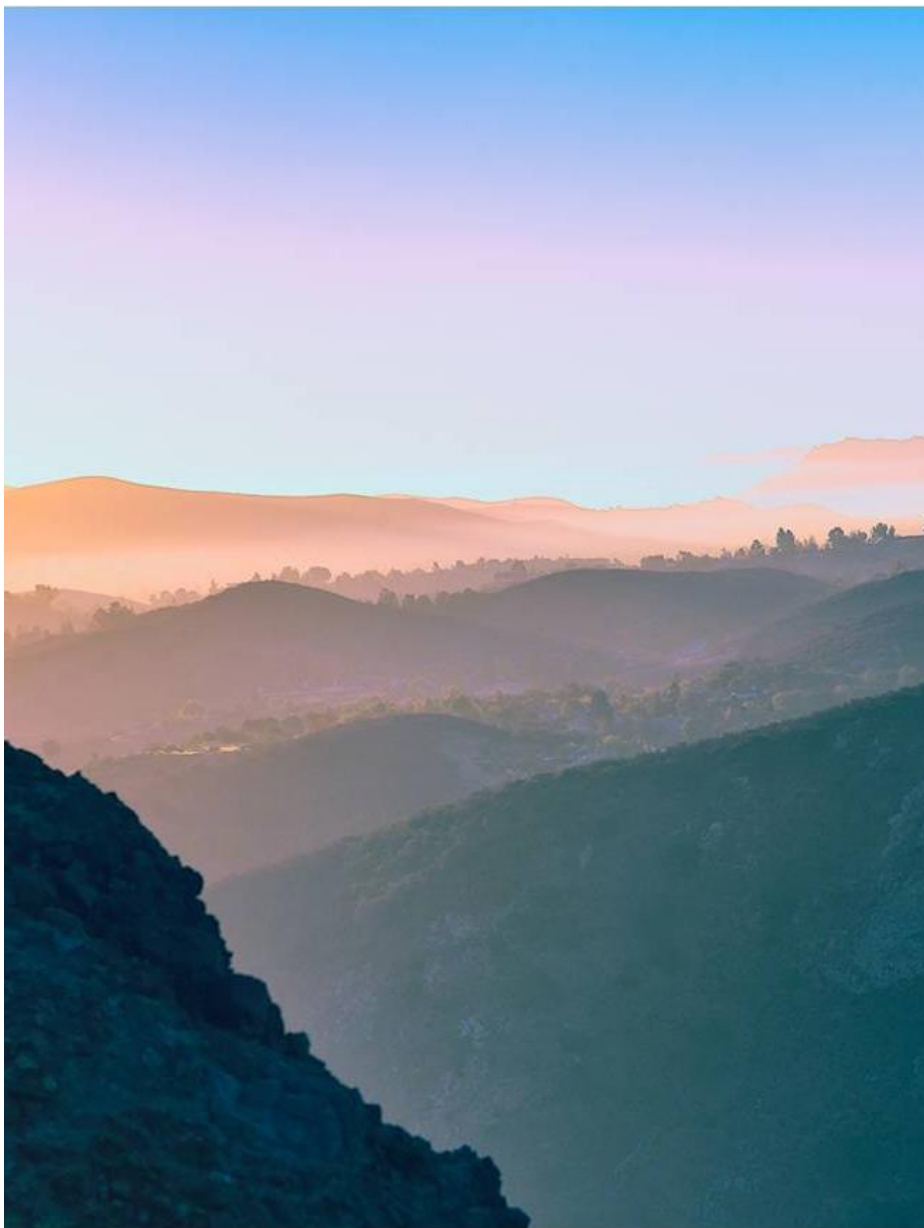




Sustainability Plan for Municipal Operations



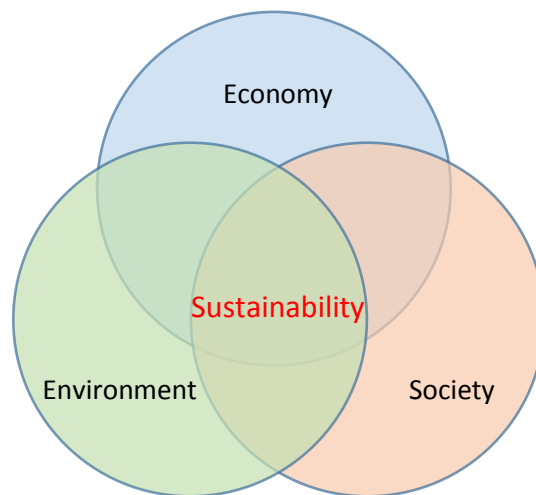
2018

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Executive Summary

Although “sustainability” is most commonly cited from its roots in the United Nations definition of sustainable development as that which “meets the needs of the present without compromising the ability of future generations to meet their own needs”¹, it can be more narrowly defined in the context of City operations as resource management that protects the environment and avoids the depletion or degradation of natural resources. Sustainability is often thought of as the intersection of good financial, social and environmental decisions. Sustainability is a priority for the City Council, and although its functions are ostensibly housed within the Sustainability Division of the Public Works Dept., it should be a guiding influence for all City activities.



Background

This plan was motivated by the desire of City Council to support and lead efforts towards creating a clean, efficient, environmentally friendly, fiscally-responsible, and sustainability-focused City. Towards this end, the plan presented here details actions that will establish the City as a sustainability leader while incorporating new advances in technology, assisting the State in meeting its ambitious sustainability goals, and preparing for anticipated future direction of State legislation. This plan is organized around areas under the direct control of local government, and provides strategies that will make municipal operations more sustainable through improved efficiencies, reductions in energy and water use, an increase in renewable energy generation and resilient energy supply, a lessening of landfill waste, and better environmental quality. A follow-on plan is scheduled for development of community-wide sustainability strategies.

¹ United Nations World Commission on Environment and Development, 1987

California continues moving ahead with its strong commitment to climate action and has taken leadership not only nationally but also internationally in this arena. The State's framework for achieving its mandated and ambitious greenhouse gas emission reductions are laid out in its Climate Change Scoping Plan developed by the California Air Resources Board (CARB) in 2008 and updated recently (2017). This plan is an outgrowth of State law (AB 32, Pavley 2006), which set a goal of reducing California emissions down to 1990 levels by 2020 (on the path to an 80% reduction by 2050), and another law (SB 32, passed in 2016), which codifies a 40% reduction target by 2030. These mandates have led to a suite of State programs and regulations designed to achieve emissions targets, including:

- SB 375 (2008) which requires coordinated regional transportation and land use planning through cities' participation in Metropolitan Planning Organizations;
- Low Carbon Fuel Standard (2007, re-adopted 2015) which calls for a reduction of at least 10% in the carbon intensity of California's transportation fuels by 2020 and provides mechanisms for reducing transportation emissions;
- AB 1826 (2014) which mandates organic waste recycling for commercial entities;
- AB 2188 (2014) which mandates expedited permitting for residential rooftop solar;
- SB 350 (2015) which increases the Renewable Portfolio Standard to require electric utilities to generate 50% of their power from renewables by 2030;
- AB 802 (2015) which creates a building energy use benchmarking and disclosure program;
- SB 1383 (2016) which will require citywide organics collection and recycling plus the recovery of edible food;
- AB 262 (2017) which will require public contracts to utilize materials that meet global warming potential specifications.

In one way or another these laws impact the City, either directly by requiring local government to implement programs (e.g. recycling, solar permitting, energy benchmarking, procurement, waste food diversion) or indirectly by planning smartly for a changing landscape (e.g. electrification of transportation, increased food waste to recycle). Because planning and development decisions have long-term impacts it is important that the City not only keeps up with current State regulations but also pays close attention to the future direction of State policy.

Besides California's pledge to climate action, it has also demonstrated its ongoing commitment to environmental and natural resource protection through policies on water use, water quality, air quality and waste reduction. These in turn are reflected in the City's water utility, stormwater, landscape, transit, solid waste and wastewater programs.

The current cycle of drought from which there was a (likely, temporary) reprieve in 2016-17 led to the development of new State regulations² “Making Water Conservation a Way of Life” that go into effect in 2019 and place restrictions on local water use through State-established agency allocations based on population, climate and landcover. These, and related regulations, affect the City’s own irrigation and landscaping decisions, its community water conservation ordinance, enforcement and programs, and potentially water rates and structures for all purveyors in the City.

A 2015 Trash Amendment enacted by the State Water Resources Control Board prohibits the discharge of trash into surface waters, stipulating implementation of additional protective measures for the City’s stormwater runoff. This will require the City to take added preventative measures to eliminate litter from drainage outfalls in addition to meeting existing stringent water quality standards.

The recent State regulations that have been enacted regarding solid waste generation and recycling have primarily affected commercial and industrial entities because these sectors generate nearly three quarters of the solid waste in California. The regulations include mandatory recycling (of bottles, cans, metals, glass, plastics, paper etc. and other commodities which can be used in re-manufacturing) and mandatory organics recycling (food waste, green waste, landscape and pruning waste, nonhazardous wood waste) for organic waste generators (establishments where food is prepared or served, landscaping businesses). Moving forward it is likely that the City will also need to prepare for residential organic waste recycling. As such, it is incumbent upon the City to put programs in place, ensure hauler service, and provide education and outreach in support of these regulations.

Besides positioning to the City to be a sustainability leader, another key driver of the need for strategic planning in sustainability is the rapid evolution and expansion of technology and data. The City should position itself to take advantage of these and utilize such advances to aid its decision-making process. Traditional structures within local government organizations do not lend themselves to the rapid pace of change today. Although the very nature of government requires that it take a slower and more conservative approach than private entities in order to mitigate risk and ride out market fluctuations, it should incorporate flexibility in its sustainability approach in order to stay relevant, keep pace and best serve community needs. Some of the actions proposed in this plan include the use of technology to improve efficiencies, measure, monitor and analyze data and performance, and improve service and communications with our constituents.

² Governor’s Executive Order B-37-16

The Plan

Construction of City facilities predates many recent advancements in energy and building efficiency and technologies. While some remodeling and upgrades to mechanical systems have taken place since construction, many facilities are in need of improvements to reduce energy use and costs.

In 2017, the City joined a growing number of municipalities in benchmarking the performance of public facilities. Under AB 802 (2015), by June 1, 2018 (and annually thereafter) all commercial buildings over 50,000 square feet must be benchmarked for energy performance and data shared with the California Energy Commission for public disclosure.

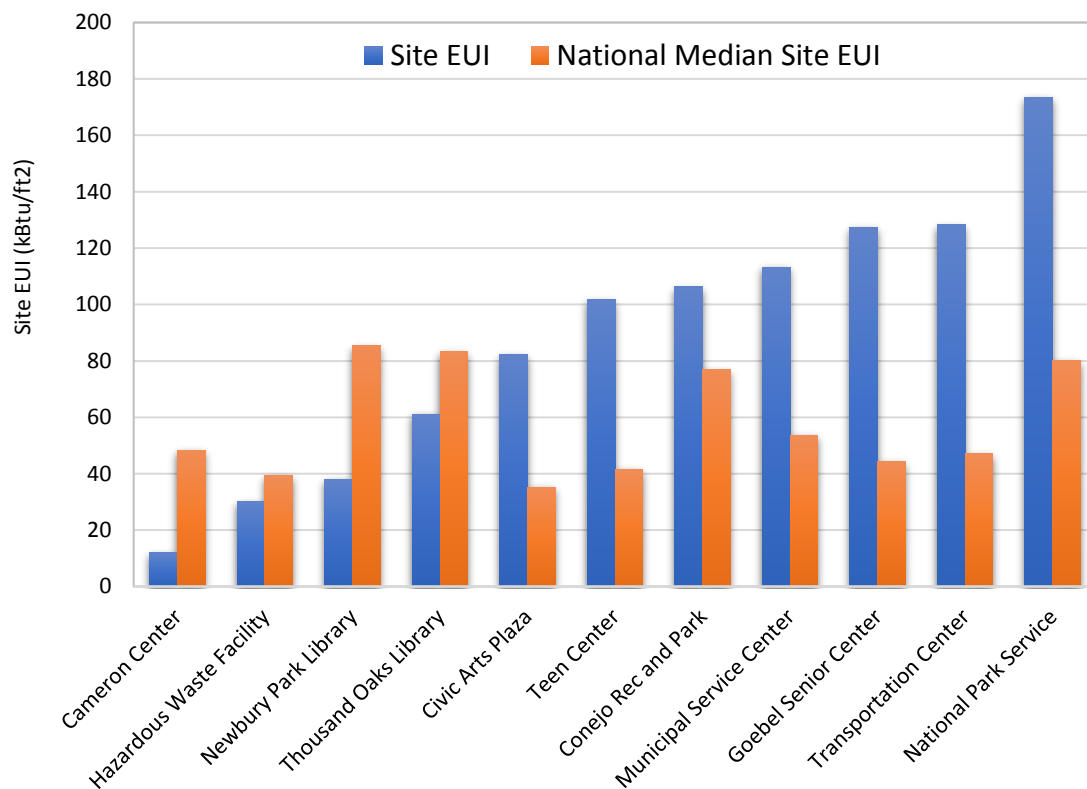


Figure ES-1: City facilities' energy use intensity (EUI) vs national median (2015)

Using EPA's Energy Star Portfolio, City facilities' energy usage has been compared to the national average of similar building types and sizes. According to the results, many of the City's buildings have a considerably greater energy use per square foot than the national average of similar buildings (Figure ES-1). This presents the City with an opportunity to identify major cost-saving energy efficiency improvements.

City Council recently approved the implementation of an Energy Information System, which will provide the foundation for the City's energy actions. All energy consumption and generation data, together with equipment and building-level usage will be monitored and

analyzed to inform the best strategies for improving energy efficiency in our facilities and putting them on a path to meeting current energy efficiency standards. Through participation in the regional energy network and utilities' energy partnership programs, implementation incentives will help to lower capital costs for investments made in such upgrades. Specific recommended improvements include heating ventilation and air conditioning (HVAC) equipment, lighting and (water/wastewater) pump upgrades or replacement. For several years now, the City has taken the prudent step of purchasing electricity for its facilities through a third-party provider, allowing for 100% renewable energy at a reduced cost. In addition, two facilities generate onsite solar power to offset use at those sites. This Plan recommends the City investigate deployment of additional solar at remaining sites where feasible, coupling these with onsite battery storage. For the Hill Canyon Treatment Plant and the Municipal Services Center, the connection of this equipment in a microgrid which can operate as a standalone power source in the event of power failure or emergency, is an option that deserves serious consideration. There are cost benefits to pursuing such options on a larger scale across all practicable sites. Batteries not only provide the ability to shift load to cheaper times of day but also to reduce the significant demand charges that our facilities incur, and to participate in demand response programs that offer more attractive tariff structures.

With respect to water use, the landscape is changing, both figuratively and literally. As a result of California's drought, new restrictions to water use were established which are leading to changes in the way that the City landscapes and irrigates its medians, parkways and facility sites. The impact of these changes can be seen in the City's water use between 2014 and 2016 (Figure ES-2). This plan lays out a number of measures which will help ensure that the City is prepared for any future drought or water use restrictions. Although the City is no longer watering turf in its medians, many areas await new landscaping and the installation of smart irrigation meters which will play an essential role in conserving and managing water use responsibly. Much like the need to track energy use consistently and effectively, water use monitoring and tracking will aid in understanding and better managing its use, and in saving on the City's over \$1 million annual water costs.

Besides the implementation of a water data management system to oversee community water use in accordance with the State's new allocation methodology, this Plan identifies actions necessary to meet other water agency priorities. These include enhancing the reliability, safety, monitoring, and control of the water distribution system. Investment in new technologies to help identify leaks, remotely monitor infrastructure, and communicate water usage will proactively reduce risk and wastage, and improve control. Further risk reduction can be achieved through the development of local water sources including groundwater and potable re-use, whose feasibilities will be assessed. Although the City is ahead of the State's goal of 20% reduction in water usage by 2020, the new water allocations are likely to result in the need for additional future conservation. Measures should be put in

place to prepare for these by improving customer communications through bill enhancements.

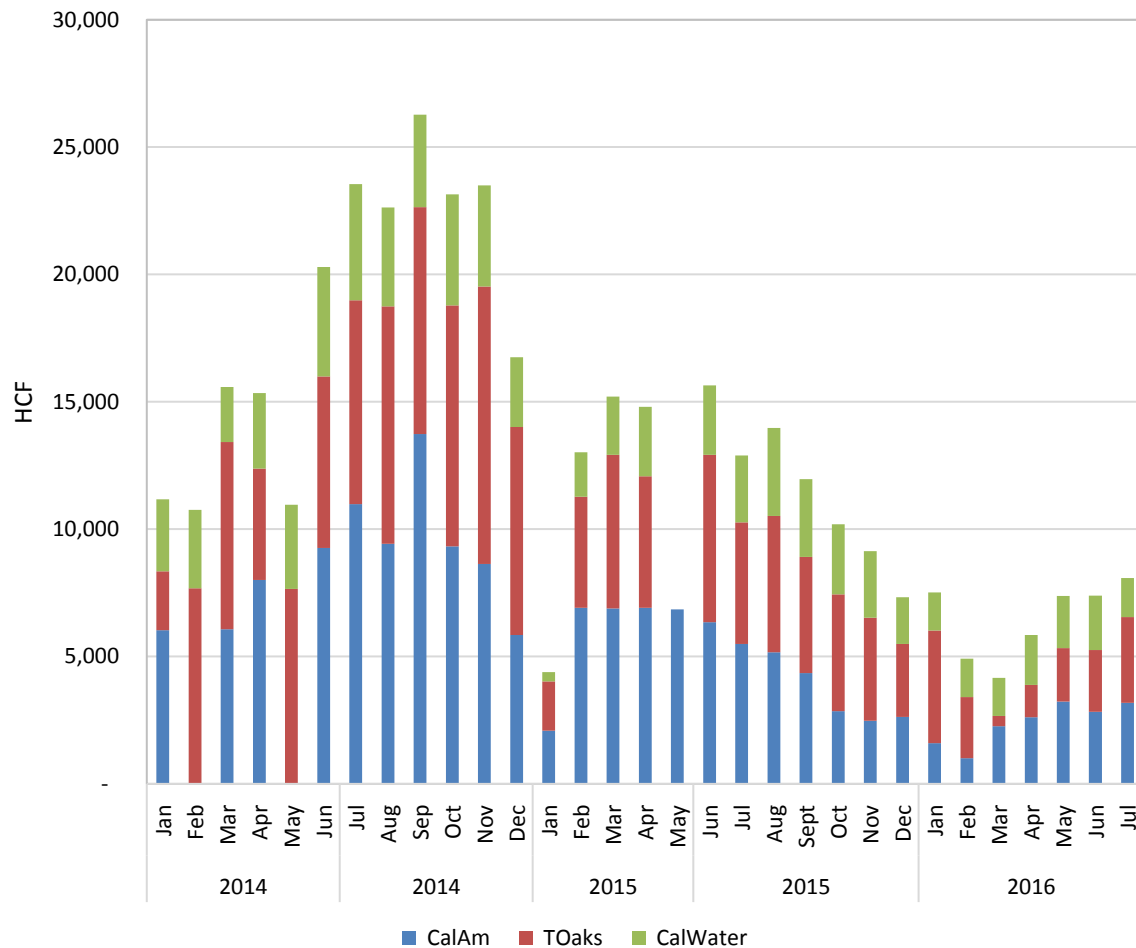


Figure ES-2. Water use associated with irrigation of landscaping in medians and public areas broken down by agency, 2014-2016. Note some missing data in May 2015. Units are Hundred Cubic Feet (HCF). 1 HCF = 748 gallons.

California currently has mandated that a minimum of 50% of waste is recycled or otherwise diverted from landfills. The State diversion goal for 2020 is 75%. The State's disposal rate target for the City was established by CalRecycle at 7.5 lbs./person; at a current value of 4.6 lbs./person, the City's diversion rate is 70% (Figure ES-3). Diversion rates in the county all surpass the mandated 50% minimum, but none have yet met the 75% 2020 goal, although the City of Camarillo is close at 73%. Improved recycling of both traditional recyclables and organics will improve the City's waste diversion rate. Plan recommendations include increased organics collection from commercial generators, measures to ensure environmentally responsible disposal of hazardous waste, and the use of less toxic alternatives. This plan also details several ways in which the introduction of technology into the City's waste program will improve efficiencies in data collection, invoicing, reporting, program administration and customer service.

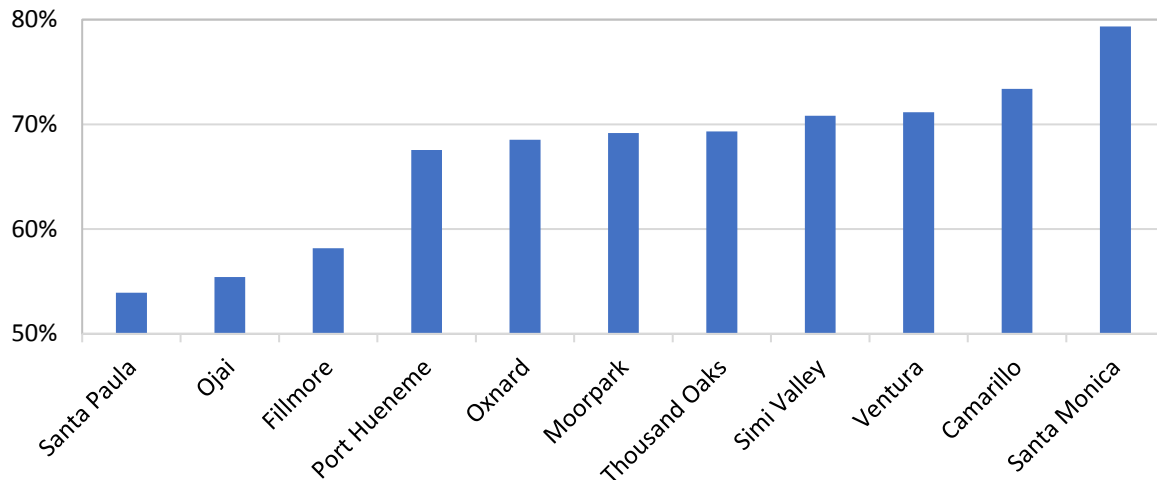


Figure ES-3: Waste diversion rates across local cities (2016).³

Stormwater quality benefits from a number of the strategies outlined above. Better capture of trash and hazardous waste reduce polluted runoff, as does water conservation. Expansion of the City’s environmental programs through the addition of trash capture devices in stormdrains and increased green waste collection will reduce contaminants in runoff. Many pollutants that wind up in stormwater originate from over irrigation of lawns that have been treated with fertilizers and pesticides. Water conservation strategies outlined in this plan will help to reduce these sources.

