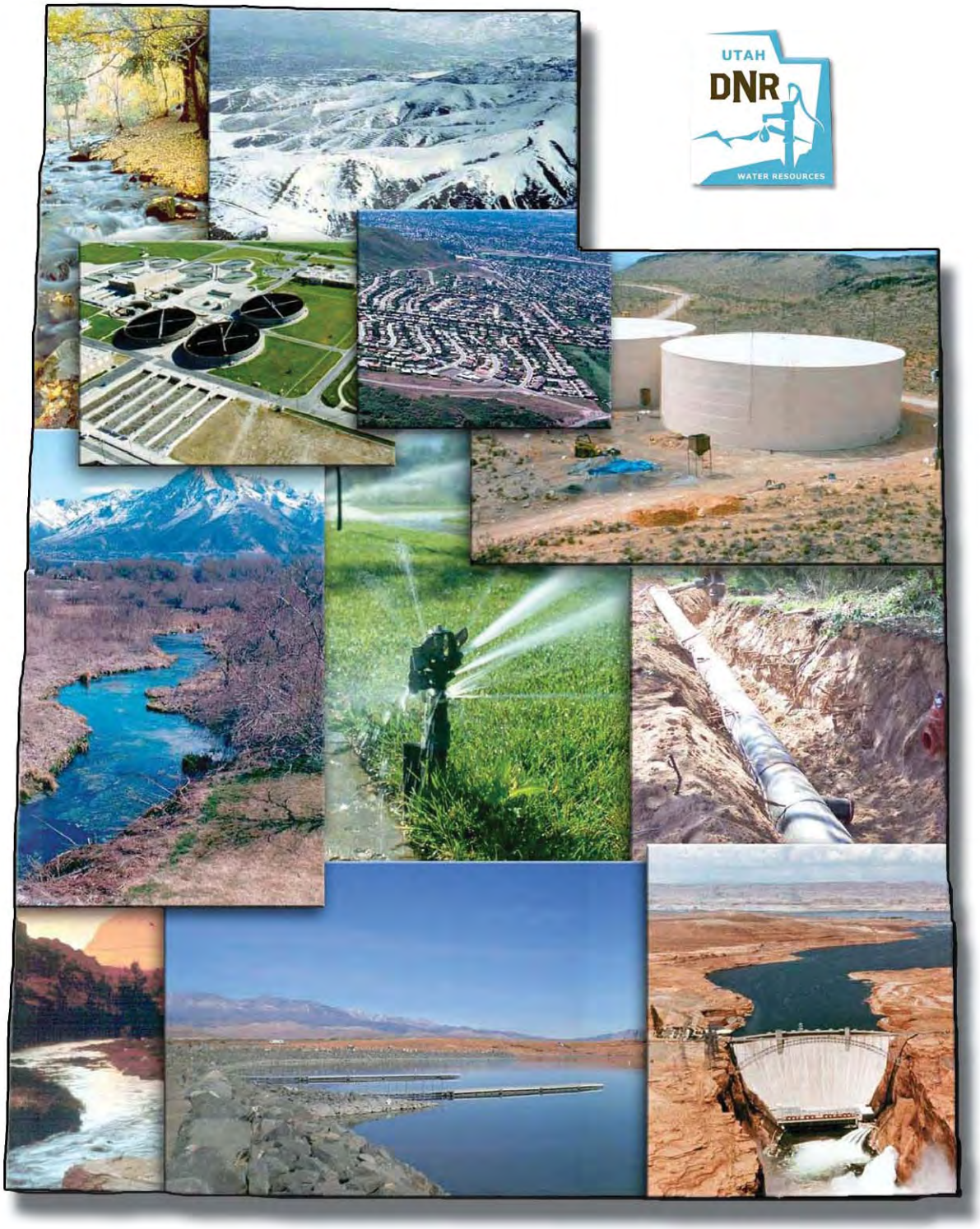
The Cost of Water in Utah

"Why Are Our Water Costs So Low?"



THE COST OF WATER IN UTAH

"Why are our water costs so low?"

