

Challenges for water sector reform in transition economies

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Abstract

This paper discusses the practical problems of implementing water policy and pricing reforms in transition economies by looking at the case of Odessa, Ukraine. Chief among the policy advice for the water and sanitation (W&S) sector in less developed countries is greater cost-sharing by customers through increased service prices, with the goals of encouraging more efficient water use by users, promoting a greater perceived stake among customers in the health of their W&S systems and enabling service providers to maintain and expand their networks as needed. While appropriate for much of the developing world, this policy advice has had limited applicability for many communities in transition economies. The complex existing water supply infrastructure in much of Central and Eastern Europe, along with residents' low effective demand for high-quality service, create an environment in which typical price reform strategies will initially be a minor component in sector reform efforts. We use the case of Odessa, Ukraine, to discuss the reasons why traditional advice on water pricing has been of limited use in the region.

Keywords: Central Europe; Infrastructure; Odessa; Pricing; Ukraine; Water

1. Introduction

For the past several decades, practitioners interested in water and sanitation (W&S) infrastructure planning in developing countries have recognized that the unique economic and institutional characteristics of developing countries pose challenges to W&S planning that are substantially different from those of industrialized countries (Munasinghe, 1990; Brookshire & Whittington, 1993). A “low-level equilibrium” in which political interference in service delivery, inadequate investment, non-payment by customers and deteriorating service quality are linked in

a vicious cycle is a metaphor that has been used to describe water supply and sanitation services in places as diverse as India, Nicaragua, Pakistan and Guinea (Singh *et al.*, 1993; Altaf *et al.*, 1993; Spiller and Savedoff, 1999). Consistent with this common problem diagnosis, the strategies recommended by development banks and support agencies for reforming the water sector are quite consistent across less developed countries.

Chief among these tools is greater cost sharing by customers through increased charges for service. It is commonly argued that users who are faced with the full costs of the water supply service they receive are more likely to use water efficiently, to maintain plumbing fixtures in their homes and to perceive a greater stake in the health of their community's water supply system, compared to users paying a smaller share of service costs. Water utilities, in turn, are able to cover the costs of service provision and to upgrade or expand their networks as needed. Much of the empirical research cited in support of cost-recovery policies also shares many similarities. Households receiving inadequate services typically choose to invest in alternative means of supply, often collectively expending more on these alternatives than the investment that would be needed to upgrade and expand services for the entire community (e.g. Whittington *et al.*, 1999; Schur, 1994; Altaf & Hughes, 1994). Under such circumstances, achieving cost recovery is principally a matter of restructuring the flows of services and money toward a more desirable outcome.

We argue in this paper that, while appropriate for much of the developing world, this policy advice has had limited applicability for many communities in transition economies. The complex existing water supply infrastructure in much of Central and Eastern Europe, along with residents' low effective demand for high-quality service, creates an environment in which typical price reform strategies will initially be a minor component in sector reform efforts. We examine the case of Odessa, Ukraine, to show why traditional advice on water pricing has been of limited use. Despite the fact that households in Odessa currently face an effective price of zero for their water service, for the foreseeable future standard water tariff design and pricing prescriptions will have a relatively minor role in strategic planning for sector reform in most parts of the city. In the following section, we describe the existing water supply situation in Odessa, as well as its residents' demand for service improvements, using data from a 1996 survey of 2,259 households.¹ Next we consider the advantages and limitations of several policy alternatives that have been proposed for implementation in Odessa. Finally, we consider a set of alternative policies and projects that might respond to households' demand for different levels of water supply service, even under Ukraine's uncertain economic conditions.

2. Water supply conditions in Odessa

Ukraine is the second largest transition economy in Eastern Europe and the former Soviet Union; with 1.1 million residents, Odessa is its fifth largest city and is typical of many large metropolitan areas in Central and Eastern Europe. Its downtown area features cobbled streets and turn-of-the-century architecture, a number of museums and galleries and a cosmopolitan pedestrian boulevard. Yet the city's infrastructure is in dangerous disrepair and its economy is

¹ Additional information about our sampling and data elicitation procedures can be found in the Appendix.

struggling in the transition from socialism to market-oriented democracy. Nowhere are Odessa's economic problems more manifest than with the city's municipal services. Electricity, natural gas, telephone and hot and cold water services are all erratic and declining in quality, while service fees continue to rise in an effort to keep pace with inflation.²

Our fieldwork was conducted in 1996 (all data refer to this year, unless otherwise specified) and conditions in Odessa have not changed much since then. Households in Odessa are generally small, with a mean number of 3.4 persons. The majority of citizens live in apartment blocks comprising single-family units, or in communal apartment buildings with shared kitchen and bath facilities. Only about 10% of Odessa residents live in single-family, detached dwellings. Residents are well educated, with approximately one-third having completed university level education. Like most communities in the region, Odessa has an elderly demographic profile, with almost 45% of residents aged 50 or above. The heads of household we interviewed reported an average monthly income of approximately US\$81 in 2001 dollars; more recent reports have documented average monthly household income ranging from US\$53 (Vorobyov, 2002) to US\$80 (Bonner, 1997) and US\$88 (UCIPR, 2001).

