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WATER SUPPLY AND SANITATION SECTOR BOARD DISCUSSION PAPER SERIES

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Explanatory Notes on Key Topics in the Regulation of Water and Sanitation Services

Eric Groom, Jonathan Halpern, and David Ehrhardt

THE WORLD BANK GROUP

Water Supply & Sanitation Sector Board

BNWP Bank Netherlands Water Partnership

PPIAF

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CONTACT INFORMATION

To order additional copies, please contact the Water Help Desk at whelpdesk@worldbank.org. This paper is available online at http://www.worldbank.org/watsan.

Eric Groom, Senior Regulatory Specialist, World Bank: egroom@worldbank.org, tel. 202-458-8558

Jonathan Halpern, Adviser, World Bank: jhalpern@worldbank.org, tel. 202-458-4442

David Ehrhardt, Chief Executive, Castalia Limited: David.Ehrhardt@Castalia.fr, tel. +64 4 913 2800

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INTRODUCTION

Considerable confusion has arisen about what regulation means in the context of water supply and sanitation (WSS) services. In particular, there are questions about the application of the "independent regulator" model to WSS in the developing world. What types of problems can it can address effectively? What is its relevance, especially as provision and oversight of these services are often the responsibility of subnational governments with limited resources? The *Explanatory Notes on Key Topics in the Regulation of Water and Sanitation Services* provide a consistent set of principles and practices that respond to these questions. Such information will be of interest to service providers, policy makers, and development practitioners interested in improving the performance of WSS services in urban areas.

The notes draw upon current regulatory thinking and research, but are intended to be accessible to those who are not regulatory experts. These are the first outputs of a program of work on regulation in the water supply and sanitation sector funded by the Public-Private Infrastructure Advisory Facility (PPIAF), the Bank-Netherlands Water Partnership (BNWP), and the World Bank. We will add additional notes as that work progresses. Each of the notes can be read separately, and together the notes provide an integrated framework for the development of practical approaches to the regulation of WSS.

The seven notes address the following topics:

1. Defining Economic Regulation for Water Supply Services
2. Designing Economic Regulation for Water Supply Services: A Framework
3. Choosing Organizations and Instruments for Economic Regulation of Water Supply Services
4. Regulation and Private Participation Contracts
5. Cost of Service and Tariffs for Water Utilities
6. Regulating Government-Owned Water Utilities
7. Regulating Wastewater Services in Developing Countries

Explanatory Notes 1–3 provide an integrated view of regulatory functions and the principles and practice underlying the design of regulatory systems in the WSS sector. These notes stress the following:

- *Economic regulation is the set of rules and organizations that set, monitor, enforce, and change allowed tariffs and service standards for water providers.* This looks beyond whether there is a regulatory body or what that body may do. Economic regulation can function well for extended periods without a "regulator." In such cases, the regulatory mechanism may be a contract with a privately owned service provider, a process for decision making by a department or minister, or a performance contract/license with a publicly owned service provider. Furthermore, economic regulators have often been asked to do far more than economic regulation (for example,

resolving customer disputes or fulfilling policy roles, such as formulation of financing and subsidy policies).

- Economic regulation should be clearly defined. While there is overlap with other functions (for example, consumer dispute resolution and social policy), the domain of economic regulation should be kept narrow, clearly specified, and distinguished from the policy and governance functions.
- *Often the challenge in a developing country context is to increase average prices that are "too low" and distorted because of political factors,* rather than to constrain a monopolist from charging prices that exceed the cost of services. This is the reverse of many of the textbook models of regulation. The role and efficacy of regulation in these circumstances need careful consideration.
- *Designing effective regulation starts with an identification of the WSS objectives and a careful consideration of both the extent to which regulation can facilitate achievement of these goals and its attendant costs.* This evaluation should consider the full range of regulatory and policy instruments and is a task for policy makers (rather than for regulatory bodies).
- *WSS services typically require economic and technical regulation, but it is not necessary that all regulatory functions be undertaken by a stand-alone regulatory body.* Legal rules and instruments can be used to set key regulatory parameters (such as the initial price path and key elements in its subsequent resetting). This applies particularly to privately owned WSS utilities. Assignment of the functions should consider the country's social, political, and legal traditions; the capability of existing agencies; and potential impacts on sector reform programs. Different jurisdictions can use quite different organizational structures to perform similar functions. There is no single "best practice" model for the allocation of functions to agencies or instruments:
  - Where in-country capacity is scarce, there may be opportunities to use existing organizations, international panels of experts, or regional bodies.
  - Where legal and governance traditions are supportive, contracts can be an effective regulatory mechanism. However, care should be taken to avoid inconsistencies if contracts are combined with the creation of regulatory agencies.

Explanatory Note 4 explores regulation of services provided by privately operated utilities. There are two distinct traditions: one that relies on courts or arbitrators to fulfill the regulatory functions when the parties cannot agree; and another that relies upon government-established regulatory agencies. In the former, services are typically provided under contract to the government, which retains ownership of the assets, whereas the latter approach arose in the context of investor-owned utilities. This note outlines the range of contractual options available for delivery of WSS by privately owned utilities and highlights the problems that have occurred where there are both contracts and an independent regulatory agency.

Explanatory Note 5 provides a brief analysis of consistent approaches to resetting tariffs for WSS services. Most successful approaches have used a cost building-block approach that sets average prices or revenues on the basis of forecasts of reasonable costs by broad categories (operational expenditures, depreciation or renewals expenditures, and return on assets). Because it is forward looking, it still provides incentives for the utility to improve its efficiency, and because it is reset on the basis of utility specific costs, it provides some assurance that the utility will be able to recover reasonable costs incurred (including the cost of capital). The note explores the key issue of what to do where actual costs exceed the assessed efficient costs. The note emphasizes the need for caution.

Explanatory Note 6 looks at the conundrum of regulating government-owned water utilities and poses the question: given that monopoly power can be controlled by the government (as owner), is there a need for separate regulation of government-owned utilities? However, if the governments can control their utilities for the public good, why are the outcomes often so poor (for example, selective meeting of customers' needs; use of service provision for short-term political aims or personal ends; capture of ministers by service providers)? In some countries, governments have established independent regulators for their water utilities. This can increase transparency, reinforce the positive incentives for utilities operating within a framework of good governance, and create more political space for tariff increases. But the history of these agencies shows the difficulty of the task. Further work has been commissioned on this issue, and the note highlights that a separate regulator is not a panacea. Whether a separate regulatory agency should be established and the extent of separation between the governance, policy, and regulatory functions will depend on the sector objectives, governance and incentive structures, and institutional and capacity constraints within the country.

Explanatory Note 7 provides guidance on the role of regulation in improving wastewater services. Access to wastewater services often lags well behind access to water services. There are strong public health benefits from providing wastewater services, but the provision of a centralized network can be prohibitively expensive. Improving wastewater services may be a matter of improving or extending existing small-scale systems: for example, septic tanks, latrines, and small-scale local systems. In this case, economic regulation may not be critical, but centralized environmental regulation could be necessary to ensure that health objectives are achieved. Centralized sanitation systems may be able to exert monopoly power; hence, some economic regulation may be necessary. Two key points to consider are the level and structure of the charges. Recovering full costs from charges on consumers may not be possible (because of the impact on bills) or desirable (because of the community health benefits). Hence, there may be a role for government subsidies, but these should ideally be based on measurable outputs. Volumetric sewerage charges (based on a percentage of metered water sales) have become more popular, but the note concludes that they are not necessarily efficient or equitable.

NOTE 1 — DEFINING ECONOMIC REGULATION FOR WATER SUPPLY SERVICES

Overview

There is some confusion over what regulation is and what it can do.

In the past decades, water sector reforms worldwide have focused attention on regulation of the sector.[1] But is it not always clear what is meant by "regulation" or which problems regulation is able to solve. Sterile debates have raged on topics such as whether regulation by contract is or is not "regulation." Some assert that regulation is not possible without a regulator and define regulation as whatever the regulator does. Others use "regulation" to mean almost any form of government control of the water sector and assume it to be the answer to any water sector problem.

This note aims to provide clarity …

This is the first in a series of notes designed to bring greater clarity to economic regulation of the water sector. This note's role is simply to define what economic regulation in the water sector is and what it is not. Clarity on this point means that later notes can address how to design economic regulatory regimes effectively, using well-understood concepts.

… in definitions.

Economic regulation is best thought of as the legal controls on water providers intended to overcome the problem that water is an essential, monopoly service. A core definition of economic regulation is

> the rules and organizations that set, monitor, enforce, and change the allowed tariffs and service standards for water providers.

Although other closely related functions (such as controlling asset condition) can usefully be considered part of economic regulation in some cases, some things (such as policy, ownership, governance,[2] and coordination) are not regulation. Such concepts are best kept distinct.

Defining Economic Regulation in the Water Sector

Regulation is not just "what regulators do."

One way to define economic regulation would be to survey what regulators around the world do. However, this would be unhelpful because of the following:

1 The phrase "water sector" refers to the provision of water supply services and also the collection, treatment, and disposal of wastewater.

2 "Governance" refers to the relationship between the owners, directors, and managers and the rules, laws, policies, and customs that define this relationship and ensure that the managers and directors are accountable to the owners for the pursuit of objectives consistent with those of the owners and that the entity complies with all laws and regulations.

- It is precisely the absence of a ready consensus on what constitutes appropriate regulation that motivated this note; hence, a descriptive approach would provide little guide to good practice.
- A descriptive survey would confuse regulatory rules with the organizations charged with making and enforcing those rules. Regulation can be implemented through a variety of organizations and is more than just "what regulators do."
- Regulation can exist where there is no regulator.

For example, if we observe that ETOSS, the water regulator in Buenos Aires, claimed the right to direct particular investments by the utility, while in Azerbaijan the Tariff Council does not direct investments, but does set tariffs, this tells us little about what regulation is or should be.

We need a definition that guides good policy.

We need a definition that makes it easy to develop regulation that plays an appropriate role in water sector reform. Such a definition starts with an understanding of the problems that economic regulation should be used to solve and of the differences between regulation and other interventions that could be used to solve those problems. In developing such a definition, we must consider both "economic" and "regulation."

Economic Regulation Addresses Monopoly Power

Economic regulation is about stopping monopoly abuse.

Economic regulation is needed to address the problem of natural monopoly. In a competitive market, customers can choose between suppliers, so suppliers try to offer the products and services that customers want. Competition between suppliers keeps the prices charged in line with costs. For example, in many countries, bread is an essential, but any baker who provided poor quality or overcharged would soon lose business to his or her competitors. Equally, a baker who undercharged would also lose money and have to raise prices or go out of business. In most markets, competition ensures that providers offer what customers want and charge a price that reflects efficient costs.

Water utilities are monopolies, and can provide bad service …

Water utilities are natural monopolies. This means that customers cannot choose between competing suppliers, so there is no competitive pressure to ensure that they provide the services that customers want.

… and charge prices well above costs …

Water is generally worth a lot more than it costs to supply. In other words, the value of water piped to the premises is so great and the cost of alternatives so high that customers are often willing to pay several times the reasonable cost of the service, rather than go without the service completely.

… either to make profits or cover inefficiencies.

Left to themselves, providers could take advantage of this to make high profits at the expense of consumers. Government-owned providers might also take advantage of consumers by charging too much and would typically dissipate the excess charges in inefficiencies (such as low labor productivity or corruption). Or they might charge low prices for a poor service, when customers would prefer a good-quality service, even if it meant paying more.

Traditional regulation tries to keep prices down.

For a long time economic regulation focused on private providers in developed countries, where the concern was that the provider would charge too much. The tools of traditional regulation are therefore largely concerned with stopping prices from rising too high.

But regulation can also be used to help government-owned providers charge more.

However, we often observe that publicly owned providers, particularly in developing countries, charge too little. Charging below cost is meant to help consumers, but is generally counterproductive. When tariffs are below cost, the provider must either rely on government subsidies or cut back on service, maintenance, and investment.

Subsidies are seldom sufficiently large and reliable to allow a provider to function at the level that customers want. Even if subsidies are provided, they tend to undermine the customer focus of the provider without necessarily promoting equity (because the taxpayers who fund the subsidy are not necessarily less deserving than the customers who receive it).

Commonly, tariff below costs result in poor service, asset deterioration, and an inability to invest to meet growing demand. The damage this does exceeds any benefits from the low tariff, so governments in both developed and developing countries have adapted regulation to bring tariffs up to a level that covers reasonable costs.

Adapting regulation like this can be difficult. Clearly, a regulator that keeps tariffs down will be more popular than one that raises them. The need for public acceptance means that regulators are most likely to be effective in creating space for tariff increases where they have already earned public confidence and where they have political support.

Economic regulation aims to ensure that providers offer good service at reasonable prices.

In other words, economic regulation can usefully be thought of as mimicking the pressures that competition provides in other markets. That is, regulation should make providers offer services their customers want at reasonable tariffs. Reasonable tariffs, in this sense, are tariffs that cover the reasonable cost of providing the service, including a reasonable return on capital used, but no more.

Economic Regulation versus Regulation Generally

There are other problems, besides monopoly abuse, that regulation can tackle, …

We often use regulation as shorthand for economic regulation. More generally, regulation means legal restrictions on the normal freedom of operation of people and enterprises. Governments use regulation in pursuit of many objectives, not just control of monopoly power. In developing regulatory regimes, it is helpful to distinguish between economic and other types of regulation, including the following:

- *Environmental*. Water providers and other businesses have little incentive to care about the environment. They may overabstract water resources or discharge untreated pollutants. Environmental regulation can stop this. In some countries (such as the United Kingdom), all abstraction from, and discharge to, the environment is controlled by the Environment Agency, while in other countries, there are specific controls that apply only to the water utility.
- *Safety*. Even in competitive markets, information problems may mean that consumers do not know which services are safe and which are not. Governments often impose product safety standards to combat this problem. For example, food safety standards impose purity requirements on bread and other foods, just as drinking water standards can be used to ensure that water is safe to drink
- *Consumer Protection*. Similarly, governments may regulate for other forms of consumer protection (such as arrangements for handling complaints) both in monopoly and in competitive markets. In Barbados, the Fair Trading Commission deals with customer complaints against all businesses and also regulates utilities. In other countries (for example, Jamaica), the utility regulator responds to complaints against utilities.
- *Social Objectives*. Finally, governments may regulate for social objectives, to ensure that service is available to certain groups, redistributing benefits from one group of people to another.

… and the boundary between economic and other forms of regulation can be blurred.

As figure 1.1 shows, economic regulation overlaps with other areas of regulation, making the boundaries somewhat unclear. The core—the area without the overlaps—is a narrow definition of economic regulation as simply setting, monitoring, and enforcing rules on tariffs and service quality (in particular, pressure and reliability).

In the blurred area around the core, a choice is needed as to whether a particular regulatory function should be considered part of economic regulation or dealt with in another way.

Table 1.1 lists many of the common overlap areas and provides the arguments for and against treating them as economic regulation. The right approach will differ from country to country and depend on the general regulatory regime,

the levels of organizational capacity, and the types of problems that must be addressed.

Economic Regulation versus Other Interventions

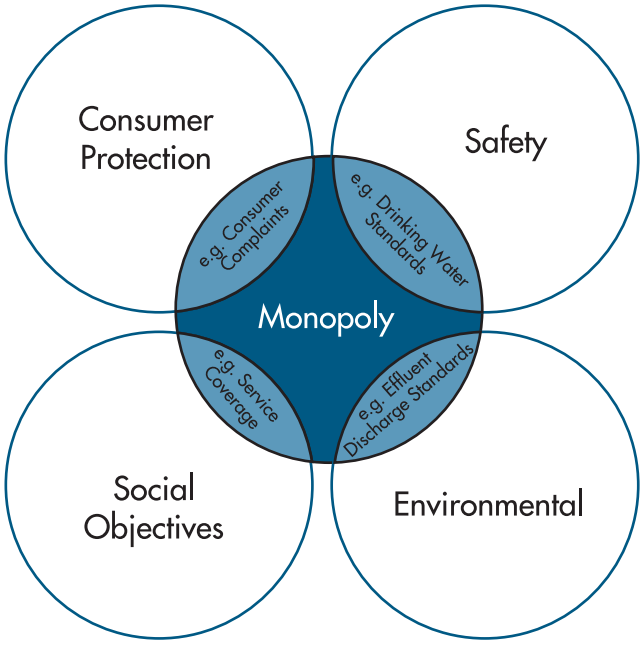
Economic regulation must be distinguished from other government interventions.

Governments have a range of tools they can use to limit monopoly power and to achieve social, environmental, safety, and consumer protection objectives. These include the following:

- *Ownership*. Governments can own water service providers and achieve their desired objectives by telling the providers what to do. How governments tell the providers they own what to do is called "governance."
- *Fiscal Incentives*. Governments can influence providers through subsidies and tax incentives. For example, governments can offer subsidies for extending service to poor households.
- *Regulation*. Governments can use the power of the law to instruct providers to do certain things and can enforce these instructions through penalties and other forms of compulsion.

Economic regulation must be distinguished from other types of control (in particular, ownership).

Figure 1.1: Defining Water Sector Economic Regulation



Source: Castalia.

Regulation can support public sector ownership …

Controlling a water service provider by owning it is not regulation. In fact, regulation is, in a sense, a substitute for control through ownership.

Because ownership seems to give government complete control and flexibility, one might ask, "Why bother with regulation? Why not just own the water company?" One answer is that in practice, governments have difficulty in getting their water providers to serve the public interest. Governments try to make state-owned water companies serve the public purpose though "governance

Table 1.1: Economic Regulation and Other Policies and Instruments

	Is this economic regulation?	
Regulatory function	**Yes**	**No**
Controlling drinking water standards	Essential part of the service specification	Health issue, best dealt with by health authorities and experts
Effluent discharge standards	Essential service specification for wastewater services	Environmental issue, best dealt with by environmental authorities
Monitoring the utility's response to consumer complaints	Monopolies have little incentive to treat customers well. Complaints on billing and service standards can provide information for monitoring utility performance.	Helping consumers deal with merchants is an economywide function and requires an economywide response (such as a consumer affairs bureau for all sectors).
Service coverage targets	Monopolies may limit service by charging high prices, so regulation is required to make them offer widespread service.	Extending service to unserved areas is a policy decision involving social objectives and subsidies.
Controlling tariff structure (in addition to the average tariff)	Monopolies may price-discriminate in unjustified ways or set inefficient tariff structures.	Tariff structure may be used to ensure cross-subsidies and achieve social objectives.
Input-based controls such as the following: • Specifying asset conditions • Specifying efficiency or performance targets (such as NRW or staff-per-connection ratios)	To keep costs at efficient levels and to ensure that service is sustainable, operating efficiency and asset serviceability may need to be controlled directly.	The provider should be given the incentives to provide good service at reasonable cost, and then investment and operating decisions should be left to provider management.