Prepared by

Utah Division of Water Resources
1594 West North Temple, Suite 310
P. O. Box 146201
Salt Lake City, Utah 84114-6201

October 27, 2010

ACKNOWLEDGEMENTS

This report was prepared under the direction of Todd Adams, Assistant Director of the Division of Water Resources, by a project team consisting of the following staff members:

Eric Klotz -	Chief, Water Conservation and Education
Gregory Williams -	Senior Water Resource Engineer
Eric Jones -	Water Resource Engineer (Primary author)
Lyle Summers -	Research Consultant

Other staff members provided significant assistance with reviewing, editing and preparing the document for publication.

The Division of Water Resources also wishes to express gratitude to members of the Governor's Water Conservation Team, and other advocates throughout the state; whose work to promote a long-term water conservation ethic in Utah have given the water conservation efforts of the division valuable momentum.

Dennis J. Strong, Director

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INTRODUCTION

The Utah Division of Water Resources (DWRe) has frequently asked and been asked the question, "Why are our water costs so low?" Questions about water costs usually stem from concerns about water conservation, namely that the cost of water is too low to encourage conservation. The cost to consumers of water provided by water suppliers in Utah is well below the national average and regionally one of the lowest. The Utah Division of Drinking Water (DDW) has regulatory authority over water providers and collects water rate data for the State of Utah. The DDW regularly collects this information for the State of Utah and compiles it in an annual report. However, the DWRe felt it would be valuable to evaluate this issue to accomplish its mission of water planning, conservation and education. This report will not address the issues concerning conservation (this subject is comprehensively covered by the DWRe in the "M&I Water Conservation Plan"); however, this report analyzes the cost of water in various communities and the factors that contribute to low water cost.

Salt Lake Valley

COST COMPARISONS

There are few national reports that offer statistics calculating the per capita cost of water. The DDW compiles yearly information regarding Utah's water cost per capita, and Raftelis Financial Consultants, INC. (RFC), in conjunction with the American Water Works Association (AWWA), generates biennial data for the entire nation.

The DDW, in conjunction with the Utah Division of Water Rights (DWRi) and the DWRe, conducts a survey of community drinking water systems within the state. This report utilizes the results of the Billing and Rate Portion of the 2006 Community Water System Survey that was compiled by the DDW. The report indicated that there were 462 registered community water systems in the State of Utah, serving a reported population of 2,510,426 residents. Of the 462 community systems, 322 participated in the most recent survey (2006). These 322 systems serve a reported population of 2,291,825 residents. The majority of the respondents provided satisfactory responses to questions regarding water bill information and consumer costs. From this survey, DDW found that the average monthly consumer water bill in 2006 was $37.11 and the cost of water per 1,000 gallons was $1.34. However, not every state compiles a similar report, making it difficult to compare results.

Child using community drinking water system

A biennial survey has been produced by RFC in cooperation with the AWWA since 1996 to aid water and wastewater utilities in its benchmarking efforts. The RFC/AWWA 2006 Water & Wastewater Rate Survey includes the participation of 256 utilities. Rates, as well as other operational and financial metrics, are organized by size and location. Table 1 on the following page, derived from the RFC/AWWA 2006 database, shows the average cost of water per 1,000 gallons, residential and combined (residential, commercial, institutional and industrial) monthly bills for Utah, other western states and a few eastern states. The table shows average monthly water bills vary greatly from state to state. Based on this data, Utah is shown as having an

average cost of water per 1000 gallons of $1.34, the same cost reported by the DDW. **Based on the numbers shown in the table, the cost of water per 1,000 gallons in Utah is 43% below the national average and 45% below the western states average.** The residential and combined water bills of Utah also illustrate that the state has low water bills when compared to other areas of the country.

