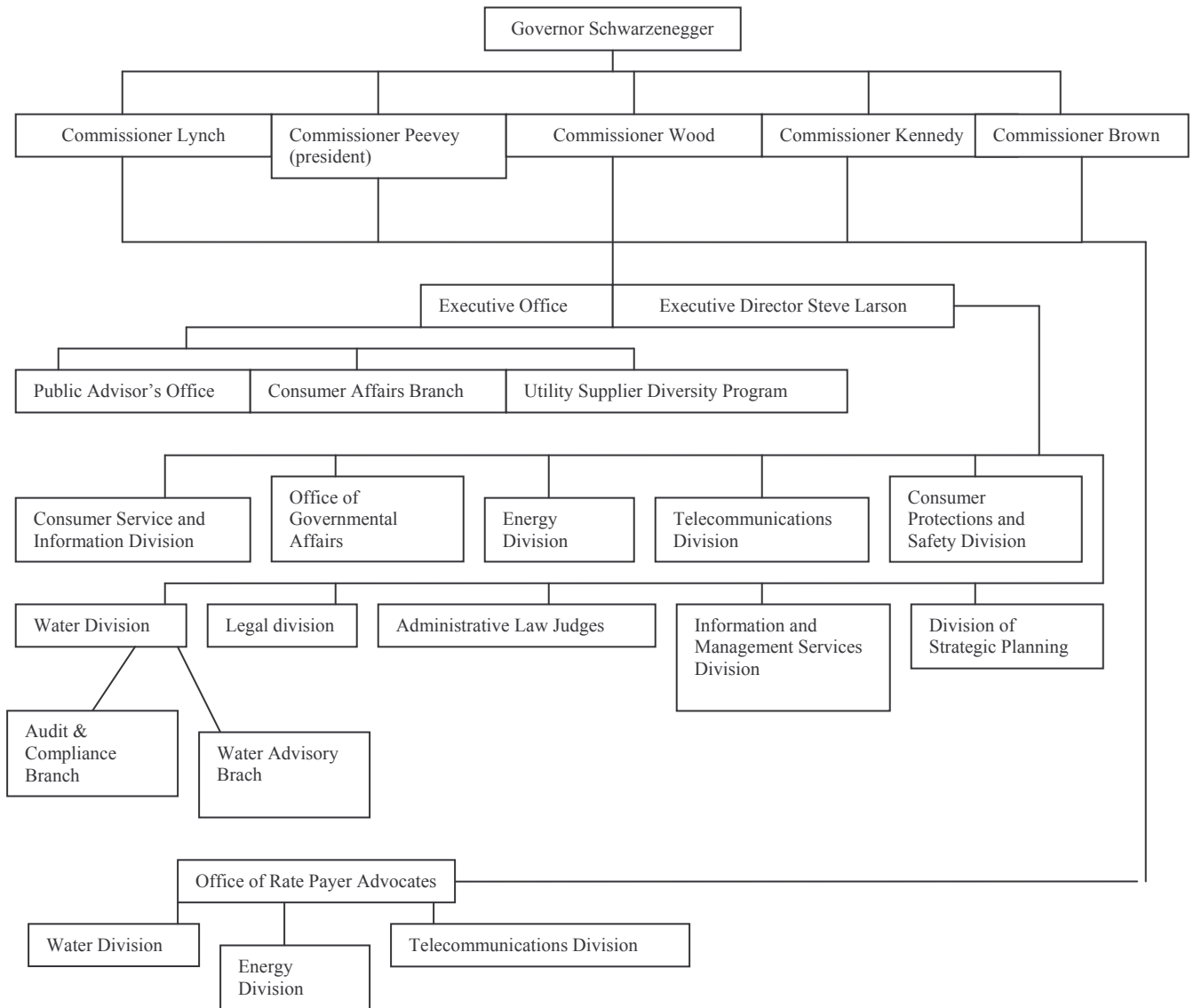
Five commissioners serve on the CPUC. Each commissioner is appointed by the governor and must be then confirmed by the state senate. The governor also appoints one commissioner to serve as the commission president. Each commissioner serves a six-year term, and the terms are staggered so that the entire commission does not turn over at once.

Directly under the commissioners, the executive director heads the Executive Office, which interacts with the commissioners and all staff divisions for policy implementation and planning purposes. Included in the Executive Office is an Office of Media Relations, which is in charge of raising awareness of the commission's activities in various forms of media. There is also the Office of the Public Advisor, which assists members of the public in participating in various CPUC proceedings.

Apart from the Executive Office, the CPUC is composed of several divisions which include: 1) the Consumer Service and Information Division; 2) the Office of Governmental Affairs; 3) the Energy Division; 4) the Telecommunications Division; 5) the Consumer Protections and Safety Division; 6) the Water Division; 7) the Legal Division; 8) the Administrative Law Judges; 9) the Information and Management Services Division; 10) the Division of Strategic Planning; and 11) the Office of Rate Payer Advocates. Most divisions have their own director. Under the Consumer Service and Information Division, there is a Public Advisor's Office, a Consumer Affairs Branch and a Utility Supplier Diversity Program. Figure B-1 provides an overview of the CPUC's current organizational structure and key staff.

The Water Division supports the commission by investigating water service issues and processing utility rate change requests. The Water Division staff works directly with utility managers on compliance issues. The division is divided into two branches, the Audit and Compliance Branch (ACB) and a Water Advisory Branch (WAB). The ACB is made up primarily of financial analysts who work on regulatory compliance issues and to ensure that the rate of return is reasonable. The WAB assists with rate-setting for water utility classes B-D and processes their advice letters (requests for minor rate changes or other limited actions).

Figure B-1: Organization of the CPUC [326]



B.2.3 Office of Ratepayer Advocates

The Office of Ratepayer Advocates (ORA) is an independent arm of the CPUC with a governor-appointed director. The ORA represents consumers in all commission proceedings. The mission of the ORA is to: “Represent ratepayers so that they receive safe and reliable utility service, at the lowest possible rates, and to ensure that utility customers have access to the best possible information about their options and choices” [327]. The ORA employs engineers, analysts, and lawyers to investigate a range of regulatory issues and take part in various proceedings including rate cases. The ORA director also has authority to conduct investigations or audits of other CPUC division activities and cases.

B.2.4 CPUC operation and regulation

There are four general types of regulatory proceedings that the CPUC is involved in. These include: 1) general rate case proceedings, 2) Orders to Institute Rulemaking (OIR), 3) Orders to Institute Investigation (OII), and 4) individual complaint proceedings. The ORA generally does not participate in individual complaint cases, and typically participates only in major proceedings such as general rate cases.

There are two ways that water companies make requests to the CPUC. There are *applications*, a formal proceeding where a company files a specific request, such as a rate increase. In response, the commission can have a hearing on the request or it can grant the request without a hearing, which is known as an *ex-parte decision*. This is where the commission approves the application if there is no opposition from any party. Applications usually go to a hearing, however, which means that the company has to present all their evidence and testimony with the application in a formal setting under the supervision of an administrative law judge (ALJ).

The other way that companies can make requests is through the *advice letter* process. An advice letter is usually a request that does not require a formal proceeding, such as a small administrative matter or a minimal rate adjustment. The company begins by requesting a small change through the advice letter process, but if there are complaints about the advice letter, it can become a formal proceeding. Generally, any time a company makes a request, either an application or advice letter, they are required to notify all affected parties. This could include customers, the local government where the company is operating, or affected non-governmental organizations.

The private water companies are classified by size, based on how many customers they have, from Class A to Class D. Class A companies serve over 10,000 customers. Class B companies serve 2,000 to 10,000 customers, and Class C and D are below that. There are approximately nine Class A water companies operating in California.

A relatively new CPUC code, Section 855.2, is applicable to Class A water companies only, and requires that the companies file rate applications once every three years. Multi-district water utilities are allowed to file rate cases for a third of their districts each year – a process which spreads the workload for the utilities and

the commission. Prior to the existence of this code, companies only filed when they deemed that a rate adjustment was necessary.

The commission sets the schedule for when each company and each district must file. According to one employee of the ORA, this new code came into effect as a result of lobbying by private water companies due to their perception that the CPUC was not processing rate adjustments in a timely manner [328]. Companies are allowed to file either in January or July, and they can only file according to their assigned schedule. If a company misses their time slot, they can not file again for another three years.

Before the company files, they must submit a pre-application which is a list of all the documents they will submit in the actual application. The ORA has 30 days to review the pre-application and let the company know if there are any deficiencies. They have 20 days to correct any deficiencies. If the company fails to correct the problem, they are prohibited from filing during that period, and must wait till their next scheduled application date. If the problem is corrected, the ORA usually requires between four and six months to review the application and file their report.

Typically once the ORA report comes out, there is a settlement conference. This is the forum where the company and the ORA, as well as any other involved parties, discuss settling any areas of conflict between the company's application, other interested parties, and the ORA assessment, with the goal of preventing the process from going to the next step, which is a formal hearing. If there are issues that are outstanding following the settlement conference, then the process goes to a formal hearing, which takes place in front of an ALJ. Once the hearing is over, each party will file a brief, summarizing their position, which is submitted to the ALJ for his/her decision. The parties can comment on the ALJ's proposed decision. Then after a comment period, the judge will issue the final decision. Most of the preliminary work to review an application is done by the ORA. The ALJ usually reviews issues that have gone past that settlement conference. The CPUC commissioners do not usually get involved in a rate case at all unless there is something particularly controversial about the case. However, in certain circumstances they may change something in an ALJ's decision. If they want to make a change to a decision, they are obligated to write up their justification for doing so, which is called an *alternate*.

B.2.5 Public involvement

The CPUC promotes public involvement by holding public participation hearings (PPH). After an application is filed, a company is required to notify its customers regarding the application and the proposed changes that are included in the application. Following the notification, the commission will schedule a PPH on the proposed changes, usually held locally in the affected jurisdiction. During a PPH, all of the public statements are made in front of an ALJ, are transcribed, and are made available to all the commissioners.

In addition holding PPHs, the CPUC has a customer service division. Among other duties, the customer service division takes phone calls and e-mails from the public

and handles issues that arise from these comments. For example, if individuals call to complain about a specific private utility, the customer service division may follow up. Individuals may turn their comments into a formal complaint if they feel that the issue has not been adequately addressed by the CPUC.

B.2.6 Water rate design

The CPUC uses a standard two-part rate design for water service. The first component is the meter charge. This is the flat service charge that the customer pays monthly regardless of whether any water is used. The other component is the quantity rate, which is a charge for each unit of water the customer uses. In order for a company to collect their entire revenue requirement with those two charges, they first have to figure out how much to collect from each part. In water operations, there are fixed costs such as infrastructure, and variable costs, such as the cost of purchased water or purchased power. Those costs are recovered through the quantity rates. Of the remaining fixed costs, half are recovered by service charges and half by the quantity rates. The theory behind this structure is that some of the fixed costs are also tied into how much water is used. For example, mains and tanks and the like have to be sized based on how much water the company anticipates storing or pumping. Thus a portion of fixed costs is tied to water use.

There are some exceptions to this standard rate design, such as in Monterey, where there is a state order not to pump more than a specific amount of water from the Carmel River. The water companies operating in that area are permitted to penalize high-volume water users in order to strengthen incentives for conservation. Thus, the CPUC permits the water companies to implement an increasing block rate structure, where high-volume users pay a very high rate. The CPUC does not currently mandate a tiered rate structure for conservation purposes across the state. According to an ORA staff person, the CPUC historically mandated an increasing block-rate structure, but changed this policy in order to make rate design simpler [329].

B.2.7 Water conservation

State regulations do not bind California's private water companies to any specific standard in terms of promoting water conservation. However, many urban water agencies are part of the CUWCC. In 1991, nearly 100 agencies signed the CUWCC MOU, pledging to develop and implement 14 comprehensive water conservation BMPs. Today the CUWCC has grown to over 310 members [330]. Many private water companies have also signed on to the CUWCC MOU, including the two Class A water companies operating in the City of Thousand Oaks (CAW and CWS).

The CPUC has the authority to develop *district-specific* conservation rules for privately owned water companies. In other words, conservation measures to be taken by the company are implemented specifically according to rules assigned to them for each particular district in which they operate.

APPENDIX C: CALIFORNIA WATER SUPPLY

C.1 STATE WATER PROJECT OVERVIEW

The California State Water Project SWP is a system of reservoirs, pumping plants, and aqueducts that form one of the largest water infrastructure systems in the world. The SWP stretches more than 600 miles from Lake Oroville in the north to Lake Perris in the south (see Figure C-1). Water is stored at Lake Oroville and released when needed into the Feather River, which flows into the Sacramento River and to the San Francisco Bay Delta. In the north Delta, water is pumped into the North Bay Aqueduct for delivery to Napa and Solano Counties. In the south Delta, SWP pumps lift water into the California Aqueduct. Some water flows into the South Bay Aqueduct to serve areas in Alameda and Santa Clara Counties. The remainder flows southward to cities and farms in central and southern California. In the winter, when demand is lower, water is stored in the San Luis Reservoir located south of the Delta.

The SWP's water supply originates primarily in the snow-pack of the Sierra Nevada range. The various rivers that drain the Sierras and contribute to the flow of either the Sacramento or San Joaquin Rivers (both of which empty into the Delta and eventually into San Francisco Bay) provide the water supply for the SWP. The aqueduct is a 660 mile canal that brings Delta water to southern California. Along the journey south, the water must be pumped more than 1,000 feet up the Tehachapi Mountains, requiring a substantial energy input. The net power consumption of the entire SWP for 2001 was 6.656 million megawatt hours [331].

C.2 THE DELTA

The focal point of the SWP's water supply is the Delta, where the Sacramento and San Joaquin Rivers converge. The Bay-Delta system is the largest estuary on the west coast; its upstream watershed drains more than 40 percent of the land of California [332]. The Delta is also a navigable waterway. It is made up of hundreds of islands, wetlands, open water, and myriad wildlife habitats which are home to several threatened and endangered species. The entire San Francisco Bay and estuarine system is divided into three main portions – Northern, Central, and South – each with distinct hydrodynamics. The largest portion is San Francisco Bay which opens to the Pacific Ocean at the Golden Gate Bridge. The southern portion of the system is where the pumping plants exist for both the SWP and the federal Central Valley Project (CVP), another massive water infrastructure system.

The Delta is a complex and dynamic system. Change is occurring in the Delta on many scales. For example, the Delta islands are subsiding. Several hundred years ago, the tidal marsh islands were stable or accreting vertically [333]. Subsequently, as the islands were dewatered in order to make them suitable for agriculture, the land surface began to subside under the influence of erosion and compaction of the peat soils. Today, the island farms are threatened by the decreased stability of the levees that surround them. As the island surface subsides, there is increased hydrostatic pressure on the levee walls and increased seepage of water in from the channels

surrounding the islands. The subsidence of the Delta islands is likely to be exacerbated in years to come if sea-level rises in response to global warming.

