Making Subsidies Work Harder

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1999 Water Supply & Sanitation Forum
April 8 – 9, 1999
Water & Sanitation Division
The World Bank

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Introductory Notes

Subsidies pervade the water and sanitation sector. The unsustainability of life without water and high mortality rates in the face of poor sanitation provide good political ammunition for subsidy-seekers. Even hard-headed economists would, in some cases, argue for sanitation financing mechanisms that look like subsidies. Despite their appeal, we now have evidence that some types of subsidy correlate highly with unsustainable investments—investments that fail to perform properly when new and reach the end of their economic lives much more quickly than anticipated.

Some subsidies work. One could argue that the U.S. Federal and state capital grants for municipal wastewater treatment plant construction in the 1970s deserve such credit. Those programs led to rapid, nationwide installation of treatment plants (plants, to be sure, that were often overdesigned in response to the subsidies). The rules required O&M cost recovery through tariffs. Those plants are reaching the end of their economic lives and major new investments are being made to rehabilitate or upgrade them. In most cases, those new investments are being paid for by local citizens without the benefit of further subsidies. Cost control is better than the original programs (driven in part by W&S price increases due to higher mandated standards), but there is broad public acceptance of the need to continue treatment. By financing a simultaneous, nationwide building program, the initial subsidy overcame the "I'm not going to do it for you if you don't do it for me" syndrome so common when facing environmental externalities.

But the failures far outweigh the successes. Sanitation subsidy failures abound. In the 1970s, Spanish municipalities operated only 17 percent of their wastewater treatment plants. Operations were financed by municipal budget subsidies and shutting them down saved the municipality money and hurt only downstream communities. The same reasoning led to a similar failure rate for Chinese wastewater plants in the early 1990s.

Subsidies designed to help the poor may hurt service for everyone. An excellent analysis of such failure has been written about water supply in Guayaquil, where residential tariffs were held so low that it cost more to collect them (even with efficient collection) than they could yield. Every new connection, even if fully grant financed, represented a net revenue drain on the utility. The system sought to finance itself through industrial cross-subsidies, but the resulting tariffs were so high that most users could more cheaply self-supply water.

Bank task teams frequently work with utilities enmeshed in subsidies. To simply walk in and demand that they be ended does neither ourselves nor the client a service. Yet we do less of a service if we permit subsidized Bank funds to further contribute to an existing problem. Participants in this session will examine a range of project examples, identifying subsidies and assessing their likely importance to project service and sustainability goals.

To facilitate project review, the following are some of the subsidies that may be encountered:

- Cross-subsidies among user groups within a utility.
- Budgetary subsidies for capital costs.
- Budgetary subsidies for operating costs.
- Concessional term financing in the domestic capital market
- Grant aid (domestic or foreign)
- Multilateral bank or bilateral credits and loans.
- Intergenerational
- Geographical
- Inefficient operation

Many water and sanitation projects enjoy a combination of the above subsidies. We find little written about the conditions under which a given subsidy will be sustainable. This session seeks to foster broader discussion of the issue within the Bank, as a prelude to seeking consensus on which subsidies should be encouraged, tolerated, or fought.

Lee Travers
Session Leader

Lee Travers received a PhD in Agricultural and Resource Economics from U.C. Berkeley. He spent the next decade primarily with the Ford Foundation, including stints in their Egypt and Beijing offices. After eight years doing operational work in the Bank's China department, a year ago he joined the Water and Sanitation Division as Principal Water and Sanitation Economist.

A report to the MacArthur Foundation

PERVERSE SUBSIDIES

Their Nature, Scale and Impacts

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October 1997

Table ES.1

SUBSIDIES: OVERALL TOTALS
(billion $ per year)

Sector	Conventional Subsidies*	Environmental Externalities documented/quantified	Total Subsidies (range)**	Perverse Subsidies (range)**
Agriculture	325	250	575	460 (390-520)
Fossil Fuels/Nuclear Energy	145	***	145	110
Road Transportation	558	359	917 (798-1041)	639
Water	58	175	233	219
Fisheries	22	--	22	22
Forestry	3	3	6	6
Totals	1,111	787	1,898	1,456

* Subsidies of established and readily recognized sorts, including both direct financial transfers and indirect supports such as tax credits.

** Ranges: some of these estimates are supported by ranges: for details, see text. In some instances, ranges are not inserted because there is simply too little agreement even about ranges!

***Regrettably it has not been possible to come up with even a reasonably agreed estimate for these values: the data are too patchy and disparate. While there is a degree of agreement about what median figures might be, there is next to no agreement about how broad the range should be

Appendix I.1

SUBSIDIES: THEIR TECHNICALITIES

Subsidies are not new. Their benefits were recognized by the Ancient Egyptians, Romans and Greeks. Since those distant times, subsidies have multiplied until they appear in multitudinous forms today. They include direct payments, low-interest loans, tax concessions and reliefs, supported services, tax-funded laboratories, R and D grants to industry, and training programs. There can be more generalized types of subsidy too: assumption of liability by government (e.g. loan guarantees and site clean-ups such as the U.S. Superfund), provision of a good or service at less than market price or full economic cost, and financial support to maintain a product price above full cost. In addition to these direct subsidies, government interventions can include price controls, import tariffs and quotas, and infrastructure financing, among many other modes of supporting individual sectors.

Some of these interventions, notably direct subsidies, tax exemptions and infrastructure financing, can be viewed as conventional subsidies whereby governments provide direct financial support for a given activity. Others, such as price controls, are effectively "cross- subsidies", whereby the customer is paying either more or less than the uncontrolled market price for a good, so that the transfer is between consumers and producers (for example, electricity market regulation). Then there are covert or implicit subsidies, which can include the failure of governments to internalize environmental costs, e.g. pollution costs, in those prices faced by suppliers and users of energy (Michaelis, 1995; see also Steenblik, 1995).

A formal and textbook definition (Putnam and Bartlett, 1993) states that "A subsidy is a transfer of economic resources by the government to the buyer or seller of a good or service that has the effect of reducing the price paid, increasing the price received, or reducing the cost of production of the good and service". This definition should include not only cash transfers but opportunity costs.

According to the same subsidies experts (Putnam and Bartlett (1993), a thorough taxonomy of subsidies would include:

"1. Policies that transfer resources through market prices, e.g. price regulations, government procurement policies, import tariffs and non-tariff trade barriers.

2. Direct transfers, e.g. direct grants or payments to consumers or producers, or the provision of inputs at below-market prices.

3. Tax policies, e.g. tax credits, exemptions, deferrals, exclusions and deductions, investment expensing, accelerated depreciation, and other preferential tax treatment.

4. Policies that reduce input costs, e.g. preferential loans, loan or liability guarantees, indirect expenditures such as research and development.

WATER

The water sector features abundant subsidies, making it crucial for this report. The subsidies are diverse, scattered and often concealed, hence they are difficult to track down. Because they are so large, however, a review is essential, even if its findings are approximate and exploratory in some respects.

Water Demand and Supply

Humans withdraw water from rivers, lakes and other freshwater bodies for three main uses: household/municipal, industrial and agricultural (irrigation). Worldwide, household/municipal takes 10 percent, industry 25 percent, and agriculture 65 percent (Table VI.1) (Pimentel et al., 1997; Postel et al., 1996; Serageldin, 1994; World Bank, 1992). In developed countries, agriculture accounts for less than 40 percent of total use, whereas in many developing countries it is over 90 percent. Most of the funds spent on the water sector each year go to financing irrigation schemes, as is appropriate given that irrigated croplands make up only 17 percent of all croplands but supply 38 percent of our food (Jones, 1995; Pimentel et al., 1997; for further general reviews of the water sector, see Engelman and LeRoy, 1993 and 1995b; Falkenmark, 1994; Gleick, 1993 and 1996; Postel, 1996 and 1997).

Of all agricultural water used, the developing world's share is almost 80 percent. In developed countries, by contrast, industrial use of water tends to be higher than agricultural use (World Bank, 1993). In the United States, the single biggest user is the thermo-electric power industry (fossil fuel and nuclear plants), which requires huge quantities of water for cooling purposes, albeit much being returned to source in semi-satisfactory state. Other big industrial users are pulp and paper, iron and steel, chemicals, and petroleum. Yet industry is not always obliged to treat its waste water--a factor which serves as a salient example of the many major uncounted subsidies in the water sector. The same applies to waste water from domestic households. Both these sets of covert subsidies arise in developed and developing countries alike (Roodman, 1996).

How much water does a person use each day? Counting all three main purposes, the average worldwide is 1800 liters. An American gets through 400 liters for personal and direct purposes, and 5100 liters when we reckon in all forms of use (Postel, 1996). The latter figure primarily reflects an American's consumption of grain in both direct and indirect fashion, an average tonne of grain requiring 1000 tonnes of water and 1 tonne of beef requiring 100 times as much (Pimentel and Pimentel, 1996). One tonne of water is equivalent to one cubic meter or 1000 liters. Were the worldwide average daily water use to amount to 2740 liters per day, that would work out to 1000 cubic meters per year. So a global average of 1800 liters per day equates to just over 650 cubic meters per year (Postel, 1996 and 1997).

We can reckon this another way. A nutritious and low-meat diet requires about 1600 cubic meters of water per person per year or 4400 liters per day. Worldwide water use for household and industrial purposes averages about 240 cubic meters per person per year, or 660 liters per day. By reducing this level through more careful consumption and more efficient

Table VI.1

MAIN USES OF WATER WORLDWIDE

Households/municipal	10%
Industry	25%
Agriculture	65 %
in many developing nations	90%

During the next 30 years we need to pruduce an extra 60-100% more food,
half of it from irrigation
To produce 1 kg. of corn takes 1000 kgs. of water;
to produce 1 kg. of beef takes 100 times as much.

Sources: Gleick, 1996; Pimentel and Pimentel, 1996; Postel, 1997.

technologies, we can assume an average of 200 cubic meters per person per year or 550 liters per day. When we add in water for food production, the total rises to 730 cubic meters per person per year or 2000 liters per day. A portion of water runoff must remain in rivers, however, in order to dilute pollution and meet other "instream" needs. Thus the total amount of runoff must be two to three times higher than the amount required to meet the three main purposes. So let us postulate an average total requirement of 1700 cubic meters per person per year or 4660 liters per day (Postel, 1996 and 1997).

When water use falls below 1700 cubic meters per person per year, a country encounters "water stress" through a lack of adequate supplies. When water use falls below 1000 cubic meters, there is "water scarcity", meaning a significant and often a severe restriction on material welfare at individual level and on development prospects at national level (Falkenmark. 1994; see also Gleick, 1996 and 1997; Postel, 1996).

True, some countries manage with a good deal less than the cut- off level of 1000 cubic meters. Israel, for example, gets by with a renewable per-capita water supply of only around 400 cubic meters (Engelman and LeRoy, 1995b; see also Gleick, 1997). In part, the country manages to do this by importing much of its grain, which has been referred to (Allan, 1995) as "virtual water" since one tonne of grain requires 1000 tonnes of water (see above). The Middle East as a whole, which is the most concentrated region of water scarcity in the world, is fortunate in that its oil exports allow it to import 30 percent of its grain (Postel, 1997).

Whatever the limitations on water supplies today and still greater shortages in the future through population growth alone, they could become even more stringent because of global warming. If mean annual temperatures rise, as is expected through a "business as usual" scenario, by as much as 3-4 degrees C., rainfall in the U.S. cornbelt could well decline by 10 percent (Downing and Parry, 1994). This will be accompanied by increased evaporation, meaning still greater loss of moisture. Worldwide, global warming could step up irrigation needs by one quarter simply to maintain the production level of the early 1990s, without allowing for increased human numbers and improved diets (Postel. 1992). In addition, there could be many more droughts: those that have only a five percent frequency today could increase to 50 percent by 2050 (Rind et al., 1990).

Yet we need to produce 50-60 percent more food during the next 30 years simply to keep up with the projected rise in human numbers and the rise in human appetites. Since at least half of this increase is scheduled to come from irrigated croplands, this places a premium on more efficient and careful use of water. It is, after all, a renewable resource, available for repeated recyclings and thus contrasting strongly with other natural resources such as topsoil and fossil fuels. Almost everywhere, however--from California and Britain to Mexico and India--water is mis-used and over-used, in major measure because of subsidies that discourage people from making efficient and careful use of water. Fortunately, and through vigorous policy reform of subsidies among other measures, developing countries--these being where water shortages are likely to become most pronounced--could eliminate almost two thirds of their present water losses due to inefficient and profligate use of water. This would be equivalent to increasing their actual water supplies by a full one quarter (Serageldin, 1995; see also de Moor, 1997).

Water Waste and Subsidies

There can hardly be a country in the world that is more dependent on a natural resource than Egypt is on water. At the time of the 1994 Cairo Conference on Population and Development, the conference grounds were regularly watered at midday when the temperature was over 30 degrees C. So too in California's Central Valley where it is often the practice for highly inefficient water sprinklers to irrigate croplands at midday when the temperature is not much lower than in Cairo. The reason in both cases is that government subsidies encourage wasteful use of water, and eliminate any incentive to use it sparingly, let alone repeatedly. These subsidies typically range from 75 to 99 percent of full costs; in the irrigation sphere, governments collect an average of under 10 percent of irrigation services via user fees (Tables VI.2 and VI.3) (Gleick, 1996; Postel, 1996; Serageldin, 1994). Almost as bad, wasteful use of water means that money is spent on lobbying and other forms of persuasion to secure further supplies of cheap water, causing subsidies to create a second-order source of waste (Repetto, 1986).

A potent political reason for subsidizing irrigation water in developing countries is that agriculture often employs over half the workforce (Gupta et al., 1995; Sampath, 1992). This often helps to justify government measures to build yet another irrigation project or a further hydro works. To oblige its farmers, China plans to divert five percent of the Yangtze River's flow to its dry northern provinces, while Mexico proposes to pump water as much as 1000 meters up into its Central Valley.

In short, subsidies give rise to a host of problems: chronic excess demand for water, especially through grandscale water projects; poor operation and maintenance of water systems; inattention to scope for water conservation; and many other problems. The upshot (to cite Repetto, 1986) is "inefficient, inequitable, fiscally disastrous, wasteful use of increasingly scarce water, and environmentally harmful. [Because of subsidies,] neither farmers, local governments, irrigation agencies, nor international banks are financially at risk for the success of irrigation investments, so pressures for new capacity lead to a proliferation of projects, many of them being of dubious worth."

All this is the more unfortunate in that water is becoming scarce in many parts of the world. Humans already use 54 percent of available water runoff, and new dams will increase this runoff by only about 10 percent over the next 30 years—a period during which population is projected to increase by 40 percent (Postel et al., 1996). Global water use has tripled during the four decades 1950-1990, and demand is expected to double again during the two decades 1991-2010 (Table VI.4). In 88 developing countries with 40 percent of the world's population, the problem has become a serious constraint on development, and the number of people experiencing water shortages is projected to reach three billion by 2025 (range, 2.8 billion to 3.3 billion), or more than one person in three worldwide (Table VI.4) (Engelman and LeRoy, 1993 and 1995b; see also Gleick, 1996; Postel, 1997; Serageldin, 1995). It is unlikely that demand will be met if only because of practical upper limits of usable and renewable freshwater stocks. The principal areas at risk include (though are not confined to) parts of China, India, Pakistan, the Middle East, and much of Africa. This analysis takes no account of further shortages brought on by global warming.

Table VI.2

WATER PRICES AS SHARE OF MARGINAL COST OF SUPPLY

Israel	60%-+
China	25%
Algeria, Egypt	20%
United States	17%
Pakistan, Indonesia, South Korea	13%
Mexico	11%
Philippines	10%
Nepal	4%
Thailand	3%
Bangladesh	1%

Sources: Gleick, 1996; Postel, 1996; Serageldin, 1994.

Table VI.3

IRRIGATION SUBSIDIES IN DEVELOPING REGIONS, 1983-93
(million $)

	Total annual costs	Irrigation subsidies
Africa	6,281	5,909 (94%)
Latin America	3,598	3,386 (94%)
Asia	13,263	12,480 (94%)
Total	23,142	21,775 (94%)

Water subsidies often amount to 75-99% of full costs.

Governments collect an average of less than 10% of irrigation services via user fees.

Amount of irrigation water available to plants, generally 40%;
Through efficienct irrigation systems 60-90%.

Over the past 30 years Israel has achieved a five-fold increase in the value of crops grown with a given amount of water.

Sources: Gleick. 1996; Postel, 1997; World Bank, 1997.

Table VI.4

WATER TRENDS WORLDWIDE

During 1950-90, water use has tripled; 1991-2010, demand is expected to double.

Humans already use 54 % of available water runoff.

People experiencing water shortages today: 550 million
expected in 2025 3 billion

Principal areas at risk: most of Africa and the Middle East, also parts of Pakistan, India and China.

Source: Engelman and LeRoy, 1995b.

Adverse Consequences

Water shortages cause major problems for irrigation agriculture, industry and public health. A full 80 percent of developing-nation disease, or four billion cases, are due to lack of clean water for household use, and six million deaths per year stem from water-related diseases such as malaria, cholera, schistosomiasis, yellow fever and river blindness, and especially diarrohea (Pimentel et al., 1997; World Health Organization, 1992). There are one billion episodes of diarrohea annually in developing countries. Moreover, when a person experiences diarrhoea, malaria or other disease, some 5-20 percent of food intake is needed simply to offset the disease's impact on nutrition (Pimentel et al., 1997). These water-related diseases are estimated to levy a cost, just through workdays lost to sickness, of $125 billion a year (late 1970s value) (Pearce, 1993), by contrast with the cost of supplying both water and sanitation facilities, $50 billion a year (Christmas and Rooy, 1991). Thus the subsidized abuse of water exacts high costs from national economies in the health sector alone. This effectively amounts to a concealed subsidy of egregious scale, though because of its very indirect nature it is not considered further in this analysis.

There are many other instances of broad-scope externalities from water pollution. Industrially contaminated wastewater used for irrigation in northern China causes a loss of 5 million tonnes of grain a year (Gardner, 1996). Pollution of groundwater in Yingkou, China, has almost doubled the cost of new water supplies, while in Shenyang, also in China, similar pollution will cause the cost of new supplies to almost triple during the period 1988-2000 (Jones, 1995). Worldwide, pollution externalities of various sorts must collectively amount to tens of billions of dollars of covert subsidies per year, but they remain unquantified by economists and hence unconsidered by policy makers. To this sizeable extent, of course, the subsidy estimates in this chapter are to be viewed as all the more cautious and conservative.

Water subsidies also exert adverse effects on the environmental cause writ large. Foremost (and as noted above) is the wasteful use of a natural resource that is coming into ever-greater demand and ever-tighter supply. Other effects include, in terms of irrigation water alone, widespread agricultural pests (as well as a lengthy list of diseases); disruptions of river hydrology; water-caused soil erosion: siltation of water bodies; draining of wetlands; depletion of fish stocks; and building of unnecessary dams. All these adverse effects arise because governments find it politically easier to provide new water sources than to make users pay a price that reflects the true costs of supply, thus inducing consumers to treat water negligently if not prodigally (Repetto, 1986). In India alone, 100,000 square kilometers out of 420,000 square kilometers of irrigated croplands have been lost to cultivation through waterlogging, and 70,000 square kilometers are affected by salinization. In Pakistan, more than half the Indus Basin canal system, some 120,000 square kilometers of irrigated croplands, is waterlogged and 26 percent is salinized. Worldwide, 454,000 square kilometers out of 2.8 million square kilometers (20 percent) are salinized enough to reduce crop yields, with crop losses worth almost $11 billion per year (Ghassemi et al., 1995; see also Jones, 1995; World Bank, 1992). Waterlogging and salinization may now be taking as much old land out of irrigation as is added through new irrigation networks (Seckler, 1995; Serageldin, 1995).

There are other environmental problems from excessive irrigation. In some regions, so much water is withdrawn from rivers that they start to run dry. In Asia, which will see most population growth and greatest rise in food demand within the foreseeable future, many rivers are largely or completely tapped out during the drier part of the year, precisely when irrigation is most needed. They include most rivers in India, including the Ganges; also China's Yellow River, whose lower reaches have run dry for an average of 70 days a year in each of the last ten years, and for 122 days in 1995 (Postel, 1996).

At the same time, heavy irrigation leads to a decline in water tables. As far back as ten years ago, more than one fifth of the United States' 100,000 square kilometers of irrigated lands was being watered only by lowering water tables, especially that of the Ogallala Aquifer (Gleick et al., 1995). In parts of the north China plain around Beijing and Tienjin, the water table is currently dropping by one to two meters a year. This area, roughly China north of the Yangtze River, contains nearly half a billion people or almost 40 percent of the country's populace. It also encompasses half of China's croplands, yet it features only one-fifth of the country's surface water. This situation explains, even if it does not justify, the Chinese government's action in subsidizing water for agriculture (Postel, 1992; see also Gardner, 1996). In India, excessive water pumping means that water tables have fallen precipitously in many areas (in parts of Tamil Nadu State, by as much as 25-30 meters during just the 1970s), drying up the more shallow tubewells, while in certain coastal areas the over-use of freshwater has sucked in seawater, destroying freshwater aquifers permanently (Brown and Kane, 1994). In India's bread basket of the Punjab, water tables have recently been falling by 20 centimeters per year (Postel, 1996).

Falling water tables affect urban communities too. Water for Mexico City used to be supplied at a price that implied an annual subsidy of $1 billion. This encouraged excessive pumping, with the result that the water table has fallen by 80 metres, aquifers are being compacted, and many parts of the city have been sinking (in some localities, as much as eight meters, damaging the city's underground infrastructure of pipes, cables and sewers, and increasing potential earthquake damage) (Postel, 1992).

Perhaps the best known example of subsidy-driven degradation of a water resource has occurred in the former Soviet Union, in the form of the Aral Sea's decline. Much of the water basin centered on the Sea--once the world's fourth largest lake--was given over in the late 1950s to cotton growing with heavily subsidized irrigation water, requiring the diversion of two of the Sea's main feeder rivers. As a result, the lake's expanse declined by 50 percent and its water volume by three-quarters between 1960 and the early 1990s. The lake's fishery, once worth 44,000 tonnes a year, has all but disappeared, taking with it 60,000 jobs. Within another decade or two, the Aral is likely to dwindle to a few residual brine lakes, worsening water shortages in an extensive sector of Central Asia and contributing to political tensions (Aral Sea Program Unit, 1994; Elliot, 1991; Postel, 1996). To rehabilitate the area's salinized lands could cost at least $1 billion (Serageldin, 1996).

There are still further environmental problems from water subsidies, albeit of less precise and graphic impact. For instance, subsidies foster agriculture on marginal lands where cultivation requires excessive use of chemicals, hence contributing to degradation of rivers, contamination of aquifers, destruction of wetlands, and toxic pollution of fish and wildlife (Sinclair, 1987). Yet these environmental externalities, like the others listed above (rivers running dry, water tables plunging, etc.), remain almost entirely unquantified in economic terms and hence unnoticed in

policy terms--even though they effectively constitute perverse subsidies of exceptional size.

Another way to get a handle on what is at stake is to consider the putative value of major benefits derived from water, and then to reflect on what will be lost as water supplies decline in relation to fast-growing demand. According to a recent assessment (Costanza et al., 1997), water supplies from watersheds, aquifers and reservoirs generate benefits worth $1.7 trillion per year, and water for agricultural irrigation, industrial processes and waterway transportation is worth $1.1 trillion worldwide per year. Even if these benefits totalling $2.8 trillion were reduced through water waste, pollution etc., by only 1 percent per year, the annual loss would be $28 billion.

That the $2.8 trillion estimate is in the right ballpark is demonstrated by a further recent assessment. This shows that the dilution of pollutants, as measured by the cost of removing all contaminants and nutrients from wastewater by technological means, is worth $150 billion worldwide per year (this estimate applies to municipal water only, and does not consider the dilution function that removes pesticides, nitrates and other contaminants from agricultural drainage water). Then there is the value of transportation by freshwater, generating revenues in the United States of $360 billion per year and in Western Europe $169 billion per year, this being a lower- bound estimate that also does not consider the rest of the world. In addition there is the value of freshwater systems for sport fishing, worth $46 billion per year in the United States alone; the global value of fish, waterfowl and other goods takes from freshwater systems amounts to at least $100 billion per year, possibly several times as much. The marginal value of these benefits is increasing in many countries as more people spend time and money on outdoor pursuits, and as freshwater systems become more scarce. The economic value of the services listed amounts to $779 billion per year, while "The entire benefits and services provided by freshwater systems almost certainly amount to several trillion dollars annually" (Postel and Carpenter, 1997).

Finally, consider what could prove to be the biggest potential externality of all: water wars. This is not so improbable within the foreseeable future (Gleick, 1993; Serageldin, 1995), mainly because of water stocks that straddle international frontiers. Of 214 major river basins around the world, three-quarters are shared by two countries and one quarter by three to ten countries (Table VI.5). Almost half of Earth's land surface is located within international river basins, supporting 40 percent of the world's population; two-thirds of these basins are in developing countries with generally less water per citizen than do developed countries. Nearly 50 countries have more than three- quarters of their territory within such areas. Within countries too there is scope for conflict. In India's Punjab, there have been constant violent clashes as Sikh nationalists claim that too much of their water has been diverted to the Hindu states of Harayana and Rajasthan.