Source: Castalia.

mechanisms," including appointing the board of directors or management and giving the company instructions or directions. But governance arrangements often fail because the government cannot adequately monitor or motivate management to act in the public interest. For this reason, governments may choose to establish a regulator for a public company. The government of Victoria in Australia recently brought all water providers in the state under the jurisdiction of the Essential Services Commission, even though the water providers are publicly owned (see Explanatory Note 7 for a discussion of the pros and cons of regulating publicly owned providers).

… or substitute for it.

Alternatively, governments may bring in a private firm to run the water service and subject it to regulation. The U.K. government did this in 1989, and since then many other countries, including Chile, Malaysia, and Romania, have done the same thing.

Similarly, governments may subsidize private or publicly owned providers to provide service that would otherwise be uneconomic, in addition to, or instead of, imposing service requirements through regulation.

To design good regulation, we must recognize when something is not regulation.

Overall, clear thinking about regulation demands clarity about what regulation is and what it is not. Vital government roles in the water sector that complement regulation, but are distinct from it, include the following:

- *Policy Making*. Water policy defines the "ends and means" for the sector (that is, it defines sector objectives and principles and sets out who should do what to achieve those objectives). The extent to which consumers or taxpayers should pay for water services and infrastructure is a policy decision, as is the ownership of the providers and the general strategy for controlling tariffs and service standards.
- *Ownership, Service Provision, and Governance*. Water provider performance is driven largely by four factors: who owns the water assets (asset ownership), who owns the service provider (utility ownership), who is responsible for delivering service (service provision), and how the owner exercises control over the utility's management (governance). In most developing countries, water utilities and assets are owned by the government. The government may retain responsibility for service provision or transfer it to a private provider. A government may establish good governance procedures by exercising effective control over the utility through a well-functioning board. Getting these four things right is critical to sector performance. They must align with the regulatory design, but they are not themselves regulation.
- *Coordination*. Governments must coordinate the water sector. This involves ensuring that policy decisions and implementation plans are consistent, managing input from the various bodies involved in water sector activities

and coordinating water development with other public expenditure priorities. The regulatory regime must be coordinated with other interventions, but coordination is not regulation.

Summary

To sum up, economic regulation in water involves setting and enforcing rules to address the problem of monopoly in the water sector. This produces the following core definition of economic regulation:

> the rules and organizations that set, monitor, enforce, and change the allowed tariffs and service standards for water providers

It may be useful to include other functions in our definition of economic regulation. Controlling drinking water quality, effluent discharge, customer service, coverage, and asset condition may be a reaction to a problem of monopoly and therefore come under the heading of economic regulation. However, controls in these areas may address wider concerns (such as social and environmental objectives). Whether or how these issues should be integrated with the system of economic regulation must be decided case by case.

Regulation is definitely distinct from policy, governance, ownership, and subsidy arrangements. Successful water sector reform may require action in all these areas, but planning and implementing subsidy regimes or changes in ownership are not regulation.

Reform will be more successful if the definitions of the various reform instruments are kept separate. Then the interrelationships between regulation and the other reform instruments can be clearly seen and the right mix selected to achieve sector objectives.

Further Reading

Braetigam, R. 1989. "Optimal Policies for Natural Monopolies." In R. Schmalensee and R. Willig (eds): *Handbook of Industrial Organization*. The Netherlands: Elsevier Science.

Harris, Clive and I. Alexander. 2005. *The Regulation of Investment in Utilities: Concepts and Applications*. World Bank.

Laffont, Jean-Jacques. 2005. *Regulation and Development*. Cambridge University Press.

Midttun, Atle and Erik Svindland. 2001. *Approaches and Dilemmas in Economic Regulation*. Macmillan. Palgrave.

Public Utility Research Center, University of Florida, Université de Toulouse and Pontificia Universidad Católica de Peru. 2004. *Annotated Reading List for a Body of Knowledge on the Regulation of Utility Infrastructure and Services*. Prepared for the World Bank, under PPIAF funding.

NOTE 2 — DESIGNING ECONOMIC REGULATION FOR WATER SUPPLY SERVICES: A FRAMEWORK

Overview

This note provides a framework for design of economic regulation …

We know that regulation in the water sector is important. However, we sometimes struggle with what regulation is, what problems it can solve, and how to design effective regulatory systems that will really work.

… consisting of simple logic steps.

This note outlines a simple, high-level set of steps that can help with designing economic regulation in many countries:

1. Define the problems and objectives in the sector.
2. Determine whether regulation is well suited to the objectives.
3. Define the specific regulatory functions needed to achieve those objectives.
4. Decide which legal instruments are best suited to embody the regulatory rules and which organizations are best suited to perform the regulatory functions.

This will generally be a better approach than importing regulatory models designed for other countries …

Although these steps are simple, they are often not followed. Rather, policy makers short-circuit the process, saying, "We know we need regulation, so we had better create a regulator," and importing regulatory designs from elsewhere. The resulting regime may be doubly ill adapted, in the senses that it is not designed to solve the problems the country really has and also that it does not take into account the political, legal, and organizational cultures and capacities in the country.

… and allow for regulatory designs more suited to each country's needs and traditions.

This note shows that well-designed regulatory regimes can use widely varying legal and organizational arrangements to achieve similar objectives. This suggests that regulatory design must pay more attention to local circumstances and traditions than has been done in the past.

Steps in Designing Economic Regulation

Regulatory design is not a matter of "checking the box."

Regulation is often a key component of water sector reform, but it is sometimes treated as an end in itself. In an effort to "check the regulation box," governments may pass laws and create regulatory bodies without defining the purpose of economic regulation or how it fits with other issues and organizations in the country and without considering the best way to deliver regulation within each country's legal and institutional culture.

It is worth giving an example of just how poorly thought out regulatory reform processes can be. In the mid-1990s, Trinidad and Tobago abolished its public utilities commission (PUC). It did this in part because the PUC had been ineffective in achieving rational tariffs for the state-owned water utility. The PUC had had no discernable positive impact on service standards or efficiencies and had itself become bloated and expensive.

Before the decade was out, however, development agencies interested in helping Trinidad and Tobago in reforming its water sector had insisted that it "create an independent regulator." The Regulated Industries Commission (RIC) was established, an entity with legal powers and structure very similar to the former PUC. The RIC is even housed in the same building that the PUC was. While the RIC has bright staff working hard to improve the water sector, five years after the establishment of the RIC, water tariffs remain well below cost, water service is intermittent, efficiency low, and investment inadequate.

We have not picked this example because it is particularly bad, but because it is illustrative of an approach to regulatory reform that has become all too prevalent. Figure 2.1 outlines a better framework for developing workable economic regulation in water.

The steps involve the following: define objectives, …

As illustrated in figure 2.1, governments should first *identify the water sector objectives and issues*. Without a clear idea of what is to be achieved in the water sector, it will be impossible to develop an effective solution. This seems obvious, but surprisingly often this step is missed or lacks the rigor to allow proposed regulatory and policy reforms to be evaluated against clear objectives. Such objectives may be to provide service to people who do not have service now, to make sure that water is drinkable and supplied 24 hours a day, to reduce government expenditure on water, and to make sure that as many people as possible can afford water services.

… analyze what regulation can contribute, …

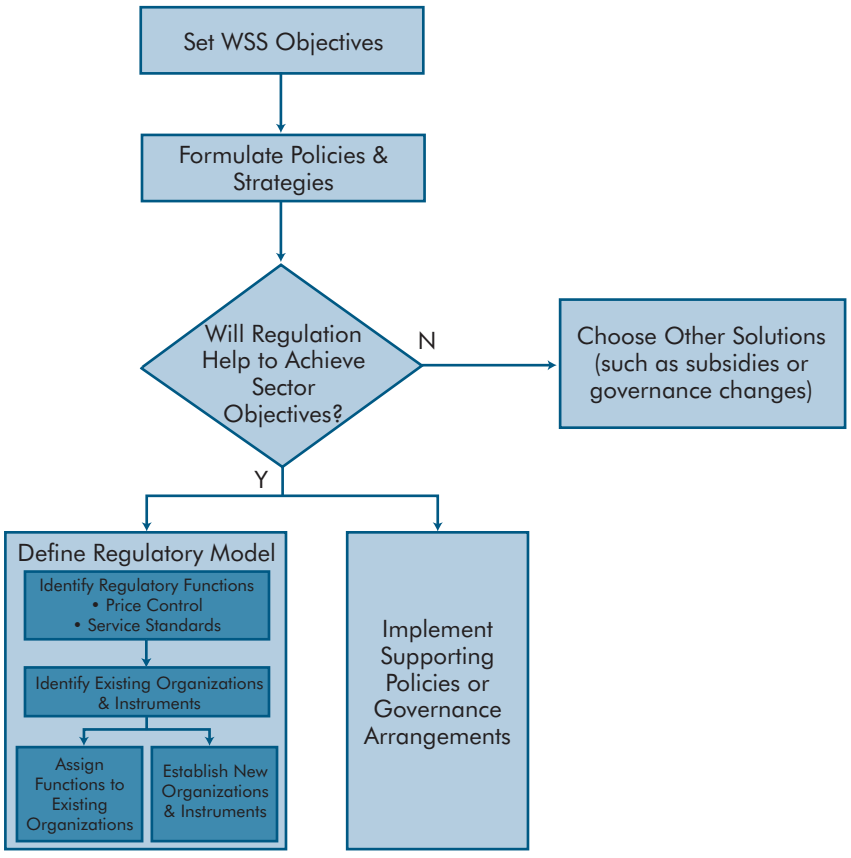
Having identified the sector objectives, governments must *decide whether economic regulation will help to achieve them*. Economic regulation may be the solution, only part of a solution, or not a solution at all. For example, economic regulation is well suited to keeping tariffs in line with reasonable costs, but cannot by itself achieve social objectives (such as extending service to large numbers of customers who cannot afford to pay the full cost of service).

To decide whether regulation is part of the solution, governments must *know what economic regulation is*. Explanatory Note 1 in this series defines regulation as "the rules and organizations that set, monitor, enforce, and change the allowed tariffs and service standards for water providers."

… specify the key regulatory functions, …

Economic regulation has many facets. Effective regulatory design specifies exactly *what regulatory functions must be performed* to achieve sector objec-

Figure 2.1: Framework for Thinking about Regulation



Source: Castalia.

tives. These may include controlling prices, setting service standards, defining asset serviceability indicators, and so on.

… and choose the legal instruments and organizations in which to embed the functions.

Once regulatory functions have been defined, it is necessary to *allocate them to appropriate organizations,* and to *select legal instruments* to embody the regulatory rules. People sometimes assume that an "independent regulator" should perform all regulatory functions. In reality, different functions may be allocated to different organizations. Explanatory Note 3 provides more detailed guidance on this step.)

Finally, regulation alone cannot solve all water sector issues. Governments must *identify the complementary policies or governance arrangements* to complete the reforms. For example, in Armenia, regulatory developments and pri-

vate participation arrangements have proceeded in parallel, supporting each other. In contrast, in Trinidad and Tobago, regulation might be more effective if it were accompanied by reforms to the governance arrangements for the state-owned water utility.

Is Regulation Part of the Solution?

Policy makers should not assume that regulatory reform is needed.

As shown in figure 2.1, before developing regulation, government should assess whether regulation can help achieve sector objectives. This should not be assumed. It requires empirical testing. For example, in Guyana, Trinidad and Tobago, and many other countries, regulation has not been able to overcome political unwillingness to allow water utilities to charge cost-recovery tariffs. In Azerbaijan, like many other countries, regulation has not been effective in increasing the efficiency of service provision. In the Comoros, regulation crumbled as political order broke down.

Table 2.1 shows some common water problems and things to consider in deciding whether economic regulation has a role in solving them. In some cases (such as keeping tariffs at no more than cost-reflective levels), regulation is generally effective, but may need to be supported by complementary policies such as reforming governance. In other cases (such as achieving social objectives), regulation can do little, and government policy and subsidy provision must take the lead.

Defining Regulatory Functions

"Regulatory functions" generally include controlling tariffs and service standards …

Once governments are clear what regulation can do to help solve water sector problems, they will be able to define the required regulatory functions. By "regulatory functions" we mean what regulation will actually do. For example, when water companies are privatized (as in Santiago, Chile), the following are clear:

- Tariffs must be limited to no more than reasonable levels.
- Minimum service standards must be set and enforced.

Controlling tariffs and service standards are common, core, regulatory functions.

… and may extend to controls on asset condition, efficiency parameters, coverage targets, and the like.

Economic regulatory functions can be drawn wider than this core, depending on the circumstances, as the following examples show:

- In Manila, the Metropolitan Waterworks and Sewerage System (MWSS) Regulatory Office has recently created a regime to directly encourage reductions in nonrevenue water levels.
- In Vanuatu, the regulatory regime created under the concession contract for Port Vila includes a mechanism for deciding on network extensions.

Table 2.1: Is Regulation Part of the Solution?

Problem	How regulation could help	Limits on the effectiveness of regulation
The utility is efficient, but average tariffs are above cost.	Limiting tariffs to no more than costs.	Where the provider is not able to reduce costs to efficient levels, regulation will causes losses for the company. This may lead to service-standard reductions and increased subsidies, especially if the provider is publicly owned.
The utility is efficient, but average tariffs are below actual cost.	Providing a neutral and authoritative view on reasonable cost-recovery tariffs provides legitimacy for tariff increases. This worked for the state of New South Wales (Australia) and in Colombia.	Governments nevertheless hold tariffs below costs, especially for publicly owned companies.
The utility is inefficient. Average tariffs are below actual costs, but above efficient costs.	Regulation can support effective governance and incentive structures to provide pressures for efficiency. It can also allow tariffs to rise to cover actual costs.	In this situation, regulation cannot simultaneously keep tariffs in line with reasonable costs and allow the provider to be financially viable. If tariffs are to be kept to reasonable costs, the owner will have to be willing to cover the utility's losses while efficiency improves.
Tariffs are at cost, but some customers cannot afford service.	Regulation can assist in this case by allowing cross-subsidies between customer categories.	Cross-subsidies should involve a policy decision. There may not be enough consumers able to pay above cost to subsidize all those who need subsidies. In such cases, a taxpayer-funded subsidy may be the only option.
Water service provision is unreliable.	Setting a minimum level of service and applying penalties for not meeting it can improve service provision.	If the provider lacks the funds, motivation, or ability to increase service, regulatory penalties will simply increase the provider's losses.
Utility operations are inefficient.	Regulation can give incentives to reduce costs while maintaining service quality.	If the utility does not respond to incentives, this will not be effective.
System coverage is poor.	Regulation can mandate increased coverage targets. Regulation can allow tariffs to recover full costs of service, thus making service extension viable.	If people cannot afford to pay for service extension, government policy decisions (such as subsidizing service extension) will be needed.

Source: Castalia.

- In many countries, the regulatory regime also serves to control tariff structure, fulfilling social as well as economic objectives.

Controls on asset condition, operating efficiency parameters, coverage, and tariff structure may be appropriate regulatory functions, depending on a country's circumstances and objectives (see Explanatory Note 1 for a discussion of what should and should not be thought of as economic regulation).

Allocating Regulatory Functions to Organizations and Instruments

Regulatory design involves examining the countries' existing "regulatory endowment" of organizations and traditions, …

The final step is to allocate regulatory functions to organizations and legal instruments. Before doing this, governments should consider their "regulatory endowment": Which existing organizations have the capacity to do the sort of work required in utility regulation? How has the country regulated utility service providers in the past, and how well has this worked? What attributes of cultural, legal, and administrative traditions in the country could be important in the design of regulation? For example, a country with a civil law tradition may look to civil law models of utility regulation, rather than Anglo-American approaches. A society in which public discussion is traditional in reaching decisions may want to enshrine a role for such discussions in its regulatory system.

This is where the difference between the approach outlined in figure 2.1 and the conventional "check the regulatory box" approach is most apparent.

… assigning regulatory functions to particular agencies, …

Government need not create a "regulator" to carry out all regulatory functions. Governments should consider which organizations are best suited to perform the regulatory functions. A well-functioning ministry, for example, may be a better choice for monitoring provider performance than a new and untested agency. An expert panel, like that used in the Sofia concession, may be a better choice than a public utilities commission for resetting tariffs.

… and embedding rules in legal instruments.

Similarly, governments should not assume that regulation must be embodied in any particular legal instrument, such as a statute or license. The better approach is to choose which instruments would be most effective in making the regulatory rules predictable and enforceable in each case. For example, in Azerbaijan, an attempt to give a utility regulator direct legal powers risked undermining the government's plans for the sector and was shelved. In contrast, contracts between government ministries and private providers do an effective job in controlling tariffs in many Western African and Latin American countries.

Various allocations can achieve functionally equivalent results, …

To emphasize the point that radically different allocations of functions to organizations and instruments can achieve the same functional result, we compare the regulatory regimes in England and Wales; Vanuatu; and Wellington, New Zealand.

As is well known, in the United Kingdom, the Water Services Regulation Authority (Ofwat) was established by statute and given independent responsibility for setting, monitoring, and enforcing tariffs and service standards.

Table 2.2 shows that on the surface, the regime for economic regulation of water in Port Vila, the capital of Vanuatu, could hardly be more different from that in England and Wales. In Vanuatu, tariffs and service-standard changes are negotiated between the government and the private operator. A government ministry is responsible for monitoring and enforcing these standards. If disputes arise between the government and the utility, they are settled by an arbitrator or the normal courts.

In Wellington, New Zealand, the City Council owns the water utility. The City Council also sets the water charges and decides on service standards (above certain minimum standards set by the national government).

Despite the dissimilarities between the three approaches, each system performs the same basic functions of keeping tariffs and the remuneration of the operator broadly in line with reasonable costs, providing incentives to the utility to be efficient, maintaining and improving service standards, and supporting provider sustainability.

… and the choice should be informed largely by the specific institutional and legal environment of each country.

The choice of organizations and instruments to perform regulatory functions should depend in large part on a country's social, political, and legal traditions, as well as on sector organization and ownership. (Explanatory Note 3 discusses choosing regulatory organizations and instruments in more detail.)

Table 2.2 on the next page, followed by "Further Reading."

