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Output-Based Aid: Possible Applications in the Design of Water Concessions

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More than 1 billion people in the developing world lack access to safe water, and more than 2 billion lack adequate sanitation. Expanding and improving water and sanitation services in developing countries is thus a fundamental challenge in poverty reduction. In recent years many governments have sought to improve the efficiency of water utilities and the quality of service they provide by engaging the private sector. During the past decade water and sewerage projects in developing countries have attracted more than US$37 billion in private investment.

Policymakers have experimented with a wide range of schemes for private sector participation in the water sector. Those schemes can be broadly classified under three major models, based on the level of risk and responsibility transferred to the private sector:

- *Management contracts,* under which a private operator undertakes the operation of the water utility for a limited period in exchange for a performance-based fee. The private operator and the government share the operational risk, while the government retains the demand and investment risks.
- *Lease (or affermage) contracts,* under which a private operator assumes the full operational, commercial, and demand risks of the water utility, while the public sector remains responsible for financing investments.
- *Concession contracts,* under which the government retains ownership of the infrastructure but transfers to a private operator all risk and responsibility for running the water utility, including for financing investments.

Concession schemes have proved efficient in developing countries and have rapidly improved service coverage and quality for the population, as in Buenos Aires, Argentina (Alcazar, Abdala, and Shirley 2000). By design, the concession model offers the greatest potential benefits, for two main reasons. It reduces the financial burden on the government by transferring to the private sector responsibility not only for operating the utility but also for financing investments. And it provides the private operator with flexibility, allowing it to optimize investment through creative operational solutions.

Moving to cost recovery

Although the concession model has clear benefits, it also imposes big demands on governments. Under a concession the private sector mobilizes private funding for infrastructure investments through project finance or limited recourse financing, approaches in which the private lenders essentially rely on the expected revenue flow from user tariffs for the loan repayment. To make such schemes viable, governments must commit to a strict policy of cost-covering user fees from the onset of the contract.

In many developing countries, however, water tariffs have historically been set well below cost-covering levels. In these countries raising user tariffs is essential to improve service quality and coverage, whether private sector participation is considered or not. But moving to cost-covering tariffs has usually proved to be politically sensitive. Where major tariff increases have not been politically feasible in the short term,

that has prevented many governments from entering concession agreements—limiting the potential benefits from private sector participation.[1]

Moreover, designing a concession for water and sanitation services raises additional challenges. One is how to address the concerns of the poor, who often cannot pay the full cost of a connection. Another is how to finance investments for public goods such as wastewater treatment, for which most users' willingness to pay is low and which therefore cannot be easily financed through user fees alone. Two main approaches have been traditionally used for addressing these issues in the design of water concessions: relying on cross-subsidies between user categories and providing public funding tied to inputs used by the operator. Both approaches have their weaknesses.

Relying on cross-subsidies

Cross-subsidy arrangements require some categories of users to pay higher prices in order to subsidize services for others. They have been used in many water concessions to subsidize the cost of new connections (to promote expansion of coverage in poor areas) or to subsidize the tariff for some basic level of water consumption (to ensure minimum consumption for the poor at an affordable rate).

But relying on cross-subsidies has several drawbacks:

- No additional funding is injected into the system—and the amount that can be raised through cross-subsidy is limited by the existing customer base. That puts a limit on the financial resources that can be directed to social priorities and on the corresponding obligations that can be imposed on the private sector.
- Demand for water and sanitation services is not inelastic, so those asked to pay higher prices face incentives to lower their consumption or even to switch to private solutions (industrial users may drill their own wells, for example). These incentives can put the financial viability of the concession at risk.
- Cross-subsidies intended to reduce costs for the poor typically are poorly targeted, with benefits often going to better-off customers (notably the ones already connected), and often lack transparency.
- Cross-subsidy schemes do not create strong incentives to provide services for the poor. A concession contract could contain obligations to provide such services, backed by penalties. But cross-subsidies naturally create an incentive to give priority to more affluent users—because private operators stand to lose money by providing services at a lower tariff to the intended beneficiaries of the cross-subsidies. [2]

Introducing input-based cofinancing

Recently there has been growing interest in introducing some public funding into water concessions that impose significant social and environmental obligations on the private operator. In this alternative to cross-subsidies, the basic idea is to directly subsidize social and environmental investments with low financial returns.

Most discussions have centered on input-based schemes, in which public funds complement the private debt and equity raised directly by the private operator. In a typical cofinancing scheme concessional public funds would finance specific civil works, and the operator would have little flexibility in the choice and design of the investment. Unlike cross-subsidies, this approach mobilizes additional resources. But it also creates several problems:

- It is difficult to target such funding to particular beneficiaries or development outcomes, since it is allocated for specific civil works (inputs) rather than final results (outputs). So the performance risk remains with the government.
- The approach provides fewer incentives for efficiency and innovation, undercutting a key benefit of the concession model.
- The approach tends to blur the line of responsibility between the government and the private operator and thus reduces the operator's accountability for performance. That could make it more difficult to hold the private operator contractually responsible for nonperformance (box 1).

One alternative to a strictly input-based approach is to allow the private operator flexibility in the use of the public funds provided. The key challenge is then to strike the right balance between the operator's flexibility on investment decisions and the government's rightful control over the use of the public funds—a common issue in the design of lease contracts. In

Box 1 How a cofinancing scheme can reduce a concessionaire's accountability

Consider the example of a water concession providing most customers with only intermittent supply. One of the operator 's contractual obligations is to move rapidly to the provision of continuous service. Construction of a new water treatment plant is proposed to increase production capacity. But additional capacity alone cannot solve the problem. Also essential is to improve operational efficiency and to put significant investment into increasing the network 's transmission capacity and reducing leakage.

To reduce the impact on user tariffs of the large investments needed to achieve continuous water supply, a cofinancing scheme is designed. A donor will finance the new plant through a grant, and the private operator will be responsible for the rest of the investment.