Table 1 Cost of water for selected states

AVERAGE MONTHLY WATER BILLS[1,2,3]

State	$/1000gallons	Residential ($)	Combined ($)[4]
Selected Western States			
Idaho	1.26	23.16	30.57
Utah	**1.34**	**23.47**	**31.27**
Arizona	2.48	35.23	48.19
Colorado	2.54	31.43	43.54
Wyoming	2.67	24.30	33.14
Nevada	2.80	44.42	60.78
New Mexico	2.50	27.07	38.63
California	2.92	32.81	57.78
Selected Eastern States			
Georgia	2.51	22.13	24.46
Michigan	2.70	20.70	23.54
New York	3.27	41.92	44.77
Interior Western U.S. Average[5]	2.31	30.23	42.99
Western U. S. Average[6]	2.42	28.58	33.19
Eastern U. S. Average[6]	2.75	22.66	28.15
National Average	2.37	27.61	32.48

NOTES:

1. Data source (unless noted): 2006 American Water Works Association (AWWA) database.
2. Average for each state is based only on the cities included in the AWWA database.
3. All monthly billings are from water sales income only.
4. The combined billing includes all categories: residential, commercial, institutional and industrial usage.
5. The average of the seven listed western states, based on the cities included in the AWWA database.
6. The eastern and western averages include all states east or west of the Mississippi River, respectively.

REASONS FOR CURRENT LOW WATER COSTS

There are several factors that contribute to the cost of water in every state across the country. These are; climate, geography, water quality, types of delivery systems, energy costs and funding from federal, state and private sources.

Utah's climate and geography make it possible for high quality water to be gravity fed into the larger urbanized areas of the state. After Utah was settled, there were several large water development projects funded by the state, as well as the federal government. These, coupled with water use conversion from agricultural irrigation to Municipal and Industrial (M&I) and low energy costs, have all contributed to low water costs in Utah.

Climate and Geography

Utah has a unique climate and geography that allows for low water costs. From Brigham City to Cedar City (the I-15 corridor) the average annual precipitation is 16 inches, although during the summer months the precipitation is limited to 4-7 inches. The majority of Utah's population lives, along this corridor, west of the Wasatch Mountains, in what is considered an arid high desert climate. However, in the Wasatch Mountains the average annual precipitation is 40 – 50 inches. This is from an annual mountain snowfall range of 200 inches to 500 inches. Fifty inches of precipitation is roughly what is received on an annual basis in many of the nation's southeastern states, well known for their high rainfall.

Snowpack in the Wasatch Mountains

This is a very important fact concerning the cost of water in Utah. The snowpack acts as a storage reservoir of billions of gallons of water, storing the water until the summer months. When the snowpack begins to melt in May and June the canyons east of the I-15 corridor fill with water, delivering some to reservoirs and lakes. Much of this water enters ground water aquifers, which flow to springs or can be pumped from the ground and used as needed by communities lining the Wasatch Mountains. Water taken from groundwater aquifers requires

little treatment since a lot of the particulates have been filtered as the water seeped through the underground rock and soil. In the western portion of Utah, including the Wasatch Front, all of the excess water flows into the terminal water bodies of the Great Basin, the most famous being the Great Salt Lake.

When the Mormon Pioneers first settled in Utah, the available mountain snowpack was an important factor as to why they settled where they did. In 1847, the early pioneers began to prepare the Salt Lake Valley for agricultural uses. This involved the construction of ditches and canals that would bring the summer run-off out of the canyons and onto adjacent developed farm lands. In addition to settling at the base of snow covered mountains, the Mormon Pioneers established their communities atop fairly large ground water aquifers. This allowed many communities to utilize ground water when the mountain snowpack was no longer delivering sufficient water (late summer, fall and winter months).

