

Economic Incentives— Loans, Grants, and Water Pricing



A Resource Management Strategy of the California Water Plan

California Department of Water Resources

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Acronyms and Abbreviations

af	acre-foot
CDPH	California Department of Public Health
CPUC	California Public Utilities Commission
CWC	California Water Code
DWR	California Department of Water Resources
IRWM grant program	Integrated Regional Water Management Grant Program
MWD	Metropolitan Water District of Southern California
RWMG	regional water management group
SWRCB	State Water Resources Control Board
USBR	U.S. Bureau of Reclamation

Economic Incentives — Loans, Grants, and Water Pricing

Loans, Grants, Water Pricing, Technology Adoption, and Water Market Policies

Economic incentives include financial assistance, water pricing, and water market policies intended to influence water management. Economic incentives can influence the amount and time of water use, wastewater volume, and source of water supply.

Examples of economic incentives include low interest loans, grants, and water rates and rate structures. Free services, rebates, and the use of tax revenues to partially fund water services also have a direct effect on the prices paid by water users. Government financial assistance can provide incentives for integrated resource plans by regional and local agencies. Also, government financial assistance can help water suppliers make incentives available to their water users for a specific purpose. Assistance programs can also help align the economic and financial drivers affecting local, regional, and statewide water management decisions to minimize unintended consequences and maximize the benefits of working cooperatively with consistent goals and objectives. As opposed to incentives, penalties are a type of economic disincentive that can be used to discourage undesirable water use behavior.

Incentives can be created or enhanced by facilitating water market transfers, by creating market opportunities where they did not exist, by expanding opportunities where they currently exist, or by reducing market transaction costs. In each case, new or enhanced market opportunities can influence water management decisions.

Economic Incentives in California

Water Rate Incentives

The most prevalent water rate policy is for water suppliers to price the water they supply to recover costs for such things as planning, operation, maintenance, capital, and administration. Water rates are also commonly used to contribute to water agency capital investment accounts for funding anticipated infrastructure projects. Water rates can be used to recover costs for compensating third parties such as agricultural services businesses that are adversely affected by water market transfers. Other means available to recover costs include ad valorem taxes and revenues from bonds not repaid from water rates.

Some agencies are not required to recover the full cost of development and maintenance. For example, Congress has not required the U.S. Bureau of Reclamation (USBR) to recover all of the costs of providing supplies to Central Valley Project agricultural contractors that meet specific acreage limitation criteria. This is an example of an incentive that was designed in 1902 to achieve a social goal of agricultural development in the West. Rates charged for urban wastewater treatment also traditionally have not been required to recover the full cost of projects because of substantial federal grant funding through the Clean Water Act.

Water rate incentives can take several forms. Water rate structures designed to recover costs can be fixed, uniform, or tiered rates (Box 1). Both uniform and tiered rates can have a fixed component. Where water use is unmetered, fixed assessments might be necessary. For example, water rates can be based on connection size (of the pipe entering the residence) for urban users or irrigated acreage for agricultural users.

Marginal cost pricing is one strategy to help promote more efficient water use. With marginal cost pricing, instead of being based on average unit costs, the volumetric rates to all customers would be based on the unit cost to the water purveyor of the last and probably most expensive, source of supply. In a much milder form, marginal-cost pricing for new customers (e.g., residents of new subdivisions) might reflect the average cost after factoring in the cost of the additional supply needed for those customers. This price would be higher than that for customers who are served by the existing delivery infrastructure.

Most urban water suppliers in California are moving away from fixed and uniform rates and toward rate structures based on the amount of water used. Many urban suppliers have already adopted tiered rate structures where the unit water charge increases as water use increases; the more units of water used, the higher the charge for each subsequent unit (increasing tiered rates). Some tiered water rate structures may have higher season rates. In 1999, a survey of the California urban water purveyors found that about 43 percent had increasing tiered rates, 45 percent had uniform rates, 10 percent had fixed or other type rates, and 2 percent had declining tiered rates. By 2003, about 41 percent had increasing tiered water rates, 49 percent had uniform rates, 9 percent had fixed or other type rates, and 1 percent had declining tiered rates. A 2007 survey of the suppliers reporting their rate structures reported that 58 percent had increasing tiered rates, 36 percent had uniform rates, 2 percent had declining tiered rates, and 4 percent had other types of rates. In 2011, the agencies responding to the survey indicated that 67 percent had increasing tiered rates, 23 percent had uniform rates, 1 percent had declining tiered rates, and 9 percent had other types of rates.