The net result of these processes is that the levee network that protects the Delta's water infrastructure system is in jeopardy. The levees not only protect farms but also the freshwater fore-bays where Delta water is pumped for SWP and CVP supply. The levees are fragile and will require increasing maintenance to keep sound. As was seen with the Jones Tract levee failure of June 2004, one flood can cost the state millions of dollars and alter the operation of the SWP and CVP. Although the levee program is a large portion of the funding allocation under the current ten year finance plan authorized by the California Bay-Delta Authority (referred to as "CALFED"), there is a large unmet funding need. The levee program currently has \$48 million available out of a funding target of \$446 million and an unmet need of \$339 million [334].

Additionally, human activity has led to a significant modification of the Delta ecosystem. According to the U.S. Geological Survey, more than 95 percent of the historic marshes and wetlands that used to make up the Delta have been lost [335]. Specifically, the pumping of significant amounts of freshwater from the Bay-Delta system for use by agricultural and urban interests in the Central Valley and Southern California have lead to negative impacts on sensitive fish populations: "Changes in the quantity, timing, and quality of fresh water flowing into the Delta and Bay, as a result of diversion via pumps within the Delta, is implicated in declines of fish species both because of physical removal of young fish by the pumps as well as habitat changes resulting from changing flow patterns and salinity distributions" [336].



Figure C-1: The State Water Project

Source: California Department of Water Resources [337]

C.3 SUPPLY LIMITATIONS

According to the State Water Project Analysis Office, there are currently long-term water supply contracts between DWR and 29 local water agencies. In return for state financing, operation and maintenance, and construction of SWP facilities, the agencies agree to repay all associated SWP operating and capital costs [338]. Under their contracts, each agency is promised a certain amount of SWP water. This amount is their “Table A” allotment. Due to both increasing demand from contractors and capacity and environmental constraints on the SWP, the full contracted “entitlement” to the contractors has not been met. In certain circumstances, the State is forced to reduce pumping from the Delta. For example, in 1999 the SWP was forced to reduce pumping by about 500,000 acre-feet to protect Delta smelt and spring-run Chinook salmon. These pumping reductions were in addition to fish protection measures built into the water quality standards established by the State Water Resources Control Board (SWRCB). Although the SWP was able to offset some of the water supply impacts by increasing pumping rates later in the year, SWP lost access to more than 150,000 acre-feet of water for storage and suffered a significant reduction in water quality.

Figure C-2 shows the variability in annual water exports from federal and state Delta pumping facilities from 1957 to 2002. This figure shows that the exports from the Delta vary widely from year to year depending on weather and drought conditions. For example, total exports dropped from a high in 1989 of approximately 6,700,000 acre-feet to just over 2,700,000 acre-feet in the drought year of 1992. According to DWR, in 2001 “3,206,922 acre-feet of water were conveyed to 26 long-term contractors and 18 other agencies. The SWP delivered 1,546,742 acre-feet of approved Table A water” [339].

CVP / SWP Delta Facilities Exports

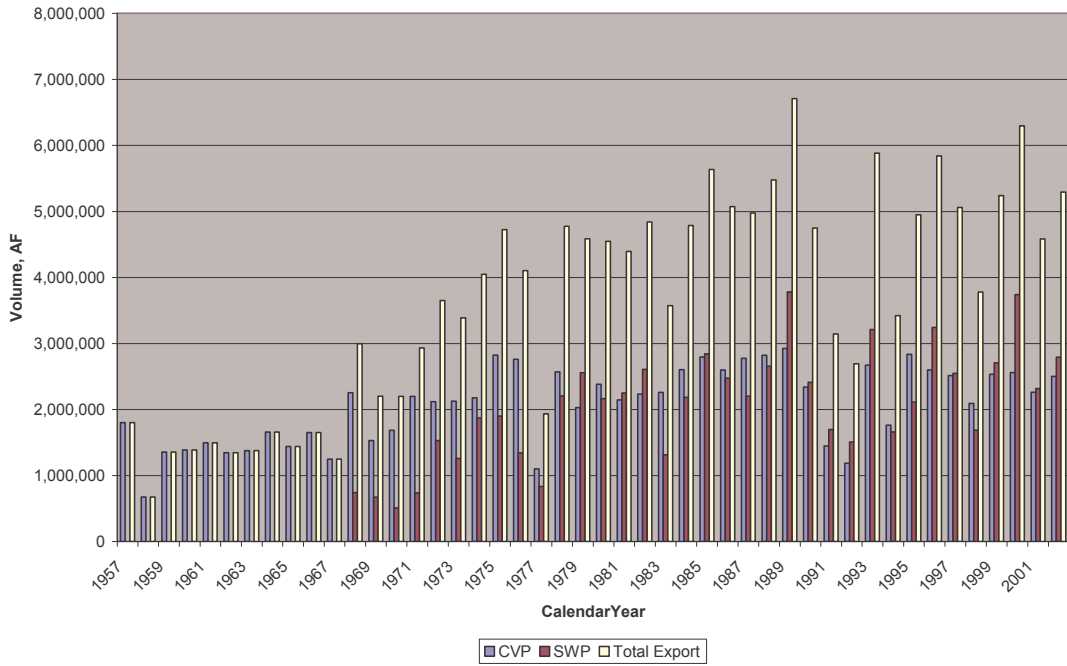


Figure C-2: CVP and SWP Delta Exports (1957-2002)
Source: California Bay-Delta Authority [340]

APPENDIX D: CAPITAL FINANCE

Water is not free; there are significant capital requirements and costs associated with the operation and maintenance of water supply and distribution systems. Public and privately owned utilities use different mechanisms to finance and recover these costs. This Appendix discusses some differences between how public utilities and IOUs recover costs through pricing water and financing capital projects.

D.1 PUBLIC UTILITY FINANCING

Municipal water utility operations are typically set up as an enterprise funds. As described by the Municipal Finance Officers Association of the U.S. and Canada, an enterprise fund is:

A fund established to account for operations (a) that are financed and operated in a manner similar to private business enterprises – where the intent of the governing body is that the costs (expenses, including depreciation) of providing goods or services to the general public on a continuing basis be financed or recovered primarily through use charges; or (b) where the governing body has decided that the periodic determination of the revenues earned, expenses incurred, and/or net income is appropriate for capital maintenance, public policy, management control, accounting-ability, or other purposes [341].

Special districts are another type of public entity that may be involved in water utility operations. Because special districts are set up for a single purpose, they function similarly to municipal enterprise funds. The sections below focus on municipal water utility financing mechanisms.

Though public agencies are not generally held to the same requirements for publishing their financial statements as private companies, the Governmental Accounting Standards Board (GASB) is a non-profit board that sets Generally Accepted Accounting Practices for public agencies at the state and local level. GASB is the equivalent of the Financial Accounting Standards Board (FASB), which sets accounting standards for the private sector. The most recent standards promulgated by the GASB set forth more comprehensive financial statement formats by which public agencies must account their finances.

D.1.1 Pricing water

An enterprise fund earns its revenues by charging customers for the services that it provides; it receives no tax-generated revenue from the city's general fund. Thus, a majority of the water system's revenue is earned through the rates charged to its customers for water consumption. Public utilities generally set user charges or rates on a "cash-needs" approach [342]. Under a "cash-needs" approach, user charges are structured to recover specific cash requirements of operations, maintenance, and capital. Additionally, the charges must be sufficient to cover all cash needs, including debt obligations, for the period the rates are intended to cover [343].

D.1.2 Capital investment

Capital facilities represent a significant investment for public water utilities. Capital expenditures are incurred for installation of new storage facilities and associated infrastructure, extensions of the water distribution system, service connection installations, and equipment such as motors, pumps, instrumentation, and vehicles [344]. Capital investment may also be driven by system expansion necessitated by population growth. In addition, deteriorating infrastructure and increasingly stringent environmental regulations can increase the need for capital investment. To finance these costs, public utilities can rely on their rate structure or other revenue sources such as development fees, take advantage of federal grants and loans for infrastructure renewal, enter into agreements with private companies to finance and manage operations, or they can issue debt [345]. If the municipality decides to issue debt, it must determine whether the debt will be long-term or short-term. Issuing long-term debt has been the public sector standard for capital financing, where the useful life of the asset being financed is used to determine the term of the debt [346]. In other words, if a water supply tank is expected to have a useful life of 30 years, then the municipality would issue bonds that take 30 years to mature.

The debt alternatives discussed below have different degrees of risk, flexibility, and other features which must be considered when financing capital projects.

D.1.3 Short-term debt

Since the 1980s public utilities have increasingly looked to short-term debt as a method of financing capital investment. Short-term debt is typically issued only in anticipation of long-term financing, including bonds, federal grants, and expected revenues. Short-term debt instruments include tax-exempt paper, variable rate demand notes, and fixed rate demand notes [347]. Traditional fixed rate notes are issued for a period of one to three years. Tax exempt commercial paper are promissory notes that must be backed by line of credit from a lending institution such as a bank. Tax exempt notes are sold to investors and the interest rate is dependent on the market [348].

D.1.4 Long-term debt

The most common method used by public utilities to finance long-term debt is by issuing general obligation bonds. Municipalities typically have a limit on the amount of general obligation bonds they can issue, usually determined by state or local law. Anything exceeding that amount must be approved by legislative means or voter approval. Because general obligation bonds are backed by the taxing capacity of the municipality, they carry the lowest risk and interest rate for any long-term financing option. However, issuing too many bonds can lower the credit rating of the municipality and hurt its ability to issue debt at a future date.

Revenue bonds are the municipal finance mechanism used for income-producing projects such as service area expansion. The income generated by these water projects (rates) pays revenue bondholders their interest and principal. Because they are not

backed by the taxing capacity of the municipality as general obligation bonds are, revenue bonds have a higher risk of default, but they also have the potential to pay out higher yields in return [349]. Voter approval is not generally required for revenue bonds and unlike general obligation bonds, they do not affect the debt capacity of the issuing agency.

Used less frequently, there are two additional methods of issuing municipal debt to finance capital projects: “double-barreled” bonds and moral obligation debt. “Double-barreled” bonds combine features of general obligation bonds and revenue bonds as they are backed both by the taxing power of the municipality and the revenue from capital projects [350]. For example, if a bond issued to finance infrastructure extension to a new development is backed by the revenues from the water sales and the taxing power of the government, it would be “double-barreled.” Moral obligation debt is defined as: “the promise to pay under default service of an entity that issues debt” [351].

An alternative method of long-term financing is leasing. Leasing is a means of financing where one party who owns a capital item (the lessor) leases that item to another party (the lessee). The lessor retains the full tax advantages associated with owning the capital item, and the lessee pays the lessor for its use [352]. For example, a municipality could lease its water utility infrastructure out to a private company and the private company makes a lease payment to the municipality. A lease is a specific kind of public-private partnership.

D.2 PRIVATE UTILITY FINANCING

Depending of the type and scale of the IOU, mechanisms for financing capital investments may be very different from the types of financing used by municipalities or other public entities.

D.2.1 Pricing water

Where government utilities rely almost entirely on a “cash-needs” approach to set user charges, investor-owned water utilities take a “utility” approach [353]. Under the “utility” approach, the IOU is allowed to recover operating costs and interest on capital investment. In addition, investors in private utilities are allowed to earn a rate of return on their investment, as determined a by a state regulatory commission (see Appendix B).

D.2.2 Capital investment

An IOU’s investment in capital is often referred to as its “rate base.” This includes *plant* (reservoirs, mains, pipe, etc.) less depreciation, deferred tax, and developer contributions. The return on newly invested capital is considered a fixed cost, as is depreciation. Since depreciation and deferred taxes are built into the rate structure, the companies can use this money for new capital projects [354].

Private companies, like municipalities, can rely on their revenues to finance capital investment. If a large capital project requires funding over the level that the rate base

can provide, the company has several options. One option is to issue debt. Until 1987 with the passage of the Deficit Recovery Act, companies had access to tax exempt debt equal to that of a public agency through the use of Industrial Development Bonds (IDB) [355]. IDBs were an attempt to equalize the cost of capital for private companies and municipalities, and are comparable to revenue bonds in that they are backed by the revenue of the project they are intended to fund. IDBs are relatively rare now since the passage of the Deficit Recovery Act. Private companies can also borrow against their equity. Generally, these types of loans have a higher cost of capital than municipal bonds due to higher interest rates. In addition, excessive borrowing can lower a firm's credit rating and hurt their ability to borrow in the future.

Private companies can raise money for projects without hurting their credit by increasing equity, or issuing stock. The advantage of money raised in this manner is that it is interest free and does not have to be repaid on a set time schedule. However, issuing more shares can dilute the value of a company's stock, and dividends would have to be distributed among a greater number of shareholders. Rarely do private firms raise money for a project singly through debt or equity, but rather they raise money through a combination of the two mechanisms. One of California's largest IOUs finances 60 percent of capital projects with debt, and 40 percent with equity [356].

D.2.3 Capitalization versus expense policy

Another difference between private and public financing mechanisms is whether repair and maintenance costs are capitalized or expensed. When repair or maintenance work takes place, a private company can either list the cost as an expense on the current budget, or it can be capitalized (depreciated). Generally, a company can receive a full tax deduction for a cost that is listed as an expense. In other words, an expense is worth more in terms of a deduction in the current year, as opposed to a deduction over time through the depreciation of the cost. However, some companies prefer to capitalize items in order to show higher profits on the current balance sheet (the fewer expenses on the balance sheet, the more profit the company would show). Public utilities generally do not capitalize any expenses, as they do not pay income taxes and thus would not seek to depreciate any items on a balance sheet for tax purposes.

D.2.4 Developer fees

When a new development goes into an area that is served by a private company, there are two ways that the developer will pay the costs of adding the development to existing water system infrastructure. Under an "advance in aid of construction," the developer will either pay the water company to build the necessary infrastructure, or the developer will build the infrastructure themselves and then pass along title to the water company. The water company will then repay the advance in even increments over forty years, or similar lengthy time period. Alternatively, the developer could make a "contribution in aid of construction" to the private water company, meaning

the developer pays the entire cost of the infrastructure up front either in cash or property. Water companies do not repay the developer for contributions in aid of construction [357].

APPENDIX E: WATER QUALITY REGULATION

E.1 FEDERAL REGULATION

Both private and public water utilities in the U.S. are subject to oversight by state health departments as directed by the SDWA, which authorizes the EPA to set national health-based standards for drinking water to protect against both naturally-occurring and man-made contaminants that may be found in drinking water [358]. Amendments to the SDWA in 1996 required that states also develop programs to assess drinking water sources and encouraged the establishment of state programs to protect lands critical to the protection of water supplies. In California, this led to the creation of the Drinking Water Source Assessment and Protection (DWSAP) Program by the Department of Health Services' Division of Drinking Water and Environmental Management. According to the DHS, "A drinking water source protection program envisions a partnership between local, state, and federal agencies to ensure that the quality of drinking water sources is maintained and protected" [359].

At a minimum, states must comply with federal water quality standards, but also have the authority to set more stringent standards [360]. Interstate agencies, such as river basin commissions, can exert influence on the management of water systems as well. Water management districts and local health departments add additional layers of regulation over water quality and quantity.