Tensions and violence have erupted too in the river basin of the Mekong, shared by Thailand, Laos, Cambodia and Vietnam; in that of the Amur, shared by China and the former Soviet Union; in that of the Parana, shared by Brazil and Argentina; in that of the Lauca, shared by Bolivia and Chile; and in that of the Mejerdah, shared by Tunisia and Libya (Myers, 1987). Were confrontation over water shortages to give way to conflict and outright violence, this would likely be the biggest and most costly single externality of all, yet it does not figure in the economic calculations of policy makers in the water sector.

Table VI.5

DEPENDENCE ON INTERNATIONAL WATER SUPPLY

Country	Share of Total Water Flow Originating in an Upstream Country/Countries (%)
Egypt	97
Botswana	94
Uzbekistan	91
Cambodia	82
Syria	79
Sudan	77
Iraq	66
Bangladesh	42
Thailand	39
Jordan	36

Sources: Gleick, 1993; Postel, 1997.

Why this dismal state of affairs from both economic and environmental standpoints? Much of the essential reason is that nations and people alike tend to regard water as a free good, which places an ostensible burden on governments to supply it without charge. (The free-good approach is explicitly enshrined in the Koran, which may account for grossly wasteful use of water in Muslim lands of the Middle East--though in the largest Muslim country, Indonesia, the government gets round the problem by charging for the container that brings the water.) The overall result is that water is generally used inefficiently because it appears to cost next to nothing if not nothing at all. What is priceless is then taken to be value-less. As a further result, governments squander large amounts of taxpayers' money building new water-supply systems (Cairncross, 1995).

A subsidiary reason is that all governments recognize a basic responsibility to make sure their citizens are fed, preferably with home-grown food. A full one third of our food is produced on irrigated lands, even though they comprise only one sixth of all croplands. But if agriculture were to compete openly with industry and domestic needs for water, it would often be out-priced. So governments support agricultural water with one subsidy after another, certain of them of indirect character, difficult to discern. In particular, governments sponsor water-demanding crops. In California's Central Valley with its desert-like climate, three of the main crops are alfalfa, cotton and rice, crops more suitable to a much moister climate. In an increasing number of semi-arid countries, the main use of water is to grow crops that are worth less than the water itself. In Cyprus, for example, three-quarters of crops grown are uneconomic, produced only because of water subsidies (World Bank, 1993). In Jordan, one of the driest countries anywhere, subsidies encourage over-use of irrigation water, whereupon strict rationing is required to allocate the resulting scarcities (Rosegrant, 1995). A further subsidy lies with the electricity used to drive irrigation pumps, a virtually universal practice in developing countries.

In most thirsty regions, water management can account for as much as 14-18 percent of all public investment. This should supply a massive incentive to ensure farmers make best use of every last drop of water. But whether in California, Mexico and Indonesia, or along the banks of the Nile, the Ganges and the Yangtze, farmers rarely pay more than one fifth and sometimes only one tenth of the operating costs of irrigation schemes, let alone their capital costs (Gleick, 1993; Postel, 1996). Much the same applies in Australia, Canada, and Germany, though most other developed countries cover their government outlays with consumer charges (capital costs are often subsidized to an average of 20-40 percent) (Herrington, 1987; Repetto, 1987; U.S. Department of Agriculture, 1994). In Australia, the government of Victoria State recovers only two-fifths of the delivery costs of irrigation water, and the government of New South Wales manages even less. Because of massive over-use of water, irrigated lands in New South Wales' Murray Darling Basin--specially important because they produce 90 percent of the country's irrigated food with just 6 percent of the country's water runoff--feature broadscale salinization, water pollution, rising water tables and soil erosion (Armstrong, 1996; Mussard, 1995).

Inefficiency and Waste

Let us take a closer look at the degree of subsidy-induced inefficiency and waste in many developing nations. In China, water prices are believed to be only 25 percent of the marginal cost of supply, while the cost of infrastructure (dams, piping, etc.) is left out of account altogether. In Algeria and Egypt, supply-cost recovery is 20 percent or less, in Pakistan, Indonesia and South Korea it is 13 percent, in Mexico 11 percent, in Philippines 10 percent, in Nepal 4 percent, in Thailand 3 percent, and in Bangladesh 1 percent of water supply's full economic cost to the government (compare the United States, 17 percent) (Table VI.2). Irrigation charges as a percentage of economic benefits to farmers work out in Mexico to 26-11 percent, in Indonesia 21-8 percent, and in Pakistan 6 percent (Falkenmark and Suprapto, 1992; Gleick, 1993; Pearce and Warford, 1993; Postel, 1992; Sampath, 1992). This means that were governments to steadily increase the cost of water supply, it would make only marginal difference to farmers' overall costs.

Because farmers are implicitly encouraged to be prodigal in their use of irrigation water, it is generally the case that only a small fraction of water actually becomes available for plants' use--typically no more than 40 percent, compared to 60-70 percent in more advanced systems. The rest of the water seeps or evaporates from unlined or obstructed canals and distributories (van der Leeden et al., 1990). So wasteful is water use by outmoded irrigation systems that they often use twice as much water per hectare yet achieve crop yields only one third as high as advanced counterparts (Falkenmark and Widstrand, 1992; Serageldin, 1994).

Even in more efficient irrigation systems, however, generally only half the water is used by crop plants. Farm distribution systems lose 15 percent, irrigation systems lose another 15 percent, and field application methods lose another 25 percent (Food and Agriculture Organization, 1994). Irrigation efficiency can be improved by several techniques, including the simple expedient of irrigating at night in order to reduce evaporation (van der Leeden et al., 1990; Verplaneke et al, 1992). This is not to say that farmers do not value their irrigation water, rather that the situation discourages them to value it much at all in financial terms. In India, farmers in areas with irrigation water supplied by private instead of public bodies have been willing to pay six to nine times the water charges levied for official supplies (Mundle and Rao, 1991; Shah, 1993). This means of course that subsidies are strictly unnecessary insofar as farmers are willing to pay highly for their irrigation water.

The same applies to inefficiency and waste in municipal communities. The water supply in Manila loses 58 percent of its water through leakages from pipes between the treatment plant and the consumer, whereas Singapore with its hefty water charges loses only eight percent. In most Latin American cities, water losses through pipe leaks and other sources of "unaccounted for" water amount to fully 40 percent, while the average municipal loss in many countries rises as high as 50 percent. As a result, Latin America as a whole foregoes $1- 1.5 billion in water revenues each year (Serageldin, 1994). As noted, developing countries could readily avoid two-thirds of their water losses.

Three Case Studies

1. India

Some 93 percent of India's water use is for agriculture, mostly for irrigation. Revenues from irrigation farmers cover only 7.5 percent of the cost of operating and maintaining irrigation systems, while subsidies cost Indian taxpayers $735 million in 1991 (Pachauri, 1994; see also Mundle and Rao, 1991; Shah, 1993). Yet there is not enough public money even to repair and desilt irrigation canals, so the whole canal network is deteriorating. The system encourages farmers to mis-use and over-use irrigation water, and years of excessive soaking of irrigated farmlands have led to much waterlogging and salinization (as detailed above).

There are further subsidies at work in India, this time indirect ones. State electricity boards supply electricity for irrigation pumps at a 1992 cost to the states of around $1.5 billion a year, yet farmers pay only one eighth of the cost (in three southern states, the power is given free) (Pachauri, 1994; see also Mundle and Rao, 1991; Shah, 1993). Ironically farmers could cut back on irrigation water use by 15 percent without reducing crop yields simply by eliminating over-watering (Faeth, 1993). Since water charges are typically 2-5 percent of the harvest's value, they have very little impact on the farmers' financial planning.

The two figures, $735 million and $1.5 billion, add up to $2.2 billion. They date from 1992 and 1991, and at the time of the author's visit to India in early 1996, there was no sign of the subsidies being reduced--rather the opposite. Allowing for expansion of the subsidies (and not counting other subsidies, notably the many indirect and otherwise concealed items), we can suppose a realistic minimum estimate for India's irrigation subsidies in 1996 was $2.5 billion.

2. Israel

Israel is an instance of a country that tries to do things properly, or at least better. It has come a long way, but has quite a way to go. Over the past 30 years it has achieved a five-fold increase in the value of crops grown per unit of water, yet in a flooded or spray-irrigated field, at least half the water never reaches plants' roots but seeps underground or evaporates. This is to be contrasted with an Israel-innovated technique, drip irrigation, utilizing long lengths of hose with pin-holes that drip water close to plant roots; the technique cuts water losses by half (Pearce, 1992). As far back as the early 1980s, at least 5000 square kilometers of irrigated lands were being watered by drip irrigation and other efficiency techniques. True, this area was small compared to the total expanse under irrigation. but half of remaining irrigated lands were being subjected to a moderately efficient technique known as micro-irrigation (Meybeck et al., 1989). It is a measure of Israel's pioneering efforts that only one percent of irrigated lands worldwide feature any form of trickle-drip irrigation (Verplaneke et al., 1992).

In addition, Israel recycles 65 percent of its domestic wastewater for use on farms, where wastewater accounts for 30 percent of all water supply (a figure planned to rise to 80 percent by the year 2025). As a measure of the significance of Israel's efforts, note that if all countries were to recycle 65 percent of their domestic and municipal wastewater. they could theoretically boost their agricultural output by 350 million tonnes of wheat or almost 20 percent of all grain grown today (Postel, 1996).

Due to excess pumping from water reserves over many years, however, Israel now faces an acute hydrological deficit (Cohen and Plaut, 1995). The source of the problem lies with water subsidies of numerous sorts, plus special interests' control over water-use decisions, faulty pricing assumptions, and rigid use patterns that penalize users of low-cost stocks of water. Water subsidies amount to $120 million annually, the most expensive subsidy in the country apart from that for public transportation, but they reduce the price of agricultural water by only 17 percent after tax exemptions. On top of this, there is an indirect subsidy with respect to the under-pricing of the pumping and distribution services of the main water agency, Mekerot Ltd. (Pearce, 1992).

In marked contrast, Saudi Arabia spent $40 billion during the 1980s on developing its farming, thanks largely to extravagant subsidies, mostly for water. The country also spent $10 billion on desalinization plants which provide just 15 percent of drinkable water for its citizens, the rest coming from groundwater. Due to poor irrigation techniques, more than two-thirds of water pumped to the surface to irrigate fields of wheat, alfalfa and date palms never reached plants' roots but was lost to evaporation (Pearce, 1992). Yet the country contrived to increase its wheat output from virtually nil in 1980 to more than 4 million tonnes in 1992, even producing an exportable surplus thanks to huge subsidies that reduced the price from a level ten times that of American wheat (Pinstrup-Andersen, 1994). Following the recent decline in oil prices, however. the Saudi government has slashed its agricultural subsidies and wheat output has dropped by half.

3. United States

Irrigated lands in the United States account for one ninth of croplands and one third of the value of agricultural output (Gleick et al., 1995; Pimentel et al., 1997). They also feature the largest irrigation subsidies in the world. Since the cost recovery from Bureau of Reclamation irrigation projects in the early 1980s averaged only about 17 percent of total costs, the implied subsidy to farmers using Bureau water was about $1 billion per year (Repetto, 1986; see also Congressional Budget Office. 1983). There is little reason to suppose the subsidy has declined significantly since then (Gleick et al., 1995; Roodman, 1996).

Remarkably enough, it is impossible to estimate the total value of all U.S. water subsidies because government agencies do not maintain the records that would permit such calculations. There is general agreement, however, that irrigation subsidies alone in the western United States alone amount to $4.4 billion per year (Pimentel et al., 1997; see also U.S. Department of Agriculture, 1994). Well over half of all federally irrigated lands are in the West (three-fifths of that total in California). In this dry region, irrigation accounts for 86 percent of water use (Carlson et al., 1993). Ironically, irrigation is used primarily to grow crops that are officially in surplus and subject to other expensive federal programs to reduce production (Anderson, 1995 and 1996; Jones and Dyer, 1995; Gaffney, 1995; Reisner, 1996; Wahl, 1989).

To gain a clearer picture of subsides at work, consider California and its Central Valley Project. So extravagant are subsidies here that one hectare of agricultural land can sometimes use roughly as much water as one hectare of houses and offices. Although agriculture accounts for only three percent of the state's economic product, it consumes 85 percent of the water. Were urban users to cut their water consumption by one third (swimming pools and all), that would do no more than farmers cutting their consumption by a mere 10 percent. Grandscale irrigation enables California to grow 8 percent of U.S. agricultural output (and half of all fruits and vegetables) on less than 1 percent of U.S. farmland. Each California farmer feeds 130 people, of

whom nearly 100 are Americans and the rest are foreigners. But without virtually unlimited supplies of artificially cheap irrigation water, most farmers could not continue with their traditional cropping patterns (though there is plenty of scope for them to shift to less water-demanding crops and to use scarce water more productively) (Gleick et al., 1995; Reisner, 1996).

The water subsidies derive from cheap 50-year contracts signed early this century, which are still in operation even though they have long exceeded their "shelf life". By the mid-1980s, farmers had repaid only 4 percent of the original capital cost of almost $1 billion, with U.S. taxpayers footing the rest of the bill. The subsidies ensure that many farmers now pay around $25 per hectare-foot for water that costs ten times as much to pump it to them, by contrast with $575 for the same hectare-foot in San Francisco and more than $750 in Los Angeles. On top of that, California farmers still collect direct subsidies of $400 million to grow such thirsty crops as rice, cotton and alfalfa (Department of Water Resources, State of California, 1994; Gaffney, 1995; Jones and Dyer, 1995; and for some historical background, see LaVeen and King, 1985; Reisner, 1996). This curious circumstance is by no means confined to California; in neighboring Arizona, farmers pay only one twenty-fifth as much for their water as do residents of Phoenix (World Bank, 1993).

Fortunately there is vast scope for water savings in California, and not just in agriculture. They are urgently needed. Demand already exceeds supply, and a "business as usual" scenario projects that the gap will steadily increase until at least the year 2020. But through water- use efficiency and conservation, fostered by water markets (see below), supply could easily exceed demand by 2020. Thanks to existing technologies, industrial water use efficiency could increase by 20 percent over today's level within 25 years; residential water use could decline by 46 percent; and use of reclaimed water could expand fivefold (Gleick et al., 1995). There is potential for similar grandscale savings throughout the United States. Were subsidies to be phased out and Americans required to pay the full social cost of their water, they would then feel more inclined to install efficient technologies. Fitting improved showerheads alone would effectively save water equivalent to the output of 10 large dams, while the resulting electricity savings would equal the output of three Chernobyl-sized power plants (they would also reduce CO2 emissions by 20 million tonnes a year) (Hawkin et al., 1998). The cost of water from a plumbing-retrofit programme is only half the average cost through conventional suppliers.

So attractive are water savings that the Seattle Water Department is relying on water efficiency as the sole source of additional water for its expanding population during the 1990s. It will actually give away efficient showerheads. It will also audit homes, promote the installation of efficient toilets, and implement many other similar water-saving programs. By 2002, this will supply over 30 million liters of water per day at an estimated cost of almost $16 million, whereas water from conventional supplies, notably by diverting a river, will cost almost three times as much per liter (Jones and Dyer, 1995; see also Gladstone, 1992).

The Scale of Subsidies

What is the scale of water subsidies worldwide? To reiterate a key point: governments do not usually keep systematic records, let alone systemic records, of all their financial supports for any of the three main categories of water use. So the true total remains a black hole. For purposes of this report, however, it is pertinent to attempt a best-judgement estimate in order to indicate the

scale of these government outlays.

We have just noted the annual $4.4 billion for irrigation in the western United States. Let us suppose that other irrigation subsidies in the United States bring the U.S. total up to $5 billion (could be much more). Let us suppose too that other developed countries such as Japan, Australia, Russia and Ukraine (leaving out other former Soviet Union republics in Asia) practice irrigation subsidies of the same scale. That makes a developed-world total of $10 billion (possibly much more) per year. This is rather a "heroic extrapolation", but it is surely justified when we consider that the reckoning reflects no other kinds of water subsidies beyond irrigation. It is almost certainly well below the true figure, but there is no way to establish that with worthwhile accuracy.

In developing countries, the cost recovery of providing water for household use averages around 35 percent. The fiscal burden of this underpricing can be conservatively calculated at $13 billion for 1993 (de Moor, 1997; see also World Bank, 1994) (rather more today if only because of the booming growth of cities and other urban communities). Then there are savings to be made from eliminating illegal connections, worth perhaps $5 billion in 1993; also savings available through increased efficiency, worth $4 billion. This all makes a total of $22 billion for 1992 (World Bank, 1994; see also de Moor, 1997; Roodman, 1996). By late 1997 the total could well have risen to $25 billion per year. and this figure is used for present purposes.

More important than subsidies for household use in developing countries are those for irrigation, particularly in Asia. Ten years ago the cost recovery was no more than 20 percent at best, often only half as much (World Bank, 1993; see also Bahatia and Falkenmark, 1993). There is scant reason to suppose it is better today except in a few countries, and abundant evidence to suggest it is worse in most countries. Given total costs in 1985 of $25 billion. and using the conservative recovery figure of 20 percent, irrigation subsidies could effectively be put for 1985 at $20 billion. Twelve years later they are likely to have risen to perhaps $23 billion if only because there are an extra one billion people in developing countries, over 60 percent of them in the humid zones of Asia where most rice is grown. That this figure of $23 billion is reasonable is demonstrated by five- year old estimates of $2.5 billion per year for each of India and Egypt (Bahatia and Falkenmark, 1993).

Thus subsidies in developing countries are here estimated to be at least $48 billion and in developed countries at least $10 billion. for an overall total of $58 billion per year. (The figure of $48 billion per year for developing countries is to be compared with a World Bank estimate for minimum water investments in these countries over the next decade, an average of $60 billion per year (Serageldin. 1995).) The true subsidies total could readily be twice as big, conceivably several times bigger were we to consider all forms of water use. Given the harm that these subsidies impose on economies and environments alike, at least three-quarters of them or $44 billion are considered to be perverse. True, this is a very preliminary and approximate estimate, even an exploratory guesstimate. though it reflects a strong consensus of opinion among water experts consulted in Europe, North America, Israel, India and Australia. It is advanced solely with the aim of getting a handle, however rough and ready, on the scale of a matter of paramount importance to developed and developing countries alike.

In addition to these formal or conventional subsidies are the implicit subsidies of environmental externalities. Notable instances are water pollution and water deficits, both of which relate strongly to disease in developing countries. We have already noted the cost of workdays lost to water-related diseases, $125 billion per year (Pearce, 1993). A further way to shadow price the cost of water shortages is to estimate the numbers of people--at least 500 million (Engelman and LeRoy, 1995b; see also Falkenmark, 1994; Postel, 1997; Reddy et al., 1997)--who must spend several hours a day in fetching clean water to their homes, then to reckon their time opportunity costs at, say, 25 cents an hour. Result, an externality cost of at least $50 billion a year. These two implicit subsidies alone total $175 billion per year, or three times more than the formal and conventional subsidies. As argued in Chapter I, these implicit subdidies are to be counted as 100 percent perverse. So the total subsidies figure for the water sector amounts to $58 billion plus $175 billion, i.e. $233 billion per year.

The Scope for Policy Reform

The main priority is to reduce and eventually phase out water subsidies. This chapter has demonstrated there is plenty of scope to do this, especially in agriculture. California landowners can buy water for only one tenth as much as it costs the federal government to deliver it--and it can be worth six times as much on the open market (Roodman, 1996; see also Gaffney, 1992). Nor need farmers fear the gradual elimination of subsidies. For most agricultural commodities, water is such a small component of overall costs that steady climbing water prices would have negligible effects on crop prices. Far from undermining farming, the disappearance of subsidies would foster more sustainable agricultural practicies in the long term. In fact, by growing less thirsty crops and making more careful use of water, farmers could increase their revenues by 12 percent while using 12 percent less water (Gleick et al., 1995).

There is lots of scope too in the urban and industry sectors. An increase in the water tariff in Bogor, Indonesia from $0.15 to $0.42 per cubic meter has resulted in a 30-percent decline in household demand for water. In the industrial sector, increased water prices led to investment in water recycling and conservation technology. In Goa, India, increased water tariffs have induced a 50-percent reduction in water use by a fertilizer factory over a five-year period. In Sao Paulo, Brazil, three industrial concerns have reduced water consumption by 40-60 percent in response to effluent charges (Rosegrant, 1995). (See also Box VI.1 on South Africa).

Water conservation in households can also be achieved through efficiency standards. The United States has recently established standards for faucets, showerheads and toilets, with water savings of 35 percent expected over the next 30 years. Similar standards have been adopted by a number of other governments, including the Canadian province of Ontario and Mexico (Postel, 1997). This is not only better for the resource, it is generally cheaper than looking for new supplies of water. Reducing demand through efficiency and conservation costs 2- 45 U.S. cents per cubic meter, while treatment and re-use of waste water for irrigation runs at 36-60 cents. By contrast, desalination of brakish water costs 43-68 cents, and desalination of seawater 98-148 cents. Development of marginal water sources comes in at 52-83 cents--a high cost partly because there are few good dam sites left (Postel, 1996).

Box VI.1

SOUTH AFRICA--A SUCCESS STORY IN THE MAKING?

South Africa has long been a thirsty country. Two-thirds of the country receive less than 500 mms. of rainfall per year, regarded as the minimum for sustainable dryland farming, and evaporation is often greater than precipitation. Only 13 percent of the country is suitable for cultivation. Due to water shortages, the industrial sector sometimes endures months of water restrictions. One third of all citizens lack access to drinkable water, and one half do not enjoy water-borne sanitation. At the same time, the population is growing at 2.3 percent per year, and its current total of 46 million is projected to surge to 58 million as early as the year 2010. Regrettably there is little incentive for consumers to use water sparingly, given the multitudes of subsidies pushing him or her in the opposite direction. Farmers pay some of the cheapest water prices in the world.

Much depends, however, on how many people want how much water. An affluent citizen consumes at least 1,750 liters of water per day for household purposes alone, whereas a shantytown dweller makes do with only 15 liters, equivalent to a single flush of the rich citizen's toilet. In Metropolitan Cape Town and the rest of the Western Cape region, there are 400,000 households. plus schools and the like. If they were all to switch to low-flow showerheads and dual-flush toilets, they would save more water than is to be delivered by a huge new dam, and do it at one quarter of the capital investment and with none of the operational costs. The dam is being built primarily to satisfy the "needs" of affluent Cape Towners, comprising five percent of the populace.

Fortunately the new Minister for Water is embarking on a program to (a) phase out those many subsidies that encourage abuse of water, and (b) charge consumers the "full economic costs" of water, i.e. the cost of replacing each liter consumed. He is also encouraging water marketing, and mandating that water suppliers adopt conservation measures such as recycling.

It is sometimes objected that to reduce water subsidies for household use would penalize the poor. There is much evidence, however, that these people are willing to pay highly for dependable water supplies. In many developing-country cities, street vendors sell water at prices far higher than those of public utilities (Rosegrant, 1997; see also Bahatia and Falkenmark, 1993). In Onitsha, Nigeria, for instance, revenues collected by street vendors are ten times greater than those collected by the formal water utility (Serageldin, 1994).

A further policy initiative lies with water rights and water markets (Anderson, 1995; de Moor, 1997; Frederiksen and Perry, 1995; Postel, 1996 and 1997; Roodman, 1996). As we have seen with respect to areas as disparate as California, central United States, India, China, and central Asia, when farmers have motivation to view water as "cheaper than dirt", they treat it as such. They also face the choice of "use it or lose it", meaning that if they behave with public spirit and reduce their consumption through conservation measures, the water merely becomes available to other users. If, by contrast, the farmers could sell their water to higher-value users, the opportunity cost of using the water would immediately rise, and the farmers would have an incentive to conserve it. But they will not be willing to consider this positive prospect unless they are accorded some form of ownership of their water. Hence the vital issue of water rights (Anderson and Snyder, 1997; Cohen and Plaut, 1995; Keller et al., 1995; Rosegrant and Schleyer, 1995; Seckler, 1993).

Fortunately these rights are now being made available in many areas, and in turn this opens up the scope for a highly promising phenomenon: water markets. As soon as water rights become tradable, they achieve several things: they empower water users, provide investment motivation, improve water use efficiency, increase flexibility in resource allocation, and reduce incentives to degrade the environment (Anderson, 1996; Frederiksen and Perry, 1995; Keller and Keller, 1995; Pinkham and Chaplin, 1996; Postel, 1996; Rosegrant et al., 1995; Seckler, 1996).

Water markets state in effect that water is an economic good and should be treated as such--whereupon there are many opportunities for imaginative husbandry of the resource. The gap between the value of a liter of water to a farmer and to a thirsty city dweller is so large, and agriculture's use of water so extensive as well, that there is abundant opportunity for trading deals. Since the late 1970s, a vigorous water market has sprung up in the western United States, allowing urban authorities to buy up farmers' water rights and thus provide extra water for city communities. Los Angeles has done a deal with Imperial Valley farmers: by paying for improvements to reduce wastage from irrigation channels, the city has acquired more water at less than half the cost of the cheapest alternative, while farmers have received cash and suffered no reduction in their irrigation supply (Cairncross, 1995). Annual savings of more than $200 million could be achieved in California through regional reallocation of water from agriculture to urban areas (Howe, 1996).