Compared with communities in other countries with comparable *per-capita* gross domestic product (GDP) values, Odessa's existing water and sanitation infrastructure is very sophisticated.³ Approximately 85% of households have private in-home connections to the piped network operated by the city's water utility, Odessa Vodokanal (OVK). In addition, almost all unconnected households receive most of their water from the OVK system. The majority of such households are either residents of communal apartments, in which several households utilize one or more shared taps, or they make use of a neighbor's private water connection. A limited system of public taps also exists, located principally in the city center. Although Odessa's water supply network is thus quite similar to that of many industrialized countries, two characteristics make it strikingly different. First, hot and cold water supply are different services and are delivered to households through different piped networks, as with most cities in the region. (Our paper focuses exclusively on cold water supply unless otherwise noted.) Second, unlike most homes in industrialized countries, the majority of Odessa households have multiple external water pipes entering their homes for different end uses (e.g. taps and toilets).

Odessa's piped water network is fed entirely by the Dneister River. The quality of the river water is poor, largely a result of upstream industrial and agricultural activity.⁴ The intake works and water treatment plant, which are located approximately 30 km from the city and were originally constructed in the 1870s, are in need of refurbishment. The distribution system is in similar disrepair. Because the network is not metered, OVK has virtually no information about the amount of water it loses each year in distribution system leakage. Few deny, however, that

² After reaching rates of more than 500% in 1993–1994, annual inflation rates in Ukraine fell to 110% in 1995 and averaged approximately 25% over the period 1996–2000 (CIA, 2002; World Bank, 2002).

³ For example, in 2000 Ukraine's per capita GDP (in purchasing power parity US\$) was \$3816, close to that of many Latin American/Caribbean countries including Suriname (\$3799), Guyana (\$3963) and Guatemala (\$3821) (UNDP, 2002).

⁴ In 1998 a Ukrainian NGO, MAMA-86, sponsored water quality testing in several Ukrainian cities. Odessa's water supply was found to have high levels of inorganic compounds, heavy metals, DDT and chlorine organic compounds (Golubovska-Onisimova *et al.*, 1998).

Odessa's water supply infrastructure is deteriorating. Most households with private water connections receive water for about 12 hours per day, although a tenth of the households we interviewed have 6 hours of service or fewer per day. (The city enjoyed a 24-hour supply for several decades prior to the 1990s.) Water pressure is variable in different regions of the city and on different floors within a given apartment block. Eighty-five percent of the households we interviewed said that they store water on a regular basis because service is irregular and/or unreliable.

Odessa residents are not billed directly by OVK for their water service. Instead, the City Housing Management and Maintenance Company (known as ZhEKs) renders a monthly bill that covers a number of services, including rent, heat, water and sanitation and building maintenance. After withholding a percentage of the funds collected, the ZhEKs transfer payments directly to service providers such as Odessa Vodokanal. Although the ZhEKs bills are itemized, the majority (72%) of individuals consulted for our study did not know the amount their household pays each month for cold water supply. Very few Odessa households have water meters; service bills are based on a flat per person fee of approximately US\$0.60 per month (2001 dollars). Many households, however, receive discounts on the prices of all communal services, including water supply. Among residents we interviewed, 32% said their households receive some sort of communal services discount; of these, 91% receive discounts of one-half or more.

Among individuals who (1) reported their average monthly household income and (2) said they knew the amount of their monthly water bill, the median household paid 1.8% of its income for water supply service (Figure 1). Almost 60% of households who said they knew how much they pay each month for water supply reported bills of US\$1.25 (2001 dollars) or less.⁵ With respect to the percentage of income allocated to water supply, the 1.8% value cited by survey respondents is slightly higher than the 0.8–1.2% range typically found in OECD countries. In terms of the absolute value of households' water bills, however, families in Odessa pay between 10 and 20 times less—to support the operation and maintenance of essentially the same water supply infrastructure—than most of their OECD counterparts (Jones, 1999).

