Castle Rock, CO

Committing to Cost-Effective Conservation

Project at a Glance

Utility Overview

- Utility: Castle Rock Water
- Location: Catle Rock, Colorado
- Population served: 75,857
- Service area: 34 square miles

Challenges

- Major reliance on deep water groundwater supply, such as deep aquifers, which have a very slow rate of recharge
- Drought prone
- Rapidly growing population
- Need to reduce peak demand

Solution

- An aggressive water efficiency program, including cost-of-service water budget rate structures, mandates and incentives, and community education, that will reduce future demands by 18%, or 2,700 acre-feet, by around 2050-2055.

Costs and Funding Sources

- Water Rebates Budget (2018-2021): $145,000
- Sources:
  - Fees collected from water schedule violations
  - Surcharges imposed on residential customers using more than 40,000 gallons of water / month

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Benefits

Projected to save ~$97M in avoided infrastructure costs

Decreased peak water demand by approximately 300%

Mitigates energy costs and environmental impacts

Achieves an 18% reduction in overall water use by 2050

Meets state conservation mandates 30 years early

Supported by 97% of community

Reduced residential outdoor use by ~19%

Reduced non-residential outdoor use by ~33%

BACKGROUND

The Town of Castle Rock is located south of the Denver Metro area in a semi-arid, high-desert climate with more than 300 days of sunshine and receives 10 to 15 inches of precipitation each year. One of the Town's primary water sources is the Denver Basin, which has four principal aquifers. From 2018 through 2020, approximately 71 percent of the Town's water was pumped from deep groundwater wells. The remainder is sourced from a variety of alluvial wells and local and imported surface water supplies.

Castle Rock is in a **semi-arid, high desert climate and a fast growing population**...

...To meet future demand, the Town set a goal to shift its sources of supply by **obtaining 75 percent of its water from renewable surface water sources**.

CHALLENGE

Due to its semi-arid, high-desert climate, the Town of Castle Rock is prone to droughts, especially during the peak irrigation season of July through September. Compounding this challenge, by the year 2055, Castle Rock's population has the potential to double in size, increasing water demand by approximately 84 percent over the 2020 demand, for an estimated future total annual demand of approximately 16,995 acre-feet.

To meet these future demands, the Town set a goal to significantly shift its sources of supply by obtaining 75 percent of its water from renewable surface water sources that get replenished each year from snow and rain by 2050 and 100 percent sometime after 2050 rather than heavily relying on groundwater. However, opportunities to secure traditional sources of water, such as importing regional water, was and is financially and politically challenging for Castle Rock.

SOLUTIONS

To help meet the challenge of living in a semi-arid high-desert climate with a growing population, Castle Rock is embracing water use efficiency as a way of life. The Town implements comprehensive water use efficiency measures, including budget based rate structures, conservation-oriented system development fees, landscaping standards, incentives, and community education, just to name a few.

Budget Based Rates

A key element of Castle Rock's conservation measures are its budget based rate structures that reward efficient water use and discourage water waste. For Castle Rock residential properties, a four-tier water budget rate structure that creates budgets for indoor and outdoor water use applies. Indoor budgets are

Castle Rock is embracing *water use efficiency* as a way of life

calculated based on use from November through February; residential outdoor budgets are calculated using the irrigated area and a rolling average of the past seven years' evapotranspiration data. For non-residential customers, a two-tier water budget rate structure applies, which also establishes budgets for indoor and outdoor use.

Encouraging Water Efficient New Development

To encourage water use efficiency in new developments, the Town developed a prorated system development fee. The prorated fee is structured so developers receive a discounted water fee proportionate to the amount of water saved.

To take advantage of the program, new developments must have a water efficiency plan in place that sets minimum standards for: 1) indoor water efficiency, 2) outdoor water efficiency, 3) resident education, 4) third-party verification, and 5) monitoring and enforcement.

Efficient Landscaping Standards

Focused on enhancing water-efficient design, installation, and maintenance of outdoor landscaping, Castle Rock's standards for new landscaping are among the most progressive in Colorado. As a unique aspect of the Town's landscaping measures, all professional landscapers, including designers, installers, and maintenance contractors performing commercial landscape and/or irrigation work within the Castle Rock Water service area, must attend Castle Rock's landscaping certification course and pass the associated test. In addition to the Castle Rock specific program, landscape contractors must also successfully complete the Qualified Water Efficient Landscaper training and certification. These programs ensure Castle Rock landscaper professionals understand and implement the Town's irrigation efficiency standards and regulations.

Further, to manage peak water demand, Castle Rock designates specific irrigation schedules where watering hours are designed to ensure customers irrigate when watering is most effective and efficient. The schedule keeps peak demand down by spreading water use evenly throughout the irrigation season allowing for storage tank recovery during non-irrigation periods.