Table 2.2: Allocating Regulatory Functions

Regulatory functions	England & Wales	Vanuatu	Wellington, New Zealand
Set tariffs	Ofwat	Agreed on between utility and Cabinet; embodied in a concession contract	City Council
Monitor and enforce tariffs	Ofwat	A government ministry	City Council
Change tariffs	Ofwat	Agreement between utility and Cabinet	City Council
Control the remuneration received by the private operator	Ofwat	Controlled by the concession contract negotiated between the utility and the government	Not applicable (municipal-owned utility)
Set service standards (for example, water pressure and reliability)	Ofwat	Controlled by the concession contract negotiated between the utility and the government	City Council
Monitor and enforce service standards (for example, water pressure and reliability)	Ofwat	A government ministry	City Council
Change service standards (for example, water pressure and reliability)	Department for Environment, Food, and Rural Affairs (DEFRA), Welsh Assembly government; Ofwat responsible for changing level-of-service indicators	Agreement between the utility and the government, subject to arbitration if they cannot agree	City Council
Resolve disputes between provider and regulator or government	Ofwat responsible for disputes between consumers and the utility; price control disputes referred to Competition Commission	Arbitration or the courts	City Council is both owner and "regulator" of the utility, so disputes would not arise; or if they did, the City Council itself would resolve them.

Source: Castalia.

Further Reading

Brown, Ashley C., Jon Stern, Bernard Tenenbaum, and Defne Gencer. 2006. *Handbook for Evaluating Infrastructure Regulatory Systems*. The World Bank. Washington, D.C.

Baron, D. 1989. "Design of Regulatory Mechanisms and Institutions." In R. Schmalensee and R. Willig (eds): *Handbook of Industrial Organization*. The Netherlands: Elsevier Science.

Eberhard, A. A. 2006. *Infrastructure regulation in developing countries: an exploration of hybrid and transitional models*. 3rd Annual Conference. Africa Forum of Utility Regulators. Windhoek, Namibia.

Estache, Antonio. 1997. *Designing Regulatory Institutions for Infrastructure--Lessons from Argentina*. Public Policy for the Private Sector 114. The World Bank. Washington, D.C.

Joskow, Paul L. 1998. *Regulatory Priorities for Reforming Infrastructure Sectors in Developing Countries*. Paper prepared for the Annual World Bank Conference on Development Economics. Washington, D.C.

Kessides, I. N. 2004. *Reforming Infrastructure: Privatization, Regulation, and Competition*. A World Bank Policy Research Report.

Lavey, Warren G. 2002. *Making and Keeping Regulatory Promises*. Federal Communications Law Journal 55.

Stone and Webster. 2003. *Introduction to Economic Regulation of Water Supply and Wastewater Utilities*. Asian Development Bank: Capacity Building for the MWSS Regulatory Office TA 3703-PHI.

Young, A. 1997. *Consumer Choice? Social Obligations, Cross-Subsidies and Competition in the Privatized Utilities*. Center for Management under Regulation.

World Bank. 2006. *Approaches to Private Participation in Water Services: A Toolkit*. Funded by PPIAF and The World Bank. Washington, D.C.

NOTE 3 — CHOOSING ORGANIZATIONS AND INSTRUMENTS FOR ECONOMIC REGULATION OF WATER SUPPLY SERVICES

Overview

Policy makers must decide which regulatory functions (such as controlling tariffs and service standards) are needed …

Economic regulation in the water sector[3] puts legal limits on water service providers to control monopoly power. Core regulatory functions include setting, monitoring, enforcing, and changing the maximum tariffs that water providers are allowed to charge and the service standards that they are required to provide. Other economic regulatory functions can include controlling tariff structures, setting coverage targets, or ensuring that asset serviceability remains above specified levels (see Explanatory Note 1).

… and then allocate these functions to organizations and legal instruments.

Policy makers must decide which economic regulatory functions are needed in their country's water sector. After that, regulatory design involves deciding the following:

- Which organizations should have responsibility for which regulatory functions?
- Which legal instruments should be used to embody the regulatory rules (such as limits on tariffs, or procedures and powers to change tariffs)?

A wide variety of organizational …

It is sometimes erroneously assumed that all regulatory functions must be performed by a "regulator". This note shows the diversity of organizational arrangements that can achieve functionally similar regulatory results.

… and legal architectures are possible.

In choosing instruments for regulation, some familiar with (Anglo-American) common law tradition may consider it an anathema for regulation to be contained in a contract. Those familiar with French civil law traditions may be equally uncomfortable with statutes that give a government agency unilateral power to set tariffs for a private company. In fact, a wide range of legal architectures can give functionally similar results.

The right design will often depend on local institutional capabilities and legal traditions.

This note shows that many organizational and legal architectures can be used to achieve similar results. How then to choose the right option in any given situation? Often, the best architecture will be the one that makes the best use of existing organizational capacities and achieves consonance with local legal and administrative traditions.

3 The term "water sector" refers to the provision of clean water supply, as well as the collection, treatment, and disposal of wastewater.

Organizational Architecture

Different jurisdictions perform similar functions through quite different organizational architectures.

Regulatory systems that seem structurally different may carry out the same regulatory functions to solve similar problems. This note considers three examples:

- The Public Services Commission (PSC) of Florida, a typical U.S. regulator
- The regulatory regime for the Manila water concessions, comprising the Metropolitan Waterworks and Sewerage System (MWSS) board (a self-regulating government corporation); its Regulatory Office, which regulates private concessionaires in accordance with concession contracts and the MWSS statute; and an international appeals tribunal
- Water regulation in Colombia, where several organizations are responsible for regulatory functions, including the Comisión de Regulación de Agua Potable y Saneamiento Básico (CRA), the Superintendencia de Servicios Públicos Domiciliarios (SSP), the Ministry of Economic Development, and the Ministry of the Environment (these organizations regulate both public and private service providers at the municipal level)

Table 3.1 summarizes how regulatory functions are allocated to organizations in each of these jurisdictions.

Florida has a classic "independent regulator."

The Florida PSC seems like a classic utility regulator. Established by statute, it has broad discretion to set, change, monitor, and enforce limits on tariffs. However, the regulatory function of setting standards for water pressure is the job of the Department for Environmental Protection, which also controls standards for drinking water and effluent discharge.

In Manila, the Regulatory Office is constrained by the concession contracts and requires approval from the asset-owning company board.

The Regulatory Office in Manila looks like an independent regulator on the U.S. or U.K. model, however, the reality is more complex. The Regulatory Office's discretion is limited by the contract, which sets out the rules for tariff adjustment. This contract was agreed on between the board of MWSS (the body that owns the assets and has statutory responsibility for water supply) and the concessionaires that provide water services. Tariff changes recommended by the Regulatory Office must be agreed on by the board and may be appealed to the appeals panel (an arbitration panel). The Department of Health controls drinking water standards, while effluent discharge standards are set by the Department of Environment and Natural Resources.

Table 3.1: Organizational Architectures in Three Regulatory Jurisdictions

Regulatory functions	Florida, United States	Manila, Philippines	Colombia
Set tariffs	Public Service Commission (PSC) Division of Economic Regulation	Base tariff set during bidding	CRA (Comisión de Regulación de Agua y Saneamiento Básico — Regulatory Commission for Water and Basic Sanitation Services)
Monitor and enforce tariff limits	PSC Division of Economic Regulation	Regulatory Office	SSP (Superintendencia de Servicios Públicos Domiciliarios — Public Services Superintendent)
Change tariffs	PSC Division of Economic Regulation	Regulatory Office Final approval by MWSS board, subject to private law arbitration in event of dispute	CRA (Comisión de Regulación de Agua y Saneamiento Básico — Regulatory Commission for Water and Basic Sanitation Services)
Set service standards (pressure and reliability)	Water pressure — Florida Department of Environmental Protection	MWSS, set in contract	Ministry of Economic Development
Monitor and enforce service standards (pressure and reliability standards)	Water pressure — Florida Department of Environmental Protection	Regulatory Office	SSP (Superintendencia de Servicios Públicos Domiciliarios — Public Services Superintendent)
Change service standards (pressure and reliability standards)	Water pressure — Florida Department of Environmental Protection	Regulatory Office MWSS board has final approval	Ministry of Economic Development
Resolve disputes	Office of the General Counsel, Courts	Appeals panel	SSP (Superintendencia de Servicios Públicos Domiciliarios — Public Services Superintendent)
Handle consumer complaints	PSC Division of Regulatory Compliance and Consumer Assistance	Regulatory Office	SSP (Superintendencia de Servicios Públicos Domiciliarios — Public Services Superintendent)
Set drinking water standards	Florida Department of Environmental Protection	Department of Health	Ministry of Economic Development
Set effluent discharge standards	Florida Department of Environmental Protection	Department of the Environment and Natural Resources	Ministry of the Environment

Source: Castalia.
PSC = Public Service Commission; MWSS = Metropolitan Waterworks and Sewerage Services.
Note: All RO decisions are subject to final approval or veto by the MWSS board of trustees.

In Colombia, setting tariffs is the responsibility of one body, while another body monitors and enforces compliance.

In Colombia, the distribution of regulatory functions across various organizations is even more apparent. The Comisión de Regulación de Agua y Saneamiento Básico (CRA — the Regulatory Commission for Water and Basic Sanitation Services) established the tariff-setting methodology. Providers set their own tariffs, in accordance with this methodology (or apply to the CRA to set the tariffs a different way). Service standards are set by the Ministry of Economic Development. The Superintendencia de Servicios Públicos Domiciliarios (SSP – Public Services Superintendent) monitors the providers to check that they follow the tariff-setting rules and comply with the service standards. This separation of regulatory powers is deliberate; Colombian administrative tradition requires that a single body should not be responsible for both making and enforcing rules. However, where private providers operate under concession contracts with a municipality, the general practice is for the contract to set service standards and tariffs and to be enforced by the municipality.

These examples illustrate the possible range of organizational architectures for regulation.

These examples are only a few among the variety of possible organizational architectures for regulation. While it would clearly be wrong to conclude that all systems for allocating regulatory responsibilities between organizations work equally well, it is also wrong to imagine that unified, independent regulatory agencies patterned after U.S. or U.K. models are the only effective regulatory organizations. Rather than relying on imported models, the key may be to allocate organizational responsibilities in a manner consonant with organizational capabilities and administrative and legal traditions.

Regulatory Instruments

Regulation must be embodied in legal instruments.

Economic regulation in the water sector consists of legal controls on water service providers. These controls are applied by legal instruments. For example, in Manila, a decision of the Regulatory Office setting a maximum tariff derives its legal force from the concession contract. From a technical and legal perspective, if a concessionaire charged more than the allowed tariff, it would be a breach of contract. In contrast, a U.S. public utilities commission is typically created by a statute, and the statute typically makes it illegal for a regulated water provider to charge tariffs that have not been approved by the commission.

Different jurisdictions use widely different instruments …

There are many ways to make regulatory rules legally enforceable. These include the following:

- *Statutes.* These are legally binding documents passed by a legislature. Statutes may contain detailed regulatory rules themselves, or they may confer the power on another body (typically, a minister or a regulatory commission) to make such rules.

- *Contracts*. These are legally binding agreements between two or more parties, usually between the government and a private water provider. Terms can be changed only with consent from all parties. Contracts often contain formulas controlling tariffs, as well as minimum service standards, and may also stipulate the mechanisms by which these limits can be changed.
- *Licenses*. Typically, licenses are issued by a minister or executive agency under statute. Like a contract, a license may contain detailed regulatory rules, but it has a more unilateral character than a contract, in that it may provide power for the issuing authority or another government agency to change aspects of the license unilaterally (as is the case with the U.K. water licenses).
- *Executive Orders*. In some countries, executive agencies can issues orders with legal force. Presidential decrees in some of the Former Soviet Union countries or in the Philippines of the Marcos era are examples.

Different countries have chosen different legal instruments to implement similar regulatory rules. Table 3.2 illustrates the choices that some countries have made.

… to achieve similar ends.

There is no "right" choice of legal instruments. As these examples show, a single regulatory system can use several instruments to good effect. More important, different systems achieve similar results with different legal architectures. Again, the right choice may be a matter of fitting with existing legal and administrative traditions.

Table 3.2: Legal Instruments for Regulation in Three Jurisdictions

Instrument purpose	Typical U.S. PUC	Manila, Philippines	Cartagena, Colombia
Creates major regulatory organization	Statute	Statute created MWSS, a self-regulating utility. Concession contract mandated the creation of the Regulatory Office.	Statue
Controls tariffs	Decisions (orders) of the PUC, given legal force by statute	Concession contract and the MWSS statute	Lease-affermage contract
Controls service standards	Varies	Concession contract, statutes, and regulations	Lease-affermage contract

Source: Castalia.

Legal and Organizational Design for Regulation

Policy makers want to know how to choose from the variety of possible arrangements.

There are a variety of ways to allocate regulatory functions to organizations and to choose legal instruments to embody regulatory rules. Many arrangements work reasonably well and achieve functionally similar results. How should policy makers choose one design over another?

While each case is unique, the choice should typically be based on whether any proposed design can be expected to do the following:

- Perform the necessary regulatory functions competently and predictably
- Perform them in a way that does not strain the country's organizational capabilities
- Be consonant with legal and administrative traditions

Where in-country capacity is scarce, countries could consider using existing organizations or outsourcing regulation to regional or international bodies.

When selecting regulatory organizations, governments should consider the country's human resources capacity and capabilities. If the country has a small population or limited secondary or tertiary education, it may not be sensible to create a separate, independent regulatory body. In these countries, it may be better to use staff in existing organizations with appropriate skills or to outsource the functions (for example, to a regional body or a specially created panel of international experts).

Many Western African countries conserve water sector expertise by placing regulatory functions within sector ministries or combining asset ownership and regulation in one statutory body. In keeping with the Francophone tradition, the regulatory rules are embodied in contracts with private operators, allowing a reasonable degree of predictability in their application, although the ministry staff are answerable to the government of the day.

Several small countries in the Eastern Caribbean have addressed capacity issues through implementing a regional regulatory body for the telecommunications sector, and this model also has promise for water regulation.

Contract-based regulation may be more compatible with existing jurisprudence in civil law countries, while common law countries may be more comfortable with statute-based independent regulators.

In deciding on the appropriate legal architecture, existing legal traditions and jurisprudence are important. Countries can generally be divided into two categories: those with a tradition of civil law and those with a common law tradition. Countries in continental Europe (such as France and Spain) and their former colonies (for example, many North and West African or Latin American countries) generally use civil law. The United States, the United Kingdom, and many of the latter's former colonies (for example, many Caribbean and East and Southern African countries), use common law.

These different traditions have given rise to two distinct forms of regulation: civil law or French regulation, which evolved from a model of private participation contracts operating under specialized administrative law, and *common law or Anglo-American regulation,* a tradition of independent regulators that exercise discretion in the public interest. These traditions evolved over a number of years and are based on the specific legal and political arrangements in their countries of origin.

Hybrid systems are possible, but can lead to unexpected problems.

It is possible to mix and match regulatory concepts from these two traditions; however, sometimes the resulting hybrids have not worked as well as hoped. In Manila, for example, the Regulatory Office was intended as an independent regulator of the concession contracts. The Regulatory Office was bound to follow the rules in the concession contracts, but it was also intended to be independent and to exercise discretion. When a sudden devaluation of the Philippines peso put the concession contracts under great strain, the chief regulator thought that the Regulatory Office should use judgment and discretion in trying to find a workable solution. Some of his deputies thought that their job was simply to enforce the terms of the contract. These tensions crippled the Regulatory Office. They followed from a failure to define how an independent regulator can coexist with rules defined in contracts and subject to final decisions by binding arbitration.

The constitution of a country, as well as its judicial and administrative traditions, influences which instruments will best promote regulatory stability.

Regulatory systems must be predictable, especially if private investment is sought. While it may seem useful to government to have the flexibility to change the rules easily, this flexibility can in fact be counterproductive because providers may not act in a manner consistent with the existing rules if they think that the rules can easily be changed. Stability and commitment are important.

In some countries with clear and easily enforceable contract law, contracts offer a good choice for legal commitment because they cannot be changed unless both parties agree. In other countries, governments may not be constrained by contracts that they have signed, so other instruments are more appropriate.

In systems with a separation of powers between the legislature and the executive, and especially in those with bicameral legislatures, statute law is hard to change, once passed, and so can provide a stable basis for regulation. Again, it is a question of choosing the instrument that will work best in the particular legal and administrative traditions of the country concerned.

Further Reading

ADB. 2001. *Regulatory Systems and Networking: Water Utilities and Regulatory Bodies*. Asian Development Bank: Proceedings of the Regional Forum. Manila.

Bertolini, Lorenzo. 2006. *How to improve regulatory transparency.* PPIAF (Public-Private Infrastructure Advisory Facility) Gridlines Note No.11.

Johannsen, Katja Sander. 2003. *Regulatory Independence in Theory and Practice: A Survey of Independent Energy Regulators in Eight European Countries.* Energy Research Programme and the Danish Research Training Council. Copenhagen.

Levy, B. and P. Spiller. 1996. *Regulation, Institutions and Commitment.* Cambridge University Press.

Samarajiva, Rohan, A. Mahan, and A. Barendse. 2002. *Multisector Utility Regulation.* Discussion Paper 0203. World Dialogue on Regulation for Network Economies (WDR). Lyngby.

Smith, W. 1997. "Utility Regulators — The Independence Debate"; "Utility Regulators — Roles and Responsibilities"; "Utility Regulators — Decision-making Structures, Resources, and Start-up Strategy." *The Private Sector in Infrastructure: Strategy, Regulation and Risk.* The World Bank.

Spiller, P. and W. Savedoff. (eds). 1999. Spilled Water: Institutional Commitment in the Provision of Water Services. Inter-American Development Bank, Washington, D.C.

Srivastava, Leena. 2000. *Issues in Institutional Design of Regulatory Agencies.* Paper presented in the South Asia Forum for Infrastructure Regulation (SAFIR) Core Training Course on Infrastructure Regulation and Reform. New Delhi.

Tremolet, Sophie; P. Shukla, and C. Venton. 2004. *Contracting Out Utility Regulation.* The World Bank, Washington D.C.

NOTE 4 — REGULATION AND PRIVATE PARTICIPATION CONTRACTS

Overview

Economic regulation and private participation in water often go together.

Private participation in water is often based on contract. This note looks at good regulatory design for contract-based private participation.

Private participation can help water service providers to increase efficiency, invest in infrastructure, and improve service. At the same time, private providers may seek to charge tariffs above cost, skimp on investment, and provide inadequate service. Economic regulation is intended to ensure that the drive for profits leads to lower costs and better service, not higher tariffs and worse service (see Explanatory Note 1).