Not only does Odessa Vodokanal charge substantially less for water-supply services than utilities in OECD countries, but it collects only a fraction of the fees that it bills. When asked whether they pay their communal services bill on a regular basis, only 58% of respondents said they "always" or "almost always" pay their bills. Twenty-two percent said they "usually" pay, 9% "sometimes" pay and 11% "rarely" or "never" pay. Historically, Odessa Vodokanal has not had the authority to disconnect households delinquent in their payments for service. Even recent legal reforms, which allow for non-payment penalties require OVK to obtain multiple government approvals before action can be initiated against a delinquent household.

Not surprisingly, Odessa Vodokanal—like many water and sanitation utilities in the region—is unable to cover the operating costs of service provision to residents, much less make strides toward replacing the city's aging infrastructure. Ukraine's continued economic struggles and cost cutting by the federal government have drastically reduced the subsidies provided to local government and utilities for water and sanitation services. Whereas government funding covered

⁵ Tariffs have been increased several times since our survey in 1996—discussed further below—resulting in a current average cold water bill of approximately US\$3 in 2002 dollars.

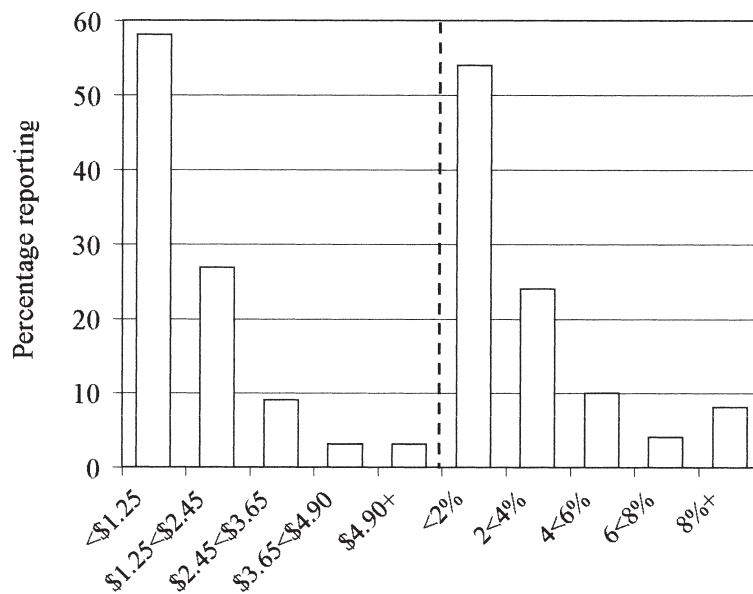


Fig.1. Percentage of households reporting indicated monthly bill amount plotted against percentage of monthly income spent on water supply services (among householders who knew bill amount, in US\$ 2001).

almost all the costs of communal service enterprises in 1994—representing 9% of the government's total budget outlays—in only five years this support was reduced by three-quarters. As one observer of the W&S sector in Ukraine has noted, “the scarcity of financial resources has brought investments in water and wastewater almost to a complete stop” (Golubovska-Onisimova *et al.*, 1998).

3. Household perceptions of water supply services

In general, Odessa residents are highly dissatisfied with the quality of water they receive from the piped network. Approximately 88% of households we interviewed reported treating their drinking water in some way before consuming it, usually with a combination of boiling and settling. When asked what health risks from drinking untreated water most concern them, residents cited a range of ailments, including those caused by bacteria (such as diarrhea-type disease), by viruses (hepatitis) and by exposure to radioisotopes (cancer).⁶ Respondents were also asked to rate the quality of their water in terms of taste, odor and color on a five-item scale (Table 1). The majority (60%) said they felt the quality was “bad” or “very bad.” Similarly, 69% said that drinking water directly from the tap (without treatment) is “unsafe” or “dangerous” for human health. Finally, respondents were asked how the reliability of the water service, as well as the quality of the water they receive, had changed during the previous five years. Only 4% felt that

⁶ In 1997 a study supported by UNICEF, UNDP, WHO and the World Bank estimated that, among all illnesses suffered by the country's women and children, 13% are caused by polluted drinking water. See Berdnyk *et al.* (1997).

Table 1. Residents' rating of piped water quality.

