

## CHAPTER 3: GOALS & STRATEGIES

*Chapter 3 identifies three big-picture energy reduction goals, and details strategies that will help the City and Sonora community reduce their energy need and the accompanying costs. In summary, this is achievable by practicing energy efficiency, utilizing renewable energy, and efficiently utilizing water resources.*

### Basis for energy goals and strategies

To identify the most appropriate energy-efficiency strategies for the City of Sonora the following documents and resources were reviewed:

- City of Sonora General Plan 2020<sup>1</sup> (Adopted May 2007)
- City of Sonora Municipal Code<sup>2</sup>
- Review of 2010-2015 community and municipal energy use
- Review of 2010-2016 energy efficiency PG&E program activity
- Review of 2010-2016 solar PV statistics
- Review of active energy efficiency and water conservation initiatives and programs
- Review of measures in other similar jurisdictions
- Meetings and consultation with City staff
- Public input received from community members and Planning Commission

There are many ways to reduce energy consumption while building greater community resiliency, benefiting not only energy resources, but also water resources, improving the health, safety, and prosperity of Sonora community members. The selection of measures most appropriate for the City and Sonora community was based on the criteria below and in consultation with City staff:

1. Potential of actions to reduce energy use
2. Availability of other organizations to implement actions
3. Co-benefits outside of energy savings (ex. air-quality improvement, public safety, economic development)

The goals, strategies, and actions pertain to the energy consumed by buildings and facilities in the residential, non-residential and municipal sectors. Other sectors of energy usage, such as transportation, are not included in this report but could be addressed in future studies. The energy reduction potential was calculated for each goal using the baseline energy use data, the energy use forecasts, and the estimated energy savings associated with reaching specific targets. The annual energy reduction potential was calculated using top-down methods<sup>3</sup> to estimate energy savings achievable in 2035 by meeting the associated 2035 targets. Calculations are documented in Appendix C. The estimated potential annual energy savings in 2035 were calculated for each strategy and, where applicable, reported for residential and non-residential energy use. By implementing the EAP and through actions taken by community members and the City, the community can potentially reduce energy use by 38,184,137 kWh of electricity (55% reduction), 530,684 gallons of propane (25% reduction), and 287 cords of wood (18% reduction) in

<sup>1</sup> General Plan. Adopted May 30, 2007. City of Sonora. Accessed September 22, 2017.  
<https://www.sonoraca.com/cityservices/commdevelop/generalplandocs/SonoraGeneralPlan2020.pdf>

<sup>2</sup> Municipal Code. City of Sonora. Accessed September 22, 2017.  
<https://www.sonoraca.com/cityservices/commdevelop/municipalcode.htm>

<sup>3</sup> An approach that begins with community-wide energy use, breaks it down into smaller sub-sectors (residential, non-residential, water-energy, and municipal) and then applies reduction estimates based on the targets for each strategy.

2035. A portion of these reductions have already occurred, evidenced by the overall decreases in the consumption of most forms of energy from 2010 to 2015, as noted in chapter 2. Specifically, from 2010 to 2015 Sonora saw an 8.0% decrease in residential electricity use, 22.8% decrease in residential propane use, 0.3% increase in nonresidential electricity use, 2.0% decrease in nonresidential propane use, 6.6% increase in wastewater services electricity use and 41.5% decrease in potable water services electricity use, resulting in a total reductions of 1,542,187 kWh of electricity and 275,505 gallons of propane.

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## ENERGY EFFICIENCY GOALS AND STRATEGIES

The goals and strategies in this section are focused on improving the City of Sonora's community energy efficiency by broadening the reach of existing programs, expanding renewable energy utilization, and employing efficient practices that address the water-energy nexus. The goals in this chapter are interrelated and many of the actions, when implemented, may simultaneously achieve multiple strategies and goals. The Implementation Plan in Chapter 4 describes the actions that support the strategies in more detail. The goals were designed with California's preferred "loading order" in mind for meeting energy demand:

**1st: Cost-effective energy efficiency**

**2nd: Cost-effective renewable energy**

**3rd: Conventional energy sources**

For the City, the economic implications of implementing the strategies and actions primarily involve costs associated with staff time and the potential costs associated with retaining outside consultants to assist with program implementation. The strategies and actions were designed to be low/no-cost to the City by leveraging partnerships with other organizations and utilizing resources available to help with implementation.