E.2 CALIFORNIA REGULATION

The California Department of Health Services is a permitting agency for both public and private water companies. According to the DHS, any organization, group, company, or individual that provides water for at least 25 people for at least 60 days per year is a "water system" and must have a permit from the state of California. Some counties with smaller water systems have permit-granting authority, as delegated by the state. However, the water systems in Ventura County are considered large systems and must be permitted by the state, including those in the City of Thousand Oaks [361].

Privately owned water systems require the same permits as public water systems that are municipally or publicly owned. These permits specifically address storage facilities, treatment facilities, and some distribution pipeline. Storage and treatment facilities are of particular interest to the DHS, because of their potential impacts on water quality.

Water system permits issued by the DHS are based on the California Code of Regulation's (CCR) requirements regarding water quality and sampling. The language used in these permits is usually in general terms, except when addressing additional monitoring procedures that are not included in the CCR, or in regards to unique qualities of a water system. Water system managers must provide water quality verification to the DHS, in accordance with the issued permits. Every year,

water system managers must also submit verification of how much water was used in the previous year as well as how much is expected to be used in the coming year, and where the water is coming from [362].

Permits issued by the DHS are valid forever, although the DHS has an internal goal of re-evaluating and renewing permits every 10 years [363]. It is typical for the DHS to make annual visits to all systems older than 10 years. The California DHS has authority to issue citations, fines, and eminent domain (though this is rarely used) for permit violations. The DHS may also place a service moratorium on water systems, meaning that no further meters may be installed. The moratorium is rarely used and only in extreme water supply shortages where a water utility underestimates its water supply needs.

APPENDIX F: SURVEY METHODOLOGY

F.1 SURVEY DESIGN

A critical part of our case study research in the City of Thousand Oaks was determining whether there are significant differences in the level of service provided by the three water utilities. In order to establish an equal basis for comparison, we developed a customer satisfaction survey to administer by mail to Thousand Oaks residents in each of the three utility service areas.

Our survey was designed to address three primary research areas:

- *Overall satisfaction:* Is there a significant difference in customer satisfaction between the three water providers?
- *Determining factors of customer satisfaction:* What factors most influence customer satisfaction?
- *Opinion assessment:* What are public opinions regarding public versus private ownership, and foreign versus domestic ownership of water utilities?

We obtained advice on survey design from our advisor, Dennis Aigner (Dean of the Bren School), and from Bruce Kendall (Associate Professor of Applied Ecology), and pre-tested the questionnaire with eleven employees of the City of Thousand Oaks to improve the clarity of the survey instrument. Pre-test responses were not included in the survey results. Prior to mailing our survey, we obtained approval from the Human Subjects Committee at UC Santa Barbara's Office of Research.

The survey instrument was a four-page questionnaire with 28 questions, which we estimated would take respondents approximately five minutes to complete. A copy of the questionnaire and cover letter are included in Sections F.3 and F.4. Question 1 was a screening question to determine response eligibility. To qualify as an eligible response, the respondent must have indicated that he/she pays the bill for water service at the address noted on the survey cover sheet.

On most of the questions, respondents were asked to rate their level of satisfaction or level of agreement/disagreement with a statement on a 5-point scale. There was an optional open-ended question where respondents could include additional comments about their water service, and there were six optional questions where respondents could provide demographic information.

F.2 RESEARCH METHODOLOGY

F.2.1 Sample stratification

As we did not have access to the customer records of the three water providers, we determined that property owners in Thousand Oaks would be a reasonable proxy for utility customers. Due to our interest in public opinion factors, we chose to focus our survey on residential customers rather than commercial or industrial customers. We obtained property owner names, service addresses, mailing addresses, and utility

provider information from a Ventura County Assessor database managed by the City of Thousand Oaks. After omitting commercial, industrial, and public agency property owners, as well as property owners whose mailing addresses were not in Thousand Oaks, we had a sample population of 33,656 records. Owners of multiple parcels were listed more than once.

In order to obtain a distribution of responses both geographically and across all three water providers, we stratified our sample population into ten cells by zip code and water provider, as shown below in Table F-1.

Table F-1: Cell population

Zip	CAW		CTO		CWS	
	Cell	Population	Cell	Population	Cell	Population
91320	1	9,757	5	1,886		
91360	2	5,559	6	5,442		
91361	3	154	7	40	9	253
91362	4	313	8	7,417	10	2,835
TOTAL		15,783		14,785		3,088

F.2.2 Sample selection

For all survey mailings, a stratified random sampling technique was used to select the appropriate number of records from the population of each cell. We conducted three mailings to obtain an appropriate number of responses for our survey. Each survey instrument that was mailed contained a cell reference, but was otherwise anonymous.

F.2.2.1 Pilot survey

The first mailing was a pilot survey conducted in August 2004. The purpose of the pilot was to obtain enough responses from each cell to be able to calculate a sample variance for response to Question 2 (overall satisfaction). The Question 2 sample variance for each cell would then be used to calculate the optimal number of responses necessary from each cell, as described in Section F.2.2.3.

At least three responses were needed from each cell in order to calculate a sample variance. Our objective was to obtain approximately 100 responses from the pilot survey, so we determined the needed number of responses from each cell based on the percentage of the total population that the cell represented, setting the minimum number of responses needed from any given cell to three. Assuming a response rate of fifteen percent, we calculated the total number of surveys we needed to mail in order to obtain the requisite number of responses. Table F-2 summarizes the number of responses needed from each cell, as well as the number of surveys mailed in the pilot.

Table F-2: Pilot survey mailing

Provider	Cell	Records in Cell	% of Total	Needed Responses	Surveys Mailed
CAW	1	9,757	0.29	29	193
CAW	2	5,559	0.17	17	113
CAW	3	154	0.00	3	20
CAW	4	313	0.01	3	20
CTO	5	1,886	0.06	6	40
CTO	6	5,442	0.16	16	107
CTO	7	40	0.00	3	20
CTO	8	7,417	0.22	22	147
CWS	9	253	0.01	3	20
CWS	10	2,835	0.08	8	53
TOTAL				110	733

F.2.2.2 Supplement to pilot survey

After the pilot surveys were returned, we did not have enough responses from Cells 3 and 9 to calculate a sample variance, so in September 2004 we mailed twenty additional surveys to each of these cells as a supplement to the pilot.

F.2.2.3 Final survey mailing

After the supplemental mailing results were in, we used the sample variance of responses to Question 2 to calculate the total sample size needed to obtain statistically reliable results. We also calculated the number of responses needed from each cell using the Neyman allocation. The difference between the number of responses needed in each cell provided by the Neyman allocation and the number of responses already received for that cell would determine the additional number of surveys to send in our final mailing.

First, we calculated an estimated population mean (Equation F-1), incorporating a weighting factor for each cell based on the proportion of the cell's population to the total population.

Equation F-1: Estimate of the population mean, incorporating weights for stratified sample

$$\bar{x}_{st} = \sum_{h=1}^k \bar{x}_h \frac{N_h}{N}$$

Where:

\bar{x}_{st} = estimate of the population mean based on a stratified sample

k = the number of cells

h = the cell number

\bar{x}_h = the cell mean

N_h = the cell population

N = the total population

Applying Equation F-1 to the Question 2 data from our pilot and supplemental survey mailings yielded $\bar{x}_{st} = 1.997$.

We determined that we wanted our estimate of the population mean (\bar{x}_{st}) to have a margin of error (d) of 0.15. As $\bar{x}_{st} = 1.997$, setting $d=0.15$ would mean the true population mean was within 7.5 percent of our estimate. We then calculated the desired variance (V) for the estimated population mean of \bar{x}_{st} using the 95 percent confidence interval $\bar{x}_{st} \pm 1.96\sqrt{V}$, where $1.96\sqrt{V} = d$. Therefore, setting $d= 0.15$ yielded $V=0.00586$.

Next we calculated the total number of responses needed from the population, based on the weighting factor for each cell, the cell standard deviation from the pilot sample, and the desired variance for \bar{x}_{st} (Equation F-2).

Equation F-2: optimal allocation to determine total number of samples needed

$$n = \frac{(\sum W_h S_h)^2}{V}$$

Where:

n = total number of responses needed

$W_h = N_h/N$

S_h = sample cell standard deviation

V = desired variance for \bar{x}_{st}

Applying Equation F-2 to the Question 2 data from our pilot and supplemental survey mailings yielded an desired $n=180$.

Lastly, we calculated the Neyman allocation to determine the optimal number of responses from each cell (Equation F-3).

Equation F-3: Neyman allocation to determine number of responses needed from each cell

$$n_h = n \frac{N_h S_h^2}{\sum N_h S_h^2}$$

Where:

n_h = optimal number of samples in each cell

n = number of returned surveys

N_h = cell population

S_h^2 = sample cell variance

Table F-3: Neyman allocation results

Desired number of responses: 180						
Cell	Cell Population N_h	Sample Variance S_h^2	Optimal Responses n_h	Responses Received	Additional Responses Needed	
1	9,757	1.147	55	55	0	
2	5,559	0.960	26	27	0	
3	154	0.000	0	2	1 ²¹	
4	313	0.667	1	6	0	
5	1,886	0.500	5	9	0	
6	5,442	1.190	32	21	11	
7	40	3.583	1	4	0	
8	7,417	0.898	33	34	0	
9	253	0.917	1	4	0	
10	2,835	1.781	25	15	10	
			179	177		

We used the calculation listed in Equation F-3 as a guide to determine whether the responses from our pilot survey and supplement were sufficient to obtain statistically reliable results. Indeed, with 177 responses received after the two initial mailings, and an optimal sample population of 180, we were very close to our goal. However, we still did not have enough samples from Cell 3 to calculate a sample variance, and we needed additional responses from Cells 6 and 10 to achieve the optimal number of responses from those cells. Due to a calculating error, we mistakenly thought we needed additional responses from Cell 8 as well. The number of surveys sent in our final mailing of October 2004 is summarized in Table F-3:

²¹ As we still did not have enough responses from Cell 3 to calculate a variance, one additional response was needed, despite the results of the Neyman allocation.

Table F-4: Final survey mailing

Provider	Cell	Surveys Mailed
CAW	3	10
CTO	6	50
CTO	8	15
CWS	10	50
TOTAL		125

F.2.2.4 Response rate

Table F-5 summarizes the overall response rate for each cell after all three mailings were conducted.

Table F-5: Cell response rate

Provider	Cell	Cell Population	Surveys Mailed	Cell Sample	Response Rate
CAW	1	9,757	193	55	28%
CAW	2	5,559	113	27	24%
CAW	3	154	50	5	10%
CAW	4	313	20	6	30%
CAW Response Rate					25%
CTO	5	1,886	40	9	23%
CTO	6	5,442	157	31	20%
CTO	7	40	20	4	20%
CTO	8	7,417	162	40	25%
CTO Response Rate					22%
CWS	9	253	40	4	10%
CWS	10	2,835	103	26	25%
CWS Response Rate					21%
TOTAL		33,656	898	207	23%

F.2.2.5 Response coding

Before conducting our data analysis, we coded survey responses numerically on an integer scale. For the five-level questions, strongly positive responses (“Very Satisfied,” “Exceptionally Good,” “Strongly Agree”) were coded 1, and strongly negative responses (“Very Dissatisfied,” “Exceptionally Poor,” “Strongly Disagree”) were coded 5, with the intermediary responses distributed evenly between these two extremes. Thus, for the questions applicable to customer satisfaction, a lower score

indicates a higher level of customer satisfaction. The numerical codes assigned to each response are included in the copy of the survey shown in Section F.4. Non-responses were coded NA.

F.2.3 Data analysis

F.2.3.1 Estimation of population mean

Once the survey responses were compiled, we were able to construct a 95 percent confidence interval for the Question 2 (overall customer satisfaction) population mean using Equation F-4 to calculate the variance of the sample mean ($\hat{V}(\bar{x}_{st})$), and Equation F-5 to calculate the 95 percent confidence interval. The weighted sample mean (\bar{x}_{st}) was 1.950 for the full set of Question 2 responses.

Equation F-4: Variance of the sample mean

$$\hat{V}(\bar{x}_{st}) = \sum_{h=1}^k \frac{W_h^2 S_h^2}{n_h}$$

Where:

$\hat{V}(\bar{x}_{st})$ = variance of the sample mean

k = the number of cells

h = the cell number

W_h = N_h/N (proportion of cell population to total population)

S_h^2 = sample cell variance

n_h = number of returned surveys in the cell

Table F-6: Summary of cell weighting factors, sample variance, and population

Cell	Weight W_h	Sample Variance S_h^2	Number in Cell n_h
1	0.290	1.147	55
2	0.165	0.960	27
3	0.005	0.200	5
4	0.009	0.667	6
5	0.056	0.500	9
6	0.162	0.983	31
7	0.001	3.583	4
8	0.220	0.974	40
9	0.008	0.917	4
10	0.084	1.282	26
$\hat{V}(\bar{x}_{st}) = 0.005$			

Equation F-5: 95 percent confidence interval for the Question 2 population mean

$$\bar{x}_{st} \pm 1.96\sqrt{\hat{V}(\bar{x}_{st})} \text{ at 95\% confidence}$$

Where:

\bar{x}_{st} = the weighted sample mean of 1.950

$\hat{V}(\bar{x}_{st})$ = the sample variance of 0.005

Thus, we are 95 percent confident that the true population mean of Question 2 is between 1.811 and 2.089. The margin of error for our estimate of the population mean is approximately 7 percent.

F.2.3.2 Proportional odds model estimation

For the model estimation conducted in this analysis, we used the statistical analysis software, R 1.9.1. A key part of our analysis was to assess whether a customer's water provider had a significant effect on his/her overall satisfaction (Question 2 response). We also wished to test the effect of a number of service-related variables on overall satisfaction, including rates, water pressure, and whether the respondent felt their water provider promoted conservation, among other factors. Demographic variables were also included to assess the extent to which factors outside water-provider control affected overall customer satisfaction. We tested a series of models to estimate the effect of the following independent variables on the dependent variable of overall satisfaction (Q2 Response):²²

- Provider (CTO, CAW or CWS)
- Provider type (Public or Private)
- Ownership (Domestic or Foreign)
- Service (Q3 Response)
- Rates (Q4 Response)
- Water pressure (Q5 Response)
- Informing customers of planned interruptions (Q6 Response)
- Promoting conservation (Q7 Response)
- Satisfaction with telephone customer service system (interaction between Q11/Q12 Response)²³
- Receipt of late/incorrect bill (Q15 Response)
- Billing dispute (Q16 Response)
- Community involvement of water provider (Q18 Response)

²² In the pilot mailing, the original formatting for Question 10 was confusing and most respondents did not answer the question in the manner instructed. Though the formatting problem was fixed for the subsequent mailings, it was not appropriate to include the Question 9/10 interaction in model estimation. In addition, due to the minimal number of responses on Question 13 (website), the Question 13/14 interaction was omitted from model estimation.