Most apartment building owners do not individually meter their tenants, removing the effect of volumetric pricing on the tenant's water use. Although most residential wastewater treatment is currently charged a fixed rate, commercial and industrial users are more likely to be charged by wastewater volume and in some cases, by the types of constituents in their wastewater. Some agricultural agencies have adopted tiered rate structures.

A recent influence on water rates is the cap and trade program which was adopted by the Air Resources Board in 2011 as part of Assembly Bill 32. Under cap and trade, the water sector will be treated same as any other non-exempt industry. The cost of purchased electricity from fossil fuel sources will increase due to the premium placed on electricity by the allowance requirement under cap and trade, and those costs will be passed on to users such as water districts. Electricity from hydropower generation or renewable energy sources will avoid that premium. However, renewable energy is more expensive than fossil fuel based electricity. Water districts purchasing electricity from wholesale, market-based fossil fuel sources will experience an increase in the cost of electricity either due to an increase in market prices as private generators include the cost of cap and trade allowances in their sales price, or, for imported electricity, the water district itself will need to acquire allowances. The increase in electricity will create an added cost for water districts which rely on electricity for activities such as pumping water and running water treatment plants. Water districts using more energy, such as for conveying water greater distances, may expect to see larger cost increases. Potentially mitigating some of these effects is one of the recommended investment priorities for proceeds from the cap-and-trade auctions, which are energy efficiency and clean

Box 1 Water Rate Structures to Recover Costs

Fixed rate. The water user pays the same amount for water each month regardless of the amount of water use. This is common where water is unmeasured (also known as a flat rate). Example: \$20 water bill each month.

Uniform (or constant) rate. The water user pays the same for each unit of water. This requires measurement of water. Example: \$100 for each af of water.

Tiered water rate. As use exceeds predetermined amounts, the water user pays a higher or lower rate for each unit of water. This requires measurement of water. Example of a tiered rate with increasing unit costs (also known as an increasing block rate): \$1 for the first 100 cubic feet, \$1.50 for the second 100 cubic feet, \$2 for the third 100 cubic feet, etc.

energy. Projects to increase water system and use efficiency as well as energy efficiency funded under this investment priority have the potential to reduce water utility costs.

Water users who use electricity provided by IOU's or municipal utilities should expect to see some rate relief in their electricity bills due to the free allowances allocated to those utilities in the cap and trade program. The rate relief program is currently under development by the California Public Utilities Commission (CPUC) and by individual municipal utilities, and it is uncertain how the rate relief will affect retail electricity customers, and whether the class of affected customers will include water districts.

Financial Assistance Incentives

The California Department of Water Resources (DWR), the State Water Resources Control Board (SWRCB), and the California Department of Public Health (CDPH) have run multimillion dollar bond-funded programs, which have provided grant and low interest rate loan money to many local agencies for integrated regional water management, water conservation, water recycling, distribution system rehabilitation, groundwater storage, water quality improvement, conjunctive use projects, and drinking water treatment. These programs are intended to encourage local agencies to adopt water management practices which have a statewide as well as a local benefit. More than \$18.4 billion in grants and low interest loans have been authorized via State-issued bond programs since 1996.

DWR is currently managing the Integrated Regional Water Management Grant Program (IRWM grant program), using funding authorized from the passage of Propositions 84 and 1E. In August 2010, DWR issued program guidelines for the IRWM grant program. Those guidelines described the solicitation and evaluation processes for the award of funds to regional water management groups (RWMGs). The program guidelines include requirements that integrated regional water management plans address the causes and effects of climate change on water management. Specifically, to receive funding, the 2010 climate change standard required that a RWMG (1) evaluate the adaptability of their water management infrastructure to the anticipated effects of climate change, and (2) consider the effect on greenhouse gas emissions (and thus on climate change) from the construction and operation of its new water infrastructure and programs. Updated program guidelines issued in November 2012 also require that plans include a prioritized list of climate change vulnerabilities and a plan, program or methodology for further data gathering and analysis of them.

At the wholesale agency level, the Metropolitan Water District of Southern California (MWD) has developed plans to expand its Local Resources Program, which provides an incentive of up to \$250 per

acre-foot (af) to its member agencies for water recycling, groundwater recovery, and seawater desalination. MWD's water rate structure includes a "water stewardship charge" to collect revenue to help individual retail suppliers develop projects and programs that benefit the region. Incentives can include rebate programs for low-flush toilet installation, water audits for residential landscapes, and mobile lab services for increasing on-farm water use efficiency at no charge to customers, or other innovative programs.