Incentivizing Water Use Efficiency & Fostering a Culture of Conservation

Castle Rock's efficiency programs also include a suite of rebate, incentive, and customer assistance programs for indoor and outdoor water use, including:

- Converting high water use plants to ColoradoScape or hardscape
- Replacing traditional sprinkler timers with smart irrigation controllers
- Replacing traditional spray nozzles with more efficient rotary nozzles
- Toilet retrofits
- Whole-home water monitoring systems with leak detection and automatic shutoff

Water Resource Benefits

Castle Rock's efficiency programs have saved a lot of water. On average, between 2016 and 2020, the Town reported overall water use of 118 gallons per capita per day—already well below the State of Colorado's goal of 129 GPCD that applies as of 2050. The Town's goal is to reduce water use by another 18% to 100 GPCD by 2050.

Specific to outdoor water use incentives, on a six-year average, residential customers that received a ColoradoScape Renovation rebate reduced their outdoor water use by 19%; participating non-residential customers saw a 33% reduction.

Regulatory benefits

As detailed above, Castle Rock has already met State mandated conservation requirements that do not go into effect until 2050; thus, the Town is in compliance 30 years early. In addition, the Colorado Department of Public Health and Environment awarded Castle Rock Water Gold Tier status in the Environmental Leadership Program, 2016 through 2019, for voluntarily going beyond compliance with state and federal regulations, increasing sustainability, and commitment to continual environmental improvement.

Economic benefits

Castle Rock's investment in water efficiency and conservation is cost-effective. By achieving a 108 GPCD in 2014, for example as shown in the below table from Castle Rock's Water Efficiency Master Plan, the Town theoretically saved ~$59 million in avoided future costs for purchasing additional water and building future infrastructure. If the Town meets its target goal of 100 GPCD by 2050, it could save the community approximately $97 million in total by avoiding the purchase of additional water supplies and building of additional infrastructure at $32,000 to $35,000 per acre-foot.

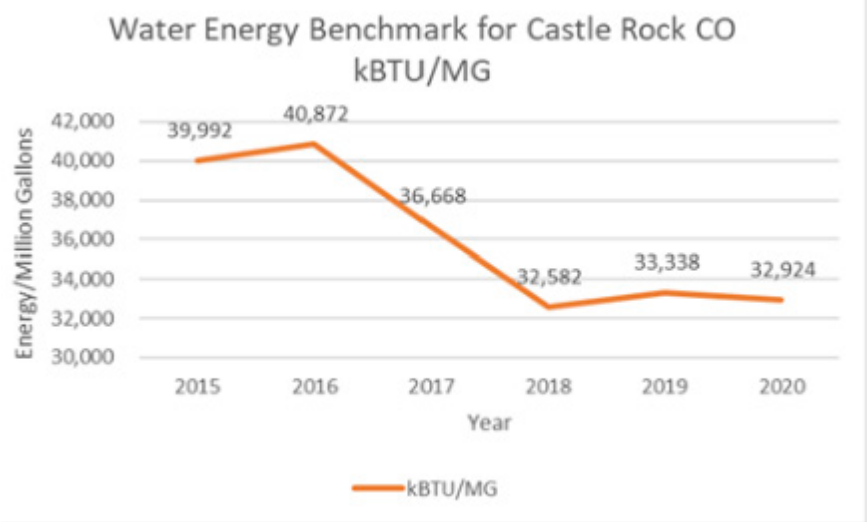
Table 5: Estimated Water Savings, 2010-2014

Description	2010	2011	2012	2013	2014	Notes
Population	49,002	49,949	51,573	54,238	56,645	
System-Wide Annual GPCD	132	123	131	116	108	
Annual Water Savings (Compare to 135 gpcd), gpcd	3	12	4	19	27	Achieved 135 gpcd in 2007.
Annual Water Saved, gallons	51,648,234	216,735,888	84,209,273	380,324,938	555,007,457	
Value of Water Saved	$5,549,603	$23,288,271	$9,048,286	$40,865,915	$59,635,551	$35,000/AF

Environmental and Water-Energy Nexus Benefits

Installing native landscapes via Castle Rock's ColoradoScape program has environmental benefits, as native landscapes increases wildlife habitat and encourages and supports additional native wildlife population.

The Town's water conservation programs also save energy. By reducing the need for water demand per capita, the Town mitigates associated energy costs and environmental impacts of daily operations, as shown in this graph.



Social benefits

Castle Rock residents support a "community culture of conservation." A 2015 water conservation survey found that 97 percent of community members that were familiar with the Town's water use efficiency educational programs thought the programs were valuable. Respondents also showed strong support for additional conservation efforts, such as extending the "no watering" period from 8:00am to 8:00pm, implementing a personalized, one-on-one, sprinkler system assessment where Castle Rock Water conservation staff reviews the landscape and irrigation needs directly with residential customers. This program is estimated to save thousands of gallons of water over the irrigation season.

Sources

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