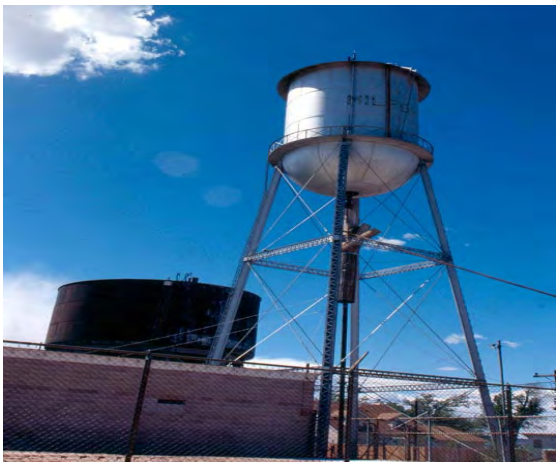
Diamond Fork Pipeline

Of course, Utah is not the only state where communities were established due to geographic convenience. The major early settlements in California were established near ocean ports, beaches and producible agricultural lands. However, many of these communities grew rapidly and now have a greater water demand than the local supply; therefore, they are required to convey water over hundreds of miles from other watersheds. Transporting their water over these long distances increases the cost of water. Other western cities having similar arid climate to Utah's, such as Denver, Boise and other more arid cities such as Las Vegas and Phoenix, established their communities close to good water supplies. However, due to population increase, the local water demands are now greater than the capacities of those original water supplies. Thus, these communities must also convey water from other sources outside of their watershed, increasing the cost to provide water for their communities. In comparison, many of Utah's communities are located at the mouths of canyons,

near their water sources and their demand doesn't yet exceed supply. It requires less energy and less infrastructure to transport and treat their water supply. In turn, it is less expensive to deliver higher quantities of water to the residents of many communities in Utah.

Water Quality and Water Delivery Systems

As discussed previously, a large portion of Utah's water is obtained from the snowpack that acts like a large storage reservoir. The snowpack is made up of relatively clean water that is usually gravity fed into actual reservoirs and then gravity fed to area treatment plants. The snowpack is considered clean because it is not exposed to pollution for extended periods of time. Every year there is a new snowpack that covers the mountain tops. Whereas, in many other parts of the country, major cities have water sources that have to be heavily treated prior to entering the drinking water system. Also communities that use snowpack as a water source are usually the first users of the water. In other parts of the country, many communities are downstream from other major communities and therefore are utilizing a degraded water source. A degraded water supply requires more frequent and extensive treatment of the water source, translating into higher cost for the users.



Traditional Water Tower vs. Typical Utah Water Tanks

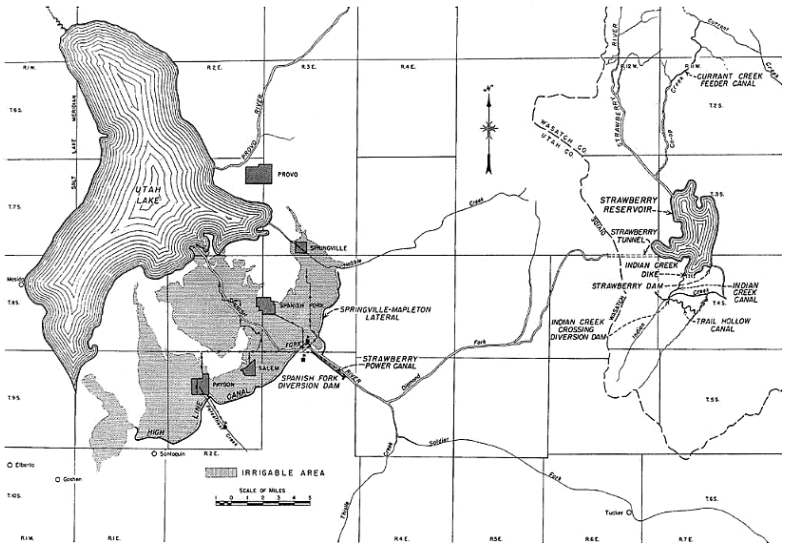
Almost half of the treated water in Utah is gravity fed; this greatly reduces the necessity of additional energy to transport the water. In addition, some of the surface water conveyance systems are used to generate electricity, further lowering costs. Gravity fed systems eliminate the need for elevated water storage tanks in the system. The storage tanks that are required, in Utah,

are usually constructed on the ground. In many other parts of the country, because of the topography, storage tanks are constructed on high towers and water is pumped up and then released to provide the necessary pressures. These systems require more energy to deliver water to the end user and therefore increase the cost of water. Utah has very few traditional water towers.