There are two distinct traditions in regulation and private participation: the French and the Anglo-American.

There are two distinct traditions in private participation in water. In the Anglo-American tradition, the water utility is privately owned, but regulated by an independent government agency. This regulator controls the provider's prices and services. The regulator uses its judgment to set tariff and service standards at levels that it believes will serve the public interest.

In the French, contract-based tradition, water infrastructure is publicly owned, and the supply of services remains a public responsibility. The public authority contracts with a private firm, allowing it to use the infrastructure and requiring it to provide services at a price stipulated in the contract.

Mixing the two traditions' designs can cause problems, ...

Both traditions harness private management and capital to serve the public interest, but do so in different ways. Problems can arise when the traditions are combined.

Around the world, private participation in water has generally followed the French, contract-based model. However, regulation of the resulting arrangement has generally been based on Anglo-American designs. This risks regulatory confusion. In the French model, many of the regulatory rules are embodied in the private participation contract. In the Anglo-American model, an independent regulator has discretionary power to direct the utility, which may conflict with the operator's contractual rights. Too often governments receive poor advice, resulting in regulatory arrangements that undermine, rather than support, the private participation plans.

… although in principle, cross-fertilization between the two traditions is possible.

In principle, elements of the two traditions can be combined to improve on either one. The French tradition could be supplemented with a dedicated contract-monitoring body and public proceedings, for example. For instance, the Societe Nationale des Eaux du Senegal (SONES) in Senegal is the contract-monitoring body, as well as the asset holder. The Anglo-American approach might increase certainty with greater use of low-discretion rules that the regulator is required to follow, similar to contracts. However, successful hybridization requires a deep understanding of the two systems and how they might interact with the legal and administrative traditions of the country concerned.

Two Different Traditions

Private participation through contract …

Private participation in water is usually done through contract: the government retains ownership of the water assets and contracts with a private firm to manage the systems to deliver water services to customers. There are many types of contract, but in all cases, the responsibilities, rights, and remuneration of the private operator are defined by the contract, and the operator is obliged to the government to deliver the services specified in the contract. Examples include the concession contracts in Manila (Philippines) and Côte d'Ivoire, the lease-affermage contracts in Brno (Czech Republic) and Senegal, and the management contracts in Gaza and Trinidad and Tobago.

… derives from France

The contractual models commonly used are derived from a French approach to private provision of infrastructure that has evolved over more than 100 years.

… and differs markedly from the Anglo-American tradition of privately owned utilities

In contrast, in the United States and England, private participation in water commonly involves a private firm that invests in and owns the assets. Like any firm, it would (were it not for regulation) be free to use its assets as it wished, supply whatever service it wanted, and charge whatever prices its customers would pay.

… on which most conventional regulatory models are premised.

Economic regulation arrangements in the United Kingdom and United States share a set of common features. They are based on an autonomous government entity known as a regulator (Ofwat in the United Kingdom, a state public utilities commission [PUC] in the United States), and a statute that gives the regulator legal authority to determine maximum allowed tariffs and minimum service standards. The regulator is expected to act in the public interest, but has considerable discretion in its decisions.

While the similarities are more important than the differences between the two models, it may be worth mentioning that the key differences include the

type of decision maker (an individual in the United Kingdom, a committee in the United States), the decision-making process (executive in the United Kingdom, quasi-judicial in the United States), and the type of tariff regulation (price cap in the United Kingdom, cost of service in the United States).

The U.S. and U.K. models have been widely copied in both water and electricity. The U.K. strain (which typically involves a single decision maker setting price caps by executive decision) has taken root in Australia, Jamaica, and Malawi, to name just a few examples. Barbados, Canada, and the Philippines have long had regulators modeled closely on U.S. PUCs (with decision making by a multimember commission, through a quasi-judicial process). New ones are being created all the time. Recent examples in the water sector include Armenia (operational) and Azerbaijan (proposed).

The two traditions differ in fundamental ways, …

The assumptions and machinery embodied in the Anglo-American regulatory tradition differ in fundamental ways from those underlying the French tradition of private participation through contract. For a start, the question of controlling the profit-seeking behavior of a private firm does not arise in the same way with private participation through contract, because there is no question of the private provider acting solely in its own private interest: the private firm provides the service only because of its contract with the government, which confers public service obligations.

Another fundamental difference is that a contractual approach assumes an agreement between equals. Generally, neither party has the power to unilaterally alter the relationship. Often the tariffs and service standards are fundamental contractual terms, and the agreement of both parties is required to change them. This is quite different from a model in which an autonomous government agency has discretion to set tariffs and service standards in what it judges to be the public interest.

… so attempts to merge them cause problems.

Too often, Anglo-American style regulatory models have been layered on top of contract-based private participation, without sufficient thought as to how to make them compatible.

Regulation with Various Private Participation Contracts

The right regulatory approach depends on the type of PSP contract.

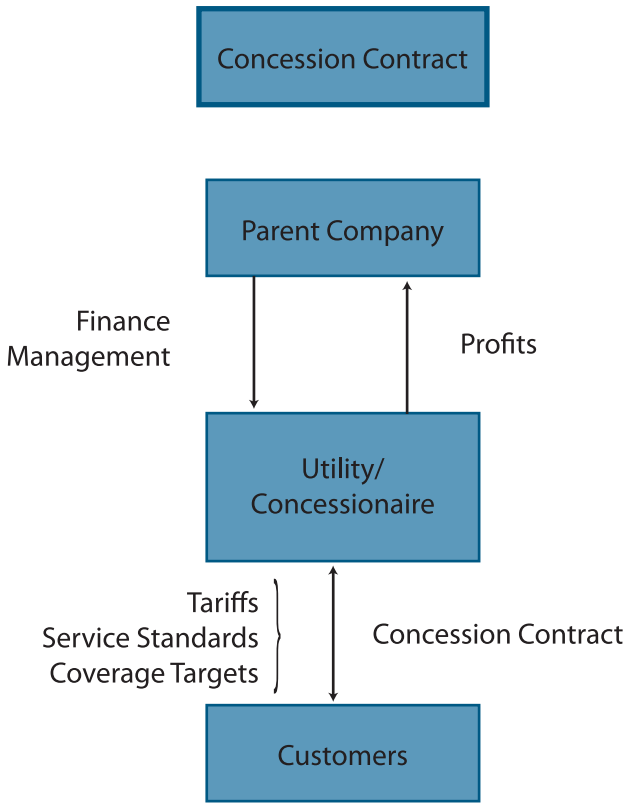
There are several types of private participation contract. The regulatory objectives—good service, reasonable tariffs, investment, and efficiency—are much the same in all situations, but the approach to achieving those objectives depends on the type of contract.

The following sections look at a typical concession contract, a typical management contract, and a typical lease-affermage contract. For each type of contract, they discuss how regulatory objectives are achieved purely within the contract-based approach to private participation. They then give examples of what can go wrong when an Anglo-American regulatory approach is applied unthinkingly, before discussing some ways in which ideas from the Anglo-American approach could be adapted to perhaps improve the contract-based approach.

Concession Contracts

The diagram at left illustrates a concession contract. In some senses, a concession contract is similar to a fully private utility that owns the assets. The concessionaire is responsible for all aspects of service provision, and its shareholder(s) or parent company is rewarded with the profit from the utility, after all operating and debt service costs are paid.

Figure 4.1: Concession Contract



In a classic concession, the contract sets the service standards and tariff rules. Economic regulation—in the sense of protecting customers by controlling tariffs and service standards—is subsumed into the design and monitoring of the concession contract.

The regulatory roles in this case are the following:

- Monitor performance under the concession contract.
- Resolve disputes under the contract.
- Provide a mechanism to fill in contractual incompleteness by exercising discretion in a principled and predictable way in those cases (such as tariff resets and response to new information) where discretion is unavoidable.

Traditional concession contracts contain their own regulatory framework.

Traditional concession contracts, such as those in Côte d'Ivoire and Vanuatu, have no special regulatory organizations. Contract monitoring is done by the sector ministry, a municipality, or an asset holder set up as a statutory body. Tariff resets are agreed on by negotiation between the concessionaire and the government. Arbitration governs disputes, including failure to agree on tariff resets. While these arrangements are not perfect, they are often successful in delivering water services that are of higher quality and more efficient that in similar countries that do not have concession contracts.

Adding a conventional Anglo-American regulator will not work.

It should be clear that imposing an Anglo-American regulatory framework on a concession contract will not work. The essence of a concession is that the rules determining the tariff are embodied in a contract between the investor and the government. Because the rules are in a contract, they cannot be changed without the investor's consent. This gives the investor the confidence to invest in water infrastructure, knowing that its tariff expectations are legally protected.

On the other hand, a classic Anglo-American style regulator has the legal right to set the tariff at the level it considers reasonable. If a regulator is given such a legal right, it implies that it can override the tariff-setting rules in the contract. This removes the contractual certainty that the investor sought. Alternatively, if the regulator is bound to follow the rules in the contract, then it becomes a contract-administration unit. This model can provide greater certainty for the future investor, but it is not an independent regulator.

In some countries, one group of consultants has been engaged to establish an Anglo-American style regulator, while at the same time the government has tried to develop a traditional concession contract for water. These countries have typically not been able to attract investors to the concession contract or have had to make last-minute changes to the regulatory regime.

There are several cases where concession contracts and the Anglo-American traditions have been combined in ways that worked, but in hindsight may have done more harm than good.

In Manila, combining a Regulatory Office with a concession contract caused confusion.

In Manila, the water system was transferred to private firms under two concession contracts. Service standards and tariff-setting rules are embodied in the contract. Influenced by the Ofwat example, the government created a quasi-autonomous Regulatory Office. There has been confusion over the proper role of the Office. For example, when the Asian currency crisis struck, the regulatory rules needed to be changed if the concessionaires were to remain viable. Yet it was not clear whether the Regulatory Office should take the lead in adapting the rules (an approach consistent with an independent agency using its discretion in the public interest) or whether its role was to strictly enforce the terms of the contract and leave any negotiation to the board of MWSS. The board was not intended to have any role in tariff setting or regulation, but was the legal signatory to the contract. In the end, a confusing mess of regulatory players were involved, including the Regulatory Office, the board of MWSS, the president of the Philippines, and the arbitrator under the contract.

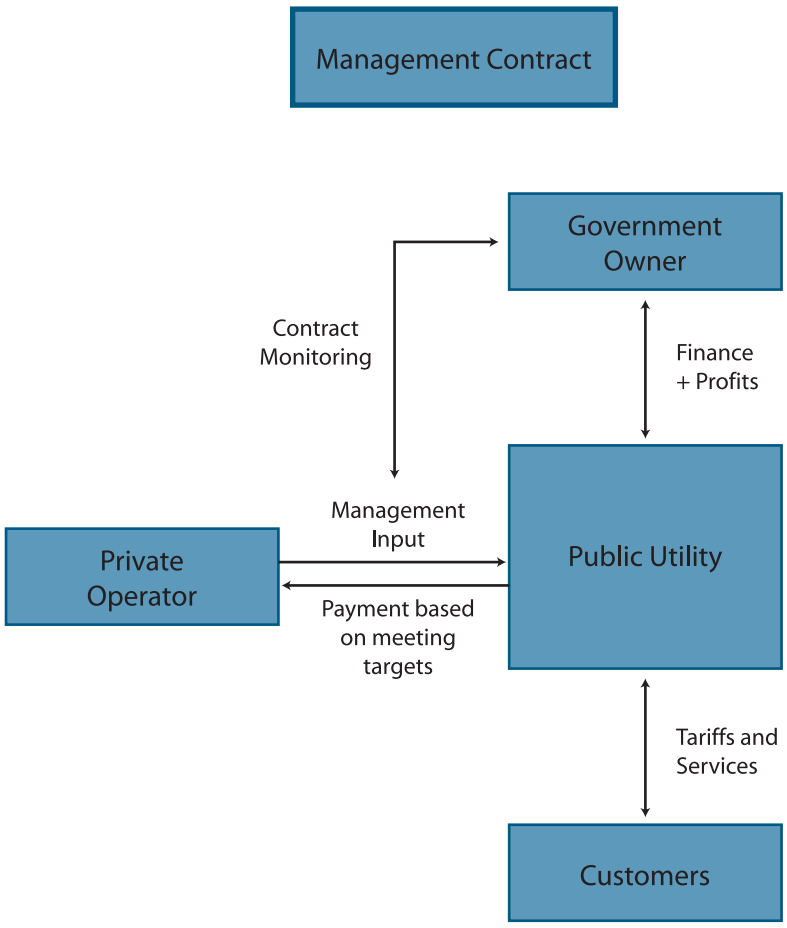
But there may be ways to combine elements of the two traditions.

Some concession contracts have had more success in creating both special government organizations charged with administering the contract and dedicated mechanisms for making binding decisions at periodic tariff resets. Examples include the Bucharest and Sofia concessions, where each established dedicated units with clearly defined functions. These units point the way toward possible successful cross-fertilization between the two traditions.

Management Contracts

Management contracts are completely different from concessions in their "regulatory" approach. Under a management contract, the private operator is typically paid a fixed fee for managing the utility, plus a performance fee for meeting financial and service improvement targets. In this scheme, the management contract provides the incentives to improve performance. The targets and payments in the management contract will determine how the operator manages the utility. What happens in this case to regulation as it is conventionally understood (that is, controlling the relationship between the utility and its customers by setting service standards and tariff levels)?

Figure 4.2: Management Contract



The management contract itself provides incentives for efficiency.

It will still be necessary to set tariffs and service standards for the utility. But in most cases, the regulatory regime that sets the tariffs will have very little impact on the management contractor—and so very little effect on the way the utility is managed.

For this reason, in the pure contract-based approach, the tariffs and service standards continue to be set by the government, at its discretion. The theory is that the contract gives the management team incentives to improve the utility. The contract governs the management contractor's remuneration. The government remains as representative of the consumers and sets tariffs at a level that strikes the right balance between financial viability and social acceptability, quite independent of its arrangements with the management contractor.

Anglo-American style regulation of the utility is likely to impose risks on government, without increased incentives for efficiency or performance.

Again, overlaying a management contract with conventional Anglo-American style regulation is likely to be counterproductive. Consider a utility that is both subject to a management contract and regulated by a price cap.

Price caps are intended to create incentives to increase efficiency. Under a price cap, reducing costs can increase utility profits. If the utility is privately owned, this gives the private firm an incentive to reduce costs and so increase the private firm's profits. However, under a typical management contract, the operator's fees do not depend on the utility's profits. In this situation, a price cap does not give the private firm an incentive to increase efficiency. It would increase the risk that the utility would suffer financial distress, at least if compared with a cost-plus approach to tariff setting.

In Guyana, regulation had little effect on a government utility under management contact.

Guyana implemented a comprehensive water sector reform, including a management contract and Anglo-American style regulation. The Guyanese government mandated Guyana Water to sign a management contract with Severn Trent Water International, a United Kingdom–based firm. The government also gave the public utilities commission authority over the water utility. The intention was that the private managers would make the utility more commercial and efficient, while the regulator would ensure that tariffs reflected reasonable costs and that service quality improved.

Things have not worked out as planned: Tariffs are well below cost. For social and political reasons, the government, which still owns the company, does not want a tariff increase; therefore, the government instructed the board to delay filing for an urgently needed tariff increase.

Guyana Water is not meeting the service standards in its license. The public utilities commission would like to enforce compliance with service standards; however, imposing penalties on Guyana Water would only increase its operating deficit. Because the company is publicly owned, the deficit must ultimately be funded by taxpayers.

Regulatory models suited to publicly owned utilities might be adapted to work with management contracts.

A utility operated under a management contract is publicly owned. Taxpayers, not the management contractor, typically bear most of the risks of the business. In looking for a regulatory model, models suited for public utilities may turn out to be a better starting point than those intended for private utilities. (Explanatory Note 6 discusses options for regulating publicly owned companies.)

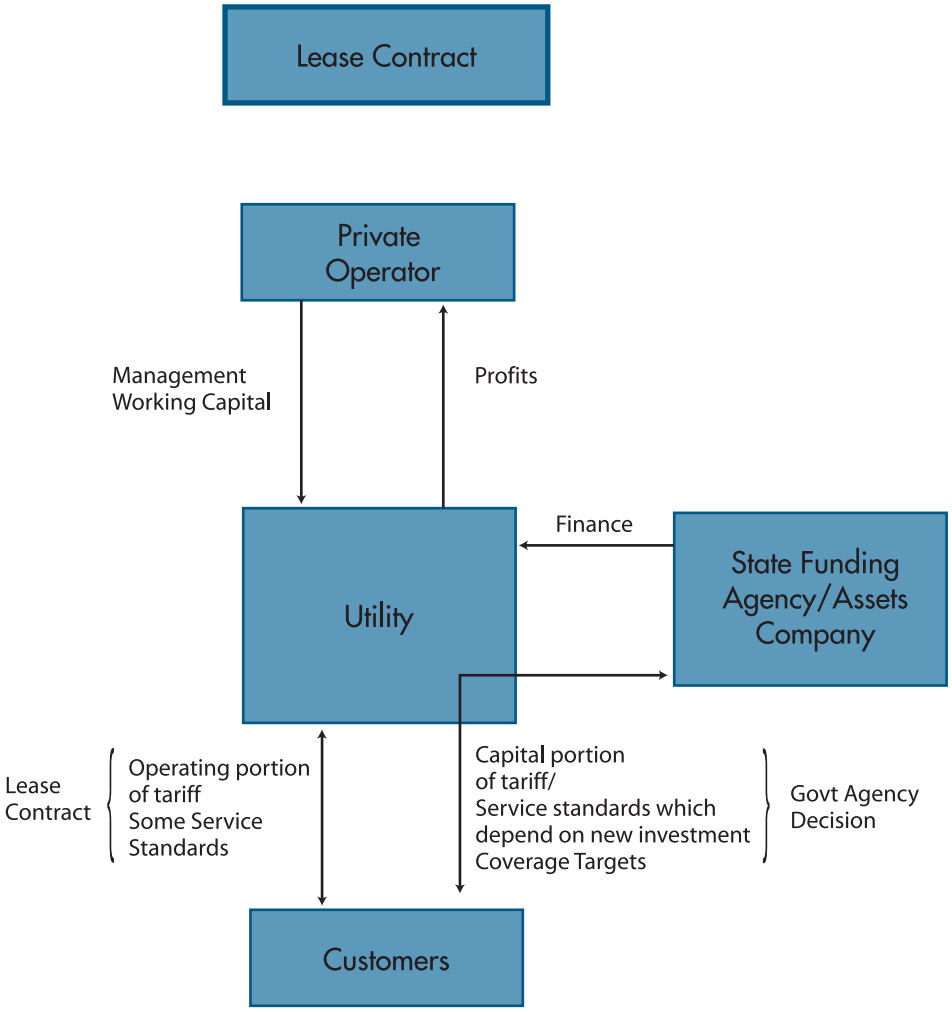
Lease-affermage contracts also expose the private firm to only some of the risk and responsibilities of providing the service.