²³ This interaction term measured the effect of satisfaction with the customer service system for those respondents who had telephoned their water provider within the last year.

- Gender (Q24 Response)
- Age (Q25 Response)
- Income (Q26 Response)
- Education (Q27 Response)
- Political affiliation (Q28 Response)

As Q2 Response is a qualitative, polytomous dependent variable consisting of ordered categories, we used a proportional odds model to estimate the model parameters using multinomial regression. A proportional odds model estimates how the various independent variables listed above affect the probability of a given response to the dependent variable of overall satisfaction (Q2 response).

The dependent variable Y (Q2 Response) can take on one of five qualitative values: (1) Very Satisfied, (2) Somewhat Satisfied, (3) Neither Satisfied nor Dissatisfied, (4) Somewhat Dissatisfied, and (5) Very Dissatisfied. Let P_{ij} denote the probability that the i th observation falls in the j th category of the dependent variable Y; that is, $P_{ij} \equiv \Pr(Y_i=j)$, for $j=1, \dots, 5$ [364]. Using the multivariate logistic distribution, we can model the dependence of P_{ij} on a number of regressors, X_1, \dots, X_k , where each regressor is one of the independent variables listed in the beginning of this section.

The proportional odds model is an ordered logit model, and can be written as:

Equation F-7: proportional odds model

$$\text{Logit}[\Pr(Y_i > j)] = \alpha_j + \beta_1 X_{i1} + \dots + \beta_k X_{ik}$$

As described by Fox, “The logits in [Equation F-7] are for cumulative categories – at each point contrasting categories above category j with category j and below. The slopes for each of these regression equations are identical; the equations differ only in their intercepts” [365]. The model output provides estimates of the cut-points between the different categories of overall satisfaction ($j_1 \dots j_5$) as well as estimates of the regression coefficients ($\beta_1 \dots \beta_k$) for the independent variables ($X_{i1} \dots X_{ik}$).

Using R, we tested a series of proportional odds models to determine which independent variables provided the best fit for the survey response data, including a no-effects model that assumed none of the independent variables had a significant effect. All models were more significant than the no-effects model. We used the Akaike Information Criterion to compare the fit of different models. The AIC is a partial likelihood test statistic that penalizes models with more variables [366]. The model with the lowest AIC provides the best fit for the data, accounting for the number of variables used to estimate the model parameters. The AIC can also be used to test the significance of each variable, as a difference in AIC of 2 roughly corresponds to $P=0.05$ in a likelihood ratio test. If removing a single variable from a model decreases AIC by 2 or more, that variable is not significant. The results of our model estimation are discussed in Section 4.4.10.

F.3 SURVEY COVER LETTER

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SANTA BARBARA • SANTA CRUZ

DONALD BREN SCHOOL OF ENVIRONMENTAL SCIENCE AND MANAGEMENT

SANTA BARBARA, CA 93106
<http://www.bren.ucsb.edu/>

[Date]

[Name]

[Address]

[City, State, Zip]

Re: Thousand Oaks Water Service Customer Satisfaction Survey

Dear [Name]:

You have been randomly selected to participate in a survey that is part of a study being conducted by the Bren School of Environmental Science and Management at UC Santa Barbara. This study will assess the service provided by the publicly and privately owned water companies operating in Thousand Oaks. Your name and address were obtained from the Ventura County Assessor's public database of property owners in Thousand Oaks.

Your feedback is extremely valuable to us! Even if you are completely satisfied with your water service, please take a few minutes to complete the enclosed questionnaire. By participating in this survey, you will enable us to determine customer attitudes toward the quality of water service and the performance of water service providers operating in Thousand Oaks. You can read more about our project at <http://fiesta.bren.ucsb.edu/~towater/>.

The enclosed questionnaire should take approximately 5 minutes to complete, and there are no right or wrong answers. Your answers are completely confidential, and survey results will not be traceable to individual respondents. To ensure that your survey response is anonymous, please remove the yellow cover sheet before completing the questionnaire.

Please complete the survey, and drop your postage-paid, preaddressed response in the mail by Friday, November 5 2004. If you have any questions about this survey, you can contact the Thousand Oaks Water research group at (805) 893-5524, or by email at towater@bren.ucsb.edu.

Thank you in advance for your help!

Sincerely,

Claire Cowan
Master's Candidate

PHONE: (805) 893-5524 • FAX: (805) 893-7612

F.4 SURVEY QUESTIONNAIRE

Cell Reference

THOUSAND OAKS WATER SERVICE CUSTOMER SATISFACTION SURVEY

Please read each question and circle the option below that you feel is the best answer. This survey should take approximately 5 minutes to complete.

1. The following questions pertain to water service at the address printed on the yellow slip attached to this questionnaire. Do you currently pay the bill for water service at this address?

Yes (1) No (0)
(Circle one)

If you answered "No" to Question 1, you are not eligible to complete this survey. Thank you for your time.

2. Which term best describes your overall level of satisfaction with your water company?

Very satisfied (1) Somewhat satisfied (2) Neither satisfied (3) Somewhat dissatisfied (4) Very dissatisfied (5)
nor dissatisfied
(Circle one)

3. Which term best describes the level of service provided by your water company?

Exceptionally good (1) Somewhat good (2) Adequate (3) Somewhat poor (4) Exceptionally poor (5)
(Circle one)

4. Please indicate the extent to which you agree or disagree with the following statement: "I feel my water company charges reasonable rates for the services it provides."

Strongly agree (1) Agree (2) Neither agree nor disagree (3) Disagree (4) Strongly disagree (5)
(Circle one)

5. Please indicate the degree to which you agree or disagree with the following statement: "Water pressure at the service address is consistently adequate throughout the day."

Strongly agree (1) Agree (2) Neither agree nor disagree (3) Disagree (4) Strongly disagree (5)
(Circle one)

6. Please indicate the degree to which you agree or disagree with the following statement: "My water company informs me of planned service interruptions or changes in a timely manner."

Strongly agree (1) Agree (2) Neither agree nor disagree (3) Disagree (4) Strongly disagree (5)
(Circle one)

7. Please indicate the degree to which you agree or disagree with the following statement: "My water company promotes water conservation and wise water use practices."

Strongly agree (1) Agree (2) Neither agree nor disagree (3) Disagree (4) Strongly disagree (5)
(Circle one)

8. Please check any of the following methods your water company has used to promote water conservation.

8a	1 or 0	Informational literature and brochures about how to conserve water
8b	1 or 0	Free devices such as low-flow showerheads or garden hose nozzles
8c	1 or 0	Rebates for installation of water-efficient equipment such as washing machines and toilets
8d	As written	Other (please add): _____
8e	1 or 0	My water company has not used any of the above methods to promote water conservation

(Check as many as are applicable)

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PLEASE TURN OVER

Masters Group Project: Thousand Oaks Water Survey
Bren School of Environmental Science and Management, University of California Santa Barbara, CA 93106-5131

9. When was the last time you contacted your water company regarding a problem with your water service?

Never (0) Within the last 12 months (1) Between 1 and 5 years ago (1) More than 5 years ago (1)
(Circle one)

If you answered "Never" to Question 9, please skip to Question 11.

10. Please indicate how satisfied or dissatisfied you were with your water company's response to your service request by rating each service category on a scale from 1 to 5, where:

1=very satisfied
2=somewhat satisfied
3=neither satisfied nor dissatisfied
4=somewhat dissatisfied
5=very dissatisfied

Question	Service Category	Rating (1-5)
10a	Timeliness of service	<u>1 to 5</u>
10b	Quality of service	<u>1 to 5</u>
10c	Effectiveness of service	<u>1 to 5</u>
10d	Expertise of water company employee(s)	<u>1 to 5</u>
10e	Courtesy of water company employee(s)	<u>1 to 5</u>

If you have contacted your water company multiple times regarding different service problems, please rate your overall satisfaction with the quality of the service you received for each service category listed above.

11. Within the last year, have you contacted your water company by calling their customer service telephone number?

Yes (1) No (0) Not sure (0)
(Circle one)

If you answered "No" or "Not sure" to Question 11, please skip to Question 13.

12. How satisfactory was the telephone customer service system in facilitating a timely resolution to your question or problem?

Very satisfactory (1) Satisfactory (2) Neither satisfactory (3) Unsatisfactory (4) Very unsatisfactory (5)
nor unsatisfactory
(Circle one)

13. Within the last year, have you viewed your water company's website in order to obtain information?

Yes (1) No (0) Not sure (0) Don't have Internet access (0)
(Circle one)

If you answered "No," "Not sure," or "Don't have Internet access" to Question 13, please skip to Question 15.

14. How satisfactory was the website in helping you obtain the information you needed?

Very satisfactory (1) Satisfactory (2) Neither satisfactory (3) Unsatisfactory (4) Very unsatisfactory (5)
nor unsatisfactory
(Circle one)

15. Have you ever received a late or incorrect bill from your current water company?

Yes (1) No (0) Not sure (0)
(Circle one)

16. Have you ever had a billing dispute with your current water company?

Yes (1) No (0) Not sure (0)
(Circle one)

If you answered "No" or "Not sure" to Question 16, please skip to Question 18.

17. Have you ever had a billing dispute with your current water company that was resolved in your favor?

Yes (1) No (0) Not sure (0)
(Circle one)

18. Please indicate the degree to which you agree or disagree with the following statement: "My water company is an active member of the community working to make Thousand Oaks a better place to live."

Strongly agree (1) Agree (2) Neither agree nor disagree (3) Disagree (4) Strongly disagree (5)
(Circle one)

19. Please indicate the degree to which you agree or disagree with the following statement: "I feel that in general, a privately owned company provides better quality water service than a publicly-owned utility."

Strongly agree (1) Agree (2) Neither agree nor disagree (3) Disagree (4) Strongly disagree (5)
(Circle one)

20. Please indicate the degree to which you agree or disagree with the following statement: "I feel that in general, a publicly-owned utility provides more affordable water service than a privately owned company."

Strongly agree (1) Agree (2) Neither agree nor disagree (3) Disagree (4) Strongly disagree (5)
(Circle one)

21. Please indicate the degree to which you agree or disagree with the following statement: "I believe that local water companies in the US should not be owned by foreign corporations."

Strongly agree (1) Agree (2) Neither agree nor disagree (3) Disagree (4) Strongly disagree (5)
(Circle one)

22. If you would like to add any additional comments about the service you receive from your water company, please do so here.

As written

DEMOGRAPHIC INFORMATION

The information in this section will be used for the sole purpose of evaluating our survey results. If you do not feel comfortable providing this information, please leave this section blank.

23. Do you live at the address that is the subject of this survey (as printed on the yellow slip attached to this questionnaire), or do you rent it to tenants?

Live there (0) Rent to tenants (1)
(Circle one)

24. What is your gender?

Male (0) Female (1)
(Circle one)

25. Please indicate the category that best represents your age.

- 1 Under 18
- 2 18 and under 30
- 3 30 and under 45
- 4 45 and under 60
- 5 60 and over

26. Please indicate the category that best represents your annual household income.

- 1 Under \$20,000
- 2 \$20,000 and under \$50,000
- 3 \$50,000 and under \$100,000
- 4 \$100,000 and over

27. Please indicate the category that best represents the highest level of education you completed.

- 1 High school
- 2 Two year college
- 3 Four year college
- 4 Graduate or professional degree

28. Please indicate the category that best describes your political affiliation.

- 1 Republican
- 2 Democrat
- 3 Independent
- 4 No affiliation

THANK YOU FOR PARTICIPATING IN OUR SURVEY!

ALL YOUR ANSWERS ARE COMPLETELY CONFIDENTIAL.

**PLEASE RETURN THE COMPLETED QUESTIONNAIRE IN THE ENCLOSED PRE-ADDRESSED,
POSTAGE PAID ENVELOPE.**

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Bren School of Environmental Science and Management, University of California Santa Barbara, CA 93106-5131

APPENDIX G: PROPOSITION 50

California State Proposition 50 (Prop 50) was an initiative bond measure placed before the California voters and approved in November 2002. Out of this \$3.44 billion general obligation resources bond, approximately \$1.4 billion has been allotted for various water-related programs [367]. Traditionally, state bond funding for water projects has been available only to public agencies. However, Prop 50 does not clearly define whether funding eligibility is restricted to the public sector. This has opened the door for a continuing policy debate regarding the eligibility of private, for-profit water companies to receive Prop 50 funding.

The various funding programs available under Prop 50 are administered by several state agencies including DWR, SWRCB, CALFED, and DHS. For example, out of the total amount, there is \$500 million in grants available from the SWRCB and DWR for projects that fall into the category of integrated regional water management. There is also \$100 million available from DWR for desalination projects and contaminant treatment works. Other categories of funding include CALFED Bay-Delta restoration, programs to reduce Colorado River water use, coastal wetlands protection, river parkway projects, water system security projects, and water quality improvement projects.

Private water utilities in California supply approximately 20 percent of the state's residents [368]. These utilities own and operate their water distribution systems and are regulated by the CPUC as described in Appendix B. Most of these companies are small and serve communities of fewer than 500 people [369].

On one side of the debate, private water companies argue that they should have access to public bond money because they serve low-income communities. The funding could translate into water projects that benefit these communities who need access to safe drinking water and water treatment. To assess this argument, it is important to differentiate small Class C or D companies serving low-income communities, often in rural areas, with Class A companies that happen to have a service area that covers a low-income community. While it is true that many of the Class A companies serve communities that include low-income populations, there is the question of whether their having access to public bond money will actually result in better service, lower rates or other tangible benefits for these populations. For example, if a Class A company receives a grant through a Prop 50 program, could they use the money to offset operating expenses in a different service area from the one targeted in the grant? A letter from the American Federation of State, County and Municipal Employees, AFL-CIO, the Association of California Water Agencies (ACWA), the Sierra Club, and Public Citizen to several state representatives in May 2004 raised these issues. Specifically, these groups question whether Class A water companies in California need the financial assistance of the Prop 50 funds and what effect garnering these funds would have on their customers: "In effect, for most regulated utilities, gaining access to State G.O. bonds won't reduce customer rates,

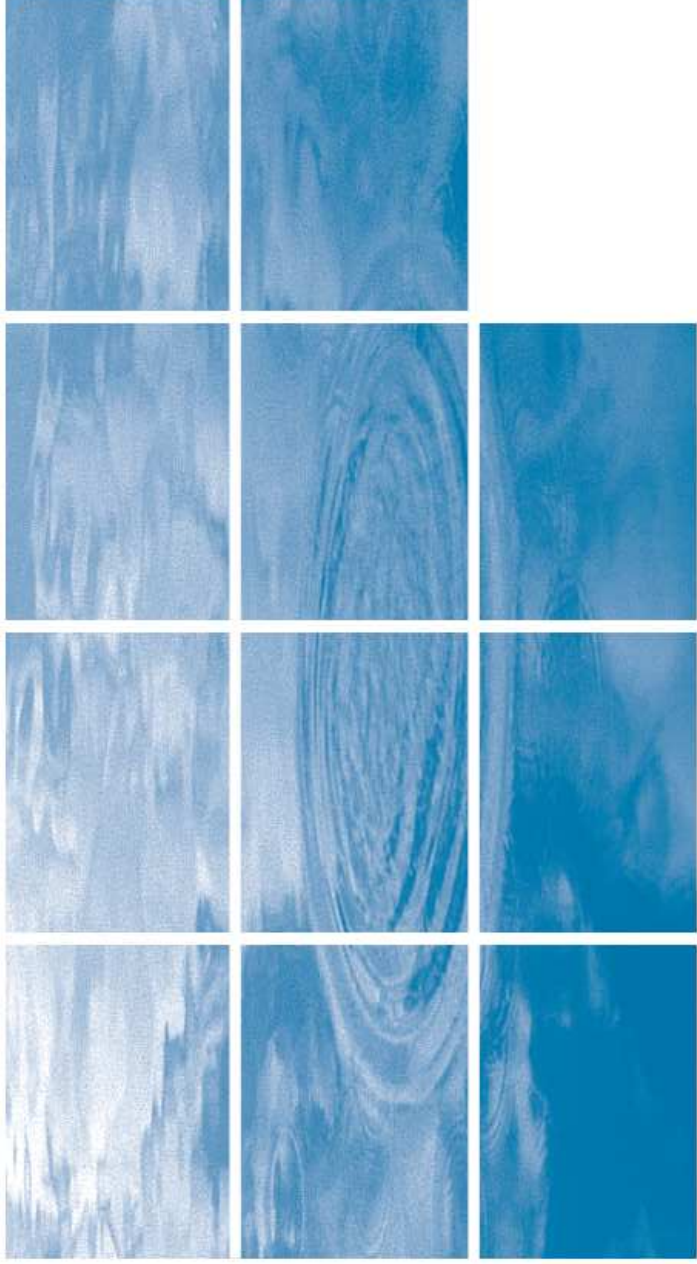
but it will free up other capital sources to pump up the rate of return to approved levels; or, in certain cases, free up capital to pursue acquisition activities throughout the United States and or in other countries around the world” [370].