Proximity to a high quality water source (snowpack), the limited requirements of treatment of the water prior to being sent to the users, and gravity fed systems have contributed greatly to low water costs in Utah.

Early Irrigation and Municipal Water Developments

Early surface water developments in Utah began on a large scale in 1902, when the U. S. Bureau of Reclamation (USBR) constructed the Strawberry Valley Project, located in the Utah Lake hydrologic basin. Additional large USBR water storage projects followed (Provo River Project, Ogden River Project, Weber Basin Project, Central Utah Project, etc.). In addition to these large federally funded projects there have been several large state funded projects, (Sevier Bridge, Piute Reservoir, Panguitch Lake, etc.). Local conservancy districts were created to sponsor those projects and to enter into contracts to repay the loans.



Schematic for the Strawberry Valley Project

Most Utah communities also acquired local surface water rights early on, thereby securing future water for projected growth. Later, some of these same communities participated in federally funded water projects at costs that, in their time period, were expensive. However, in today's dollars, those early projects were fairly inexpensive when compared to current water developments elsewhere around the west.

Through these programs, Utah leaders were able to direct the planning and development of large-scale water storage and development projects. These projects provided water to irrigate the agricultural lands and for M&I needs. Utahns could then homestead and live in the arid state. Many of those early federal projects have been completely repaid to the federal government and are still in use. The only costs now are for operation and maintenance. Thus, many Utah communities are the beneficiaries of large, federally-financed water projects that are mostly paid for and still operational. This is yet another factor why many Utah communities can provide low cost water to their customers.

The State of Utah also has several state water funding programs which are seen as an investment in the local infrastructure and are designed to promote water development, conservation and safe drinking water. These programs are valuable in promoting Utah's economic growth. Most of the funding assistance from state agencies is provided to smaller cities, towns, special districts and irrigation companies. Collectively, the state programs have been effective in providing between 15 to 20 percent of the annual M&I water infrastructure funding. Of course, while the cost benefit is substantially greater to the individual community receiving the funds, overall, these programs have helped to keep water costs low in Utah.

State funded water project, Quail Creek Reservoir

Effect of State and Federal Funding Programs

The Utah Board of Water Resources works closely with water districts, irrigation companies, cities and towns statewide to develop new water sources and upgrade irrigation and community M&I water systems so that water usage can be carried out in a more efficient manner. Since the establishment of the Board of Water Resources in 1947 it has contributed more than $300 million for M&I projects. In addition, the state's Drinking Water Board has

loaned more than $170 million over the last 20 years to build and improve drinking water systems throughout the state. The Community Impact Board has also provided funding for M&I water system improvements. Since 2000, they have loaned and granted water entities over $125 million. All of these state financial programs have provided partial project funding with grants and/or low or no interest loans for many water development projects across the state. As stated earlier, these programs, loaning nearly $600 million since 1947, have helped keep the cost of water low.

Federally funded project, Strawberry Reservoir

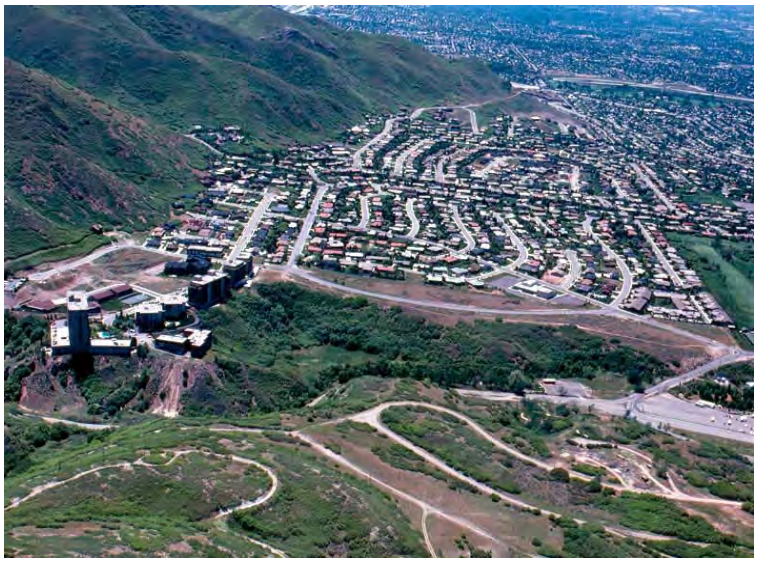
Utah has also been the beneficiary of numerous investments by the federal government in local water development projects. Many of these projects have been paid for. Yet these development projects still function and provide benefits today. There are however, some large scale USBR projects still being paid for. Federal M&I project costs must be repaid with interest, although the interest rate is below the market rate. Again, keeping water costs low