Lease-Affermage Contracts

Lease-affermage contracts (such as that in Brno, Czech Republic) are intermediate between a concession contract and a management contract. The operator takes risk on the operation of the business, as with a concession contract. But like a management contract, the public authority retains responsibility for investment, and this creates a gap between the profits and risks of the service as a whole and the profits and risks of the private operator.

In a lease-affermage, the tariff revenue is typically divided into two parts: The first part covers operating and maintenance costs, which are to be retained by

Figure 4.3: Lease Contract



the private operator. The second part of the tariff goes to the public sector to help finance investment. This complicates tariff regulation. The operator portion of the tariff must be governed by the lease-affermage contract; however, the government typically chooses to retain discretion over its portion of the tariff, and so over the final tariff faced by customers.

Service-standard regulation is also complicated. Many service levels will be jointly determined by operating and capital decisions, but the private operator does not usually control the capital expenditure decisions. For example, to increase reliability, leaking pipes must be fixed. This can be done by patching leaks as they occur (maintenance) or replacing entire sections of the network (capital expenditure). The private operator may argue that reliability standards are being missed because the public sector is falling behind on its pipe replacement program, while the government may argue that the operator is to blame for not doing adequate maintenance work.

NOTE 4

The lease contract provides incentives for operating efficiency, while the public authority determines tariffs and investment.

The logic of the classic contract-based system is that the lease-affermage provides incentives for operating efficiency and also gives the operator predictability as to what it will earn. The government is accountable to consumers and therefore determines the appropriate level for the final tariff and for the investment program.

Again, simply applying a classic Anglo-American regulatory regime to a lease-affermage contract would not work. Consider tariff regulation: A classic independent regulator would examine operating efficiency and capital needs. The regulator would then set the tariff in line with its estimate of reasonable operating and capital costs.

Assume that a regulator reviews a utility under a lease contract and concludes that its capital costs are reasonable, but its operating costs are excessive. The regulator would order a tariff reduction. Under a lease contract, how this reduction in income was allocated between the private operator and the public authority would depend on the details of the contract. There is no guarantee that the inefficient operator, rather than the public authority, would suffer the consequences of the regulatory decision. Alternatively, if the regulator has the authority to determine the remuneration of the private operator directly, it would mean that it had the power to override the contract, creating risk and uncertainty.

In Azerbaijan, the plan was to create a regulator with powers to override private participation contracts, but reforms have stalled.

It might seem obvious that basing private participation on a contract and then creating a regulator with unilateral power to override the contract is a recipe for failure. But it happens surprisingly often. In Azerbaijan, for example, the government planned to introduce contract-based private participation to the WSS sector. Its advisers drafted statutes to create a United States–style regulatory authority with the powers to change the contracts without the consent of the contracting parties. No transactions have yet taken place. If a transaction were attempted, the statutory regulatory system would make it difficult to attract bidders and could result in extensive disputes between the government, the regulator, and the contracted parties.

Key regulatory design issues in a lease contract include the following:

- Holding the private operator to account for performance when responsibility for the system is divided
- "Regulating" the public sector component (Conventional regulatory tools harness an operator's profit motive to provide incentives for good performance. Different mechanisms are needed to promote efficiency and well-targeted investment in a public sector agency.)

Possible improvements on the pure contract-based system could include the following:

- A dedicated contract-monitoring unit to manage the lease contract for the public authority
- A unit to "regulate" the performance of the public authority by assessing the adequacy of its capital investment planning and by benchmarking its efficiency against other similar agencies
- A body with the responsibility for publishing the performance of both the private operator and the public authority compared with their contractual obligations and other relevant standards or benchmarks to promote increased transparency and accountability

Approaches to Combining the Traditions

Where private participation is based on contract, the contract is the foundation of the arrangements.

Regulation is generally intended to complement and support private participation. Where private participation is based on a contractual arrangement, the contract is fundamental—it must be respected. In contract-based private participation, private firms are not buying an asset. Firms are entering an arrangement in which their risks, rewards, cash flows, and obligations are determined by the contract. The contract is the deal. The contract is also the primary legal instrument that gives the private firm the predictability and enforceability it needs and so leads it to commit management and investment resources and to take risk. All this means that any additional regulatory mechanisms must be consistent with, and supportive of, the contract.

But contract-based approaches have some common weaknesses …

Each approach—reliance on contracts and reliance on independent regulators—has it own flaws, and each may benefit from drawing on the other.

Wherever private participation arrangements are based on contract, the approach should be to start with the logic of the contract-based approach, identify its weaknesses, and then look for mechanisms to offset those weaknesses. Common weaknesses in the contract-based tradition include the following:

- Lack of a dedicated unit with the expertise to monitor, enforce, and (where necessary) renegotiate the contract
- Lack of transparency in regulatory processes, where they are treated as commercial contractual matters to be settled between the government and the utility behind closed doors
- No structured process for public consultation or for the public to contribute and be heard in the regulatory process
- In countries where water is a municipal responsibility, concession contracts for each town are the responsibility of the local government. Often, there is no mechanism
  to reduce costs and increase quality through adopting similar regulatory approaches and sharing information between municipalities.

… that may be overcome by techniques from the Anglo-American tradition.

In thinking about how to overcome these problems, regulatory designers may benefit from ideas from the Anglo-American regulatory tradition, including the following:

- Creating an autonomous body to monitor the contract, enforce it, and provide the analytic input when tariffs or other aspects of the contract are reset or renegotiated. Such a unit may be delegated the job of agreeing on changes with the private
  operator (subject to arbitration in disputes), or it may simply advise the government.
- Giving a government entity the responsibility to publish information about the performance of the private operator against its contract and about the performance of government agencies involved in the sector to increase transparency and accountability
- Establishing a national unit to benchmark the performance of a number of municipal systems and perhaps also to monitor and enforce contracts or reset tariffs on behalf of the municipalities
- Creating a customer complaints unit with a mandate to assist customers with complaints they cannot resolve directly with the utility
- Finding ways to involve the public in regulatory decision making (for example, by allowing the public to make submissions or ask questions of the utility and to attend public sessions in which the utility presents its case for tariff changes to the government)

Further Reading

Bakovic, T., B. Tenebaum, and F. Woolf 2003. *Regulation by Contract*. The World Bank: Working Paper No. 14.

Brocklehurst, Clarissa and Jan Janssens. 2004. *Innovative Contracts, Sound Relationships: Urban Water Sector Reform in Senegal*. Water Supply and Sanitation Sector Board Discussion Paper 1. The World Bank. Washington, D.C.

Burns, Phil and Antonio Estache. 1999. *Infrastructure Concessions, Information Flows, and Regulatory Risk*. Public Policy for the Private Sector 203. The World Bank. Washington, D.C.

Castalia. 2004. *Final Report on Key Contract Provisions for Long Term PPP in the Water and Sanitation Sector*. Volume I, main report, Report to World Bank and Operator Roundtable. Castalia Strategic Advisors.

Crampes, Claude and Antonio Estache. 1996. *Regulating Water Concessions: Lessons from the Buenos Aires Concession*. Public Policy for the Private Sector 91. World Bank. Washington, D.C.

Guasch, J. L. 2004. *Granting and Renegotiating Infrastructure Concessions*. World Bank Institute.

Kerf, M, R. D. Gray, T. Irwin, C. Lvelesque, R.Tayplor, and M. Klein 1998. *Concessions for Infrastructure: A Guide to Their Design and Award*. World Bank Technical paper no. 399. Finance, Private Sector, and Infrastructure Network. The International Bank for Reconstruction and Development. The World Bank. Washington, D.C.

NOTE 5 — COST OF SERVICE AND TARIFFS FOR WATER UTILITIES

Overview

Regulation tries to set tariffs equal to reasonable costs.

Regulation usually aims to set tariffs at a level that allows the utility to cover its reasonable costs, but no more, over the medium term. This is enormously challenging. Regulators often do not know what the reasonable cost of service is. Often the reasonable cost of service is above current tariff levels. Increasing tariffs to a level that covers reasonable costs is socially and politically challenging.

This is difficult because utilities are inefficient and tariffs often start well below costs.

At the same time, many utilities in developing countries are inefficient. Their actual costs are more than what would be deemed reasonable. So tariffs set to cover reasonable costs may condemn these utilities to a vicious cycle of losses, underinvestment, and deterioration in both efficiency and service.

This note offers an approach to these problems. It describes how to calculate the reasonable cost of service for a water utility and how to use that calculation in controlling tariffs. It suggests ways to deal with inefficient utilities and with social issues in tariff setting. In general, the analysis is applicable to both publicly and privately owned utilities.

The note also argues that the debate over the merits of rate-of-return regulation compared with price-cap regulation is overdone. Almost all successful regulatory approaches base tariffs on estimates of the reasonable cost of service.

At the heart of most successful regulatory regimes is a process for estimating the reasonable cost of service, based on a number of cost "building blocks."

Figure 5.1 illustrates the underlying approach common to most successful regulatory regimes. In essence, these are the key steps:

- Estimate the total cost that the utility would incur in providing the required service efficiently. We refer to this as the "reasonable cost of service." The cost of service comprises a number of building blocks (that is, the various operating and capital cost components).
- Set the actual tariff to be charged (that is, the fixed charges, metered charges, and so on) for each class of customers. The various types of charge and the relativities between them are called the "tariff structure." The tariff structure should be set so that when applied to actual customer numbers and demand, the revenue generated is equal to the cost of service.
- Put in place the tariff control regime (that is, the rules that specify how the utility may change its tariffs). This regime may be, for example, a price cap or a United States–style mandated tariff.

This note focuses on the first of these three steps—estimating the cost of service—before discussing the tariff structure and control regime.

Estimating the Cost of Service

To estimate the cost of service, add up all the costs …

Estimating the cost of service is conceptually simple. The regulator just adds up all the costs that the utility must incur to provide the required services. This starts with summing the actual costs recorded by the service provider, because these are all that can be observed.

… and adjust for costs that are not reasonable.

The regulator must know whether these costs are reasonable; therefore, it adjusts actual costs by

- ensuring that all costs are properly recorded;
- checking whether the utility is inefficient in some areas (in which case, its actual costs are more than is reasonable and must be reduced); and
- checking whether actual costs are too low because service levels are too low (in which case, costs must rise if the utility is to provide the required level of service).

This process is illustrated in figure 5.1. Regulators in Australia have developed a clear and effective way of setting tariffs using this method, which they refer to as the "building-block" approach. This is similar to the approach used in the United Kingdom, with perhaps the difference that Australian regulators tend to be more open about the cost-plus nature of their methodology. The Australian approach is also similar to the U.S. cost-plus approach, although regulators in Australia focus on forecasts of costs while regulators in the United States may pay more attention to historic costs. The key point is that the process shown in figure 5.1 is common to most successful regulatory systems. The steps in the process are discussed below, first for operating expenses, then for capital costs.

Operating Expenses

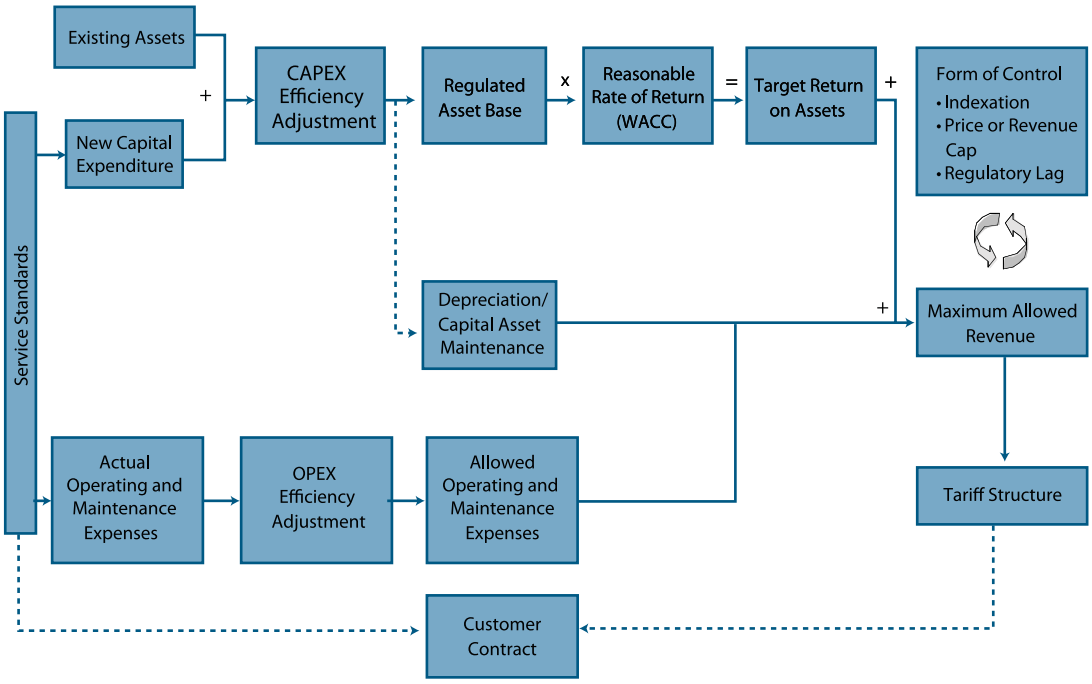
Operating costs must be correctly recorded and reviewed for possible efficiency gains.

This section discusses three of the key operating cost components: labor, electricity, and provisions for bad debts. These typically account for most of a utility's operations and maintenance costs.

Labor and electricity costs are usually recorded accurately in the utility's accounts, so the regulator's[4] focus is simply on ensuring that the levels of these costs are reasonable. This involves checking how efficient the utility is

4 In this note (Explanatory Note 5), the term "regulator" means the body deciding on the tariffs that the utility is allowed to charge. As discussed in Explanatory Note 2, this could be a conventional independent regulator, another kind of organization (such as a ministry overseeing a publicly owned utility), or an arbitration panel setting tariffs under a contract.

Figure 5.1: The Building-Block Approach to Tariff Setting



Source: Castalia.
Note: CAPEX = capital expenditure; OPEX = operating expenditure.

(for example, whether costs are too high, or whether the costs are being held too low, thereby causing service problems). Box 5.1 gives an example.

Many utilities are in arrears on their electricity bills; therefore, in reviewing electricity expenditure, the first job is to ensure that actual bills are being recorded in the accounts. The next step is to review whether efficiency can be improved (for example, by replacing old pumps or reducing leakage). On the other hand, if the company is trying to increase hours of service, this may require additional pumping, which could push up electricity costs.

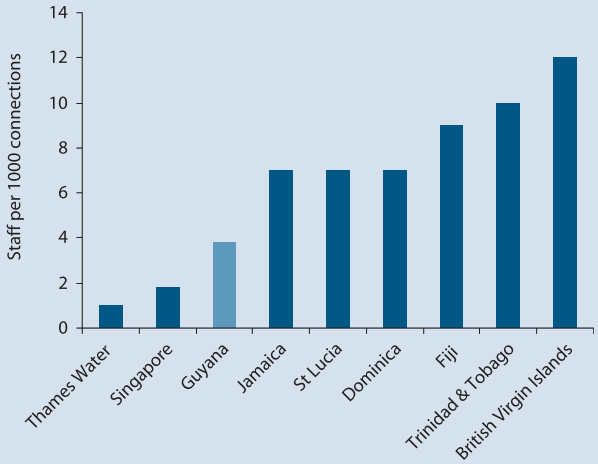
Similarly, many utilities do not collect all the revenue owed to them. The regulator first must check that uncollected bills are reflected in the utility's accounts through an accurate provision for bad and doubtful debts. Then the regulator must examine whether the collections rate should be improved so that the reasonable provision for bad debts could be reduced.

Box 5.1: Benchmarking Labor Costs — Guyana Water

A recent review of the tariffs charged by Guyana Water Inc. (GWI) for the Guyana Public Utilities Commission benchmarked staff numbers per thousand connections against other utilities in the Caribbean and elsewhere. The review found that on this simple indicator, GWI performed well (as this graph shows), but went on to caution:

"The number of staff per 1,000 connections is only one measure of labor efficiency. In particular, the measure does not evaluate whether the number of staff employed is sufficient to allow the provider to operate effectively and provide acceptable levels of service. Indeed, GWI … emphasizes that more staff are required to identify and counter system leaks."

Source: Castalia.



NOTE 5

Estimating the reasonable cost of service involves judgments on the level of service required and the efficiency gains achievable.

Estimating the reasonable cost of service is an art as much as a science. The regulator must balance the increases in service standards it imposes against their impact on costs.

Even more difficult are judgments on the rate at which the utility can increase efficiency. If the regulator sets targets for cost reduction that the utility cannot meet, tariff revenue will not cover costs. The utility will become financially distressed, making it impossible to improve service levels and efficiency. Rather than risk setting unachievable efficiency targets, one option is to set tariffs in line with actual costs initially. A well-run company should be able to reduce costs and increase its cash flows as a result, making it easier to attract investment. At a later tariff review, the regulator might then be able to set tariffs at a lower level, to pass on to customers the benefits of the lower costs.

Capital Costs

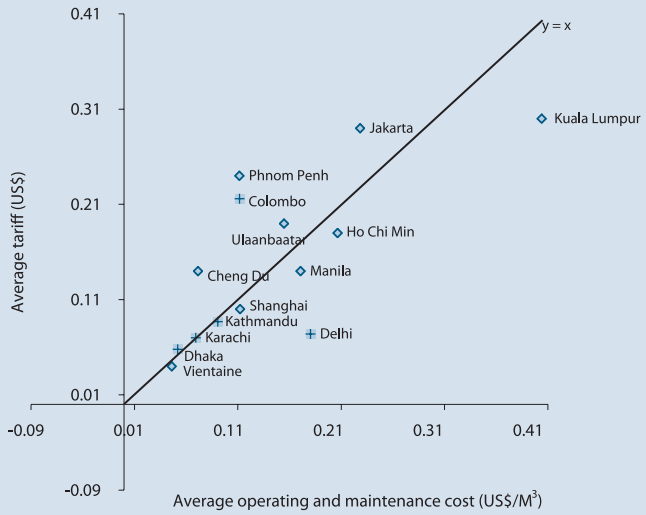
Capital costs are usually the biggest element of the cost of service …

Providing water and wastewater services requires substantial capital investment in pipes and other fixed assets. This capital investment results in two types of capital cost:

Box 5.2: Tariffs Compared with Operations and Maintenance Costs

This figure plots Asian water utilities according to their average tariff (on the vertical axis) and their average operating and maintenance cost (on the horizontal axis). The 45-degree line indicates the point at which tariffs equal average operating and maintenance costs. Utilities below the line are making an operating loss. Those above the line are earning more in revenue than they are spending on operations and maintenance (that is, they are covering at least some of their capital costs).