Transportation is the single largest contributor to greenhouse gases in California, contributing roughly 40% of emissions. As a result, the State has implemented several programs to increase alternatives to single vehicle occupancy and shift fuels away from gasoline and diesel to cleaner and more sustainable alternatives. The City has long led the adoption of alternative fuels, with almost two thirds of fleet vehicles utilizing CNG, renewable diesel or hybrid/electric technologies. The composition of fuel types varies within each vehicle category. All buses and 84% of passenger vans are powered by CNG, which produces significantly lower GHG emissions than traditional or low-sulfur diesel and gasoline powered vehicles.⁴ For special purpose vehicles and dump trucks, the primary source of fuel is renewable diesel (also known as advanced biofuel), whereas trucks, SUVs, and cargo vans are primarily gasoline powered. 71% of sedans are hybrid vehicles. Compared to other local cities, Thousand Oaks has a much higher proportion of its fleet powered with alternative fuels (Figure ES-4). This plan calls for a continued investment in clean fuel vehicles with an added emphasis on electrification and electric vehicle infrastructure. Transit routing, and additional partnerships continue to be explored in an ongoing effort to increase ridership.

³ Santa Monica is widely regarded as one of the greenest cities in the State and is shown here for comparison purposes.

⁴ Link: [US Department of Energy - Natural Gas Benefits](#)

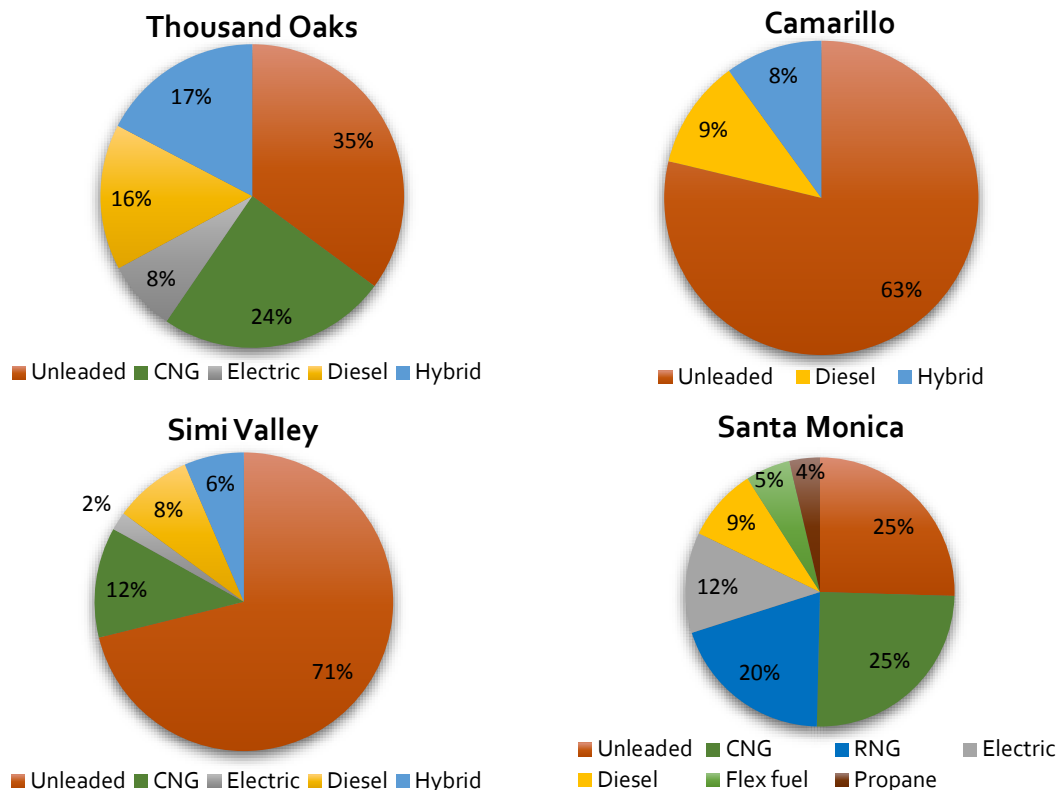


Figure ES-4: Comparison of cities' fleet compositions by fuel type – July, 2017

The City's wastewater treatment plant, with its onsite renewable energy, has long been held as a model for sustainability in the industry. It utilizes anaerobic digestion to generate gas which is burned in a co-located co-generation facility to generate electricity for site use. Supplementing this is production from a 584 kW solar system. Together, onsite renewable energy production has accounted for over 70% of the facility's total electricity use since 2010 (Figure ES-5), and has achieved 100% in many months.

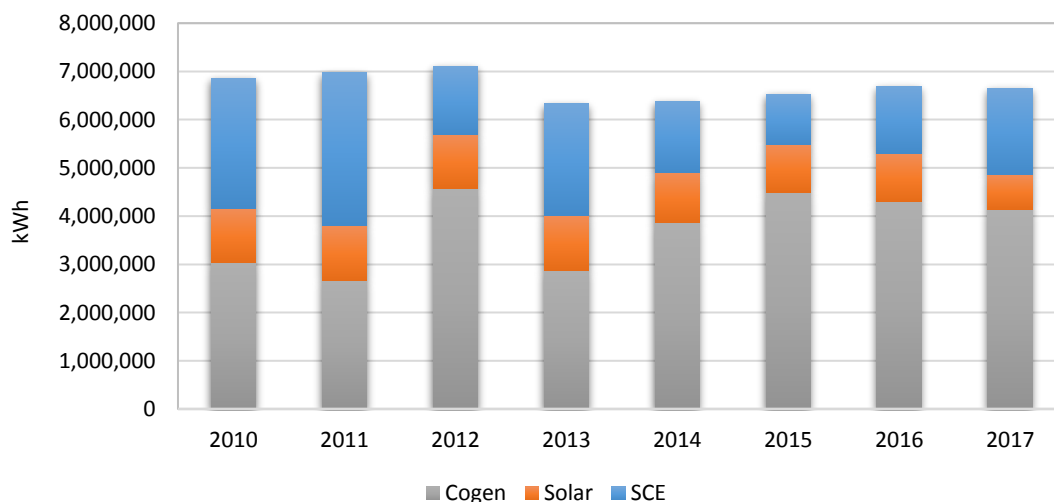


Figure ES-5: Electricity supply for HCTP (2010 – 2017)

The City is now well-positioned to evaluate options for the future of this valuable resource. There is an attractive market for biogas and biogas-generated electricity, an increase in solar module efficiency means that generation capacity can be doubled on the same physical footprint, decreasing cost of commercial scale battery storage makes energy storage an attractive proposition, and the high demand for organics processing facilities in the County make this an attractive site for installation of a high solids digester and, potentially, a microgrid for resilience to power failures and catastrophes.

A Smart City

Innovative technology solutions can support local governments in improving their use of resources that ultimately affect sustainability. Technology has evolved to the point at which almost everyone is equipped with a smart device (mobile phone) that monitors their location, motion, preferences, activities and social networks. Similarly, small inexpensive sensors are available to monitor everything from temperature, light and sound, to object presence and motion. Such sensors and a range of apps are available to run City infrastructure more effectively and efficiently. Location data (from GPS systems or cell phones) can be used to sequence traffic signals and move vehicles around more efficiently, exterior lights can communicate with each other to dim and brighten in response to motion, trash containers can alert haulers for collection when full, water pumps can sequence themselves automatically in response to flow rates and efficiency. These, and many other technology solutions, are in different stages of development from conception to piloting to deployment, and evaluating such options entails both risk and resources.

The ‘Smart Cities’ initiative, introduced by the White House in 2015, aims to help communities tackle key challenges such as reducing traffic congestion, fighting crime, fostering economic growth, managing the effects of a changing climate, and improving the delivery of city services using technology. To date, Thousand Oaks has not actively engaged in Smart City initiatives, but this is an area with significant future potential that requires upfront planning and investment in order to prepare for compatibility with current and new technologies. With the fast pace of innovation, local governments will find it necessary to adopt some changes in the future. Investing in the foundations required to become a ‘Smart City’ will prepare the City for change. Essential steps include installing instrumentation and sensors to collect data, connecting devices with citywide multi-service communications, supporting interoperability of systems to ensure that deployed technologies work well together, creating a smart systems security plan, storing data in a cloud for easy access and security, and analyzing collected data to identify actionable intelligence⁵. Many local governments have decided to open their local data to the public in order to inspire innovation in different ways, an option the City should consider.

⁵ These initiatives are adopted from Smart Cities Readiness Guide published by Smart Cities Council

Streetlights are a particularly valuable asset in a smart, connected city. They can be used for sensor installation to support the collection of transportation and environmental data, for hosting antenna for wireless communications from sensors and smart meters (e.g. water meters), for creating a wireless communications network which can be made available to the public, for installing EV chargers, and for programmable light dimming and timing. While City streetlights are owned and maintained by Southern California Edison, the City should consider options for better utilization of streetlights through partnerships with SCE, including the potential of acquisition.

Preparing for the future

Many of the priorities identified in this Plan require technical expertise. Historically, hiring of City staff has prioritized core competencies such as effective communications, customer-focused and organization, with additional required subject matter expertise pertaining to the specific department – e.g. civil engineering in Public Works, planning in Community Development, law in the City Attorney’s Office, information technology and accounting in Finance, etc. With the pace of technology change, the introduction of intelligent systems and the increasing availability of large information-rich data sets there is a growing need for technical and analytical skills and expertise across a variety of City functions including sustainability. Renewable energy procurement and deployment, participation in demand response programs, operation of equipment and building systems, microgrids, storage and load shifting, control systems, EV charging networks and interconnection of distributed energy resources into the grid are all complex technical challenges. Whether analysis and planning is conducted by consultants or in house, sufficient technical expertise must exist among City staff to ensure that strategic decisions are made. A focus on specific technical areas in the hiring of new staff and increased training of staff in areas such as energy and building technologies as well as in the broader area of data analytics, which can be applied to all resource use and associated costs, would be prudent.

Finally, cross-training amongst City departments would be wise to ensure that all building, planning, engineering, fleet, and facility staff are knowledgeable on the State’s mandates for energy efficiency in new and existing buildings, zero net-energy (ZNE) timeline for residential and commercial construction, electric vehicle policies, benchmarking disclosure, and others as they arise.

Next steps

The City has broad influence and authority over many activities that impact sustainability. Through planning and permitting processes, local ordinances, outreach and education efforts, and municipal operations local governments can become leaders in carbon emission reduction, environmental protection and resource stewardship. This Plan offers a roadmap for the integration and expansion of sustainable practices in the City’s own operations that

will demonstrate the City's commitment to sustainability. The Plan's Appendix presents a proposed five-year schedule for the implementation of the measures identified herein. Next steps will include the development of a Community Climate Action Plan, which will identify actions to be taken to enhance sustainability within the community and position the City to be recognized as a green leader.

Acronyms and Abbreviations

ARB	Air Resource Board	HCTP	Hill Canyon Treatment Plant
Btu	British thermal units	HHW	Household Hazardous Waste
BAS	Building Automation Systems	IPM	Integrated pest management
CalAm	California American Water Company	kWh	Kilowatt hour
CalWater	California Water Service Company	MSC	Municipal Service Center
Camrosa	Camrosa Water District	NPS	National Park Service
CEQA	California Environmental Quality Act	PPA	Power Purchase Agreement
CaGBN	California Green Business Network	RTP	Regional Transportation Plan
CPUC	California Public Utilities Commission	SCE	Southern California Edison
CRV	California Refund Value	SCS	Sustainable Communities Strategy
COSCA	Conejo Open Space Conservation Agency	VCREA	Ventura County Regional Energy Alliance
CRPD	Conejo Recreation & Park District	kBtu	Thousand British Thermal Units
CVUSD	Conejo Valley Unified School District	TOT	Thousand Oaks Transit
C&D	Construction and Demolition	TOU	Time-Of-Use
DAR	Dial-A-Ride	UPT	Unlinked Passenger Trips
ECTA	East County Transit Alliance	VRH	Vehicle Revenue Hour
EIS	Energy Information System	VSH	Vehicle Service Hours
EUI	Energy Use Intensity	VSM	Vehicle Service Miles
EPP	Environmental Purchasing Policy	VCTC	Ventura County Transportation Commission
EV	Electric Vehicle	WM	Waste Management
FOG	Fats, Oils, Grease	ZEV	Zero Emission Vehicles
GHG	Greenhouse Gas	ZNE	Zero Net Energy

Energy



1. Overview

California has aggressive GHG emission reduction goals which drive State energy policy. According to the California 2016 annual statewide GHG Emission Inventory¹, 20% of emissions come from the generation of electricity used to power our businesses and homes, and another 9% comes from direct use of fuel (normally gas) primarily used for heating these buildings. The State has called for a doubling of energy efficiency by 2030, including that of existing building². Recognizing this opportunity, the City has worked with its utilities on a number of energy efficiency projects along with exploring options to increase the use of clean energy for municipal services and operations.

The City of Thousand Oaks is in the service territories of Southern California Edison and SoCal Gas Company. The City operates twelve facilities³ and maintains street and traffic lights, pump stations, lift stations and irrigation systems for landscaping, which together use an average of 20,724,068 kWh electricity and 15,510,200⁴ kBtu of natural gas annually, costing over \$3 million per year. The City's control over these energy uses offers a significant opportunity to save public money and cut carbon emissions through the introduction of additional energy efficiency measures and renewable energy.

Energy Goals

- A. Energy tracking and reporting:**
Improve means to measure, track and analyze energy use.
- B. Conservation and efficiency:**
Identify and implement actions to conserve energy and improve the energy efficiency of facilities and operations.
- C. Distributed energy resources:**
Increase clean, local and resilient energy supply.



¹ Link: [California Energy Demand 2016-2026, Revised Electricity Forecast, Table 6: Rates by Demand Case for Five Major Planning Areas \(2014 cents per kWh\), Page 35](#)

² Link: [Existing Buildings Energy Efficiency Action Plan](#)

³ National Park Service, Conejo Recreation & Park District, Teen Center, Hill Canyon Treatment Plant, CivicArts Plaza, Goebel Adult Center, Cameron Center, Transportation Center, Thousand Oaks Library, Newbury Park Library, Municipal Service Center, Household Hazardous Waste Facility

⁴ These values do not include electricity and gas used to operate the CNG station at the Municipal Service Center.

Implementing projects to reduce and be more strategic in energy use is critical in the light of ongoing rate restructuring, shift in peak times, demand response and rate increases. Although the California Energy Commission forecasts a change of less than 2%⁵ in commercial sector rates in Southern California Edison's territory annually between 2016 and 2020, historically SCE's rates have increased an average of 3% a year over the past ten years. These increases, accompanied by pricing structures aimed at changing user behavior, mean that the City will need to pay close attention not only to total consumption but also to managing time of use and peak demand. In addition, climate change is projected to bring Los Angeles region's land locations 60–90 additional extremely hot days per year in a business as usual greenhouse gas emission scenario⁶, which will lead to higher energy consumption during the summer from increased air conditioning demand. This anticipated increase in demand could have a significant impact on the energy costs of those City-owned facilities designated by the City's Emergency Preparedness Plan as cooling centers⁷, which should fully operate during heat waves to support residents that do not have access to air-conditioned areas.

“According to the California 2016 annual statewide GHG Emission Inventory, 20% of emissions come from the generation of electricity used to power our businesses and homes, and another 9% comes from direct use of fuel (normally gas) primarily used for heating these buildings.”



⁵ Link: [California Energy Commission: California Energy Demand](#)

⁶ Link: [A Hybrid Dynamical–Statistical Downscaling Technique. Part II: End-of-Century Warming Projections Predict a New Climate State in the Los Angeles Region](#)

⁷ City facilities designated as Cooling Centers are the Teen Center, Adult Center, T.O. Library and N.P Library

2. Status

The City is a member of the Ventura County Regional Energy Alliance (VCREA), which is a Joint Powers Agency composed of public agencies working in collaboration to address energy stewardship through integrated demand-side management practices in the Ventura County region.⁸ Through VCREA, the City has participated in utility-sponsored programs such as SCE's Direct Install program for lighting upgrades. To complement regional efforts, the City adopted its first Energy Action Plan in 2012.



In 2011, the City contracted with a Direct Access provider to supply the top fifteen City energy users (with the exception of HCTP) from third party renewable energy sources. This contract was recently renewed until the beginning of 2020⁹. In addition to this offsite clean energy source, renewable energy projects have been installed at two City sites. In 2007, HCTP entered into Power Purchase Agreements (PPAs) for an onsite 584-kW solar array¹⁰ and a co-generation plant¹¹ that is powered by the biogas produced from wastewater. Together these generate an average of 4,762,061 kWh annually, which represents 70% of the facility's total energy consumption. In 2012, the City's first fully-owned solar 300 kW array was installed on the roof of City-owned 401/403 Hillcrest Drive in buildings currently occupied by CRPD and NPS. The array provides over 40% of the two facilities' electricity needs. In December 2017, Council voted to join Los Angeles Community Choice Energy, now Clean Power Alliance, which will provide clean energy purchase options for both municipal facilities and the community beginning in 2018.

The City manages 575 electricity accounts with facilities served through a total of twenty-one Edison electric meters, and 11 gas accounts, each serving a single facility with one meter. In some cases, the electric meters serve distinct areas or functions (e.g. exterior lighting vs. building); in other cases, there is no clear physical distinction between the areas served by different meters (e.g. Civic Arts Plaza where multiple meters serve both the Kavli Theater and City Hall, but meters are not separated by these functional areas). Water, wastewater and irrigation pumps along with streetlights¹² and traffic controls are other municipal electricity users.

Historical energy use data between 2010 and 2016 has been gathered and analyzed by the Sustainability Division staff and is presented here. Data was obtained from SCE, SoCal Gas, and VCREA. SCE provided 2014-2016 monthly electricity usage and billing data; VCREA, 2010-2013 monthly electricity usage and billing data needed to develop the countywide 2015

⁸ Link: [VCREA Website](http://www.vcenergy.org)

⁹ The City purchases energy through the Direct Access program at a current rate of \$0.0378/kWh (originally contracted at \$ 0.0558 for 2011-2014, then renewed for 3 years at \$ 0.048 per kWh for 2014-2017).

¹⁰ The City purchases the generated solar energy for \$0.1686 per kWh.

¹¹ The City purchases the generated electricity through co-gen system at \$ 0.0704 to 0.0719 per kWh.

¹² There are 149 streetlight accounts that each includes multiple streetlights. Street and area lights are on fixed charges and not metered.

Climate on the Move plan¹³. SoCal Gas provided 2010-2016 gas usage data, but not billing data. City staff provided onsite renewable energy production data. Data were compared with information provided by Accounts Payable and City divisions who authorize payments.

The energy costs calculated and presented reflect the total amount paid by the City to SCE, 3-Phases Renewables (Direct Access provider), and through PPAs for the solar and co-gen electricity generated at HCTP. These costs do not include the initial capital cost of the PV systems at 401/403 Hillcrest Drive, nor the monthly fees charged by SCE to HCTP for lease of additional equipment required to support onsite generation. The gas consumption by the CNG station located at the Municipal Service Center is not included here, but is instead presented in the Transportation section of this Plan.

Usage and costs for energy are divided between facilities and non-facilities. All buildings owned or managed by the City are included in the facilities class. Energy used for transporting water and wastewater, operating irrigation systems, powering streetlights, and lighting parking lots and other areas is included in the non-facilities class.

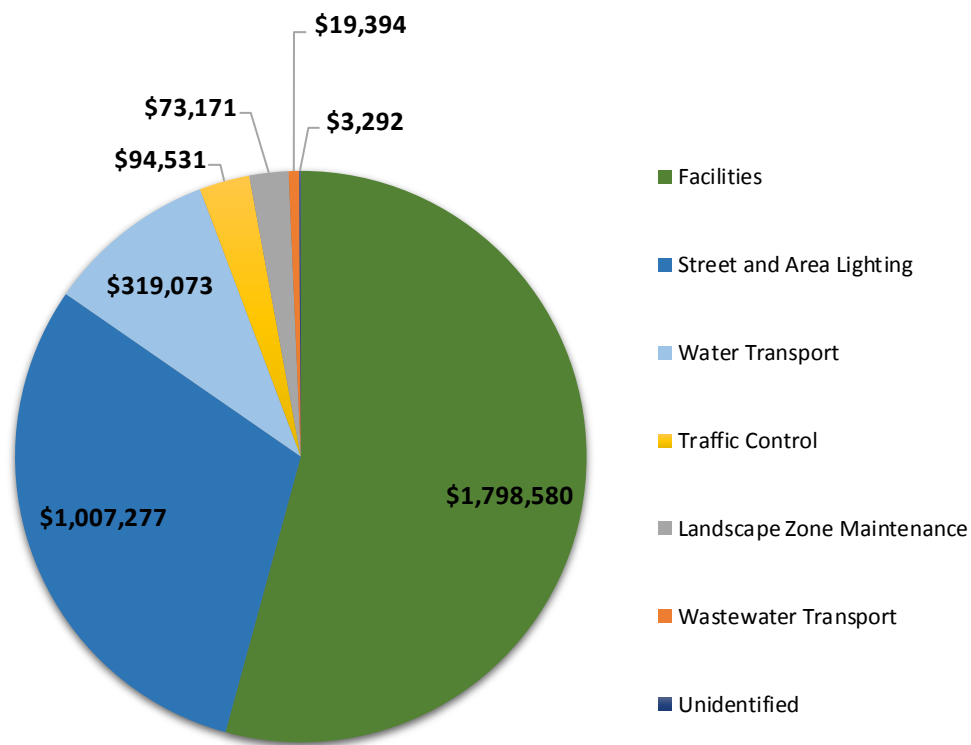


Figure EN-1: 2016 breakdown of electricity costs (\$) into classes: 1. All facilities, 2. Each non-facilities class

¹³ Link: [VCREA Climate on the Move](#)

2.1. Facilities Energy Use

In order to assess total energy consumption in a common unit, electricity use (measured in kWh) has been converted to Btu using a straight conversion factor of 1 kWh = 3412.14 Btu¹⁴. Together facilities use a total of 63,227 MBtu (18,530,159 kWh) of gas and electricity annually¹⁵, of which 17,365 MBtu (5,089,202 kWh) of electricity is produced on site by the consuming facility (Figure EN-2). Onsite energy production represents 36% of the total electricity used by facilities. HCTP, with an average of 6,694,499 kWh electricity usage annually, is the largest power consumer, followed by the Civic Arts Plaza, with an average of 3,308,707 kWh annually.