Perception of water quality (color, taste, odor)		Perception of risk to human health from drinking untreated tap water	
Rating	% reporting	Rating	% reporting
Very good	0.3	Very safe/no risk	0.6
Good	4.7	Safe/little risk	4.4
Fair	31.3	Fairly safe	21.5
Bad	26.5	Unsafe/serious risk	25.4
Very bad	3.7	Dangerous/great risk	43.5
Don't know	3.4	Don't know	4.5

their service had improved; 61% said that their service level had declined and 31% said it had stayed the same (4% were unsure of their response).

Approximately one-third of respondents reported buying bottled water regularly; among these households, respondents purchased an average of four 1.5-liter bottles per week. The mean per bottle price that respondents reported paying was US\$0.40, suggesting that the typical household buying bottled water devoted roughly US\$6.40 each month toward their purchases (in 2001 dollars). Another 5% of respondents said that they purchase “ecologically pure” water at private kiosks throughout the city. Entrepreneurs in this emerging industry use water from the city’s piped network and “purify” it using different water treatment processes. The price for ecologically pure water has fallen since our field work; customers currently pay an average of US\$0.15 per liter, not including the container (gas or flavoring can be added for an extra fee).

Although most Odessa households expressed discontent about their water supply situation, they were generally unwilling and/or unable to pay significantly more than their current tariff levels for improvements in their service. In particular, we asked study participants about their willingness to pay for an improvement in Odessa’s existing piped water service to the level of most modern water supply systems (including the delivery of high-quality tap water that requires no treatment before drinking; 24-hour service for 365 days per year; few or no system breakdowns; and the use of water meters to charge each household only for the water it uses).⁷ Although most respondents were willing to pay moderate increases in their water bills for such high-quality service, the majority (59%) said they would not pay average household monthly bills in the amount of US\$9 or more (in 1996 dollars)—values for which cost recovery for Odessa’s residential water supply begins to be possible (Figure 2). Among those who said they preferred their current service and billing levels to the improved service at higher prices, 90% said the primary reason was that the proposed improved service was too expensive for their households. Another explanation for households’ low effective demand for improved water supply services may be Odessa residents’ very high rates of time preference (Poulos & Whittington, 2000). Infrastructure projects such as water supply networks take time to come to fruition and were thus of limited appeal to households frustrated with the lack of economic progress in their city.

⁷ More detailed information about the willingness-to-pay scenario employed is provided in the Appendix.

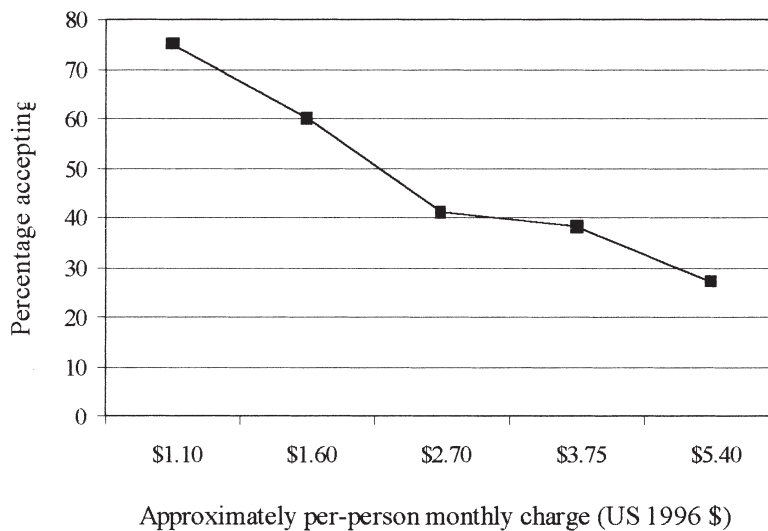


Fig. 2. Willingness to pay for cold water service improvements (Household survey results, $n = 767$).

4. The policy dilemma

The current economic crisis in Ukraine and other countries of the region places a significant financial constraint on the municipal water sector. In Odessa, the water utility estimates that it currently covers approximately 80% of its operating costs of providing (poor quality) service to residential customers, although independent assessments are substantially less optimistic.⁸ Households would have to pay bills three to eight times their current amount in order to meet the full cost of residential water service with user fees. Tariff increases are also occurring in other public sector services; for example, an 18% increase in natural gas and electricity tariffs was announced in June 1998 (following a 16% increase in May 1997). As service prices rise, however, most Ukrainians have less real income to pay them. At the time of our study, citizens employed by the country's "budget organizations," or provincial and national government bureaus, had not received their salaries for five months. The pensions of Ukraine's large retired population have not been adequately adjusted for inflation and instead have been set at a level roughly equivalent to the official poverty line. In the ten years following independence, average real wages in Ukraine fell by 60%, while unemployment increased almost three-fold to 12% (UNDP, 1996.). In short, households are unable to pay for the level of municipal services they currently receive, much less to finance the rehabilitation of Odessa's deteriorating infrastructure. Even if a "merit good" case could be made for government subsidies for the residential water sector, Ukraine's government has no funds available to provide them. In 1998 the gap between existing tariffs and the cost of communal services provision in Ukraine was estimated to be US\$780 million, whereas only