For residents and businesses, almost all actions with significant private costs result in a return on investment in energy cost savings that will accrue over time, thus defraying the initial investment costs. Additionally, there are funding sources and financing mechanisms available to offset the upfront costs and often can make projects cash flow positive from day one.

The following table compares 2010 baseline energy use, 2035 business as usual forecasted energy use and potential energy use savings in 2035 with the successful implementation of the EAP strategies and actions. The majority of energy savings are attributed to existing structures and would have significant impact in the community regardless of the projected new construction. A critical way of achieving the energy savings estimated in this plan is by convening a Working Group that focuses on implementing the plan. In order to complete the actions in the Implementation Plan, it is recommended that with coordination assistance of the Local Government Commission's CivicSpark AmeriCorp fellow, the Working group can assist with implementation and alleviate the demand on City staff time. The Working Group should be comprised of representatives from the City, Tuolumne County, Tuolumne Utilities District, Tuolumne County Resource Conservation District, Amador Tuolumne Community Action Agency, Sonora School District, PG&E, Tuolumne County Association of Realtors, the business community, and residents.

**Table 3-1: Summary of 2010 Baseline and 2035 BAU Forecast Energy Use and Potential 2035 Energy and Cost Savings**

Energy Use	2010 Baseline	2035 BAU Forecast	2035 Potential Energy Savings	2035 Potential Cost Savings <sup>4</sup>	Percent Difference
Electricity	60,306,795 kWh	69,398,808 kWh	38,184,137 kWh	\$8,018,669	55% reduction from 2035 BAU
Propane	1,903,951 gallons	2,115,239 gallons	530,684 gallons	\$1,332,018	25% reduction from 2035 BAU
Wood	1,529 cords	1,612 cords	287 cords	\$78,997	18% reduction from 2035 BAU

**Table 3-2: City of Sonora Energy Action Plan Goals and Strategies**

<b>CITY OF SONORA ENERGY ACTION PLAN GOALS AND STRATEGIES</b>	
<b>Goal 1:</b>	<b>Improve Energy Efficiency in Buildings, Facilities, and City Operations</b>
<b>Energy Efficiency</b>	<p><b>Strategy 1.1:</b> Expand outreach and education on existing energy efficiency practices, programs, and financing options for residential and non-residential utility customers.</p> <p><b>Strategy 1.2:</b> Improve compliance with current California Building Energy Efficiency Standards (Title 24, Part 6) by providing informational materials when available.</p> <p><b>Strategy 1.3:</b> Improve the energy efficiency of City buildings, facilities, and operations.</p>
<b>Goal 2:</b>	<b>Expand the Utilization of Renewable Energy and Resilience Measures</b>

<sup>4</sup> Forecasted composite rate for 2035 of \$0.21 per kWh based on SBC forecast of PG&E and TPPA Rates, 2035 average rate of \$2.51 per gallon of propane based on 2010 Energy Information Agency West Coast Annual Average Retail Prices. Accessed September 22, 2017. [http://www.eia.gov/dnav/pet/pet\\_sum\\_mkt\\_dcu\\_R50\\_a.htm](http://www.eia.gov/dnav/pet/pet_sum_mkt_dcu_R50_a.htm), and 2010 average of \$275 per cord estimated based on local listings for soft and hardwood.