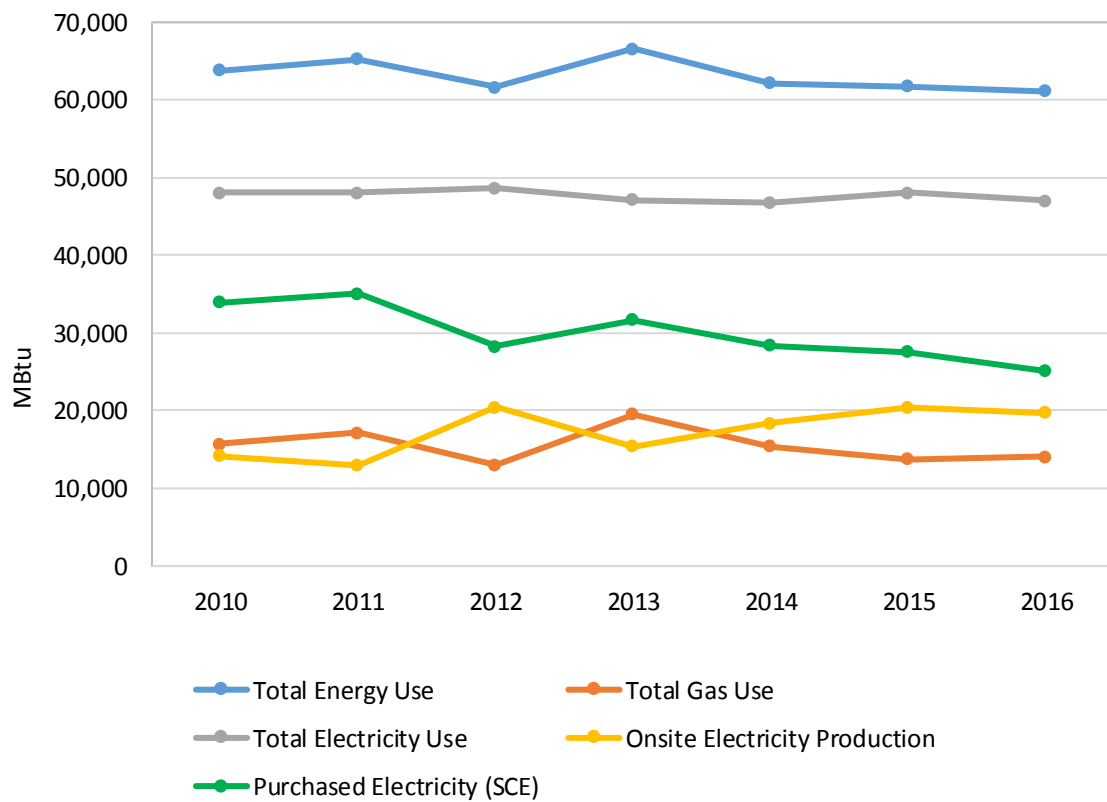


Figure EN-2: Total annual energy production and usage in facilities

Total energy use (electricity and gas) decreased 4% in 2016 compared to 2010, and peaked in 2013. Total electricity consumption has decreased 2% since 2010, mainly due to a reduction in usage at HCTP as a result of energy conservation measures taken (Figure EN-3). Electricity purchases from the utility have decreased 26% since 2010 due to increased onsite renewable production.

¹⁴ In some energy usage analyses, a one-to-one conversion factor is not utilized because it takes roughly 3 units of thermal energy (from gas) to produce and deliver 1 unit of electrical energy. However, we have chosen to use a one-to-one conversion here since for the most part our purchased electricity is generated from renewables not from a thermal/combustion process.

¹⁵ Annual average for years 2010-2016

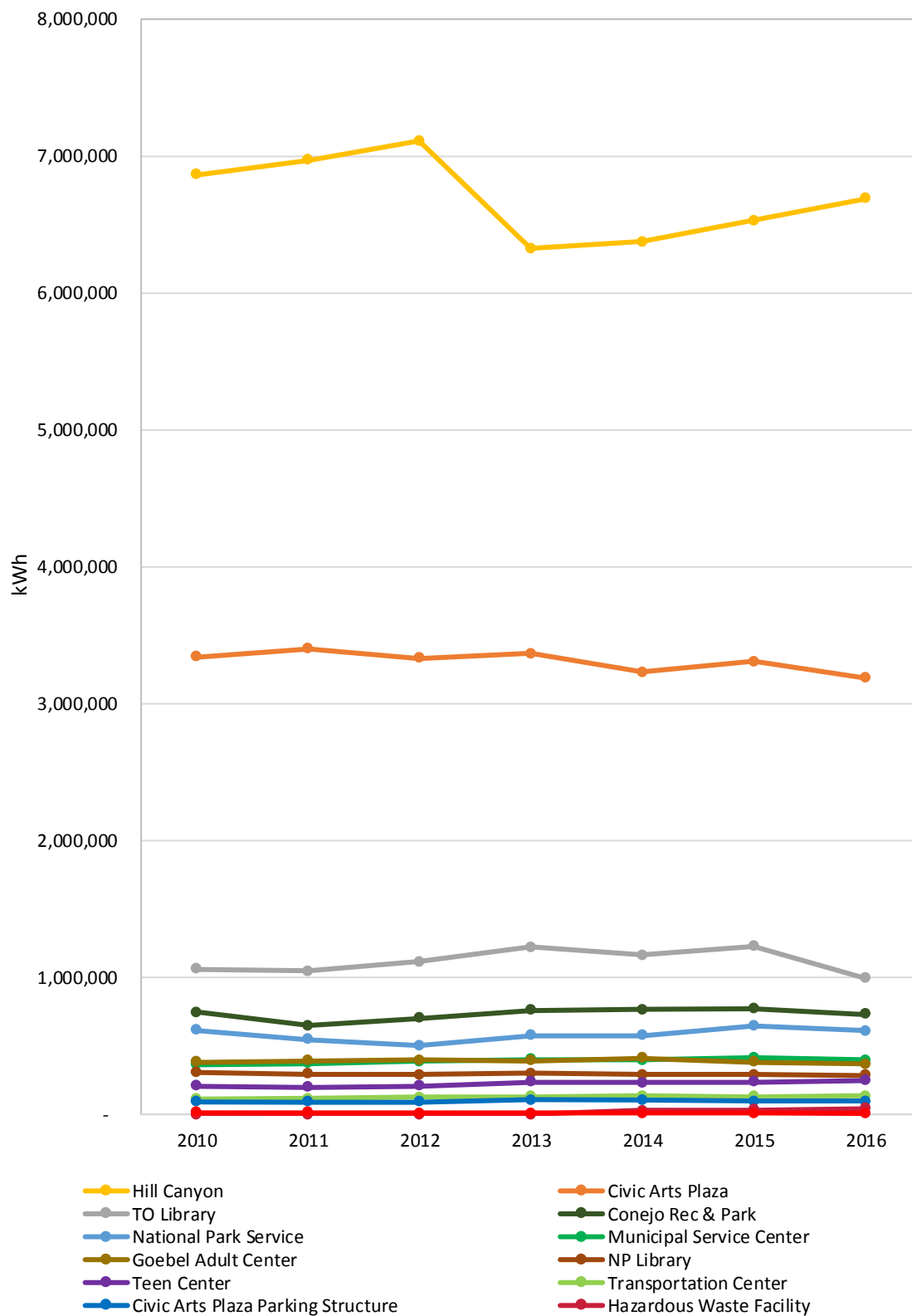


Figure EN-3: Electricity consumption for each facility

Natural gas consumption (Figure EN-4) shows a 10% reduction between 2010 and 2016, with major reductions at the MSC and CRPD buildings. Upgrades conducted at MSC include installation of a new energy efficient HVAC unit and programmable thermostats, and replacement of two heaters with energy efficient models. In the CRPD building, flushing out the boiler loop had a significant effect in reducing gas consumption. At HCTP gas consumption has shown dramatic fluctuations due to its use in co-generation on an as-needed basis. The spike in 2013-2014 was due to the need to employ gas for supplemental digester heating when the co-gen engines were not providing sufficient waste heat.

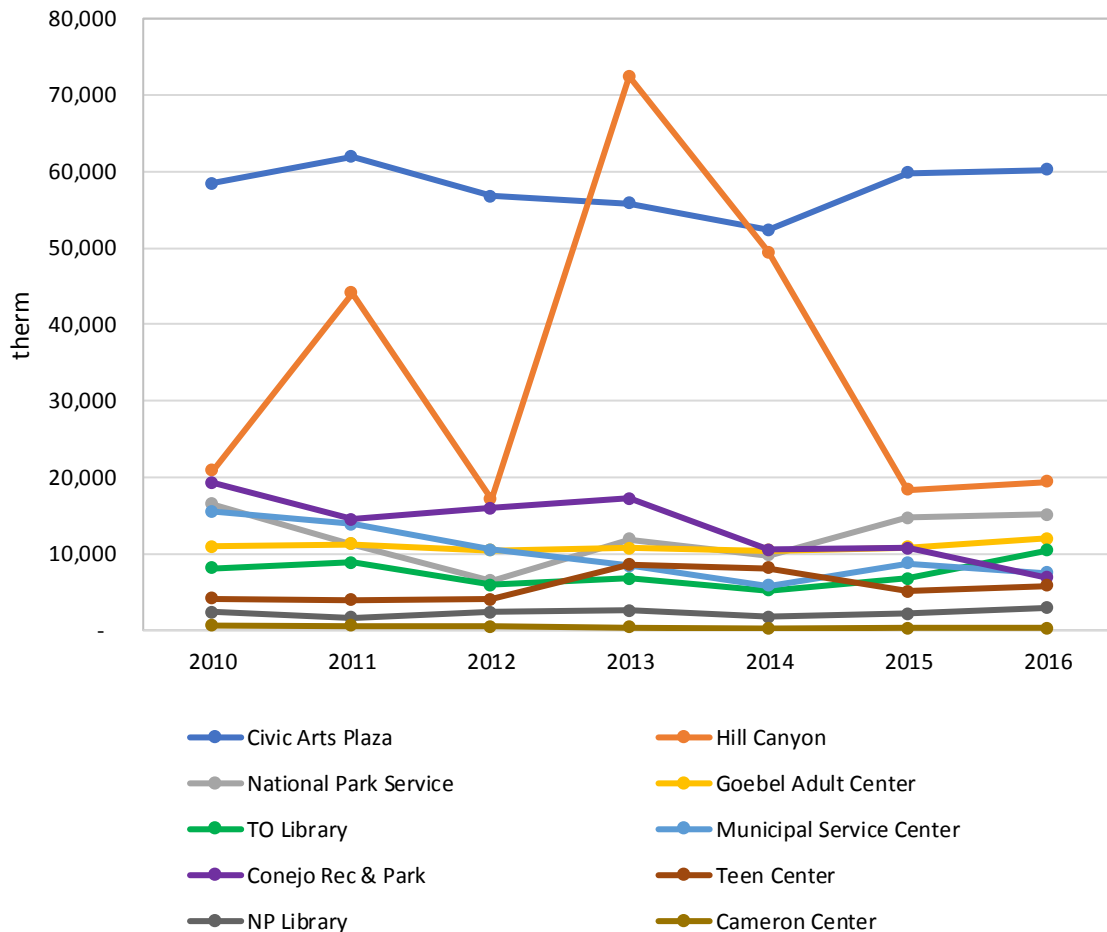


Figure EN-4: Natural Gas consumption in facilities¹⁶

When electricity and gas usage are summed (Figure EN-5), the Civic Arts Plaza, which is the largest building among the City's commercial/office spaces at 208,936 sqft, is the largest total energy user. Energy consumption at other City buildings is less than a third of this. The next highest users are the Thousand Oaks Library and the CRPD building. The large differential between energy use at CAP and other sites has implications for energy efficiency improvements, which should prioritize this facility.

¹⁶ HHW facility does not have its own meter. Usage is included in MSC data.

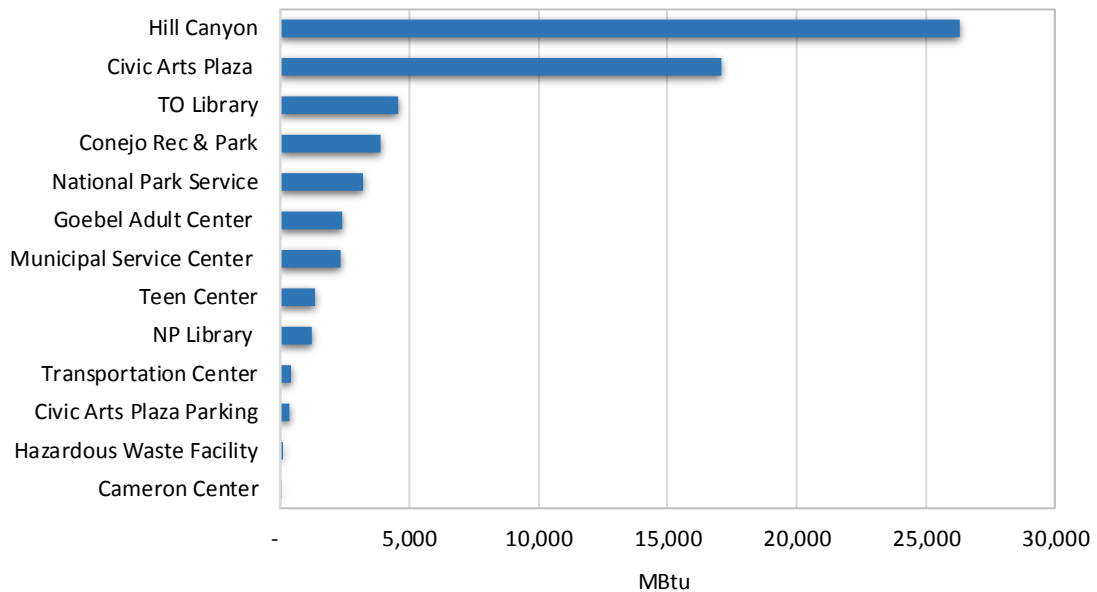


Figure EN-5: Average annual total energy (electricity and gas) consumption at facilities between 2010 and 2016

Since City facilities are of very different sizes, it is instructive to compare energy use on a per unit area basis, or “Energy Use Intensity” (EUI), calculated by dividing total gas plus electricity consumption (Btu) by floor area (Figure EN-6). Of the municipal office buildings, the Transportation Center, NPS building, and MSC have the highest energy use intensity. However, each has a different function, with the MSC operating heavy machinery including welding, fabrication and vehicle maintenance shops.

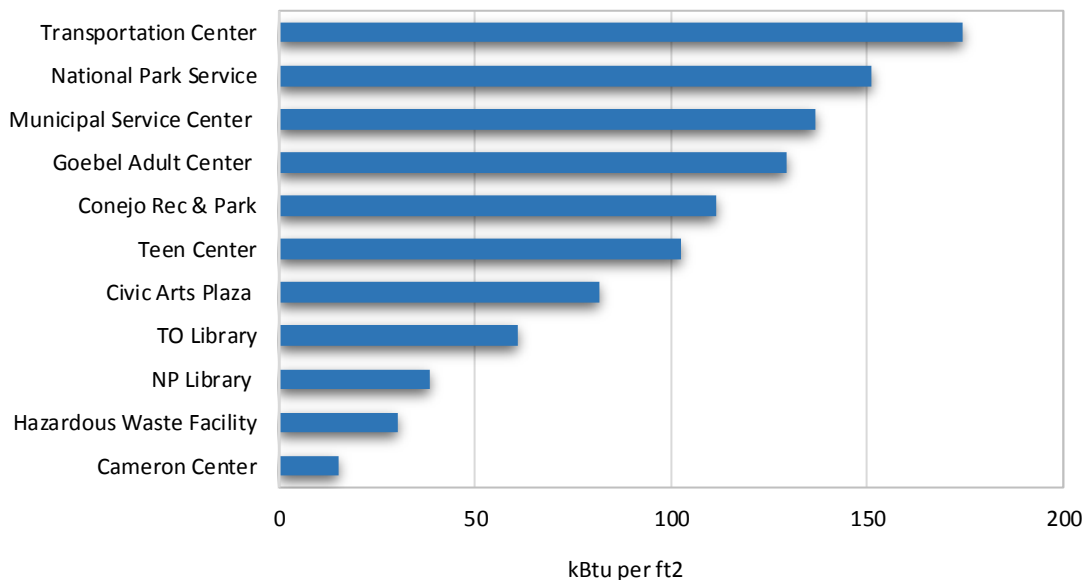


Figure EN-6: Average energy use intensity (EUI) of municipal office buildings (2010-2016)¹⁷

¹⁷ HCTP is not included here because its energy usage depends on the volume of wastewater treated, not on the size of the building.

In 2017, the City joined a growing number of municipalities in benchmarking the performance of public facilities using EPA’s Energy Star Portfolio manager. Under AB 802 (2015), by June 1, 2018 (and annually thereafter) all buildings over 50,000 square feet and no residential accounts must be benchmarked for energy performance and data shared with the California Energy Commission for public disclosure, which is expected in the latter half of 2019. Using Energy Star Portfolio, City facilities’ energy usage has been compared to the national average of similar building types and sizes. According to the results, many of the City’s buildings have a considerably greater EUI than the national average of similar buildings (Figure EN-7). This presents the City with an opportunity to identify major cost-saving energy efficiency improvements.

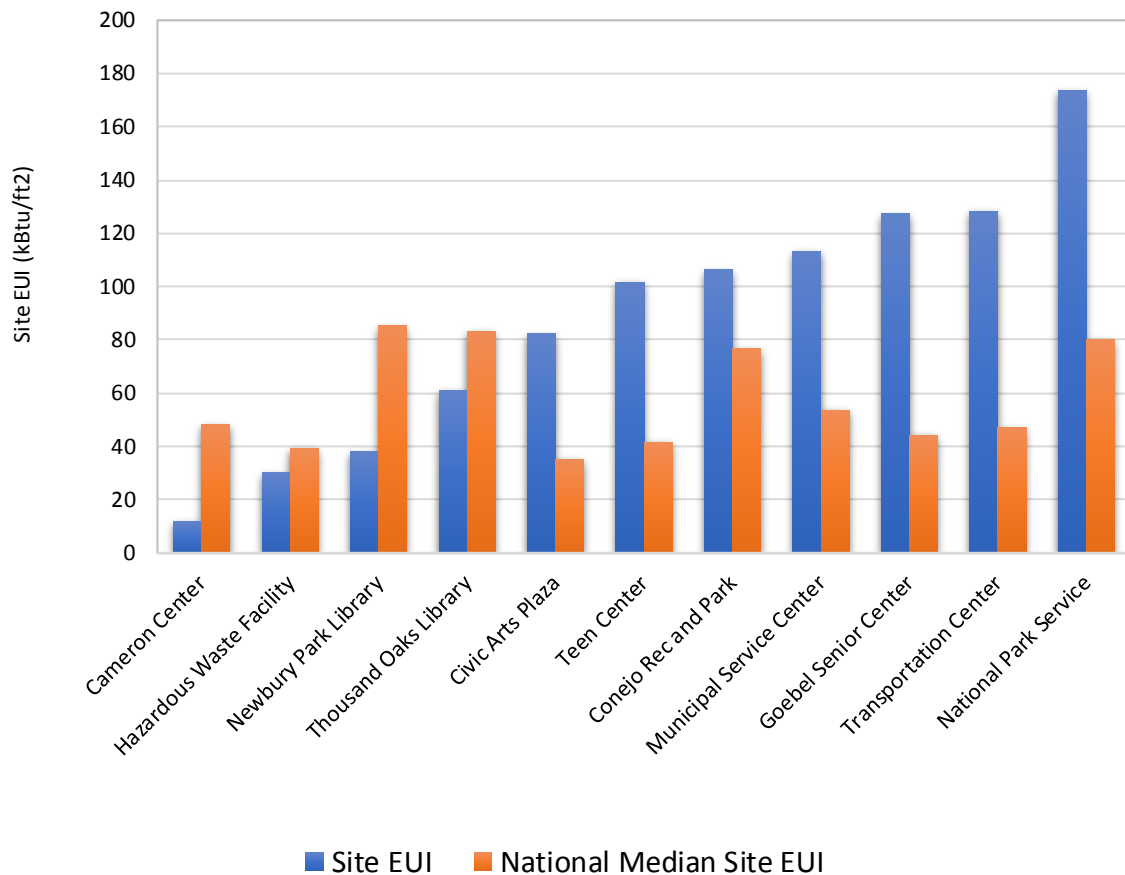


Figure EN-7: City facilities’ EUI vs national median EUI (2015)

The total annual cost of electricity for all facilities (Figure EN-8) averages \$1,607,745 (2010-2016). Facilities that have onsite renewable energy saved approximately \$128,000 annually on electricity bills over their projected cost had all their energy been purchased from SCE. The City’s electricity costs have decreased 7% since 2010 due to deployment of solar on the rooftops of 401/403 Hillcrest (capitalization costs not included) and participation in the Direct Access program.

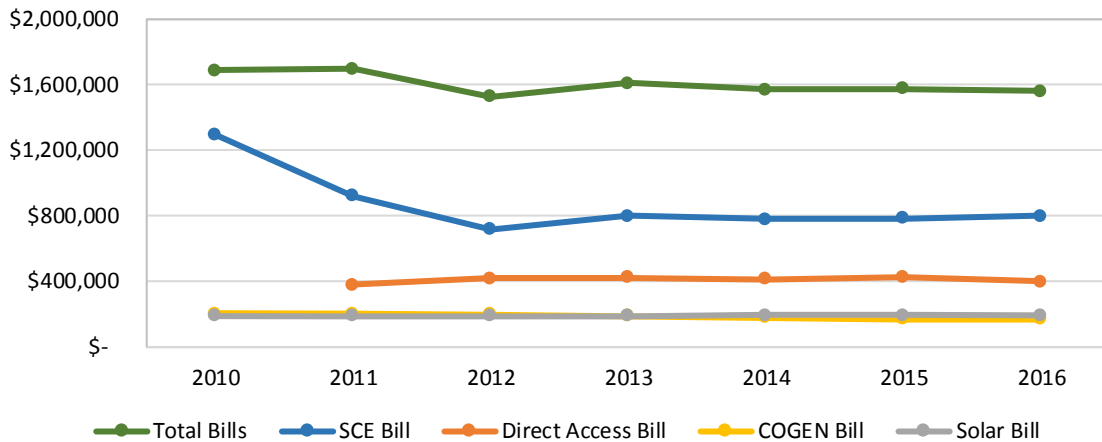


Figure EN-8: Total cost of electricity for all facilities

Electricity costs for each facility are shown in Figure EN-9. As mandated by the California Public Utilities Commission, all facilities are on a Time-Of-Use (TOU) rate (except the Cameron Center), so the cost of power not only depends on quantity but also on the time of day at which it is drawn. In addition, there are separate charges for delivery and generation of power, and for energy consumed and its rate of delivery (demand). This leads to a non-linear relationship between usage and cost which complicates the analysis of cost reduction strategies.