But if the new plant fails to consistently operate according to its original specifications —such as expected production capacity and potability treatment standards —the problems will escalate. And in that case the cofinancing scheme might make it difficult to sort out the reason for the failure —whether a design or construction problem (typically the responsibility of the government and donors) or an operational problem (the responsibility of the operator). If the private operator can make a case for some kind of design or construction problem, it might be able to invoke force majeure for its failure to provide continuous service. And if the operator 's obligation to provide continuous service is softened as a result, it might even be able to delay or forgo a large part of the scheduled investment to upgrade the network.

So a cofinancing mechanism can blur the division of responsibility between the private operator and the government. And that runs counter to the very reason for a concession contract: to transfer the full performance risk to a private operator.

the often politically charged environment surrounding the concessioning of a water utility, an approach leaving too much flexibility to the operator could easily raise concerns about how public funds are being used—and lead to criticism that the public funding is benefiting a private company rather than the intended population.

Notes

1. In such situations governments wanting to introduce private sector participation have resorted to schemes transferring lower levels of risk and resposibility to the private sector. One such scheme, in Guinea, involved a lease contract designed around a subsidy to ease the transition to cost-covering tariffs (see Brook and Locussol, 2001).
2. In a cross-subsidy scheme affluent users are charged a tariff that is higher than the marginal cost of serving them, while the operator's marginal revenue from serving the intended beneficiaries of the scheme is lower than the marginal cost of serving these users.

In the international development community there is growing interest in applying the output-based aid approach to the delivery of public services that depend at least in part on public funding. In contrast to the traditional approach of directing public funding to the financing of assets or other inputs used by public sector service providers, the output-based aid approach ties the disbursement of the public funding (including the proceeds of World Bank loans or grants) to the delivery of specified outputs or services by private firms or nongovernmental organizations.

In the water sector an output-based scheme can provide powerful solutions to the challenges of concession design:

- It can help take pressure off cross-subsidy arrangements.
- By tying disbursement of public funding to specified services or other outputs rather than to inputs, it can create opportunities for better targeting of intended beneficiaries or results, and make the use of public funds by a private concessionaire more acceptable to the general public.
- It allows governments to introduce public funding into a water concession while keeping performance risks with the operator, providing much stronger accountability for performance and creating greater incentives for efficiency and innovation.

Where the transition to cost-covering tariffs must be gradual, well-designed output-based schemes can also help governments progress more rapidly to deeper forms of private

Table 1 Four output-based schemes for water concessions

Scheme	Basic concept	Development rationale
Targeted consumption	Ensure affordability of ongoing consumption for targeted groups	Ensure basic level of water consumption for the poor
Coverage expansion	Expand water and sewerage coverage	Promote access to water and sanitation services for the poor
Transition	Ease transition to cost-covering tariffs	Facilitate reform where major tariff increases are not feasible
Wastewater	Expand wastewater treatment	Promote environmental protection (externalities)

sector participation, because operators will have recourse to revenues not only from user fees but also from the output-based payments. By providing a mechanism for efficiently and transparently channeling public funds into a water concession, the output-based aid approach allows governments to move directly from public management to a concession contract—rather than taking the step-by-step approach to private sector participation that starts with a short-term management contract.

Although the output-based aid approach has been successfully implemented in a range of sectors and environments, experience in the water sector remains at a relatively early stage (see Brook and Smith 2001). This paper looks at four potential mechanisms for applying the output-based aid concept to the design of water concessions (table 1):

- *Output-based targeted consumption scheme*—to improve the affordability of ongoing consumption for targeted groups.
- *Output-based coverage expansion scheme*—to expand water or sewerage coverage to currently unserved populations or areas.
- *Output-based transition scheme*—to ease the transition to cost-covering tariffs.
- *Output-based wastewater scheme*—to expand wastewater treatment.

"Virtual" cases of water utilities, representative of some of the most common situations in the developing world, illustrate the use of these mechanisms.

Option 1: output-based targeted consumption scheme

A virtual case for an output-based targeted consumption scheme

The first option, an output-based targeted consumption scheme, could be used to ensure the affordability of the water bill for the poorest portion of the population.

To see how such an output-based scheme could work, consider the example of a water concession in a city with one million inhabitants in 200,000 households. The average water tariff is set at €0.75 per cubic meter, and the average monthly household bill, based on consumption of 20 cubic meters, is €15. Around 15 percent of households have a monthly income of less than €150. So even if these households consumed only 12 cubic meters a month, their monthly water bill of €9 would amount to at least 6 percent of their income (above the traditionally accepted threshold of 5 percent)

How the scheme could be structured

To help the poorest families pay their water bills, the government has decided to provide some public funding to increase the affordability of a basic level of consumption corresponding to a family's minimum water needs. This could be done very simply by using an output-based aid mechanism:

- Beneficiaries of the scheme, identified in advance by the government, would be entitled to a lower tariff for the first consumption bracket, corresponding to the basic level of consumption. These beneficiaries—households with a monthly income of less than €150—would pay the operator only €0.40 per cubic meter for the first 12 cubic meters consumed (€4.8 a month rather than €9).
- To make up the difference in revenue, the government would pay the operator €0.35 for each cubic meter of water sold to targeted beneficiaries at the reduced tariff.
- To receive this output-based payment, the operator would periodically submit billing and collection information (subject to auditing) to the government agency managing the scheme.
- Only targeted households paying their full share of the water bill would be entitled to the government consumption subsidy.

The annual public payment would amount to €50 per targeted poor family, or around €1.5 million. In this virtual example, while more than 14,000 poor households would benefit from the scheme, the public funding would be less than 5 percent of the total revenues of the water utility (at €36 million per year).