Conversion of Agricultural Water to Municipal and Industrial Uses

As economic growth has continued, a major portion of Utah's landscape, especially along the Wasatch Front, has changed from rural to urban. The water uses from many of the federal and non-federal projects, built primarily for irrigation of agricultural crops, began changing to M&I uses. In 1950, the Board of Water Resources estimated that agricultural water uses accounted for 92% of total water use in Utah. Currently, the USGS data indicates that 81% of total water use in Utah is on agricultural lands; however, every year more agricultural water uses are being converted to M&I uses. This conversion process is only being done in areas where it is allowed by legal constraints. For example, recent DWRe data indicates that in urbanized Davis,

Salt Lake, Utah and Weber counties, agricultural water use currently accounts for only 50% of the total water use. This demonstrates how land and water use patterns have changed and are continually changing along the Wasatch Front.

As cities and towns have grown, many have acquired shares of stock in local irrigation companies. In many cases, irrigation companies and cities have installed gravity pressurized secondary water systems. The proliferation of these projects is fairly unique to Utah. They deliver untreated water to customers for irrigation of lawns and gardens. These systems have allowed for easier conversion of agricultural irrigation water to M&I uses. Because of this, more high quality culinary water from wells and springs can be reserved to meet existing indoor M&I needs, as well as for future growth. Conversion of agricultural water to M&I use has greatly increased the number of people who can be served by existing developed water supplies. Additionally, fewer new sources are required for culinary purposes as growth continues. Thus, costs incurred to supply the M&I water needs of a growing population are lower than if new sources were needed to be developed.



Land converted to M&I use

Examples of agricultural to M&I conversion are numerous across the state. The following two examples from the Wasatch Front are typical. Payson City, located in southern Utah County, has acquired irrigation water rights over the years from developers that have established new subdivisions. The city then charges developers the current market price for the amount of water needed for their developments, in addition to infrastructure costs and other impact fees. Payson City will incur costs in treating and delivering this water, but no additional cost of acquisition is passed on to customers through the water bills. In another example, Salt Lake City has entered into numerous agreements with local irrigation companies to exchange the city's lower quality water in the Jordan River for the irrigation companies' higher quality canyon

stream water. Therefore the amount of energy and time to treat the water to drinking standards is significantly less, which in turn helps keep the cost of water lower.

In some cases, cities and water districts purchase additional water rights to accommodate growth. These costs are then passed on to end users through the water bills. However, more often than not, developers are required to provide the cities, in which they are developing, with adequate water rights as a condition of subdivision approval. Developers acquire this water through the purchase of water rights associated with the land they want to develop. Developers can also acquire water on the open market. The developer costs are then passed on to the real estate purchaser. This results in cities increasing their water supply without additional costs for the water users.

Because Utah water laws allow these types of exchanges and acquisitions, they will continue to occur. As agricultural water gradually converts to M&I use in the state's urban areas and developers are required to provide water rights, communities can continue growing while maintaining adequate water supplies without having to develop new water sources and therefore maintaining a lower water cost.

Energy Cost

A recent case study, performed by DWRe, of a typical large water distribution system, showed that the energy to convey and treat a unit volume of water was significantly less in Utah than elsewhere in the west. This is due to some of the factors discussed earlier, higher quality water sources and gravity fed systems.