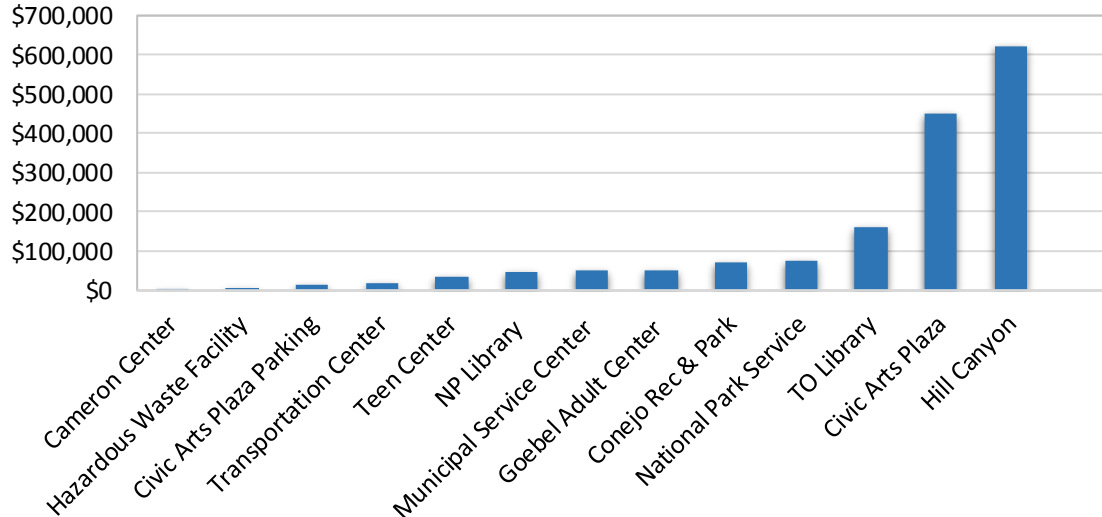


Figure EN-9: Average annual electricity costs between 2010 and 2016¹⁸

At times of day when the utility has excess power available, the energy charge is low (“off-peak” rate). When energy is in high demand and less is available (such as in the late afternoon), the rate is high (“on peak”). In some tariff structures, there is also a “mid-peak” rate. In addition to the cost of the energy itself, customers incur a “facilities-related demand”

¹⁸ Note that equipment lease cost from SCE at HCTP is not included here.

charge based on the highest “instantaneous” (measured over 15 minutes) power draw during the month. In summer, time-related demand charges also apply and can be even higher. Demand charges are a significant component of the City’s overall electricity bills. Strategies to reduce these demand charges by exercising smarter control over timing of use or battery storage to level out demand and reduce spikes (so-called “peak shaving” and “load shifting”) are effective strategies to lower the bills particularly during summer.

2.2. Non-Facilities Energy Use

The non-facilities class includes energy used to transport water and wastewater, and power streetlights, irrigation and traffic controls. This class of energy uses only electricity (no gas) and consumes an average of 6,750,073 kWh annually.

Street, area and parking lights are the largest electricity user in this class (Figure EN-10), with an average use of approximately 3,126,000 kWh annually. The City owns only a small fraction of the streetlights within its jurisdiction (approximately 480 fixtures) which are either mounted atop traffic signal poles at intersections or on City-owned surface parking lots. Although all City-owned streetlights use LEDs, SCE owns 7,362 streetlights in Thousand Oaks that run on high-pressure sodium vapor light bulbs¹⁹. Since these are not metered, SCE charges are computed from a formula which estimates electricity consumption based on the number of hours of operation, lamp type, and maintenance. Charges are much lower for LED fixtures.

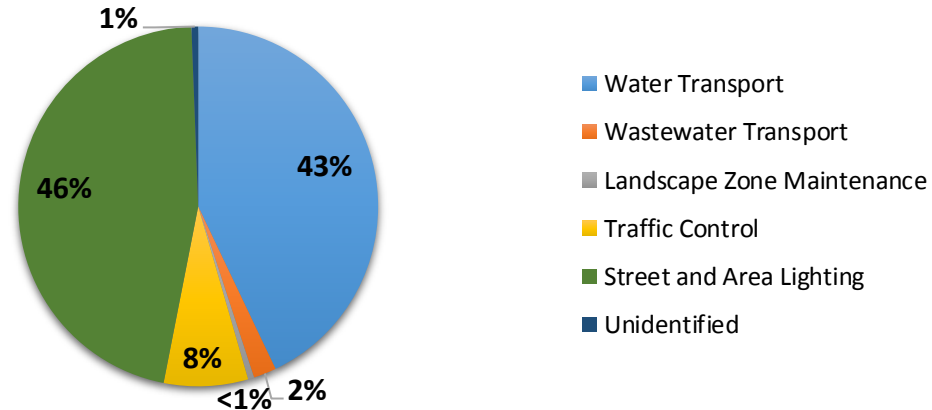


Figure EN-10: Breakdown of electricity usage for the “non-facilities” class (2010-2016)

Water transport is the other energy-intensive operation, with an average consumption of 2,897,714 kWh annually, used to power 15 pump stations. Four pump stations run on a pressure control system which starts running any time that the water pressure falls below a certain threshold. Northwood Booster is the only pump station that runs constantly to increase the water pressure in the adjacent neighborhood. Since all pump stations are on a time-of-use rate schedule, 10 of the 15 pump stations automatically shut down between the hours of 11:30 am and 6:30 pm (peak charge hours), under the control of the Water Division’s SCADA (Supervisory Control and Data Acquisition) system to reduce energy costs. The City is

¹⁹ 1993 of type 5800 L, 342 of type 16000 L, 2 of type 27500 L, 4211 of type 4000 L, 645 of type 9500 L, 161 of type 22000 L

exploring the feasibility of expanding this practice while ensuring that water quality is not adversely affected. Recent SCE efficiency tests indicate that the pump stations are running between 50-75% efficiency.²⁰

Traffic signals on average use 510,439 kWh annually. The City converted all signals to LEDs over a period of ten years, completing the conversion in 2010.

Wastewater transport on average uses 138,615 kWh annually, which mainly supports two lift stations' operations. Energy efficiency tests are currently scheduled on the lift stations for the second quarter of 2018.

Landscape maintenance, with an average use of 36,564 kWh annually, is the lowest energy user in the operation sector. Electricity is used to power two small irrigation pumps, irrigation controllers and monument lighting. The City is in the process of replacing all landscape lights with LEDs, which will save on not only electricity costs but also maintenance costs since the lifetime of LEDs is many times greater than that of traditional incandescent bulbs.

Energy use in this class (Figure EN-11) has increased 2% since 2010, peaking in 2013 mainly as a result of demand for additional water transport to support the demand from residents and businesses for outdoor irrigation during the recent drought. Water use fell after 2013 because of mandatory water conservation measures beginning in 2014.

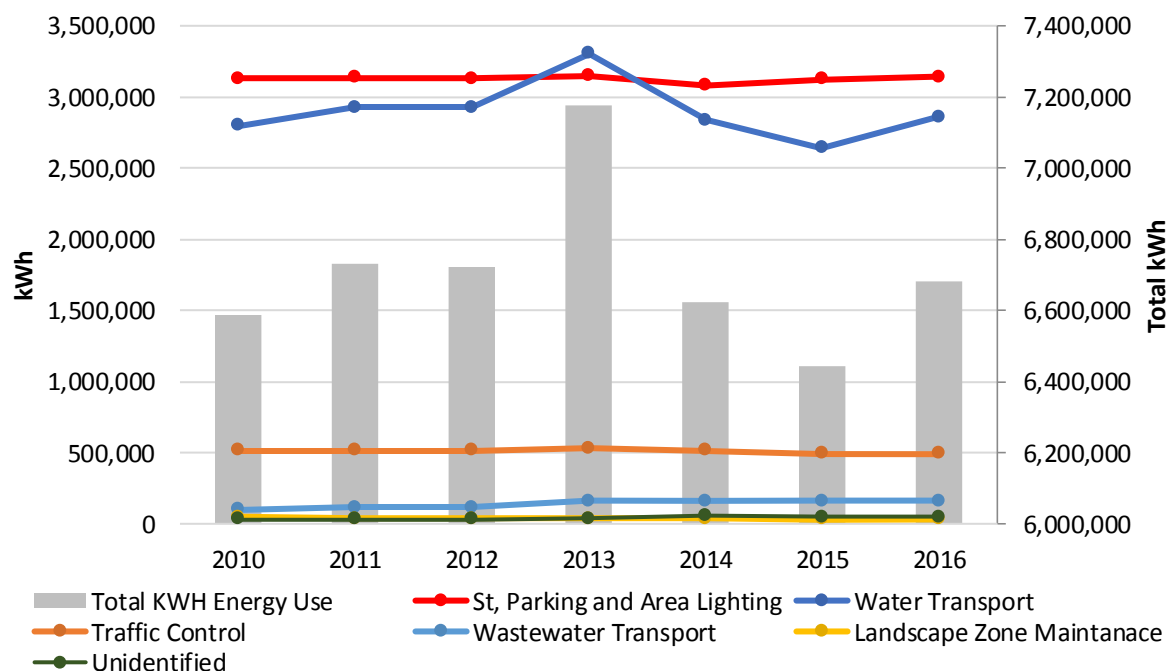


Figure EN-11: Annual electricity usage for non-facility classes (left axis) and total for all non-facility classes (right axis) (2010-2016)

²⁰ The City uses a 50% efficiency threshold for a pump replacement.

Operations' electricity costs average \$1,656,642 annually (2010-2016), of which \$1,025,148 is for streetlighting. It is important to note that streetlight bills include maintenance fees, which are not included in other categories.

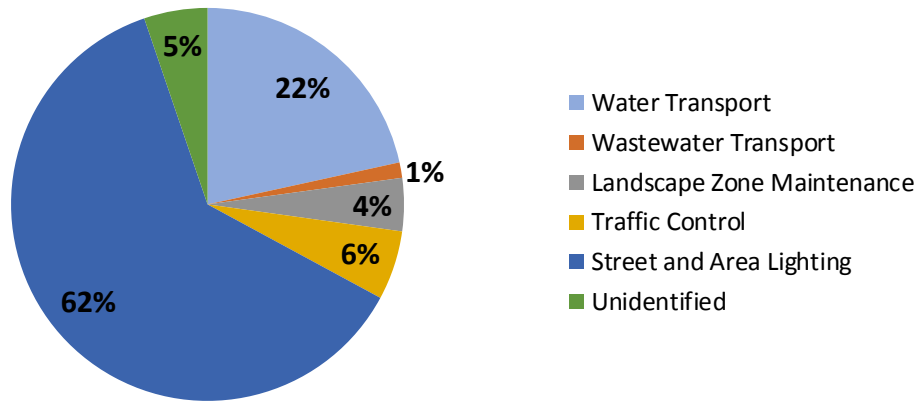


Figure EN-12: Breakdown of proportion of total bill by category

2.3. Energy upgrades

The City has invested in a number of energy efficiency upgrades over the past decade which include:

1. LED lighting conversion projects at HCTP, MSC and the Kavli Theatre lobby in CAP.
2. LED lighting conversion projects conducted by SCE at NP Library, Teen Center, Adult Center and CRPD building in Fall 2017.
3. HVAC upgrades to NP and TO Libraries in 2013.
4. New air conditioning chiller installed at HCTP in 2013.
5. 549 safety lights above traffic signals have been replaced with 133-watt LED fixtures.²¹
6. Solar-powered lighting has been installed at 13 city bus shelters.
7. The City has changed all traffic signals to LED.

In addition, many improvements have been made at HCTP in the wastewater treatment process to save energy (see Wastewater Section).

The City is enrolled in the utilities' Energy Leadership Partnership program²² which provides financial and technical assistance with energy efficiency upgrades. The program yields verifiable energy savings that result in incentives to help offset the capital costs of projects. Incentives increase in monetary value as the partnership tier level increases, where tiers are determined by prior energy efficiency investments undertaken. Currently Thousand Oaks is at the Silver Level in which energy projects are incentivized at \$0.06/kWh of savings. These increase to \$0.09/kWh at the Gold level and \$0.12/kWh at the Platinum level. Currently the County of Ventura and City of Moorpark have qualified for the Gold level; the Cities of Camarillo, Fillmore, Oxnard and Port Hueneme are at the Platinum level. As the City moves up it can take advantage of increasingly attractive cost savings.

²¹ The safety lights are on the fixed rate charge. It is not clear if Edison dropped the charges when these lights were converted to LED.

²² <https://www.sce.com/wps/portal/home/partners/partnerships>

3. Related policies and regulations

a. Global Warming Solutions Act of 2006 (AB 32) and SB 32 (2016)

California's landmark Global Warming Solutions Act of 2006 established a goal of reducing statewide GHG emissions to 1990 levels by 2020; follow up legislation, Senate Bill 32, was signed into law in 2016. These bills direct the California Air Resources Board to set rules and standards to reduce emissions statewide, including mandating limits on statewide greenhouse gas emissions to 40% below 1990 levels by 2030. California has employed a Cap-and-Trade program for the state's largest emitters, a low carbon fuel standard, a zero-emission vehicle program, and a renewable energy portfolio standard as its primary mechanisms for reaching these targets.

b. SB 97: CEQA and GHG emissions, 2007

California's Senate Bill 97, passed in 2007, directed the California Natural Resources Agency to include GHG impacts in the California Environmental Quality Act Guidelines. The bill marked the first occasion that the state acknowledged that GHG impacts, primarily from energy consumption and transportation, should be included in legal assessments of environmental impacts.

c. California Strategic Plan, 2008

Adopted by the California Public Utilities Commission (CPUC) in 2008, the state's Strategic Plan expressed a vision for California's local governments: "By 2020, California's local governments will be leaders in using energy efficiency to reduce energy use and global warming emissions both in their own facilities and throughout their communities." The plan's five goals for local governments are: 1. Local governments are leaders in adopting and implementing "reach" codes.²³ 2. Strong support from local governments for energy code compliance enforcement. 3. Local governments lead by example with their own facilities and energy usage practices. 4. Local governments lead their communities with innovative programs for energy efficiency, sustainability, and climate change. 5. Local government energy efficiency expertise becomes widespread and typical.



d. AB 719: Energy, energy efficiency, and street light pole, 2013

In October 2013, Assembly Bill 719 was approved by Governor Brown and chaptered into law, requiring in part that a tariff be used, at the discretion of local governments, to fund energy efficiency improvements in street light poles owned by the electrical corporations. This enables local governments to drive the conversion of streetlights towards use of cost-effective technology for reduced energy consumption.

²³ State law establishes a process that allows local adoption of building energy standards that are more stringent than statewide standards, sometimes called "reach codes."

e. SB 350: Clean Energy and Pollution Reduction Act, 2015

Senate Bill 350 (passed in October 2015) requires retail sellers and publicly-owned utilities to procure 50% of their electricity from eligible renewable energy resources by 2030 (RPS standard). It also requires the CPUC to establish annual targets that will achieve a cumulative doubling of statewide energy efficiency savings and demand reductions in electricity and natural gas use by 2030.



f. AB 802: Energy Efficiency, 2015

This 2015 bill mandates the establishment of a new statewide building energy use benchmarking and public disclosure program. Beginning June 2018 municipal and commercial/industrial buildings over 50,000 square feet, with no residential utility service accounts, are required to have energy data entered into a common tool like ENERGY STAR Portfolio Manager for benchmarking and then shared with the California Energy Commission for public disclosure, which is expected to begin in the latter half of 2019.

g. California's Existing Buildings Energy Efficiency Action Plan, 2015

California's Existing Buildings Energy Efficiency Action Plan²⁴ was developed in 2015 as a requirement of Assembly Bill 758 (2009). The plan calls for a doubling of energy savings in California's buildings, equivalent to a 20% reduction in statewide building energy use in 2030 compared to projected levels of usage. The plan calls for a Local Government Challenge Program to encourage local governments to implement innovative efficiency programs and gather relevant experience for wider application. Examples include:

- Aggressive efficiency for public buildings.
- Early implementation of nonresidential benchmarking and disclosure programs.
- Innovation in building permitting and code enforcement systems.
- Data-driven communitywide energy planning.
- Energy performance districts.

h. Residential New Construction Zero Net Energy Action Plan, 2015

The Residential New Construction Zero Net Energy Action Plan²⁵ (June 2015) lays the groundwork for meeting California's energy efficiency strategic plan to have all new homes be zero net energy by 2020. New and remodeled state-owned buildings are to be net zero energy by 2025. In order to achieve these targets, changes to the building code could require all new construction to include solar technology by 2020.

i. AB 2868: Energy Storage, 2016

Assembly Bill 2868, signed by Governor Brown in 2016, requires the CPUC to direct the state's three largest electrical corporations to file applications for programs and investments to accelerate the widespread deployment of distributed energy storage systems. The bill also authorized the CPUC to modify and approve programs and investments in distributed energy

²⁴ Link: [Existing Buildings Energy Efficiency Action Plan](#)

²⁵ Link: [Zero Net Energy Action Plan](#)

storage systems and required the CPUC to prioritize programs and investments that provide systems to public sector and low-income customers.²⁶

4. Strategies

A. Energy tracking and reporting

Improve means to measure, track, and analyze energy use.

A.1. Acquire and implement a data collection and analytics system for energy and climate data.

Implementation of an Energy Information System (EIS) is the first step in managing energy resources smartly, allowing for identification of opportunities for savings. An EIS allows for analysis of building envelope and equipment performance, lighting and plug-in loads, and heating ventilation and air conditioning (HVAC) systems. In addition, operational improvements can be identified to reduce consumption and shift loads to reduce costs. Building performance should be benchmarked for comparison to similar buildings across the state and the country, and to detect performance drift over time. These kinds of analyses should inform decision making when it comes to building and equipment upgrades, operations and integration of onsite renewables and storage.

Currently, energy use at facilities is tracked in two ways – through the Finance Department who process electricity bills, and through building automation systems in facilities where these exist. The finance database system does not provide energy use or cost data by function and data format is not compatible with current protocols and systems. Energy consumption data is aggregated monthly and cannot be utilized for equipment or building level analysis or fault detection. Seven facilities are equipped with building automation systems (BAS) as follows. These systems provide detailed real-time information about building systems operation.



²⁶ Link: [SEEC 2016 Climate and Energy Legislative Update](#)

Facility	Building automation system
Civic Arts Plaza	Siemens Apogee system
Newbury Park Library	Siemens Apogee system
Teen Center	Automated Logics Controls system
Goebel Adult Center	Automated Logics Controls system
Thousand Oaks Library	Siemens Apogee system
National Park Service	Carrier System
CRPD	Automated Logic & Trane

Table EN-1: Facilities and building automation systems

The BAS at the Civic Arts Plaza, Teen Center, Goebel Adult Center, and CRPD can be accessed remotely, but other systems require a staff person to travel to the site to check on building operation. They lack user-friendly graphic interfaces which makes them challenging to use, and facilities personnel must be specially trained.

An accessible web-based EIS can perform the multiple functions of monitoring buildings, tracking real-time energy use, and integrating interval data from the utility company. It should:

- Track energy use at each facility.
- Integrate live data from existing building automation systems.
- Integrate 15-minute interval data from the utility and weather data from an external source, and normalize usage data based on weather.
- Provide a method to identify faults to be resolved and determine action items.
- Provide a user-friendly and simple administrative interface.
- Provide an attractive public-facing dashboard with visualization tools.
- Provide analysis tools to inform energy efficiency recommendations.
- Provide recommendations for operational improvements.
- Have the ability to integrate other utility data such as gas and water.

An EIS also has the potential to feed into a billing system, providing support services for accounting.

A.2. Develop a plan and schedule for sub-metering.

Understanding and addressing electricity use within a single facility generally requires data at a more granular level than a single building meter. The City currently has designs for sub-metering at all facilities, but most have not been implemented due to resource constraints. From an analytical perspective, some of these sub-metering projects are critical for any meaningful energy analysis. For example, until Fall 2017 the Civic Arts Plaza had only two meters, which together covered



both City Hall and the Kavli Theater, but not separately. A lack of enough meters to track the energy used for different functions (e.g. lighting vs plug-in loads vs HVAC equipment) makes it challenging to identify energy efficiency actions. The additional ten sub-meters installed at CAP in Fall 2017 provide usage information on the major HVAC components at that facility and assist in evaluating efficiencies. In facilities with less functional diversity, analytics can be done with current meters. Identifying which buildings would benefit the most from sub-metering will help accelerate energy efficiency actions.

A.3. Benchmark buildings.

Benchmarking examines a building's performance over time and compares it to itself over time and to similar buildings. With enough usage data (2010-2016) to start benchmarking its own facilities, the City began the process in 2017. This work should expand to include benchmarking facilities against their historical performance and be automated in future to continuously track progress. Reporting of some facility benchmark data will be a future requirement under recent California law.

A.4. Conduct utility tariff optimization.

Tariff optimization is necessary to ensure that all facilities, pumps, and lighting are on the most favorable utility rate structure. This includes checking tariffs at facilities that deploy renewable energy and streetlights that have been converted to LED. Specific actions include:

- Conduct an audit of all streetlights to check that the correct tariff is applied to each.
- Conduct an audit of all other non-facility meters to ensure correct tariffs.
- Model different scenarios using software to investigate the effects of changes in demand and energy profile on optimum tariff for different energy generators.
- Determine the cost effectiveness of Direct Access program versus SCE and CCE participation.

A.5. Complete a local government greenhouse gas inventory.

California calls for local governments to set municipal and communitywide greenhouse gas reduction targets consistent with AB 32 and SB 35 - 1990 levels by 2020, 40% below 1990 levels by 2030 and 80% below by 2050. The first step in the development of a plan to reduce emissions is the collection and analysis of GHG data, primarily from energy and transportation but also including waste and wastewater contributions from municipal operations. As part of the EIS, emissions resulting from energy use in municipal buildings and operations will be generated. Transportation emissions can be computed from fuel use data available from fleet operations. In measuring progress towards meeting California's GHG reduction targets, the City should calculate and report its GHG emissions using the national standard, the Local Government Operations (LGO) Protocol developed by the International Council for Local Environmental Initiatives, ICLEI.

B. Conservation and efficiency

Identify and implement actions to conserve energy and improve the energy efficiency of facilities and operations.

B.1. Identify building- and equipment- level operational changes and upgrade City facilities to current energy efficiency standards.

Like much City infrastructure, the City's own facilities are aging. While some remodeling and upgrades to mechanical systems have taken place in facilities since construction, many are in need of HVAC and lighting improvements in order to operate with greater efficiency and reduce energy use and costs. California recently adopted new energy efficiency goals for existing buildings of doubling energy efficiency savings by 2030 and 50% of commercial buildings retrofitted to zero net energy, and is developing benchmarking and reporting tools in support of these goals. Analysis of facility energy use data indicates that the City's facilities fall well behind current (Title 24) energy efficiency standards.