Advantages and limitations of the scheme

A similar simple mechanism could be used to ease the cost of sanitation service for targeted beneficiaries. Overall, an output-based scheme can provide an efficient mechanism for targeting aid to the poor while strengthening the concession's viability, where there is concern about the ability of the poorest households to pay their water or sanitation bills:

- It generates incentives for the private operator to supply service to the poor, since the government pays the operator only after the service is delivered.

- It creates incentives for beneficiary households to pay their bill in full, reducing the collection risk for the operator associated with serving poor areas.

In the context of developing countries, however, implementing an output-based targeted consumption scheme could be very challenging, for two main reasons. First, targeting the poor can be difficult. In Chile, where such a scheme was implemented in the water sector, many middle-income households receive the subsidy, while many eligible poor households do not (Gomez-Lobo 2001). Moreover, the cost of administering such a scheme can account for a significant share of the public funds allocated. One way to lower the cost is to use a targeting and administrative mechanism that takes advantage of scale economies across sectors (Smith 2001).

Second, the ongoing nature of output-based targeted consumption schemes raises difficult issues for sustainability. In most developing countries, vulnerable to periodic macroeconomic shocks and with public budgets under strain, it might be unrealistic to expect long-term fiscal commitments. Moreover, donors might be reluctant to commit to long-term transfers. These concerns weigh heaviest in the poorest countries, where a large share of the population might be eligible and the scheme could require substantial financing. Since private concessionaires would require credible long-term financial commitments, doubts about the sustainability of such a scheme could limit its application in water concessions for many developing countries.

Option 2: output-based coverage expansion scheme

A virtual case for an output-based coverage expansion scheme

The virtual case for an output-based coverage expansion scheme is a typical city in the developing world, with an estimated population of around 3 million. More than a third of the residents—mostly poor households in slums or peripheral urban areas—are not served by the public water utility and must get their water instead from private vendors at a very high unit cost or from unsafe sources such as shallow wells or surface watercourses.

The city has just elected a new government, with a mayor committed to improving access to piped water service. His objective is to increase coverage from less than 70 percent of households to around 95 percent over the next four years. This expansion program is ambitious, and the government has decided to allow an experienced private operator to carry it out under a concession contract.

Meeting the coverage goals will require around 150,000 new water connections plus significant investment to increase the capacity of the existing system (production plants and the transmission and primary distribution network). The investment is estimated at an average €800 for each new customer (€500 for each new connection and €300 for the average share of the cost of expanding system capacity for each new customer) or a total of €120 million—more than twice the current annual revenue of the water utility.

Drawbacks of a conventional concession for service expansion

Assume that the current tariff, at €0.50 per cubic meter, already covers the cost of operation, maintenance, and rehabilitation. For simplicity, assume also that if the cost of new connections and capacity upgrading is excluded, the cost-covering tariff will be the same after coverage has increased to 95 percent. In addition to the €120 million required by the expansion program, an estimated €300 million will be needed over the next five years to rehabilitate existing infrastructure systems (beyond the coverage expansion plan), which the private operator can finance directly through a mix of equity and private debt.

In the absence of an output-based payment scheme, the cost of the expansion must be recovered through additional revenues from user fees. To balance the concession's financial flows, a mix of cross-subsidies and connection charges needs to be introduced. One way to do that is to move from a uniform tariff of €0.50 per cubic meter to the following tariff structure:

- An increasing-block tariff, under which consumers using more than 20 cubic meters a month would be charged €0.65 per cubic meter.
- A special tariff for industrial users of €0.90 per cubic meter.
- A one-time connection charge of €300 to be paid by each new customer.

This kind of tariff structure, often used in water concessions, has a straightforward advantage: if existing customers accept the tariff increase and new customers can afford to pay the one-

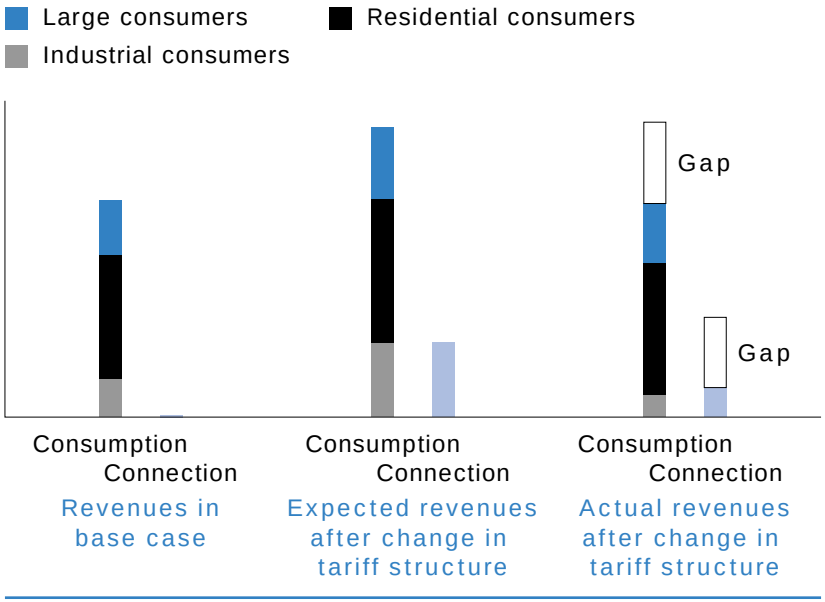
time connection charge, the expansion plan can be financed without recourse to public funding. This approach has succeeded in several water concessions, such as that in La Paz, Bolivia (see Komives 1999).

Nonetheless, sector practitioners are becoming increasingly cautious about the difficulties of expanding water networks in low-income neighborhoods—and aware of the limitations of drawing solely on cross-subsidies and connection charges to finance service expansion. Consider this example in which the expected additional revenues from cross-subsidies and connection charges fail to materialize (figure 1):

- Users affected by the tariff increase (30–80 percent) reduce their consumption, particularly industrial users who can develop private wells.
- Most households to be connected are poor and lack access to credit and are therefore unable to pay the one-time connection charge—even though, once connected, they would be willing and able to pay their normal water consumption bill.