<b>Renewable Energy</b>	<p><b>Strategy 2.1:</b> Prepare for the inclusion of renewable energy systems in new construction and large retrofit projects in order to meet California Zero Net Energy Goals by providing informational material when available.</p> <p><b>Strategy 2.2:</b> Encourage renewable energy projects through education, outreach, and local leadership.</p> <p><b>Strategy 2.3:</b> Encourage energy storage and grid optimization infrastructure projects that support local renewable energy systems and community resilience.</p>
<b>Goal 3: Water Energy</b>	<p><b>Encourage the Efficient and Safe Transportation and Use of Water Resources</b></p>
<b>Water Energy</b>	<p><b>Strategy 3.1:</b> Support Tuolumne Utilities District’s outreach and education efforts by providing information on existing and future programs.</p> <p><b>Strategy 3.2:</b> Encourage Tuolumne Utilities District to reduce water losses through proactive leak detection programs.</p> <p><b>Strategy 3.3:</b> Encourage Tuolumne Utilities District to improve the efficiency of their operations.</p>

**GOAL 1: IMPROVE ENERGY EFFICIENCY IN BUILDINGS, FACILITIES, AND CITY OPERATIONS**

**Target Audience**

- Residents
- Businesses
- Public Agencies

**Projected Energy Savings**

- 11,792,741 kWh of electricity
- 326,097 gallons of propane
- 235 cords of wood

**Benefits**

- Comfort
- Convenience
- Low-maintenance
- Reduced Energy Costs
- Workforce Skills Improvement

Improving the energy efficiency of new developments and existing buildings is a crucial best-practice in reducing long-term energy costs. There are a variety of ways to improve the efficiencies of energy-consuming appliances, devices, or processes used daily in our homes, offices, communal spaces, and public and commercial facilities. The following strategies are recommendations for increasing community participation in programs that are designed to save energy and money, encourage the City and public agencies to lead by example, and assist all parties involved in the planning and design review process of new developments to meet and exceed energy efficiency standards.

Many energy efficiency projects have a return on investment ranging from a few months to several years, depending on the size and scale of the project. Incentives and financing programs can offset some of the upfront costs and can often make projects cash flow positive from day one. Incentive and financing programs are listed in Appendix F.

**STRATEGY 1.1: EXPAND OUTREACH AND EDUCATION ON EXISTING ENERGY EFFICIENCY PRACTICES, PROGRAMS, AND FINANCING OPTIONS FOR RESIDENTIAL AND NON-RESIDENTIAL UTILITY CUSTOMERS.**

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Since 2010, City of Sonora residents and businesses have saved 4,794,107 kWh of electricity through PG&E rebate and incentive programs. As technology continues to improve, there is significant opportunity for residents and businesses to save more energy through efficiency improvements. Energy efficiency improvements make homes, offices, and facilities more comfortable, safe, and sustainable while reducing energy bills and operational costs. The improvements also increase the value of the property. The first way to encourage participation is by ensuring that community members, both residential and non-residential, understand the benefits of energy efficiency, simple ways they can practice being more efficient, and are informed of the wide variety of energy efficiency programs available for participation. The Implementation Program in Chapter 4 describes the actions that support this strategy in more detail.

Common energy efficiency practices for existing buildings include retrofitting indoor and outdoor lighting, refrigeration and Heating, Ventilation and Air Conditioning (HVAC) systems to more efficient technology. Other common practices include ensuring proper weatherization practices are in place, upgrading windows and insulation to maintain comfort without requiring significant energy use. Additionally, PG&E offers Time-of-Use rate plans, which helps support energy management by incentivizing energy use during times of low demand when energy costs are low and discouraging energy use during times of high demand when costs are high. By shifting behaviors to accommodate times of high demand, residents and businesses can save money.

**STRATEGY 1.2: IMPROVE COMPLIANCE WITH CURRENT CALIFORNIA BUILDING ENERGY EFFICIENCY STANDARDS (TITLE 24, PART 6) BY PROVIDING INFORMATIONAL MATERIALS WHEN AVAILABLE**

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There is significant opportunity to achieve high levels of energy performance in new development projects, and in large renovations through utilizing new technology, advanced materials, and holistic design. Since 1977, when the first California Energy Efficiency Standards were implemented, the required measures have saved Californians billions of dollars in reduced electricity bills.<sup>5</sup>