Water Market Policies

California Water Code (CWC) Sections 1725 through 1732 were adopted to facilitate short-term water transfers. Prospective buyers benefited from the reduced cost of obtaining SWRCB approval, length of time for approval, and risk of denial of approval. These buyer benefits translated into increased opportunity costs to prospective sellers by encouraging those buyers to participate in the market and giving them the ability to offer higher payments. DWR and the SWRCB have taken actions to both facilitate and encourage water transfers. USBR ran water banking operations during the 1976-77 drought. In 1992, DWR operated the Drought Water Bank and currently operates the Dry Year Water Purchase Program on behalf of the State Water Project contractors. DWR has also developed procedures to wheel water market purchases through the California Aqueduct for both its contractors and other parties. In 2009, DWR operated a water bank to coordinate water transfers between willing sellers and willing buyers in response to drought conditions.

Potential Benefits

A major purpose of economic incentives is to promote water management practices that meet federal, State, regional, and local policy goals. Incentives may produce environmental or social benefits, or avoid or delay construction of new water supply projects by promoting water use efficiency. When water costs increase, for example, customers have a choice to either pay the higher water bill or find ways to use less water, such as using a broom or blower to clean sidewalks instead of a hose. Residential customers might install smart irrigation controllers or change to drought-tolerant landscaping. Industrial users may adopt process technologies that use less water or move to on-site recycling. Agricultural users may shift crop types, change their irrigation technology, or reduce the acreage they irrigate. Water efficiency gains may require higher expenditures for businesses and residential users and/or lower incomes to businesses, depending on the ability of users to adjust their water use.

Water use efficiency is a policy goal that can be facilitated by economic incentives. A water management system becomes more efficient when users act as if the cost of the last increment of water they use (i.e., the marginal cost of water) is equal to its opportunity cost (i.e., the amount of economic value that water would generate in its next best alternative use). If more water is available, users should act as if the cost were equal to the opportunity cost of the resources needed to make it available (e.g., the land, labor, and materials needed to construct a recycling plant, a reservoir, or to institute a conservation measure). The quantification, to the extent practicable, of environmental and social values which could be realized for the alternative uses of the water should also be considered when determining opportunity costs.

If water suppliers make management decisions as if their customers faced these costs, including the decision to invest in new supplies, then water use efficiency more likely will be improved, even if the prices actually seen by their customers do not fully reflect those costs. This strategy applies to decisions

by State and federal agencies to provide financial incentives to local water suppliers and to decisions to develop statewide water supplies.

Economic incentives, such as water pricing, can also promote social (e.g., preservation of agricultural production in disadvantaged areas dependent on agriculture for food security and economic health) and environmental well-being (e.g., preservation of wetland habitat and streamflows for fish). These benefits should also be evaluated whenever possible to facilitate informed decision-making by policy makers, including the public.

It should also be made clear that improving water use efficiency may not necessarily result in reduced use because of the increased productivity of water (i.e., the added efficiency increases its marginal value). For example, if water cost or availability was a constraint and depending on the demand for the product, production could increase and water use could approach, if not equal or even exceed, the previous amount of use. In any case, efficiency improvements can allow the same or greater value to be created with reduced water use.

Economic incentives that produce more efficient water management practices, such as lining canals, can result in unintended costs to the environment by reducing supplies to wetlands dependent on subsurface flows. Conversely, water rate policies that lower the cost of surface water during wet cycles, apparently promoting inefficiency, can encourage recharge of groundwater basins, thus promoting conjunctive use and greater overall efficiency. Water quality improvements resulting from economic incentives can, in addition to benefiting the environment, help farmers meet drainage water goals as well as lower treatment costs or provide health benefits to urban users.

It is difficult to quantify secondary (or indirect) benefits provided by economic incentives since the incentives influence decisions on other management strategies that produce their own benefits. Economic incentives can be used to influence development of water supply augmentation or demand reduction programs that promote regional self-reliance. For example, grant funds from a State agency can help promote recycling by reducing its cost to local suppliers. Similarly, a wholesale water agency might make financial assistance available to retail water purveyors to encourage implementation of projects or programs that would benefit the region. Financial assistance can also be used to achieve beneficial changes in water system storage, conveyance, and treatment operations. The willingness of a water agency to participate in water marketing can also be influenced by economic incentives.

Water market policies that promote willing buyer/willing seller water transfers by increasing opportunity costs to potential sellers tend to move water from areas and activities where it produces less economic value to areas and activities where it produces higher economic value.