Of the 14 utilities shown, 9 are located on or below the line. Only the utilities in Colombo and Phnom Penh are far enough above the 45-degree line to come close to covering all their capital costs. While it is impossible to generalize, many utilities need tariffs that are twice their operations and maintenance costs to achieve full cost recovery.



Source: C. T. Andrews and C. E. Yniguez, eds., *Water in Asian Cities: Utilities' Performance and Civil Society Views,* ADB Water for All Series, Vol. 10 (Manila: Asian Development Bank, 2004).

- The cost of replacing old assets when they reach the end of their useful life (called "return of capital")
- The cost of providing a return on the capital tied up in the assets (called "return on capital")

… but they are often not accurately recorded.

Many utilities' tariffs do not allow them to cover their capital costs at all (as box 5.2 illustrates). That may be fine if the government is reliably providing subsidies to fund the capital. Often though, capital costs are neither recovered through the tariff nor adequately funded by government. The result is decaying infrastructure and declining service. To avoid such decay, it is advisable to start by accurately measuring capital costs. Only when true costs are known can an informed decision be made on the extent to which they should be covered by tariffs or by subsidies.

Table 5.1 Approaches to Calculating Capital Costs

	Depreciation plus a return on assets	Infrastructure renewals accounting plus a return on assets	Cash needs
Return *of* capital	Depreciation	Infrastructure renewals charge *plus* depreciation on operating assets	Loan principal payments *plus* cash-financed capital expenditure
Return *on* capital	Cost of capital *times* asset valuation	Cost of capital *times* asset valuation	Interest payments on loans

Source: Castalia.

NOTE 5

There are three ways to calculate capital costs:

- Depreciation plus a return on assets
- Infrastructure renewals accounting plus a return on assets
- Cash needs

The table below shows how each of these methods addresses return *of,* and return *on,* capital.

The first priority is to record capital costs. Various approaches are possible.

Perhaps the most commonly recommended approach is *depreciation plus a return on assets*. Depreciation records the reduction in value of an asset over time. For example, a pump that costs $5 million and has a life of five years might be depreciated at $1 million a year. This is a way of recognizing the decline in value of the pump over time.

The return on assets recognizes that capital tied up in water infrastructure could have an alternative use (for example, it could be invested in income-earning assets instead) and therefore has a cost associated with it. If the return earned on investments with a similar degree of risk is, say, 10 percent, then the cost of capital for the water utility is 10 percent. Using this approach, the total annual cost of the $5 million pump would be $1.5 million: $1 million in depreciation (return of capital) and $0.5 million as the required return on capital invested.

Depreciation is the common accounting approach to recognizing the loss in value as assets wear out; however, depreciation is not necessarily well suited as a measure for water infrastructure. A pipe network does not wear out over a predictable life and then get replaced; it is typically repaired and renewed in sections. *Infrastructure renewals accounting,* which is used by water companies

in the United Kingdom, addresses this problem by recording as a cost the medium-term average expenditure required to maintain the network at existing levels of serviceability. This may provide the best estimate of the actual costs involved in keeping the system working and would be used instead of depreciation for the infrastructure assets. The return on capital would then be added to this level of expenditure to make up the capital cost figure.

The third option is the *cash needs* approach. Under this approach, the capital cost measure is simply the amount of debt service the utility incurs each year through interest and principal payments on loans. While at first sight this seems to be completely different from the depreciation-plus-return-on-assets method, the two can in fact be equivalent. For example, if the $5 million pump was financed by a $5 million loan at a 10 percent interest rate, then the annual debt service could be $1.5 million per year—the same capital cost as determined using the depreciation-plus-return-on-assets approach.

Whichever approach is used, the regulator must determine the *regulated asset base,* which comprises the value of existing assets and the value of new capital expenditure.

Existing assets may need to be valued at well below book value to avoid tariff shocks.

Setting the value of existing assets is often difficult. It seems natural to set it equal to the book value of the utility's assets when it enters the regulatory system; however, in many cases, the utility has not previously been earning a return on those assets. If the cost of service is calculated to include a reasonable return on the book value of assets, the result might be a doubling or tripling of tariffs. A more practical approach is to set the value of existing assets, based on the profits they generate under current tariffs. When the water companies in England and Wales were privatized, the regulatory value of existing assets was set at around 10 percent of the *current cost book value* of the assets. If a utility had zero operating profits, this approach would imply a zero regulatory value for existing assets. If the utility will have to service the debt incurred to construct the assets, a good approach may be to set the regulatory value of the existing assets equal to the amount of debt that will have to be serviced.

New assets should be recorded at cost, but with some check on the need for the investment and its cost.

The regulator will also want to be sure that new capital expenditure is prudent and efficient. This usually involves some combination of (a) requiring regulatory approval of investments before they are made and (b) allowing for inefficient or unnecessary capital expenditure to be "disallowed" after it has been made. Whatever capital investments are allowed or approved by the regulator, the utility is then allowed to earn a return on them, and this is added to the reasonable cost of service (in a cash-needs approach, the regulator may approve the loans as well as the capital expenditure).

The utility should have the right balance of operating and capital expenditure to reduce total costs.

Finally, in assessing the reasonable cost of service, it is not enough to just look at operating and capital costs in isolation. Many capital investments may be justified in part because they reduce operating costs. For example, replacing pipes may reduce leakage and thereby cut pumping and chemical costs. The regulator will want to be satisfied that the utility has chosen the right mix of operating and capital expenditures to reduce total costs over the medium term.

Setting the Maximum Allowed Revenue

The maximum allowed revenue is how much the utility will be allowed to earn.

Once the regulator has estimated the reasonable cost of service, it must decide how much the utility will be allowed to earn (that is, its *maximum allowed revenue*). At first sight, it would seem that the utility should simply be allowed to recover the reasonable cost of service. But things are not always so simple. When the cost of service is higher than current tariffs, increasing tariffs to cover the cost of service could have a severe social impact and political backlash. Equally, if a utility's actual costs are higher than reasonable costs, then limiting the utility's revenue to the reasonable cost levels could cripple the utility's financial viability. These competing tensions can make the regulator's job very difficult. In this section, we outline a systematic way of addressing these tensions.

Cost of Service and Social Impact

Where reasonable costs are above current tariff levels, increasing tariffs to cover reasonable costs will be difficult.

The real cost of service may be much higher than the current average tariffs. As box 5.2 illustrated, it is not uncommon for tariffs to be half the current cost of service. And while efficiency gains could reduce the cost of service, the need for service improvements can more than offset this. This raises the question, how should the regulator use the cost of service in setting tariffs? Simply increasing tariffs to full costs is often unpalatable. Water tariff increases are always politically sensitive, and rapid and substantial increases in bills can cause genuine hardships for some customers.

The first and essential point to recognize is that if the service is to be provided, the cost of service must be paid by someone: either customers or taxpayers. Many regulators keep tariffs below the cost of service out of concern for customers' ability to pay. If the gap is not filled by reliable taxpayer-funded subsidies, then service will suffer, and the utility will not be able to finance expansion to new areas. Because (for most customers) water service is worth a lot more than it costs, a regulatory approach that prevents the utility from providing the desired service does more harm than good.

The regulator may recommend that the government provide a subsidy to keep tariffs lower or build a cross-subsidy into the tariff.

The implication of this is that if the regulator wants some customers to pay less than the cost of service, then the regulator must do one of the following:

- Be sure that the government will cover the shortfall (for example, by funding the infrastructure or providing other direct subsidies).
- Create a tariff structure in which some customers are charged more than the cost of service so that others can pay less. This is commonly referred to as "cross-subsidization," which is discussed in the section Setting the Tariff Structure.

In other words, the cost of service is what it is. Social impact issues cannot be addressed by changing cost-of-service estimates. They can be addressed through direct subsidies or possibly by cross-subsidies in the tariff structure.

What to Do When Efficient Costs Are Below Actual Costs

Actual costs are often higher than reasonable costs.

Often the *efficient* cost of service will be lower than a utility's actual costs. In Baku (Azerbaijan), for example, the utility had bad debts of around 25 percent of revenue, when international experience suggested that an efficient utility would have bad debt provisions of only around 5 percent of revenue.

In this situation, regulators are often inclined to set the maximum allowed revenue at efficient cost levels, on the grounds that the utility should not be entitled to recover the costs of its inefficiencies from its customers. In theory, a utility subject to rigorously enforced service and coverage requirements would continue to provide the required service and absorb its losses until it can increase efficiency and return to profitability.

In practice, utilities with revenues held below actual costs generally allow service and maintenance to decline while trying to cut costs. New areas go unserved, while existing customers suffer increasing inconvenience as service deteriorates.

Worse still, when the utility is government-owned, the losses will be funded by government, as owner of the company. Losses absorbed by government are ultimately a cost to taxpayers. Often the taxpayers are much the same people as the customers, so what a household saves in lower water bills it pays later in higher taxes.

This "money-go-round" would be justified if the losses motivated the government (as owner) to change the way the utility is managed, increasing efficiency and reducing future losses. But very commonly, governments are not able or willing to do this, and losses simply continue to be absorbed, often in an unplanned way (for example, when the utility is bailed out when it is in danger of defaulting on its obligations to creditors).

Limiting tariffs to reasonable costs may cripple the utility if it cannot increase efficiency fast enough.

The reality is that increasing efficiency in a water utility is a difficult and time-consuming process that often requires initial increases in expenditure. Typical "quick wins" in improving efficiency include increasing collections and reducing electricity costs by installing more-efficient pumps. But to increase collections may require a new billing system, often costing millions of dollars and taking months or years to procure and install. Staff may need to be retrained or laid off, or new staff hired, incurring additional costs and delays. New pumps often have a payback period of only a few years, but still require up-front capital expenditure. When the utility is bleeding cash and credit lines are exhausted, the quick wins may be unobtainable.

This suggests that a hard-line regulatory approach of limiting allowable revenue to the efficient cost of service may be counterproductive.

A better approach may be to allow the utility to pass on some of its inefficiencies to customers during a transition period.

A more pragmatic approach may be for the regulator to determine, with the utility and its owners, a realistic and phased program for improving efficiency. This may involve agreeing with the owner (often the government) on the losses the owner will absorb and on the investment it will make in efficiency improvements. The regulator may then allow the utility to recover the remaining inefficiencies and investment costs from customers.

This may seem unpalatable for those schooled in the belief that a regulator's job is to stop a utility from passing on its inefficient costs to customers. However, the alternative of a utility spiraling into deteriorating service and diminishing efficiency is often worse for customers.

Conclusions on the Maximum Allowed Revenue

In summary, having estimated the reasonable cost of service, the regulator must translate this into the maximum allowed revenue that the utility will be allowed to recover.

Where the utility is inefficient, the regulator must decide whether to set the maximum allowed revenue at efficient costs immediately or to allow a transition in which maximum allowed revenue starts higher than the efficient cost of service and converges over time. Unless the utility has owners able to absorb losses and make the investments needed to increase efficiency, the latter is often the better strategy.

Where tariffs are below the cost of service, the regulator may be tempted to set maximum allowed revenue below the cost of service to limit tariff increases. This is counterproductive because it will lead to deterioration of service.

A better approach may be to encourage government to provide a subsidy sufficient to address the social impact concerns and then set maximum allowed revenue equal to the cost of service minus the subsidy provided. Failing this, the regulator may choose to adjust the tariff structure so that those who are better able to pay will absorb a greater share of the total costs than do those who are poorer.

The result should be a maximum allowed revenue that is equal to the reasonable cost of service, plus any inefficiencies allowed for a transition period, minus any subsidies provided by government.

Setting the Tariff Structure

The tariff structure determines which customers pay what.

Up to now, this note has focused on the cost of service and the maximum allowed revenue (that is, the total amount of money the utility should be allowed to recover from customers). The next question must be, how much should each customer pay? This is determined by the tariff structure.

The simplest tariff structure, workable when customers have meters, would be a single price per cubic meter of water consumed. Another simple tariff structure, frequently used where customers do not have meters, is for each customer to pay in proportion to the value of his or her property.

Most tariff structures are more complex than these simple examples. Customers' bills may include both a fixed monthly component that does not vary with consumption and a volumetric charge. The charges may differ between customer classes (such as residential, commercial, and industrial). The charge per cubic meter consumed may change as the volume consumed changes, either rising or falling.

A good structure must provide financial viability, reflect costs, and be socially acceptable.

Amidst this plethora of possibilities, which approach is best? This depends on the specific circumstances and the regulatory and policy objectives. Generally, these objectives include the following:

- Financial viability: in our terminology, ensuring that the maximum allowed revenue can be recovered
- Cost-reflectiveness: charging customers in a way that reflects the costs they impose on the system, thus giving them an incentive to limit consumption to efficient levels
- Social acceptability: ensuring that charges seem reasonable and that all customers—even those with low incomes—are able to receive at least basic service

Setting volumetric tariffs at the long-run marginal cost will signal to consumers the true cost of their consumption.

Cost-reflectiveness can generally be approximated by calculating the *long-run marginal cost* of supplying an additional cubic meter of water and setting the charge per cubic meter equal to this. If the revenue generated by such a volumetric charge would be less than the maximum allowed revenue, the shortfall can be made up from a fixed monthly charge. If marginal cost pricing would see the utility recover more than the maximum allowed revenue, the regulator may reduce the volumetric charge until expected revenues are equal to the maximum allowed revenue.

Social objectives are often pursued through cross-subsidies in the tariff structure (such as lifeline blocks or residential tariffs that are lower than industrial tariffs).

Considerations of social acceptability often lead to a tariff structure intended to make water services cheaper for low-income residential customers. These tariff structures seek to allocate a more-than-proportional share of the maximum allowed revenue to better-off or nonresidential customers. The most common approaches are the following:

- Charge industrial customers a higher rate to allow residential customers to pay less.
- Charge a lower amount for a consumption level assumed to reflect a household's basic needs (referred to as a "lifeline block"), with a higher charge for consumption in excess of this amount.

In practice, these approaches tend not to be effective in helping poor people.

These approaches may be well intentioned, but in practice, they seldom achieve the objective of helping the less well-off. One unintended consequence is that they discourage utilities from extending service into poorer residential areas because the utility will lose money by doing so.

Quantity-based consumption subsidies tend to benefit the better-off customers. Put more precisely, the subsidy benefits of underpricing tend to be concentrated in the top four income deciles.[5]

If possible, direct subsidies are a better approach.

Overall, a regulator will want to ensure that the tariff structure is cost-reflective and promotes cost recovery. This will minimize costs and promote service for all customers over the medium term. Social equity issues can be addressed through the tariff structure in principle, but in practice, they should be viewed with some skepticism, given their poor performance in practice to date.

5 "Water, Electricity and the Poor: Who Benefits from Utility Subsidies?" Komives, K., Foster, V., Halpern, J., Wodon, Q, 2005–10

The Tariff Control Regime

The maximum allowed revenue and the tariff structure together determine the tariffs that a utility is allowed to charge immediately after the regulator has made its determination. But tariff controls apply for more than a single moment. How should the controls be extended into the future, and for how long? How do the ideas reviewed so far relate to conventional regulatory concepts (such as price caps and rate-of-return regulation)?

Once tariffs are set to recover the maximum allowed revenue, they may be left unchanged until the utility or a customer applies for a review.

The simplest approach is for the regulator to set the actual tariffs the utility is allowed to charge and to require the utility to charge those tariffs for the indefinite future. In this approach, if the utility wished to change its tariffs, it must apply to the regulator, asking for tariffs to be reviewed and reset.

This simple approach is used by many U.S. regulators. It is associated with rate-of-return regulation and has been adopted in other regimes influenced by the U.S. regulatory tradition, including Barbados and Guyana. In the U.S. tradition, customers can also request a tariff review if they think that tariffs exceed the cost of service.

This creates a United States–style "cost-plus" regime.

This simple United States–derived approach has a number of drawbacks:

- It can be inflexible (for example, the utility would need the regulator's permission to reduce tariffs or to introduce a tariff for a new service, which might be unduly restrictive).
- When input prices are rising rapidly, the U.S. approach can harm the utility's financial health because needed tariff increases will be delayed while tariff applications are considered. Similarly, a utility embarking on a major investment program to improve quality of service might have to keep filing for tariff reviews to ensure that it can earn a return on the new capital invested.
- It may not promote cost efficiencies on the part of the utility. If the regulator is not easily able to tell whether cost increases or new investments are justified, the utility may simply apply for a tariff increase whenever costs rise, rather than working hard to keep costs down to efficient levels. Conversely, if a utility does reduce costs, customers could then file for a tariff reduction, thus capturing the financial benefits of the cost reductions.

Alternatively, the tariff may be indexed to input prices and other factors and reviewed after a set period, creating a price cap.

The price-cap approach to tariff control overcomes these problems. The most famous example of a price cap in water is the RPI+K formula introduced in England and Wales when the regional water authorities were privatized in 1989. Similar formulas had been used for some time in lease and concession contracts in the French tradition. Price caps are now widely used, including in Australia and Jamaica (where they are applied to publicly owned utilities). Similar approaches are used in concession contracts in Manila (Philippines), Monteria (Colombia), and Port Vila (Vanuatu).

A typical price-cap approach differs from the traditional United States–style tariff control in a number of ways:

- The tariff control applies to the average tariff charged. The utility is generally free to change the tariff structure (at least within certain limits) if the average tariff remains below the cap. The maximum allowed average tariff may be calculated by dividing the maximum allowed revenue by forecast demand.
- The maximum allowed average tariff is indexed to increases in the price of inputs. In England, the utility may increase its tariffs in line with inflation. More complex formulas, such as the one used in Vanuatu, track a weighted average of changes in wage rates, electricity costs, and the price of other major inputs and allow the utility to increase its average tariff accordingly.
- The tariff control may be set on a forward-looking basis. For example, when the regional water authorities were privatized in England and Wales, it was clear that substantial new investments were required. A financial model of the companies was constructed, and the real tariff increase that would be required to allow the companies to finance the new investments was calculated. This real tariff increase entered the formula as the "K" factor. This is simply the amount in excess of inflation by which each company was allowed to increase its average tariff each year.
- The price cap applies for a set number of years (typically, five), and reviews occur only at the end of the set period. This contrasts with the U.S. approach, in which reviews can be requested at any time. Having a fixed review period or "regulatory lag" may increase incentives for cost efficiencies because the utility knows that cost reductions will increase its profits (and cost increases reduce them), at least until the time set for the next review.