There is an opportunity to take advantage of upcoming remodeling at City facilities to make energy efficiency upgrades such as smart lighting. After HVAC, lighting is generally the single largest consumer of energy at commercial/municipal facilities and one where significant advances have been made in technologies over the past twenty years not only in bulbs but also in controls. A switch to LED bulbs, and removal of unnecessary ones, is just a part of the energy improvements that can be made. Today's smart lighting is equipped with sensors for occupancy, temperature and light level, with additional options and programmability available. Lights communicate with each other to sense motion and can dim continuously to save energy by only providing light when, where and at the appropriate level it is needed. Other upgrades such as air handlers, fans, motors, and pumps should also be conducted as informed by building and equipment data analytics. These have the potential to save on energy, costs, GHG emissions and air pollution over the long term and be a significant part of the City's commitment to sustainability and climate goals.

B.2. Develop and implement a Municipal Energy Plan.

As part of the Strategic Planning funding received from SCE in 2017 the Sustainability Division, in collaboration with the EIS developer and the Facilities Division, will develop an energy plan for municipal facilities. The plan, informed by energy performance analytics, will identify and prioritize actions to increase energy efficiency by both operational changes and equipment upgrades to facilities. Implementation of these actions will elevate the City from the Silver level in the utilities' Energy Leadership Partnership program to the Gold level through savings of 600,000 kWh annually. The adoption and implementation of the Municipal Energy Plan will be an essential step in achieving Gold level status, investing in long-term improvements and reaching energy savings targets.

B.3. Enroll facilities in SCE Direct Install Program.

Direct Install is a program funded by California utility ratepayers and administered by SCE. The program provides no-cost replacement of certain types of equipment with more energy-efficient alternatives. Under SCE's Direct Install program LED retrofits to overhead lighting were conducted free of charge to four of the City's facilities in 2017. Some City facilities have previously participated in this program, but with new measures (including LED lights); more facilities could qualify to participate in the program.

B.4. Explore energy and cost reductions from streetlights.

Most of the City's streetlights are owned by SCE and have not been converted to LEDs. Currently SCE offers an option ("Option E") in compliance with AB 719, PU Code Sections 384.5 and D.14-10-046 to convert streetlights to LED, paid for by local governments. There is a general consensus among sustainability professionals that any upgrades of streetlights mandated in the future will cause rate changes that will shift the upgrade costs to local governments in any case, which makes using option E an attractive solution to accelerate the transformation and potential gain a cost advantage.

B.5. Enroll pump and lift stations in SCE energy efficiency programs.

SCE has a Water Infrastructure System Efficiency (WISE) program through which water agencies and city-owned water systems can benefit from incentive funding to optimize their pumping systems and minimize electrical consumption in wastewater treatment plants. The City should coordinate with SCE and enroll in the WISE program to:

- Conduct process benchmarking against other wastewater treatment facilities.
- Conduct pump and lift station efficiency testing and make efficiency improvements where necessary. Perform a cost-benefit analysis for replacing pumps with more efficient ones.
- Implement pump sequencing so that the most efficient pumps are always utilized first.
- Conduct hydraulic modelling for pressure and distribution optimization.
- Identify time-of-use adjustments that can be made to pump operations in order to reduce peak demand charges while maintaining water quality.
- Analyze potential for participation in demand response program.
- Enroll in SCE pump stations rehabilitation program and lift stations energy efficiency program.

B.6. Engage with SoCal Gas to explore gas upgrades.

Engage with SoCal Gas to identify measures that would decrease gas consumption, including participation in SoCal Gas Direct Install program.

B.7. Design and implement strategies to reduce demand and peak electricity charges.

The expansion of renewables in California has led to challenges for the electric utilities in matching supply with demand, leading to an oversupply of electricity in the middle of the day and a dearth in early evening when solar output falls and commercial and residential uses overlap. Because of this mismatch, utilities have been developing alternative ways

of managing supply and demand through the use of incentives designed to shift demand patterns. Through time-of-use (TOU) rate pricing, electricity use is highly incentivized at non-peak hours and dis-incentivized at peak times. Additional seasonality is applied. Rate structures are further complicated by charges that depend on both instantaneous power demand and aggregate energy use, and by separate charges that apply to generation and delivery. A limited analysis of City facility electricity bills shows that demand charges frequently exceed energy use charges. Better data collection, analysis and decision tools are essential to developing a smart energy use strategy that can save costs not only through equipment and operational improvements that reduce consumption, but also through demand shifting.

Besides changing the operating hours of certain equipment, additionally the City should evaluate participation in the demand-response program, which is a mechanism for utilities to reduce peak use by providing lower overall rates to those entities willing to curtail use upon request. The Teen Center is currently the only facility enrolled in the program.

B.8. Explore performance-based contracting for municipal buildings operation and energy savings.

This is a mechanism to reduce the burden of energy upgrades and costs through public-private partnerships. Capital costs of upgrades are made by a third party and paid back by the local government through sharing energy cost savings with the private investor. This can not only accelerate the implementation of energy efficiency measures but also reduces risk and assures that each building's performance stays on track to achieve its goals through the use of a benchmarking process.

An additional opportunity exists for cost sharing with participation in the demand response program through a third party, who provides continual real-time energy monitoring and identifies response opportunities that are conducive to facility function.

C. Distributed energy resources

Increase clean, local and resilient energy supply.

C.1. Develop a plan for distributed energy resources at City facilities.

The City has committed to clean energy through its participation in the Direct Access program since 2011, which allows procurement of energy from a third-party electricity supplier. Through this program the City purchases 100% renewable energy for its top fifteen accounts (with the exception of HCTP) at a rate comparable to, or lower than, SCE's. In December 2017 City Council voted to join Los Angeles Community Choice Energy, now Clean Power Alliance (CPA), which will expand electricity



plan choices for both the City and the community through offering a choice of provider and suite of energy plans including ones with higher renewable energy content. In addition to these programs, the City has invested in onsite solar at its 401/403 Hillcrest Drive and HCTP facilities.

These City investments in onsite solar were made several years ago, since which costs have declined and technologies have advanced. It would serve the City well to conduct a cost-feasibility assessment of expanding its onsite solar capacity at viable sites including water storage/pump locations as well as its buildings. Recent studies have employed non-standard designs which has led to long projected payback times. Since cost savings can be achieved through scale, a plan should be developed for deployment at all facilities concurrently utilizing standard carport and mounting structures.

Such an assessment should be paired with inclusion of battery storage, which can be attractive from both economic and resiliency perspectives. Storage can be used to conduct 'peak shaving' and 'load shifting' to reduce energy costs by storing energy when it is cheapest and deploying it when it is costly. In addition, batteries can be used to facilitate participation in demand-response programs which provide financial incentives to entities that reduce loads for short time periods upon demand. Control systems have the potential to operate water pumps and other equipment furnished with onsite generation and storage autonomously from the grid, which would increase the City's resilience to power outages and disasters.

C.2. Implement a microgrid.

Microgrids are local electricity grids on scales varying from a single building to entire communities. They have the capability to "island" or operate autonomously from the main transmission grid in the event of power outages, although they do not generally operate in this mode permanently. The advantages of microgrids include energy efficiency, local control and ability to integrate a variety of local power sources, but their primary benefit is providing resilience from power outages, emergency power and a more stable and reliable power source. Both HCTP and MSC provide ideal sites for microgrids as both have the need to operate in the event of an emergency or power outage, and have space capacity.

HCTP has existing diverse onsite reliable renewable power sources, can accommodate energy storage, and has expansion capacity (e.g. for additional bio-digester/co-gen/solar). In addition, it has the potential to connect to MSC and provide emergency power or fuel (biogas) to operate that facility in the event of a natural disaster. The MSC facility should be considered for its own stand-alone microgrid for resilience purposes. Although a recent solar bus canopy was recently deemed too costly at that facility, much of the cost was associated with the construction of the custom shade structure. With the installation of standard solar carports there is enough parking area to offset the facility's own power demand. With accompanying battery storage, a microgrid could be developed to establish this facility as an emergency center for City operations.

Although microgrids are still in their infancy, they are the future of distributed energy resources (DER) in California. Decentralization of the grid is becoming increasingly important as grid operators struggle to balance supply and demand and maintain stability in the face of expanded DER. Although there is still a need for regulatory barriers to be addressed for multiple site microgrids (such as right of way access), and appropriate tariffs to be designed, it is not too early for the City to be considering the development of microgrids at HCTP and/or MSC that are modular and scalable.

C.3. Evaluate electricity purchasing options.

The City has a contract with a third-party provider through the Direct Access program to purchase 100% of its electricity supply for its facilities from renewable sources until February 2020. For its remaining energy users, the City should explore participation through LACCE/CPA, and moving forward should conduct a cost-benefit analysis for moving all its facilities to the CCE.

C.4. Evaluate cleaner emergency backup energy.

Currently, most of the facilities' backup generators are powered by diesel. Explore clean resilient emergency backup alternatives.

Water Consumption



Water Consumption Goals

1. Overview

The City of Thousand Oaks imports almost all of its water from the State Water Project through its distributor, Calleguas Municipal Water District (Calleguas), which contracts with Metropolitan Water District for supply. Calleguas serves water agencies throughout Ventura County, including the three purveyors operating in the City - California American (Cal-Am) (approx. 55% of accounts), the City's own agency (approx. 35% of accounts) and California Water (CalWater) (approx. 10% of accounts). Five of the City's twelve facilities are served by its own agency; the remaining seven are served by Cal-Am.

A five-year drought in California led to restrictions on water use throughout the State beginning in 2014, which affected the City both as a water purveyor and as a consumer. Each water agency's target was specified relative to its 2013 usage and based on a number of factors including historical use and climate. For the City's water agency, this target was a 28% reduction. For Cal-Am the target was established at 32%, and for CalWater it was established at 36%. Targets were achieved with a variety of mandated and voluntary measures, which included elimination of turf watering in medians, a restriction of the number of days and the hours that irrigation was permitted, a ban on watering within 48 hours of rain, and others.

After record rainfall and snow throughout California in 2016-17, Governor Brown rescinded the statewide drought declaration in April 2017 and in response local water agencies lifted many water use restrictions and returned to a set of less restrictive "permanent" measures to be in place at all times. Given the likelihood of future droughts, the City has adopted practices to permanently reduce its own water use.

- A. Water conservation:** Use water in a responsible manner and conserve where possible. Prepare for new state water regulations.
- B. Water use tracking:** Develop methodology for ongoing monitoring, reporting and analysis of water use data.

2. Status

Drought-imposed restrictions led to the installation of indoor water-saving devices at City facilities and permanent changes in the way that the City landscapes. In 2016 the City-owned Los Robles Greens Golf Course was completely re-landscaped for better environmental and economic sustainability¹. Over 30 of the original 85 acres of grass was removed and replaced with drought-tolerant native plants and mulch, allowing for a projected annual water savings of 20-25%. The majority of the funding was secured through a turf rebate program offered by Metropolitan Water District.

Although the City tracks its utility's water purchases and sales, it does not currently maintain a centralized database for tracking its own water use data. In 2017 Sustainability Division staff submitted data requests to all three water agencies operating in the City in order to analyze usage. Monthly data was received which spans the past few years. A number of challenges were encountered in the analyses of these data due to the different data formats used by the three agencies, different and inconsistent billing cycles, missing data, and lack of comprehensive inventory of accounts, meter numbers and service addresses. Moving forward, the City should invest in a database management system for automating water consumption tracking which will facilitate a better understanding of the water savings that have been realized through adopted measures and provide a platform for future planning.

One other advancement that will assist water use tracking is a transition to smart meters which can provide interval (normally, hourly) data and do not require manual reading. Cal-Am has transitioned twelve of the City's irrigation accounts to such meters as part of its test of an advanced metering infrastructure but no City facilities were converted. Further upgrades are not scheduled until the end of each meter's 15-year life-cycle. The City's own water utility is also piloting new smart meters (see Water Utility section of this Plan).

2.1. Indoor water use

Indoor water use at most City facilities is overseen by the Facilities manager, who is aided by a supervisor and five full-time maintenance staff. HCTP and MSC, which are operated under the Public Works Department are managed by PW staff.

City facilities are fitted with low water use fixtures throughout, though an inventory of these is needed. As a result of drought restrictions, the fountain at the Civic Arts Plaza was turned off. After the drought was declared over, the fountain was re-activated, repairs were conducted, and geysers were modified to reduce energy and water use by operating at lower

¹ Link to: [VCStar article](#), [Golf Inc. magazine article](#), [Golf Course Architecture journal article](#)

levels with short bursts occurring at preset intervals. A water sub-meter for the fountain was installed to track usage.

Although, like other City facilities, HCTP uses potable water for sinks, showers and other indoor use, all other operational water and irrigation needs there are met with reclaimed water produced onsite. In addition, treated wastewater from the plant is used by MSC staff to fill a 225-gallon tank once a week for cleaning graffiti and pressure-washing bus stops. The bus wash at the MSC utilizes recirculated water except for the last spray arch, which uses treated (reverse osmosis) water to minimize spots. Waterless urinals are installed at the MSC and HCTP.

Figure WC-1 shows the results of the analysis of facility water use data received from the two entities that serve the City’s facilities, Cal-Am and the City’s own agency. These data include landscaping use associated with each facility and show the effect of drought-related reductions in 2015 and later years.

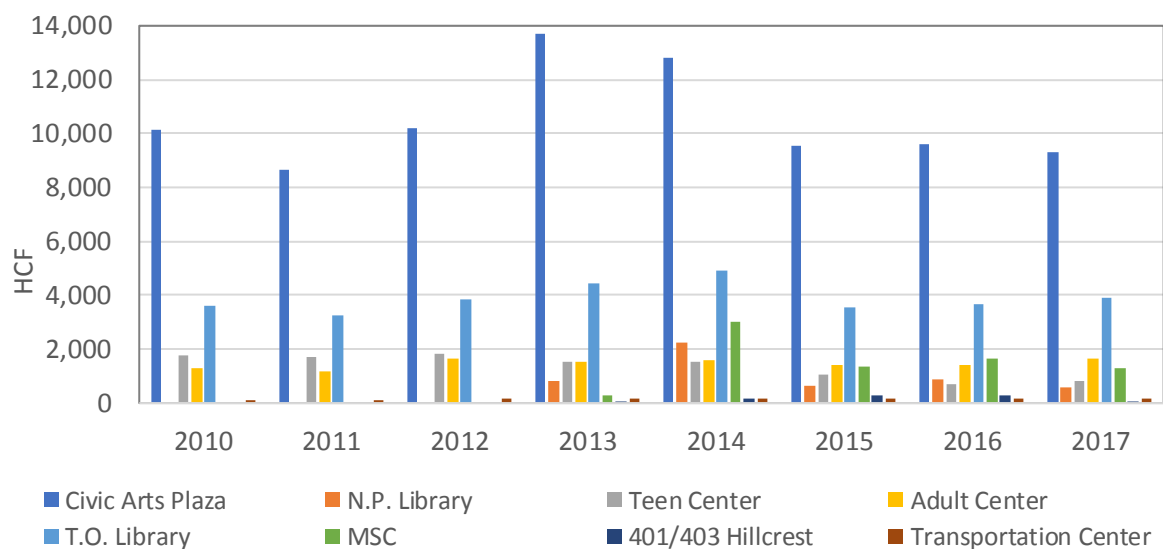


Figure WC-1: History of water consumption at City facilities, 2010-2017. Totals include landscaping irrigation associated with each facility. Data for NP Library, 401/403 Hillcrest, MSC and Transportation Center begin in late 2013. Units are Hundred Cubic Feet (HCF). 1 HCF = 748 gallons.

The limited number of water meters and their type (Table WC-1) add to the challenges of usage analysis since for the most part, data cannot be disaggregated either functionally (e.g. indoor vs outdoor use) or temporally (e.g. hourly). Advanced metering will improve usage analysis.

Facility	Provider	Domestic (meter # and type) *	Irrigation (meter # and type) *
Cameron Center	Cal/Am	0	
Civic Arts Plaza	City	1 AMR	2 AMR, 1 Std.
CRPD (Hillcrest) combined with NPS	Cal/Am	0	
HHW Facility	Cal/Am	0	
Hill Canyon	Cal/Am	1	1 Std.
Municipal Service Center	Cal/Am	3	3 Std.
NPS (Hillcrest)	Cal/Am	4	4 Std.
Newbury Park Library	Cal/Am	2	2 Std.
Goebel Senior Center	City	1 AMR	
Teen Center	City	1 Std.	
TO Library	City	1 AMR 1 Std.	
Transportation Center	City	1 AMR	2 AMR

*Standard = old meter, records usage only; AMR = Automated Meter Reading

Table WC-1: Facilities, providers, and meter types

2.2. Outdoor water use

In addition to water use at facilities themselves, outdoor water use occurs at the 400 acres of landscaped areas maintained by the City. Outdoor water use falls under the City's landscape program, which is managed by the Landscape Maintenance Supervisor who oversees twenty-five full-time maintenance workers and a contracted landscape maintenance service provider. Of these, five City staff and four contractors monitor, administrate, operate, and service landscape irrigation. This work includes programming schedules, performing system checks and adjustments, conducting repairs, reporting, and responding to public inquiries and concerns related to leaks, broken pipes and emitters, overspray, overwatering, and irrigation timing. The remaining staff perform landscape and tree maintenance.

Irrigated areas include medians, parkways and the bordering zones along major streets, as well as landscaping associated with the facilities themselves. A significant challenge

associated with irrigating municipal landscape is providing enough water to maintain the health and appearance of ornamental plants including turf, ground cover, shrubs and trees while eliminating runoff and controlling costs.

In response to the Governors Executive Order² that prohibited the use of potable water on turf medians, staff capped sprinklers in the medians that were exclusively watering turf. These areas are being re-landscaped with drought-tolerant and native plants. The City's new Forestry and Landscape Master Plan³ will serve as the guiding document for this effort, with bubblers used to replace sprinklers throughout, providing for better control over watering of trees and shrubs. A demonstration project utilizing the new landscaping standards is scheduled for completion in early 2019. A complete transition of all areas will be a lengthy process, estimated at ten or more years, depending on capital budget.

An additional water conservation measure employed by the City is the use of mulch throughout and incorporation of biochar with all new and existing plantings; staff estimate up to a 50% reduction in water demand where biochar has been integrated in the soil mix.



Areas are equipped with a variety of irrigation equipment, much of which needs upgrade or replacement in order to standardize and improve operation while saving water and associated costs. The City currently utilizes 350 irrigation controllers of various makes and models, many of which are over thirty years old. The replacement of damaged and poorly-functioning automatic timer controllers with web-based smart controllers is a priority for the City, but one which is anticipated to stretch out over the next five to six years due to the high cost of the upgrade (\$8,000 - \$10,000 apiece including installation costs). To date, the City has installed 109 smart controllers that can reduce water use by as much as 20 - 40 percent⁴ by turning off automatically in the event of rain and utilizing local weather information to modify watering times based on evapotranspiration data. Staff has website access to remotely manage such controllers, create custom programs, modify watering schedules, and shut down individual stations. Wiring faults are detected automatically and trigger alarm notifications to staff, and controllers can be calibrated to detect broken heads, pipes and main lines. Managing landscape irrigation with older controllers is time-consuming and expensive, requiring staff to drive to multiple locations and physically turn sprinkler stations off as necessary. This is particularly problematic for rain events that occur on weekends and holidays.

There are 342 irrigation meters associated with parcels maintained by the Landscape Division. 119 of these are within the City's agency service area, 86 within CalWater's and 137 within

² Governors Executive Order April 1, 2015

³ Link: [Thousand Oaks Forestry Master Plan](#)

⁴ Project Report WaterSMART14 grant application page 1 summary

Cal-Am's. Bills are processed by the Finance Department and then scanned and forwarded to the Landscape Division for review and payment authorization. Bill information is manually entered into a spreadsheet by MSC staff to track usage and cost. This process would benefit from automation.

Figure WC-2 shows water usage associated with the City's irrigation accounts as documented by MSC staff. Irrigation is utilized for landscaping in medians and public areas. The effect of State-mandated water conservation measures, which included no watering of turf in medians, had a significant effect on the City's water usage beginning in mid-2015. Comparison with Figure WC-1 shows that irrigation demand dominates municipal water consumption, generally accounting for more than 90% of total usage.

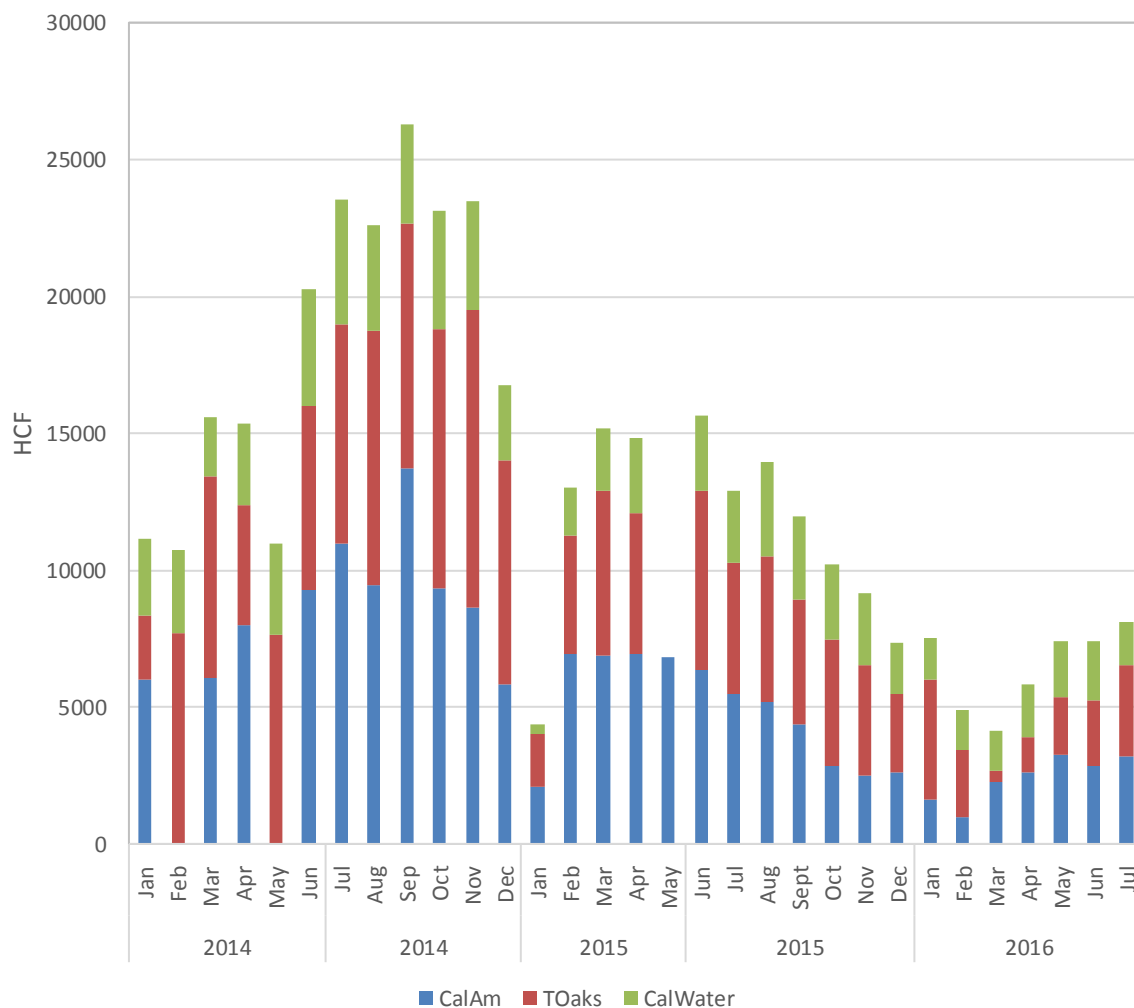


Figure WC-2. Irrigation water use broken down by agency, 2015-2016. Note some missing data in May 2015. Units are Hundred Cubic Feet (HCF). 1 HCF = 748 gallons.