Private water companies point out that CPUC regulations prohibit any grants or loans from the government being used as part of the company’s rate base. The CPUC states clearly that their goal is to ensure the proper usage of public bond funds:

Due to the implementation of Proposition 50, it is also appropriate to consider to what extent existing policies, rules and procedures are reasonably applicable or require changes if applied to government funding of utility projects in the form of grants. In both instances the goal is to ensure the proper usage of government financed funds and to preserve the public interest integrity of the products of that special funding. Utilities should not receive a windfall nor should shareholders benefit from grant-funded facilities even if, years later, the utility itself or the individual, grant-funded facility is subsequently leased or sold [371].

For the most part, Proposition 50 does not specifically state that private water companies are not eligible to receive funding. There are specific exceptions where the language is clear that funding is only available to public entities and some non-profit organizations, such as the case with coastal non point-source pollution prevention programs. The Legislative Analysts Office (LAO) has found that the various programs covering the \$1.4 billion potentially available to private water companies include only those “that have not been specifically excluded from eligibility by terms of the bond measure are for purposes relating to private water companies’ activities” [372]. State Senate Bill 909 introduced by Senator Machado last year would have established a policy specifically related to the eligibility of bond funding to private water companies, allowing such funding under certain conditions. The bill was debated in the legislature but did not receive the votes necessary to be approved. According to Senator Machado’s office, since SB909 has failed, each department that is charged with distributing Prop 50 funding is in the process of crafting their own policy regarding eligibility of private water companies. Specifically, his office noted that DHS is allowing private companies to be eligible for Prop 50 funding under their drinking water programs [373]. It is unclear at this time if any other state agency has ruled on the matter.

a framework for evaluating water system ownership and management alternatives



An analysis tool to assist public sector decision-makers with evaluating major changes in the ownership and management of retail water distribution systems

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Introduction

This framework is a tool to assist public policy makers with the decision to change the ownership and management structure of their local water utility, evaluating four alternatives that range from public ownership to full privatization.

Water utilities in the United States are facing the staggering cost of maintaining aging system infrastructure, meeting the demands of population growth, and complying with increasingly stringent water quality regulations. The fiscal pressures facing local governments have led some municipalities to look to the private sector for the financial and technical resources necessary to address these issues. At the same time, in some cities concerns about the performance of private companies in operating local water systems have led to public acquisition of utility assets, referred to here as “municipalization.”

The decision to implement a different ownership model may be driven by politics and ideology, rather than a systematic assessment to determine which model best addresses local management priorities. This framework is designed to assist public sector decision-makers with evaluating four scenarios for changing the ownership and management of retail water distribution systems:

1. **CIP** Implementing operational and management changes to improve the efficiency of a public water system, referred to as a Continuous Improvement Program
2. **MUNICIPALIZATION** Purchasing the assets of a private water system, transferring ownership to a public entity
3. **PPP** Contracting out the operation and maintenance of a public water system to a private company, also known as a public-private partnership
4. **ASSET SALE** Selling the assets of a public water system, transferring ownership and operating responsibility to a private company

Public and private firms face different constraints and incentives in the operation of water systems. Given these differences, when deciding to replace one ownership model with another, it is important to systematically evaluate alternatives and establish a basis for decision-making that provides the best potential for meeting local needs and priorities.

Using a set of ten management objectives applicable to water utility operations, this framework identifies key considerations under each scenario and, where possible, recommends actions to improve results. The management objectives evaluated herein are: local control, water conservation, local accountability, rate affordability, supply reliability, water quality, system reliability, customer satisfaction, operational efficiency, and public acceptance. Each tab in this framework reviews one management objective, summarizing our key findings and recommendations for each of the four decision scenarios listed above.

Access our framework online at <http://www.waterproject.info>

Local Control

INDICES

We define local control in terms of authority over water management decisions. Some ownership models remove decision-making authority from local jurisdiction; others have the opposite effect. Indices used to assess local control include whether a municipality retains decision-making authority over rates, utility budgets, capital expenditures, conservation programs, personnel decisions, and water supply planning.

CIP

Publicly owned utilities offer the highest degree of local control, which should not be negatively impacted by CIP implementation.

MUNICIPALIZATION

The desire to increase municipal control over management of the local water system is often a driving reason for municipalization. Since privately owned utilities are regulated at the state level, cities may feel that state oversight of the water utility does not provide adequate protection for local interests.

In the event that the water utility considers joining with other public systems as part of its municipalization strategy (regionalization), a certain level of local control may be sacrificed.

PPP

Under most PPPs, the role of the private company is to perform specific operation and maintenance duties as a municipal contractor for some specified length of time, after which the municipality may choose whether to renew the contract. The municipality should identify the decision-making authority it wants to retain prior to entering into negotiations with a private company. Typically, public agencies continue to set rates and authorize capital expenditures under PPP contracts.

It is possible that private companies have a negotiating advantage over public entities due to their experience from other contract situations, and the resources they have to hire seasoned legal professionals. According to George Irving, District Manager for the Montara Water and Sanitary District, private companies are generally “...very conversant in acquisition and corporate strategy,” which may give them an advantage over public agencies in negotiations. For many cities entering into PPPs, it may be the first time they have negotiated such an arrangement. The public entity representatives entering into negotiations should be well-versed in local management priorities, and be prepared to negotiate a contract to address those priorities. Some public managers have hired outside consultants experienced in bid solicitation and contract negotiation when there is insufficient local expertise to address the city’s needs.

Although contract management can be labor and time-intensive, it should be a priority because a well-managed contract will enable a more effective PPP relationship. The municipality should plan for appropriate staffing to address contract management.

The retention of decision-making authority is important for water utility operations during the term of the contract, as well as utility operation after contract expiration. If either party decides not to renew the PPP contract, the public entity must be prepared either to seek another contract partner, or to resume municipal operation and maintenance of the water utility.

With proper contractual provisions, the public entity retains oversight of the private company’s operations, in contrast to the asset sale model of privatization. However, there may be problems with the city reassuming utility management from the private company following the expiration of the contract.

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Key Findings

LOCAL CONTROL

ADVANTAGES	ISSUES	RECOMMENDATIONS
C Public agency retains sole authority over water system management decisions	No significant findings	No significant findings
M Local control over utility management decisions will increase under municipalization	No significant findings	No significant findings
P Public entry retains greater control over private company operations than under asset sale	Contract does not clearly define decision-making authority Contract management can be labor-intensive and costly Difficulties with reassuming municipal control after contract expiration	Set priorities for decision-making authority before entering into contract negotiations and ensure that contract terms address those priorities Plan appropriate staffing for contract management activities and ensure expectations as well as contract management activities are clearly specified in contract
A S S E T S A L E	Municipality no longer has decision-making authority and less influence over private company operations than with the PPP privatization model	Implement frequent operational briefing meetings between city staff and contractor to stay informed about utility management activities Municipality can intervene in public utilities commission rate cases if they are not satisfied with private company operations

Water Conservation

INDICES

Indices to assess water conservation include unaccounted-for water expressed as a percentage of total water purchases, per capita water use, and implementation of water conservation best management practices (BMPs). Additional indices – if data are available – include per capita indoor water use, use of an increasing tiered rate structure, and annual volume of recycled water sold.²

CIP

Water use efficiency may be improved indirectly under CIP implementation through improved system monitoring and increased infrastructure investment that reduces unaccounted-for water. Implementing preventative or predictive maintenance programs under CIP implementation is likely to reduce the amount of water lost through system leaks. In addition, because they are self-regulated, municipal utilities have the opportunity to establish conservation rate structures such as increasing tiered rates. At the same time, political factors may discourage public utilities from implementing such a rate structure.

Our Thousand Oaks case study provided evidence that state or regional efforts to promote conservation are essential to increasing local incentives. As public systems are not regulated at the state level, they are not typically subject to state conservation requirements except possibly in times of drought.

In Thousand Oaks, the private companies primarily evaluate cost considerations in determining whether to implement conservation BMPs. Public entities may theoretically be motivated by public interest considerations.

MUNICIPALIZATION

Municipalization involves a transfer of regulatory authority from the state level to the local level. Depending on the extent and efficacy of the public utility commission's mandatory conservation programs

for Investor Owned Utilities (IOUs), and the priority of the municipal agency, this transfer could result in more or less emphasis on conservation.

Our research has not produced data regarding how municipalization might affect water conservation, and issues and advantages under public ownership are probably similar to those identified under CIP above.

PPP

Under a PPP, water conservation is likely to depend on the priorities of the public entity, so issues and advantages under this alternative are similar to those identified under CIP above.

Contracts can be developed that encourage the private company to take a proactive role in maintaining system infrastructure. Long-term contracts and specific infrastructure maintenance requirements can ensure that the contractor uses proactive management techniques to reduce unaccounted-for water. To reduce the potential for confusion regarding which entity is responsible for conservation efforts, the contract should specify this delegation of responsibility.

ASSET SALE

With an asset sale, regulatory oversight of water conservation is transferred from local government to the state

CALIFORNIA URBAN WATER CONSERVATION COUNCIL (CUWCC)

The CUWCC is a nonprofit organization created to promote wise water use in California. CUWCC works through partnerships among urban water agencies, public interest organizations, and private entities, and has developed a set of 14 best management practices to assist water utilities in implementing water conservation measures. CUWCC can be found on the web at <http://www.cuwcc.org/home.html>

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Key Findings

WATER CONSERVATION

ADVANTAGES	ISSUES	RECOMMENDATIONS
<p>Developing water conservation program could be part of CIP implementation</p> <p>Implementing preventative and predictive maintenance programs, if part of CIP, reduces system leaks</p> <p>Public agencies are more likely to be motivated by public interest considerations regarding conservation than private companies</p> <p>Our research has produced no specific data regarding how municipalization might increase water conservation</p> <p>Our research has produced no specific data regarding how PPP implementation might increase water conservation</p> <p>Independent third party regulator has authority to mandate conservation measures</p>	<p>Lack of third party regulatory oversight to promote conservation, if it is not a priority of the public agency. We conclude that regionally or state-implemented conservation programs are less subject to local pressures to "sell more water."</p> <p>Insufficient data collection to evaluate conservation efforts</p> <p>Political pressure to keep rates low may discourage conservation</p> <p>No significant findings</p> <p>No significant findings</p> <p>Lack of clarity regarding which party is responsible for promoting conservation</p> <p>Private companies are more likely to limit evaluation of conservation programs to economic analysis, while public agencies may theoretically consider the public interest</p>	<p>Make water conservation a management priority and implement BMP's</p> <p>Analyzing per capita use information (preferably separate indoor/outdoor use) provides metric for evaluating conservation efforts</p> <p>Implement increased rate structure that ensures affordability for basic water needs and encourages conservation</p> <p>No significant findings</p> <p>Contract should allocate responsibility for customer education regarding conservation to the party that bills the customer. Since the public entity retains rate-setting authority under a PPP, they should be responsible for establishing conservation objectives and delegating implementation responsibility to the contractor if desired</p> <p>No significant findings</p>

C I P M U N I P P A S S E T S A L L E

Local Accountability

INDICES

We define accountability as the responsibility for outcomes of management decisions. Three questions should be considered in assessing accountability with respect to different water system ownership models: 1) Does the ownership model clearly assign accountability, or is it ambiguous? 2) Is accountability primarily in the public or private sector? 3) To what degree can the municipality or utility customers affect utility management decisions? The extent to which the municipality retains legal and financial liability for the outcome of water system management decisions is also an important consideration in evaluating water system ownership and management alternatives. Some models decrease local accountability for management decision outcomes, and others have the opposite effect. Accountability is also a complex management objective to assess because a public decision-maker may be interested in increasing or decreasing local accountability, depending on his/her priorities.

Indices used to assess local accountability include whether there is a local forum for water customers to access decision-making processes, and whether the public entity retains liability for environmental violations, worker accidents, or system failure at the water utility.

CIP

Under the CIP model of continued public ownership, the accountable party is the municipality, which plays both the role of service provider and regulator. Public ownership provides accountability because local citizens have the opportunity to directly participate in decision-making processes through attending city council meetings or other local public forums. CIPs could be designed to encourage community participation and use the opportunity to identify community priorities.

At the same time, the political pressure surrounding public utility management decisions can make such direct accountability problematic. According to the National Association of Water Companies (NAWC), “the common government interest in putting money into

more politically ‘visible’ projects such as education, law enforcement, roads, bridges, port facilities and subway systems often places water projects near the end of budget prioritization.”⁷⁴ The answer to this problem lies in the area of public outreach and effective communication. The American Waterworks Association Research Foundation (AWWA RF) writes: “getting consumers to foot the bill [for infrastructure investment needs] will be all the more difficult, and implies a need for better communication.”⁷⁵ Kevin Watter of the Long Beach Water Department writes, “the key to preventing artificially low water rates is to continually stress investment and long-term decision-making is in the best interests of the residents.”⁷⁶

For decision-makers interested in decreasing public sector liability for utility operations (environmental violations, worker accidents, etc.), the CIP alternative does not address this objective.