Industrial coal fired power plant in Carbon

As a secondary contributing factor, the majority of Utah's power is generated by coal-fired power plants. Because of Utah's large coal reserves, it is relatively inexpensive to

produce and transmit electric power in Utah. According to the U.S. Energy Information Administration (EIA), Utah ranked 4th lowest in 2007 for energy costs to consumers. Utah is ranked with Idaho, West Virginia and Wyoming; like Utah these states have ready access to an energy source and geography that allows said states to distribute the produced energy with less of a financial impact to the end user. These two factors, low energy demand for distributing water and low energy costs, help keep the overall cost of water low in Utah and other states. Table 2 illustrates that energy costs could be a factor that contributes to the cost of water.

Table 2 U.S. energy costs for selected states and their cost of water

U.S. Energy and Water Costs by State [1]		
State	Average Retail Energy Price (cents/kWh)	Cost of water ($/1000 gallons)
Selected Western States		
Idaho	3.16	1.26
Utah	**4.23**	**1.34**
Wyoming	4.13	2.67
New Mexico	5.40	2.93
Colorado	5.91	2.54
Arizona	5.60	2.48
Nevada	7.53	2.80
Selected Eastern States		
Michigan	6.54	2.70
Georgia	5.38	2.51
New York	8.56	3.27
National Average	6.20	2.37

1. Source: U.S. Energy Information Administration, 2007

Water Conservation

In a period of ten years (1995 – 2005) Utahns have reduced their overall water use from 320 gallons per capita per day (gpcd) to 260 gpcd (a 19% decrease). Shown in Figure 1 is the water use for public community systems since 1970. These systems serve 98% of all Utah residents. From 1980 to 1990 the increase in water use followed the same trend as the population. However since that time water use has decreased while population continues to increase. This decrease in per capita water use helps keep water costs low. The DWRe has set a goal to reduce per capita use further by 25% from the year 2000 to 2050. With this water conservation goal, the development of new sources will be delayed, saving millions of dollars. These saving are passed on to the end water user. Conserving water not only helps with monthly water costs for an individual user; it also helps mitigate costs increases incurred from new water developments. Thus, the recent reductions in per capita use, mainly the result of major statewide water conservation efforts, have also helped keep water costs low.

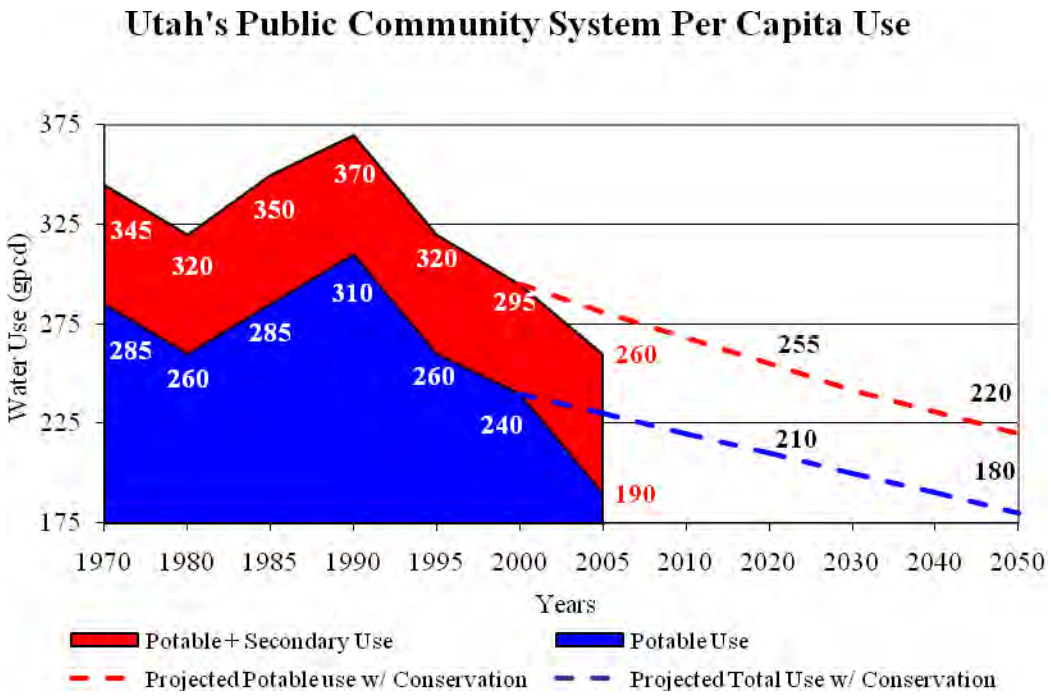


Figure 1 Utah's GPCD since 1970 with the projected goals for future GPCD
Source: DWRe *Municipal and Industrial Water Supply and Use Studies Summary*, 2009