The City paid approximately \$1.1 million for water usage in 2017. In moving forward with drought-tolerant landscaping, the City will benefit both environmentally and financially from this transition.

3. Related policies and regulations

a. City Ordinance on Water Use - Ord. 1516-NS, 2009⁵

- Outdoor irrigation prohibited between 9 am – 5 pm.
- Outdoor irrigation limited to 15 minutes per station (exceptions for low volume systems)
- No excessive runoff.
- No washing down of hard or paved surfaces.
- Leaks must be fixed within seven days.

b. Forestry Master Plan, 2017

The overall goal of the Forestry Master Plan is to provide the city with a sound basis for the creation and management of its community forest. The plan prioritizes drought-tolerant plantings and water conservation efforts in this management.

c. Making Water Conservation a California Way of Life

“Making Water Conservation a California Way of Life” (Governor’s Executive Order B-37-16) replaces and increases water conservation requirements. AB 1668 (Friedman, 2018) and SB 606 (Hertzberg, 2018) implement various provisions of the Governor’s Executive Order including the establishment of long-term urban water use efficiency standards, an indoor water budget of 55 gpcd which decrease over time, and outdoor allocations based on irrigated or irrigable landscaped area.



⁵ By Governor’s Executive Order there is also no watering during or 48 hours after any rain

4. Strategies

A. Water conservation

Use water in a responsible manner and conserve where possible. Prepare for new state water regulations.

- A.1.** Conduct water use audit at each facility, develop a list of water fixtures at each and compare efficiency to current standards. Implement upgrades as necessary.
 - Develop list of recommended upgrades and work with Facilities staff to implement. A comprehensive list of water fixtures at the Civic Arts Plaza exists, but lists do not exist for other City facilities. An inventory of all City facilities is useful in understanding and reducing water usage.
- A.2.** Evaluate additional water metering needs at each facility.
 - Separate irrigation/outdoor water meters may need to be installed at some facilities to ensure compliance with new State water policy. The Adult and Teen Centers are likely candidates.
- A.3.** Prioritize the purchase and deployment of smart irrigation controllers to ensure compliance with State regulations and reduce staff costs.
- A.4.** New regulations require a more sophisticated approach to water management and will likely necessitate an investment in infrastructure improvements including upgrades of irrigation controllers to smart controllers to ensure compliance with the prohibition on watering after a rain event.
- A.5.** Identify and implement leak-testing technologies to reduce and/or prevent leaks in irrigation systems.

B. Water use tracking

Develop methodology for ongoing monitoring, reporting and analysis of water use data.

- B.1.** Collect and record existing water use and billing data, including service address, meters, monthly use, and cost.
- B.2.** Implement database to provide analysis tools for insight into usage patterns, trends, and anomalies.
- B.3.** Develop plan for use reduction informed by analytics.

- B.4.** Automate data collection and reporting through an online platform that is accessible by all departments. Plan for future integration into billing software.



Waste Management



1. Overview

Environmentally responsible purchasing, use, and disposal of goods have a significant impact on waste production and the resulting greenhouse gas emissions. It takes energy to manufacture, distribute and use consumables as well as to manage the waste generated from such use. According to the US EPA, the food lifecycle alone - from extraction and harvesting to reuse, recycling, composting or disposal - plus the release of methane during decomposition¹ accounts for roughly 42 percent of domestic GHG emissions. Curtailing consumption not only benefits the environment by reducing the need for landfills but also by reducing air and water pollution.

The passage of the California Integrated Waste Management Act of 1989 (AB 939) marked a paradigm shift in the administration of solid waste collection programs in California. Previously the focus had been on collecting and disposing of waste quickly and cheaply. This policy transformed that practice into a new one targeting waste reduction through recycling and composting. The State has mandated that 25% of waste be diverted from landfills by the year 1995 and 50% by the year 2000. In 2011, California established a new diversion goal of 75% by the year 2020 under AB 341. Since then the State has introduced additional legislation which mandates organics recycling for commercial entities under AB 1826, and more recently SB 1383 which establishes targets of 50% reduction in organic waste disposal by 2020 and 75% by 2025, and additionally requires that 20% of edible food currently wasted is recovered for human consumption.

Waste Goals

- A. **Process improvement:** Utilize technology to improve efficiency in data collection and reporting. Use analytics to inform program improvements.
- B. **Waste reduction:** Support and provide programs that increase efficiency, reduce waste volume, and promote materials reuse.
- C. **Hazardous waste:** Ensure environmentally-responsible disposal of hazardous waste and encourage use of less toxic alternatives.



¹ Link: [Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices \(2009\)](#)

2. Status

To achieve regulatory compliance, the City developed a Source Reduction and Recycling Element², based on an analysis of the trash generated in the City. Waste was divided into 23 categories and the quantity and type of materials produced and disposed of in each sector (residential, commercial, and industrial) was determined. The City's waste reduction and diversion programs were designed to attain State-mandated waste diversion targets based on these findings.

The City's performance is monitored by the California Department of Resources Recycling and Recovery, CalRecycle, through annual site visits and a detailed annual report which includes status on programs and facilities. CalRecycle calculates the City's diversion rate from data submitted by landfill and recycling centers throughout the State. The most recent data for the City indicates a diversion rate of approximately 70% in 2016.³



Franchise agreements for commercial and residential hauling ensure access to waste, recycling, and green waste services at consistent rates throughout the City and minimize impacts on traffic, emissions and roads. Funding for the City's solid waste, recycling and hazardous materials programs is derived from fees incorporated into the waste hauler franchise agreements, as well as the City's waste disposal agreement with the Simi Valley Landfill. Amounts are calculated based on gross waste hauler revenue, number of accounts serviced, and tons of landfilled waste. While the City prioritizes reuse, recycling and composting, some waste cannot be diverted from landfilling and must be disposed in an environmentally sound manner. Simi Valley Landfill and Recycling Center and Toland Landfill in Santa Paula serve as the county's landfills.

2.1 Residential program

The City maintains a multi-stream residential curbside service through contractors operating under exclusive franchise agreements. Waste Management (WM) serves approximately 70% of the City's residential customers and the remaining 30% is served by Newbury Disposal (Harrison). Together they host over 35,000 residential accounts. Since 1994, franchise hauler contracts have been adjusted annually and renegotiated every three years. The current contract includes "Zero Waste" support for City special events, and a requirement that 80% of street sweeping debris



² City of Thousand Oaks Source Reduction and Recycling Element (1992)

³ Link: [Jurisdiction Diversion/Disposal Rate Summary](#)

is recycled, resulting in the diversion of 2,000 tons of material per year and improved storm water quality.

Residential curbside recyclables collection has been offered to City residents since the early 1990s. All plastics #1-7 may be placed in recycling containers along with steel, aluminum, tin, mixed paper, beverage containers, glass bottles or jars, dry/empty paint and aerosol cans, and cardboard. WM residential recyclables are processed at WM's Materials Recycling Facility (MRF) in Azusa. Harrison's residential recyclables go to Gold Coast Recycling in Ventura. Trash and green waste for both haulers go to the Simi Valley Landfill for processing and then Agromin for composting.

Basic residential service includes one 96-gallon green waste cart, one 64-gallon trash cart, and one 64-gallon recyclables cart. Basic service for condominium/ townhome residents includes 64-gallon carts for trash and recyclables, but omits green waste service. Reduced volume "super recyclers" can opt for a smaller 32-gallon trash cart at a discounted rate. All residents may order an additional recycling container free of charge, and additional refuse and green waste carts at per-unit rates. Subsidized compost bins are also made available to residents through the City. The residential waste breakdown for the most recent data available (2015) is shown in Figure WM-1 below.

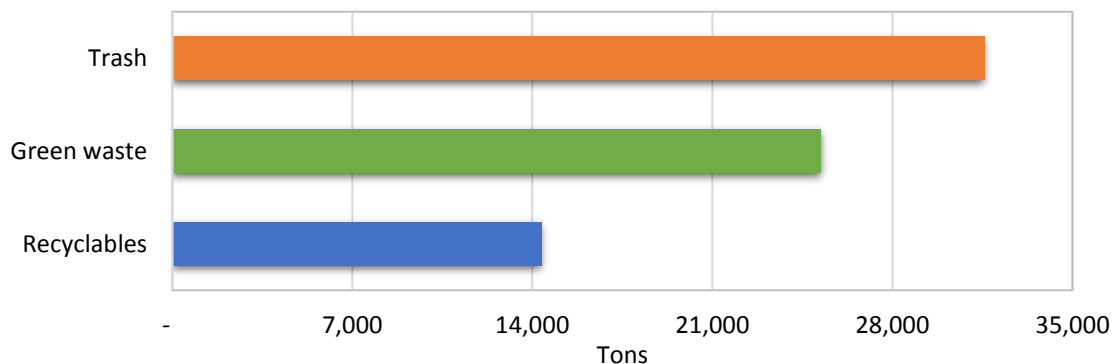


Figure WM-1: Residential waste breakdown, 2015

Green waste is processed into compost by Agromin, a commercial company headquartered in Oxnard. The composting process converts organic materials such as plant, food, and certain animal waste into soil-like, nutrient-rich, natural fertilizer product and diverts organic materials from the landfill.

The City offers either commercial dumpster or cart service to multifamily communities. Commercial recycling, which includes multi-family communities, became mandatory with the passage of AB 341 in June 2012. All multifamily communities subscribing to cart services have recycling services included, accounting for approximately 3,500 cart service accounts⁴. There are approximately ninety multifamily commercial-type dumpster accounts in the City. Most of these (seventy-seven in 2017) are compliant with the AB 341 mandate, four others are limited by single-bin enclosures, and the City is working with the remainder to achieve full compliance.

⁴ Figures provided by Waste Management

Supplementary and seasonal recycling opportunities are also available to residents. Appliances, furniture and electronics are accepted by franchised haulers through a curbside bulky item pick-up program that offers two free pick-up appointments per year. Special allowances are made for extra holiday recyclables, trash and holiday trees during the two weeks following the winter holiday season. Residents can self-haul trash, green waste, appliances, concrete, and other waste to two free disposal day events per year at the Simi Valley Landfill and Recycling Center.

2.2 Commercial program

Throughout the City, commercial collection service is provided by Waste Management utilizing cart, dumpster or large volume roll-off and compactor containers, depending on generation quantities. Under State law (AB 341) recycling is mandatory for businesses that generate more than four cubic yards per week. Customers commingle all recyclables (such as cardboard, office paper, plastics, glass, aluminum cans etc.) in one collection container. Commercial green waste service is available on request; however, the majority of commercial green waste is self-hauled by landscape contractors.

Under AB 1826, local jurisdictions were required to have an organics recycling program in place by January 1, 2016. Mandatory recycling of organic waste was implemented under CARB's Scoping Plan⁵ to help the State achieve its aggressive waste diversion and GHG emission goals. More than 30% of the approximately 30 million tons of waste that Californians dump in landfills each year could be diverted through composting and mulching, and through anaerobic digestion, which can produce renewable energy and fuel. (Figure WM-2).

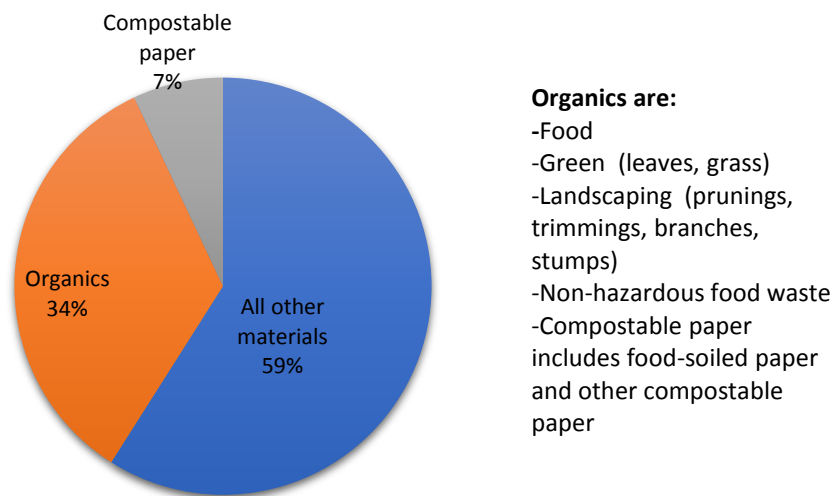


Figure WM-2: Organics in California's waste stream, 2014⁶

The City is responsible for conducting outreach and education to inform businesses about local options for organic waste recycling, as well as monitor compliance and identify those businesses not recycling. Pre-consumer organic food waste is being collected from local restaurants and grocery stores in the City with a phased-in approach that began in 2016. As

⁵ <https://www.arb.ca.gov/cc/scopingplan/scopingplan.htm>

⁶ CalRecycle's 2014 Disposal-Facility-Based Characterization of Solid Waste in California

of July 2017, 21 businesses are being serviced with food waste collection. In addition, all food outlets in the Oaks Mall are recycling food waste through an onsite pilot program. By January 2019, all businesses that generate four cubic yards or more of commercial solid waste per week must arrange for organic waste recycling, regardless of the type of business or amount of organic waste generated. This will greatly expand the need for organics collection and processing within the City.

There are approximately 1,300 commercial accounts in the City, with waste breakdown as shown below (Figure WM-3).

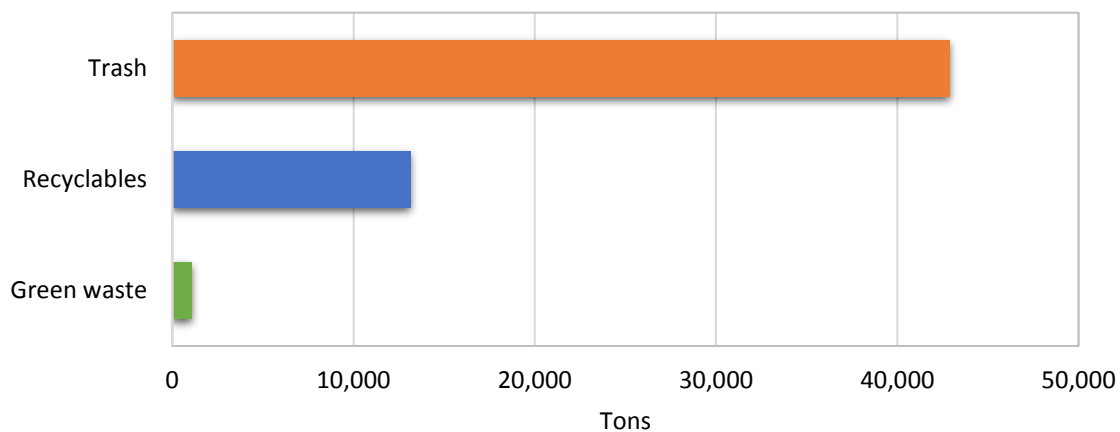


Figure WM-3: Commercial waste breakdown, 2015

Rate structures provide incentives for waste reduction and recycling, and Waste Management provides free waste audits on request. Commercial waste is disposed of at Simi Valley landfill and recyclables are processed at Harrison's Gold Coast Materials Recovery Facility in Ventura.

2.3 Special Programs and Collection

Solid Waste funds are used to support the Freeway Ramp Litter Removal Program which removes litter along fourteen Thousand Oaks freeway on/off ramps and the 101/23 Freeway Interchange, through a contract with Adopt-A-Highway Litter Removal Service. Community members can participate in community beautification, clean up and solid waste-related service projects through the Community Enhancement Grant Program, which was established in 1998 and provides up to \$45,000 per year to non-profit groups for project implementation.

The City's Neighborhood Clean Up program allows residents to coordinate annual clean-up events in their neighborhoods, allowing residents to clean out their garages, yards, and homes at no charge. The City also offers residents two free landfill days in which they can self-haul refuse, green waste, concrete/asphalt, appliances, and tires to the Simi Landfill, free of charge (Figure WM-4). A centrally located community recycling dumpster behind the DIY Center on Thousand Oaks Blvd is available for residents to place larger quantities of mixed recyclables that would otherwise exceed their curbside capacity.

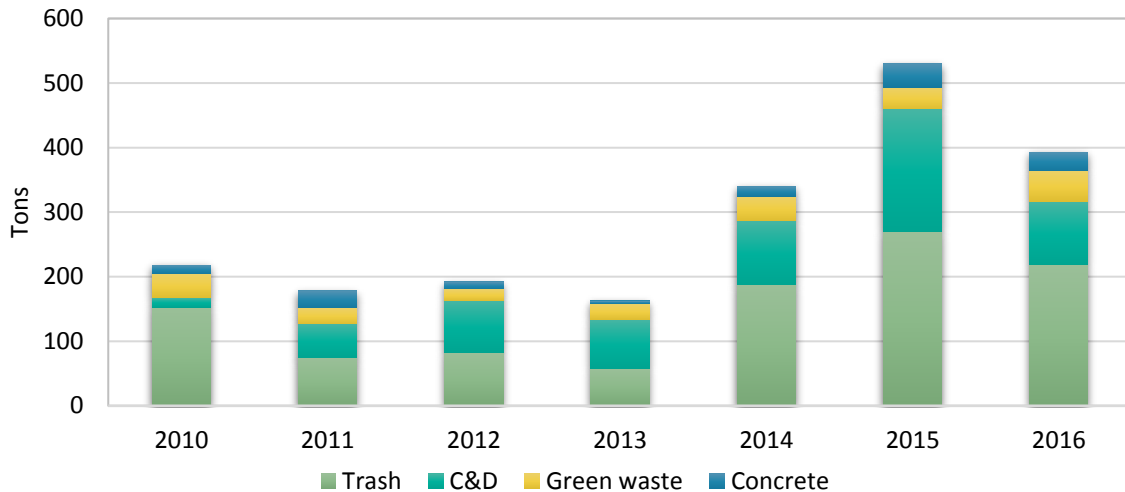


Figure WM-4: Free annual landfill day collection tonnage

Each year CalRecycle offers its Beverage Container Recycling City/County Payment Program. Commonly referred to as the CRV Grant Program, this assists cities and counties in implementing projects that will meet the State’s goal of recycling 80% of qualifying beverage containers. The City has typically used CRV grant funds to purchase collection bins, conduct education and outreach, and clean up litter.

The City partners with the Conejo Valley Unified School District (CVUSD) and has provided public schools with equipment for collecting and redeeming CRV recyclable bottles and cans generated on campus. WM provides recycling service free of charge to CVUSD campuses. Four beverage container recycling centers, privately owned and operated by RePlanet, LLC, are in operation within the City and offer CRV in cash to customers who return aluminum cans, glass and plastic bottles to these sites.

Local thrift stores are promoted on the City's website, e-newsletter, and the TOTV Cable Channel, and neighborhood cleanup participants are encouraged to donate reusable items to thrift stores and charitable organizations. Residents and businesses are encouraged to donate new and used building materials, including appliances, hardware, doors, windows, and yard items to Habitat for Humanity ReStore which uses proceeds from the sale of donated materials to assist in their home construction and restoration projects.

To increase diversion of construction and demolition waste materials entering landfills the City enforces CalGreen’s building codes which require that contractors and City residents engaged in demolition and/or construction projects must divert at least 65% of all non-hazardous construction materials from landfills either through recycling or reuse.⁷ Excavated soil and other land clearing debris such as trees, stumps and rocks must also be reused or recycled.⁸ Waste Management’s processing facility at Simi Valley Landfill consistently reports over 80% diversion rates for construction and demolition waste primarily by converting debris into alternative daily cover for the landfill, soil amendment, recycling, and mulch.

⁷ Building Code Part II of Title 24 California Code of Regulations

⁸ CalGreen Building Code Sec. 5.408.4

2.4 Household Hazardous Waste

Household Hazardous Waste (HHW) refers to waste resulting from products purchased by the public for household use which, due to its quantity, concentration, physical, chemical, or infectious characteristics, may pose a substantial known or potential hazard to human health or the environment when improperly treated, disposed of, or otherwise managed. Household hazardous waste also includes materials that in combination with other solid waste, may be infectious, explosive, poisonous, caustic, toxic, or exhibit any of the characteristics of ignitability, corrosiveness, reactivity, or toxicity.

For approximately 20 years the City hosted monthly collection events to collect HHW materials from the public and small businesses. In response to resident demands for additional service, in 2014 the City opened a permanent HHW Facility as part of the Municipal Service Center expansion. Between 2010 and 2016, residents disposed of 1,415 tons of HHW (Figure WM-5). The volume of hazardous material handled by the City has been reduced by the City's participation in the statewide paint collection program, Paintcare, since mid-2013. Small businesses that produce up to 27 gallons or 220 pounds of hazardous waste per month are also permitted to use the City's HHW facility, contributing 74 tons of HHW over the same time period. A Material Reuse Store housed at the HHW facility offers unused items such as cleaners, paints, and pool supplies free to residents.