MUNICIPALIZATION

Another reason for municipalization commonly cited by its proponents is that locally owned and regulated water utilities have greater accountability to the community. Citizens concerned about the rates or quality of their water service can hold publicly elected officials directly accountable for problems at the local utility. Local ownership also provides easier and more convenient access to decision-making forums. Conversely, this increased accountability should be considered by decision-makers evaluating municipalization, and they should be fully prepared to take ownership of whatever challenges operation of the water utility may present.

A drawback to such direct access is the political pressure that may create incentives for a public system to underprice water or under-invest in system infrastructure (see CIP above).

PPP

According to regulatory expert Janice Beecher, PPPs may blur lines of responsibility and decrease accountability as the public entity serves as both the regulatory body and the contracting agency. In contrast with asset sales,

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LOCAL ACCOUNTABILITY

Key Findings

ADVANTAGES	ISSUES	RECOMMENDATIONS
<p>C Clear accountability for management decisions, as compared with potential ambiguity under PPP</p>	<p>Regulatory agency (the municipality) is subject to political pressure</p>	<p>Effective public outreach to ensure adequate support for utility resource requirements</p>
<p>M Local accountability increases as residents have local forum to address concerns about utility management. Accountability is not ambiguous</p>	<p>Regulatory agency (the municipality) is subject to local political pressure</p>	<p>Effective public outreach to ensure adequate support for utility resource requirements</p>
<p>P Direct contractual relationship between municipality and private company can specify roles and responsibilities</p>	<p>Municipality is playing dual role as regulator and contracting agency, creating potential for conflicts of interest</p>	<p>No significant findings</p>
<p>A Municipality has no liability for private company operations, as compared with PPP</p> <p>S No ambiguous accountability in relationship between municipality and private company, avoiding potential conflicts where the regulator is also the contracting partner</p>	<p>Reduced local access to decision-making forums</p> <p>No contractual relationship between municipality and company to enforce accountability</p>	<p>Municipality can intervene in IOU rate cases if they are not satisfied with private company operations</p> <p>Franchise agreements, when applicable, can be a way for municipality to retain some contractual obligations with the private company</p>

Rate Affordability

INDICES

According to the EPA, the simplest metric to assess rate affordability is the ratio of annual user charges to median household income, expressed as a percentage. An additional level of detail would involve scaling the metric for local socioeconomic conditions such as unemployment, ideally measured against state or national benchmarks.

CIP

Public utilities have several advantages that may lead to lower rates. According to Janice Beecher:

Private providers generally charge higher rates, which can be explained by profits (return on equity), taxes (all levels), financing (including availability of public funds), subsidies (often hidden), costing (including accounting and depreciation), ratemaking practices and types of charges (for example, system development and other charges by cities), and historic underpricing by many cities (deferrals).¹²

Our Thousand Oaks rate analysis supports this conclusion. Despite the fact that the private utilities operated significantly more efficiently, the public provider had significantly lower rates. In addition, because they are self-regulated, public systems may develop rate structures that address the affordability needs of their community, implementing their own “lifetime rate” structure that addresses local demographics.

In the instance where CIP implementation involves significant capital investments or acquisition of new technologies, a rate increase may be required. Publicly owned waterworks may choose to spread out costs over a period of time and/or issue bonds to raise the needed capital to initiate the CIP while attempting to avoid “rate shock.” AWWA RF recommends public outreach efforts to communicate the need for rate increases, and suggests that consumer resistance against higher rates may be less than expected.¹³

The rate affordability indices discussed above may be used to quantify customers’ ability to pay for current and expected change in rates and potential eligibility for an extension and/

or variance in meeting federal drinking water standards.

MUNICIPALIZATION

Municipalization may be driven by the desire to increase local control over water rates, and concerns that private companies are over-charging for water. In the unincorporated areas of Ashtabula County in Ohio, ratepayers took action in 1996 towards municipalizing the water system after water rates increased by approximately 33 percent. The county Board of Commissioners intended to stabilize rates, and in 1999 decided not to renew its 20-year contract with the company then operating the system, Aqua Ohio.¹⁴

At the same time, since municipalization often involves asset acquisition, significant transaction costs and potential backlogs of deferred maintenance may create the need for rate increases.

PPP

Under a PPP, the municipality retains rate-setting authority, so many of the issues and advantages associated with public ownership are similar to those identified under the previous sections.

As discussed under System Reliability, problems arose under the Atlanta PPP over infrastructure investment needs. If the parties do not undertake a thorough infrastructure assessment during contract negotiation, unexpected costs could lead to unanticipated rate increases. It is important that a thorough infrastructure assessment be conducted before the parties enter into a PPP, so that both parties understand infrastructure investment needs and can plan accordingly in contract negotiations.

According to the NAWC study, asset sales have been used more frequently than PPPs to avoid or reduce projected rate increases. Of the 14 PPPs they studied, only one city entered into a short-term contract when faced with projected rate increases of 37 percent, and the study does not indicate how much projected rate increases were reduced, or over what time period, merely stating: “rates limited following privatization.”¹⁵ We take this to mean that after privatization, rate increases were less than pre-privatization projections.

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Key Findings

RATE AFFORDABILITY

ADVANTAGES	ISSUES	RECOMMENDATIONS
<p>C I P</p> <p>Because they are self-regulated, public utilities have the ability to create rate structures that meet the demographic needs of their community (e.g., establish lifeline rates)</p> <p>Customers have a local forum (e.g., city council meeting) to address rate concerns</p>	<p>CIP implementation may involve up-front costs (e.g., technology purchases) that could affect rates</p> <p>CIP could identify need for major capital projects that may increase rates</p>	<p>Cities can avoid “rate shock” by spreading costs over longer period, or issuing bonds to raise additional capital for such expenditures</p> <p>Create dedicated fund for long-term capital needs issue bonds; spread cost-recovery over long time period</p>
<p>M U N I</p> <p>Public ownership may lead to lower rates due to political incentives, lower cost of capital, smaller tax burden, etc.</p>	<p>Up-front costs of municipalization may lead to rate increases</p>	<p>In acquisition planning, consider how infrastructure needs may affect rates and develop long-term plan for cost-recovery that will minimize “rate shock”</p>
<p>P P P</p> <p>Municipality retains rate-setting responsibility, and public utilities have the ability to create rate structures that meet the demographic needs of their community (e.g., establish lifeline rates)</p>	<p>Unclear cost-sharing arrangement or lack of info about infrastructure conditions leads to “unexpected” costs and the need for unanticipated rate increases</p>	<p>Infrastructure assessment prior to contract negotiation to avoid unexpected costs, and contractual recommendations on capital cost-sharing</p>
<p>A S S E T S A L E</p> <p>For small systems, increasing economies of scale under consolidation with larger private company operation may lower operating costs and reduce need for rate increase</p>	<p>Private company rates may be higher due to profits, taxes, etc.</p>	<p>Implement restrictions on rate increases through purchase & sale agreement or franchise agreement</p> <p>Municipality can be intervenor in IOU rate cases, especially if they feel rate increases are not justified</p>

Supply Reliability

INDICES

Indices for assessing supply reliability include: 1) volume and type of storage capacity (surface, tank, and groundwater), 2) timeline for water supply planning efforts, 3) whether regional supply coordination efforts exist, and 4) whether water supply planning efforts are coordinated with local land use planning efforts.

CIP

Our research does not definitively address the issue of whether public or privately owned water utilities are more effective in addressing long-term supply issues. In California, the majority of the state's water supply infrastructure is under public ownership, so public ownership may offer a greater likelihood of regional supply coordination between public agencies. According to AWWA RE, "A primary driver of regionalization is to optimize drinking water supplies to meet increasing customer water demands ... A regionalization process allows utilities to restructure water rights agreements to the benefit of the entire region."²¹ Another advantage to public utility ownership is the increased potential for coordination between municipal land use planning and water supply planning efforts.

Lastly, in California, public water agencies have better access to state funding for water supply projects.

MUNICIPALIZATION

Whether municipalization has the potential to increase supply reliability is dependent upon local circumstances. Potential advantages for public systems in addressing water supply are the same as those identified under CIP above.

PPP

Under a PPP, the municipality retains asset ownership, so public-sector advantages in addressing water supply planning should be the same as those discussed under CIP above. In addition, the private contractor may be able to provide additional expertise for supply management decisions. Some of the PPP contracts that Southwest Water enters into require the contractor to develop an annual supply plan for the city.²²

ASSET SALE

Asset sales may decrease the potential for regional coordination between public agencies to address issues related to supply reliability, and private companies may have less access to public grant funding for supply-related projects than public agencies. At the same time, NAWC cites water supply projects as attractive prospects for private capital investment.²³

Key Findings

SUPPLY RELIABILITY

RECOMMENDATIONS

ISSUES

ADVANTAGES

<p>Community does not have resources to meet long-term water supply needs</p>	<p>Assess opportunities for regional coordination with other public agencies to address supply issues</p>
<p>Lack of communication between water supply planning personnel and land use planning personnel</p>	<p>Increase coordination between municipal agencies to incorporate water supply planning into land use planning efforts</p>
<p>See CIP above</p>	<p>See CIP above</p>
<p>See CIP above</p>	<p>See CIP above</p>
<p>Lack of access to funding sources that publics have (e.g., Proposition 50)</p>	<p>No significant findings</p>

CIP provides opportunity to address long-term supply planning needs
 Municipality oversees land use decisions as well as water supply planning, creating opportunity to consider water supply issues in land use decision-making
 In California, public agencies have greater access to state funds for supply planning under Proposition 50

Public ownership could bring increased potential for regional coordination to address supply

Private company may increase supply planning expertise, particularly for small cities

Private company serving multiple areas could have benefits of institutional knowledge about addressing water supply issues, particularly in comparison with small public systems

Water Quality

INDICES

In retail water distribution systems, water quality is most influenced by the source of water supply, but may also be influenced by the level of infrastructure investment. Our analysis considers only factors related to infrastructure investment in our assessment of potential water quality impacts from decisions regarding water system ownership and management. Some water quality metrics include:

- 1) number of water quality violations issued by the Department of Health Services (DHS) per year, and 2) the number of DHS citations for not meeting monitoring or reporting requirements per year. In addition, tracking customer complaints about water taste, odor, or appearance could also be used as water quality indicators.

CIP

As described above, CIP implementation may improve water quality through increased focus on long-term asset management practices. At the same time, if systems do not have the financial resources required to address infrastructure needs, CIP implementation may be an inadequate mechanism for meeting the funding gap.

Regionalization may provide a means for small systems to address water quality concerns. AWWA RF cites Jenny Bielanški, the EPA Drinking Water Utilities Team Leader, who stated that regionalized systems "... can be better equipped to have the long-term technical, managerial, and financial capacity to comply with Safe Drinking Water Act (SDWA) requirements."²⁴

In the case where political pressure to keep rates low induces public officials to under-fund system maintenance, CIP benchmarking processes can be used to produce decision-making support for increasing infrastructure investment. In the NAWC privatization study, process improvements implemented by the private companies to attain compliance with water quality standards were relatively simple in four of the twelve cases studied, involving system flushing and implementing chemical dosing programs.³ Depending on the extent of water quality problems facing the public system, achieving compliance through CIP implementation may not require excessive capital investment.

MUNICIPALIZATION

If municipalization occurs as the result of poor service quality under private ownership, there could be a significant backlog of

deferred maintenance which affects water quality. In addition, the significant up-front costs of municipalization can make adequate investment in system infrastructure more problematic. See the System Reliability section for a discussion of the need to account for infrastructure investment requirements in acquisition planning.

PPP

According to the California DHS, the owner of water utility infrastructure is responsible for meeting water quality standards. Under a PPP, the public entity retains asset ownership and is ultimately responsible for standards compliance. However, the public entity is not actively participating in day-to-day management of the system. For this reason, the terms of the PPP contract should clearly define responsibility for meeting water quality standards and which entity will pay if any violations are imposed. Contractual cost-sharing mechanisms may increase coordination between the parties to address water quality issues.

The NAWC study offers promising results in terms of improving compliance with water quality standards through privatization. Twelve of the 29 facilities studied attained compliance prior to privatization, and all were in compliance with water quality standards within one year of privatization. Four of these examples were O&M contracts. Process improvements implemented by the private companies to attain compliance with water quality were relatively simple in four of the twelve cases studied, as discussed under CIP above.

ASSET SALE

As discussed under System Reliability, asset sales involve greater potential for private sector capital investment than the PPP model of privatization. Particularly if infrastructure investment was under-funded under public ownership, water

RESOURCES

The EPA currently has an affordability-based variance program that works to assist small and very small municipal systems with meeting water quality requirements; additionally, funds are available to small systems via the Drinking Water State Revolving Fund.

For more information, visit: <http://www.epa.gov/safewater/smallsys/affordg.pdf>

Key Findings

WATER QUALITY

	ADVANTAGES	ISSUES	RECOMMENDATIONS
CIP	CIP implementation may address infrastructure problems, improving water quality CIP implementation may increase operational efficiency, freeing more resources to address water quality issues	Water quality depends in large part on source of supply - for some systems, cost of managing water quality outstrips available resources CIP implementation may not be sufficient to create the necessary resources for meeting the high cost of meeting new regulatory standards	Regional coordination with other public utilities to address supply quality issues Proactively work with regulators to identify compliance problem areas and develop solutions that meet community needs. See Resources box
MUNI	Increased accountability and political pressure may increase incentives for infrastructure investment	Up-front costs of municipalization create obstacles for adequate level of infrastructure investment	Consider needed infrastructure investment in acquisition planning and financing
PPP	Particularly for small systems, water quality management could become more cost-effective through increasing economies of scale. Ideally, private company can merge water quality activities into larger operation, such as lab analysis, regulatory compliance, and infrastructure maintenance activities	Municipality is removed from direct activities of managing water quality, but is legally accountable for violations	Contract terms that specify water quality benchmarks to be attained and stipulate repercussions for water quality violations. Contract can also include positive incentives such as rewards for certain length of time without water quality violations Research water quality performance record of any companies submitting bid to purchase system
ASSET SALE	If private company serves multiple areas, acquisition could increase economies of scale by merging water quality activities into larger operation	Municipality no longer has control over water quality management activities but has political accountability to its citizens	Municipality no longer has to bear the cost of water quality management

System Reliability

INDICES

System reliability addresses long-term infrastructure investment and planning, and other asset management practices. Indices to assess system reliability include: 1) unaccounted-for water (the amount of water purchased from the wholesaler minus the amount billed to customers minus non-revenue water expressed as a percentage of total water purchases), 2) number of distribution system breakdowns (main breaks) per mile of pipeline, and 3) annual maintenance expenditures per mile of pipeline. Financial performance can also be an indicator of system reliability because systems that are not performing well financially may have a greater incentive to defer infrastructure maintenance. Two indices of financial performance are: 1) return on assets (net income over total assets) and 2) debt ratio (total liabilities over total assets).