⁸ Personal correspondence with staff of donor agencies and local NGOs in Odessa suggests that user fees cover no more than 60% of the total costs of communal services, primarily because cost calculations used by Ukrainian communal service providers exclude depreciation and other components. Nevertheless, cost recovery has increased dramatically from the approximately 4% documented in 1994 (Vaughan, 1995).

US\$380 million of central government funds was budgeted to cover the shortfall. Given Odessa households' current income levels and relatively low effective demand for high-quality water service, it would appear that Odessa's water supply infrastructure is overbuilt in the sense that the capital stock exceeds the ability of the economic base to maintain it.⁹ If so, economic theory suggests that the existing water supply infrastructure should be allowed to deteriorate until it adjusts to a lower, socially optimal level. In practical terms, what does this "solution" imply for water sector reform in Odessa?

5. The limitations of traditional policy alternatives

The circumstances facing W&S planners in Odessa, as well as many other cities in the region, are thus quite different from those in which the standard policy advice for sector reform in developing countries was originally developed. The principal challenge is not, as is typically documented in less developed countries, to increase access to W&S services, nor to facilitate collective action that enables service improvements better to reflect consumers' effective demand. In Odessa, residents simply want to be provided with the same, relatively high-quality water and sanitation services they enjoyed for the past several decades. Re-establishing this level of service, however, requires that the city's aging water intake works be replaced and the distribution network repaired or replaced as necessary. Maintaining this infrastructure would require consumers to be metered at the household level and billed based on volumetric pricing, thus imposing on them the cost of their water consumption decisions. Water tariffs must be designed that balance economic, financial and social objectives. However, given the economic conditions in Ukraine, new investments are financially unfeasible. The magnitude of price increases needed to finance rehabilitation of Odessa's W&S infrastructure through user fees is currently unaffordable by most citizens.

Nor can the private sector be expected to play a significant role in water sector reform. Whereas private sector participation in the W&S sector is increasingly advocated by donor agencies as a means of "kick-starting reform" in developing countries, the transition economies have elicited relatively little interest from private firms. Of the roughly US\$500 billion of private investment in infrastructure projects during the period 1990–1998, only about 10% was spent in central and eastern Europe, a proportion lower than any region excepting sub-Saharan Africa (World Bank, 2001). Only 2% of this investment was allocated to the water and sanitation sector. As one market analyst notes regarding the dearth of private sector involvement in Ukraine's W&S sector, "the low profitability of Vodokanal may be one of the reasons why no private company has tried to engage in the sector" (Babus, 2001). Ukraine is also seen as a particularly risky country for investors: its parliament has blocked numerous attempts to privatize state enterprises; it is ranked 106th of 114 countries on the Fraser Institute "economic freedom index" (Gwartney and Lawson, 1997); and it is ranked 106th out of 133 countries on the Transparency International corruption index (2003).

⁹ See Tynan (2002) for an example of the consequences that ensued from overbuilt municipal water infrastructure systems in 19th century London. See Kahn (1970) for a discussion of the generic economic problems associated with an overbuilt capital stock in a public utility.

Given the extent of deterioration in the water and sewer networks of the region, it is also unlikely that “strategic disinvestment” approaches focusing on incremental improvements to some part(s) of the capital stock (while allowing others to deteriorate) will result in perceptible service improvement to many households. At the time of our research in Odessa, foreign engineering consultants put forward several such proposals, including:

- *Rebuilding the water intake works on the Dneister River* would improve the quality of water put into the distribution system. Given the poor condition of much of the distribution network, however, it seems likely that such improvements in water quality would be offset by contamination during transmission. Households would still face a marginal cost of water of zero and would thus continue to use water wastefully; this strategy would thus have little effect on service reliability or water pressure fluctuations.
- *Rehabilitating the distribution system* would reduce water loss and contamination of water during transmission. Supply pressure and service reliability might improve somewhat, although the quality of water introduced into the system at the intake works would continue to be poor. Again, households would face no incentive to use water efficiently.
- *Metering individual households and introducing volumetric pricing* would induce households to practice water conservation and to maintain indoor plumbing. Water use would decrease and service reliability would be likely to improve, although the quality of piped water would not change. Metering households in a city such as Odessa, however, is a costly and technically challenging undertaking. As noted above, each household in Odessa receives water through multiple external pipes. Metering a household would require multiple meters (usually three to four), along with the additional personnel needed to maintain and read them, or extensive retrofitting of the housing stock to enable a modern, single-meter approach. Moreover, given the poor quality of much of the city’s housing stock, it is likely that an investment in universal metering would need to be duplicated after a short period.¹⁰
- *Installing water meters in the stairwells* of Odessa’s apartment blocks, thus metering groups of households, is an alternative to household-level metering. Under this approach, the city’s apartment-dwelling population could be metered with a much smaller investment (7,000–10,000 versus the more than 800,000 meters required for a household-level metering program). It is unclear, however, what impact block metering would have on household water consumption. In some buildings, a single stairwell meter would serve more than 150 households. Decisions about water consumption in any one household would have a negligible effect on that household’s share of the monthly water bill. Block metering also requires that one or more individuals take responsibility for dividing the monthly water bill among users and for collecting their payments.¹¹ Odessa Vodokanal would also meet with difficulty in enforcing penalties for non-payment, given that one client account would represent dozens of households. Finally, block metering would not improve Odessa’s piped water quality.

¹⁰ Among the residential buildings constructed in Odessa before 1976, more than half are officially classified as “ramshackle” or in a “state of emergency” (Mascarell, 2000).

¹¹ Cooperative housing societies, such as condominium associations, that manage collective billing in other countries, are still very rare in Ukraine (Mascarell, 2000).

6. Practical alternatives

Given the binding funding constraint for Odessa's water infrastructure in the near term, planners will have to come to terms with a substantially more modest set of objectives for water supply services to city residents. In particular, effective solutions will be likely to require a reduction in scale from the kinds of city-wide initiatives that have been proposed. A minimal volume of safe water should be made available at a reasonable price to all households, while those residents willing and able to pay for improved water service should have the opportunity to obtain it. Attempts to respond to the demands of this latter group of households is particularly difficult in Ukraine, both because of the country's uncertain economic environment and as a result of its housing policies under the Soviet regime. Unlike households in most industrialized-country communities, households in Odessa are not "sorted" into neighborhoods with particular socio-economic characteristics (De Shazo, 1996). Rich and poor households are scattered throughout the city, a result of the socialist *propiska* system of virtually random housing assignments.

Policies that could support households willing to pay for higher levels water supply service include:

- *Metering new construction* outside the city center and providing a high quality reliable service at full cost to these households would help arrest the problems of unmetered connections that plague the rest of Odessa and would initiate a transformation of the city's water supply network. This strategy assumes that it is primarily Odessa's wealthy households that will relocate to the suburbs and that these households are willing and able to pay for high quality service. To ensure that poorer households in the suburbs also have access to high quality service, the utility could permit shared metered connections and/or could construct a limited system of free public taps.¹²
- *Supporting the bottled water industry in Odessa* will ensure that at least one source of high quality water is available to residents as OVK struggles to improve its service. A market for small quantities of high quality water clearly exists in Odessa. One of the few changes in Odessa since our field work is the tremendous growth in the "ecologically pure" industry: the number of water vendors has grown from fewer than a dozen to more than 200. This recent emergence of a vibrant water vending industry makes Odessa look much more like many other cities in developing countries with comparable per capita GDPs.¹³ Most of these vendors draw water from the OVK network, subject it to additional treatment (e.g. reverse osmosis or activated carbon filtering) and resell it to consumers. No standards for water quality currently exist for these vendors; a local NGO, MAMA-86, has recently begun publishing the results of water quality tests for many of the sellers. Government and donor agencies can foster the bottled water industry with a range of policies that support the dissemination of information to consumers, provide technical assistance and financing and facilitate legal reforms in the area of private enterprise.
- *Allowing creative solutions and collective action* at the neighborhood or district level will encourage households with relatively high demand for improved water supply to organize and

¹² In fact, a 1995 Ukrainian Cabinet of Ministers Resolution mandated household-level metering for all new construction in the country.

