CBO TESTIMONY

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CBO's Comments on H.R. 1071, a Bill on Subsidizing New Desalination Facilities

before the
Subcommittee on Water and Power
Committee on Resources
U.S. House of Representatives

May 24, 2005

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Mr. Chairman and Members of the Subcommittee, thank you for the opportunity to be here today to discuss H.R. 1071. H.R. 1071 directs the Secretary of Energy to make payments to the public or private owners or operators of new desalination facilities providing municipal water service to domestic customers. Those payments, for which $200 million is authorized for appropriation from fiscal year 2006 to fiscal year 2016, are intended to partially offset the energy costs of facility operations. The bill specifies that no more than 60 percent of the funds can be disbursed to facilities that obtain source water from the sea; the remainder must go to those using brackish groundwater or surface water. H.R. 1071 also authorizes for appropriation $10 million over the 10-year period to support research and development of novel technologies for desalination.

Specific Effect of H.R. 1071

As it is currently written, H.R. 1071 serves to subsidize facility operating costs in general, rather than energy costs specifically. Under the bill, eligible facilities would receive a payment of $0.62 (adjusted for inflation) for every 1,000 gallons of water produced and sold, regardless of the energy costs associated with their operations. Generally speaking, energy costs for desalination—which rise in conjunction with the salinity of feedwater—can account for more than one-third of operating costs, but the ratio is not fixed among facilities.

The proposed subsidy amounts to approximately $200 per acre-foot of water produced, which corresponds to about 30 percent of a new desalination facility's total costs of production. In 2002, new desalination plants were reportedly producing freshwater at a cost of about $655 per acre-foot. By comparison, in 2002, the average price for irrigation water from California's Central Valley Project was $17.14 per acre-foot, while Los Angeles residents paid $925 per acre-foot.

In the absence of federal support, the demand for water has already led to the establishment of new desalination facilities, including sites in Tampa, Florida, and Brownsville, Texas (drawing brackish groundwater from the Gulf Coast aquifer). In Texas alone, there are more than 100 desalination units using either brackish surface water or groundwater as their source. Municipal facilities account for roughly 60 percent of the state's desalination production, and the remainder is produced by industrial facilities. At the end of the 1990s, nearly 800 desalination plants in 46 states (many of which were inland and for industrial use) were in operation and provided desalinated water amounting to about 1.4 percent of domestic and industrial water consumption.

Traditionally, federal subsidies for water supply have primarily been designed to address capital costs—for example, federally financed Western water supply projects initiated by the Reclamation Act of 1902, financial assistance for construction of water reclamation and reuse facilities under title XVI of the Reclamation

Projects Authorization and Adjustment Act of 1992, and the Drinking Water State Revolving Fund that finances infrastructure improvements. H.R. 1071 adopts the less-common approach of subsidizing operating costs. From an economic-efficiency perspective, however, the distinction between a capital- or operating-cost subsidy makes little difference in this case, because the only facilities eligible for the subsidy are those that begin operations during the 10-year period following the bill's enactment. Either approach reduces the overall costs of building and operating a new facility and improves the relative attractiveness of the subsidized-water-supply option compared with others.

Subsidizing Desalination: Implications for Economic Efficiency

In the area of desalination, past federal support has primarily been directed toward research and development. That funding began with the Saline Water Act of 1952; by 1982, when most federal funding for desalination research and development was discontinued, the United States had spent cumulatively more than $1 billion (in today's dollars). Under the Water Resources Research Act of 1984, desalination research was conducted by the U.S. Geological Survey as part of general research, rather than as a separate program. In 1996, the Congress passed the Water Desalination Act, renewing support for research and development with the aim of determining the most technologically efficient and cost-effective means of purifying saline water. The act created the Bureau of Reclamation's Desalination and Water Purification Research and Development Program, authorizing $5 million annually from fiscal year 1997 through fiscal year 2002 for research and $25 million per year for desalination demonstration and development projects. The Congress appropriated $28.1 million under that (extended) authority from 1998 through 2005 (see Table 1).

In addition to those instances of support, the 2004 Energy and Water Development Appropriations bill contained $3 million for desalination research at the Sandia National Laboratory in New Mexico and authorized the design, construction, testing, and operation of the $5 million Tularosa Basin National Desalination Research Facility in Almogorda, New Mexico. That facility, which is currently under construction, will focus on inland brackish groundwater from sources that have widely varying degrees of salinity.

An economic-efficiency argument can be made for federal investment in research and development, because when multiple states and private-sector entities face a similar problem, each balances the potential cost of research against only its own expected benefits, rather than the benefits that could accrue to all parties. Federal support counteracts the resulting tendency for nonfederal entities to invest too little in research and development.

Table 1.