This can occur on a short-term (e.g., drought emergency) or long-term basis. With appropriate compensation and mitigation for adverse impacts, the overall economic well-being of the state can be increased without additional water development and without imposing undue hardship.

Potential Costs

One financial cost of an incentive program to a water purveyor or government agency is the cost of its creation and administration, including the costs of arranging bond funding or low interest rate financing.

Grant programs include the cost to the taxpayers of obtaining and repaying grant funds. Other costs would be associated with the adoption of water management strategies or water use behaviors — including forgoing some water use — that may result. The costs of the economic incentives will depend on how the incentives are integrated with other management strategies. As with other management strategies, economic incentives must be specific to the circumstances and water management goals of each individual water supplier.

If incentive programs result in the adoption of programs or the construction of projects that would not otherwise be adopted or created, then the associated economic, social, and environmental costs of those projects and programs would have to be compared to the costs of programs and projects that would have been adopted or created in the absence of the incentives to determine if, on balance, the incentive programs resulted in greater costs than were avoided through their use.

Another type of cost can arise from the possibility that an incentive will result in actions not aligned with policy goals or that incentives will operate at cross purposes (i.e., have unintended consequences). To the extent that resources are misallocated, a loss in economic, social, and/or environmental well-being will be incurred compared with fewer losses, if any, from a better allocation of resources.

Major Implementation Issues

Selecting Appropriate Water Rates

A major consideration is determining what rates to charge customers while ensuring that costs of providing the water (including conveyance, treatment, and distribution) and treating and disposing of the wastewater are recovered. Also, managing water rate changes during water shortages can be challenging since incremental costs of supply can both increase dramatically and change rapidly, making it more difficult to recover costs.

If regulations against collecting revenues in excess of costs remain in effect, some suppliers would have to reduce their lower tier prices in order to charge higher costs at the higher tiers. While achieving overall reductions in total water usage, lowering the first tier rate would tend to increase use by the lower tier customers, a potentially undesirable result from a water use management standpoint, which seeks to encompass all customers and customer segments.

Those water utilities regulated by the CPUC which have implemented tiered rates and revenue decoupling mechanisms are not permitted to collect revenues in excess of authorized costs. Any excess revenues are refunded to customers and any revenue shortfalls are recovered through a surcharge.

Assembly Bill 2882 (2008) facilitates allocation-based conservation water pricing by amending the CWC to add new requirements for implementing tiered water rates. The added requirements, if followed, allow suppliers to adopt rates which discourage the waste and unreasonable use of water while ensuring that water service fees are proportionate to the cost of providing water service in accordance with the requirements of Proposition 218 (1996).

If surface water rates are set too high, and the option is available, agricultural users or urban water users may choose to pump groundwater instead. This could have undesirable consequences for groundwater management.

Funding for Loans and Grants

The availability of State funding can be intermittent. Funding methods that require direct legislative appropriation or approval of new water bonds could require years of lead time before funds are available.

State Funding for Investor-Owned Water Utilities Regulated by the California Public Utilities Commission

With relatively few exceptions, State bond-funded grants and loans have historically been limited to public agencies and nonprofit organizations. While public water agencies serve the majority of Californians, approximately six million of the state's residents are served by investor-owned water companies under the jurisdiction of the CPUC. Some of these investor-owned water companies and districts serve disadvantaged communities where customers may be faced with unaffordable rate increases to make necessary improvements to meet water quality and safety standards. In addition, all Californians pay for these bonds through taxes, including the customers of CPUC-regulated water utilities. The CDPH has determined that, for its programs, the benefits of State funded grants and loans should accrue to all customers, regardless of whether they receive water from a publicly-owned or investor-owned water company, unless specifically stated otherwise in the authorizing legislation. This determination could also be made by other State agencies for their grants and loans programs.

To ensure that savings accruing from State funding are passed on to customers, the CPUC instituted rules to protect the public interest integrity of the bond funds in early 2006. In recent years, bonds have addressed the eligibility of investor-owned water companies for the bond or grant programs (e.g., the Proposition 84 implementation legislation and the water bond legislation proposed in both 2008 and 2009). The investor-owned water utilities continue to work with the Legislature to ensure that future bond measures explicitly include eligibility for all water suppliers, thus ensuring that all Californians can benefit from available State funding.

Criteria for Loans and Grants Funding Approval

Historically, requests for loans and grants have exceeded available funding. Deciding which strategies and which suppliers receive loans and grants requires setting of priorities for funding. Financial and economic criteria for determining funding eligibility may leave out communities that cannot support needed infrastructure without financial assistance. Setting aside funds for those types of communities as well as lowered eligibility requirements may be required.