In Sonora, nearly 76% of the housing stock or 1,898 of the 2,497 housing units were built prior to the adoption of the state's first Title 24 Energy Efficiency Standards in 1978 and the non-residential building stock is likely similarly dated.<sup>6</sup> While there are certain challenges to renovating historic buildings, energy reduction goals for these buildings is feasible with well-planned and implemented energy efficiency improvements that take into account not only the potential energy savings, but also the protection of the historic property's materials. The number of historic and older buildings that make up a significant part of Sonora's housing and building stock presents a unique opportunity for energy efficiency renovations. Historic buildings can take advantage of the Federal Historic Preservation Tax Incentive program.<sup>7</sup> The National Park Service of the U.S. Department of the Interior prepared a Preservation Brief on Improving Energy Efficiency in Historic Buildings that details the inherent energy efficient features of historic buildings and the opportunities to improve the efficiency through minimal alteration of the buildings.<sup>8</sup> The City of

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<sup>5</sup> Energy Efficiency Standards. California Energy Commission. Accessed September 22, 2017. <http://www.energy.ca.gov/efficiency/savings.html>

<sup>6</sup> U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates, Selected Housing Characteristics, City of Sonora, CA. [https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS\\_15\\_5YR\\_DP04&prodType=table](https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_15_5YR_DP04&prodType=table)

<sup>7</sup> U.S. Department of the Interior, National Park Service, Federal Historic Preservation Tax Incentives. <https://www.nps.gov/tps/tax-incentives.htm>

<sup>8</sup> U.S. Department of the Interior, National Park Service, Preservation Brief: Improving Energy Efficiency in Historic Buildings. <https://www.nps.gov/tps/how-to-preserve/briefs/3-improve-energy-efficiency.htm>

Sonora General Plan identifies preserving and promoting the cultural heritage as an important goal for the City, and energy efficiency improvements can be incorporated into preservation efforts to reduce operational costs and help the City meet historic preservation goals.<sup>9</sup>

Due to a rapidly evolving field and advancements in technology, Title 24's Energy Efficiency standards are updated every 3 years, and it is important that designers, planners, building inspectors, and contractors maintain a current, working knowledge of the standards. Additionally, there are numerous opportunities in the design phase for new developments and renovation projects to achieve savings through holistic design.

**Figure 3-3: California Energy Efficiency Standards in Residential and Non-Residential**



## Buildings

### STRATEGY 1.3: IMPROVE THE ENERGY EFFICIENCY OF CITY BUILDINGS, FACILITIES, AND OPERATIONS.

The 2010 baseline municipal operations inventory indicated that the City consumed 374,383 kWh of electricity for City facilities and 266,352 kWh of electricity for public lighting. The facilities using the most electricity were the Public Lighting (42%), Sonora Police Department (14%), the Sonora City Hall (14%), and the Sonora Fire Department (14%). Additionally the City consumed 5,419 gallons of propane. The three largest consumers were the Sonora Fire Department (40%), Sonora Public Works Facility (28%), and the Sonora Opera Hall (27%). Measures taken to improve the energy efficiency of these facilities will improve staff workspaces and reduce operational costs, thus allowing the City and public agencies to allocate money from savings elsewhere. The City has begun increasing the energy efficiency of public lighting by opting in to PG&E's LED streetlight retrofit program.

Best practice is to benchmark building energy use with the U.S. EPA's free online software, Energy Star Portfolio Manager. It allows users to track the energy use of buildings or facilities, determine their efficiency, and evaluate opportunities to save energy and money. The facilities with the greatest energy use or highest energy intensity should be targeted for energy audits and retro-commissioning<sup>10</sup> to optimize energy performance and identify opportunities for energy efficiency projects.

<sup>9</sup> Sonora General Plan 2020, Cultural Resources, 9.5: Goals, Policies, and Implementation Programs.

<sup>10</sup> Retro-commissioning is a systematic process to improve an existing building's energy performance and occupants' comfort through a whole-building systems approach.