REASONS FOR CURRENT LOW WATER BILLS

All of the reasons for lower water costs discussed previously (Geography, Climate, Water Quality, and Energy Costs) contribute to lower monthly water bills for customers in Utah. Additionally, there are two more issues that have no effect on overall water costs, but they do affect water bills. In much of Utah, true water costs are not completely reflected in monthly water bills. These other factors that keep monthly water bills lower in Utah are discussed below.

Water Impact and Connection Fees

Cities and towns in Utah are allowed to assess impact fees on new developments to cover the capital cost of growth. These fees are an upfront payment of the cost of the water infrastructure needed to deliver water to new growth and tend to stabilize water rates, reducing the need for system-wide rate increases to pay for new growth. According to the DDW report entitled *2006 Survey of Community Drinking Water Systems*, statewide water impact and connection fees are about $50 million, or about 15% of the total revenues received by Utah water systems. These fees help to keep community system water rates low and fund the cost of new system developments that would otherwise have to be recovered through water bills.

Property Taxes

Conservation Garden of Weber Basin WCD

Nationally, approximately 8% of drinking water utilities receive property taxes as a significant part of their total revenue. In 2006, the Utah Division of Drinking Water identified 32 retail and wholesale drinking water systems in Utah (7% of the 462 public community systems) that receive property tax revenues. These water systems serve approximately 750,000 people or 30% of the state's population. The property tax revenues for

these 32 systems in 2006 amounted to about $26 million, or about 8% of total water revenues ($326 million) received. Water providers indicate property taxes are a stable revenue source that ensures funding of future water projects in a timely manner. For customers, this means lower monthly water bills but does somewhat distort the true cost of water, because the property tax is collected separately.

An example of how property tax revenues help keep water bills lower can be seen at the Weber Basin Water Conservancy District (WBWCD). Some of their projects have been sponsored by the USBR and there is a loan associated with these projects. Therefore, the WBWCD has to pay back the loan that was given to them by the USBR. They use the property taxes that they receive to pay off the loan. All of the fees that are collected directly from the water users are used to help maintain the system and continue to provide the same level of service that is expected. This process helps keep the local water bills lower because they can provide water and not have to add additional fees into the monthly water bills.

CONCLUSIONS

Utah's M&I water suppliers have been successful in providing **affordable** water for Utah's growing population. Much of the success has been the result of physical factors. These physical factors include: Easy access to high quality water that translate into low treatment costs, and close proximity to the point of use that translate into low infrastructure and energy costs. Fiscal factors that have also contributed to reduce water costs include: (1) Conversions of already developed agricultural water to M&I uses, (2) federal/state funding programs, (3) lower energy costs. Numerous cities and towns in Utah exhibit many of these factors, which result in lower operational costs. In addition to these, water conservation, by Utah's residents, has helped delay new water projects. These delays in new water developments have saved millions of dollars. Also, impact fees and property taxes help keep monthly water bills lower by moving the true water cost elsewhere. The result is water costs and monthly water bills are lower for Utah consumers than in other areas of the West, as well as the rest of the nation.

Utah's 2.9 million residents have been provided with an abundance of high quality water from nearby mountain streams and groundwater aquifers. With the steady increase of population and the need to meet the water requirements of its future population, Utah's relatively inexpensive water sources will need to be supplemented with more expensive sources. This will cause the cost of water to steadily increase. However, even with proposed expensive water projects, because of Utah's unique climate, geography and other factors discussed in this report, average water bills are likely to remain below those of other areas of the west and the nation.

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