This situation creates a "financial gap" in the revenue flow of the concession. As a result the private operator finds itself with inadequate resources to carry out the full investment program scheduled.

Figure 1 Effect of a revenue shortfall on the financial profile of a water concession



How the scheme could be structured

Where poor households cannot afford the full cost of a water connection, an output-based coverage expansion scheme can

provide a powerful alternative for financing an expansion program. The scheme not only would reduce the pressure on cross-subsidies; it would also push more financial resources to the objective of coverage expansion. Similar schemes have been successfully used to expand coverage by other infrastructure services, notably in Latin America.

The basic concept of such a scheme is straightforward: the concession would include public funding, with a fixed amount to be paid to the private operator for each new water connection installed in a poor neighborhood. Some moderate cross-subsidies could still be used, as well as a connection charge for new users. In our virtual case, introducing an output-based coverage expansion scheme would translate into the following structure of user tariffs and public funding:

- Rather than a system of increasing-block tariffs, a moderate cross-subsidy would be introduced, requiring industrial users to pay a special tariff of €0.60 per cubic meter—a level at which developing private wells would still be uneconomical.
- Each new user would pay a moderate one-time connection charge of €100, an amount that reflects a true financial commitment from new customers but that most poor households in targeted areas should still be willing and able to pay in exchange for access to piped water.
- The government would make an output-based payment to the private operator of €550 for each new connection once the connection has been installed and the new user is receiving water service that consistently meets specifications.[3]

The €550 output-based payment would cover not only the direct cost of each new connection but also part of the related share of the cost to upgrade the capacity of the production and distribution system, for which the operator would enjoy full technical design flexibility. Under this financial arrangement a significant share of the funds required for expansion (€120 million) would come from the output-based payment (€82.5 million), with the rest coming from the connection charge for new users (€15 million) and cross-subsidies (with a net revenue flow equivalent to €22.5 million).

The advantages of such a scheme to support coverage expansion are threefold. First, the scheme would provide more resources for the private concessionaire to focus on coverage expansion objectives: the €82.5 million in public funding for coverage expansion would allow almost one million poor people to gain access to piped water in a short period.

Second, the scheme would mobilize private funding in support of the development objectives of the concession. In our virtual example the private operator should be able to bring €80 million in equity and raise €250 million in limited recourse financing based on user tariff revenues. So public funding for service expansion would still amount to less than 25 percent of the investment financed by the operator in the first five years of the concession.

Third, the scheme would provide flexibility, both in the funding sources and for carrying out the expansion plan. A special-purpose "output-based expansion fund" could be set up in parallel with the concession contract, with initial funding covering only part of the expansion plan. Throughout the

concession, conditional on successful implementation, the government or donors (or both) would provide additional resources—with the concessionaire's contractual obligation to implement the expansion plan conditional on enough resources being available in the fund.

Potential pitfalls of the scheme and how to deal with them

Our virtual example, with public funding paid as a lump sum after each connection has been installed, has the advantage of simplicity. In practice, however, the design of an output-based coverage expansion scheme could involve several pitfalls.

The first relates to the level of flexibility that should be allowed the operator in implementing the expansion program, particularly in selecting the urban areas to which the network should be expanded and in what order. For example, a government would probably want to design an output-based scheme so as to prevent it from subsidizing new real estate developments in middle-class neighborhoods or expanding service coverage to marginal areas where demand for piped water might not exist. Several options can be considered, with different levels of control for the government :

- The government might periodically submit a list of eligible neighborhoods or households to the operator, to maintain strong control over the targeting of the scheme.
- The government might request the operator to prepare proposals for geographic expansion in poor neighborhoods, with the eligibility of these neighborhoods for the scheme subject to the government's non-objection.
- The government might establish a set of guidelines—such as for determining the eligibility of households—and then leave the operator some flexibility in decisions on where and how to expand the network. For example, to mitigate the risk that the operator would expand coverage in areas with insufficient demand for piped water, the government could disburse the €550 output-based payment as follows: a €130 down payment, plus €0.75 per cubic meter of water that is sold and for which payment is collected over the next four years, with a cap of €40 for every four-month period .

The second potential pitfall relates to the risk that the newly connected users might not receive adequate service from the operator after the connection has been installed. This results from the fact that a portion of the €550 payment is supposed to cover the capacity upgrade of the production and distribution system. While verifying that a new connection has been installed is straightforward, the new connection is not sufficient to guarantee adequate service. There are several approaches to dealing with this risk:

- For every new connection installed, the operator should usually have a natural incentive to serve the new customer as long as the consumption tariff has been set at a cost-covering level. Where there is special concern about the ability of some of the new customers to pay their water bills in full, an output-based targeted consumption scheme

could help solve the problem by sharpening the operator's incentives to serve the poorest customers.

- The performance standards specified in the concession contract—which must include the provision of reliable water supply to all customers, with a well-designed penalty schedule backed by performance bonds—should be a powerful incentive for the operator to avoid noncompliance.
- Where the risk of nonperformance appears significant—because production capacity is already under strain and the cost of developing additional capacity is high—disbursement of public funds should be conditional not only on installation of the new connection but also on the operator's demonstrated ability to provide continuous, reliable service.

In the last case the government could disburse a small share of the output-based payment after each new connection is made, paying the rest in installments conditional on the new connection receiving continuous water supply during the corresponding period. For example, the €550 output-based payment could be disbursed as a €130 down payment when the connection is installed, plus 12 installments of €30 over the next four years for every four-month period in which the new customer receives adequate water service. Various means could be used to monitor performance, such as installing pressure meters in the secondary network at the entry to each new neighborhood connected, ensuring that each newly connected household reaches a minimum level of monthly consumption, or relying on customer complaints.