## GOAL 2: EXPAND THE USE OF LOCAL RENEWABLE ENERGY AND RESILIENCE MEASURES

### Target Audience

Residents  
Businesses  
Public Agencies

### Projected Energy Savings

26,096,462 kWh of electricity  
204,587 gallons of propane  
52 cords of wood

### Benefits

Reduced Energy Costs  
Increased Resiliency  
Improved Air Quality

Local renewable-energy projects benefit the City's economy by creating jobs, educating a new and emerging workforce, and reducing energy costs. In Sonora, there are unique opportunities for generating energy from renewable sources including wind, biomass, solar, and micro-hydro. Rooftops, parking lots, and under-utilized open spaces provide excellent opportunities for solar energy generation. In particular, non-residential and municipal facilities tend to have large, flat roofs that are well suited for solar equipment. For historic buildings, it is recommended to select solar for locations where it will have the minimal impact on the buildings' integrity and keep with the City's historic building guidelines. As solar technology advances, there will be more aesthetically pleasing solar options available for culturally significant historic buildings, and one example of this are solar shingles.

Additionally, Tuolumne County is home to significant hydro resources and bountiful forests that must be maintained in order to reduce the risk of catastrophic wild fires. Sustainably managing forests can provide the City and community of Sonora with significant biomass resources that can be used to generate electricity and used for heating. Finally small scale hydro and wind systems can be implemented locally without negatively impacting the environment.

### STRATEGY 2.1: PREPARE FOR THE INCLUSION OF RENEWABLE ENERGY SYSTEMS IN NEW CONSTRUCTION AND LARGE RETROFITS IN ORDER TO MEET CALIFORNIA ZERO NET ENERGY GOALS BY PROVIDING MATERIALS WHEN AVAILABLE.

California's Zero Net Energy (ZNE) goals as part of the California Building Energy Efficiency Standards are for new residential construction to be built to achieve ZNE standards by 2020 and new commercial construction by 2030. A ZNE building produces as much energy through clean, renewable resources as it consumes over the course of a year.<sup>11</sup> These buildings are high performing, highly efficient, more resilient to economic and climate changes, offer more comfortable homes with higher resale value, and more productive workspaces. Achieving ZNE in new construction will help property owners and renters save money on energy costs, foster technological innovation, and improve the workforce skillset in Sonora and surrounding areas to meet these standards. The California Energy Commission's (CEC) Local PV Ordinance Cost Effectiveness Study determined that incorporating a solar PV system in all single family and multifamily new construction is currently feasible and cost effective in all climate zones in California.<sup>12</sup> The City should provide information from the CEC to developers of new construction projects on the feasibility and cost effectiveness of incorporating solar PV systems into the construction process.

<sup>11</sup> California ZNE Communications Toolkit. July 2013. Energy Upgrade California. Accessed September 22, 2017. [http://newbuildings.org/sites/default/files/ZNE\\_MessagePlatform.pdf](http://newbuildings.org/sites/default/files/ZNE_MessagePlatform.pdf)

<sup>12</sup> California Energy Commission, Local PV Ordinance Cost Effectiveness Study, [http://docketpublic.energy.ca.gov/PublicDocuments/17-BSTD-01/TN217290\\_20170425T110520\\_Model\\_Solar\\_Ordinance\\_Cost\\_Effectiveness\\_Study.pdf](http://docketpublic.energy.ca.gov/PublicDocuments/17-BSTD-01/TN217290_20170425T110520_Model_Solar_Ordinance_Cost_Effectiveness_Study.pdf) - Accessed October, 25, 2017.