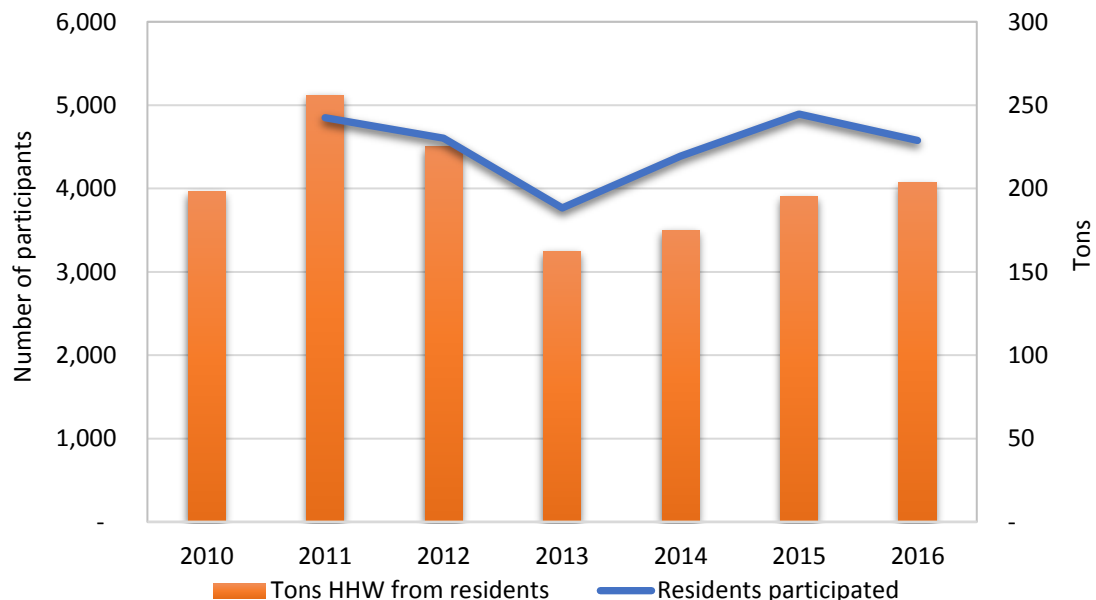


Figure WM-5: HHW participation and tonnage

The building is certified by a professional oversight body and used as a teaching facility by UCLA as part of their Solid Waste Management and Sustainability curriculum. The facility is operated through a contract with Clean Harbors and is open Fridays and Saturdays; advance appointments are required to ensure adequate staffing and eligibility. The County contracts with the City for use by residents of unincorporated areas.



Figure WM-6: City of Thousand Oaks HHW Facility

The City's household battery collection program prevents environmental and health exposure to toxic materials, reduces landfill contamination, and allows potentially valuable metal to be recycled. Batteries contain heavy metals such as mercury, lead, cadmium, and nickel. Battery collection is available at thirteen public locations across the City including City Hall, Thousand Oaks and Newbury Park Libraries, Borchard and Dos Vientos Community Centers, Adult Center, Thousand Oaks Transportation Center, Teen Center, and Home Depot. 33,400 pounds of batteries were collected in 2016.⁹ The City also provides for the collection of electronic waste, fluorescent tubes and paint at locations throughout the City. Through CalRecycle's used motor oil and filters collection program, residents can bring used oil and filters to the HHW facility, or dispose of them at twenty-three drop-off collection locations throughout the City. Residents can also receive free oil kits to assist in collecting and transporting these materials safely.

Improperly disposed pharmaceuticals (human and animal medicines and vitamins) contaminate landfills, soil, and water. This contamination has a serious impact on human and ecological health. Since Spring 2010, the City has maintained a pharmaceutical collection bin at the East Valley Sheriff's Station for residents to drop off unwanted or expired medications and vitamins. For residents unable to leave home, postage paid mail-in envelopes are provided.



The City's "sharps" (needles) collection program provides free rigid containers to residents for the safe collection and disposal of needles at City Hall, the Conejo Valley Family Medical Center and Los Robles Hospital.

⁹ Figures provided by Waste Management and Harrison Industries

2.5 Municipal Operations

The City follows standards which requires state agencies to buy recycled content product for at least 50% of the reportable purchases for a specific list of products, including copy paper¹⁰. Approximately 75% of the paper purchased and used by the City's print shop meets the 30% minimum recycled content requirements. Recycled content purchases are also made for tissue and toilet paper. Between 2010 and 2016 the City purchased 4,880 cases of recycled paper, and 1,615 cases of recycled envelopes.

To save paper, all network printers are set to default to double-sided print settings. Additionally, some administrative processes have transitioned to digital formats, including employee timesheets, some documents such as contracts, invoices, and City proceedings, and paperless water and wastewater utility billing is available by our Finance department. The City uses a paperless payroll check processing system reducing paper use by over 10,000 sheets per year.

In 2009, the City adopted a policy to eliminate single-use plastic water bottle purchase using public funds¹¹. The Sustainability Division promotes this practice through distribution of reusable water bottles to the public and employees.

The City has placed containers for recyclables in employee break rooms, exterior areas of the Civic Arts Plaza, City libraries, and various other locations throughout City-owned facilities. Recycling containers are also utilized in each employee's office/cubicle and in communal areas throughout operations' areas. All print toner cartridges are recycled and batteries are reclaimed.

The City was ranked 20th among the top 100 "greenest" government agency fleets in North America in 2015, based on the exclusive use of re-refined oil and antifreeze, recap tires, and alternative fueled vehicles (Figure WM-7). In 2016, the Fleet Division purchased 1,033 gallons of re-refined oil, 228 gallons of antifreeze, and 92 recapped tires for use in the City's vehicles. All used oil filters are recycled, and all-wheel-balancing weights have been replaced with lead-free alternatives.

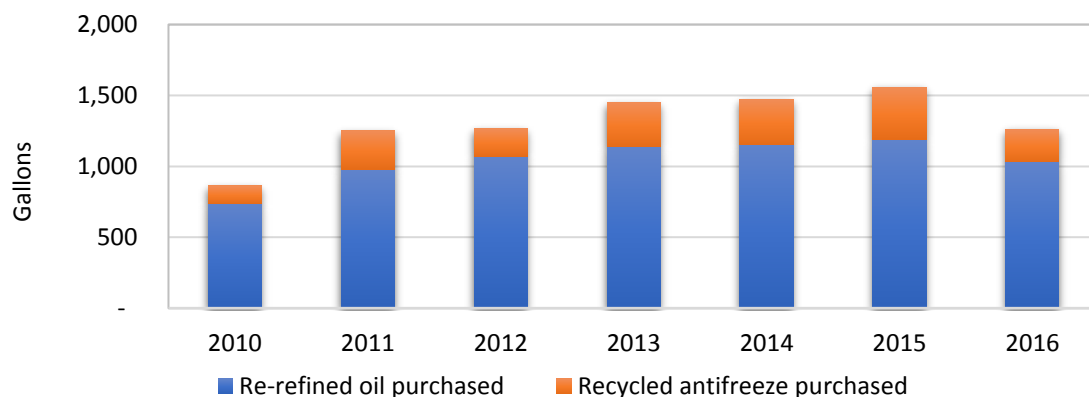


Figure WM-7: Fleet division purchases

¹⁰ State of California Public Contract Code 12200

¹¹ City of Thousand Oaks E-Manual 22.14.006

The City's Street Maintenance Division removes and replaces asphalt and concrete, recycling all material and utilizing recycled material as road base. In 2016, the City recycled 766 tons of asphalt and 670 cubic yards (approximately 1,105 tons) of concrete material. Furthermore, close to 1,000 tons of Class II recycled road base were used for paving projects within the City. Since 1991, the City has utilized rubberized asphalt for paving projects and was one of the first in the nation to pioneer this practice, which utilizes ground-up tires and results in roads that are more durable and require fewer repairs. In 2016, approximately 11,199 tons of rubberized asphalt were purchased and utilized.

MSC maintains bins to collect and haul scrap metal to the recycler on an as-needed basis. Recycled items include water meters, old street signs, and roadside debris such as bed frames, basketball hoops, and unclaimed newspaper stands. Between 2010 and 2016, these bins collected over thirty-two tons of scrap metal.

2.6 Recycling Rates

In 2008, California shifted from a recycling weight metric to a per capita disposal metric to gauge performance and compliance with State mandates. Under the new metric, all waste generated from anywhere within the City and disposed of at a CalRecycle-permitted landfill or transformation facility or exported from the state is reported. This waste tonnage is then divided by the City's population to yield a per capita disposal rate, which is compared to the 50% diversion target, established from total waste generation data between 2003 and 2006. Using this methodology, the actual tonnage of recycled material is no longer utilized in computing waste diversion rates. The disposal rate target for the City has been established at 7.5 lbs./person; at a current value of 4.6 lbs./person, the City's diversion rate is 70%.

CalRecycle makes statewide data available. Diversion rates in the county all surpass the mandated 50% minimum (Figure WM-8), but none have yet met the 75% diversion 2020 goal, although Camarillo is close at 73%.

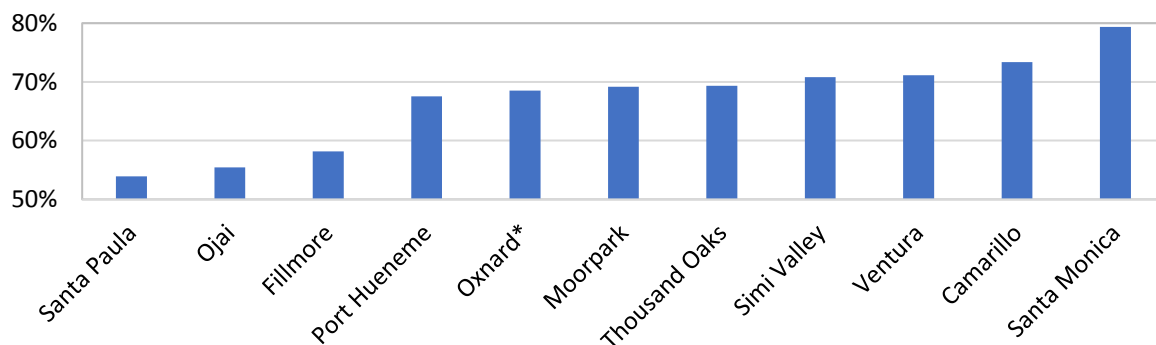


Figure WM-8: Diversion rates across cities (2016)¹². *Oxnard data is 2015.

The collection and processing of waste materials requires a substantial investment of resources, and the management of these materials has real economic and environmental impacts. Thus, it is critical that the City continue to implement and offer effective and efficient solid waste, recycling, organic waste, and household hazardous waste programs to its residents and businesses.

¹² Santa Monica, widely regarded as one of the greenest cities in the State, is included here for comparison purposes.

3. Related policies and regulations

a. AB 939: Integrated Waste Management Act, 1989

Provided direction for City solid waste program and policy.

b. AB 341: Solid Waste Diversion, 2011

Multifamily communities with five or more units must provide recycling carts/dumpsters for their residents. Businesses generating 4 cubic yards or more of solid waste per week must arrange for recycling services. 75% of solid waste source-reduced, recycled or composted by 2020 (State goal).

c. AB 513: Rubberized Asphalt Concrete Market Development Act, 2013

The City had utilized rubberized asphalt to maintain its roads for 22 years prior to this.

d. AB 1826: Mandatory Commercial Organics Recycling Compliance, 2014

Requires the City to implement an organic waste recycling program for businesses by January 1, 2016. Requires businesses to arrange for recycling service for organic waste according to the following schedule:

1. April 1, 2016 – businesses generating 8 cu yd. or more of organic waste per week
2. January 1, 2017 – 4 cubic yard or more of organic waste
3. January 1, 2019 – 4 cubic yard or more of any kind of solid waste (aligns with AB 341 thresholds thereafter)

e. SB 1383: Short-lived climate pollutants, 2016

The State is finalizing a comprehensive short-lived climate pollutant strategy to achieve a reduction in statewide emissions of methane by 40 percent, hydrofluorocarbon gases by 40 percent, and anthropogenic black carbon by 50 percent below 2013 levels by 2030. To achieve these emission reductions, disposal of organics in landfills must be reduced by 50 percent of 2014 levels by 2020 and 75 percent by 2025. Of the edible food in the organic waste stream, not less than 20 percent is to be recovered to feed people in need by 2025.

f. CalGreen Building Code Sec. 5.408.4: Construction & Demolition Ordinance

Requires diversion of at least 65% of project-generated waste from qualifying projects and 100% of land clearing debris such as trees, stumps, and rocks.



4. Strategies

A. Process improvement

Utilize technology to improve efficiency in data collection and reporting. Use analytics to inform program improvements.

Local government is responsible for implementation of the State's waste and recycling laws. The regulatory environment surrounding waste places significant burdens on reporting. In addition, the City's agreements with five to ten franchised and temporary haulers leads to an abundance of paperwork associated with quarterly reporting and invoicing. These processes are currently handled manually. Implementation of an electronic waste reporting system is essential to allow the City to replace complex spreadsheets and paper forms with web-based streamlined reporting, standardize data collection, increase analytics and reporting capabilities, and manage recycling compliance and grant fund administration.

Another potential benefit of a waste database and tracking system is its ability to inform rate re-structuring. The current solid waste rate structure was developed many years ago in the nascence of recycling and before organics collection. Although a recycling rate is incorporated as part of the solid waste rates it is tied simply to landfill costs and is not connected to the actual costs of recycling. Historically this has served its purpose, but significant changes in the recycling industry over the past year have caused drastic changes in the market for, and processing of, recyclables and led to increased local costs at materials recovery facilities. These changes, and the new mandate for commercial organics recycling (under AB 1826), require that the City examine the solid waste rate structure and assess alternative fee structures that are tied more directly to the real costs of these services.

A.1. Procure and implement a waste data collection and reporting system.

- With the current process, every quarter, each hauler submits paper records to the Sustainability Division containing weights hauled in a dozen or so different categories, landfilled tonnage, accounts served, revenue received, and calculated franchise fees based on service agreements in place. These data are entered manually into spreadsheets by staff, and fee calculations and invoices reconciled. Receipts are forwarded to Accounts Receivable and recorded in the City's financial system. This process would benefit from conversion to an electronic automated process.
- CalRecycle's annual waste and recycling reporting requirement also entails significant manual data entry. It requires additional waste and recycle data reporting from the City's nine haulers and other sources including e-waste, hazardous waste, fats, oils and greases quantities, used oil, sludge volume from wastewater processing, construction and demolition debris, and Public Works operations' waste material. Data sources include the quarterly hauler reports, spreadsheets, emails and paper documents. Currently there is no common

database or information system into which data are electronically recorded, processed or analyzed.

- The waste information system should incorporate hauler data on tonnage of residential and commercial materials collected, special collection, Neighborhood Cleanups, and batteries; costs, fees and invoice data; e-waste collected by Designated Approved Collectors; HHW material collected at the HHW Facility (including Material Reuse Program); used oil at Certified Collection Centers; data from HCTP on FOG, sludge, and food waste tonnage; City operations waste material; Beneficial reuse volume/tonnage; Coastal Cleanup waste breakdown; waste receptacles at City facilities.

A.2. Utilize various digital technologies to assist with automating administration of:

- Community Enhancement Grant applications and awards.
- Insurance documentation and encroachment permits.
- Service level agreement management (complaints/compliments).
- Permitted commercial recyclers.
- Non-franchise haulers.
- Compost bin ordering.
- Neighborhood cleanup application.
- Construction and Demolition recycling plan approval.
- Carts out and unauthorized hauler complaints.

A.3. Renegotiate waste hauler contracts to include technologies and innovations that include:

- Trucks that support weighing and reporting of bin weight and collections in real time.
- Franchise fees to finance implementation of waste tracking, data collection and reporting, and new technology.
- Significant increase in public education and outreach conducted by the hauler.
- Develop facility assessment tool (waste auditing, infrastructure inventory, collection process analysis, hauler review, etc.).

B. Waste reduction

Support and provide programs that increase efficiency, reduce waste volume, increase recycling and promote materials reuse.

B.1. Develop policies to:

- Restrict landfilling of specific commodities (e.g. CRV materials, cardboard).
- Restrict commercial and government sectors from purchasing expanded polystyrene materials.

B.2. Support manufacturer packaging legislation that requires reduction in packaging materials and incorporating recycled content materials in packaging.

B.3. Reduce waste from City employees:

- Utilize “mini bins” for trash for all employee offices and cubicles.
- Standardize waste containers (locations, sizes, colors, and signage) with organics collection addition in all break rooms.
- Purchase reusable kitchenware.
- Install dishwashing capabilities.
- Provide staff training.
- Partner with local food donation programs to donate food from City events.
- Purchase products with recyclable-packaging.
- Place recycling boxes in all employee offices and cubicles.
- Increase recycled content of paper used by City.
- Expand electronic processes and move more paper processes online.
- Require meeting agenda and attachments be sent electronically. Outfit each conference room with electronic access and utilize central document repository (e.g. Dropbox, Google Drive, OneDrive) for meetings.

B.4. Conduct outreach and education to AB 1826 non-compliant businesses and multi-family complexes.

B.5. Conduct outreach and education to AB 341 non-compliant businesses and multi-family complexes.

B.6. Develop plan for organics collection at all City shopping centers.

B.7. Mandate recycling for non-curbside recyclables such as mattresses, carpet, and textiles.

B.8. Expand new franchise agreement to include organics.

B.9. Develop zero-waste strategic plan.

B.10. Develop plan for residential organics (food and green) waste collection and processing in accordance with SB 1383.

B.11. Develop plan to divert edible food waste from landfill and feed people in need in coordination with the haulers, non-profits and other jurisdictions.

C. Hazardous waste

Ensure environmentally responsible disposal of hazardous waste and encourage use of less toxic alternatives.

C.1. Automate HHW registration process to ensure ease of access for registrants, up front address validation, and to reduce staff resources required to process and analyze data.

C.2. Introduce Extended Product Responsibility ordinance for HHW, pharmaceuticals and/or items that are difficult to recycle (expanded polystyrene, film plastics, toys).

Transportation

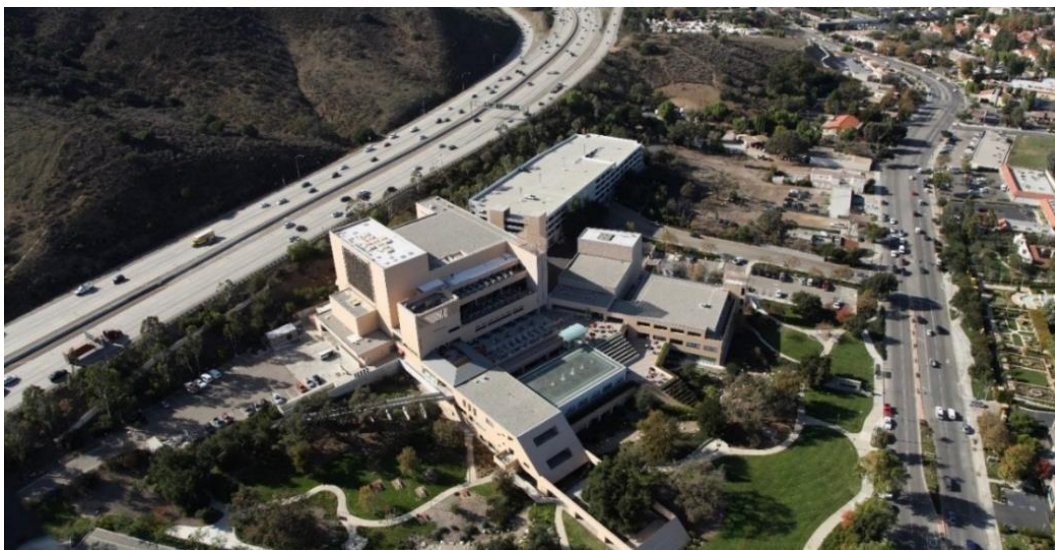


1. Overview

Transportation accounts for approximately 40% of California's greenhouse gas emissions and is thus the focus of much attention at the State level in the development of strategies to meet AB and SB 32 mandates¹. Meeting emission goals is broadly seen as generating a massive shift towards the electrification of transportation in the State. Reducing today's petroleum use in cars and trucks by 50 percent by 2030 is one of the State's five key climate strategy pillars. To that end, the California Air Resources Board's Scoping Plan has a strong emphasis on clean transit including 100 percent of new bus sales using zero-emission technology by 2030. The 2017 Scoping Plan also calls for 1.5 million zero emission vehicles (ZEVs), including plug-in hybrid electric, battery-electric, and hydrogen fuel cell vehicles to be on the road by 2025 and 4.2 million ZEVs by 2030. (There are currently 300,000 such vehicles in use.) The State plans to meet these targets through a number of programs and regulations including minimum sales targets for manufacturers (15% by 2025), the low carbon fuel standard, and cash incentives for purchasers of new EVs. The City should prepare for this shift through planning for appropriate infrastructure within the City and at municipal facilities, and when procuring and maintaining its own fleet.

Transportation Goals

- A. **Transit:** Increase ridership.
- B. **Vehicles:** Increase number of low- and no- emission fleet vehicles.
- C. **Transportation services:** Implement the most cost-effective and efficient solutions to meeting the City's transportation needs.



¹ Reduce GHG emissions to 1990 levels by 2020, and 40% below by 2030.

The City of Thousand Oaks owns and operates both fleet and transit vehicles. Heavy- and light-duty compressed natural gas (CNG)- powered buses are utilized by the City's transit program to provide fixed route bus and reservation-based/on-demand Dial-A-Ride services. A variety of special purpose vehicles are employed by Public Works to maintain streets, landscaping, stormwater and water conveyance systems, and fleet vehicles are used by City staff as required to perform their duties and by staff carpooling to work.

2. Status

2.1. Fleet

The City owns a variety of vehicles, such as special purpose and utility vehicles, light-, medium- and heavy- duty trucks, cargo vans, sedans, SUVs, and passenger vans. In all, the City's rolling stock comprises 225 vehicles broken down as follows (Figure TR-1).

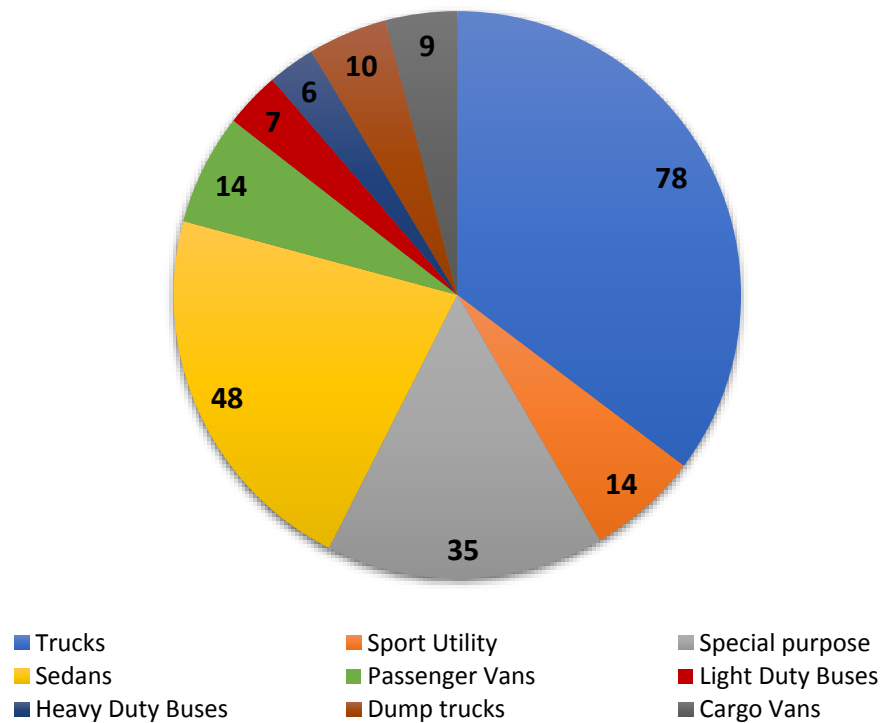


Figure TR-1: City fleet composition by vehicle type (as of July 2017). (Chart shows number of each type of vehicle.)²

² Data provided by Fleet Manager

Wherever possible the City employs alternative fuels in its fleet of vehicles. It was the first city in Ventura County to purchase CNG passenger vehicles and buses, and the first to operate a public/private CNG fueling station. City Council set a goal in 2009 to convert 2/3 (or 67%) of its fleet to alternative/renewable fuel by 2017. As of July 2017, the City has 146 vehicles, or 65% of its fleet running on alternative fuels. Diesel vehicles are included in these counts because the City uses renewable diesel to fuel its diesel vehicles. Although diesel is not commonly a “clean” fuel, renewable diesel (also known as advanced biofuel) is used at 100% concentration to power many of the City’s heavy-duty vehicles and has less than a third of the GHG emissions of its low sulfur equivalent. The City selected CNG as an alternative fuel due to availability, fuel characteristics, and original equipment manufacturer availability, which signifies that vehicles ready to operate on CNG are available from the manufacturer without a retrofit. CNG-powered vehicles produce significantly lower GHG emissions than diesel (traditional or low-sulfur) and gasoline powered vehicles.³ Compared to other local cities, Thousand Oaks has a much higher proportion of its fleet powered with alternative fuels.