¹³ For example, see Whittington *et al.* (1991), for a description of the water vending industry in Onitsha, Nigeria.

seek solutions to their water supply problems. To the extent that it is feasible, OVK should work to provide higher quality service (through the installation of a booster pump or filter, for example) to those households willing to pay for the costs of these improvements. Creative engineering solutions would be required to deliver improvements to particular neighborhoods; this strategy would also require significant institutional reform in OVK, which to date has not even operated a consumer affairs division to handle customer complaints. Donors, perhaps in collaboration with local NGOs, could play an important role in organizing a “demand-responsive” program, including the dissemination of information to neighborhoods about the types of service improvements that are technically possible and the process by which households could obtain them.

Together, these strategies could allow more households to obtain a higher quality water service than would be possible with a poorly conceived city-wide initiative. Odessa’s growing suburbs can be supplied with high quality service at full cost, while some households in the center city can organize service improvements that they are willing to finance. Equally important, these strategies work well under different macroeconomic conditions. To date, Ukraine has experienced one of the most disappointing transition periods among the post-Soviet countries (Åslund, 1999). If the country is able to restructure its economy successfully, suburbanization and gentrification will both be likely to occur at a rapid pace. As Odessa’s housing stock is modernized, its piped water network will be transformed with system rehabilitation and expansion and also with household-level metering. This process, however, will be likely to span decades under the most favorable economic scenarios, while the results of our survey indicate that some households are willing to pay for improvements in their water service in the short term. Rather than investing resources to meter housing stock with a limited economic life, households with relatively high demand can be supported in making some immediate improvements in their water supply situation while awaiting more permanent solutions.

Of course, the focus of these strategies is providing improved service to households able to pay for it (generally wealthier families). Odessa Vodokanal, the government, donors and the public are all justifiably concerned about ensuring a minimum level of water supply service for all households in the city.¹⁴ Current policy in Ukraine requires that a minimum of 80% of the costs of providing public services such as water supply and sanitation be met through user fees. To protect low-income households, Ukrainian policy also stipulates that a family shall pay not more than 15% of its monthly income toward all public-service bills combined (Government of Ukraine, 1995). The state government is required to pay the difference between the 15% ceiling and the amount of the household’s bills directly to the public service providers.¹⁵ In the year 2000, approximately 2.8 million, or 17%, of households were granted communal services subsidies under this Housing Subsidy Program. The typical household received a monthly subsidy of US\$8, yielding a total of US\$272 million in payments under this program (in 2000 dollars) (PADCO, 2001).

¹⁴ More than three quarters of respondents in our survey said they were in favor of subsidized water supply services for low-income households.

¹⁵ See Komives *et al.* (2003) for a discussion of the relationship between household income and coverage of multiple infrastructure services (e.g. piped water, sewerage, electricity, telephone) in developing countries.

It is unclear how effectively the Housing Subsidy Program targets Odessa's poor. One national-level study found that a typical household's expenditures on building maintenance (ZhEKs fees), hot and cold water supply, heating, sewerage and solid waste collection, amounts to slightly below the median household income (PADCO, 2001). World Bank (2002) data suggest that a third of Ukrainians are living below the poverty line (US\$22/month); estimated poverty rates for certain groups (e.g. families with three or more children) exceed 50% (ILO, 1998). Moreover, despite revisions to the country's subsidy policies, a substantial proportion of those entitled to public services support are not low-income households, but those with "special circumstances". In our survey, approximately 60% of households received discounts on their ZhEKs bill for reasons unrelated to the occupants' ability to pay their communal services bills, such as past service in the military or police force, or "suffering due to the Chernobyl catastrophe".¹⁶

Households that are unwilling or unable to pay for an improved water supply service will, of course, continue to receive their existing level of cold water service; although less than desirable (and deteriorating), this level of service is still superior to that of other developing country communities with comparable income levels. By repairing Odessa's existing system of public taps, OVK could also ensure that all households have access to at least a minimal quantity of water, even if service levels in the inner city continue to decline. Support for the bottled industry may also benefit low-income households. Promoting competition such that prices are forced down will help ensure that poor households have access to minimal quantities of potable water. (The influx of new entrants to the water vending market is likely to be one explanation for the more than 35% reduction in the price of "ecologically pure" water since 1996.) Indeed, during several focus groups we held throughout the city, a surprisingly high proportion of poor residents said they would be willing to pay for a bottled water delivery service. They felt it would be a more affordable means of obtaining potable water compared to their current practice of boiling the water from their taps.