A third potential pitfall, common to all output-based schemes, relates to the risk of nonpayment by the government. An output-based scheme introduces a new form of political risk that must be properly mitigated in the design of the concession contract (box 2).

Adapting the scheme to different modes of service

In developing countries the urban poor can make up a diverse group—ranging from marginalized communities occupying slums with no formal titles to their homes (and often in violation of urban planning rules) to poor families living in peripheral areas but holding titles to their homes and earning regular salaries. Poverty might also be combined with ethnic exclusion. Where this kind of diversity exists, a segmented approach to providing water service to low-income groups might be desirable.

In such a situation an output-based coverage expansion scheme could easily be structured with different payments for different modes of service. In our virtual example the payment schedule could be designed as follows:

- A payment of €550 for every conventional new connection, with each new user paying a connection charge of €100.
- A payment of €200 for every low-cost connection, with the user paying a connection charge of only €30. The low-cost connections could involve less stringent technical specifications (relating to materials, the diameter, the

Box 2 How to mitigate the political risk of nonpayment in an output-based scheme

Political risk arises in a public-private arrangement from the possibility that the government might renege on its contractual obligations. The categories of political risk in a typical concession contract have been well analyzed (see Smith 1997 and Irwin and others 1997). Output-based schemes create an additional category of political risk —that the government might refuse to make the promised output-based payment even though the private operator has met the performance benchmarks.

Several mechanisms can be used to mitigate this risk. An offshore trust fund could disburse the output-based payments. The scheme could be financed through a program directly managed by a foreign donor. Or political risk mitigation instruments could be used, such as political risk insurance or partial risk guarantees.

service pressure, or sharing part of the connection between households) or include some labor performed by the beneficiary.

- A payment of €50 for every new user to be served through a community fountain, with users paying no connection charge. This would mean a total payment of €5,000 for a new community fountain serving 100 households.

The public funding for each mode of service would be set at a level sufficient to recover the direct cost of each new "connection" plus a pro rata share of the cost of expanding the system's capacity. The output-based payment mechanism could be designed with an initial allocation of resources to an expansion fund, with the concession contract giving the operator the flexibility to determine with each community what mode of service best suits its practical needs and financial capacity. The fund would then be replenished as needed.

Introducing competition for service delivery in low-income neighborhoods

An output-based scheme for coverage expansion could also support the introduction of competition for service delivery in marginal neighborhoods. To illustrate this option, the concession's expansion objectives are separated conceptually into two components: *densification,* expanding coverage to poor households within the urban area already covered by the distribution network, and *peripheral expansion,* expanding coverage to new neighborhoods in the periphery of the

metropolitan area. The concession contract would set densification targets for the private operator but limit its contractual responsibility for serving the new peripheral areas to bulk water supply. And the concessionaire's tariff structure would include a retail tariff and a bulk water supply tariff set to recover the average marginal cost of supplying bulk water (production and transmission).

While an output-based coverage expansion scheme similar to the one described above would support the densification targets, a separate output-based scheme would be created to support service expansion in the peripheral neighborhoods. A special expansion fund would be set up for that purpose, and the construction and operation of the water network in each new neighborhood would be competitively tendered on the basis of the lowest output-based payment required to expand coverage to that neighborhood. Local private companies and community-based associations (with the support of nongovernmental organizations) would be allowed—indeed, encouraged—to bid alongside the incumbent bulk water concessionaire.

Such a scheme would have two major advantages. First, it could reduce the overall cost of the expansion program for the government, since local players might be better able to handle the operational and commercial risks in some of the poor neighborhoods—and therefore require a lower payment than the incumbent concessionaire. And second, it would introduce horizontal competition in water service provision, fostering the development of local private operators.

Notes

3. The total subsidy payment would then be €610 per connection, an increase of more than 10% over the original €550 to account for the cost of financing of the private operator.

Option 3: output-based transition scheme

With water tariffs historically set well below cost-covering levels in most developing countries, water utilities have lacked a sustainable revenue flow to invest in maintaining and expanding infrastructure. More often than not, this has meant poor service quality and—because customers are unwilling to pay for intermittent supply and undrinkable water—low billing collection rates. So the problems are perpetuated.

Raising tariffs is the first step toward sustainable improvement in water and sanitation services. But in an environment of traditionally poor service and a "no-pay" culture, the transition to cost-covering tariffs has usually been difficult. All the efforts needed to improve service quality—reducing leakage, expanding capacity, upgrading equipment—can take several years to translate into reliable improvements in service. Until service quality is significantly improved, however, most customers will be unwilling to accept the sharp tariff increases needed to finance the improvements. In these situations governments contemplating a water concession face a dilemma:

- They can implement a concession with a sharp tariff increase—and risk creating a perception among the population that a private concessionaire equals higher tariffs. Until service quality can be improved, the concession contract will remain politically vulnerable.
- They can delay the implementation of a concession—and accept slower improvements in service quality. This approach means concentrating first on improving the water utility's financial and operational situation through gradual tariff increases and rehabilitation programs. It is typically combined with lower-powered forms of private sector participation, such as a short-term management contract, relying on public funding to finance investment and support a gradual transition to higher tariffs.[4]

As the virtual example will illustrate, the output-based aid approach can provide an alternative to starting with lower-powered forms of private sector participation, allowing governments to move immediately to a concession.

A virtual case for an output-based transition scheme

Consider the case of a water utility whose main deficiency is not poor coverage—everyone in the city has access to piped water—but poor quality of service. Customers receive water only on certain days of the weeks for certain hours, and the water does not always meet the potability standards. This situation has resulted from decades of poor maintenance and rehabilitation, and several years of infrastructure upgrading will be needed before the operator can provide a reliable supply of drinkable water. The current water tariff is €0.30 per cubic meter, which merely covers the operating costs of the system. To improve service, the government would like to transfer the utility to a private operator under a long-term concession contract.