Whether a price cap or cost-plus regulation is better depends on the circumstances.

In some cases, the traditional U.S. approach of approving a detailed tariff schedule and then requiring that the utility stick with it may be the better option. It has the advantage of being clear and easily understood. In other cases, the advantages of indexation, or a forward-looking approach to tariffs, may point toward a price-cap approach.

Conclusion

Much has been written on the differences between price caps and rate-of-return regulation. But in practice, both approaches depend on calculating a reasonable cost of service, deriving from that a maximum allowed revenue, and then limiting tariffs to a level that is expected to generate that amount of revenue.

The Australian regulatory approach of constructing price caps based on cost building blocks (as illustrated in figure 5.1) makes this clear. The Australian regulators are doing explicitly what U.K. regulators have generally done implicitly. Tariff controls in concession contracts are similarly set based on estimates of efficient costs of service.

Given this, someone involved in setting up a regulatory framework would be well advised not to start this task with a discussion on whether to use a rate-of-return or a price-cap approach, but to focus on these key steps:

- Estimate the reasonable cost of service, which involves reviewing each of the building blocks of operating costs and capital costs to
  - ensure that actual costs are correctly recorded,
  - check whether actual costs are reasonably efficient and estimate reasonable cost levels if they are not, and
  - analyze whether costs must rise to allow the utility to deliver the required standards of service.
- Set the maximum allowed revenue, which could differ from the reasonable cost of service if
  - government provides a subsidy to reduce the amount of revenue that must be collected from customers or
  - the utility's costs are above efficient levels and the regulator decides to allow the utility to recover those costs from customers for a transition period while efficiency is improved.
- Determine the tariff structure, which will involve the following:
  - Considering whether to charge some customers less, and others more, for social reasons (lifeline blocks, or industrial charges that are higher than commercial charges, are common examples of such socially motivated tariff structures; however, empirical analysis shows that these structures are seldom effective in benefiting poor people, so they should be used with care)
  - Deciding on the relative mix of fixed and volumetric charges
  - Ensuring that the tariff structure chosen is likely to allow the utility to generate revenue equal to the maximum allowed revenue
- Determine the tariff control mechanism, which involves deciding whether the regulator will require the utility to use the exact approved tariff levels and structure or whether the regulator will just set the maximum average tariff and allow the utility freedom to change its tariff structure to stay at or

below this average. Choosing the tariff control mechanism will involve deciding the following:

- Whether the utility will be allowed to charge tariffs that are lower than the maximum allowable amounts
- Whether the maximum allowed tariffs should be indexed to input costs
- Whether the maximum allowed tariffs should include a factor (such as a "K" factor) specifying the amount by which tariffs should increase or decrease in real terms each year
- Whether reviews should be allowed only after a certain period of time or whether a tariff review may be triggered whenever the utility or a customer applies for one

Further Reading

Andrews, C. T., and C. E. Yniguez (eds.). 2004. *Water in Asian Cities: Utilities' Performance and Civil Society Views*. ADB Water for All Series, Vol. 10. Manila: ADB (Asian Development Bank).

Chisari, Omar O., Antonio Estache, and Catherine Waddams Price. 2001. *Access by the Poor in Latin America's Utility Reform: Subsidies and Service Obligations*. Discussion Paper 2001/75. World Institute for Development Economics Research. United Nations University. Helsinki.

ERA. 2004. *Inquiry on Urban Water and Wastewater Pricing*. Economic Regulatory Authority. Perth.

Green, Richard, and Martin Rodriguez Pardina. 1999. *Resetting Price Controls for Privatized Utilities: A Manual for Regulators*. The World Bank. Washington, D.C.

ICRC (Independent Competition and Regulatory Commission). 2003. *Investigation into Prices for Water and Wastewater Services in the ACT*. Issues Paper, ICRC, ACT (Australian Capital Territory).

Komives, Kristin, Vivien Foster, Jonathan Halpern, and Quentin Wodon. 2005. *Water, Electricity, and the Poor: Who Benefits from Utility Subsidies?* The World Bank. Washington, D.C.

McIntosh, A. C. 2003. *Asian Water Supplies — Reaching the Urban Poor*. IWA Publishing.

PPIAF (Public-Private Infrastructure Advisory Facility) and World Bank. 2006. *Approaches to Private Participation in Water Services: A Toolkit,* chapters 5–6. Washington, DC: World Bank

NOTE 6 — REGULATING GOVERNMENT-OWNED WATER UTILITIES

Overview

Most water utilities are government-owned.

In most countries, water utilities are owned by governments, which hope that by owning the utility, they can make it operate in the public interest.

Should they also be regulated?

Some governments are considering independent regulation of government-owned utilities. But if government ownership and regulation each aim to make a utility provide good service at reasonable prices, do we need both mechanisms? Can they complement and reinforce each other? Or will they duplicate or conflict with each other?

There are times when regulation can complement government ownership. This note describes ways in which government ownership can fail in its mission to make a water utility truly serve the public and the way in which regulation could fill the gap.

On the other hand, regulation as commonly applied to private companies may fail with government-owned companies. The rewards and punishments of conventional regulation do not stop with the managers or shareholders of a government-owned utility, but are passed through to customers and taxpayers. Regulation can only complement governance, not replace it.

Caution is warranted before applying private models to government companies; however, there are techniques that might work for government companies. These include creating competing streams of advice, providing trusted comparative information, and increasing transparency and public participation.

Why Regulate What You Own?

Private utilities are regulated to control their monopoly power.

Privately owned water utilities are motivated to increase profits, so governments regulate them. The profit motive makes private utilities provide service and control costs, but can also cause private companies to put up tariffs and (possibly) provide inadequate service. Regulation is intended to make private firms operate in the public interest while allowing the private company to make money if it delivers the required service efficiently.

Government ownership is another way of doing the same thing …

Instead of regulating a private utility, governments may own and operate the utility. Public utility ownership is another way of addressing the monopoly problem. Governments direct the utilities they own to achieve social, environmental, safety, and consumer protection objectives.

… through the governance mechanism, …

Governments do this though the *governance* mechanism. In utilities that are departments of ministries or municipalities, this is done through the normal line of command in civil service. For statutory bodies and government-owned companies, the main governance mechanism is a board, usually appointed by government. The board monitors utility management and sets the strategic direction for the utility.

… which is distinct from regulation.

This raises the question, what is the difference between governance and regulation? These notes define *economic regulation* as the organizations and rules that set allowed tariffs and required service standards. Generally, in a government-owned utility, the board or government decides tariffs and service standards. Governments often do not distinguish between regulation, ownership, and policy: all three functions are conflated in the relationship between the government and the management of the utility.

One might expect ownership and governance to be enough …

Governments are (or should be) accountable to their citizens—the totality of water consumers and the unserved; therefore, the interests of the owners and the customers should be aligned. Seen in this light, a government-owned water utility is similar to a cooperative, in which the utility is owned by its customers.

A cooperative may deal with market power issues without an external regulator. For example, La Cooperativa de Servicios Públicos Santa Cruz Ltda (SAGUAPAC) in Santa Cruz, Bolivia, is a consumer cooperative that is governed by its customers, who are also its owners. Until 1998, SAGUAPAC operated as a de facto self-regulated utility. The utility moved to cost recovery at the initiative of its owners—in contrast to other public utilities in Bolivia.[6] Similarly, one can argue that the customers elect the government, which owns and operates the business of a public water utility in the consumers' interests.

… but often it isn't.

Yet in many countries, government-owned utilities are inefficient and provide poor service. Governments are often unable to make their utilities perform the way the government and the people would like. Why is this? There are some systemic reasons:

1. *Selective representation of customer needs*. Water is a basic need, so utility customers are diverse, spanning widely different social and financial circumstances. However, governments may represent the interests of some

6 Since 1999, SAGUAPAC has had to have its tariffs approved by the Superintendencia de Saneamiento Básico (SISAB), the same as any other regulated water utility in the country.

constituencies more than those of others. Often poor or other marginal groups are not represented.

2. *Short-term political aims*. Higher water tariffs are immediately unpopular, while long-term deterioration in the viability of a water utility and the service it provides is less noticeable. Short-term political motives often drive government owners to hold water tariffs below cost or provide subsidies to politically powerful groups. This erodes the financial viability and efficiency of the utility in the long term, and ultimately the quality of service that customers receive.
3. *Capture of the utility for personal ends*. Governments may interfere in management of the utility in an ad hoc way intended to benefit themselves or their friends—a minister or mayor may tell the utility to hire his or her friends, to extend tertiary mains to an influential person's new house far from existing mains, or to buy meters from a company owned by a politician's friends. Managers of the utility may be similarly tempted.
4. *Provider capture*. Government-appointed boards or managers are at risk of being captured by the companies they administer. In other words, instead of acting in the interests of the customers, boards and managers begin to systematically favor the interests of the utility. Often, a board and its management act in the interests of themselves or unionized staff, using the utility's monopoly power to benefit management and employees at the expense of customers through high pay or low productivity. Tough decisions (such as changing working styles and demanding good performance) are not taken because the benefit to the consumer is outweighed by the difficulties involved in disrupting established behavior in the utility.

Governments Adding Regulation to Ownership

Therefore, some countries separate regulation from governance …

Some governments have recognized these problems and have tried to encourage greater accountability and better utility performance by separating governance, policy, and regulatory functions. Regulation becomes the responsibility of an autonomous organization that operates at arm's length from the utility and often from existing government structures.

… by creating independent regulators.

The regulatory organization most frequently recommended is an Ofwat- or PUC-style "independent regulator." For example, Jamaica's Office of Utilities Regulation (OUR) regulates the government-owned National Water Commission. In Colombia, the Regulatory Commission for Water and Basic Sanitation Services (CRA) sets tariffs for municipal-owned water utilities. Municipally owned water companies are regulated by public utilities commissions in some states of the United States.

In these models, elected officials (or the bureaucrats who report to them) continue to oversee the operations of the utility. However, the utilities must now

also comply with the decisions of a separate regulatory agency on tariffs and service standards.

This can make sense for commercialized utilities …

There are a number of circumstances in which such separation of roles may make sense:

1. *Commercialized utility.* Many governments have tried to increase efficiency by making their utilities independent from day-to-day political considerations and more profit-oriented. In such settings, public utilities are asked, in effect, to pursue similar objectives to those of private utilities. Hence, public utilities may need to be regulated in the same way and for the same reason as private utilities.

… or where an independent body can insulate the sector from political pressures …

2. *Political space for tariff increases.* An independent regulator may protect governments from political pressure, making necessary tariff increases easier. For example, in the state of New South Wales (Australia), the state government knew that water tariffs should be restructured to reduce the subsidies to households; however, past attempts had failed because they were politically too difficult. The government brought the water sector under the jurisdiction of the Independent Pricing and Regulatory Tribunal (IPART), the state's independent regulatory tribunal, to "take the politics out of price determination." This allowed a transparent, arms-length approach to pricing that engaged with stakeholders and helped insulate the water sector from short-term political pressures. The outcome was much-needed tariff reform.[7]

… or ensure that the utility is benchmarked and scrutinized.

3. *Information and transparency.* Often the utility is the only source of information on the water sector. Consumers and politicians both end up distrusting the utility, but lacking independent information to assess whether costs, tariffs, and services are reasonable. A competent independent body can be an alternative source of information, benchmarking and scrutinizing the utility. A regulatory agency can also manage hearings that allow customers' views to be heard. A regulator can force the utility to disclose information and answer criticisms.

But there is a serious problem: lack of sanctions.

However, independent regulation of public utilities has often failed to deliver the expected outcomes. The principal problem is the *inability to apply sanctions*. Effective regulation requires the ability to reward good performance and

7 The reforms involved removal of a free water allowance and the property tax component of charges, increases in the usage charge, and a rebalancing of prices between residential and business users to remove the cross-subsidies paid by business.

punish poor performance. When a privately owned utility is inefficient, regulators may refuse to grant a tariff increase. This hurts the private owners by reducing their profits. In response, they may change the management team or make other reforms to increase the utilities' efficiency. The key point is that the cost of the penalty is borne by the shareholders, and so the penalty motivates them to action.

This logic does not apply in a publicly owned utility. If the regulator punishes a publicly owned utility for inefficient performance by refusing it a tariff increase, the government-owner will have to cover this deficit through its funds, which are generated through taxes. Alternatively, the utility will cut back on expenditure, worsening service. In either case, the public suffers. Although in principle, the government could change the board and management of the company or take other steps to improve performance, in practice, this seldom happens.

Also, government may still make short-term, populist decisions.

Another problem in many cases is that government as owner retains control of the tariffs actually charged and the services actually delivered. For example, in Trinidad and Tobago, the Water and Sewerage Authority is under the jurisdiction of the Regulated Industries Commission. Tariffs are well below costs, and the Commission would in all likelihood grant a tariff increase to cover reasonable costs; however, the government, as owner of the utility, has decided that it should not file for a tariff increase. In other words, the short-term political pressures to keep tariffs down still dominate, despite the independent regulator.

Regulation for Government-Owned Utilities

An independent regulator is no panacea.

Clearly, creating an independent regulator of a public utility does not automatically increase service, efficiency, or cost recovery. So, when is it sensible to have a separate institution regulate publicly owned water utilities? Rather than assuming that "regulation" is the answer and that this requires an "independent regulator," a more subtle approach is warranted. There are various degrees of separation of regulatory and ownership forms of control that the government exercises over a public utility.

There is a spectrum of options to consider.

There is a spectrum of options. At one end is the classic department with no regulatory oversight. We could call this the "unitary" end of the spectrum because a single mechanism combines the role of regulator and provider, owner, policy maker, and consumer representative.

At the opposite, "dualist" end of the spectrum, a government-owned utility is regulated by an independent agency that tries to treat the government-owned entity on an arm's-length basis, similar to the way in which regulators typically treat a private utility. Both regulation and policy making are separated from

ownership. This is the situation in New South Wales and Victoria (Australia), Colombia, Jamaica, and Scotland.

In between, a number of options create some of the tensions inherent in the dualist models, without going to the extreme of treating the public company as though it were a private, profit-maximizing entity.

For example, shifting up slightly from the unitary end of the spectrum, the government could ask a unit in a government ministry to develop a real competence in water utility monitoring. This unit could benchmark the utility and engage external expertise to scrutinize its operations and services. This would provide an independent source of information and advice, making the utility more accountable. In Scotland, for instance, the Water Industry Commissioner (WIC) is responsible for ensuring that the public utility Scottish Water meets its service standards. However, its role is only as an adviser. WIC also advises on Scottish Water's four-yearly revenue cap.

Closer to the dualist end of the spectrum would be an independent body that held public hearings and issued public reports on the efficiency and service performance of the utility, but that did not itself set tariffs and service standards, leaving this to government.

Choosing a model should be based on the specific problems you're trying to solve.

The right position on the spectrum between unitary and dualist—or to put it another way, the right degree of separation between governance, policy, and regulatory mechanisms—depends on a country's circumstances. It is necessary to first determine what is wrong with the existing system and then define a solution that best fixes the problem, as in these examples:

- *Poor accountability stemming from lack of information may be fixed by providing more information.* In some instances, lack of accountability to customers stems from lack of public information about utilities' performance. In this case, an agency that provides independent information and assessment may be a good approach. This would help the government make the right decisions about improving the utility. If government fails to make the right decisions, consumers equipped with the new information will be better able to hold the government to account.
- *Lack of expertise may be addressed by an autonomous expert body or panel.* Some regulatory activities are complex. While the ministry responsible for the government's ownership of a water utility may be able to perform routine regulatory functions, such as monitoring service standards, it may not have the necessary expertise for something as complex as a periodic tariff review. Establishing an independent regulator does not necessarily solve the problem of competence. An alternative solution could be to appoint a panel of experts who would be called upon from time to time. The ministry would still make the final decision, based on advice from the

panel. To ensure transparency and accountability, the expert panel's advice could be made public before the ministry's decision.

- *Short-termist tariff setting may be addressed by giving an independent body powers to set tariffs.* If the problem is that political time horizons always result in tariffs being set below costs, the solution may be to give an independent body power to set tariffs. For this to work, the independent body must have the power to override political decisions on tariffs. It should not have to wait for the utility to file an application before it orders a tariff increase. The political credibility and durability of the body also must be considered. A body with established public credibility and political backing (such as the New South Wales Regulatory Tribunal or Jamaican OUR) should be able to make its tariff decisions stick. But a newly created entity whose first job was to raise tariffs in the face of popular and political opposition might not be sustainable.

Regulation should build on existing competencies, …

Whatever the position on the spectrum chosen, it makes sense to use existing organizational competencies in carrying out the new role. Assume that the model chosen is to publish independent benchmarking information on the utility, to help the government and the public hold the utility accountable. If a respected regulatory commission were already monitoring electricity and telecommunications companies, it might make sense to give that commission the job of benchmarking water utilities. But it would not necessarily make sense to create an independent regulatory commission solely to benchmark the water agency. If no commission existed, another competent government agency, which might be the Ministry of Water, the Ministry of Finance, or the Auditor General, could be given the job, possibly overseen by an external panel.

… and if the decision is made to regulate public utilities like private ones, the regulator needs some teeth.

If the government decides that government-owned utilities should be regulated like private utilities, it is essential to build in ways to punish poor performance. This is difficult when the government is the owner, because often only the customers suffer.

Countries that have used regulation as a positive force for public utilities have introduced it gradually and as part of a wider set of reforms. As a first step, responsibilities were introduced without specific sanctions. This can both enhance performance by prompting the parties to the contract to focus on results and strengthen the relationship between parties by giving them periodic opportunities to discuss progress and problems. Legally binding rules that include sanctions can be introduced only when performance evaluation systems are functioning properly. Overall, it is easier to introduce positive sanctions ("carrots") for good performers before negative ones ("sticks") for bad performers. Establishing a new culture of doing business through incentives is

easier than changing an existing culture of noncompliance. Introducing overly ambitious unenforced contracts might create a tradition that is hard to transform later on.