**STRATEGY 2.2: ENCOURAGE RENEWABLE ENERGY PROJECTS THROUGH EDUCATION, OUTREACH, AND LOCAL LEADERSHIP.**

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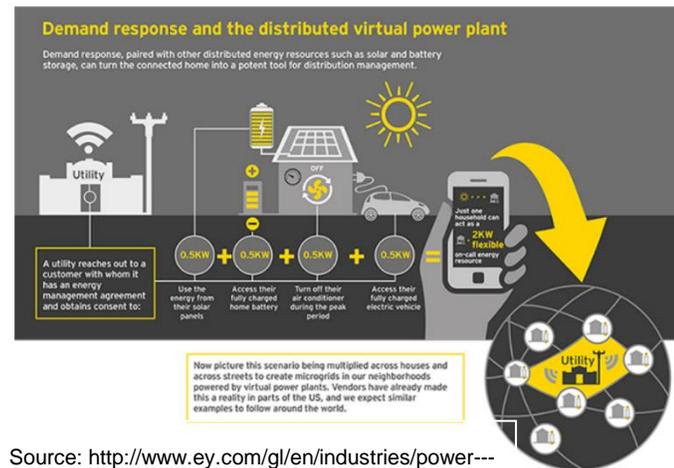
Since 2010, 317 residential and 5 non-residential solar PV systems have been installed in the City of Sonora producing an estimated 3,640,474 kWh of electricity annually. The City has also taken steps to streamline the permitting process to reduce costs for installing solar PV systems as mandated by AB 2188. There is still significant opportunity for property owners and renters to benefit from local solar PV systems. The most common barriers to renewable energy include property ownership, site obstacles (i.e. shading and structural integrity), and financing. To address these barriers, the U.S. Department of Energy and State of California have launched initiatives to increase access to innovative financing mechanisms and ownership structures. The innovative financing mechanisms include the Residential Energy Efficiency Loan (REEL) Program which provides subsidized loans for energy efficiency projects and other home improvement projects and Property Assessed Clean Energy (PACE) programs which allow property owners to finance energy efficiency, water efficiency, and renewable energy upgrades through low interest loans that are paid back through an assessment on their property taxes. Additionally, installing solar PV systems do not trigger a reassessment of home value which could otherwise increase property taxes. Finally, collaborative solar procurement and community solar programs have the opportunity to reduce costs and increase access to solar for property owners with site obstacles or renters who cannot install systems at their home or business.

Outreach efforts should educate community members on the benefits of local renewable energy generation and emphasize the energy cost savings that can be realized. Community members can save additional money and improve the comfort of their homes and businesses by combining renewable energy systems with upgrades to high efficiency electric hot water heaters, heat pump air conditioning and heating systems, and electric vehicles. The program should also make information and resources available to community members through the City's website and at City Hall on evaluating renewable energy systems and financing programs. It should also provide information on community solar programs that renters and property owners with site obstacles can utilize in order to benefit from the local renewable energy resources that are available. For instance, through community solar initiatives renters and property owners can opt into a local community solar array and realize the benefits of solar on their electricity bill without having to install solar on their home or business.

The City should encourage other public agencies in the community to show leadership by installing solar at public facilities to offset their electricity use or by providing sites for community solar projects. While public agencies in Sonora already receive renewable electricity for most of their operations from the New Melones hydroelectric facility, the agencies could still benefit from local solar projects that would have guaranteed electricity costs for up to 30 years, stimulate the local economy by contracting with local businesses, and serve as a reminder to community members of the benefits of local solar projects. The projects would also give the agencies more local control over their energy, allow for integration with storage to increase resiliency, and free up the hydroelectric resources for other uses.

**STRATEGY 2.3: ENCOURAGE ENERGY STORAGE AND GRID OPTIMIZATION INFRASTRUCTURE PROJECTS THAT SUPPORT LOCAL RENEWABLE ENERGY SYSTEMS AND COMMUNITY RESILIENCE.**

As renewable energy has become more common, the value of electricity at different times of the day is changing. Peak demand is shifting to the early morning and late evening when solar systems are not producing as much electricity. Therefore demand response and energy storage systems have become more important in order to meet time varying energy needs at the lowest cost. Demand response and energy storage systems can shift demand to times of plentiful electricity or store electricity for times of high demand. Examples of demand response include pre-cooling homes earlier in the day or running high energy using appliances like dishwashers and dryers overnight. Energy storage systems can take the form of batteries that collect and store energy generated from a renewable energy system or a hot water heater that uses electricity from the grid to pre-heat water at times of lowest cost. The collected electricity can then be used at a time of higher electricity costs. California utilities are moving towards time varying pricing which will more accurately reflect the actual costs to provide electricity at different times of the day and year. Demand response and energy storage can help keep customer energy costs low when employed at hours of peak demand pricing, and also serve as a resource of energy reserves for utilities during times of peak demand when electricity is at its highest cost. Utilities, communities, and customers alike can save money by investing in energy storage systems.