This all epitomizes the saying "Water flows uphill to money." Similar water markets are emerging in other parts of the United States, also in Australia, New Zealand, Algeria, Morocco, Tunisia, Brazil, Peru, Mexico, Chile, China, India and Pakistan (Roodman, 1997). In Chile, for instance, water companies supplying urban communities with their fast-growing numbers can now buy water from farmers with surpluses thanks to their efforts to improve efficiency (Postel, 1997). In 1994 the Mexican government turned over some 25,000 square kilometers of irrigated land, being 78 percent of all such lands under federal management, to water-user organizations; farmer water fees in several districts soared by 50-180 percent, thus lifting the nationwide rate of

irrigation financial self-sufficiency from 57 percent to 80 percent (Gorriz et al., 1995; Postel, 1997).

As a measure of how far water markets can stimulate conservation, note that farmers in northwest Texas, trying to cope with falling water tables through depletion of the Ogallala Aquifer, have reduced their water use by 20-25 percent by adopting more efficient sprinkler technologies, surge valves to even out distribution, and gravity systems among other water-saving practices. Farmers in a variety of countries who have switched from furrow or sprinkler irrigation to drip systems which deliver water directly to the root of crops, have cut their water use by 30-60 percent (Postel, 1992 and 1996).

That irrigation subsidies can be removed with benefit to the economy and environment alike is demonstrated by the experience of several republics of the former Soviet Union, where these subsidies have been largely ended, leading to a marked shrinkage of irrigated areas. During just the period 1990-93, Russia lost more than 7000 square kilometers of irrigated cropland, or 13 percent of its former expanse. This contraction is expected to continue for perhaps another decade or however long it takes for governments in the region to recover their fiscal health (Gardner, 1996).

Notes

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Do Cross-Subsidies Help the Poor to Benefit from Water and Wastewater Services? *Lessons from Guayaquil*

by Guillermo Yepes

The purpose of the Working Paper Series is to share information in order to stimulate discussion, broaden thinking within the sector, and encourage dialogue among our clients in developing countries. These papers have not been formally published and your comments and feedback are welcome. Please send to: Water and Sanitation Program, World Bank, 1818 H Street, NW, Washington, DC 20433, or via email to: info@wsp.org. Copies of these papers are also available on the Program website: www.wsp.org.

February 1999

Introduction

Do Cross-Subsidies Help the Poor to Benefit from Water and Wastewater Services?: Lessons from Guayaquil

The importance of demand responsive approaches to assuring sustainable water and sanitation services has long been a tenet of the UNDP-World Bank Water and Sanitation Program Earlier papers in this series have presented arguments in favor of gauging consumer demand and using this information in investment choices ("Lessons from Large-Scale Rural Water and Sanitation Projects" by Harvey A. Garn), have explored willingness to pay studies ("The Neighborhood Deal" by Dale Whittington et. al) and have described cases where appropriate technology and community participation have been applied to identify solutions which utilize effective demand ("Considerations for Regulating Water Services While Reinforcing Social Interests" by Vivien Foster and "PROSANEAR – People, Poverty and Pipes", by Yoko Katakura and Alexander E. Bakalian.) Each of these, and indeed most analysis on the subject of demand responsiveness in water supply, focuses on the clients willingness to pay and ways to find an appropriately affordable delivery system. But as Guillermo Yepes' paper implies, sustainability depends not just on customer willingness to pay, but also on the company's willingness to charge.

As Guillermo Yepes points out, many systems in developing countries have failed because they presume that customers cannot pay and base their tariff structure on that presumption. The understandable desire to assure that the poor have access to reliable water and sewerage services has often led to a system of cross-subsidies. The water utility charges low income groups and most residences at below-average rates, but charges industrial and commercial users at-above average rates to make up the difference. Despite the good intentions the cross subsidies often leave companies less willing and able to serve the low income population in the long run, and too weak to provide sustained services to higher income groups. They also tend to send the wrong message to consumers, and to companies themselves about water use and conservation.

Guillermo Yepes has been with the World Bank for over twenty years, moving from sanitary engineer to deputy division chief for Latin American water supply to unit chief for urban and water projects in Latin America, to the position he now holds as Water Supply Advisor for the World Bank. During his tenure Yepes has overseen the refocusing of Bank projects from large-scale engineering investments to support for institutional strengthening and the development of a "business outlook" in water supply companies. Yepes points to his work with the water company of Santiago, Chile in the late 1970's and early 1980's as key in setting the stage for the new thinking about effective water supply practices. For the past five years he has been developing performance indicators from water companies on a worldwide basis, as part of the Bank's benchmarking project.

In this paper Guillermo Yepes examines a single case, that of Guayaquil, Ecuador and shows the multiple effects of the subsidies applied in the tariffs. He concludes with concrete recommendations concerning tariff policies and ways to apply subsidies without creating negative impacts.

Harvey Garn
The World Bank
December, 1998

Contents

Tariff policy in many countries is often driven by the understandable desire to assure that the poor have access to reliable water and sewerage services which leads, in turn to a system of cross-subsidies. The water utility charges low income groups and residences at below-average rates, but charges industrial and commercial users at-above average rates to make up the difference. While this cross subsidy is planned with good intentions, it may be the case that it leaves companies less able to serve the low income population in the long run, and too weak to provide sustained services to higher income groups.

This paper looks at the particular case of Guayaquil, Ecuador. Water and wastewater public utilities in Ecuador have been unable to extend service to the poor. Tariffs paid by the poor and residential consumers do not cover the costs of providing services and, besides causing an effective "welfare loss" by distributing water resources inefficiently, they leave the utilities unable to generate the financial resources to extend services. In addition, national and municipal governments lack the financial resources to provide grants to extend and improve service on a sustainable basis. The shortage of funds frequently leads the utilities to charge high connection costs for water and sewer hook-ups. The end result is that residents in poor areas have been excluded, de facto, from these services and have no other alternative but to depend on unreliable sources of water that are either costly, of poor quality, or both.

Background

The Water and Sanitation company of Guayaquil (ECAPAG), responsible for providing water and sewerage services and storm drainage, faces the challenge of improving quality and coverage of services. Service coverage is low. Some 500,000 people of a total population of 2 million have no house connection and about 1 million lack adequate sanitation services. In addition, deficient maintenance has water service intermittent, flowing only for a few hours a day in some areas of the city. Poor care of drains and waste water systems has accentuated flooding in some zones. A similar situation prevails in other urban areas of the country.

It is estimated that the expansion and improvement of the water and sewerage systems in Guayaquil will require an annual investment of about $ 90 million for the next four years. World Bank missions calculate that about half or $ 45 million/year are urgently needed to cover the cost of rehabilitating the existing infrastructure alone. Given present consumption levels, an average tariff of $0.94/m3 would provide funds to meet these objectives, based on preliminary Bank calculations of a long-run marginal cost of about $ 1.00/m3. But in 1995 the average water and sewerage tariff in 1995 was $ 0.47/m3. Will Guayaquil be able to fill the gap created by its tariff system ? And can it operate and maintain an expanded system without changing that system?

The Existing Tariff System

Guayaquil's water utility charges different rates depending on the type of user (domestic, industrial, commercial and official) and on the amount consumed. Tariffs range from $ 0.02 to $ 1.76/m3.[1]

The utility charges nothing at all to the military, to sport centers, and to municipal parks, all of which receive water free of charge. The charges for wastewater collection service -or use of the sanitary sewer system - represent a percentage of the monthly water bill. Domestic users pay 60% of their water consumption, commercial users 80%, and industry pays between 100 and 150 % (The latter charge applies to industries where water is part of the final product, e.g. soda water).

Total annual revenue is estimated at US$ 55 million. US$ 45 million are derived from operations and US$ 10 million come from municipal subsidies, including transfers from taxes to other municipal services. Revenue from wastewater collection represents approximately 84 percent of the water billing. At 45 percent of billings, collection efficiency is low Guayaquil's situation probably reflects that of many Latin American cities. And, as we shall see, it is compounded by its tariff policy.

[1] In contrast, families without house connection frequently buy their water from private vendors at substantially higher rates substantially higher ($ 3.45/m3).

Problems Created by Cross-Subsidies

Economic Welfare Losses

Cross-subsidies have adverse economic, financial and other effects which often are not quantified or appreciated, perhaps because regulators and utilities believe that they are not substantial. However, in many instances as this note will show, these side effects can be substantial. To begin with, a cross-subsidy policy sends the wrong signals to both the utility and consumers. These signals translate into inefficient choices by users at both ends of the tariff scale. In Guayaquil the fact that water is supplied free of charge to military bases and sports stadiums can lead to wasteful uses of a good that represents zero cost, regardless of the amount consumed. The same principle applies to residential and other customers who are charged less than the marginal cost of water production and delivery. On the other hand, customers who are higher tariffs for water may reduce their consumption, or find other water sources, even though they would very likely have bought more water if they were charged at the marginal cost and not above it.

At the same time, cross subsidies can discourage utilities from collecting payments. Problems with low collection rates are rooted in ill conceived policies which subsidize utilities, regardless of performance; unrealistically low rates which discourage collection, and lax regulatory practices

In the past, the effects of price on water consumption tended to be neglected. It was often assumed that people would be indifferent to price increases because water forms such a basic human need. Most tariff policies were based on this notion, or on a corollary, that people's consumption patterns relative to price changes would be the same regardless of cost increases. If this were the case it would be easy to justify subsidizing one group's water consumption because another group could be expected to purchase enough water at a higher price to make up the difference.[2]

[2] In economic terms the elasticity of consumption with respect to the price of water for different consumer categories was thought to be either zero or the same.

Recent studies have shown this assumption to be erroneous.[3] High income residential, industrial and commercial consumers are more price-sensitive than residential low-income consumers. When the price of water goes up even high income consumers will buy less. Therefore, there is a real possibility then that the revenue loss from the subsidy given to a group can not be fully recovered from the overtaxed group in which case the average revenue per m3 will drop.

Economists refer to both the overconsumption by subsidized customers and the loss of sales to the subsidizing customers as inefficiencies. In the case of water, both of these inefficiencies also constitute losses to society, or "welfare losses" because it can be argued that society as a whole would be better off if the water were valued and used at its true cost, avoiding both waste and underuse. In the case of Guayaquil, knowing the marginal cost of water to be around $1.00/m3, and knowing the changes in consumption patterns which result in both the subsidized and subsidizing groups, we can calculate the welfare loss to be approximately US$ 4.4 million/year.

This amount corresponds to the welfare loss based only on water consumption. If we were to consider include the waste water collection and treatment in the equation the losses would more than double. Many utilities add a surcharge to the water bill to cover the cost of providing wastewater collection and treatment services. While the experience in industrialized countries is that the cost of sewerage services is almost always higher that the cost of water supply and therefore the surcharge fraction should be higher than 1, in most Latin American countries waste water collection and treatment is charged at a fraction of the water bill - generally 50%. (In Guayaquil it is calculated to be 85% of the water bill.) Moreover, many utilities separate the charges for wastewater collection and wastewater treatment. It is especially important to calculate waste water treatment in settings with large industrial bases as these can impose significant additional treatment

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Financial Losses

Besides welfare losses, cross subsidization frequently causes serious financial losses to utility companies. Taking a case in point, for Guayaquil, we can calculate the revenues which would be lost annually were ECAPAG to increase its connections by 500,000 among the currently unserved marginal population. Given the current subsidized tariff rate ($ 0.02/m3), ECAPAG would find itself running an annual loss of some US$ 4.7 to cover the unrecovered costs of serving the new consumers. This has serious implications for the utility. The first is an implicit increase of rates to the higher income customers to cover the unrecovered costs of the subsidized group. But we cannot rely on a straight calculation, because each time the cost per cubic meter increases at the upper end, the amount of consumption drops and ECAPAG will have to calculate a still higher tariff to cover its costs. In summary, the average tariff for the "subsidizing" group would need to be increased by $.87/m3 - and increase of almost 50% from the current rate of $ 1.35/m3 to a new rate of $ 2.42/m3.

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At the Lower End of the Tariff Spectrum

In Guayaquil variable costs run about 0.11/m3 while billing and collection represents about US$ 1.00 per connection/month to ECAPAG. This means that over and above the loss in revenue from production costs, the utility also incurs in a net operating loss (marginal operational revenues less marginal operating costs). If we return to the above example, if ECAPAG were to connect 500,000 currently unserved households it would run an additional net operational loss of approximately $ 2 million per year which derive simply from the costs of registering charging and collecting customer payments. In this situation, it literally can cost ECAPAG more to calculate and to send out the bills than it would bring in if the bill were paid. The utility loses incentives to charge, or to reduce the part of unaccounted for water (UFW) related to commercial losses. In effect, under these circumstances it is not cost effective either to meter or to collect from this highly subsidized group of users. The situation in Guayaquil confirms this. UFW is the order of 75% and only 26% of the water connections are metered. In addition, some 60,000 water and 38,000 sewerage connections are not even registered. The utility finds it cheaper to give free service than to incur the costs of connection and collection.

At the High End of the Tariff Spectrum

In Guayaquil, where all residences benefit from subsidies, the industrial and commercial groups pay higher tariffs which, as we've seen, can prompt them to reduce consumption on the one hand or to search for alternative water supplies. If they can find cheaper sources of water they will simply disconnect from the public water system. In this case the utility company stands to lose its biggest and highest paying consumers and a substantial revenue loss. In fact, led by its own policy, the utility will lose its competitive edge. Although not fully documented, industrial consumers with their own private supply are on the increase. But many buy water from the same private vendors who also sell to the poor. Even though vendors are notorious for buying from the utility at subsidized rates (or obtaining water free of charge) and selling at extremely high prices, they still can represent a bargain to consumers at the high end of the tariff scale. The utility will then find itself caught in a vicious circle, needing to increase tariffs for an ever smaller group of industrial and commercial users and a growing number of subsidized consumers. The result is to exacerbate the cross-subsidy problem and the financial viability of the utility. As this examples also suggests, highly differentiated tariffs may also encourage corruption as users seek to be classified in a lower tariff bracket. ECAPAG's endemic and protracted problems with the commercial system provide circumstantial evidence to this effect.

Since the signals to the utility suggest that consumption at the high end could and should increase, there is always pressure to increase the number of subsidized users (already 90.8 percent) and the tariff on the subsidizing users (2.9 times the average). In the case of ECAPAG, non subsidized rates have been increasing at an annual rate of 12 percentage points higher than subsidized ones. The experience in many cities including Guayaquil is that the ratio of subsidized consumers and consumption to non-subsidized users and consumption tends to increase over time. Furthermore, consumers who face higher charges may be induced to use more of other inputs in order to offset the disproportionately high cost of water. An industry, for example might opt to recycle water - even though it means using more energy and equipment to offset high water tariffs and optimize production. Clearly, such reactions can lead to losses for both the utility and for its customers.

Other Problems with Cross-Subsidies, and Some Misconceptions

Conflicting Objectives

Cross-subsidies are is often predicated on ground that "progressive tariffs" favors water conservation and are, therefore, intrinsically good. However, if the base tariff reflects the economic costs of providing the service, higher or lower tariffs will result in welfare losses. Furthermore, when, as in the case of Guayaquil, a high percentage of users are not charged at all, either by explicit subsidies (military, sports users) or by the defacto UFW (the utility's decision not to bill) there is no incentive to conserve water. Indeed, water running unstopped into the streets or into channels is not an uncommon sight in Guayaquil. When there is no meter, no bill and no valve, there is little incentive to conserve water.

Cross-subsidies also present the utility and the regulator with two conflicting objectives: to recover the costs of providing the service (economic or financial objective) and, at the same time, to charge less than cost to some consumers (social objective). Countries which have attempted to meet these two conflicting objectives have often failed to do either, as evidenced by financially weak utilities which provide poor quality service and low coverage.

The Information Gap

As we have seen, tariff policies tend to be based on inadequate knowledge of consumer patterns and effective demand. To begin with the relative growth of subsidized and subsidizing consumers and their corresponding consumption patterns over time are poorly known. Households which are assigned a subsidized tariff rate tend to keep on paying that rate - and getting intermittent service - even though their economic status may improve over time.

More important, tariffs are designed without taking into account the impacts of price increases (and decreases) on consumption. In economic terms people's tendency to buy more or less water depending on how much it costs is called the elasticity of demand for water with respect to price. Working without any basis in fact, utilities and policy makers wrongly assume that industrial and commercial clients will continue to buy the same quantity of water regardless of how much it costs. By the same token, they presume that poor families will use only a minimum "presumed" amount of water and no more, even if it gets much cheaper.

While elasticity with respect to price has not been sufficiently studied, its corollary, elasticity of water with respect to income (or how people's purchasing habits will change if their earnings increase) has been the subject of considerable research. A recent World Bank review[4] documents households' tendencies to use as family income rises. (The average income elasticity reported in these studies is + 0.30; e.g. if incomes double then water consumption will go up by 30 percent). This has serious implications as far as who benefits from cross subsidies. When all residential consumers receive a subsidy the high income families will stand to benefit more - even if the amount of subsidy is less at higher income levels. In Guayaquil, a residential customer using 10 m3/month receives a subsidy of $ 120 per year while a residential customer consuming 100 m3/month receives a subsidy of $ 830 per year though the higher paying user is charged at a rate fifteen times higher than the lower paying customer

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Finally, even though the magnitude of the cross-subsidy transfer is often substantial, few policy makers or utility managers ever know exactly how much the cross subsidy costs them. Even if they attempted to find out, most utilities lack complete data and rely on murky definitions of which consumers and which uses get subsidized. A calculation based on the average tariff ($ 0.47/m3) gives about $16 million/year as the full amount transferred from industrial and commercial users to residential and official ones in Guayaquil. This sum is equivalent to 35 percent of operating revenues, but it is less than the US$22million/year, calculated by breaking down costs and payments per subsidized group.

Sound Tariff Policy - Lessons From Guayaquil

Tariff Objectives

An adequate tariff system should promote both economic efficiency in the use of natural resources and financial soundness in the utility company. There are cases, however, when the application of full cost recovery would exclude the poor from receiving service. In this case, a subsidy is needed to ensure access to the poor to these services. To achieve these objectives, several principles must be satisfied:

1. **Tariffs should cover all costs.** This objective can be defined in economic (marginal cost) or financial terms (utility financial needs). Both alternatives should be based on the premise that the utility will be operating efficiently. Tariffs set under these two approaches will differ in most situations. Although an economically-based tariff is the desirable alternative, trustworthy information is often not available to perform a meaningful calculation. The tariff based on financial terms can often be calculated more readily by making use of the financial information available. Nonetheless, it is often necessary to make adjustments to this information to determine an adequate tariff level. Such adjustments pertain to the value of the fixed assets and related depreciation, adequate level of maintenance, and contribution to investments and debt service obligations.

2. **The tariff should not be discriminatory.** That is, the price per unit of consumption should be the same for all users. Price differentials are acceptable, under both economic and financial objectives, when the corresponding costs to serve different consumers vary.

3. **The tariff should send a clear signal to the consumer.** Users will adjust their consumption to price variations if they are metered and the tariff is a function of the volume consumed. To this end fixed charges should be minimal. For the same reason, tariffs should be readjusted periodically to maintain their real value.

4. **Collection efficiency is an integral part of the tariff policy.** This implies applying penalties that reflect the real cost of money and rapid disconnection of services for late payment. If this policy is not applied, not only will subsidies be extended (and increased) to those who do not pay but it would also set a dangerous precedent that can seriously undermine the financial soundness of the utility.

5. **Subsidies should be explicit and clearly targeted at the poor.** The application of the first principle needs to be compromised if the resulting price cause the poor to withdraw from or not connect to the service. However, it is not imperative, nor desirable, to provide subsidies through the tariff structure. Some countries, notably Chile, provide a subsidy to the poor through the national and municipal budgets. In this case, the utility receives the same revenue for the same volume consumed regardless if consumers are poor or wealthy. Therefore, the utility has the same incentive to serve both.

6. **Sound information about consumption patterns should form the basis for tariff policy.** Cross-subsidies are all too often designed without any prior knowledge of what the poor – or the rich- are willing and able to pay. The maxim, "if you can't measure it, you can't manage it" should be key to setting tariff structures insofar as a clear quantification of effective demand is needed to design a policy – and to evaluate it later.

Conclusions

A sound tariff system is of the essence to promote the rational use of resources as a financially sound utility is necessary to provide a good service to all its customers. Cross-subsidies can create significant
distortions that interfere with these objectives as they create welfare and financial losses to the detriment of society and/or the utility.

High connection fees effectively discriminate against the poor. One alternative is to abolish these fees and include the related costs in the volumetric price of water; another is to provide long term financing to facilitate their payment. Payment of these fees should be an integral component of the tariff policy.

In many countries, including Ecuador, a subsidy mechanism independent of the utility, like the one in Chile, is not a feasible option. Such subsidy system requires an elaborate administrative mechanisms to maintain the registry of users entitled to a subsidy and to transfer these government subsidies to the utility. In such cases, cross-subsidies might have to be accepted as a second best solution provided the following principles are followed:

- the subsidy should be limited to the poor to promote basic consumption and facilitate access to the service,
- the level of the subsidized tariff should be ascertained on the basis of willingness-to-pay surveys. The amount paid by the poor to water vendors is a good starting point to measure willingness to pay;
- the subsidized tariff should cover, at least, all variable costs, including the costs of metering, billing and collection. However, if willingness-to-pay surveys indicate the need for a subsidized price bellow variable and billing and collection costs, a subsidy mechanism other than a cross-subsidy should be considered;
- the subsidy system, including eligibility criteria, should be set up in close cooperation between the municipal authorities and the utility, it should be easy to manage and monitor;
- care should be exercised to determine the cross-over price above which some subsidizing users will opt to build their own supplies and stop buying from the utility. If this situation occurs, the financial situation of the utility will worsen.

Problems Created by Cross-Subsidies

Economic Welfare Losses

Cross-subsidies have adverse economic, financial and other effects which often are not quantified or appreciated, perhaps because regulators and utilities believe that they are not substantial. However, in many instances as this note will show, these side effects can be substantial. To begin with, a cross-subsidy policy sends the wrong signals to both the utility and consumers. These signals translate into inefficient choices by users at both ends of the tariff scale. In Guayaquil the fact that water is supplied free of charge to military bases and sports stadiums can lead to wasteful uses of a good that represents zero cost, regardless of the amount consumed. The same principle applies to residential and other customers who are charged less than the marginal cost of water production and delivery. On the other hand, customers who are higher tariffs for water may reduce their consumption, or find other water sources, even though they would very likely have bought more water if they were charged at the marginal cost and not above it.

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This amount corresponds to the welfare loss based only on water consumption. If we were to consider include the waste water collection and treatment in the equation the losses would more than double Many utilities add a surcharge to the water bill to cover the cost of providing wastewater collection and treatment services. While the experience in industrialized countries is that the cost of sewerage services is almost always higher that the cost of water supply and therefore the surcharge fraction should be higher than 1, in most Latin American countries waste water collection and treatment is charged at a fraction of the water bill - generally 50%. (In Guayaquil it is calculated to be 85% of the water bill.) Moreover, many utilities separate the charges for wastewater collection and wastewater treatment. It is especially important to calculate waste water treatment in settings with large industrial bases as these can impose significant additional treatment

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- care should be exercised to determine the cross-over price above which some subsidizing users will opt to build their own supplies and stop buying from the utility. If this situation occurs, the financial situation of the utility will worsen.

Notes

PRICE AND SUBSIDY POLICIES FOR URBAN PUBLIC TRANSPORT AND WATER UTILITIES IN TRANSITION ECONOMIES

Slobodan Mitric

Summary

The paper in hand reviews the pricing issues faced by urban water services and public transport agencies in countries of Eastern Europe, Russia and Central Asia after the collapse of the former Soviet Union. It does so by drawing on the experience gathered under recent projects financed by the World Bank. The projects were initiated to help develop a suitable response to the difficulties besetting urban utilities as these countries started to change their economic systems in the early 1990s.

Under socialism, services such as these had been provided to citizens by public-sector organizations, at low or even zero prices. Low-priced services were generally considered as non-cash components of wages and pensions; some groups were given further discounts. The gap between service revenues and costs of provision was made up from the government budget or more directly from turnover taxes on local enterprises. Subsidies were endemic, the public sector controlled the greatest part of the national income, and cash wages were low. As the 1990s decade began, accumulated pathologies of a system in decline intersected with consequences of the first wave of reforms to produce difficulties, even crises on both supply and demand sides of urban services.

On the macro scale, the key developments were a multi-year fall in the aggregate output of goods and services, and high inflation. Measured at its lowest, relative to 1987, the real GDP had fallen by 15% in Poland (1991) and 35% in Russia (1995); in the latter country, GDP fell for 7 consecutive years. This reduced considerably the overall public expenditure capacity, with complicated downstream effects on different levels of government, sectors of economy, and splits between investments and current expenses. A concurrent decentralization meant that city governments suddenly had huge expenditure responsibility with ill-developed funding sources and mechanisms.