4. Summary and conclusions

Given the unique challenges facing many central and eastern European countries, it is not surprising that the standard policy advice for water sector reform in developing countries has made slow progress. The current public sector cost recovery constraint in Odessa, coupled with most households' low willingness to pay for improved water services, precludes a comprehensive modernization of the city's water supply system at this time. Until macroeconomic conditions are substantially improved, such investments will not appear attractive to international capital. Decision makers faced with these conditions often elect for limited capital improvements to isolated parts of the water system; this approach, however, will result in very little perceptible service improvements for Odessa households. Smaller scale initiatives can help meet different levels of demand among households; support of the bottled water industry and rehabilitation of the city's public taps can serve as a "safety net" should water supply service levels in the city

¹⁶ The number of households eligible for public-service subsidies was reduced with the issuance of legislation in 2000. Certain categories of households were eliminated from the subsidy program, including former military personnel, families with more than four children and the blind. However, war veterans, "combatants" and victims of the Chernobyl disaster, among others, are still eligible to receive subsidies (Government of Ukraine, 2000). As far as we know, no assessment of the effectiveness of these mechanisms to target poor households has been undertaken in Odessa.

center continue to fall. This approach prevents additional unwarranted investment in a water system that is currently over-capitalized relative to local income levels and demand for service, and fares well under almost any eventuality of Ukraine's economic restructuring process.

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Appendix A: Sampling and data elicitation approach

In 1995 the World Bank began negotiations with Ukraine for a loan to improve water utility operations and cold water supply service in Odessa. As part of project feasibility and design, it was necessary to understand both the existing water supply situation, as well as households' attitudes towards and preferences for service improvements. During June-July 1996, a number of data collection exercises were carried out in Odessa in order to obtain such information and to inform the dialogue between the Bank, Odessa's water utility and government officials regarding the design of a water supply improvement project for the city.

Four different data collection techniques—a household survey, an intercept or “convenience” survey, a telephone survey and a series of focus group meetings—were used to consult 2,259 Odessa residents. It was not possible to draw a random sample of Odessa households for this study. Instead, a stratified sampling approach was used to form a sample that (1) included households from each of the city's administrative districts and (2) mirrored the city demographic profile used by the Department of Sociology, University of Odessa. Additional information about

the sampling and data elicitation strategies used in this study is available upon request from the authors.

Respondents in each of the data collection exercises were asked about their social, economic and environmental priorities, as well as the socio-economic and demographic characteristics of their households. Individuals were also asked about willingness to pay for an improvement in Odessa's existing piped water service to the level of most modern water supply systems. In particular, enumerators described a system which included the delivery of high-quality tap water that requires no treatment before drinking; 24-hour service, 365 days per year; few or no system breakdowns; and the use of water meters to charge each household only for the water it uses. Enumerators also explained that service would be disconnected for households that did not pay their water bills and that traditional discounts on water service prices would no longer be honored. Then each respondent was told:

- Such a system does not exist yet in Odessa. Today every person has to pay about \$1.00 per month for the cold water supply service we have, regardless of the amount of water he or she uses.
- However, suppose that in the future your family would be able to have the type of service I have just described. Then cold water would be available 24 hours a day, 365 days a year, with sufficient pressure. It would be safe to drink water directly from the tap without any treatment. In your apartment/house, a water meter would be installed. You would pay only for the water your family actually used.
- Suppose that your family could have this type of modern water service. Of course, this higher level of service would be more expensive than your current service. Because you would pay for the amount of water your household actually used, your water bill would vary each month. But, suppose that in an average month, the cost of cold water for each member of your family would be \$ _____. That means that your family, which has _____ members, would have to pay a total of about \$ _____ per month for cold water.¹⁷
- Which would you choose: to keep the cold water supply services you are using now and pay the same amount as you are paying now, or to pay approximately \$ _____ each month for your whole family for improved cold water service?
- Five different average per-person monthly charges—US\$1.10, US\$1.60, US\$2.70, US\$3.75 and US\$5.40—were used in the study (all 1996 US\$). Each respondent was quoted only one of the five amounts, which were randomly assigned in different questionnaire versions. The average per-person monthly charge was used because respondents were accustomed to thinking about water tariffs on a per-person basis; however, enumerators clearly explained that volumetric charges would be employed in determining each household's monthly bill.¹⁸

The results of this willingness-to-pay question from the 767 household survey respondents are shown in Figure 2; they suggest that only a minority (41%) of respondents were willing and able to pay an average household monthly bill of US\$9 or more for the improved service described by enumerators.¹⁹ Although

¹⁷ Enumerators calculated this estimated monthly bill amount for each respondent, based on the average per-person charge and the number of persons in the respondent's home.

¹⁸ See Whittington (2002) for more discussion of the difficulties involved in using the contingent valuation method to elicit information on households' willingness to pay for improved water supplies.