Source: <http://www.ey.com/gl/en/industries/power---utilities/ey-negawatts-the-answer-to-the-volatile-grid>

Additionally energy systems, storage systems, and energy efficient appliances increasingly require high-speed internet/broadband access to communicate with utilities in real time. As such, it is necessary to have access to reliable high-speed internet to ensure that residents and businesses can take advantage of the latest technology and benefit from demand response programs. The City should encourage broadband infrastructure deployment through a Dig Once Policy which maximizes the opportunity for broadband infrastructure installation when there are open trenches for other new construction projects.

**GOAL 3: SUPPORT INCREASED EFFICIENCIES OF SOURCING, TREATING, DELIVERING, AND USING WATER RESOURCES**

**Target Audience**

- Residents
- Businesses
- Public Agencies

**Projected Energy Savings**

294,934 kWh

**Benefits**

- Reduced Energy Costs
- Improved Drought Resiliency

Improving the efficiency of water systems and facility operations can save water agencies, residents, and businesses money and resources by reducing both the amount of energy needed to source, treat, and deliver water by improving the efficiency of operations as well as reduce the total amount of water required to be delivered through efficiency and conservation programs in the community. Finally, water agencies can reduce water losses through proactive leak detection programs. The State of California has a goal to reduce per capita water use, especially in drought years when water resources become scarce. In a typical California home the major indoor water users are toilets (33%), showers (22%), faucets (18%), washing machines (14%), leaks (12%) and dishwashers rank last

(1%).<sup>13</sup> Given that indoor water is delivered to a small number of readily identifiable appliances, it is easy to target those with the greatest water efficiency potential and mitigate leaks. There is a significant amount of energy used in sourcing, treating, and delivering water to community members, and the City should encourage Tuolumne Utility District (TUD) to improve the efficiency of their processes where possible. Water efficiency measures taken at any point along the sourcing, treatment, delivery, and use of water will help alleviate this energy burden. Moreover, diversifying and streamlining our water sources and treatment systems can create more reliable water supply while utilizing fewer resources.

**STRATEGY 3.1: SUPPORT TUOLUMNE UTILITIES DISTRICT'S OUTREACH AND EDUCATION EFFORTS BY PROVIDING INFORMATION ON EXISTING AND FUTURE PROGRAMS.**

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Reducing water use by fixing leaks and improving the efficiency of appliances, showers, and faucets can help the community and city reduce costs for water and sewer service and increase community resiliency in future drought years. Water efficiency education can be effectively communicated by providing information on the City's website, at City Hall, and through the City's ability to lead by example. To do this, the City should benchmark their facilities' current water use, both indoor and outdoor, to identify how much water is used by the City and the cost to the City for water and sewer service. After baseline use has been determined, the City should identify actions to reduce water use to meet the state's 25% water use reduction goal.

Based on the 2013 California Water Plan Update, use of more water efficient toilets, showers, faucets, and washing machines in addition to leak detection could reduce water usage by 15 gallons per capita per day (GPCD), a 25% reduction from typical daily residential water usage of 62 GPCD. The City should provide information about the programs TUD provides to help customers save water and money including toilet and shower head rebates, water conservation information, and free advice from Master Gardeners in Tuolumne County.<sup>14</sup>

Additional water can be saved outdoors through improved irrigation, rain sensors, and the use of native landscaping that does not require irrigation. The City has adopted a water efficient landscape ordinance as part of this strategy, and should continue to provide relevant information to residents and businesses, as well as review new development landscaping plans for compliance with the water efficient landscape ordinance.