It may be possible for a regulator to take a more active approach to underperformance. For example, where there are a number of water utilities, such as in Colombia, the agency could identify the bottom 10 percent of performers and intervene directly to reorganize the management of the worst performers. One option would be to link managers' pay to the performance of the utility.

Another option is to allocate scarce investment funds to those utilities that perform best, using decentralization to introduce competition. In developing countries, there is hardly ever enough investment to fund all required infrastructure investments. This gives governments an option to reward better performance without starving others more than they would anyway. For example, Ecuador is pioneering a system in which the national government offers some 220 municipalities free technical assistance and financial incentives if they agree to delegate the provision of water supply and sanitation services to autonomous (public and private) operators.

These suggestions may seem radical. But without rewards and sanctions, the regulatory mechanisms used to control private utilities are unlikely to be effective in changing the behavior of underperforming, publicly owned water utilities.

Conclusion

In summary, the government can address the problem of natural monopoly in the water sector through ownership or through economic regulation. This note considered under what circumstances the government should use both instruments.

In general, applying independent regulation to government-owned water utilities is not a panacea for underperformance. There are difficulties in coordinating regulation with public sector governance. In certain circumstances, however, it is useful to separate the regulatory responsibilities from the government's responsibilities as owner and service provider.

Governments must choose the degree to which they would like economic regulatory activities to be performed by an independent organization. Choosing the right degree of separation involves determining what problem must be solved and considering the country's existing institutional constraints and capacity.

Further Reading

Eberhard, A. A., and M. Mtepa. 2003. Reform and regulation of a low-price utility: The case of Eskom in South Africa. *International Journal of Regulation and Governance,* Vol 3, No 2, 77-102, 2003.

Irwin, T. and C. Yamamoto. 2004. Some Options for Improving the Governance of State-Owned Electricity Utilities. World Bank: Energy and Mining Sector Board Discussion Paper, No. 11.

Kingdom, Bill and Meike van Ginneken. 2004. *From Best Practice to Best Fit: Reforms to Turn Around and Institutionalize Good Performance in Public Utilities*. Briefing Note for World Bank-WaterAid workshop.

NOTE 7 — REGULATING WASTEWATER SERVICES IN DEVELOPING COUNTRIES

Overview

What is the role of economic regulation in improving urban wastewater services in developing countries? In many developing cities, wastewater services are provided mostly by decentralized systems (such as septic tanks). There is seldom a need for economic regulation of decentralized solutions. Improved health and urban environments will come mostly from better environmental regulation, which must be coupled with good policy and planning to manage the transition from decentralized to centralized systems in many densely populated areas.

Centralized wastewater systems are often monopolies, justifying economic regulation; however, the cost structures, beneficiaries, and willingness to pay for wastewater services differ from those for water services. This means that government subsidies and property-tax–based systems must be considered alongside user-pays charging in deciding how wastewater services should be paid for and regulated.

Sanitation in a Developing City

Developing cities may have good water services, but very minimal sewerage services.

Imagine a developing city: More than 70 percent of the households have running water, supplied by a centralized water system; yet, fewer than 20 percent are connected to a centralized sewer system. The sewers are in the old part of town, in poor condition and often blocked. The sewage discharges untreated into the bay, where poor people go to wash themselves and fishermen catch fish for sale in the market.

People may need to rely on private septic tanks or may have no safe disposal sites at all.

In the newer areas of town, well-laid-out residential developments have all the modern utility services, including cable TV, but no sewer connection. The houses and apartments have flush toilets, but these discharge into underground septic tanks. Even in the squatter settlements, residents have (legally or illegally) connected to the water and electricity networks. But when they want to defecate, they must go down the street to a communal toilet or use the "bag and throw" method.[8]

A new, centralized network would ensure that sewerage is safely disposed of …

Urban sanitation is essential to public health and environmental quality. In densely populated areas, a centralized sewer network to collect and treat wastewater is ideal; however, for many developing cities, such a system is

8 Defecating in a cheap plastic bag, tying the bag, and throwing it into waste ground.

… but such a system can be prohibitively expensive.

decades away. The cost of digging through existing streets and neighborhoods to retrofit them with sewer networks can seem prohibitive. Generally, the cost of a centralized wastewater system will be higher than the cost of a water system serving the same area, sometimes by a factor of two or three times. Planning issues and disruption to traffic increase the challenges.

Policy and Environmental Regulation of Decentralized Systems

In such an environment, what is the role for economic regulation? We define economic regulation as *the rules and organizations that set allowed tariffs and service standards*. What role is there for a law or government agency imposing tariffs and service standards on decentralized wastewater service providers?

Wastewater services can take several different forms …

Start by considering how wastewater services are actually provided: Many apartment buildings and middle class homes have septic tanks that may need to be periodically emptied. Septic-tank emptiers typically transport the resulting "septage" by tanker and dispose of it in a treatment facility or—untreated—into a body of water. Poorer households may dig and use pit latrines or use slightly more sophisticated facilities built by local masons.

… and be operated with varying degrees of responsibility.

Property developers may put in small treatment works to serve new housing developments. The wastewater from the houses in the development is carried in sewers to a single point, where it is treated before being discharged into a local watercourse. Some of these systems are operated and maintained responsibly. In other cases, neither the developers nor the homeowners consider themselves responsible for keeping the system in good repair, and the treatment plant breaks down, after which the wastewater is discharged without proper treatment. In the late 1990s, the Water and Sewerage Authority of Trinidad and Tobago estimated that there were as many as 600 such small systems (in a country of 1.1 million people) and that most of these were in a poor state of repair.

In reality, many wastewater systems are poorly maintained …

… or provide poor levels of sanitation.

Pit latrines, septic tanks, and other decentralized solutions are often inadequate from a health and environmental point of view. Pit latrines may not adequately isolate waste from the people and properties nearby. Flies may travel from the latrine to the kitchen, contaminating food. Septic tanks and latrines often allow waste to leak into the surrounding groundwater. In densely populated areas, this can drain into rivers (as in Manila, Philippines) or contaminate aquifers with nitrates (as has happened in Kingston, Jamaica).

Economic regulation will not solve these problems, …

… and price controls seem unnecessary for small providers.

Economic regulation cannot solve these problems, which are not those of a monopoly provider setting tariffs too high or failing to provide services. It makes no sense to think of controlling the price of self-dug pit latrines or regulating the quality of service provided to householders by their own septic tanks. A similar logic applies to decentralized third-party providers. There are no significant economies of scale in septic-tank emptying, for example, so competition between the providers should ensure that the service provided to the paying consumer is reasonable and that prices are competitive.[9]

But there IS a role for environmental and health regulation.

The real problems of decentralized systems are not that those who pay for the service are being exploited, but that third parties suffer. A household that pays for its septic tank to be emptied considers the service complete when the tanker drives the septage away. If the truck then discharges the waste untreated into the harbor, it is those who use the harbor who suffer. Similarly, when nitrates seep into an aquifer, rendering it unusable, the whole community suffers. Stopping such environmental and public health problems is a matter for environmental and public health regulation, not economic regulation.

Developing environmental regulation requires …

Without intending to generalize about the right environmental and regulatory approach to wastewater, this note lists the following steps to be taken in many cases:

… identifying emissions, …

… their optimal levels, …

… and strategies for emission reduction.

- Identify emissions into the environment that are socially harmful.
- Set targets to reduce those emissions to levels that are socially optimal.
- Develop ways to bring actual emissions down to those targets.

Emissions include the leaching of nitrates into groundwater, the discharge of untreated wastewater into bodies of water, and even the transfer of fecal matter by flies and rodents out of unsanitary latrines into a neighbor's property. It is through these emissions that patterns of service provision that seem privately beneficial become socially harmful.

Care must be taken in setting targets: …

Setting the optimal level of discharge involves technical and economic analysis. In Kingston, Jamaica, the value of the aquifer that has become polluted by nitrates would perhaps have justified rules to limit discharges from latrines and septic tanks, but this analysis was not done. Flies and rodents moving in and out of unimproved latrines harm public health, so minimizing such emissions will generally be justified; however, not all emissions should be prevented. The

9 In some cases, tanker operators may collude to form a cartel; however, in this case, the better response may be to stop the cartelization rather than attempt to control the prices charged and services offered by the cartel.

… sometimes the cost of reducing emissions can be greater than the benefits.

World Bank investigated discharge of septage into the lagoon around the city of Lagos, Nigeria. The study found that provided the septage was discharged only on the ebb tide, it would not have any serious impact on water quality in the lagoon.[10] In that case, limiting septage discharge would not be justified.

Technological innovations can also help reduce emissions without regulations, …

Once a target level for emissions has been set, ways must be found to bring emissions down to that level. Sometimes this will involve environmental regulation (for example, householders might be required to install septic tanks and latrines that comply with specified technical standards). Other times, nonregulatory approaches will be better. In Dar es Salaam, Tanzania, many households rely on self-dug latrines that are periodically cleaned out by latrine emptiers. Recently, the city assisted the latrine emptiers to develop a mechanized hand pump and vacuum system for emptying the latrines, which reduced the cost of emptying the latrines and also reduced the risk of contamination.[11]

… but a centralized system may be the best way to address both environmental problems and service needs.

In most cities, the best long-term solution will be construction of a centralized sewerage system to serve the densely populated areas. Reaching that point will require a number of policy and planning decisions: first, whether a centralized system is indeed warranted, and then, decisions on how it is to be planned, financed, built, and operated. For many cities, decentralized and centralized systems will coexist, and the policy challenge is to move both systems in the direction of providing a cleaner, healthier environment.

Regulation of Centralized Systems

Monopoly operators of centralized wastewater systems may need to be regulated.

Where there are centralized wastewater systems, economic regulation may be needed. This is especially the case where households are required either to connect to the wastewater system or to pay the wastewater charge even if they do not connect. In these cases, the wastewater service provider has a legal monopoly, and it is reasonable to have regulatory mechanisms to ensure that service is adequate and that charges are no higher than the reasonable cost of service.

Wastewater services could be regulated in the same way that water services are …

It often seems natural to regulate wastewater services in the same way that water services are regulated. The reasonable cost of service can be calculated, adding together required operating and capital costs. Users can then be required to pay a tariff that allows the utility to recover its cost of service.

10 BNWPP, *Practical Wastewater Treatment Requirements* — Lessons from activities supported by the BNWPP Wastewater Window. World Bank (mimeo, April 2003).
11 Water Resources and Environment Technical Note D.2 *Water Quality Management: Wastewater Treatment* World Bank p.13.

Because the wastewater discharged by a typical household or small business is generally proportionate to the water consumed on that property, the wastewater tariff can be set on a volumetric basis. The customer's bill is then calculated by multiplying the wastewater tariff by the reading on the water meter.

… such as by controlling volumetric prices.

User-pays (that is, volumetric charging for wastewater services) is gaining in popularity. In 1995, Vancouver, Canada, moved from charging for wastewater as part of the property tax to a largely volumetric charge. In China, the new Draft Guidelines for Wastewater Tariffs state,

This is a popular approach, …

"Wastewater services should be financed from user charges, and there should be a progressive move to full cost recovery. ° All domestic and institutional customers and most commercial customers should pay for wastewater services based on a uniform price per cubic meter of water supply."

… but it is not always the best approach.

While volumetric (user-pays) charging is suitable for some countries, it is not necessarily the best choice for all, for three main reasons:

Volumetric charges are not efficient and seldom recover the full cost of connections.

- Volumetric charging is not cost-reflective and does not generally send efficient price signals.
- The beneficiaries of wastewater systems are often not those who connect to the system—they might have been quite happy with their existing on-site methods—but the wider community that benefits from reduced contamination of the environment.
- The expense of installing new centralized systems is such that it is often socially and politically impossible to recover the full cost through an increment to the water charge. As a practical matter, if the system is to be financed, other ways of paying for it must be found.

The cost of wastewater disposal is driven more by pollution load and network size than by water volume, …

Volumetric charging for households and small businesses is not, in fact, cost-reflective. The main cost driver in the wastewater business is not the volume of wastewater; rather, the pollution load (essentially, the amount of organic material in the wastewater) is the biggest determinant of treatment costs. The costs of the collection network itself are driven largely by the length of the network and the levels of groundwater and rainwater inflow and infiltration into the sewer network. Inflows and infiltration determine the required pipe diameters, holding tank capacities, and so on. For these reasons, the state of New South Wales, Australia, issued the following wastewater tariffs guidelines:

… so prices based on wastewater volume are not cost-reflective.

"Pay-for use sewerage pricing is not warranted for residential customers due to a lack of net benefits from such pricing. The costs of sewage collection and transfer are largely driven by hydraulic capacity which is dependent on wet weather flow, and the cost of treatment works is driven by biological and suspended solids loads which relate to the number of people serviced."

Volumetric user charging may still be retained, …

If volumetric charging for wastewater is in place and working well, it makes sense to retain that system. Volumetric charging may also be justified as a second-best strategy: where water charges are well below the marginal cost of water, adding a volumetric wastewater charge can help to improve customers' incentives to use water wisely. But the notion that volumetric user charging automatically reflects costs or increases efficiency is simply wrong.

… but some other source of funding is likely to be required for cost recovery.

Fully cost-reflective charges may be unacceptably high, …

For developing cities that must expand their centralized wastewater system, the costs are such that often the real issue is finding a realistic, socially acceptable way of paying for the system. Because a wastewater system generally costs as much or more than a water system, recovering the costs of a new wastewater system will generally at least double tariffs. In fact, because most water tariffs do not recover the capital costs of the system, the tariff impact will often be higher. It is common for the total costs of a centralized wastewater system to exceed US$1 per cubic meter. Where adding a charge of this amount to the water bill would be socially unacceptable, funding from other sources must be found if the system is to go ahead.

… and because wastewater systems have social benefits, their costs could be spread over the wider community.

Moreover, it is not clear that recovering the full costs from those connected to the system is the right choice, from either an efficiency or equity perspective. In many cases, customers who are offered the choice to connect to the wastewater system and pay its costs prefer not to. In this case, it is hard to say that the customers are the beneficiaries because, from their perspective, the benefits of the system are less than its costs. And yet, the community may still decide that it is worth having a wastewater system and requiring people to connect. In this situation, it might be reasonable to spread the costs across the broader community, and not simply those connected to the system.

For example, sanitation charges could be applied to ALL properties, …

One option is to require all those whose properties are passed by the sewer network to pay, whether they do or do not connect to it. This has the advantage of encouraging people to connect and reflecting the fact that everyone in an area benefits from a system that removes wastewater from that area. The

disadvantage of this approach is that it can generate resistance from those who do not connect to the system.

…or the cost could be recovered through property taxes or general taxation.

Other approaches include recovering the cost of wastewater systems through local property taxes or national government grants. Payment through property taxes reflects the fact that everyone in the area benefits from wastewater removal and treatment, and this may in fact increase property values. Grants from the national government reflect the broader benefits of wastewater treatment. Treating wastewater in an upstream municipality benefits downstream municipalities, which may justify funding wastewater treatment on a national, or at least a river-basin-wide, basis.

Economic regulation sets standards for good customer service, not environmental safety.

Economic regulation involves setting service standards, as well as controlling tariffs; however, the most important standards for a wastewater provider are those that govern the quality of the effluent discharged. These are generally best regarded as a matter for environmental regulation, rather than economic regulation. Economic regulation, however, should be concerned with the service as experienced by the customer. This may involve setting standards to ensure that sewers do not block and back up into people's properties, plus standards about responses to complaints and enquiries.

Service standards should be set to reflect community demand.

In setting service standards, economic regulation must consider the various technologies available, the cost of different standards, and people's willingness to pay. For example, condominial sewerage systems have been developed in Brazil to reduce the cost of sewage collection.[12] These systems have smaller-diameter pipes than a conventional
system does and may run across users' property, rather than being buried in the street. While cheaper, condominial systems are also somewhat less convenient and more prone to blockage. Also, rapid, widespread expansion of service seems desirable, but is costly. The regulatory system must weigh the costs and benefits of alternative expansion plans and technologies in setting both tariffs and service standards for centralized providers.

12 Jose Carlos Melo, "The Experience of Condominial Water and Sewerage Systems in Brazil: Case Studies from Brasilia, Salvador, and Parauapebas," report for Water and Sanitation Program, Latin America and the Caribbean (WSP-LAC), World Bank, and for Bank-Netherlands Water Partnership Program (BNWPP) (Washington, DC: World Bank, 2005).

Summary

In most developing cities, wastewater services are largely decentralized. Improving wastewater services is therefore a matter of improving the sanitary characteristics of septic tanks, pit latrines, and small systems serving discrete housing developments. This is not really an issue for economic regulation, but rather a question for environmental regulation and policy. In many cases, the ideal long-term solution will be a centralized system, and the big policy challenge will be deciding how such a system can be paid for, installed, and managed.

Most cities have at least some centralized wastewater collection and treatment network. These systems may be natural or legal monopolies, so there is a role for regulation in setting allowed tariffs and service standards. It may not be possible or sensible to recover the full costs of the system from the customers connected to it. In many cases, there is a role for local or national government contributions to the cost of the system to reflect its community benefits. The economic regulatory task then is to calculate the costs of service, exclude those costs covered by government, and allow the provider to recover the remaining costs from customers on some reasonable basis.

Further Reading

BNWPP (Bank-Netherlands Water Partnership Program). 2003. Practical Wastewater Treatment Requirements: Lessons from Activities Supported by the BNWPP Wastewater Window. The World Bank. Washington, D.C.

Burian, Steven J., Stephan J. Nix, Robert E. Pitt, and S. Rocky Durrans. 2000. "Urban Wastewater Management in the United States: Past, Present, and Future." *Journal of Urban Technology* 7 (3): 33–62.

Department of Land and Water Conservation. 2002. *Water Supply, Sewerage and Trade Waste Pricing Guidelines*. New South Wales, Australia

Melo, Jose Carlos. 2005. *The Experience of Condominial Water and Sewerage Systems in Brazil: Case Studies from Brasilia, Salvador, and Parauapebas*. Report for Water and Sanitation Program, Latin America and the Caribbean (WSP-LAC), World Bank, and for Bank-Netherlands Water Partnership Program (BNWPP), The World Bank. Washington, D.C.

UNEP (United Nations Environment Programme). 2001 (draft). *Guidance on Municipal Wastewater: Practical Guidance for Implementing the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA) on Sewage*. UNEP/GPA Coordination Office. The Hague, Netherlands.

World Bank. 2003. *Water Resources and the Environment: Technical Note D2: Water Quality Management, Wastewater Treatment.* The World Bank. Washington, D.C.

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