On the demand side of urban services, there was a dramatic fall in real wages and pensions. In the 1988-1993 period, real per capita income fell by 12% in the Czech Republic, 26% in Hungary, 42% in Russia, and more than 60% in some Central Asian Republics. Poverty increased from 14 million (region-wide) in 1989 to 140 million in 1996. Especially affected were unemployed workers with large families and some retirees. Concurrently, poorly implemented privatization and the rise of the gray economy led to much higher inequality.

On the supply side, there were several pre-existing structural problems. Technological backwardness of urban utilities was evident in equipment with high levels of energy consumption and spare parts consumption. Also in evidence was strong

preference for building large structures. Organizations were unwieldy and overstaffed with low-skill workers. In an enterprise, core functions were often swamped by in-house auxiliary ones, reflecting a drive for self-sufficiency typical of rigid economic systems. When the funding squeeze came, expansion and replacement plans were affected first, then maintenance and repairs, and eventually services provided by utility enterprises. The adjustment processes and the outcome for services varied widely between countries, cities and utility types, depending on the initial conditions and the depth of the crisis. At the high end were cases such as Budapest Transport Company, which in the short term was operating smoothly and providing a high level of service, but at about 30% cost recovery. This was unsustainable in the medium and longer term. Indeed, spending cuts on both state and city level started early in the transition process and still continue. At the opposite end would be the water company in Odessa, with intermittent service, low pressure, low-quality water, and leakages in both system and end-user sides. The residents have had to store and home-treat water, and/or buy bottled water, if affordable. Funds from all sources had run out much before the transition started, and the situation has not improved much since.

In this context, the objectives of the World Bank lending program have been twofold: first, to sustain services deemed essential for the population and local economy; and, second, to help implement regulatory, organizational, technical and financial improvements that would promote the commercial viability and sustainability of the service providers and to reduce their dependence on funding from the Government. Between 1994 and 1997, a dozen lending operations were undertaken in urban water and public transport sectors, in addition to other programs with a city focus such as housing, district heating, waste collection and processing, education, health, environment, and municipal administration.

In the realm of prices and subsidies, the projects had two key objectives: to move service providers towards financial health, greater independence and sustainability; and to shift the revenue burden from subsidies to user fees. A set of standard indicators, such as net operating income, return on assets, operating or working ratios, or simply percent cost recovery from user revenues, were used to measure financial performance. Time-specific targets for overall financial performance, revenue collection and price increases were negotiated and included as covenants in loan and credit agreements. Covenants were also used for actions to reform price structures or price setting processes, introduce new accounting systems, and carry out asset revaluation exercises. Price increase targets were checked for affordability to households, typically by checking whether the resulting water or public transport expenditure would fall above or under a benchmark proportion of household expenditures at average or sub-average income level.

Most projects approved in the 1994-1997 period are still under implementation. The intermediate results are that the progress in maintaining essential services and generally improving the supply side has been much better than the experience with price/subsidy actions. The progress in financial recovery of companies has been mixed, and is often subject to reversals. In the urban water sector, companies such as in Bielsko-

Biala (Poland) have increased tariffs as agreed, and are on target as concerns the overall financial indicators. In countries where the transition process has been less successful than in Poland, e.g. Romania, Bulgaria or Azerbaijan, water companies have fallen behind in both price increases and financial health. In urban public transport, the Russian Public Transport Project has so far met expectations: starting from cost recovery levels well under 20% of direct operating costs, 9 out of 13 companies reached the target 60-65%; a few reached 90% and even the worst made it to nearly 50%. This is, of course, still far from a financially healthy and sustainable state, which might be the target of the next batch of projects. Budapest Transport Company, a large multi-modal operator, has implemented fare increases regularly, increased revenue collection, and slimmed down its organization, staff and service network. The company managed to meet its 1997 cost recovery target of 43%, only to see it slide back towards 40% in 1998. The objective of overall financial health has proven elusive, indicating that further painful adjustments will be needed. In Riga (Latvia), with three companies at relatively high cost recovery levels (60-75%), considerable Bank pressure was required before the agreed fare increases were implemented. The companies are far from achieving financial stability.

Behind persistently low rate of increase in cost recovery, on the cost side, lie obsolete technologies and practices, and difficult downward adjustments in staffing and service standards. On the revenue side, it has proven quite problematic in many countries to raise service charges drastically to a population whose real cash incomes have collapsed, especially if at the same time the service levels have also fallen. More than that, this has happened not just in one service sector, but in all of them at about the same time, a bitter pill to swallow for most households. This simultaneity had not been reflected in affordability studies done in the context of preparing Bank-financed urban utility projects, which has contributed to less than realistic cost recovery targets. Project-based affordability checks have been limited to individual sub-sectors covered by a given project, and most often relied on aggregate income data and rule-of-thumb affordability benchmarks.

Quite apart from general price levels, many service users still pay sharply discounted prices, or even get free services. These discounts and exemptions are mandated by law, but the matching compensation to service providers is often not paid. Some groups enjoying special price privileges (e.g. retirees in Riga) have been successful in organizing to resist the loss of these, using political pressure methods normal in the democratic process. Other problems on the revenue side include non-payment of fares and service charges, which is still widespread and difficult to eradicate. On the supply side, obstacles against price reforms and better revenue collection include also short-term technological constraints, e.g. the absence of water meters at the household level, or obsolete ticketing systems in the case of public transport. In some services, such as district heating, the technological issue poses a formidable barriers as it is not feasible to measure consumption by apartment units or provide these control over how much service they will receive. In urban public transport, yet another factor limiting fare increases

has been the concern for the loss of patronage, whether to other public transport operators, or to other modes (private auto).

The failure to increase cost recovery from service revenue means that the pressure on public budgets throughout the region is still unsustainable and blocks economic recovery. The national governments having by and large reduced their involvement, the load has fallen on municipalities. These, in most cases, could not pay subsidies needed to get accounts of service companies into the black. The persistence of the funding gap means that the process of renewing facilities and adjusting services to sustainable levels is not proceeding rapidly enough and not in a planned manner. Instead, there is further deterioration in the physical assets and non-selective decay in the quality of services provided. (Even in the cases where the nominal funding gap has been closed for a year or two, the utilities are still in danger, given that the accounts typically have underestimated asset replacement costs and there was in any case a lot of catching up to do for years of neglect). In public transport, which unlike water is not a natural monopoly, the deterioration in public-provided services in some cities has been accompanied by a rise of alternative service providers, working with or without public sanction, offering typically better services, at higher prices, without discounts or subsidies. These have brought relief to some passengers, though most often at the price of breaking up the hitherto integrated service and fare systems.

We conclude that the approach followed until now has achieved as much as can reasonably be expected and propose an agenda for future urban utility projects meant to remove the more obvious shortcomings of the current approach to pricing issues. Its key features include: (i) avoidance of un-funded commitments by establishing the financial capacity of the local government to pay its overall subsidy load, as opposed to the current practice of checking only its debt repayment capacity; (ii) enhancing political feasibility of price & cost reforms by using self-selection, which lets client cities negotiate price increases with their own constituents directly (as was done under the Russian transport project): (iii) expanding the scope and depth of project-related studies to assess affordability and other demand characteristics, better to forecast impacts of price increases on households, including the impact of simultaneous price increases and links to wage policy; (iv) improving the subsidy system, by identifying subsidy objectives and beneficiaries, then choosing the best available transfer mechanism, coherent with the existing or planned social assistance programs; and (v) focusing on the supply side of utilities, especially as regards the rationalization of service standards, the reduction in operating costs, and helping overburdened local governments implement efficient systems of franchising and concessioning for involving competitive private operators in the provision of public services.

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1. Context and objectives

This paper addresses price and subsidy policies for urban public transport and water utilities in transition economies of Europe and Central Asia, seen in the context of the World Bank (WB)'s assistance program to the region. The term "transition economies" covers countries from Eastern Europe (EE) and those that came into existence by the break-up of the former Soviet Union (FSU), which since the late 1980s have undertaken a set of economic and political reforms away from socialism and toward liberal capitalism. The aggregate population of these countries is about 360 million, about 9% of the world population. In terms of 1995 gross national product per capita (with equivalents in purchasing power parity given in parentheses), they range from Tajikistan at $340 ($920) and Georgia at $440 ($1,470), to Poland at $2,790 ($5,400) and Hungary at $4,120 ($6,410).

The two service sectors on which this paper focuses, urban public transport and water, are typically in the jurisdiction of city governments.

A standard feature of the socialist system was that services which were deemed to be essential were provided to citizens at low price, even for free. The flip side of this was that the government and the public sector controlled a very large share of the national income, and citizens received low wages. Reflecting this, urban utilities in ECA's transition economies entered this decade with a revenue structure in which a smaller fraction came from users of the service and larger fraction came in the form of subsidy from various levels of government. The government also paid for most capital improvements. This arrangement has broken down, together with the system of which it was a standard feature.

The desired and intended direction of transition is that individuals and households would gradually command higher and higher shares of the national income, and that national income itself would grow. Households will have more income and more choice, but will have to pay much more out of their own pockets for many services than was the case under socialism. At the early stage of transition, however, the old ways are gone and the new ones are not yet in place. Many of the old benefits are gone, and cash incomes for many people have actually decreased. Subsidies to service suppliers have decreased, while some of their costs have increased. Many utilities are in a difficult position, and some are in financial crisis, lacking funds to replace infrastructure and equipment, buy spare parts and materials for proper maintenance, or even pay staff wages and energy bills. This is visible to citizens in the form of poor services, and higher prices.

In this context, the objective of the World Bank lending program has been to help maintain essential urban services and restructure the service supply sectors in their organizational, regulatory, technological and financial dimensions. The current WB portfolio of infrastructure projects in the ECA region has a dozen on-going projects which involve water and sewerage, urban public transport, or cut across several municipal activities including these two sectors. Projects combine investments in infrastructure,

equipment and institutions with reforms in the management of service enterprises, and the organization and regulation of these service sectors by the local government.

The subject of this note is the three-way interaction among the suppliers (service companies), governments, and customers (primarily individuals and households) of urban public transport and water/sewerage services in transition countries. The focus is on the realm of prices, subsidies and revenues, seen mainly through the prism of WB assistance programs. The objective is to share experience across sub-sectors, and develop good-practice guidelines for the next batch of lending operations in urban utilities.

The paper starts with a brief section on the impact of transition processes on the economy, as a background to a section on initial conditions in water and public transport utility companies, as found at the diagnostic stage of Bank assistance efforts to these utilities. The approaches used in the current portfolio of such projects are then summarized, to provide the framework within which price and subsidy reforms were undertaken. Specific approaches to price and subsidy reforms are reviewed, as is the relevant implementation experience. The last two sections discuss the sources of resistance to change and reform, and present a proposed approach to the development of assistance strategies for the future.

2. The Transition

The key economic reforms associated with transition included liberalization of prices and foreign trade, removal of barriers against private sector economic activities, and fiscal stabilization. In addition to these, the fragmentation of the Soviet Union and the cessation of economic agreements between EE and FSU countries had an enormous impact on prices and availability of factor inputs and consumption goods, terms of trade, etc.. Depending on the country, the reforms were introduced fully or partially, suddenly or gradually. Either way, things had to become worse before they could become better. The most important consequences of the breakup and reforms in this initial stage of the transition process were the following (Milanovic, 1998)[1]:

(a) a fall in the aggregate output of goods and services for several consecutive years; at the lowest point, and relative to 1987 (pre-transition base year), the fall ranged from 15% of real GDP in Poland (in 1991), to 35% in Russia (in 1995); negative growth rates were recorded for 3 consecutive years in Poland but 7 years in Russia, Moldova and Ukraine.

(b) a relatively modest rise of unemployment from near-zero levels beforehand to 3.2-9% in Russia (registered and actual) in Russia, and 12-15% in Eastern Europe, except

[1] The source reference and other works in this field stress great difficulties with availability and accuracy of data. Generally, official economic data from the pre-transition period overstate output and employment, whereas data from the transition period understate employment, output and incomes from the private sector.

the Czech Republic where it remained low until 1998; the exodus into (early) retirement, however, has been considerable in some countries.

(c) a fall in real wages (a consequence of (a) and (b) taken together) of about one-third in Eastern Europe and one-half in Russia and other USSR successor states; from household-based surveys, the fall in real per capita income (measured between 1988 and 1993) ranged from 12% for the Czech Republic, 26% in Hungary, 42% in Russia, to 62% in Kazakhstan and 66% in the Kyrgyz Republic. To this should be added wage arrears, sometimes months long.

(d) a like fall in government revenue, given that tax systems were based on payroll taxes, reducing the capacity to subsidize enterprises, make income transfers, and undertake capital investments;

(e) high inflation, varying in the 17-29% range in advanced reformers like Hungary, but reaching hyper-inflation in inverse proportion to the speed and depth of reforms: 131-256% in Romania, 92-1353% in Russia, 1610-1980% in Kazakhstan and 969-2200% in Belarus (data are for 1989-94 period, from De Melo, Denizer and Gelb, 1996).

(f) an explosion of poverty[2], from 14 million in 1989, to 140 million in 1996, nearly 40% of the total population in transition countries;

(g) an increase in inequality in some countries, notably Russia, Lithuania, Estonia, Ukraine and Bulgaria. The bottom quintile of the population in these countries lost up to two-thirds of real income, making income distribution worse than in OECD countries. Income inequality did not change materially in countries like Hungary, Slovakia and Slovenia.

In addition to changes in the economic sphere, yet another development relevant to the topic of this paper has been taking place in transition countries: decentralization of political and economic power. Local and, in some countries, regional governments are now elected; have gained jurisdiction over many local services and ownership of land and infrastructure; have taxing and spending authority, and subsidy responsibility; and benefit from new financing arrangements in which transfers from the state are a diminishing proportion of total revenue. As with economic reforms, countries differ as to the speed and scope of decentralization: Poland, Hungary, and the Baltic states being in the forefront, while the FSU countries lag behind. Even in the advanced cases, where cities like Budapest, Warsaw and Krakow have been called asset-rich but cash-poor, the

[2] Poverty threshold used here is an expenditure of $4 per capita per day in international dollars (based on purchasing power parity). This threshold is four times higher than The World Bank's absolute poverty level (Milanovic, 1998).

financial capacity of local governments has been slow to build. In less fortunate cases, cities are badly strapped for cash.

3. Urban Public Transport and Water Companies: the initial conditions

When the transition started, large differences existed between companies, cities and countries involved, and the changes taking place at different speeds have intensified these differences.[3] The main dividing line is between utility companies in Turkey, the Balkans, the Baltics, and East European "EU accession" countries on the one side, and the FSU countries on the other. Still, it is useful to sum up the features quite common to urban utility companies in all transition countries early in this decade, some of which have remained to the present:

(1) Organizationally, water and public transport services appeared either as municipal departments, or as public enterprises in state or city ownership, with no freedom to set prices and minimal degrees of managerial independence as concerns service policies and operational matters.

(2) Organizations tended to be top-heavy, and operational and management procedures were bureaucratic There was a tendency towards self-sufficiency, e.g. by setting up internal units for the production of needed inputs, as opposed to buying these services from outside sources.

(3) Staffing was excessive, following generally from the full-employment approach practiced in socialist economies, and managers ability to fire on performance grounds was very constrained.

(4) Companies had over-age and technologically obsolete plants. Energy use was especially inefficient, in great part because fuel and electricity were significantly underpriced. To these should be added problems introduced by transition, notably difficulties in replacing spare parts and equipment, due to the breakdown of the industrial division of labor in the socialist block.

(5) Investment decisions were not based on economic criteria, but in response to centrally established norms. Because of budget constraints for maintenance, there was a tendency to overcompensate by overdesigning new investments. Quality of materials was often poor.

(6) Following from the preceding points together, costs of operation per unit of output were higher than they should be.

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[3] The term "company" is used throughout the paper even if the service provider was a municipal department.

(7) Company accounts did not reflect full economic costs of operations. Some activities, such as barter trade, were not recorded. The depreciation accounting was not based on replacement value of plant and equipment, or was not calculated at all in some forms of ownership (e.g. when the service provider was a municipal department). Therefore, even if companies covered their accounting costs, this did not generate sufficient funds for replacement.

(8) Another major source of deviation of accounting costs from economic costs was the distorted price of electric energy and other fuels, endemic in pre-transition period, and still prevalent in Russia and some other countries. This distortion was especially significant for water companies, and for urban public transport companies using electrically-powered vehicles.

(9) Generally, the approach to accounting was inconsistent with western practices or meant to mislead.[4] Accounting was not meant for, and was never used as, a management tool. In some cases, different departments of the same enterprise kept separate accounts which never got fused into company accounts (Baku Water, Kazakh bus companies).

(10) Service levels, in terms of quantity and/or quality: a variety of cases, ranged from very poor to quite high. For example, services by Bucharest Water Company featured daily interruptions of water, variable water pressure, and out-of-order plumbing fixtures in households. On the high side, Budapest Public Transport Company (BKV) provided services whose availability, frequency and punctuality have been among the best in the world.

(11) Sudden and large up or down changes were experienced in demand levels due to various economic and political developments accompanying transition. This included such diverse cases as drops in water consumption and/or public transport usage due to large-scale closures of inefficient industries (water in Riga, metro in Yerevan); increases in water consumption due to a large influx of new population to cities (Yerevan, Tbilisi); drops in public transport usage in major East European cities, due to a removal of restrictions and rationing on gasoline, and increased levels of auto ownership; etc. Each of these had a major impact on both costs and revenues of service companies.

(12) Prices charged for services were low relative to the cost of supply, and sometimes zero (as for water in Turkmenistan, for example), reflecting policies pre-dating transition and various obstacles to change within the transition process. Utility prices were so low across the board in Russia that, as late as 1994, household expenditures on housing and related utilities (water & sewers, waste collection, heating, gas, electricity) added up to less than expenditures on tobacco and alcohol (Sewell, 1995).

[4] A good example of this is the habit of distributing after-tax "profits" as wage bonuses by Russian water companies, to minimize tax paid on the wage bill.

(13) Prices were not structured right, in the sense that they were not related to economic or even accounting costs of provision to different customers, or to the amount of use. Cross-subsidies between client categories were common. In the water sector, for example, unit costs of supplying households were higher than supplying industrial and commercial customers, whereas prices charged were higher for the latter. In public transport, fares did not reflect different costs of supply of peak and off-peak travel, or short and long trips; in contrast, transfer travelers were as a rule penalized by having to purchase another fare. Public transport services in Bishkek in Kyrgyz Republic, for example, feature flat fares, and very long routes.

(14) Price discounts (off already low basic prices) and exemptions were rampant, typically favoring pensioners, school children and students, war veterans, the handicapped, as well as some government employees, military personnel, and the police. Russian law, for example, specified 42 categories of privileged public transport passengers. Price discounts and exemptions were available mainly in public transport services, but sometimes also for housing and other utilities, such as water and electricity.

(15) Price discounts and exemptions were typically mandated by national laws, and the question of expenditure responsibility did not arise in the then prevalent centralized system of local government finance. In the process of redefining jurisdiction, functions, revenue raising and expenditure responsibilities between national, regional and local governments, the mandate has sometimes stayed at the national level, whereas the cities were stuck with expenditure responsibility. In other words, the national government law would require a subsidy, but would not make the corresponding budgetary appropriations. Even when the same authority (e.g. city council) granted a tariff/fare discount or waiver, checks and balances of the requisite financial capacity on the local level did not exist.

(16) Legal provisions to adjust prices in line with inflation did not exist. Historically, price adjustments had been made rarely and ad hoc. For example, the first fare increase in the history of Budapest Transport Company (created in 1968) took place in 1985; the next one was in 1989, but then adjustments became annual.

(17) Revenue collection was poor, and there was a high incidence of non-payment by households and institutional clients in case of water, and illegal passengers in urban transport. Budapest Transport Company estimated the proportion of non-paying passengers at 10-17% depending on the degree of access control (e.g. higher in street buses and lower for metro). In Russia's medium-size cities in 1993, it was estimated that 20% of passengers traveled without paying their fare. Bucharest Water Company collected only 68% of its billed revenue in 1995, and by the end of the year had four months worth of accounts receivable; main non-payers were public-sector customers. Non-payment may have been a matter of poor organization and performance of the company, a reluctance due to recognition that people cannot pay (e.g. in presence of months of unpaid wages and pensions, as in several FSU countries), a fear of social

conflict, or a combination of all of these. It has often been stated that the elimination of illegal travel and fare exemptions alone would suffice to equilibrate the accounts of urban public transport companies in some FSU countries.

(18) Bills were often based not on actual consumption but on norms. This was especially the case with water bills, where only the total output leaving the production plant was metered, then "allocated" between various groups of users using standard coefficients. Similarly, subsidy calculations for monthly and other discount passes and exemptions in public transport were based on normative usage rates rather than travel surveys.

(19) In some countries, billing and collection was not done by the service companies but by specialized local agencies for several or all utilities together; the resulting revenue was "allocated" among service companies independent of costs or output measures.

(20) As a consequence of items (12) through (19) together, business revenue (from individual and institutional clients) was with few exceptions lower than direct operating costs (DOC), not to mention the total operating costs (TOC)[5]:

Company (year)	Revenue/DOC (%)	Revenue/TOC (%)
Hungary: Budapest Public Transport Co. (1991)	37	33
Russia: Nizhniy Novgorod Bus Co.(1993)	13	n.a.[6]
Russia: Nizhniy Novgorod Electric Co (1993)	5	n.a.
Russia: Omsk Bus Company (1993)	18	n.a.
Russia: Omsk Electric Co. (1993)	7	n.a.
Latvia: TTP Tram Co. (Riga) (1994)	79	73
Latvia: Imanta Bus Co. (Riga) (1994)	67	59
Latvia: Talava Bus Co,. (Riga) (1994)	73	67
Latvia: Daugavpils Water (1994)	91	86[7]
Turkmenistan: Dashkhovuz Region (1997)	0	0
Poland: Bielsko-Biala Water (1993)	147	81
Poland: Krakow Public Transport (1992)	n.a.	56
Poland: Warsaw Public Transport (1992)	n.a.	80
Poland: Gdansk Public Transport (1992)	n.a.	47

[5] Direct operating costs include wages, energy, materials, payments for external services. Total operating costs include direct operating costs and depreciation. Business revenue may include results from activities other than the primary activity. Some data may include taxes and long-term interest costs in total costs.

[6] Depreciation and financial costs were either not recorded in the accounts of Russian public transport companies, or were negligible.

[7] Based on an estimate of deferred costs.

Azerbaijan: Baku Water Supply (1994)	130	114[8]
Romania: Bucharest Water Company (1995)	105	99

(21) Subsidies were provided by the local and/or higher levels of government to make up the gap between business revenues and costs. In the aggregate, subsidies have figured prominently in local governments expenditures. Even for individual companies, subsidies may have been so large as to be among the largest items in the government's financial statements. In 1990, subsidies to BKV in Budapest, always scrupulously paid by the city and the national government, amounted to HUF 11,197 million ($177 million), equivalent to 0.5% of Hungary's GNP in that year, and also to about 15% of total revenues of the City of Budapest.

(22) Total revenue (business revenue plus subsidies) may not have covered total (accounting) operating costs. In case of critically impoverished cities, total revenues may not even cover direct operating costs. Reasons for these accounting losses were different. Primarily, the level of subsidies required was not affordable to the government, the latter being under pressure financially from several sides. In certain ownership arrangements (e.g. service providers as budget units of the local government), balancing the accounts of individual units was not considered important. Subsidy payment may have been gauged to cover direct operating costs exactly, as has been the case in the case of Riga, Latvia. The government then would decide on ad hoc basis whether and when to provide funding for replacement investments.

(23) The funding gap gradually added up to poor financial state of companies, especially lack of working and investment capital. Different methods were used in response. Depending on the magnitude of financial problems, the array of adaptive actions included reducing/eliminating expansion investments, then postponing replacement, deferring maintenance, reducing services, not making contributions to social funds, borrowing short-term (if facility available and legal), not paying bills owed their own suppliers, and eventually not paying salaries.[9] In this last stage (non-payment of salaries), adaptation (in the case of public transport) meant that drivers and/or conductors would dip directly into the fare box. In the case of urban public transport, if this process lasted long enough, as it did in several Central Asian countries, municipal companies became defunct and the market was taken over by less regulated private providers.

4. The Structure of Bank-financed projects involving urban utilities

The Bank-financed projects involving urban public transport and water utilities have had a dual focus, aiming first to sustain services deemed essential for the population

[8] Total costs include profit tax. Without it, total cost recovery ratio would be 123%.

[9] Even in cases where there has been no nominal funding gap, e.g. for urban public transport companies in Poland, companies idled parts of the fleet, effectively reducing services in order to meet cost ceilings.

and local economy, but also to restructure the service suppliers to ensure their financial sustainability and to improve their efficiency. The approach was to try to promote a commercial orientation and to introduce organizational, technical and financial improvements with this objective in mind. Project structure has followed directly from the foregoing diagnostic statements about utility companies. The hard, investment part of any given project invariably has involved the replacement of and to a lesser degree additions to equipment and infrastructure. The soft, reform part consists of actions generally falling into some or all of the following five categories.

A. Internal restructuring of service companies:

- re-organization for higher efficiency;

- elimination of departments supplying non-core services, either through outright closure or first by setting them up as subsidiaries then offering them for sale to private parties;

- introduction of new work methods and tools (e.g. information technologies), accounting standards, and financial management;

- staff downsizing and/or changing the skills mix; upgrading knowledge and skills of managers and staff; and

- a shift in investment and development policies, to ground them on economic criteria.