Achieving continuous water supply in all parts of the city as well as compliance with potability standards will require an estimated €250 million investment over the next four years, along with big improvements in operational practices. To be financially viable, the investment will require an equilibrium tariff of €0.50 per cubic meter if the tariff is adjusted immediately—an

increase of more than 65 percent—or a gradual increase over the four years to €0.55 per cubic meter.

Most customers appear willing to accept a gradual increase in water tariffs, but only to €0.43 per cubic meter and only after they receive a more reliable supply of drinkable water. That means that only €180 million of the projected investment cost can be passed on to customers through tariffs, leaving a financial gap of €70 million to be funded through other means.

In these circumstances the conventional advice is that a concession is not feasible at this stage—and that the government's only option is to introduce private sector participation through a management contract and attempt to gradually upgrade the utility. In our virtual case, however, the government is ready to provide a €70 million grant to the utility to ease the transition to cost-covering tariffs, provided that a concession could be implemented in parallel with the tariff increase plan.

How the scheme could be structured

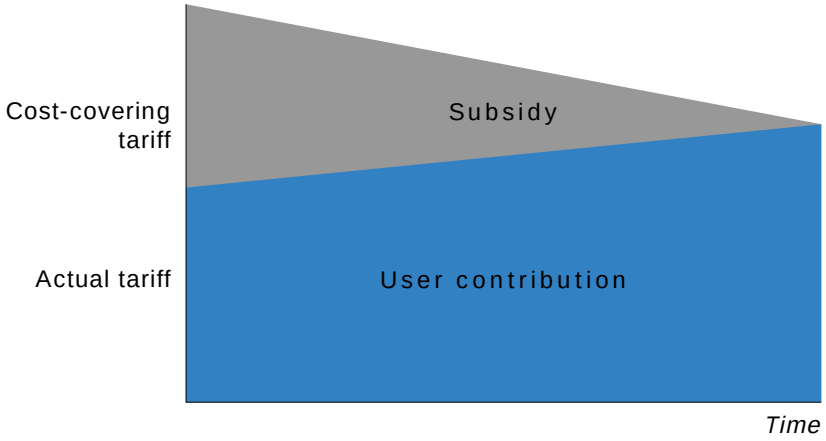
The basic concept of an output-based transition scheme is to channel transitional public funding into a concession as a complement to user revenues, to smooth the tariff increase. Payments would be disbursed to the private operator conditional on its compliance with contractual performance benchmarks. In principle, the performance benchmarks could be based on any range of performance obligations in the concession—expanding service quality, improving collections, serving particular customers—with the choice depending on the characteristics of the water utility.

In our virtual example the payment of the €70 million of public funding could be linked to gradual improvement in the reliability of water supply. An output-based transition scheme could be put in place for the first four years of the concession contract, structured as follows:

- The concession contract would establish an annual public funding arrangement, for a total of €70 million, to complement user revenues. The annual payment would be gradually reduced each year according to a preestablished schedule until its elimination in the fifth year of the concession. This public funding would smooth the necessary tariff increase (figure 2).
- The concession contract would set out a schedule for a gradual tariff increase, along with credible guarantees from the government that the tariff schedule would be implemented.
- The concession contract would also introduce a set of service performance criteria, with a schedule of performance improvements to be attained by the private operator over the four-year transition period.
- The payment of the annual funding would depend on the performance each year against the service improvement targets.

The obvious challenge would be to establish meaningful parameters for evaluating the improvement in service performance and to design the output-based payment schedule accordingly. These parameters need to be objective and easy to measure.

Figure 2 Effect of output-based payments to ease the transition to cost-covering tariffs



Source: Smith 2001.

In our virtual example three simple criteria could be used:

- Average number of days of continuous water supply, estimated using pressure meters at strategic points in the distribution network combined with a system to record customer complaints.
- Share of water samples noncompliant with bacteriological standards (potability), based on a preestablished program of laboratory analysis of random water samples.
- Collection rate on water bills.

Table 2 shows how the scheme could be structured around these criteria.

The output-based payment formulas could involve some subtlety. Thus while the operator would receive the maximum payment in a given year if it met all the performance targets, under a schedule of regressive payments it could receive part of the payment if it achieved some service improvements. For example, the disbursement formula could be based on a matrix so that if in year 3 the operator meets targets for water quality and billing collection but is able to provide continuous service for only 300 days rather than the target of 320, it could still receive partial payment (€12 million rather than €15 million).

Advantages and challenges of the scheme

As noted, the rationale for an output-based transition scheme is to cover the expected shortfall in the concessionaire's revenues during the transition period, as tariffs are gradually raised to cost-covering levels. The main advantage of such a scheme is

Table 2 Tariffs, output-based payments, and performance targets for the transition period

	Year 1	Year 2	Year 3	Year 4
Maximum output-based payment (millions of euros)	25	20	15	10
Tariff per cubic meter (euros)	0.33	0.36	0.40	0.43
Target average number of days with continuous supply	220	270	320	360
Maximum share of water samples failing to comply with bacteriological standards (percent)	5	4	2	0.5
Collection rate for water bills (percent)	70	80	90	95

that, when initial water tariffs are very low and the population is unwilling to accept sharp increases in the short term, it makes it possible to proceed immediately with a concession. It therefore offers an attractive alternative to the classical approach through a management contract:

- Moving immediately to a concession makes it possible to tap private sector financing for a large share of the investment required to upgrade the water utility. The public funding acts as a catalyst to leverage private resources.
- Thanks to the greater efficiency of the concession model, the quality of water service can be improved more rapidly.
- As long as the public funding can be used more efficiently than under other forms of private sector participation (such as a management contract), an output-based transition scheme would result in a lower user tariff at the end of the transition period.