CIP

Infrastructure investment is a key factor in system reliability. CIP implementation may improve system reliability through increased focus on long-term asset management practices. AMSA/AMWA estimates that implementing a time-based preventative maintenance program improves system reliability by an average of 25 percent, and a predictive maintenance program improves reliability by an average of 70 percent. Cost savings for planned maintenance programs can be as much as 40 percent of annual O&M costs.²⁸

Public utilities may have a lower cost of capital than private companies because they can issue low-interest municipal bonds that are tax-free for investors. This should be an incentive for infrastructure investment. At the same time, the amount of general obligation bonds that can be issued is often limited by state or local regulation.²⁷ There may be political resistance to issuing new bonds via the voting process. Also, too much debt can hurt the municipality's credit rating, limiting its ability to borrow at a future date.

Most importantly, political pressure to keep rates low may impede needed levels of infrastructure investment under public utility ownership. Public water systems may have to compete for resources with more visible public priorities such as schools, police, or street repair.²⁸ In addition, municipal water departments may have to work to keep their revenues from being appropriated for other purposes.

Effective public outreach is essential to ensuring community support for increased infrastructure investment. In addition, AWWA RF

emphasizes the importance of political skills for water managers to ensure their department's funding needs are met.²⁹ Increasing transparency and accountability for city finance practices may be one method of combating these issues.

MUNICIPALIZATION

With municipalization of small water systems, economies of scale can be problematic for meeting system reliability objectives. A 1997 study by the EPA estimated that over the course of 20 years, the cost of meeting the country's water infrastructure investment needs was much higher for small systems than for medium or large systems.* \$3,300 per household for those served by small systems, compared with \$1,200 per household for those served by medium systems, and \$970 for those served by large systems.³⁰

In addition, if municipalization occurs as the result of poor service quality under private ownership, there could be a significant backlog of deferred maintenance. It is important that the city conduct a thorough assessment of the condition of the water distribution infrastructure before acquiring the system, to ensure better accuracy for cost projections. The significant up-front costs of municipalization can make adequate investment in system infrastructure more problematic.

Communities should consider all funding options that are available prior to attempting to municipalize their water system. Some of the options available include but are not limited to, federal or state revolving funds, bonds, or loans.

PPP

The NAWC cites backlogs of deferred maintenance and capital investment needs as a primary driver for many privatization models, including PPPs.³¹ However, the same study asserts that PPPs may not be the best means of obtaining private sector capital investment: "Despite recent regulations that extend the allowable contract period in O&M arrangements to 20 years, there were no significant capital expenditures in the 14 O&M and two outsourcing projects included in this study."³²

Garner indicated that the PPP contracts his company enters into typically establish a per-item threshold of \$1,000 to \$2,000 as the maximum the private company will pay for system maintenance. Any capital requirements beyond that threshold are the responsibility of

*costs reported in 1995 dollars

Key Findings

SYSTEM RELIABILITY

ADVANTAGES	ISSUES	RECOMMENDATIONS
<p>C Lower cost of capital for public entities decreases the cost of infrastructure investment</p> <p>I If CIP involves implementing preventative and predictive maintenance program, system reliability is likely to improve</p>	<p>If CIP identifies deferred maintenance needs, addressing the backlog can increase operating costs</p> <p>Using public water system revenues directly or indirectly to fund other municipal functions could compromise system reliability by causing under-investment in infrastructure</p> <p>Political incentives to keep rates low may over-emphasize short-term cost reduction at expense of long-term infrastructure investment</p>	<p>Emphasize long-term cost savings of comprehensive asset management programs</p> <p>Strict separation of water system finances through creation of an enterprise fund, evaluation of finances to ensure city is using “market rates” for charge-backs to the water department</p> <p>Depoliticize planning process by promoting long-term planning and explaining water quality benefits of infrastructure investment</p>
<p>M Increased accountability and political pressure may increase incentives for infrastructure investment</p>	<p>Up-front costs of municipalization create obstacles for adequate level of infrastructure investment</p> <p>Lack of knowledge about infrastructure condition prior to municipalization</p> <p>Unequal knowledge about infrastructure condition between negotiating parties</p>	<p>Consider needed infrastructure investment in acquisition planning and financing</p> <p>Conduct infrastructure assessment prior to purchasing utility assets</p> <p>Conduct infrastructure assessment as part of contract negotiation process</p>
<p>P Private company may have greater access to institutional knowledge and technical expertise for managing system infrastructure, particularly for small systems</p>	<p>Lack of incentives for private company to invest in infrastructure, especially with short-term contract</p> <p>Lack of clarity regarding which party is responsible for capital investment</p>	<p>Cost-sharing, longer contract terms, & other contract mechanisms that incentivize infrastructure investment</p> <p>Clear contract terms specifying which entity is responsible for which costs. Since public entity retains asset ownership, it should take primary responsibility for capital investment in infrastructure. A contract could set a floor above which the public entity is responsible for capital costs</p>
<p>A Private company assumes responsibility for infrastructure projects and capital investments- has greater incentive for infrastructure investments than under PPP</p>	<p>Profit motive may incentivize infrastructure maintenance deferral</p>	<p>Public entity should research the reputation of potential buyers to see how they have performed in terms of system reliability in other locations</p>

Customer Satisfaction

INDICES

Through our survey research in Thousand Oaks, we determined five elements of utility operation that had the most significant effect on overall customer satisfaction: service, rates, the customer's experience with the telephone call center, billing, and the water provider's community involvement. Customer surveys are the best means of assessing customer satisfaction, and telephone surveys are the least expensive method.

CIP

CIP implementation may include efforts to increase customer satisfaction. The AWWA RF study found: "For three basic areas of consumer satisfaction (tap water quality, overall customer service, and complaint resolution), managers overestimated satisfaction by 14 percent to 20 percent," highlighting the importance of regular surveys to gauge customer satisfaction and identify problem areas.³⁵

Since a customer's experience with their provider's telephone call center significantly affects overall satisfaction, CIP implementation should involve an assessment of call center performance. AWWA RF recommends aiming to resolve customer requests on the first call, answering calls within 20 seconds, ensuring staff coverage during lunch breaks, and better training for customer service representatives.³⁶

Our research indicated that billing accuracy and timeliness was an important contributor to overall customer satisfaction. AWWA RF recommends implementing new technologies to facilitate bill payment options, such as creating web access for billing information, interactive voice response systems, and automatic meter reading.³⁷

Our research indicates that customer perceptions about their water provider's community involvement contribute to overall satisfaction. We conclude that public relations efforts informing customers about aspects of utility operations that affect service quality are important to increasing satisfaction. The AWWA RF concurs: "... communicating with customers to educate them may increase customer satisfaction."³⁸

Utility size may also affect customer satisfaction. According to the AWWA RF study mentioned above, "Customers of moderate (5-20 MGD) to large water providers (50-100 MGD) were less satisfied with overall tap water quality, safety, and healthiness, when compared to customers of small water providers (<5 MGD)."³⁹ On the other hand, NAWC asserts that consolidating customer service functions into larger operations can improve service quality through increasing "specialized expertise."⁴⁰

For small public systems, such consolidation would likely involve a regionalization effort.

MUNICIPALIZATION

Problems with customer satisfaction may be a motivating factor for municipalization. It is unlikely that a municipality would incur the high transaction costs associated with municipalization if there were not already serious customer satisfaction problems under private utility ownership.

The CIP section above outlines recommendations on improving customer satisfaction under public utility ownership.

PPP

The NAWC cites the desire to improve customer service as a driver of privatization in several of the cases they examined.⁴¹ Specific improvements from consolidation and centralization of customer service functions included the extension of call center operating hours, reductions in call waiting time, and implementation of automatic billing processes that spread statement mailings over a longer time period. In addition to smoothing cash flow, this process improvement spreads customer calls over the length of the billing cycle.⁴² Particularly for small public systems that do not have the resources to support dedicated customer service personnel or implement 24-hour call centers, PPPs can bring improvements in customer service.

Our case study in Thousand Oaks supports the potential drawbacks from consolidation of customer service operations that occur when customer service staff are no longer locally based. Customers were more dissatisfied with the centralized call center that was located in another state, particularly with the customer service representatives' lack of local knowledge.

ASSET SALE

One of the most attractive aspects of privatization is the potential for realizing economies of scale through centralizing administrative

RESOURCES

The Office of Water Service in England and Wales (Ofwat), England's regulatory agency for water utilities, uses detailed indicators to assess service performance, including requiring utilities to report customer service metrics on an annual basis.

These indices are available at: <http://www.ofwat.gov.uk/aptrix/ofwat/publish.nsf/Content/losindicators>⁴³

Key Findings

CUSTOMER SATISFACTION

ADVANTAGES	ISSUES	RECOMMENDATIONS
<p>C CIP implementation may improve customer satisfaction through assessment of current practices and implementation of procedures to improve performance</p>	<p>Our research does not show that public water utilities provide better customer service than private utilities, and much depends on management priorities</p> <p>Water utility is not an active, visible participant in community events, which may decrease customer satisfaction, according to our survey results</p> <p>Lack of customer satisfaction data to determine where problems exist</p> <p>Customers unaware of issues utility is working to address (ex: algae blooms, other quality/taste issues)</p> <p>Lack of resources (e.g. to provide adequate customer service staffing), particularly for small water systems</p>	<p>Incorporate customer service assessment into CIP implementation</p> <p>Develop public outreach campaigns to communicate how the utility is serving the community. Participate in community events</p> <p>Conduct regular customer satisfaction surveys</p> <p>Develop protocol for informing customers proactively about issues affecting service</p> <p>Investigate opportunities for regionalizing customer service operations with other public water utilities in the area</p>
<p>M Our research did not produce specific findings about how municipalization could affect customer satisfaction. Issues and recommendations are similar to those discussed under CIP above</p>	<p>No significant findings</p>	<p>No significant findings</p>
<p>P Particularly for small systems, benefits may come from consolidation of customer service function with larger operation; for example, gaining dedicated customer service personnel and technical support system</p>	<p>Service center moves to centralized location and is no longer local</p>	<p>Contract terms that seek to maintain local customer service office/personnel or other customer care protocols</p>
<p>A Particularly for small systems, benefits may come from consolidation of customer service function with larger operation; for example, gaining dedicated customer service personnel and technical support system</p>	<p>See PPP above</p>	<p>Supulation in purchase and sale agreement to maintain local customer service office/personnel</p>

Operational Efficiency

INDICES

Operational efficiency is defined as short-term system input per short-term system output. Operationally efficient systems will minimize the resources (employee hours, operational costs, etc.) needed to produce a unit of output (one HCF, for example). Some metrics to evaluate operational efficiency include: 1) operating ratio (annual operating expenses divided by annual operating revenue), 2) annual operating expense (less uncontrollable costs) per customer connection, and 3) labor expenses per customer connection.

CIP

CIPs can be designed to increase the operational efficiency of public utilities in many ways: increased organizational focus on efficiency improvement, performance benchmarking (both with other utilities of similar size, and by using detailed metrics to track the utility's own internal improvement), process streamlining, labor-management improvements such as cross-training, and acquisition of technological tools such as management information systems.⁴⁴

Our Thousand Oaks case study results show that the two private companies are operating more efficiently than the public utility. Most likely this is due to private sector incentives to maximize profits, where the public sector objective is to ensure that revenues cover the cost of providing the service. However, customers of the privately owned utilities in Thousand Oaks also pay higher rates for their water service, despite the companies' greater efficiency. These results suggest that public utilities potentially have much to gain from CIP implementation.

MUNICIPALIZATION

A key consideration under municipalization is the potential for loss of economies of scale that would reduce operational efficiency. Under private ownership, the system may combine functions with the company's other service areas, such as consolidated billing, customer service, or laboratory operations. Under public ownership, the municipality is confined to a limited jurisdiction, and is likely to have limited options for increasing economies of scale.

In some instances, regional coordination may be an opportunity for improving operational efficiency by realizing economies of scale.⁴⁵ According to the AWWA RF, "the consolidation of specific utility services, such as billing, utility administrative functions, planning, operations, and maintenance, can

also result in significant cost savings."⁴⁶ Consolidation benefits may include reduction of treatment costs, access to capital at lower costs, and an increased capacity to address annual resource management concerns.⁴⁷ Whether such efforts are possible depends largely on the spatial distribution of surrounding systems and also the relative size of the public water utilities involved.

PPP

Municipalities may use PPPs to reduce utility operating costs. In 1999, the NAWC surveyed 29 instances of water system privatization across the U.S. Eighteen (62 percent) of the facilities included in that study indicated that financial issues were the primary reason for privatization.⁴⁸ The most common issues included cash flow problems (deficits) or excessive operating costs and a backlog of capital requirements.⁴⁹ Due to the importance of economies of scale to water utilities, small systems may be more likely to face these types of problems.

Ideally, the private company will be able to utilize economies of scale and technical expertise from multiple service areas, as well as implement process improvements that increase efficiency. Anton Garnier, CEO of Southwest Water, says that his company can typically achieve a 30 percent reduction in operating costs when they take over operation of a publicly run utility under a PPP.⁴⁶ According to the NAWC, major operating cost reductions (10 to 40 percent) were achieved at five of the projects they studied. Cost reductions were achieved primarily through: "Installation of computerized management systems; economies of scale in purchasing equipment and supplies; and process control expertise to improve the utilization of facilities."⁵⁰

The private contractor may be able to lower operating costs through centralizing administrative staffing functions, ordering supplies in bulk at a reduced cost, and sharing common inventory items, operators, and maintenance personnel among multiple service locations.⁵¹ However, according to Garnier, the majority of the cost-savings achieved by his

RESOURCES

The Association of Metropolitan Sewerage Agencies (AMSA) and the Association of Metropolitan Water Agencies (AMWA) have compiled an excellent guide to CIP implementation, *Thinking, Getting, Staying Competitive: A Public Sector Handbook*. This guide identifies the most common obstacles that public utilities encounter in maximizing efficiency, and provides recommendations for addressing those obstacles.

Key Findings

OPERATIONAL EFFICIENCY

	ADVANTAGES	ISSUES	RECOMMENDATIONS
C I P	CIP may reduce operating costs by improving operational efficiency	Public-sector business model does not contain as many incentives to maximize operational efficiency as private-sector business model	Improve operational efficiency through systematic benchmarking and internal evaluation of operations to determine areas where greatest efficiency improvements can be made
M U N I	Our research has not provided any data regarding operational efficiency improvements resulting from municipalization	System is too small to realize economies of scale Political incentives to keep rates low may over-emphasize short term cost reduction at expense of long-term maintenance planning and investment Could involve loss of economies of scale, particularly if municipalization involves a system serving fewer than 3,300 people Lack of municipal experience with running water utility	Investigate opportunities for regional coordination with other public utilities Depoliticize planning process by promoting long-term planning and explaining benefits of infrastructure investment through public outreach Look for opportunities for regional coordination/consolidation with other public systems Seek to retain or attract upper level management staff with sufficient experience in utility operations to address efficiency improvements
P P P	Improve operational efficiency through centralization/consolidation with larger utility operations, leading to economies of scale	Short-term efficiency improvements could be at the expense of long-term system infrastructure investment	Contract should include specific performance benchmarks for meeting efficiency goals that do not compromise long-term infrastructure needs
A S S E T S A L L E	Transition to private-sector business model creates incentives for increased operational efficiency Improve operational efficiency through centralization/consolidation with larger utility operations Access to increased technical expertise and industry “best practices,” especially for small systems	No significant findings	No significant findings

Public Acceptance

INDICES

The primary index of public acceptance would be determining whether the management decision to implement a different ownership structure causes a significant degree of public opposition.