B. Legal changes involving service companies:

- changes regarding the status, and ownership of service companies typically by setting them up as public-owned but separate companies operating under commercial law;

- re-allocation of decision authority between service companies and the local government in matters such as service parameters, prices and remuneration, staffing, wages, budgeting, and operations-oriented matters; and

- introduction of a performance (service) agreement, as a common instrument to detail the new relationship between service providers and the local government;

C. Demand-oriented changes:

- changes in output, e.g. redesign of services and service networks in urban public transport, or, in the water sector, a change from emphasis on quantity produced to quality of services delivered; and

- reform in pricing/subsidy and revenue collection policies.

D. Market-oriented regulatory reforms

- reforms meant to break up the monopoly of traditional service suppliers and enable private sector entry, by introducing subcontracting, multiple service suppliers, and concessions; and

- introduction of private sector operators through management contracts, with a view towards privatization of service provision in the future.[10]

E. Local government reform:

- building institutional and financial capacity of the local governments so that they could handle new functions, decision powers and responsibilities given them by decentralization.[11]

Project make-up varied depending on the sector features; initial conditions in the market, company and the government; the strength of the forces for change; and the capacity to implement it. Short-term objectives depended very much on what are locally the most critical "bads" and the most desired "goods". In Russian medium-size cities and in Dashkhovuz region in Turkmenistan, the focus was on restoring services considered essential to local economy and/or households, and increasing sustainability by lifting user charges from abysmally low (even zero) levels. In Bielsko-Biala, Poland, the key reform objective was to change the tariff structure of the water company and increase tariffs in real terms to catch up with accounting costs redefined to reflect economic costs. In Budapest, where the public transport system had faced falling demand, the approach involved a combination of down-sizing of the company (divestiture of auxiliary activities, staff reductions), reduction of service network and standards, increases of internal efficiency (through investment among other things), and shifting the burden of financing towards users.

[10] Management contracts, leases or concessions are still a rare item in a Bank-financed urban public transport or water project in ECA transition economies. Interestingly, first franchise arrangements for urban public transport services, based on competitive bidding, were not introduced under Bank projects in EE countries but in Kazakhstan and Uzbekistan.

[11] There was not one project in the portfolio which had a primary focus on water or urban public transport while also involving major local government reforms. This last was typically done through municipal development projects, some of which had smaller-scale water or urban public transport investment components, without associated reforms of service companies.

5. Building blocks specific to price/subsidy and revenue-related issues

This paper now turns to its main subject, the actions under Bank-financed urban public transport and water projects, which address price/subsidy/revenue aspects of utility companies. The objectives here were twofold: (a) set the service companies on the road to financial health, independence and sustainability; and (b) shift the revenue burden away from government budgets towards user charges.

Based on a review of project documents for the current portfolio, the following actions appeared as the most common strategic building blocks used, listed here in the order of ascending complexity.

Improvement in revenue collection. Because this activity required little change in the existing framework, it was used in most projects. In urban public transport companies, it focussed on passengers traveling without valid ticket, involving improved inspection, employing conductors with a double role of ticket sale and control, increased fines, and improved enforcement of fines. A first-ever survey of illegal travel was carried out for the Budapest Transport Company.

In water companies, improving revenue collection involved much more than improving the accounting and billing service, and introducing sanctions. It was as a rule linked with changing the price structure, which in most cities had been based on flat per capita rates, to reflect actual consumption. The key technical problem here (other than affordability) has been that apartment houses, in which most urban population live, did not have apartment-specific meters, and installing them would have been prohibitively expensive. Also, there are endemic problems of broken meters (in case of industrial customers) and user-side leaking fixtures. Once consumption based bills are introduced, even at the apartment-block level only, user-side leaks acquire considerable importance. Social assessments in Baku, Azerbaijan indicated that households did not have enough funds to repair leaky faucets and valves, pursuing instead a "monthly leakage control" of stop-gap measures, cheaper than a one-time complete repair. Another problematic dimension of introducing metering and consumption-based billing for water has occurred where collection is done for several municipal utilities on a common bill, as in Russia, for example. This may require a wider-scope reform, which is typically more difficult to achieve than for one sector at a time.

Improving accounting systems and standards. Most commonly, this has been an attempt to improve basic information in service companies, regarding output, demand, costs and revenues. This may have been as basic as introducing accounts where none existed (as in Turkmenistan water companies). Going a notch higher, the change involved moving from government-type accounts (e.g. annual budget, no balance sheet, no depreciation of equipment used by individual budget units of a city) to those conventionally used by well-run public enterprises. In some countries, accounting standards and practices were being overhauled in line with new national laws for commercial companies. In countries preparing for entry into the European Union (Poland

and Hungary, for example), new accounting rules for companies operating under the Commercial Code conform to internationally accepted accounting standards, whereas this is less the case with new laws in FSU countries. When the divergence between the existing or new national standards was substantial, as for example in Russia, the approach in Bank-financed projects has sometimes been to recommend two sets of accounts, one legally mandated and another in line with international practice, the latter expected to reflect better the real costs of operation (cf. Russia Water and Wastewater Sector Study). Finally, in parallel with adopting new accounting standards, companies may have been required to carry out an asset valuation and balance sheet restructuring, so that the new accounts reflect better the real costs of the operation.

Increasing prices. Tariff/fare increases were included as loan covenants in nearly all water projects, but only in some urban transport projects. Covenants would typically specify annual price increases: (a) according to specific rates, or (b) according to a formula based on changes in one or more official price indices plus agreed real increases (as for example in Bielsko-Biala Water Project). Alternatively, to add flexibility to the reform package, price increases were not stated as loan conditions, but placed in action programs and/or performance agreements, the overall adherence to which was included as a loan covenant.

Changing price structure. In the water sector, this mainly involved changing tariffs from flat, norm-based rates to consumption-related, with or without block tariffs, and/or shifting the balance of cost recovery from one class of users to another, typically from institutional users to households. In some projects, changing the price structure was an up-front loan condition, or it was only required to commission a study to develop a new price structure (as in Turkmenistan, where water price had been zero).

None of the urban public transport projects in the portfolio included a loan condition related to price structure. Coming closest to addressing this subject is the Budapest project, with an undated loan covenant referring to the creation of a Regional Transport Association. This would, by definition, require a reform of currently separate price structures of the three major operators (national railways, inter-city bus company, and the urban transport company) and their amalgamation into a unified, area-wide transport system, with transfer privileges for passengers.

Comprehensive approach to company finance. A set of overall financial targets for the water or public transport companies included in the project was defined, the fulfillment of which would indicate their reaching good financial health in terms generally accepted in western countries. Indicators were most often related to cost recovery (working or operating ratio, or their inverse), but may also have addressed the level of working capital, debt, net income, or return on assets.[12] Some projects used

[12] Compare to Bank-financed public transport projects in Chinese cities where a reduction in annual subsidy in nominal or real terms was also included as loan conditionality.

"contractual" cost recovery targets without separate and additional references to costs or prices. The Borrowers were left to decide which weight to place on revenue increase and which on cost reduction. Overall, given low initial cost recovery scores, the judgement underlying financial conditionality has been that the scope for cost cutting was much more limited than the scope for price increases. In the Russia Urban Transport Project, no fare targets were specified, but project documents left no doubt that improved cost recovery would come mostly from the revenue side (higher basic fares, reduced exemptions, better collection). In Budapest Urban Transport Project, the contractual indicators were overall cost recovery ratios and percent of illegal travelers, in addition to some productivity indicators. No specific fare increases were cited in the Loan Agreement, though supervision reports leave no doubt as to the focus on fares. In Budapest, however, a comprehensive action program to reduce company costs was agreed, though without any numerical targets on unit costs or staff levels. In Riga, urban transport companies agreed to a wide-ranging set of targets, with separate references to fares, various aspects of productivity, and overall financial indicators.

The agreed increases in cost recovery range from modest to considerable. In Budapest, cost recovery (relative to total operating costs) is expected to move from the initial 38% in 1995 to 50% in year 2000, a change of 32% over 5 years. In Russia Urban Transport Project, the initial cost recovery was 12% in 1994, and the target was 60% to be reached by the end of 1997. This represents a change of 400% over 3 years, albeit measured relative to direct operating costs only. Underlying such different magnitudes of change are different initial positions between the Hungarian and Russian cases, but also different cost structures of companies. BKV, Budapest is a very large company with a considerable amount of specialized infrastructure (for tramway, metro and suburban railway lines), whereas Russian companies operate only street-based bus lines, without any specialized infrastructure.

Introducing alternative suppliers. Generally, the overriding objective behind this approach is to expand/improve services through the mobilization of private capital and know how. It is included here because it may also be directed at cost recovery in the sense that a portion of the market will be carried without subsidy. The latter may occur because a competitive setting induces private operators to achieve lower operating costs and/or because they are less willing to accept uncompensated fare privileges and exemptions. In the EE/FSU portfolio, this approach has so far been used as part of project design only in two urban public transport projects. Under the Kazakhstan Urban Transport Project, it was agreed to open the public transport market in Kazakh cities to any qualified entrant, subject to fare regulation. In Budapest, a more modest pilot program to tender some lines to private operators was included as part of the loan conditionality, the objective being to demonstrate a potential for cost reduction to both the Municipality and Budapest Transport Company, hitherto the monopoly operator.

In addition to the above building blocks, the following three aspects of the projects in the urban public transport and water portfolio were related to price and subsidy issues.

Affordability analysis. The common approach to affordability in project preparation has been to check the level of prices agreed to under the project against some level of household or per capita income for the area. Monthly household expenditures for public transport and water, based on an assumed frequency of travel, or consumption rates, respectively, were expressed as a percentage of average household income and compared to rule-of-thumb benchmarks graced with the name of "international standards". If transport expenditures were less than 10-12% and water expenditures less than 2-3% of the average household income, the prices were considered affordable. Under some projects, affordability analysis was extended to check the impact of future prices on lower income households, including people on minimum wage and minimum pension, with and without changes in consumption level. Bielsko-Biala Water Project, for example, made such an affordability check for six income/consumption scenarios. Older projects tended to be skimpy in this regard, whereas the newer projects evidently have profited from the numerous poverty studies done for ECA transition countries and/or city/regional social assessments commissioned in tandem with specific lending operations. Social assessment were mainly done for the Central Asian FSU countries.

Willingness to Pay. Under the more recent projects, affordability analyses were complemented by exploring the users' willingness to pay, using information collected in social assessment surveys.

Public Education. Since social assessments have indicated the degree of public ignorance about the real cost of services and their link to prices, some projects have included a public education and dissemination components. Bielsko-Biala Water Project in Poland, for example, included campaigns focusing on water conservation, costs, charges and the level of service.

6. Evaluation of experience

Most urban public transport and water projects started in the early 1990s are still being implemented, so the results are of intermediate nature and have not been systematically gathered. The reported experience indicates that best progress has been achieved in maintaining essential services and improving company organization and assets. As regards price/subsidy/revenue reforms, the results are mixed and, on the whole, less than expected. The best results appear to have been achieved in countries which have made the largest overall progress in transition. The water company in Bielsko-Biala, Poland, is on target for overall cost recovery and other financial indicators, having increased tariffs as agreed. Poland, of course, has been one of a few transition economies which has posted considerable economic growth in recent years, 7.1% in 1995 and 5.9% in 1996 in GDP terms. Companies in Romania, Bulgaria, Latvia and Azerbaijan have fallen behind relative to the targets, and in Turkmenistan all reform is at a standstill. In Baku Water Project, for example, overall collections were approaching 70% towards the end of 1998, short of the initial (80%) and revised (75%) targets for that year; the

collection rate for residential users is still only 25%.[13] The sheer number of households attached to a single meter makes conservation measures and bill enforcement very difficult. For all water projects in the Caucasus region, tariff increases are essential but are overshadowed in the short term by the need to improve on low collection.

One of the reasons for some companies to fall behind in cost recovery has been that water usage decreased sharply, so revenues decreased in spite of higher tariffs and improved collection (e.g. in Daugavpils, Latvia).[14] The change seems to be due much less to price elasticity of demand than to the reduction of industrial demand arising from economic contraction and to the fact that better numbers are available. What was previously called demand was often largely leakage and waste. Better readings are becoming available now with the introduction of metering at the consumption site, though still at the apartment block rather than apartment level. Beforehand, billing had been based on metering at the point of production, then allocated between industrial, commercial and residential customers using standard and arbitrary consumption coefficients, without regard to possible leaks. Though unsettling in the project implementation context, this is a positive development, since it is providing incentives for better system maintenance and paying more attention to price structure. Moreover, in some cities, the newly discovered downward trend in consumption has led to the identification of spare capacity in water and sewage processing plants, and to shelving of expansion plans.

In the public transport sector, companies in 9 out of 13 Russian cities have met the cost recovery target of 60-65% (based on direct operating costs only) agreed for end-1997. Five cities now recover 90% or more. In the worst case (Rostov-on-Don), the company made it to 46%.[15] In Kazakhstan, the companies have met and exceeded the loan covenant expressed as the ratio of single-fare price to its "economic costs." Cost recovery, however, is lagging because most travelers use season passes, so the weight of single-fare tickets in total revenue is not high.

The successful performance of the Russian urban public transport companies as regards cost recovery may be due in large part to the approach used to qualify cities for inclusion in the Bank-funded project. In contrast to the usual approach of preparing an investment project in a given city and then negotiating the depth and scale of the reform program, the team working on the Russian project first selected the parameters of the

[13] These revenue collection targets were not agreed under the Bank-financed project, but under the parallel EBRD-financed project. Various sources disagree on the starting position with regard to revenue collection rate, some quoting 10% and others 55%.

[14] Unrelated to Bank-financed projects, drops in the quantity of water billed of 30-70% were recorded in Poland and East German cities.

[15] The cited numbers are time specific, with considerable variation from one year to the next. Altogether, they should be treated as indicative only. Utility companies in FSU countries are still unable to produce accounts good enough for the total cost recovery to be measured with confidence.

reform agenda, then worked to prepare investment projects in cities which had made formal commitments to that agenda. This process of self-selection worked in stages, with increasing cost recovery targets set for appraisal, negotiations, tendering and a mid-project date. More cities than could be accommodated in the initial operation had been willing to meet the terms, and numerous cities have since expressed interest in the next lending operation.

In Budapest, BKV has been transformed from a state enterprise into a joint-stock, limited-liability company, still in public ownership but governed by a board of directors. It has streamlined the organization, reduced staff drastically, pruned its service network, reduced service frequencies on some lines, divested secondary activities, and increased fares regularly. Efforts to increase revenue collection have given some modest results: Budapest has stepped up its inspection and enforcement program for public transport, and reports a decrease of illegal travel from 11% to 7% on metro and suburban rail lines. Unfortunately, there has been no change in high rates on tramways and buses (13%) and trolley-buses (15-18%), which are much harder to control. The system average at 11% remains much higher than the target of 7%. The action on the reform of the price structure, in the framework of establishing Budapest Transport Association, is stalled because of difficulties in agreeing the revenue allocation among the three operators involved. The focus is now on achieving an intermediate step, a mini-association covering only passengers who use more than one operator for their daily commute.

For 1997, BKV's cost recovery was on target, reaching 43%, helped in part by one-time sales of real property. Unfortunately, the estimates for 1998 indicate sliding back towards 40%, against the target of 45% for that year, and 50% in the year after. Worse yet, BKV's accounts are in the red by substantial amounts. The municipal government in Budapest has been firm about reducing its own operating subsidy to BKV in real terms, (down 53% in real terms since 1992) because it is trying to make the city credit-worthy on capital markets. The national government on its part discontinued its block subsidy to the Budapest company in 1997, though it has continued paying compensation for non-economic fares. In another legal development, in January 1998, the Government reduced the threshold age for free passes to 65 years, without appropriating funds to pay full compensation for this. The matter is not helped by the fact that the annual performance agreement is specific on services, but non-specific on productivity increases, staff cuts and remuneration for services. The municipality prefers to make occasional, item-specific capital grants to BKV, but these have not resolved the funding gap. BKV have resorted to bank overdrafts, payment arrears, and short-term loans to pay for capital investments. With fare increases reaching their ceilings in terms of the extra revenue expected (because of price elasticity and political resistance by households), BKV will be pushed towards deeper cost cuts and service reductions. The funding gap is largely a measure of how painful these actions will be.

The experience with urban public transport in Riga is of special interest. Three public sector companies provide services, two running street-buses and one running tramways and trolley-buses. Due to a three-way tug-of-war between the city

administration, its elected council and the electorate heavily weighted with residents enjoying fare discounts, fare increases did not take place regularly or to a sufficient magnitude to keep the companies on the agreed recovery track. There was no fare increase between January 1996 and June 1998, while the inflation rate was about 25% per annum.[16] The three service networks have overlaps the removal of which could bring some economies, but each operator resists being the one to cut services. Cost recovery stayed within the range of 59-74%, and none of the formal financial targets was reached.[17] The subsidies paid by the city to public transport companies cover more than variable costs, but not enough to permit the agreed pace of financial recovery and increased independence, with its own positive effect on the efficiency of operation. The accounting loss in 1997 was about $4.8 million; if asset depreciation were accounted for properly, the loss would have increased to about $14 million. As in Budapest, Riga City Council approved some additional capital subsidies to the operators, which go some way towards maintaining service levels and reducing costs. Since the companies remain in poor financial health, the Bank took a tough line and by the end of 1998 fares were increased to a satisfactory level. However, the issue of fare discounts to selected groups of riders still remains an unresolved problem.

It is of interest to place the cost recovery experience in Budapest, Riga and medium-size Russian cities, achieved using the leverage of Bank-financed projects, alongside that of Polish cities, which had no such loans. In the largest Polish cities, with systems including both tramways on separate right-of-ways and street-based buses, cost recovery ratios are 50-66% (Warsaw has 64%, excluding the results for its new metro line). In smaller cities, which tend to have only street-based buses, the cost recovery range is 70-100%. Poland, that used a "shock therapy" approach to transition, has achieved economic growth better than most transition countries, has the highest auto ownership among them, and also has a highly evolved social assistance system.

7. Where do these trends lead?

It is fair to say that, overall, the track record on price and cost recovery increases in Bank-funded urban utilities has been modest, the results in Russian transport and Polish water projects notwithstanding. It is useful to distinguish two different levels of the problem of persistently low cost recovery. If subsidies are paid fully at a level sufficient for the company to be considered in good financial health, then all other things being equal the key negative consequence of the low cost recovery fall on the subsidizing authority.

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[16] When the City Council of Riga finally raised fares of single-ride tickets by 28% in 1998 (see below), it also adopted a policy of regular fare increases in subsequent years, until a 15% profit margin is reached. Annual increases would be at the discretion of the City Administration, but subject to a ceiling of 5% above inflation.

[17] Unusually, the tramway company has the highest cost recovery, in spite of having massive infrastructure.

The consequences are substantially worse if the agreed subsidies are not paid (leading to an accounting loss) or if the level is not sufficient for the company to operate normally. This is the case for all urban water companies in EE/FSU countries east of Hungary and for all public transport companies included in Bank-funded projects.

A policy of un-funded commitments, i.e. forcing the service provider to charge uneconomic prices while paying him less than adequate compensation, if pursued over a longer term, leads to a progressive and un-managed decay in services and the physical plant of the utility in question. The system tends to the level of service which the funds made available can pay for. An extreme case of this process has been observed in Lahore, Pakistan. Funding gap started through a pay dispute with the staff of the state-owned transport operator. Gradually, all non-current expenditures ceased, then most non-salary expenditures also ceased. The company lingered on for some 10 years after it had effectively ceased to provide (urban) services, its vehicles having been immobilized for lack of parts, down to some 45 buses (in a city of 5 million population). Only the employees' union remained active, until a collective severance package was agreed in 1997.

What happens as the traditional utility company decays is different in urban water supply than in public transport. Water is a natural monopoly in urban areas, so customers have few other options available. In Odessa, Ukraine, cost recovery of the water company was 40% in 1996, and other utilities were in a similar situation (Davis and Whittington, 1998). The total funding gap for all communal services in Ukraine was estimated at about 50% of the difference between non-recovered operating costs and the budget available for subsidies. The residential water bills in Odessa would have to increase three to ten times to fully cover the costs of provision, but this is out of the question. Pensions (relevant to 45% of the population of Odessa) are set at the poverty level, and government employees are often paid with long delays. The system has deteriorated through 'strategic disinvestment" to a point where water has become unsafe for drinking, is available for roughly one-third to one half of the day, and pressure is variable depending on location within the city or the floor height. Losses to leakage are probably enormous (and unaccounted for). Well-to-do households buy bottled water, but most households adjust by storing piped water, and treating it themselves.

In urban public transport, options for travelers within and outside this travel mode are several. In the above cited example of Lahore, owner-operated minibuses used unimpeded market entry to fill the supply gap left by the public operator. Mini-bus operators did not allow any fare discounts, and received no subsidies. Given that minibus fare was set very low, the resulting level of services in terms of frequency, reliability, safety and comfort has been abysmal. Faced with poor services and severe street congestion from mini-buses, the authorities are now attempting to introduce a competitive franchising system for large private operators or operator associations, this time facing the resistance of thousands of minibus owner-operators.

Similarly, the funding gap and the deterioration in the public-owned transport services in transition countries are often accompanied by market developments in the private sector, some by design and some spontaneously. In Kazakhstan, where the private sector enters by tendering for specific routes, this appears to be a largely positive development since there had been under-supply of services.[18] Likewise, in Riga, the city administration is issuing permits to taxi-buses in large numbers, without an explicit regulatory design. Taxi-buses are said to provide higher-priced, higher-quality services, finding a large demand niche in the growing, but as yet car-less, middle class.[19] A two-tier public transport system evolves with the "regular" operator, whose services are going down in both quantity and quality, retaining low-income captives and exemption/discount holders. This practice may gradually turn the policy of granting fare/tariff privileges on its head.[20]

The evolution of a parallel private supply market may provide service relief for some segments of the population, reduce need for public capital investment, and demonstrate the case for greater cost-effectiveness in service provision, especially if based on competitive tendering and contract enforcement.[21] The key aspect of this development, though, appears to be that private providers generally do not accept (or are not forced to accept) fare discounting and exemptions. Allowing a parallel system can thus be seen as an effective instrument to get rid of politically sensitive privileges.

Whatever the benefits of parallel systems, their introduction should not imply a *laisser-faire* attitude towards the deterioration of the existing public-sector companies, left to provide services matching the level of tariffs paid by their "privileged"

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[18] If, however, the existing downward pressure on the regulated fare persists, Kazakh cities may resemble Lahore before too long.

[19] Private operators in Riga charge a flat fare of 25 sants, compared to 18 sants for the three public transport operators (after a fare increase in June 1998); the latter also have heavily discounted seasonal passes, used by most passengers.

[20] For one example of evolution towards a two-tier public transport system and its impacts, see the study of public transport reforms in Casablanca and Rabat, Morocco (World Bank, 1989). Yet another twist on the two-tier approach is in Turkey, in cities such as Bursa, where the paratransit services co-exist with a reasonably efficient public-sector operator. The latter, however, charges lower prices, and therefore requires a public subsidy, without any claim to serve a poorer segment of the market.

[21] The franchising program in Kazakhstan has been implemented, in parallel with the Bank-financed project propping up the public-sector operator, an operation for which the jury is still out. Similarly, in Guangzhou, China, 6 private joint ventures provide 1,400 buses out of the city's total of 4,500 vehicles, and appear to have stimulated the public operator to better performance. These developments are in striking contrast to Budapest, where the pilot to subcontract some lines to private providers has been delayed by about two years, and is only now in the tendering stage. The delay is due to the reluctance of BKV, the beneficiary of the Bank-financed project, to relinquish any part of its dwindling market, even if the sub-contracts would involve just 5% of its services. The company is aware just how difficult it would be to convert benefits of subcontracts into explicit cost savings, not least because of strong resistance by the union to further staff reductions.

passengers.[22] This is an approach costly in public finance terms, not to mention that some of these companies may have just purchased new vehicles from Bank-supplied funds, which they have difficulty maintaining for lack of working capital. The example of this is in Almaty, Kazakhstan, where the growth of alternative modes is accompanied by a persistence of grave problems in the traditional public company, which is not strong enough to prevent the emergence of competition and is being financially starved by the local government. It may be much better to terminate such a company, even if it had just been financed under a Bank project, than let it linger indefinitely. It would of course be much better to gauge the survival capacity of the public-sector provider before the loan has been approved. More importantly, the experience in London shows that the evolution of parallel private and public provision may be an entirely positive development if it is done within a framework of for-market competition, in which both private and public-sector operators thrive.

8. Sources of resistance to pricing reforms

The resistance to change is generally strong. Because all the main actors in this context push more or less in the same direction generally, back into the past, it is quite difficult to initiate and sustain change.

Local governments resist pressure to increase prices of services deemed essential because of a combination of motives: (i) a genuine concern for affordability; (ii) fear that their constituents will vote them out of office, especially in the presence of large bodies of marginally employed workers, pensioners and veterans; and (iii) expectations that price-induced demand drop may generate problems elsewhere, for example a shift to automobiles in urban transport, or excess labor and/or system capacity, which they wish to avoid dealing with. Similarly, they may resist changes in the scope and standard of services because they themselves may have instituted these services in response to pressure from their constituents.