An important design issue, common to all output-based aid schemes, is how to structure the bidding process. For an output-based transition scheme, the competitive bidding should probably center on the amount of public funding required by the private operator (box 3).

In principle, an output-based transition scheme could be structured around any set of performance obligations in the concession contract. The key issue, of course, is how to determine the set of criteria that will govern the output-based payments. The design of such schemes should therefore be specific to each water utility and to the contractual obligations in the concession contract.

Box 3 How to structure the bidding criteria under an output-based scheme

Even more than in a classical concession, it is essential that a concession designed around an output-based scheme be tendered through a transparent and competitive process. Otherwise it might raise concerns that the public funding is not really justified and is being provided to benefit a private company rather than the population. This issue is common to all output-based schemes.

There are two main options for structuring the bid parameters for a water concession that includes an output-based scheme. One is to fix the tariff and use the amount of the output-based payment as the variable. The other is to fix the total amount of public funding and use the tariff as the variable.The better choice depends on the situation, especially the relative quality of the information available for estimating the equilibrium tariff or the public funding required.

In the virtual example for the output-based transition scheme the government determines the maximum acceptable tariff increase. So in this case the tariff is fixed, and the private operator chosen would be the one requiring the lowest output-based payment to complement the tariff during the four-year transition period. A well-managed competitive bidding process would keep the public funding to the minimum needed to make the concession financially viable.

Notes

4. Inherent in this approach is an expectation that it will be easier to concession the water utility at a later stage and that management contracts can be an efficient way to significantly improve the situation of the wter utility. Discussing the pros and cons of this strategy is beyond the scope of this paper.

Option 4: output-based wastewater scheme

Wastewater treatment has clear public good characteristics: it generates considerable environmental and public health externalities, and the population's willingness to pay for it is usually low, well below its cost. Moreover, in the developing world not only is the population's willingness to pay often too low to support the cost of wastewater treatment through user tariffs alone, but so is its ability to pay. A strong economic rationale can therefore be made for financing at least part of the cost of wastewater treatment through some form of public funding.

For the purpose of promoting wastewater treatment, none of the standard options for dealing with wastewater treatment in concession design is satisfactory. These options typically include:

- Excluding wastewater treatment targets from the contractual obligations.
- Relying extensively on cross-subsidies (with water tariffs subsidizing the cost of wastewater treatment)—with all the pitfalls for sustainability and incentives already described.
- Delaying wastewater treatment obligations to a later phase of the concession, subject to tariff revision—effectively postponing the problem of how to finance the required investment.

The international donor community has often been willing to provide concessional funds to promote wastewater treatment in developing countries where clear environmental benefits could be identified. Some recent strategies for providing such aid under a concession have relied on traditional input-based cofinancing approaches in which public funding directly finances part or all of a wastewater treatment plant—with all the pitfalls of cofinancing already noted. Output-based aid offers a new way to introduce public funding to support wastewater treatment in a concession.

A virtual case for an output-based wastewater scheme

Consider the case of a water and sanitation utility with a sewerage network covering 70 percent of the population and discharging the untreated sewage directly into the environment. With the cost of wastewater treatment excluded, the equilibrium tariff under a concession would be €0.80 per cubic meter, of which €0.60 corresponds to the water service and €0.20 to the sewage collection service (paid only by customers connected to the sewerage network).

If the full cost of wastewater treatment (investment and operation) were to be recovered entirely through user tariffs, introducing an early obligation for wastewater treatment into the concession would require increasing the equilibrium tariff by €0.40, to €1.20 per cubic meter. For the sake of simplicity, assume that the cost of expanding the coverage of the sewerage network can be entirely recovered through the €0.20 per cubic meter sewerage charge and a connection charge that all new customers are willing to pay.

While the population is unwilling to pay the additional €0.40 per cubic meter for the full cost of wastewater treatment, most customers might still accept a moderate tariff increase of €0.15 per cubic meter for this service. This tariff increase would roughly cover the operating cost of the wastewater treatment

plant plus a small share of the investment. Much of the investment—an estimated €150 million—would need to be financed through another funding source.

How the scheme could be structured

Based on our virtual example, an output-based wastewater scheme could be structured as follows:

- The concession contract would include an obligation to provide full coverage by the sewerage network and secondary treatment of effluent over the next five years. The user tariff would be increased only to the level accepted by most customers, at €0.95 per cubic meter for water and sanitation services.
- The concession contract would establish public funding of €150 million, to be paid as a grant to the private operator against compliance with sanitation performance targets over the first five years of operation of the planned wastewater treatment plant.
- The performance criterion for disbursement of the output-based payment would be the amount of pollution removed—a proxy that captures both the objective of expanding the sewerage network and that of treating wastewater.
- After the end of the five-year output-based scheme, the wastewater tariff of €0.15 per cubic meter would be allowed to cover the ongoing cost of the plant's operation.

The amount of pollution removed would be calculated by

Table 3 Wastewater treatment standards and corresponding payments

Performance standard	Monthly removal of total suspended solids (tons)	Public funding (millions of euros)
Above target	38,000	3.0
Target	35,000	2.5
Below target	32,000	2.0
Below target	28,000	1.5
Noncompliance	Less than 28,000	0

combining a parameter representing the level of wastewater treatment (such as the percentage of total suspended solids) with the volume of wastewater treated—a measure directly linked to the coverage of the sewerage network. For example, if the wastewater treatment target was the removal of 70 percent of total suspended solids and the city produces 50,000 tons of total suspended solids a month, the sanitation performance target would be 35,000 tons. The monthly payment, a pro rata share of the total payment budgeted over the disbursement period, would vary depending on whether the operator met, exceeded, or fell short of the target (table 3).

While focusing on a single trigger for the output-based payment is attractive, alternatives exist, of course. For example, the trigger could be an index of various parameters of performance, such as the number of new sewerage connections made or the level and volume of wastewater treatment.