CIP

Since the system remains in public hands, CIP implementation is unlikely to cause significant negative reaction on the part of the public. The goal of CIP implementation – increasing public utility efficiency – is likely to draw broad support. Some degree of public dissatisfaction may arise if the CIP identifies significant capital investment that would be passed along to ratepayers. In addition, if CIPs involve staffing assessments that result in labor reductions, some public resistance may occur. AWWA RF recommends public outreach efforts to communicate the need for rate increases, and suggests that consumer resistance against higher rates may be less than expected.⁵³

MUNICIPALIZATION

It seems unlikely that municipalization would occur without significant community support for the initiative. In Montara, California, citizens had to pass a \$19 million bond measure before the city could attempt to acquire the water system. In Felton, California, the grassroots group Friends of Locally Owned Water (FLOW) has launched petition drives to support public acquisition of the water system. At the same time, community members often support municipalization because they believe public ownership will provide lower rates in the long term.⁵⁴ The extent to which the municipality can finance the acquisition in order to avoid rate shock is critical to ensuring public support. As discussed above, effective outreach is the key to promoting acceptance of municipal expenditure.

PPP

Public resistance to water privatization extends to PPPs as well as to asset sales. Resistance may be rooted in ideological arguments that profit-driven companies should not “control” a life-giving resource, which can create a sensitive and sometimes volatile atmosphere around the decision. In Stockton, California, the mayor and the Stockton city council did not adequately engage the citizens of Stockton in the decision-making process to privatize its waters systems. As a result, public outcry was far stronger than anticipated, and the city became embroiled in a costly lawsuit. In order to minimize or avoid public resistance to PPP implementation, it is crucial that the local community be made aware of the decision-making process leading towards a PPP. The public should understand the purpose of the PPP, and the steps that are taken to

protect the public's interest during contract negotiations.

Community members are often concerned about the potential for job losses with the establishment of a PPP. The contract may stipulate conditions which secure local jobs for a certain period of time, and prevent the private company from decreasing the existing work force except by attrition.⁵⁵

ASSET SALE

Water privatization is and will continue to be a politically divisive issue due to the ideological aspects discussed above. Asset sales have a higher potential for public opposition because of the decrease in local control and accountability, particularly over sensitive issues like water rates and utility staffing. Again, conducting effective public outreach and promoting community involvement in the decision-making process may increase acceptance.

Public acceptance of asset sales may be even more difficult to achieve if the private company is a foreign-owned corporation. In Thousand Oaks, the City protested to the CPUC in hopes of preventing the acquisition of American Water Works by RWE. Deputy City Manager Scott Mitnick said, “Never before have ... water companies been owned by companies outside of the U.S. It's just unprecedented. You are allowing profits to flow out of the state and out of the country.”⁵⁶ The negative perception of ceding control over a vital resource to a foreign company, despite the fact that the company is still regulated by domestic laws, is a difficult one to overcome. In our survey of Thousand Oaks water customers, over 90 percent of respondents indicated opposition to foreign water utility ownership. At the same time, customers of the foreign-owned utility were no less satisfied with their water service than customers of the domestically-owned utilities. Effective public outreach to communicate the regulatory protections afforded by U.S. law is especially critical when asset sales involve foreign-owned water companies.

Key Findings

PUBLIC ACCEPTANCE

ADVANTAGES	ISSUES	RECOMMENDATIONS
C I P	Rate increases brought on by CIP implementation Layoffs resulting from CIP implementation	Public outreach to inform community about benefits of CIP implementation
M U N I	Potentially high acquisition costs and potential for rate pass-throughs could lead to increased public resistance	Though it is unlikely that municipalization would happen without strong public support, a public information campaign to inform the community about the decision-making process could increase support
P P P	Political resistance to privatization	Consider reputation of private company in bid acceptance Ensure that privatization decision-making process is transparent, that the local needs addressed by PPP are clear, and provide a forum for the public to express their views/concerns. Start public education process early Consider official role for public representatives in decision-making process
A S S E T S A L E	Local job loss Political resistance to privatization No significant findings	Contract terms that stipulate natural attrition only for set time period Consider reputation of private company in bid acceptance Ensure that privatization decision-making process is transparent, that the local needs addressed by privatization are clear, and provide a forum for the public to express their views/concerns. Start public education process early Consider official role for public representatives in decision-making process
	Local job loss	Contractual conditions in Purchase and Sale Agreement that stipulates natural attrition

Management Objectives

Local Control
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ASSET SALE

Decisions regarding rates, infrastructure investment, staffing, and customer service operations are likely to have the greatest local impact. Public decision-makers may oppose all forms of water system privatization due to fears about loss of local control, and asset sale is the privatization model that removes the greatest amount of decision-making authority from local jurisdiction.

Asset sales are likely to reduce public access to significant decision-making processes such as rate-setting, as such decisions are no longer made in local venues like city council meetings. Public utilities commissions (PUCs) often offer forums for public comment, but such forums may not be held locally. The public meeting is usually held in front of an administrative law judge who hears commentary from the regulated utility as well as members of the public and other stakeholders. It is debatable whether the PUC as a regulatory entity performs as well representing the needs of local rate-payers compared to the accessibility provided by local ownership and regulation, but such questions were beyond the scope of our research project.

For asset sales involving foreign-owned water companies, there is the potential for international law to trump domestic regulations. The results of legal research conducted by our partners at the UCLA

School of Law indicate that the legal case for using NAFTA in this way is stronger than GATS, especially since water is not listed under the US specific GATS obligations. However, NAFTA is not currently an issue since there are no Mexican or Canadian-owned water utilities operating in the US. No examples currently exist of either law being applied in this way. In addition, in the event that foreign-owned water companies file suit against domestic regulations under GATS or NAFTA, such suits are unlikely to prevail if the regulations in question apply equally to US-owned and foreign-owned companies.

Water Conservation

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ASSET SALE

public utilities commission. In cases where water conservation was not a management priority under public ownership, this transition may result in greater emphasis on conservation. In California, the PUC develops district-specific conservation rules that the private company operates within, depending on supply availability. These rules may be more or less stringent than what a municipality may implement on their own. At the same time, some IOUs may only implement water conservation programs when there is funding available from the PUC to implement them.³

As discussed above, the public and private water utilities in Thousand Oaks do not appear to be significantly different

in their efforts to promote conservation, though public entities may have a greater incentive to consider the public interest in deciding to implement conservation measures, where private firms are primarily motivated by cost considerations.

Local Accountability

continued from page 6

the public entity serves as both the regulatory body and the contracting agency.⁷ In contrast with asset sales, there is no third party regulator or dispute mediator that is removed from the contractual relationship between the municipality and private water company. In addition, Beecher cites the use of “concession fees” — monies paid by the private company to the public agency upon bid approval — as further complicating accountability. Two of the 14 O&M contracts reviewed in a recent NAWC privatization study involved concession fees.⁸

At the same time, from the public manager’s perspective a PPP could bring greater accountability than the asset sale privatization model as there is a clear contractual obligation for the private company to meet well-defined performance specifications.⁹ Such an advantage is entirely dependent upon the efficacy of the contract document in assigning responsibility and establishing performance metrics, and creating contract management mechanisms to ensure performance goals are met.

If a municipal decision-maker is

concerned about liability from utility operation such as environmental violations, system malfunctions and worker accidents, the PPP model of privatization would not shield the public entity from liability as much as an asset sale model would. In California, the Department of Health Services (DHS) lists the owner of water utility infrastructure on the required water quality permit, which is valid for the lifetime of the system. Therefore, if a city owns the system infrastructure and a private company operates and maintains the infrastructure, the city is still liable to DHS for any water quality violations.¹⁰

ASSET SALE

Compared with the PPP model of privatization, asset sales offer less potential ambiguity with respect to accountability. Asset sales are preferable in Beecher’s analysis because they involve a third party regulator that is removed from any contractual relationship between municipality and private water company. In Thousand Oaks, we witnessed how the municipality intervened in a PUC rate case when it had concerns that local interests were not being adequately addressed by private company operations.

The more clearly-defined separation of accountability between the public and private entities does not necessarily imply that there will be sufficient local accountability to meet decision-makers’ objectives.

Management Objectives

Asset sales decrease local accountability in terms of decreasing public access to decision-making processes, as described under CIP above. However, participation in PUC rate cases can provide some measure of accountability.

Compared with a PPP, an asset sale offers less accountability from the public manager's perspective as there is no contractual obligation for the private company to meet well-defined performance specifications.¹¹ In some instances, intervention in PUC rate cases may be sufficient to address local interests. In other cases, the municipality may be able to enter into a franchise agreement with the private company.

At the same time, municipal decision-makers may find advantages in asset sales in terms of limiting municipal liability for management of the local water system. If the municipality wishes to reduce potential liability for environmental violations, worker accidents, or other outcomes of utility operations, asset sales provide the best way of accomplishing this goal.

Rate Affordability

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Private companies tend to have more aggressive bill collection strategies than local governments. When Buffalo, New York, entered into a five-year contract with American Anglian in 1997, one of the first actions taken by the company was to initiate an aggressive policy to collect unpaid bills. American Anglian's bill-pay policy involved a 21 percent

interest rate on unpaid bills, which the company was allowed to retain.¹² NAWC cites reduction of delinquent accounts as a potential benefit of PPPs.¹⁷

ASSET SALE

With an asset sale, regulatory authority for rate-setting is transferred from local government to the state public utilities commission. In California, the PUC does not have a statewide rate affordability program such as a life-line water rate requirement. Instead, life-line rates are set on a district-by-district basis due to the unique requirements of local demographics.¹⁸

Several factors could lead rates to increase under an asset sale. Under CIP above we discussed the reasons that rates may be lower under public ownership. Consequently, asset sales may lead to higher rates in the long term. Particularly if the public system had a significant amount of deferred maintenance, the private company might need to make large capital investments, which could potentially be passed on to the rate base. On the other hand, according to the NAWC study:

IOUs in this study have been able to control and in some cases eliminate the anticipated rate increases by lowering operating costs and implementing capital expenditure programs. In most cases, these operating cost savings were used to cover the cost of capital improvements and avoid rate increases.¹⁹

Our Thousand Oaks case study also demonstrated the potential for increased operational efficiency at the public utility, which supports the NAWC argument.

In order to avoid potential rate increases under asset sales, the IOU may be obligated to keep rates fixed for a certain amount of time under conditions of the sale. This was the case when the City of Coatsville, Pennsylvania, sold its water system to Pennsylvania-American Water Works. As a condition of the sale, the private company was required to freeze rates for three years after the time of the sale.²⁰

Water Quality

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ASSET SALE

quality could improve under asset sales as the private company earns a rate of return from its infrastructure investment. Private companies are also insulated from political pressures to keep rates low that may drive underinvestment in infrastructure for publicly owned utilities.

In the NAWC study, five of the nine asset sales examples were out of compliance with water quality standards prior to asset sale. Within one year, all facilities were in compliance.²¹

System Reliability

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the municipality. NAWC concludes,

“partnerships are preferred when the municipality has the ability to continue to make major capital investments.”²² In contrast with asset sales, PPPs do not provide companies with a rate of return on their infrastructure investment because the infrastructure remains under public ownership. PPPs have the potential to increase system reliability to the extent that efficiency gains save cities money, which can then be used for capital investment.

Though PPPs may not significantly increase private sector capital investment, PPP contracts can be developed to encourage companies to take a proactive role in maintaining system infrastructure. Interviews conducted during our research have suggested that if a company is only operating in an area for a short length of time, it may be more likely to defer maintenance to maximize short-term profits.

Indianapolis has contracted Veolia Water North America for operation and maintenance of the city's water distribution system. The 20-year contract includes specific language regarding infrastructure replacement and maintenance schedules. The city retains control of infrastructure condition by holding regular meetings with Veolia and approving all capital improvement projects.

Management Objectives

Another critical issue affecting system reliability under PPPs is the need for a thorough infrastructure assessment prior to entering into contract negotiations. The lack of a thorough infrastructure assessment is one of the most cited reasons for the failure of the Atlanta PPP.²⁴ A thorough infrastructure assessment will ensure that both parties understand infrastructure investment needs and can plan accordingly in the contract negotiation.

ASSET SALE

With an asset sale, the private company assumes responsibility for infrastructure maintenance and capital investment. Compared with the PPP model of privatization where utility asset ownership remains with the public sector, asset sales involve greater incentive for the company to invest in system infrastructure. IOUs are allowed to earn a rate of return on their capital investments as determined by the state public utilities commission. As long as infrastructure investment is justifiable, the company earns a larger increment for a higher level of investment. Private companies are also insulated from political pressures to keep rates low that may create incentives for underinvestment at publicly owned utilities. At the same time, our Thousand Oaks Case Study showed a higher level of infrastructure investment at the public utility though the private companies met all regulatory requirements.

efficiency of privately owned water utilities does not necessarily lead to lower rates for consumers.

Customer Satisfaction
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support systems such as customer service or billing operations. This is especially important for small systems which may not have dedicated customer support staff, or a 24-hour call center, or website where customers can obtain account information or pay bills online. Centralizing customer service functions may also involve drawbacks, as discussed above, particularly if such systems are no longer locally-based. Automated call centers may give a more impersonal response than dialing a local number staffed by a live person.

Operational Efficiency

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company under PPPs are through labor force reductions.²⁵

ASSET SALE

An asset sale may increase operational efficiency if the transition to private ownership leads to economies of scale, as discussed above. The private company may also bring increased technical expertise as specialized personnel can be shared among multiple service areas, or privatization may bring advantages from knowledge-sharing across the company. As discussed previously, the profit motive of private companies may be an important driver to maximize efficiency.

At the same time, our Thousand Oaks case study indicates that the greater

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This decision-making framework was developed as part of a year-long Master's thesis project conducted by students at the Donald Bren School of Environmental Science and Management at the University of California Santa Barbara.

The framework is informed by four primary research elements. These include: 1) A case study analysis of one public and two privately owned water utilities operating in the City of Thousand Oaks, California, 2) Legal research conducted by students at the University of California Los Angeles School of Law's Frank G. Wells Environmental Law Clinic, 3) Interviews with water sector experts, including public officials, water industry executives, utility managers, regulatory officials, and non-governmental research and advocacy personnel, and 4) Review of relevant literature.

The conclusions and analysis from our case study are our own, and do not represent the views of the City of Thousand Oaks, California American Water Company, or California Water Service Company.

Access our framework and full report online at <http://www.waterproject.info>

*“Water is urban blood,
sustaining life and permitting growth”*

-Gretchen Daily and Katherine Ellison

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