Annual Appropriations for Desalination Research and Development

Fiscal Year	Appropriation (Millions of dollars)
1998	2.7
1999	1.5
2000	0.7
2001	1.3
2002	4.0
2003	4.0
2004	7.4
2005	6.5

Source: Congressional Budget Office.

H.R. 1071's proposal to subsidize new facilities that provide local water supplies would be similarly appropriate from an economic-efficiency perspective if it targeted a market failure. The underlying market issue connected with desalination technologies, however, is that in many U.S. water markets in general, the prices charged do not reflect the full cost of providing water. Allowing the prices charged and received to more fully reflect the cost of supply is an alternative approach to enhancing the viability of desalination.

Because water users tend not to pay prices that reflect the full cost of provision, their demand is higher—in some cases, much higher—than it would be otherwise. Water supply problems in the United States are typically driven by high demand associated with underpricing rather than by physical shortages. In agriculture, for example, Bureau of Reclamation facilities provide about 32 percent of surface water withdrawals used for irrigation, but the water supply charges recover for the government only a fraction of the cost of providing the water. Since the beginning of the reclamation program in 1902, irrigators' interest-free payments—due over a 40- or 50-year horizon—have been based only on recovering the associated nominal costs for capital and operations and maintenance, neglecting the opportunity costs of federal expenditures. At a federal borrowing cost of 4 percent annually, over a 40-year repayment period, the government recovers only 49 percent of its total cost. The problem is not unique to agriculture: municipal and industrial users served by public water systems (those that furnish water to at least 25 people or have a minimum of 15 connections) are responsible for about 13 percent of freshwater withdrawals from surface and groundwater sources, and they also generally obtain water at less-than-full-cost prices. Over time, providers have failed to take in revenues adequate for procuring and treating supplies as well as for operating, maintaining, and replacing their water infrastructure.[1]

On the demand side of the market, consumers respond to the incentives they face. The lower the marginal price (the price for the next unit of water consumed) that water users face, the weaker their incentive for efficient water use. Rate structures with fixed charges for an initial volume and higher charges for use above that volume can provide for basic water use while encouraging efficient water-use choices.

Such structures are rare among Bureau of Reclamation-supplied irrigation districts. In a 1986 survey of 196 of those districts, which account for more than 70 percent of total irrigated acreage in Bureau-supplied districts, 48 percent of the districts assessed their members a fixed charge per acre that was independent of the amount of water delivered. Fourteen percent of the districts used a purely quantity-based rate structure, and almost all (96 percent) had a constant per-unit price. Thirty-eight percent coupled a fixed charge for an initial volume with a quantity-based rate for water use in excess of the initial volume that was typically not triggered in normal years (and for 86 percent of those districts, the quantity-based rate was constant or decreasing). When the districts were revisited in 1997, the situation was largely the same.

Most municipal water rate structures are made up of a service charge—a fixed fee per billing period—and a unit consumption charge for set quantities of water (or "blocks"). Under decreasing block rates, the per-unit charge for water declines as the consumption volume increases. Under a uniform structure, the unit rate for water is constant, or flat, regardless of the amount of water consumed. Under increasing block rates, the unit rate for water rises as the consumption volume increases. Although the proportion may be somewhat higher now, only about 20 percent of the systems surveyed a decade ago were using increasing block-rate structures.

Conclusion

Appropriate pricing would reflect the marginal cost of water supply, maximizing economic efficiency in allocating water among competing uses by ensuring that the marginal value per unit of water was equal for all uses. Encouraging the efficient production and use of freshwater would imply a greater reliance on its

1. Congressional Budget Office, *Future Investment in Drinking Water and Wastewater Infrastructure* (November 2002).

marginal value than is currently seen in the United States. Subsidies for new desalination facilities would most likely not improve the overall economic efficiency of water supply and use because such subsidies would compound the distortion of price signals. An alternative means of improving the viability of desalination would be to allow prices charged to water users and received by water producers in general to more fully reflect the cost of supply.

One could argue that the pace of the evolution of water treatment technologies, and thus their suitability for more widespread use, has probably been impeded by the historically low price of water in the United States. Nevertheless, the need for such technologies has already attracted private as well as federal interest, and the level of interest seems to be growing. At the end of the 1990s, industry was adding an estimated $5 million to $10 million annually to the federally supported research and development efforts for water purification technologies. Recently, global demand for freshwater has prompted increased interest in research and development of more efficient means of desalination by companies such as General Electric, ITT Industries, Siemens, and Tyco International. Sandia National Laboratory's *Desalination and Water Purification Technology Roadmap*, issued in January 2003, asserts that exploration of alternative technologies will yield the greatest advances in desalination.

With that combined support for research and development of new, more energy-efficient desalination technologies as well as efforts to improve price signals in water markets so that users face charges that more accurately reflect the marginal costs of water supply, desalination may become an important source of freshwater in some markets.