Advantages and risks of the scheme

Using an output-based aid approach to support wastewater treatment in a concession would offer several potential advantages. First, the provision of public funding through an output-based scheme would give the private concessionaire more resources to focus on wastewater treatment objectives. Given the usually low willingness to pay for such service, including wastewater treatment among the obligations in a concession often would not otherwise be possible.

Second, in contrast to a cofinancing approach, an output-based wastewater scheme would introduce a powerful incentive for the operator to comply with wastewater treatment objectives—beyond the contractual penalties for noncompliance. At the same time it would allow the operator flexibility in choosing how to reach the global target, since different technical solutions could achieve the same level of pollution removal.

The flexibility allowed by the output-based aid approach offers other potential benefits. For example, with a more complex set of performance criteria, the operator might be able to decide whether some parts of the city could continue with individual sanitation solutions in exchange for the collection, treatment, and disposal of sludge from septic tanks.

In addition, the flexibility in the scheme provides an incentive for the operator to exceed the target for pollution removal, since the operator could then potentially receive the same total payment over a shorter period. In our virtual example the operator could receive the total public funding of €150 million in four rather than five years by consistently removing 38,000 tons rather than the targeted 35,000. The operator could also exceed targets during certain months to make up for past shortfalls.

These advantages would have to be balanced against the relative simplicity of the cofinancing approach and the greater risk for the operator under an output-based aid approach:

- Under an output-based aid approach the operator would incur greater performance risk: if the operator should fail to meet performance targets, it not only would be subject to penalties but also would be unable to receive the total

scheduled output-based payment requested to cover the investment. Thus the feasibility of such a scheme would depend on the private sector's appetite for risk.

- The operator would have to arrange bridge financing to cover the period between the construction of the wastewater treatment plant and the end of the five-year output-based scheme. Given the large investment typically involved, the cost of the bridge financing might significantly increase the overall cost of the scheme.

Although the output-based schemes developed here rely on hypothetical cases, they suggest the promise of the output-based aid approach for efficiently introducing subsidies into the design of water concessions. In the developing world, where financing constraints can be severe, the output-based aid approach could become an important tool for combining public funding and private sector participation to improve water and sanitation services.

A powerful tool for improving the design of water concessions

The hypothetical cases point to several conclusions:

- The output-based aid concept offers a way to combine the efficiency of the concession model with an efficient way to channel public funds for targeted benefits. The approach allows public funding to be introduced into the financial structure of a concession without altering its risk profile.
- An output-based scheme can make the concession model a more efficient tool for rapidly attaining social and environmental objectives. Going beyond the usual contractual guarantees, it sharpens the operator's incentives to meet such objectives by tying payment to their achievement.
- In the often difficult environment of developing countries an output-based aid approach can make water concessions viable in more cases, including those in which a transition period is needed to increase user tariffs.
- For the international donor community an output-based scheme offers a more efficient and transparent use of public funds than the classical alternative of input-based cofinancing, since payment is made only after services are delivered.
- An output-based scheme can help mobilize private funds: by complementing revenues from user tariffs and thus helping to close a financial gap, the public funding makes a concession financially viable.

Looking forward

Output-based schemes have many potential applications in water and sanitation services. In fact, the four output-based schemes described here could easily be combined in one contract. For example, in a city with universal coverage but low tariffs, poor service, and no wastewater treatment—a typical situation in Central and Eastern Europe and some southern Mediterranean countries—a concession could be designed around three output-based schemes: for easing the transition to higher tariffs, for ensuring a minimum level of consumption for the poor, and for promoting wastewater treatment. A similar approach could be used in a typical metropolis in the developing world where a large share of the population lacks access to piped water—though in this case putting more emphasis on the coverage expansion scheme.

Of the four output-based schemes described here, three—those for coverage expansion, tariff transition, and wastewater treatment—are essentially time-bound and could therefore be easily implemented as one-shot programs financed

through specific donor funding. By contrast, an output-based targeted consumption scheme requires a sustainable source of ongoing public funding and thus might be less suitable for developing countries.

Although the examples described here center on the concession model, output-based aid could also have useful applications in other models of private sector participation based on a mix of public and private funding, such as the enhanced lease or mixed capital models.

Despite the potential of the output-based aid concept for improving the design of water concessions, it is no panacea. First and foremost, output-based payments should only complement—and never substitute for—user tariffs as the main source of a concessionaire's revenue. User tariffs must remain the principal source of revenue for a concession. Public funding should be used only to close a specific financial gap and act as a catalyst for private funding. Second, recourse to output-based payments cannot make the concession model viable for a water utility in all situations:

- Output-based schemes must be based on a solid rationale for complementing user tariffs with public funding—a rationale based on equity or economic efficiency considerations—and there must be a credible and sustainable source of public financing over the expected duration of the scheme.
- No output-based scheme can substitute for a strong government commitment to private sector participation, an adequate legal and regulatory framework, and an acceptable level of country risk for foreign investors—all basic requirements for implementing a water and sanitation concession.
- Designing an output-based scheme might prove difficult in countries with little reliable information on the water utility. Structuring the disbursement mechanism—selecting appropriate benchmarks for monitoring performance and designing a payment schedule that introduces the right incentives—could prove particularly challenging.

A fundamental element of output-based schemes is the need for competition and transparency. Introducing such a scheme in a water concession makes a competitive and transparent tender process even more important than with a traditional concession. Since the public funding introduced directly alters the financial equation of a concession, selecting a private operator without a competitive tender would immediately raise concerns that the public funding is not economically justified—undermining the credibility of the entire approach. The only way to ensure that the public funding provided to the concession is the minimum required for financial viability is to rely on a competitive tender.

For all the theoretical benefits of output-based aid, applying the approach in actual pilot concessions of water utilities will be the only real test of its potential to improve water and sanitation services in the developing world.

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