The resistance by local governments to paying full compensatory subsidies to a given utility company may come from simply not having enough funds. Local taxing authority and the tax base are both very constrained and unable to cope with the sudden expansion of responsibilities being devolved to them under the rubric of decentralization. The competition for subsidies at the local level is fierce. There is also a visible tug-of-war between city and national governments when it comes to inherited subsidies, especially in capital cities, where non-payment by the city may be a tactical move. Also, good financial planning is being learned slowly. In some cities, even the basic "western" concepts of municipal and company accounting have yet to be fully understood and assimilated, even though they have been nominally adopted. Alternatively, less-than-full payment of subsidies may be a part of a sophisticated financial policy (as in Budapest).

[22] See the case of Rabat in the above cited Morocco study (World Bank, 1989).

Apart from the capacity to pay, local governments may prefer to retain the position of dominance over the newly "autonomous" service companies, especially the power of deciding on capital investments, an essential part of the old patronage system. Dominance would diminish as the financial position of enterprises improves and managerial prerogatives of enterprise managers increase. There is yet another facet of this issue: at a stage where financial controls are weak in many countries, there is reluctance to inject cash into companies with low debts for fear that it will not go into best uses. Hence the governments' targeting of the subsidy payments to the level of direct operating costs only. For this reason, in situations of excess capacity and low debt, present more in water and power sectors than in urban public transport, it has been recommended that financial restructuring swaps equity for debt (Gray, 1995). Debt payments are then seen as payments for past investments in infrastructure and equipment.

Many variations on the above themes are present in practice. Local politics and generally the political economy of reforms in the utility sector have been neglected aspects of Bank-financed projects, in spite of well-known maxims such as the governments' preference for the short-term over the long-term, or the prudence of tapping revenue sources in the order of increasing political sensitivity (Dillinger, 1994).

National governments are generally less present on the local scene than before, especially as regards urban utilities (in contrast to, say, public education). Still, some national governments cling to the practice, so popular under socialism, of granting preferential tariffs and exemptions for essential services to some categories of people. They have, at least in some countries, managed to pass expenditure responsibility to lower-level government, but retained the mandate authority, hence a costless political/moral credit. In Russia, this matter has taken on some peculiar forms. The mandate for privileged public transport fares has been given up formally by the federal government, but the local governments are reluctant to make the appropriate changes in pricing rules, awaiting "instructions from above". In other cases, as the political merry-go-round turned from one election to another, one national government may give up the mandate and then another one would vote it back in, as cited above for Hungary. Finally, some resistance to price increases may come from ministries of finance, because of the concern that price increases will lead to a stronger pressure for general wage increases. In some transition countries, Hungary for example, public transport fares are included in the basket of consumer goods used to calculate official inflation indices, which are linked automatically to wage increases. Yet another twist on this theme, also present in public transport in Hungary, is that government subsidies to service providers are linked automatically to fare levels.

Utility companies themselves may be against price increases, as it is evidently much easier to have to rely on government funding than to have to be financially self reliant. Depending on the elasticity of demand, price increases may lead to demand and business revenue reduction, intensifying the pressure to reduce services and ultimately the ranks of their staff. A similar resistance exists with regard to cutting costs, because of a general reluctance to reduce staff which this often involves. Enterprises also resent being

pushed to make new efforts when their owners (local government) are not holding to their side of the bargain, e.g. paying agreed subsidies. As individuals, also, company managers and staff resist working harder after years of erosion in their own standard of living (falling real wages and benefits).

Households in transition countries have the strongest motives to resist tariff/fare increases in essential services like water and urban public transport.

First, real wages have fallen drastically and --in some countries-- are still falling. Also, what is called "discounted/preferential prices" in this paper had not been perceived as such by citizens, but as a part of a seamless cash and non-cash wage (World Bank, 1994). So, a fall in a cash component of the package has been accompanied by a fall in the non-cash part. Even worse, in some FSU countries, nominal wages and pensions may not be paid on time, sometimes for months or longer. The situation of the new poor, especially large families with unemployed adults, has been particularly precarious. As cited above, as many as 40% of total population of transition countries have fallen below the poverty threshold,.[23] All in all, some people simply could not and did not pay for services.

Second, a transition from enterprise taxes to personal income taxes is still at an early stage of concept and implementation, so the link between subsidies for services and personal income taxes has yet to be established in people's minds. Conversely, the relation between service charges and personal incomes always was and still is all too obvious.

Third, people are often being asked to pay more for worse services. This is more the case in FSU countries, and less the case in EE. Moreover, the evidence of inefficiency of providers conveys the impression that the fare hikes may not be fully justified.

Fourth, price increases for many essential services (and often essential goods too) may be concurrent. Taken together, these require bitter adjustments and trade-offs, especially for the poor. In this light, measuring affordability for individual utilities against "international standards" expressed as typical shares of household budget is pointless. It is the affordability of the "basket" of goods and services purchased by households that needs to be assessed.

Fifth, especially strong resistance to increased prices is from those who have enjoyed a preferential status, of which the pensioners and various veterans (even if not poor) are the most numerous and best organized as a political force in some countries (e.g. Latvia).

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[23] This number includes both urban and rural poverty, with the latter being more significant in most countries.

Sixth, the demand may be quite inelastic, particularly in the short run, because choice is very restricted. This is easily understood in the context of water supply, but in EE and FSU countries it also holds for urban public transport. Auto ownership has been and remains relatively low in many cities, implying a high dependence on public transport and walking by a great many people. Adding to this, accessibility patterns in socialist cities have a number of peculiarities. The location of residence has not been a matter of choice but of allocation. Residential and job mobility were and still are very low compared to Western Europe and the U.S..[24] Planned socialist cities have residential density increasing at the urban periphery, where large-scale, high-rise apartment complexes were built, unfortunately without many services. This tends to increase the length of both journey to work and for all but the most essential shopping and other services. Rationing and shortages endemic in early stages of transition also intensified the need to make multiple trips. Another common feature, which is relatively unknown in the West, is travel to vegetable patches, stemming from the government practice of giving people small plots of agricultural land at city margins (not necessarily close to their residences) where they were free to grow food for own use and for sale. Pensioners, for example, who normally do not need to make the daily journey to work, may have to make a daily trek to buy food, work in vegetable patches, seek medical care, etc. For most, reducing the frequency of travel is not an option.

Resistance to price increases may take several forms. Once the higher prices are introduced, people may behave like "rational economic actors", reducing their use of the services involved, i.e. use less water, travel less by public transport or switch to walking or another mode. Or, they may refuse to pay water bills, and/or travel without a valid ticket. On the political front, given that most transition countries now have electoral democracies, the citizens may try to prevent price increases from being adopted. If increases are adopted, the citizens may vote the current government out of office. In Riga, for example, the failure to increase public transport fares in either nominal or real terms stemmed from a reluctance of a party in power to do so in the year preceding municipal elections; the opponents won anyhow, but were reluctant to increase fares because their electoral platform promised that they would not.

9. An Agenda for future Bank lending

When the set of initial conditions listed above is juxtaposed against the list of blocks used to build the first batch of Bank-financed urban public transport and water projects and the relevant implementation experience, the following aspects are seen to dominate the agenda for future projects: (1) the capacity of the local government to fund

[24] Many people commute to work from the hinterland of large cities, even from other cities in a 100-km radius. This was made possible in the past through low intercity fares, requiring large subsidies to state railways and bus companies. Low intercity fares in addition to flat fares within urban areas has discouraged densification of cities. Dismantling these arrangements is underway in many countries, in the context of restructuring and privatizing inter-city carriers, with battles being fought at the national government level.

their subsidy commitments; (2) the tactic of leveraging price/subsidy reforms; (3) unbundling of subsidies from the questions of financing basic services; (4) a deeper and more inclusive focus on affordability; and (5) longer-term pricing considerations at the high end of cost recovery: how far should it go? In addition, the agenda is supplemented by brief statements on subjects deemed essential though outside the narrow subject of this paper: (1) the cost dimension in cost recovery equation; (3) the relation between service levels and costs; and (3) use of markets and private providers as instruments to increase financial sustainability of supply and improve services.

Ensure local capacity to pay agreed subsidies

While the process of reforming the service companies and their pricing and subsidy system continues, the non-payment of agreed subsidies accelerates the deterioration of both services and productive assets. It also slows down the reform process, as was illustrated above by the case of public transport companies in Riga and Budapest, where non-payment flies in the face of the reform objective to achieve autonomy for service companies, and slows down their drive towards efficiency. Last but not least, the non-payment of operating subsidies may undermine the proper maintenance and use of the very equipment and infrastructure that the Bank project financed, thus leading to a failure of the investment part of the project. These points are entirely independent of what magnitude of subsidy reduction or cost recovery had been adopted under a Bank-funded project.

In the current batch of projects, the focus of the financial analysis commonly has been on the public utility, the ultimate recipient of the loan, much less (if at all) on the relevant local government. When municipal finances were subjected to scrutiny, this was commonly from the point of view of the credit-worthiness of the city as a borrower of capital funds. In Budapest Urban Transport Project, for example, loan conditions include a debt ceiling (relative to revenue) for the Municipality of Budapest. This is of course more an issue of capacity to repay the Bank loan than a full-scale analysis of municipal revenues, current costs, aggregate subsidy loads, capital investments, etc. In the portfolio, there is not a single project where such a full-scale financial analysis of the local government has been done.[25] To correct this lacuna in project preparation, projects should be required to: (a) pay greater attention to the financial capacity of the local government, and (b) use covenants to ensure that agreed payments are actually made. As noted above, the insistence on paying agreed subsidies is not an expression of preference or support for subsidies as such, but rather a matter of ensuring that project objectives are met.

Subsidy payment covenants traditionally use: (1) specific annual or quarterly amounts, typically in real terms, fixed or variable, usually at a descending rate; (2) a

[25] That municipal finances have not figured prominently in so many projects has been due to the fact that many cities in FSU countries were only making first steps towards financial autonomy, and there was very little to analyze.

subsidy formula specified in a service agreement (or directly in the loan agreement), for example an amount per passenger carried or bus-km (or a combination) in public transport; or (3) an unspecified amount sufficient (in addition to business revenue) for the company to avoid an accounting loss or maintain a specified level of working capital, operating ratio or some alternative financial indicator.

Covenants with unspecific sanctions tend to be ineffective against violations, such as non-payment of subsidies. It may be necessary to take a leaf out of the arrangements for Bank-financed infrastructure loans which have faced the problem securing adequate flow of counterpart funds for investments. As part of the conditionality under some of these projects (e.g. municipal loans in Georgia), it is required for the government to deposit agreed amounts in bank accounts accessible by project implementing agencies before the procurement of sub-projects is allowed to proceed. An extension of this thinking is for service providers to honor discounts and exemptions only if prior payments have been made (this in fact was applied in one of the cities participating in the Russia Urban Transport Project).

Leveraging reforms

It is generally agreed that keys to a successful reform lie in the provision of incentives and the "selling" of the reform to the potential gainers and losers. As noted above, reforms in pricing of essential services of the kind pursued by Bank-financed projects encounter much resistance because it appears that most actors lose in the short run if the reforms are implemented. The provision of incentives and the explanation of why and how the short-run losses will be converted to benefits become even more important in this context The success in reaching cost recovery targets in the Russian Urban Transport Project and a lack thereof in the Riga case indicates that the concept of self-selection and up-front reforms holds much promise on both of these counts. "Up-front reforms" means that the incentive of loan funds remains intact until some hurdle in the reform process has been overcome. Leaving this to be done in parallel with the implementation of the physical part of the project, or at its end, reduces/removes the incentive.[26] As for self-selection, it must mean that the city mayors did their own "selling" of the reforms before committing them under the project.

Another valuable aspect of the Russian project is that self-selection bypassed the analytic approach to the problem of affordability. Normally, the project team would have looked at the prices implicit in the desired cost recovery rates, calculated them in terms of monthly household budgets, and judged them "affordable" for average income recipients. The implicit assumption is that because some price level is "affordable," the probability

[26] The crisis in service delivery in client cities, often the stimulus for a Bank project, tends to take a strong hold on the project preparation process to the detriment of the reform, which tends to be almost an afterthought, certainly so in the eyes of our clients.

of the price increase being adopted is acceptable.[27] There was no such affordability analysis in the Russian project, (at least not in the Project Appraisal Report). The self-selection approach let the city leaders do their own calculation of what was acceptable to their people.[28] That this was apparently done by unfairly overloading regular users as opposed to those enjoying preferential prices and exemptions does not take away from the efficacy of the tactic. If this method worked for cost recovery at the worst time for households in Russia, it may work for different policy initiatives and different conditions elsewhere. It is understood that a variant of this approach has been built into the forthcoming Russia Water Project.

Un-bundle subsidies from public transport and water services pricing

The discussion of subsidies often takes the form of whether they are desirable in principle, and/or how rapidly they can be eliminated given the purchasing power of the population. This is not the most useful "framing" of the problem of subsidies in the context of urban services in transition countries. A better framing may be to start from the objectives and instruments of the regulatory reform in the sectors being discussed here, in parallel with objectives and instruments for subsidies, then think through a better linkage between the two sets.

It is assumed in this paper that the objectives of the regulatory reform on the supply side are to help the municipal service sectors reach efficient production and financial sustainability, while providing service levels in line with their customers' demands and willingness to pay. This will call for a specific price structure and levels. There may be economic reasons justifying subsidies, such as the presence of "externalities". For example, access to water has direct health implications as does a traveler shift from public transport modes to autos. The level of efficient subsidy in these cases can by and large be estimated numerically. On the other hand, it may be that subsidies are largely driven by social considerations oriented towards re-distribution and politically determined. They should be implemented using the most cost effective instrument, and the government should have expenditure capacity to pay for them. Not for or against any particular subsidy, then, but for having explicit motives, carefully selected practical arrangements, and an overall coherence. The subsidies in water and urban public transport as they are now applied in most transition countries have several problematic aspects.

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[27] This is generally not a good assumption; following a widely accepted theory of collective action, small groups of potential gainers and/or losers can push through or stop major policy initiatives whatever its aggregate welfare score. (Olson, 1965).

[28] It would be of interest to study why some of the cities in the Russian project managed to meet the second-stage cost recovery targets in contrast to those which did not.

First, and the simplest, the subsidizing authority may lack expenditure capacity, which as we have seen above leads to the funding gap, as in the case of Riga City Council. Or, also as seen above, the subsidy authority and expenditure responsibility may be vested in different institutions, as in Russia (or may be believed to be so).

Second, the subsidies which are nominally meant for low-income people are in fact based on categories which are not necessarily correlated with low incomes, much less poverty. Prominent among beneficiaries of subsidies are pensioners, but pensioners may be a small proportion of the poor. For example, only 3% of the poor in Hungary are pensioners; the majority of the poor (60%) are the unemployed (Milanovic, 1998).[29] Price discounts in public transport are also given to government employees, soldiers, police and school children. These correlate with poverty even less than the pensioners. Conversely, some truly poor people do not get price discounts on public transport. In Estonia, the largest category of the poor (32%) are from single-parent families, which do not show on fare discount schedules. If the objective is to support poor people, then the current systems of utility price discounts may not be getting to them, while they may be "leaking" to those who are not truly needy.

Third, the arrangement whereby service companies subsidize users and the government subsidizes service companies is evidently not a very good one, since it exacerbates the preceding two problems.

The subsidies to preferential price holders reportedly account for a lion's share of revenue losses. Moreover, because of the uncompensated preferential prices, ordinary customers are asked to pay even more, an unfair and hard to afford cross-subsidy. In the light of all this, it may be tempting to conclude that a part of the price system reform for water and public transport services should be to eliminate subsidies for those people who "do not deserve" them. A recent Bank report on urban transport in Russia states with approval that the federal parliament is set to vote the elimination or at least the reduction of many categories of privilege. It may be tempting for a Bank project to get into deciding who deserves to be subsidized. An alternative view would be to leave the judgement of who deserves to be subsidized to the political system of the transition countries, stressing instead the budgetary coherence and the method of administering subsidies. The latter would consist of getting the subsidy out of the relation between the government and the service provider, especially the provider's balance sheet. In many, perhaps most cases, the subsidy is best handled directly between a social assistance authority and the beneficiary of subsidies. In other words, let the pension administration buy monthly transport passes at a price negotiated with the service company, then sell them to the pensioners at any discount deemed fair and affordable to that authority; let the school administration do the same with students' tickets, etc. That this is a sensible approach can be seen from the way means-tested social assistance is passed to poor households. There are no special bus fares for the poor or the unemployed, but they

[29] In Bulgaria and Russia, the pensioners account for more of the poor: 35% and 26%, respectively.

receive assistance (more in some transition countries than in others) in cash or in kind (including vouchers) directly from specialized agencies, after passing the means test to establish eligibility.[30]

Re-examine affordability

The whole concept of affordability, in connection with water and public transport pricing, defined against fixed shares of total incomes or expenditures, should be examined. Data from household expenditure surveys in transition countries show drastic variations from country to country in how expenditures are allocated between uses (Braithwaite et al, 1998). In Russia, for example, housing expenditures are $6 (in purchasing power parity dollars) from a total of $271, or 2%; clothing is $42, or 15%. In Hungary, housing is $129 out of $412, or 31%, and clothing is $28, or about 7%. What should one make of a public transport expenditure amounting to 12% of the total household spending budget? Needless to say, it is not whether the transport budget with the new price of a particular service remains under 12% of the total that matters, but what will the change in price do at the margin. If several prices change at the same time, the entire incremental change needs to be looked at.

The aggregate impact and affordability of initiatives to increase cost recovery in several or all urban infrastructure and utilities at roughly the same time has been *terra incognita* of Bank-funded projects. Not one project in the current urban water and public transport has gone beyond simple, single-sector affordability checks against "income share" norms. This has been hardly doable given poor state of information even on the supply side, much more so on the demand side. The problem has also its in-house aspects, given persistent difficulties of cross-sectoral interaction. The client countries themselves have in fact taken the lead in this matter. The Russian family allowances program allows for drastic push towards cost recovery on the supply side, but caps household payments of aggregated utility bills to a certain proportion of their monthly incomes, compensating the suppliers accordingly. Some 7% of Russian families were recipients of this allowance in 1997. Similar programs, sometimes just available for housing and at other times including a basket of services, have been applied in advanced EE countries (Poland, Hungary, Slovenia, with 10-20% coverage), but also in Moldova, Ukraine and Lithuania (The World Bank, 1998). The fiscal ability to pay these compensations drives the pace of the push for cost recovery, with 25-30% of households recommended as the limiting reach. It has been estimated, for example, that reaching full cost recovery for housing in Russia by year 2000 would make a prohibitively high 40% of the households eligible for allowances (The World Bank, 1998).

[30] This does not exclude the possibility of incremental pricing schemes meant to support low-income people but prevent leakage. The so-called "life line" pricing of household essentials has a low price for a basic block of electrical energy or water quantity per month, and all consumption above that level is at an economic price. Household-based metering is of course essential to this approach.

It would be quite useful to distinguish the problem of poverty-related subsidies (discussed above) from that of regular (non-preferential) prices. Generally, if households at (say) average incomes cannot afford to buy a service at an economic price (in the absence of externalities and second-best considerations), it is not evident why that service should be subsidized. In transition countries, the fact that people with average incomes have difficulties paying economic prices for water or street-based bus transport (the cheapest form of urban public transport) is mainly due to the above cited fall of output and the way it has been handled - by reducing real wages drastically rather than by laying off people in massive numbers. Subsidized, but non-preferential prices for these services are thus a form of hidden unemployment compensation, a temporary phenomenon.

What is the maximum rate of increase in cost recovery from regular, non-preferential tariffs? One possible answer was provided in the preceding section: let the local political leaders sound their electorate and negotiate with them the magnitude of any increase associated with a proposed Bank investment. Another answer comes from the work done outside water and public transport sectors, which links the prospect of subsidy elimination to introducing liberal labor market policies and allowing real wages to adjust to changes in the cost of living. This even includes one-time wage increases, thus converting old traditional benefits into cash, as done in some housing projects in China (The World Bank, 1998). In words reminiscent of Henry Ford's thinking about the link between auto sales and wages of auto workers, it is suggested that savings from improved cost recovery should at least in part filter down to wages, thus starting a virtuous cycle.

Longer-term considerations

Should cost recovery go all the way to 100% of total costs, and even beyond? In the water sector, the long run objective is to have a water utility with a regulated profit, so the answer is - yes: full cost recovery is the target. It is already being achieved in Poland, and in time it will be achieved elsewhere. More precisely, as the level of cost recovery increases, and better accounting systems become available, the attention should shift to more sophisticated cost and price considerations, couched in terms of short- and long-run average and marginal costs.

In urban public transport, the situation is different. This is a sector where there are externalities and second-best considerations in connection with pricing for the chief alternative mode - the private car. While the level of motorization is low, and the public transport system consists of street-based services (i.e. right-of-way shared with other vehicles) with no scale economies, it is realistic to aim for full cost recovery at the speed suggested above, in line with an increase in average wage level. As motorization increases, and city size and density rise, public transport systems may have to acquire travel-ways of their own, be it at grade, elevated or underground, with significant scale economies and benefits spreading beyond the travelers. At that stage, it would become necessary to evolve a pricing policy for the entire urban/regional transport system, public transport as well as the individual motor vehicles. This may well involve less than full cost recovery for the former travel mode (World Bank, 1995).

The focus on cost dimension

With prices grabbing most attention, due to their unusually low starting level in transition countries, there is some danger that inefficiencies on the production side would be passed on to service users and/or city treasuries. As noted above, some projects did introduce performance targets as covenants. Other projects may have included them indirectly, as key elements in the service agreements which in turn were subjects of dated covenants. Also, by combining price covenants with cost recovery covenants, some pressure is exerted on costs as well. Still, it is valid to say that costs have received less attention. Not a single Bank-funded project among the dozen reviewed here has included an economic costing study at the preparation stage, to establish the status quo and cost benchmarks against which progress in cost recovery can be measured. This can be excused by the endemic inadequacy of company accounts in some countries, as found at the beginning of project preparation.[31] Some water projects, but not one urban public transport project, have included such a study, to be carried out in parallel with project implementation. This aspect should receive much more attention in the next batch of projects.

Focus on service levels

Repeating the theme of the preceding heading, the focus on prices and on cost recovery leaves service levels less well attended. Low incomes and affordability are indeed matters of prime concern, but so is the service. In some cases, the level of services available in socialism is simply not sustainable any more, and should be reduced. This is clearly the case in public transport in Riga and Budapest. Some of the lessons and prospects, however, point in the opposite direction. Social assessments undertaken in connection with Bank-funded projects in Central Asian republics revealed that low-income households ranked the quality of public transport services as a matter of higher concern than fare levels, in spite of sharp increases anticipated in the latter. In the better-off EE countries, which face rapidly increasing motorization, service levels in public transport will eventually become pivotal in retaining "choice" customers, as those who own automobiles make their selection of the mode for daily travel.

Foster the growth of market-based supply

Under this heading is the entire issue of the regulative and institutional design underlying the reform process, specifically the entry of private suppliers and the introduction of competitively bid service awards. The above review indicates that, in Bank-financed public transport and water projects, much more effort has been spent in

[31] It may also have to do with the fact that cost and performance analysis is relatively complex for all activities where the production unit differs from the sales unit, and there are multiple outputs. Both features apply to urban public transport, but not to water supply.

reforming the public-sector service suppliers than in fostering the evolution towards market-based approaches.[32] Developments in Kazakhstan appear to have come less by design than by the sheer hopelessness of maintaining the status quo. The focus on the public sector may have been due to emergency-like context of some lending operations, where the key objective was to maintain basic services. Second-generation projects will have to adopt a different emphasis, perhaps using a self-selection technique to ensure that a market-based institutional design is adopted from the outset.

Introducing market-based, private operation may well hold the largest potential for cost (and subsidy) reductions in both urban transport and water/sanitation sectors. Potential cost savings on the order of 30-50% are cited informally in the circle of private operators of public transport services. The same is likely to be the case with regard to service improvements. Finally, the fact that the scope of local government responsibilities has tended to increase, nay explode, as a result of decentralization initiatives, argues also for the transfer of service provision responsibilities to the private sector, when and where viable. This of course, will require many changes if it is to happen in a manner that will be beneficial to the population.

Much of the preceding discussion has served to highlight the close link between political issues, generally at the local government level, and pricing decisions. Private involvement in sectors such as these, which provide services which have prices that are subject to close political scrutiny, will depend very significantly on the trust that potential investors will have that pricing rules will be honored. Transparency in the franchising or concessioning criteria, true competition for the market and well designed regulatory frameworks will therefore prove essential. The World Bank could play a very valuable role in disseminating best practices, assisting in the development and implementation of regulatory reforms, and improving the credibility of the government's commitments. Guarantees against the political risk of governments failing to follow their obligations to adjust prices when conditions warrant it, may be a useful instrument for this purpose.

[32] This paper has a biased sample in that it is limited to projects made by one Bank department, while the responsibility for private initiatives is located in other departments, and/or in the International Finance Corporation.