Incidence of Costs of Incentives

Economic incentives can affect social equity when those incurring the costs of providing incentives, through higher taxes or fees, do not receive a fair share of the benefits that the incentives are expected to generate. As an example, increasing the costs for agricultural water supplies increases the efficiency of on-farm water use, but can also induce changes in crop patterns that result in lower farm employment. Communities dependent on farm production may be disproportionately affected. In the urban sector, if

water rate changes reduce the use of ornamental landscaping, jobs that depend on establishing and maintaining that landscaping could be lost.

Incentives for water transfers can result in more water moving out of agricultural production and into other uses on a temporary or permanent basis. Communities supplying inputs to farm production through farm labor; farm equipment sales and repair; crop harvesting, hauling, and storage services, banking, legal, and farm management services may be adversely affected. This is a bigger issue in communities more heavily dependent on supplying these inputs.

Environmental Justice

Pricing policies that are designed to promote efficiency may affect the ability of disadvantaged populations to purchase sufficient water to maintain a minimal lifestyle. Some type of lifeline rate may be desirable in these cases. Also, obligations placed on the General Fund through bond measures adopted to provide financial incentives creates repayment burdens that jeopardize funding capacity available for social programs that benefit the disadvantaged.

Regulations

Some water agencies have regulations that prevent the use of water metering necessary for measuring and pricing volumes of water. Typically, loans and grants are constrained by bond language to strategies that lead to capital expenditures. Most loans and grants may not be used for developing non-capital strategies such as water rate changes, yet such rate design changes can be as cost-effective or more at achieving demand reduction than non-price conservation programs.

Development of Water Markets

See resource management strategy report, *Water Transfers*, for a discussion of the development of water markets.

Self-Served Water Users

Self-served water users are not subject to water supplier rate policies and are, therefore, unaffected by rates that are intended to increase efficiency.

Economic Modeling Tools

Responding appropriately to economic incentives requires decisions based on information from system modeling tools that correctly account for all the costs and benefits of water management strategies. Systems analysis tools are needed because of the interactions between water management alternatives and carryover storage and reuse, for example, and the implications of these interactions for system reliability. These types of tools can be very expensive to develop and maintain, particularly for water systems of any complexity. The cost of obtaining data, continually updating the data, and availability of that data are concerns. In addition, the technical knowledge to do this work, including implementing the models, may not be available in-house.

Recommendations to Help Promote Economic Incentives

The State and water agencies should consider and evaluate economic incentives as an integral part of their package of management strategies. The following recommendations recognize that economic incentives will vary widely throughout California due to differences in local conditions:

1. Institute water rates that support better water management based on the unique conditions in each water district.
 - A. Use volumetric pricing wherever practicable and economically efficient.
 - B. Use tiered pricing to the extent that it improves water management, including consideration of higher prices for water in excess of agricultural and urban vegetation management requirements.
 - C. Recover more costs from variable charges and fewer costs from taxes and fixed water charges as is financially prudent.
 - D. Agencies adopting new water rates should clearly identify what they mean to water users and provide education, training, and technical assistance to water users to maximize the desired outcome of those policies.
2. Institute loans and grants that support better regional and statewide water management based on the conditions in each region.
 - A. The State should develop guidelines and ranking criteria for grant and loan awards to water agencies that consider cost-effective water management, environmental costs and benefits, and environmental justice and equity objectives.
 - B. The grant and loan process should account for the fact that some water agencies have limited funds and staff to prepare applications.
 - C. Agencies receiving grants and loans should make information on the success of the programs/projects that they implement available so that the experience can be used to design better incentive plans.
 - D. Investor-owned water utilities should continue to work with the Legislature to ensure that future bond measures explicitly include eligibility for all water suppliers, as appropriate.
3. The State should provide technical assistance to local agencies in developing equitable and effective economic incentives to achieve local and statewide water management goals and objectives.
4. The State should explore innovative and equitable ways to provide financial incentives to private for-profit water purveyors that avoid or minimize the perception of shareholders unfairly benefiting from public funds and without risking the tax-exempt status of bond funding for these incentives.
5. The State should assist local agencies in using planning methods and adopting policies that promote long-run water use efficiency on a regional and statewide basis while accounting for policies on environmental and social well-being.
6. The State should provide technical expertise and funding to help local agencies develop and use water management system modeling tools that allow comprehensive economic analyses to be conducted and the model results to correctly reflect economic incentives.

Refer to resource management strategy report, *Water Transfers*, for recommendations on promoting water transfers.

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