**STRATEGY 3.2: ENCOURAGE TUOLUMNE UTILITIES DISTRICT TO REDUCE WATER LOSSES THROUGH PROACTIVE LEAK DETECTION PROGRAMS.**

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Old and aging water infrastructure often results in high water losses through leaks, inaccurate meters, and water theft. Studies have estimated that these leaky and outdated systems waste an estimated 14 to 18 percent (5.9 billion gallons) of daily water use in the United States.<sup>15</sup> A survey of California water agencies found water losses in California to range from 5% to 30%.<sup>16</sup> When systems are leaky, they also need more pressure to move water along the pipeline and into homes and businesses. Higher water pressure requires a significantly more energy and equally heavy costs. By addressing leaks proactively with a leak detection program, TUD can ensure that the community is receiving water efficiently, reduce the extra costs

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<sup>13</sup> California Water Plan Update, Chapter 3. Urban Water Use Efficiency. 2013. - Accessed September 22, 2017. [http://www.water.ca.gov/calendar/materials/vol3\\_urbanwue\\_apr\\_release\\_16033.pdf](http://www.water.ca.gov/calendar/materials/vol3_urbanwue_apr_release_16033.pdf)

<sup>14</sup> Tuolumne Utilities District, Water Conservation Programs. <http://www.tudwater.com/water-conservation/> - Accessed October 25, 2017

<sup>15</sup> "The Case for Fixing Leaks." November 2013. The Center for Neighborhood Technology. Accessed September 22, 2017. [http://www.cnt.org/sites/default/files/publications/CNT\\_CaseforFixingtheLeaks.pdf](http://www.cnt.org/sites/default/files/publications/CNT_CaseforFixingtheLeaks.pdf)

<sup>16</sup> California Department of Water Resources, Leak Detection Resources. <http://www.water.ca.gov/wateruseefficiency/leak/> - Accessed November 16, 2017

associated with treating and pumping the lost water, and identify customer side leaks or faulty meters. Typically water losses of greater than 5% can cost effectively be reduced through a proactive leak detection program.

In order to understand the scale of water losses, the City should encourage TUD to complete a water audit. The American Water Works Association (AWWA) and the International Water Association (IWA) co-developed a new standard method for conducting water audits. The AWWA/IWA water audit method is effective because it features sound, consistent definitions for the major forms of water consumption and water loss encountered in drinking water utilities. It also features a set of rational performance indicators that evaluate utilities on system-specific attributes, such as the average pressure in the distribution system and the total length of water mains.

The AWWA/IWA water audit method is detailed in the AWWA's manual Water Audits and Loss Control Programs. The AWWA also offers free software for this auditing method that assists in tracking water consumption and losses and calculates the costs of losses, giving agencies important information for assessing the cost-effectiveness of leak reduction measures.<sup>17</sup>

### **STRATEGY 3.3: ENCOURAGE TUOLUMNE UTILITIES DISTRICT TO IMPROVE THE EFFICIENCY OF THEIR OPERATIONS.**

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Water and wastewater treatment plants are high energy-consuming facilities, and as a necessary public service constitute some of the largest contributors to the community's total energy use. The economic and environmental costs of these operations can be reduced by improving energy efficiency of the facilities, promoting efficient water use in the community, and by capturing the energy from wastewater to generate electricity for the facilities' operations. Water and wastewater facilities can improve operational efficiencies through 3 main channels: increasing treatment and distribution equipment energy efficiency, reducing demand for water, and producing electricity through wastewater operations energy capture.

As technology in water sourcing and water treatment equipment is becoming more efficient, water agencies should look into potential funding for retrofits of old, inefficient equipment. Improving the efficiency of high energy consuming equipment at the water and wastewater facilities can decrease the amount of energy required to source, treat, and deliver water as well as the energy required to collect, treat, and dispose of wastewater. Improving the agency's water use efficiency can be done by implementing automatic meter reading at water end uses to increase water efficiency monitoring, and by reusing treated wastewater in appropriate applications to avoid energy use associated with traditional water treatment and distribution practices. Wastewater facilities can produce some or all of their own electricity and space heating by capturing and burning the biogas produced in the wastewater treatment anaerobic digester process, effectively creating a closed-loop energy system.<sup>18</sup>

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<sup>17</sup> Resources & Tools. American Water Works Association. Accessed September 22, 2017. <http://www.awwa.org/resources-tools.aspx>

<sup>18</sup> Energy Efficiency in Water and Wastewater Facilities. U.S. EPA. Accessed October 26, 2017. <https://www.epa.gov/sites/production/files/2015-08/documents/wastewater-guide.pdf>