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March 15, 1999
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Notes

WATER SUBSIDIES AND THE ENVIRONMENT

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT
Paris

This report was prepared as part of the work programme of the OECD Group on Economic and Environmental Policy Integration. It is derestricted under the responsibility of the Secretary-General of the OECD.

The document is also available in French.

WATER SUBSIDIES AND THE ENVIRONMENT

1. Introduction

1.1 Context

This paper on water subsidies and their environmental implications is prepared in the context of current OECD work on the more general relationship between subsidies and the environment. One of the main aims of this latter work is to identify subsidies that have adverse impacts on the environment. The reform, reduction, or elimination of these subsidies could lead to both environmental and economic gains (so-called "win-win" situations). To further the understanding of the relationship between subsidies and the environment, and to allow for sound policy advice regarding the reform or removal of existing subsidy schemes, the current OECD work programme has three broad objectives (OECD, 1996: 12):

- provide an analytical framework that allows for a qualitative and quantitative analysis of the relationship between subsidies and the environment;
- provide possible orders of magnitude of "perverse" subsidies, and their effects, on the environment;
- describe strategies to remove, reduce, or reformulate (decouple) "perverse" subsidies.

Water subsides have been identified as one of the priority areas of concern within this project. In this context, water subsidies are understood to encompass not only subsidies for water supply services, but all types of subsidies that contribute directly or indirectly to the *quality* of water resources available for use, or to the *quantity* of water resources actually used. This applies to a broad range of subsidies. Among the most prominent of these are subsidies to agriculture, or those in the municipal and industrial sectors.

This paper seeks to explain existing water subsidies in as many OECD countries as possible. However, the data presented here is drawn only from sources accessible within (limited) time and budget constraints. It therefore does *not* comprehensively cover all sectors of all OECD countries, and accordingly allows only for limited and cautious generalisations. The nature and type of subsidy schemes currently in use are first described. This includes an indication of their overall size, as well as where they are found. The consequences of identified subsidies for the aquatic environment and their economic context is then discussed, as are the fiscal and environmental implications of their potential removal.

1.2 The meaning of "subsidy"

Subsidies are only one of a wide range of economic instruments used in environmental policy. In general, policy instruments can be regarded as "economic" when they affect the cost and benefit structure

of alternative actions open to economic agents (OECD 1994: 17). Different ways of classifying economic instruments have been proposed, each with different consequences for the understanding of the concept of "subsidy". For example, see OECD (1994); and Gale and Barg (1995).

In the context of the broader OECD project on linkages between subsidies and the environment, the working definition of "subsidies" that has been adopted here is: "...government interventions through direct and indirect payments, price regulations and protective measures to support income that favour environmentally-unfriendly choices over environmentally-friendly ones" (OECD 1996: 5). This definition includes, for example, *direct payments,* such as tax concessions or allowances; the provision of goods and services below market prices; as well as *guaranteed minimum prices; preferential procurement policies*; and *cross-subsidisation.*

With regard to the wide variety of possible forms of subsidy that influence water-relevant economic behaviour, this paper does *not* use a broad, all-encompassing definition from the outset. However, some characteristics and limitations of the concept of subsidy are reviewed in the following paragraphs, both to enhance the conceptual understanding of "water subsidies" as used here, and to limit the scope of the paper.

Subsidies and water pricing practices: The occurrence and calculation of subsidisation is fairly straightforward if identifiable monetary transfers are involved, whether these be in the form of direct payments, low interest loans, or debt reductions. On a more abstract level, however, the concept of "subsidy" implies that the actual price paid for a good or service does not cover for all of the "real" costs of providing that good or service. This conceptual perspective highlights the close relationship between water subsidies and water pricing practices. Even in the absence of "explicit" monetary transfers, one can speak of "water subsidies" if the system of water prices in place does not adequately reflect all of the costs involved in producing water services. In turn, the effective implementation of the principle of *full cost recovery* in the formation of water prices would eliminate water subsidies. Methodologically, the identification of "water subsidies" created by "underpricing" water services requires the establishment of benchmarks for correct prices. The concept of "correct pricing" in turn largely depends on decisions on the types of costs to be included in "correct" water prices.

Benchmarks for correct pricing: In principle, three types of cost need to be considered when discussing correct prices — direct economic costs, social costs, and environmental costs. The estimation of each type of costs involves a different set of problems:

1. *Direct economic costs*: In general, exact figures regarding infrastructure, operation, and maintenance costs for water services are available. Consequently, the "benchmark" for the economic costs of providing water services, and the amount of economic costs not recovered by operational charges but from other sources (e.g. the general state budget), can be calculated. Full recovery of the *economic* costs of water services will require the inclusion of (i) the costs of operation and maintenance of water infrastructure; (ii) the capital costs for the construction of this water infrastructure; and (iii) appropriate reserves for future investments in water infrastructure within the water price structure. However, even if calculated for only certain economic contexts, significant problems will arise if levels of subsidisation are to be *compared* (e.g. among OECD Member countries). Prices for the same good or technical device change over time, and will often be different in various economies. Furthermore, the

particular regulatory requirements in place will result in differences in the applied equipment, and consequently, in varying cost structures for providing comparable water services.[1]

2. *Social costs*: The establishment of subsidy schemes often aims to achieve a social benefit, or seeks to avoid some social hardship. With respect to water services, the direct or indirect social benefits (for instance, in the field of public health) will vary largely with respect to contextual settings. To calculate these costs, and to compare them across cases, is not generally feasible. Consequently, this paper does not include any monetary estimations of social costs and benefits in its concept of "subsidy". Where appropriate, however, a qualitative evaluation of subsidy schemes is undertaken by contrasting the social objectives pursued by a particular subsidy scheme with its actual achievement. Many of the subsidy schemes discussed in this paper involve a trade-off between *social* objectives (e.g. to maintain current levels of employment in the agricultural sector) and *environmental* objectives (e.g. to reduce environmentally-detrimental effects of subsidised fertiliser use). While the achievement of social benefits, or the avoidance of social hardships, may allow for debate about the acceptable level of negative environmental externalities (see below), it is more difficult to argue convincingly in favour of maintaining environmentally-detrimental subsidy schemes that do not even meet their own social objectives.

3. *Environmental costs*: The environmental costs of economic activities are not generally reflected in the prices established at the market-place, but appear as "externalities". Conceptually, the non-inclusion of negative environmental costs in price mechanisms can also be discussed under the label of "subsidies"[2]. In practice though, there are large difficulties in establishing benchmarks for the costs caused by environmental degradation, and in including these costs into market mechanisms. Still, the principle of *full cost recovery* requires that these costs be taken into account. Given the methodological problems involved in calculating environmental externalities, the inclusion of an environmental component into water prices will typically have to be supported by political, rather than economic, arguments. On the basis of the type of data available for this survey (see below), only a qualitative assessment of subsidisation via the non-inclusion of environmental costs was therefore possible. One exception to this were cases where the negative environmental effects of a given subsidy scheme entailed identifiable costs for other classes of water users. In these specific instances, the economic price of negative environmental externalities has been included in the quantitative assessment of water-relevant subsidies.

1.3 Structure of the analysis

In order to cover the full range of existing water subsidies in OECD Member countries, several water-relevant activities are examined below (agriculture, industry including mining, human settlement). For each of these areas, and where possible, the paper describes subsidies in three steps:

- *Subsidy scheme*: A description of the nature and type of support; the goals of the scheme; the amount of support; related water pricing practices; and the use of revenues;

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1. The analytical problems involved here are elaborated at length in (Kraemer *et al.*, 1997*a*).

2. From an environmental perspective, a "subsidy" consists of the value of uncompensated environmental damage arising from any flow of goods or services (Barg 1996: 28).

- *Incentive effect of subsidy*: An analysis of the behavioural implications; marginal costs and elasticities (if available); the degree of goal-attainment of the subsidy in its own terms; and its environmental impact;

- *Removal or reform of subsidy*: An assessment of potential behavioural and environmental implications, as well as fiscal consequences.

Using this model, a broad range of subsidy schemes is described. However, on the basis of the data available for this survey, no *generalizable* quantitative assessment of the environmental implications of existing water subsidies was achieved. As a "second-best" strategy, the analysis identifies typical patterns and "clusters" of water-relevant subsidies that seem to be of particular importance in OECD Member countries. From this base, some cautious generalisations about the fiscal and environmental implications of reforming water-related subsidies are then drawn.

1.4 Sources and quality of data

Limited resources and time constraints meant that no new case studies could be carried out specifically for the preparation of this paper. Therefore, the analysis is mainly based on available information and material. The data that was used originates from three different approaches:

- *A short-term survey*, in the context of which water administrators in most OECD Member countries were contacted;

- An evaluation of *existing published studies* in this area;

- *Personal communications* with various individuals, in both governmental and non-governmental organisations.

The published material gathered from environmental NGOs was especially useful, in that it provided a number of concrete examples of subsidies, tax rules, or regulations with economic consequences that are detrimental to the environment. Often, the examples cited include estimates of the budgetary impact, and of the consequences of altering or abolishing the measures described. These examples also enrich the taxonomy of subsidies and related issues developed in this paper, in addition to filling in some of the gaps which remained after the information provided by sources in OECD Member countries themselves was assessed.

The wide variety of sources, the varying quality of the obtained data, as well as differences in accounting approaches, posed significant problems of comparability and generalisation of results. These issues, and their implications for policy options and future research strategies, are further discussed in the conclusions below.

However, it is important to emphasise at the outset that the differences in the obtained data might create imbalances in perceptions about the range and type of "perverse" subsidies currently in use in OECD Member countries:

1. There are a number of countries or cases discussed here for which detailed figures have been reported, or where assessments of the environmental impact of existing subsidy and taxation systems have already been conducted. These well-documented cases should not be interpreted as proof that the budgetary systems of the countries involved are particularly

the potential for *environmental* gains associated with subsidy reform. Subsidies in the form of income support would result in the higher political "visibility" of agricultural subsidies to all groups involved. This may shift the burden of proof away from those that would like to remove certain subsidies to those who want to maintain them.[3] Even if the maintenance of financial transfers to agriculture does not generate immediate budgetary savings, the *economic* costs of dealing with the negative environmental externalities of agriculture would be reduced, leading *(ceteris paribus)* to considerable economic gains in the medium- or long-terms.

- In each case, it should be assessed if the establishment of "correct" or "better" water prices can be accompanied by support for measures that raise the efficiency of agricultural water use. If adjusted properly, the financial losses caused by higher prices should be balanced by savings due to efficiency gains.

2.2 Industry

In many countries, industry is the largest (or one of the largest) user and/or polluter of water resources. Its impact on the aquatic environment can vary considerably. In the case of water *extraction*, the environmental effects will be similar to those related to extractions for other uses. In the case of water *pollution*, the types of substances involved will also differ according to sub-sector. Because of their often large operational scales, industrial sites can be important point sources of pollution thatendanger the water environment, even if the substances involved are not particularly dangerous in themselves. Industry (e.g. thermal power generation) can also result in environmental degradation through thermal pollution. Heating aquatic ecosystems (normally rivers) reduces dissolved oxygen, while accelerating oxygen-demanding biochemical processes. In extreme cases, the combined effect can result in large losses of fish life. Below acceptable levels, changes in aquatic flora and fauna can be expected.

There are many subsidies to industrial sectors that have no specific impact on the water environment, other than expanding the scale of industrial activities beyond what would otherwise have been the case. However, direct impacts on water systems can be expected where incentives are given to expand water withdrawal by industry, or where pollution control costs for industry are reduced as a result of subsidies or taxation measures.

In relation to pollution control, mention must also be made of measures to regulate the flow of water courses that act as receiving waters for industrial effluents. Flow control measures can be designed to ensure that sufficient water is available at all times to remove the pollution loads emitted by industry within a particular river basin. However, no specific information about indirect support of this kind has been included in this study.

2.2.1 Industrial water withdrawal

In **Canada**, thermal power and manufacturing account for the largest share of industrial water withdrawals. The greatest proportion of industrial water (83% = 6.100 million m^3) is derived from *self-supply* systems. The 10% of industrial water supply that stems from *public* utilities is mostly used by small

3. It would also allow for *other* types of arguments to be employed in the policy debate, especially regarding the positive social and/or environmental values of various forms of agricultural production, as a way of legitimising the maintainance of income supports to farmers.

industrial plants (for which public water supplies are cheaper than the costs of self-supplied water systems), and by firms that need potable water for their own production purposes (food and beverages). Industries which use municipal supplies either pay flat rates, or pay on the basis of the lowest block of increasing-block tariffs. Virtually no volume-based charges exist for water withdrawals from publicly-owned surface or groundwater sources. Instead, municipalities often offer "promotional" water rates to industry, and thereby seek to enhance the local economic base (direct subsidy). If licence fees are levied, these are primarily aimed at raising revenue, instead of at promoting economic resource management. All user demands are met, regardless of their water-using practices. The necessary *infrastructural* measures for the provision of water have been accomplished through large subsidies (Tate and Rivers 1990; Tate and Scharf, 1995).

The perceived abundance of water resources in Canada has led to costs for water supply being "cheaper than dirt", and to consistent growth in industrial water use overall, from 18.045 million m^3 in 1972 to 36,003 million m^3 in 1991 (Tate and Scharf 1995). As a result of this policy, degradation of water quality has been observed (Tate and Rivers 1990: 466).

To achieve the sustainable use of water in Canada, it would seem essential to put a price on industrial water withdrawals from *self-supply* systems. One such approach has been discussed by Tate and Rivers (1990) in a case study of Ontario industry, where they proposed to recover the full costs of water management for this region from industry through charges on (metered) water withdrawal. Overall, these charges would amount to some 0.5 billion dollars per year. They would also have a substantial effect on industrial water use.

In **Denmark**, municipal and private water works generally seek to cover the full amount of capital and operational costs via water tariffs and charges. As of 1993, the average price of water was 3.10 DKK/m^3 (see section 2.3.1.). Generally, the water price per m^3 is the same for all types of consumers, and remains constant regardless of amount consumed. However, there are some examples of quantity discounts for industrial users. In the context of the tax on water consumption recently introduced as part of the "green tax reform", industrial water users can deduct this tax on water consumption from their VAT proceeds (Wallach 1996; Andersen 1996). Assuming that the additional costs imposed upon consumers by the tax on water consumption does not cover all of the environmental costs involved, this tax exemption could be regarded as a subsidy. This structure is identical to that facing Danish *agricultural* water consumption (see Section 2.1.1).

In **Norway**, there are some subsidies for the building of new (of the upgrading of existing) water plants. Water supply management and waste water treatment fall under the responsibility of the municipalities, which levy a local tax ("water and wastewater tax") to cover for the costs of water supply. Industrial water use is usually metered, and the water tax is adjusted accordingly. The municipalities are not allowed to give discounts to large industrial users (Sjoholt, 1996).

2.2.2 Industrial water discharge and sewerage systems

In **Canada**, surface waters exist in abundance and the largest part of industrial water withdrawal originates from *self-supply* systems. Similarly, industrial plants mostly discharge their waste waters directly to surface waters. As shown by a recent survey, between 50% and 60% of these discharges occur in an untreated form, and just over 40% of discharges are treated by primary mechanical methods. Only a relatively minor portion of waste water is discharged to municipal treatment systems (760.6 million m^3/year, out of 35,486.1 million m^3/year). As reported by Tate and Scharf (1995), current practices have succeeded in minimising private sector costs, but have created serious and persistent water pollution

problems, despite very expensive regulatory efforts (1995: 43). The money required to regulate the environmental externalities of industrial waste water discharges is generated from the general state budget, and not from the polluters themselves (cross-subsidisation). It has been proposed, in order to put an adequate price on the water originating from industrial self-supply systems, that these water prices should reflect the administrative costs of dealing with the negative externalities of current discharge practices. Discussed in the context of Ontario industry, the full costs of this type of measure would have amounted to some 0.5 million dollars per year (Tate and Rivers, 1990: 471).

In the US, a 1996 survey of industrial pretreatment plants revealed that, in most cases, only limited information was available concerning the costs of providing services to specific classes of customers. As a result, multiple levels of cross-subsidisation within the pretreatment programmes, and between pretreatment and other municipal activities, was the norm rather than the exception. Without providing exact figures, it was concluded that the cross-subsidies in place generally resulted in underpricing services to industrial users of waste water services, which in turn led to under-investments in source reduction and pretreatment by these users (Koplow, Clark *et al.*, 1996).

2.2.3 Main conclusions and policy options regarding water-relevant subsidies to industry

On the basis of the preceding examples, some general observations about the environmental and budgetary impact of water-relevant subsidies to *industry* are highlighted below. Furthermore, policy options are briefly discussed that would result in budgetary and/or environmental gains.

- In OECD Member countries, industrial water use constitutes a large share of overall water use (largest or second largest).

- The water-related environmental impact of industrial production patterns can not be generalised. It depends on the type of activity involved, and on the environmental regulation regime which is in place.

- The overall level of subsidies to *industrial* water use is considerably lower than it is for *agriculture*.

- In most OECD Member countries, as regards the pricing of water services, the principle of "full cost recovery" is either already in place, is in the process of being implemented, or is under discussion. However, water-relevant subsidies to industry are still frequent. Industrial water prices therefore tend to depart from the principle of full cost recovery, and revenues lacking from tariffs or charges are covered by state budgets.

- When discussing the principle of full cost recovery and "underpriced" water services, one has to distinguish between three different dimensions of this principle: (i) operation and maintenance costs; (ii) capital costs and reserves for future investments; and (iii) environmental and resource costs. In general, industrial water prices cover the operational costs of providing industrial water services, whereas in only few cases the full amount of infrastructural costs is yet reflected in water prices. Only a few countries that have environmental taxation or similar instruments aim to include environmental costs into existing water prices. However, in these cases, exemptions for industrial water users often exist.

- Subsidies through water prices tend to be higher in the area of water *discharge* and *sewerage* systems than they are in the area of industrial water *supply* systems.

- In most OECD Member countries, industrial water price systems are of a flat- or bulk-rate type, or even include quantity discounts in their price structure. Only rarely are prices structured in ways that provide incentives to use less water, or to use available water more efficiently.

- In a number of cases, accounting problems have been reported that disguise the use and amount of cross subsidies between different classes of consumers and between public funds.

The preceding observations allow for some general remarks concerning policy options for subsidy reforms:

- Implementation of the principle of "full cost recovery" would raise industrial water prices significantly, and would provide an incentive to use water more efficiently. However, given a high enough water price, industry might switch to self-supply systems (if appropriate water resources are available, and their use is not inhibited by legal barriers). For those cases in which industrial self-supply is in accordance with the principle of "full cost recovery" regarding the *economic* costs of water services, a shift from public to industry-run water supply systems would render the "sunk-costs" of the public water infrastructure useless. In these situations, an *economic* threshold level for maximum water prices therefore exists. In practice, however, raising industrial water prices up to this level would significantly reduce the level of subsidy, and would reduce environmentally-adverse incentive effects accordingly.

- A higher price paid for industrial water is likely to result in more efficient water use. Apart from saving water resources, this shift would in effect reduce the vulnerability of industrial production processes to changes in the aquatic environment, be it in the form of relative water scarcities, or water quality degradations. This in turn will provide an additional potential for economic gains (e.g. capital-intensive measures of river flow control might be rendered unnecessary).

- At the moment, most OECD Member countries do not exploit the potential for structuring industrial water pricing to encourage the saving of water resources. Therefore, the inclusion of an environmental component into water prices would provide additional incentives to save water. These incentives would be even more pronounced if they were accompanied by measures that encouraged the introduction of technologies that use water more efficiently.

- The negative externalities of industrial water uses are much harder to specify economically than they are in the case of agricultural externalities

- There is a need for more transparent accounting, in order to identify the size and extent of cross subsidies currently in use. Only if the question of "who pays what to whom?" has been answered will political arguments about *why* some types of cross subsidies should be maintained be resolvable.

2.3 Human settlement

The concentration of human populations that characterise modern urbanised industrial societies would not have developed (and could not be sustained) without the regular provision of clean water for human consumption, and the prompt removal of human and other wastes from settlements. Water supply and sewerage systems together can be referred to as "urban water services" (understood to include central

water supply and sewerage systems in rural areas). Because of the importance of these services, subsidies are often given for the construction of the necessary infrastructure, or for its operation. Such subsidies benefit (directly or indirectly) all users.

Urban water services are primarily aimed at the protection of human health, but also have significant impacts on the water environment. This is the case where large quantities of water are abstracted from the natural environment in order to supply population centres, and where water-borne wastes evacuated from such centres are subsequently released into aquatic ecosystems.

The operation of water supply and sewerage services are segments of the water industry that fall into the category of *public services*, even in cases where they are provided by private enterprise. The reason for this lies not just in tradition. There are good reasons to regard these water management functions as being "in the public interest", the most important of which is the existence of "externalities"--the positive and negative effects on the population of a city as a whole which are not (or cannot be) captured by market mechanisms.

In the past, such externalities relating to urban water services have been associated with public health. If sewerage services are ineffective in removing human wastes from an urban area, epidemics of communicable diseases could follow. Such diseases would affect not only those without access to normal sanitation facilities, but by reason of their infectious nature, would go on to affect the larger community. Therefore, it is in everyone's interest to have effective sanitation measures and sewerage systems in a city.

The water supply system involves similar externalities, especially if local wells carry a risk of infection and if the population depends on proper the functioning of flushing toilets. In effect, for reasons of public health, it is impractical to exclude anyone from access to sewerage, even if this were technically feasible. Moreover, for political and social reasons, it is often not beneficial to exclude users from the water supply system, even though this would be technically possible in many cases.

Today, environmental externalities have gained political prominence, especially in relation to sewage treatment. Effective and stable treatment of urban waste waters is necessary to reduce water pollution. Nutrient removal (phosphorus and nitrogen) must also often be carried out to avoid eutrophication. Environmental externalities of water supply occur, for instance, when the water table in a catchment area is lowered, affecting vegetation cover and surface water flows.

In addition, the provision of urban water services is largely indivisible.[4] The technical systems involved are complex and need to cover long distances (either to the source, or to the recipient, water course). The capital expenditure involved is large in comparison with the operating costs and the (marginal) cost of connecting an additional user. It is therefore uneconomic to build separate water supply or sewerage systems for only a small number of inhabitants of a city. It is more economic if everyone is connected to the same system. Furthermore, once the technical systems are put in place, it can become physically impossible to build a second system, and in many cases, there is no real choice among sources or points of discharge. In consequence, urban water services are natural monopolies and, in this respect, are similar to other public services.[5]

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4. In rural areas and in suburbs, autonomous water supply, and especially, sewage treatment, is often a viable option. Preconditions include a ready supply of good quality water, and a reliable and effective treatment system respectively. Public health concerns also apply in relation to the contamination of natural waters and the removal and treatment of sludge.

5. The common feature here is the existence of physical networks that cannot be duplicated economically. Other

Electricity, gas and, to a certain extent, district heating can substitute for each other, while they also compete with liquid and/or solid fuels. Public transport exists in many forms which compete witheach other, and with individual transport modes. Thus, the user has a choice. In practical terms, no substitutes exist in many cases for water supply (private or public wells, bottled water, rainwater cisterns) or sewerage (septic tanks). Every user and citizen thus has an interest in these services being provided effectively and efficiently, and in monopoly power being brought under collective (and democratic) control. This can be done in several ways, and with different institutional structures.

Irrespective of ownership and control over the operation of urban water services, regulation is therefore required to ensure that these natural monopolies are exploited under supervision, and that no abuse of monopoly powers occurs. Economic regulation of water supply or sewerage always needs to address the conditions of supply (access and possible exclusion), water tariffs and prices, as well as water quality (of drinking water or effluent and natural water courses respectively). Additional objectives of regulation include investment and profits, and returns on capital. Technical standardisation and operational rules also play an important role.

The practical design of tariffs and the setting of unit rates, as well as the imposition of regulatory conditions on access to (and exclusion from) urban water services, can result in discrimination in favour of (or against) certain water users or classes of users (subsidies through redistributive effects of regulating public services). Some examples of such subsidies are described in the following section.

2.3.1 Water supply systems

The **Canadian** system of public water supply is characterised by a perceived abundance of this resource (see Section 2.2.1). This situation has led to a *supply*-oriented, water management approach, and to very low unit prices for water (usually less than $1 per cubic metre; retail prices of water and wastewater services averaged just under $23.50 per month at the 35 m^3 level of usage). About half of the rate schemes are of the flat-rate type, about 19% of a declining-block-rate type, and only about 30% of the pricing schemes relate the amount of water used to a constant or increasing unit-price, thereby providing an economic incentive to limit the use of water. While, in theory, marginal prices are seen as the key benchmark to determine consumer decision-making, it is doubtful if this concept can be effectively applied in the Canadian context. With a very low price for water, marginal prices are also very low, and the costs of water will rarely be perceived as an economic factor that is relevant to the consumer's decision (Tate and Lacelle, 1995). Despite low costs for the provision of water services, approximately CDN$ 3.3 billion is raised annually through municipal water rates (Tate and Lacelle 1995: 25). On the other hand, the estimated additional annual costs for the operation, maintenance, and improvement of the water (and wastewater) system are in the range of $ 4.5 billion between 1993 and 2003. Without adjustments of the prices for water and sewerage services, either the infrastructure of the current system is bound to degrade, or considerable subsidisation from other government sources will be ultimately required.

It has been shown that, through more realistic pricing, the funds required for infrastructural measures could be raised in a way which would not cause undue financial hardship to municipal water customers (Tate and Lacelle 1995: 23). The resulting higher prices for water related to pricing schemes that provide economic incentives to use less water are likely to have positive environmental side-effects.

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examples are electricity supply, gas supply, district heating and public (rail) transport. Telephones were another case, until radio communication made it possible to construct parallel systems.

In the **Czech Republic,** drinking water supply before 1992 had been ensured by regional state-run enterprises. The prices to consumers for drinking water supply and sewerage services were fixed (until 1990) at 0.60 +0.20=0.80 KCS/m^3 for domestic use, and at 3.70+2.35=6.05KCS/m^3 for industrial and trade use. The operation was subsidised from the state budget with more than 2 billion KCS. Through a step-by-step increase, (implemented since 1994), prices now cover production costs of water services (prices include actual operation expenditure and "standard" profits). The average price for drinking water supply and sewerage in households is now 18.07 KCS/m^3. For other uses, it is 26.03 KCS/m^3 (Pavlík 1996: 1/2).

No subsidisation of the *operation* of water companies exists in the Czech Republic, except in a few small municipalities where it is used to eliminate a heavy social impact on household water users. Investments in the water sector are supported (to a maximum of 80% of the investment cost) by the state budget. In 1995, the state subsidy was reduced to 67% for water supply systems. Another subsidy is given in form of interest-free loans, with a 7-10 year repayment period (22% in 1995). State financial support for water supply represented 1.4 billion KCS in 1995, and 1.7 billion KCS in 1996. Overall, the support for water supply and waste water treatment (subsidy + return financial aid) comprised 3.0 billion KCS in 1993; 3.6 billion KCS in 1994; 2.9 billion KCS in 1995; and 2.7 billion KCS in 1996. Taking the inflation rate into account, state financial support has therefore actually been *declining* (Pavlík 1996: 2). The revenues generated from customers are used for maintenance or operations, as well as for investment purposes and loans repayment.

The increasing prices have led to substantial decreases in the production and consumption of drinking water. This trend is expected to continue in the future (Pavlík, 1996: 3 and 5). Measured by its own goals (elimination of inequality among those regions still lacking the financial resources in the municipalities for investment and maintenance of water supply systems; improvement of drinking water quality), the current subsidy scheme appears to be meeting its objectives— water pricing practices *are* discouraging overconsumption.

Water supply systems in **Denmark** are characterised by an abundance of groundwater resources, and a highly decentralised institutional structure. Approximately 305 municipal water works and 2881 private water works exist (Andersen, 1996). Furthermore, there are approximately 115,000 private wells and borings that mostly serve one house, typically a farm (Wallach, 1996). 99% of the water extracted by water works for water supply purposes stems from groundwater sources. Consumption of water supplied by water works declined by 20% between 1982 and 1994 (616 million $m,^3$ to 493 million m^3/year). Under the Water Supply Act of 1978, municipalities are responsible for approving the local water supply tariffs that are proposed by the water works. The annual expenses for the water works are supposed to be covered entirely by tariffs or charges. Generally, there is a fixed charge, supplemented by a variable charge which depends on the consumption of water (Wallach, 1996). As of 1993, the average fixed tariff was 229 DKK, which on average made up 32% of the total tariff. The variable charge increased from an average of 2.65DKK/m^3 in 1984, to an average of 3.10 DKK/m^3 in 1993, with variations between 0.94 and 6.31 DKK/m^3. The fee per m^3 is normally the same for all types of consumers, and remains constant, independent of consumption. These prices do not include, but are subject to, VAT at a rate of 25% (Andersen 1996). As of January 1994, a national tax on piped water has been introduced as part of "green tax reforms". This tax is being phased in gradually, with an annual increase of 1 DKK -- it will reach its full rate at 5 DKK/m^3 in 1998. As of 1996, this rate was 3 DKK/m^3. However, the tax applies only to households. Industry, and agricultural activities can deduct this tax from their VAT proceeds (Wallach, 1996).

In Denmark, counties and municipalities are allowed to subsidise waterworks, principally for investment purposes. They are also permitted in some instances to subsidize operating costs. The extent of this subsidisation is not known, but is estimated to be limited (Wallach, 1996). As part of an effort to deal with the consequences of water pollution (especially from pesticides), the Minister of Environment and Energy intends to pass a law — the "Waterfund" — which will provide approximately 65 million DKK annually to affected waterworks for expenses related to new borings (especially small waterworks and single borings that extract their water from reservoirs close to the surface of the earth). This measure is effectively a cross-subsidisation to agriculture, since it deals with the negative externalities associated with intensive farming practices.

In **Ireland**, the capital costs of providing public water supplies are usually entirely met by the central government, with substantial assistance being provided by the European Union from Structural or Cohesion Funds. In cases of significant industrial use, some contribution from industry may sometimes also be required. With respect to pricing of water, a flat-rate domestic service charge is the norm. This charge ranges between £34-£150 per annum nationally (Egan, 1996). A 1996 report to the Irish Department of the Environment indicated that the water and sewerage charges levied in 1995 only covered about 75% of the costs of operating and maintaining water and sewerage services, (£86.95 million of charges levied, against total costs of £118.16 million) — i.e. subsidy through underpricing of services (KPMG Consultants 1996: 41). Without any information about local conditions regarding the quantity and quality of water available, it is difficult to make assumptions about the environmental impact of the existing charging scheme. However, it would seem both economically and environmentally advantageous to link the level of charges to the level of water consumption. In the absence of water meters, and given the anticipated high costs of metering all existing households which are connected to domestic water services (estimated costs of £200 million for installing water meters and of £8 million for maintenance, reading, billing and collection of metered charges), the pricing of water should probably be linked to the estimated level of consumption. Furthermore, the linkage between the level of water input and sewerage output could provide another approximation to be used when charging for sewerage. For the Greater Dublin area, a charging scheme has recently been proposed that would ensure that all categories of customers contribute on a fair and equitable basis towards the full financial costs of supplying water services (General des Eaux, 1996).

In **Italy**, with a net average rainfall per capita of about 5.200 m^3/year, water is generally abundant. However, there are considerable regional and seasonal differences that lead to large disparities between available water resources and water demand. (More than half of the potential water resources and more than 2/3 of the available outflow are concentrated in the North, while large parts of the South suffer from consecutive 100-150 day periods without rain (Massarutto, 1996 #82: 6).

Actual water use is not measured, but can be derived from various estimations about water needs. Overall, water needs are estimated to be 40.9 billion m^3/year, with domestic water use accounting for about 15%, or 5,8 billion m^3/year. The largest share of domestic water consumption is provided for by public waterworks, which in 1987 served 98.2 % of the Italian population.

In Italy, there is a deeply-entrenched system of financing public water works from government budgets (direct subsidy). Until the early 1980s, water services had been provided virtually free, but a worsening of water quality, overexploitation of underground catchments, as well as growing budgetary constraints, have each contributed to a process of reorganising these water supply patterns. As one consequence, charges have increased significantly, and are expected to continue to rise in the future. However, municipalities still face political constraints in setting the level of their charges to reflect their cost structures. As a result, they remain largely dependent on subsidies to cover investment and

maintenance costs. It is estimated that at least 70% of the capital expenditure for water supply is financed by public budgets (Massarutto, 1993). In absolute numbers, approximately 3 billion ECU have been transferred via grants or favourable loans for water supply purposes during the last decade. Furthermore, an additional 10-25 billion ECU is deemed to be necessary to meet the investment needs of maintaining and improving the current water supply infrastructure (Massarutto, 1996: 14).

Since 1975, a common framework for the charge structure has been in existence. It outlines a two-part tariff, with an increasing-rate in each block. The lower charges in the first block (civil uses) are subsidised from the upper blocks, and partially from the second block (cross-subsidisation), while charges in the second block (industrial/commercial uses) are calculated from average costs. However, for political reasons, this pricing scheme was never fully implemented, and the cost coverage obligation was alternatively relaxed and tightened until 1990. Nevertheless, from 1980 to 1985, prices did increase by an average of 87% (Massarutto, 1996: 18/19). As of 1992, the average annual cost for all water services, including sewerage and sewage treatment, are estimated to be 180 ECU per capita, which corresponds to a rate of 0,65 ECU per m^3 (approximately 0,43 ECU of which are used for water supply).

Due to a lack of transparent accounting by Italian municipalities, there is no reliable information about the use being made of the revenues from these charges. However, evidence does exist that some local administrations are using the charges as a fiscal policy tool, by trying to integrate costs into the water bill that are not related to the service being provided (Massarutto, 1996: 20).

In the past, pricing practices in Italy have mostly been oriented at questions of equity and inflation control. They have largely ignored aspects of allocative efficiency or environmentally-sustainable consumption patterns. In effect, this lack of incentives for an economic use of water resources has contributed to severe water shortages in the south (an average number of 36,07 days with critical situations, due to insufficient supply has been reported by Federgasacqua, a public water supply network comprising 55% of all water supply firms). Furthermore, groundwater pollution emerged as a very serious problem during the 1980s and early 1990s. In most distribution systems, drinking water could only be supplied by means of temporarily derogating European Union standards (Massarutto, 1996: 9)

Reform of current pricing schemes for water supply seems almost inevitable from the budgetary perspective, and reform efforts are already underway (Massarutto, 1996: 23). While allocative efficiency certainly would be enhanced (preventing overprovision of supply infrastructure in the future), the low price elasticities associated with public water supplies do not promise considerable changes in domestic consumption patterns unless a critical "visibility" threshold were to be exceeded. However, for industrial and irrigation purposes, significant water-saving and efficiency-gaining capacites are likely to be realised. At least the overexploitation of groundwater and surfacewater resources in some areas of Italy would be slowed down.

In the **Netherlands,** water pricing is based on the principle of cost recovery ("polluter pays" and "user pays"). A *fixed* fee is applied to cover the standing costs; a *variable* fee is related to the amount of water consumed (consumption is mostly metered, otherwise there exists a "subscriber tariff"). As of 1993, prices per cubic meter ranged between Dfl 0.85-2.50, depending on the origin of the water and regional circumstances. Purified and processed surface water results in prices twice as high as those for processed groundwater. Fixed fees vary between Dfl 37-150 per cubic meter, with a mean price of approximately Dfl 70. It is expected that this price will increase by 10% annually, at least until the year 2000, because preventive measures against source-pollution, the removal of nitrates, pesticides and chemicals (among others) will require further investments into the water supply/water treatment system (van den Bergen,

1993: 5). Despite "full cost recovery", however, the resource base is still slowly degrading (increasing fees for investment purposes constitute cross-subsidisation to polluters, mostly to agriculture).

In **Norway**, water management does not face a *quantity* problem, but does to some extent face a *quality* problem. With the opportunity costs of water being close to zero, the costs of supplying household and industry with water hinge largely on investment costs in waterplants and pipelines. The building of new or upgraded water plants is, to some extent, subsidised by state authorities. As of 1995, the rate of subsidisation was 7.3% (89,980,000 NOK of 1,235,176,743 NOK. The amount of the subsidy is calculated on the basis of projects which have *applied* for the subsidy, the *real* amount will be slightly smaller). Based on a framework regulation adopted by the Ministry of Environment, costs for providing water services (water supply, waste water discharge) are collected by municipalities through a local tax ("water and wastewater tax"), that is divided into a connection fee and a yearly payment. In general, municipalities are supposed to set the price of water at a level where the revenues equal the costs of water supply. However, the municipalities are not restricted from subsidising the water supply if they want to lower the tax-level for their citizens (Sjoholt, 1996).

Since 1985, the **Spanish** water supply system has been undergoing transformation from a system where water was considered to be a public good, to one where costs are increasingly been internalised. Urban water use currently accounts for about 11% of the total water use (agriculture for 80%, independent industrial uses for 5%). Institutionally, the management of water services is divided between two levels of government. The 11 *Basin Authorities* (covering catchment areas of specific rivers or groups of rivers) are responsible for water resource development. They plan and manage the water supply to municipal water supply agencies and Municipal Authorities. The *Municipal Authorities,* in turn, are in charge of purification, secondary distribution, as well as the collection and treatment of waste water (Maestu, 1996: 5).

In Spain, an estimated 50% of infrastructure costs for water supply is provided via subsidies from various sources (Maestu, 1996). In 16% of municipalities, operational costs are also subsidised (Maestu, 1996: 18) The municipal water supply agencies and Municipal Authorities have to pay an average of 0.48 ptas per m^3 of received water to the Basin Authorities. The revenues are supposed to cover the Basin Authorities' capital and operational costs attributable to specific waterworks. However, in 1994, the Basin Authorities experienced a deficit of 5.4 billion pesetas, which was covered through subsidies from the central budget. It is reported that this shortfall originated from ineffective levying of the water abstraction charges. The municipal water supply agencies and Municipal Authorities, in turn, each charge domestic users for their water services. Normally, two-part tariff systems are used, in which one part is determined by a fixed standard charge (67% of tariff systems) or a minimum consumption quota (33% of tariff systems), and the second part of the tariff is determined by the actual volumes used. Regarding the latter part of the charge, (as of 1992), 86% of municipalities used an increasing-block tariff, 13% applied a uniform rate, and 1.5% of the tariffs were of a decreasing-block type. The resulting average price for water supply in Spain was 68.08 ptas per m^3 in 1992 (Maestu, 1996: 10 and 14).

In the **UK** (England and Wales only), two types of water industry exist: 10 water service companies which provide *both* water supply and sewerage services, and 19 companies supplying *only* water supply. The latter companies provide approximately 25% of the drinking water. In general, water companies are liable to corporation tax. For qualifying capital expenditures, tax relief in the form of capital allowances is granted (subsidy via tax exemption). Water companies have to cover both their operational and infrastructural costs from the charges taken for their services, and from money borrowed on the open capital market, since there are no favourable government loans available. However, the prices charged for water services are regulated by the Office for Water Services (Ofwat), at a level that is

supposed to ensure that the water companies themselves are able to fulfil their functions from the generated revenues. Within the overall price limit, the structure of the charging schemes is set by the water companies themselves. Prices are supposed to be set so that they reflect the costs of the services provided, and that no undue discrimination occurs among classes of different customers occurs. For *metered* households, the amount charged is related to the volume of consumption; for *unmetered* households, the charges are set on the base of the rateable value of the property. Except for some business customers, water supply is not subject to VAT (subsidy via tax exemption) (Zabel and Orman, 1996).

2.3.2 Water discharge and sewerage systems

In **Australia,** impaired water quality in streams and in sea water (due to inadequate treatment of wastewater and excessive flows into streams and oceans) is reported to be a major environmental problem (Commonwealth of Australia, 1996*a*). The overall level of subsidies is substantial and these subsidies mainly occur through non-recovery of costs by public sewerage and drainage authorities, and from fiscal practices which encourage, (or do not discourage), liquid waste production. A survey of metropolitan areas conducted by the Australian Resource Management Committee of Australia and New Zealand shows that, as of 1993-94, subsidies comprised between 4 and 8% of the real costs — only Melbourne Water achieved full cost recovery. Overall, however, recovery of the *economic* costs of waste water treatment has been improved, in comparison with the period before 1994.

Despite the gradual achievement of full-recovery of the economic costs of constructing and maintaining water discharge and sewerage systems, the existing negative environmental externalities will still require large investments in the future. In 1990, the Australian Water Resources Council estimated that new investments of over A$2.5 billion would be required for urban sewerage treatment assets in order to provide limited improvements in nutrient removal. This survey also indicated that the planned investments at that time amounted to only about 20% of the sum estimated to be required (*ibid.*).

In reaction to some of the environmental problems associated with waste water treatment, the Sydney region initiated a comprehensive programme as part of its Clear Water Programme (CWP), with planned expenditures of around A$7 billion over the 20 years between 1989 to 2009, in order to improve marine and inland water quality, to reduce odours, and to restore bush and wetland areas in the region.

In **Canada,** charges for sewer collection and treatment are typically billed together with water charges. Flat-rate sewer charges are the most frequently-used type, while a second frequently-used type is the fixation of a certain portion of the customer's bill for water supply. The sewer charge portion of the water bill is often over 40% of the total, and sometimes exceeds 100%. Because sewerage costs are frequently integrated into the water bill, the summary financial data related to these amounts is also typically integrated (Tate and Lacelle, 1995: 14). For that reason, the same information reported in Section 2.3.1 also applies here.

In the **Czech Republic,** 73.2% of the population is now (1995) connected to public sewerage systems, and 89.5% of the waste water released to public sewerage is being purified (Pavlík, 1996: 4). The task of sewerage collection and disposal, formerly performed by regional state-run enterprises was entrusted to the municipalities in 1992. (For recent developments in these pricing regimes, see Section 2.3.1.)

While the *operation* of sewerage/waste water treatment is no longer being subsidised, subsidies for *investments* covered 77% of costs in 1995 (56% via direct payments, 21% via returned financial aid). This amounted to 1.5 billion KCS in 1995, and will reach 1.0 billion KCS in 1996 (Pavlík, 1996: 2). The

main source of financial support is the State Environmental Fund, administered by the Ministry of Environment. The revenues generated are used for operation and maintenance of the waste water and sewerage facilities, as well as for loan repayments and investments in new infrastructure (Pavlík, 1996: 3).

In the Czech Republic, large inequalities exist among regions, and the municipalities do not yet have enough financial resources for required investments in network renewal and/or enlargement. Therefore, existing subsidy schemes will still be necessary for the immediate future. To meet water quality requirements for public water supply, as well as to improve the quality of water in catchment areas for water abstraction, the subsidised construction and modernisation of waster water treatment plants and sewerage facilities seems necessary from both a public health and an environmental perspective (see also Section 2.3.1).

In **Denmark,** the average waste water charge per cubic metre has increased from 2.80 DKK in 1984, to 9.43 DKK in 1993. This is more than three times higher than the price for one cubic metre of fresh water supply, and therefore largely determines the total water price. As of January 1997, a national tax on waste water, which applies to direct discharges from municipal sewage treatment plants and industries, will be introduced as part of "green tax reforms" (Andersen, 1996). Taxation will depend on the waste water's content of nutrients. It is estimated that the average charge will be DKK 0,75 per cubic metre. Reportedly, certain (pollution-intensive) industries (fishing, cellulose production, sugar-production and certain chemical industries) are partly exempted from this tax (subsidy via tax exemption) (Wallach, 1996).

In **Italy,** capital expenditures for sewerage, and sewage treatment are financed entirely out of the public budget (Massarutto, 1993). During the last decade, approximately 7 billion ECU have been transferred via grants and favourable loans for sewerage and sewage treatment purposes (Massarutto, 1996: 16).

In the **Netherlands,** sewer construction, operation, and maintenance are the responsibility of municipal governments. The pumping stations, the pipework needed to transport the waste water to treatment plants, and the treatment plants themselves, are generally owned and operated by regional water boards. 97% of households are connected to the sewer system. In the past, there had been several subsidies available for speeding up the connection of waste water discharges to the sewer network, and to the Publicly-Owned Treatment Works (PTWs). Apart from a general flow of state money to municipalities (the "Municipality Fund"), which is used to finance a wide variety of municipal tasks, as of 1993 there were no programmes in force to transfer money for the operation, maintenance or expansion of the sewerage/water treatment systems. Current policy requires municipalities to strive for 100% coverage of sewerage management expenses from their own resources, preferably by levying a sewer tax. Only in dedicated soil protection areas are some (very limited) subsidies available (van den Bergen, 1993: 6).

In **Norway** (see Section 2.3.1), the municipalities are responsible for water and waste water management. The costs for providing water services are collected through a local tax. In principle, the municipalities are supposed to set the price of water at a level where the revenues equal the costs of water supply in practice. However, the *costs* of wastewater treatment are 12% higher than those paid in the waste and wastewater fee, which results in a 12% subsidisation to the households from the municipalities (subsidy via underpricing) (Sjoholt, 1996).

Traditionally, the **Spanish** water supply and waste water system was almost entirely subsidised. Since 1985, Spain has sought to transform its water services system from a system which considered water as a public good to one where costs are internalised. However, in order to meet the objectives set out by

European Union Directive 271/91, an estimated 1.9 trillion pesetas (12.101 billion ECU) of investments in new connections and infrastructural improvements will be necessary (Maestu, 1996: 4). Raising such large sums will require massive subsidisation from various sources: the Central Government will contribute an estimated 25% of these costs. In the period from 1995 to 2000, an estimated 2010 million ECU will need to be spent (an average of 402 million ECU annually). Regional Governments will provide about 10.286 million ECU through their general budget. These payments will be partially covered by European Union Cohesion Funds (in 1995, 235 million ECU were available) and by Regional Funds (between 20 and 40% of the total investment in the sector). Furthermore, water utilities, municipalities, and regional governments can apply for favourable loans with subsidised interest rates from the European Investment Bank. As of 1993, there were 79 billion pesetas available in outstanding loans of this type.

Wastewater collection and treatment in Spain is paid for through three types of charges. The *discharge tax* is levied by the Basin Authorities to the Municipalities and private water utilities for discharging into lakes and rivers. The *sanitation tax* is levied by the regional governments and local authorities, to recover the costs of wastewater treatment, and municipal sewage charges. There are also *other taxes*, levied by the municipalities, to recover the costs of the municipal sewage network (Maestu, 1996: 14/15).

A 1994 study calculated the average charge of Basin Authorities to Municipal Organisations at 0.48 ptas per m^3 of water used. In 1992, the highly complex discharge tax led to a situation in which only 1,600 million of the charged 6,500 million pesetas were actually received. As a consequence, subsidies from the central budget were needed to cover the operational costs of the Basin Authorities (Maestu, 1996: 16). The pricing practices of the municipal authorities and water utilities are subject to regulation by the Regional Governments. As of 1992, the average price charged for municipal waste water treatment in Spain was 19.35 pesetas per m^3 (Maestu, 1996: 10).

Switzerland is currently discussing the reform of its system of subsidising the construction of sewerage and waste water treatment from the central budget. To date, subsidies to the Cantons (regional political units, similar to federal states) have ranged between 15-45% of the construction costs. Total annual payments have amounted to approximately 110 million SFR. Despite drastically reduced contributions from the central budget to future projects in this area, outstanding obligations of the central budget still amount to 1,370 million SFR (Eidgenössisches Departement des Innern, 1996).

2.3.3 Main conclusions and policy options regarding water-relevant subsidies and human settlement

On the basis of the preceding examples, some general observations about the environmental and budgetary impact of water-relevant subsidies in their relation to *human settlement* in OECD Member countries are highlighted below. Furthermore, policy options are briefly discussed that would result in budgetary and/or environmental gains.

- In OECD Member countries, the amount of water withdrawn for human settlement is generally smaller than for either agriculture or industry.

- The local and regional availability of water resources differs considerably among OECD countries. Negative environmental externalities associated with water supply systems are of importance, especially where large quantities of water have to be transferred from rural to urban areas.

- In a number of OECD Member countries, degrading local or regional water resources has required the introduction of more costly wastewater treatment facilities. The costs of wastewater treatment have therefore risen considerably in recent years.

- Since water supply and sewerage systems require large infrastructure facilities that are constructed, operated, and maintained by public or private agencies which sell water services to consumers, subsidies generally occur via "underpricing". In most of the observed cases, the *economic* costs involved with water supply and wastewater discharge are not fully covered by the generated revenues, and require compensating financial transfers.

- Tariff structures for water prices tend to include a *fixed* fee to cover standing costs, and a *variable* fee to cover operational costs of water-related infrastructure. In a number of countries, the structure of these tariffs is *not* related to the actual amount of water consumed. On the other hand, a number of tariff structures or charging schemes in operation *do* aim to provide incentives for the use of less water. Some OECD Member countries (e.g. Denmark, Germany, Netherlands) even seek to include an explicit environmental component into their charging schemes, through abstraction taxes that become part of the water price.

- In general, for both water supply and waste water discharge and sewerage systems, operating costs are covered by prices or charges. If exceptions exist (subsidy), these can often be justified by social reasons.

- There are considerably higher levels of subsidies involved in the *construction* of water infrastructure than for its *operation*.

- As regards the existing tariff systems, a large variety of subsidy patterns can be identified: subsidies from richer to poorer users; cross-subsidies from urban to rural (or among different urban) areas served by the same utility system; cross-subsidies between different types of users (human settlement, industry, agriculture); temporal subsidies; unintended subsidies to polluters (lack of administrative capacity to effectively collect due charges); hidden subsidies (non-transparent accounting of some municipalities). These financial transfers can be related to a range of social, economic, and administrative reasons.

The preceding observations allow for some general remarks concerning policy options for subsidy reform:

- Although some generalisations can be made about water-related subsidies in the area of human settlement, the important public function of providing water services requires careful assessment for each case in question, to decide if (and under what conditions) a significant rise in water prices can be justified. In effect, this means that the principle of "full cost recovery" has to be weighed against social and economic interests, public health interests and social policy objectives.

- Before generally raising the prices of water to encourage more efficient water use, *specific* incentives that promote the use of less water within existing should be used.

- More transparent accounting practices would seem to be an important step towards assessing who actually pays for the various components of the water services, allowing a proper evaluation of currently existing water subsidies in the area of human settlement.

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