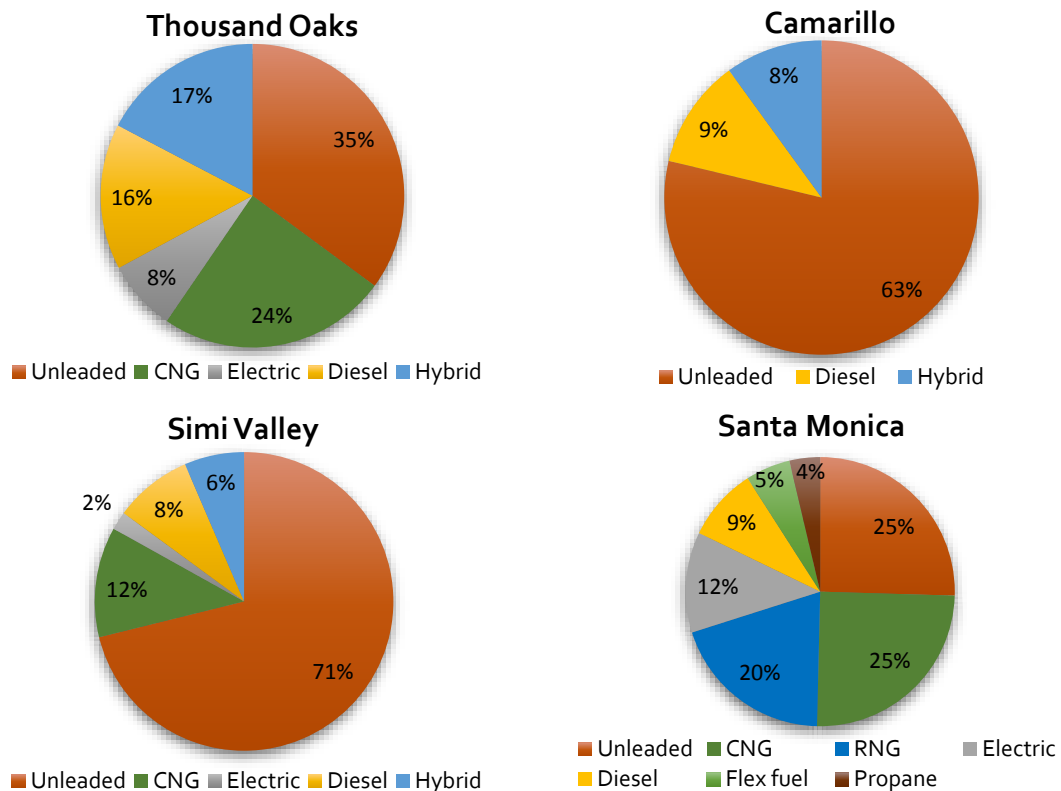


Figure TR-2: Comparison of cities’ fleet compositions by fuel type⁴ – July, 2017.

The composition of fuel types varies within each vehicle category. All buses and 84% of passenger vans are powered by CNG; 71% of sedans are hybrid vehicles. For special purpose vehicles and dump trucks, the primary source of fuel is diesel, whereas trucks, SUVs, and

³ Link: [US Department of Energy - Natural Gas Benefits](#)

⁴ Santa Monica, widely regarded as one of the greenest cities in the State, is included here for comparison purposes.

cargo vans are primarily gasoline powered. The City has been transitioning towards inclusion of more hybrid-electric vehicles and will continue to do so moving forward.

Omitting transit operations, the City's fleet vehicles have been driven an average of 890,000 miles a year over the past five years at an annual cost of approximately \$210,000.

2.2. Carpool Program

To reduce the number of people who drive alone to work, the City offers a carpooling/vanpooling program for its employees. As of July 2017, the City has 22 cars designated for this purpose, 16 of which are CNG-powered, 4 are hybrid, and 2 are gasoline powered. To be eligible for use of a City vehicle a carpool or vanpool must have at least two people in a passenger car or four people in a van participating at least three times a week. Commuting distance is to be no more than 70 miles roundtrip. Carpool/vanpool ridership is evaluated by the Fleet Services Supervisor to ensure maximum efficiency. There are currently eighty-nine staff participating, and contributing towards fuel and maintenance costs.



The current participation rates established for carpools to the following cities are:

Location	Round-trip miles	Cost per pay period per rider
Fillmore	58	\$18.56
Santa Paula	64	\$20.48
Ventura	52	\$16.64
Northridge	48	\$15.68
Granada Hills	60	\$19.20
Port Hueneme	43	\$13.76
Oxnard	42	\$13.44
Simi Valley	38	\$12.16
Moorpark	30	\$9.60
Camarillo	26	\$8.32

Table TR-1: City employee carpool program costs⁵

2.3. Transit

2.3.1. Transit bus service

The City serves the community with public transport through regular bus service on five fixed routes via Thousand Oaks Transit (TOT). Connecting services beyond City limits are facilitated through the East County Transit Alliance. These bus routes serve Thousand Oaks, Westlake Village and the unincorporated areas lying within the City's geographical boundaries. The five fixed routes ("Green", "Purple", "Gold", "Red" and "Blue") interconnect at the City's

⁵ Employee E-manual

Transportation Center and The Oaks Shopping Mall. The City also operates a Metrolink shuttle, which transports passengers to and from the Moorpark Metrolink Station in coordination with commuter trains traveling into Los Angeles. Fixed route bus services operate from around 5:00 a.m. until 8:00 p.m. on weekdays, and begin three hours later on Saturdays. Routes average 60 – 75 minutes and are each served by a single vehicle. Ridership is low, despite an increase in vehicle service miles (VSM), averaging between 155,000 and 163,000 passengers a year over the past three years, and results in value of 0.53 passengers per VSM (2014/15 data), a public transport metric used by the Federal Transit Administration (FTA).

Another defining metric in transit performance and consumption used by the FTA is the number of Unlinked Passenger Trips (UPT) per Vehicle Revenue Hour (VRH), which represents the total count of each individual vehicle boardings per hour that vehicles travel while in service. In 2014, the City of Thousand Oaks had 8.5 UPT per VRH (Figure TR-4). Within Ventura County, the city with the highest ridership is Oxnard, with 19.4 UPT per VRH.

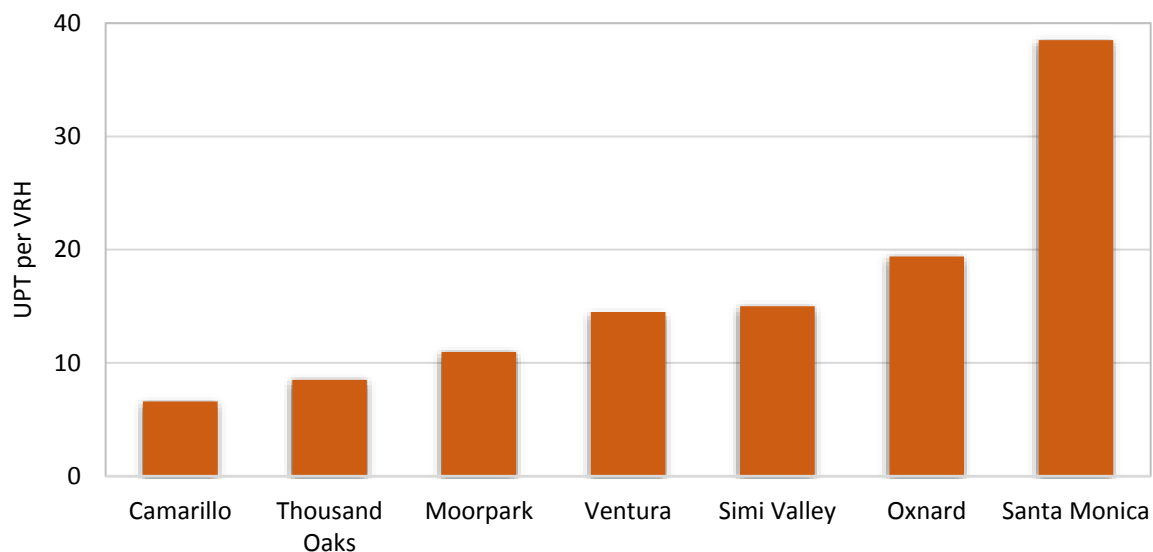


Figure TR-4: Unlinked bus trips per vehicle revenue hour⁶

Ridership and productivity are impacted by numerous factors, including the number of routes and service frequency offered, as well as many beyond TOT's control, such as local demographics and private vehicle ownership.

Survey data gathered for the draft Transit Master Plan provide a picture of the archetypal TOT user. For fixed route buses, the passenger tends to be between 25 and 34 years old, travelling to work, riding the bus 5+ times a week and earning less than \$10,000 a year. Most riders use the bus because they don't have access to a personal vehicle. These riders have indicated that the primary motivator for using buses more often would be more frequent service. The study also surveyed non-riders. The primary reason that respondents choose not

⁶ Santa Monica, widely regarded as one of the greenest cities in the State, is included here for comparison purposes.

to use public transit is that they prefer to drive their own vehicle, which is the primary transportation mode for 84% of them. As such, City residents take less than one transit trip each per year on average (0.77 trips/capita). Lower cost would not be a motivating factor in increasing ridership; though a quarter of those surveyed indicated that more frequent service could be a motivating factor.

Thus, TOT fixed route bus services do not serve the typical City resident but rather transport low income individuals to and from work in the area. Although the average resident does not ride the bus, 86% of those surveyed believe that public transit is valuable to the community. At an average operating cost of \$8.25/passenger trip, there begs the question of whether users could have their transportation needs met at a lower cost. However, constraints on the use of funds from the funding agencies are a significant obstacle to innovative solutions.

Ridership and productivity are impacted by numerous factors, including the number of routes and service frequency offered, as well as many beyond Transit's control, such as local demographics and private vehicle ownership.

The Metrolink shuttle provides bidirectional service from the City's Transportation Center to Moorpark Station via Lynn and Olsen Roads, and offers three morning and three afternoon trips. This is the least utilized route among those offered by TOT; only 5% of bus riders surveyed indicated that they used this service. At a daily operating cost of \$837 and revenue less than a tenth of that of other routes, it costs upwards of \$14.33/passenger⁷ to operate.



In the City's draft Transit Master Plan⁸, the TOT was compared with transit at half a dozen peer cities across the country and found to have low performance as measured by ridership. However, according to the 2014 data presented, the City spends only a fraction of what its peers do (30% of the average) on transit operations, and although low ridership leads to relatively low fare revenue (40% of peers), its operating costs per vehicle-service-hour are

⁷ Data provided by Mike Hauser

⁸ Link: [Thousand Oaks Transit Master Plan](#)

well below the peer average. Regular bus fares for TOT run \$1.50 with half-price for seniors, and free to seniors with Americans with Disabilities Act cards and City Dial-a-Ride Cards. The combination of these factors leads to a farebox recovery ratio (the proportion of operating costs recouped from fares) of 18.2%, second highest amongst peers in the study.

2.3.2. *Dial-A-Ride service*

Fixed route services in the City account for 65% of total ridership; the remaining 35% is accounted for by Dial-A-Ride (DAR), a door-to-door service which can be reserved in advance or on-demand for disabled passengers and those 65 years or older. The local Dial-A-Ride service also connects with the cities of Simi Valley and Moorpark and with the County of Ventura to provide connected service through the East County Transit Alliance. Dial-A-Ride offers subscription reservations for regular recurring trips, advanced reservations up to two weeks in advance, same day reservations made at least two hours in advance, and up to two on demand requests per day for a small additional charge within limited hours. Regular DAR service operates the same hours as fixed bus route service.



Ridership on DAR totaled 86,214 in fiscal year 2014/15, similar to the prior three years, with vehicle service miles of 604,073, up almost 10% from the prior 3-year average of 553,553 miles, and vehicle service hours remaining relatively constant at 36,808. This results in performance metrics of passengers/VSM and passengers/VSH of 0.14 and 2.34 respectively. In the draft Transit Master Plan, the Thousand Oaks DAR service was found to perform relatively well compared to that offered by six peer cities. TOT's DAR ridership is about 20% higher than the peer average and its operating cost per hour is close to the lowest. Farebox recovery for DAR was the best in the peer group at 11.8%.

Surveys of DAR riders show that the typical rider is over 65 and retired, does not drive and uses DAR primarily to access healthcare within the City.

Dial-A-Ride has relatively high costs. In fact, unlike peer cities, Thousand Oaks spends more on operating its DAR service than its fixed route bus service (\$2M vs \$1.4M). Even though total costs for the program are high, the program is efficient, having the lowest operating cost per passenger trip amongst its peers at \$23.07. Local demographics are an important driver of the City's decision to prioritize DAR services.

Surveys of DAR riders show that the typical rider is over 65 and retired, does not drive and uses DAR primarily to access healthcare within the city. Most reserve their trip a day or two before and use the service less than once a week. About half of the passengers have a mobility impairment. In surveying users regarding improvements, the most popular response was for a shorter response time for on-demand service. The cost of a fare is an important factor for DAR passengers in determining their decision to ride. DAR fares are \$3.00 per trip.

2.3.3. Transit vehicles

City transit owns and operates a variety of vehicles. Nine of these are designated as TOT vehicles and six as DAR. TOT vehicles comprise four 35-ft Orion CNG buses, purchased in 2008, with a seated capacity of 34 and two 29-ft Gillig CNG buses, purchased in 2014 each with a seated capacity of 28. These heavy-duty buses experienced a 46 percent increase in miles driven and fuel consumption from 2010 to 2016 (Figure TR-5). These changes are due to many operating changes - increased weekday hours of operation from 7 am – 7 pm to 5 am – 8 pm in 2012, the addition of Saturday service and Metrolink service in 2013, the addition of Summer Beach Bus in 2014, and the addition of a second bus on the Green route in 2015. In 2017 the Purple route was added. The dip in bus miles between 2010 and 2011 was due to bus route re-organization which decreased service by approximately 7%. TOT also owns and operates three light-duty CNG-powered cutaway buses, an electric sedan, and a hybrid SUV. An additional four light-duty, CNG-powered cutaway buses make up the City's DAR fleet.

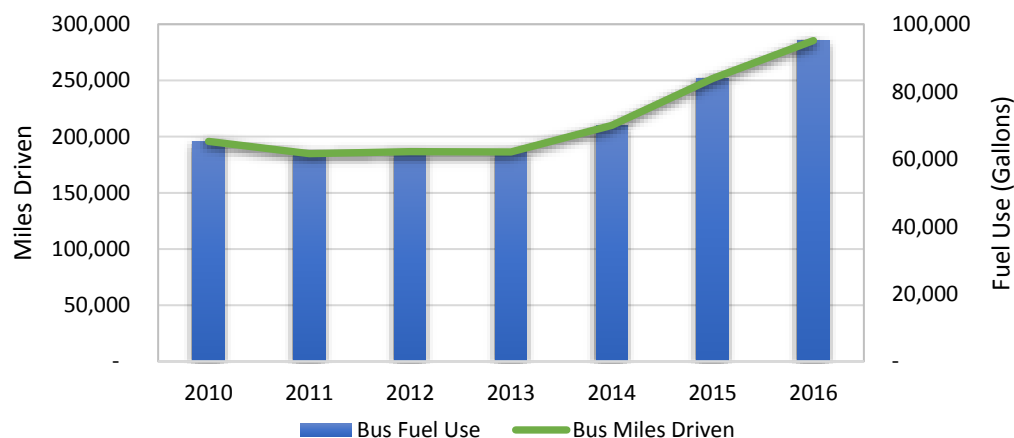


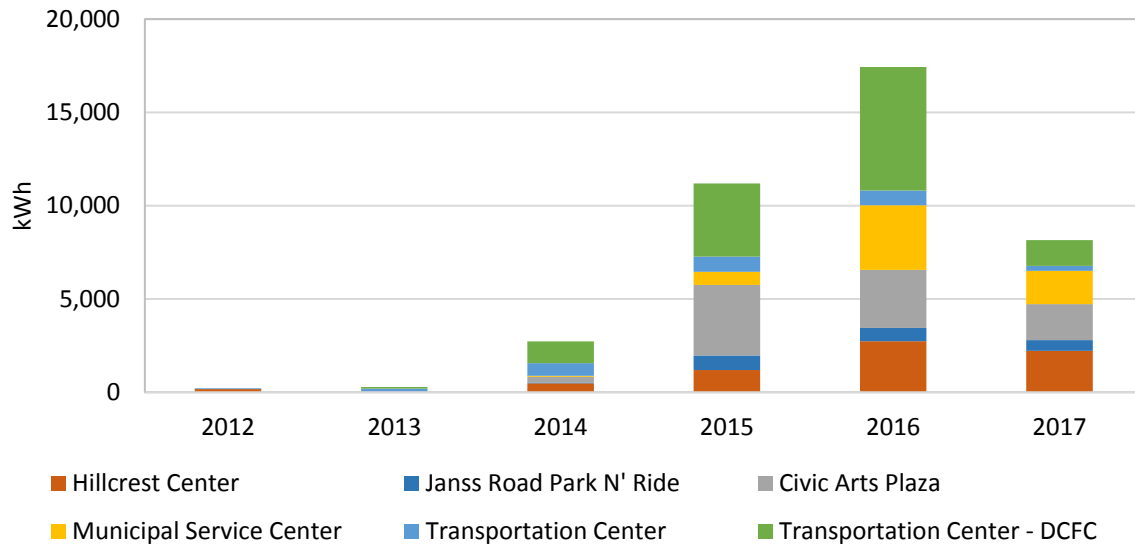
Figure TR-5: Miles driven and fuel use estimates by City-owned heavy-duty buses between 2010 and 2016 (calendar years)

The fleet replacement strategy is based on federal guidelines for funding. To be eligible for replacement funding, heavy-duty buses must be in operation for 12 years or reach 500,000 miles, depending on which occurs first. The smaller vehicles used to operate the DAR service must be in service at least four years or reach 100,000 miles to be eligible. By this measure, the majority of city transit vehicles are due to be replaced in the next two years. This provides

the City with an opportunity to consider alternative fuel vehicles, such as electric buses. It additionally allows for consideration on whether different sized vehicles or a new type of service might better meet the City's goals.

2.4. EV Charging Infrastructure

The City has a total of twelve level 2 chargers and one fast charger. They are third-party owned (Blink®) and installed at six of its municipal sites. In 2016, these chargers, available to both City staff and the public, used a total of 17,430 kWh of electricity. (To put this in



perspective, this would charge 500 – 600 typical EV batteries fully.) Charging fees are \$0.40 - \$0.59 /kWh for level 2 and \$0.69 /kWh for fast charging. The low utilization of these chargers is likely a result of a number of factors including relatively low adoption of electric vehicles in the community⁹, high charging fee¹⁰, and location¹¹.

Figure TR-6: EV charger usage at each site, 2012 – 2017

Given the State's priority on electrification of the transportation system and associated incentives, the City should prepare for a larger market penetration of plug-in electric vehicles by preparing a plan for improving its EV charger network.

2.5. Bicycling

The City encourages active transportation through its investment in bicycling infrastructure. The City provides 76 miles of bikeways, of which 2 miles are bike paths, 54 miles are bike lanes, and 20 miles are formal or informal bike routes. The City hosts a Bicycle Advisory Team

⁹ This assumption is backed up by some independent market research that shows a large difference between expected and actual electric car shares in Thousand Oaks.

¹⁰ The average price of home electricity is \$0.17 per kWh, approximately a third of the charging fee rate

¹¹ The City evaluated all municipal sites for deploying chargers; a combination of public access and infrastructure needed to connect a charger to the grid made some sites undesirable. The current charging stations are not convenient enough to activity centers.

(B.A.T.) which meets quarterly to help prioritize projects and support staff with bike education activities for children. In 2010, the City adopted a Bicycle Facilities Master Plan, which lays out a 20-year plan for linking Thousand Oaks neighborhoods to key destinations such as schools, parks, transit connections, and employment/shopping centers. In 2016 the City was awarded the Bronze level for a Bicycle Friendly Community by the League of American Bicyclists.

3. Related policies and regulations

a. SB 375: The Sustainable Communities and Climate Protection Act of 2008¹²

Each of California's MPOs must prepare a "sustainable communities strategy" as an integral part of its regional transportation plan. The SCS contains land use, housing, and transportation strategies that allows the region to meet its GHG emission reduction targets. Developers can get relief from certain environmental review requirements under the California Environmental Quality Act if their new residential and mixed-use projects are consistent with a region's SCS.

b. AB 32: California Global Warming Solutions Act of 2006¹³ and SB 32 (2016)

These laws require California to reduce its GHG emissions to 1990 levels by 2020 and to 40% below 1990 levels by 2030. These targets are to be accomplished through cost-effective technologies that improve energy efficiency, promote clean transportation, and mitigate risks associated with climate change. The Air Resource Board is responsible for preparing a Scoping Plan for achieving these goals.

c. California Charge Ahead California Initiative (Health and Safety Code 44258.4): Zero Emission Vehicle Initiative¹⁴

The California ARB's Charge Ahead California Initiative will work toward a goal introducing at least 1 million zero emission vehicles and near-zero emission vehicles in California by January 1, 2023. Possible programs consist of those concerning innovative financing, car sharing, charging infrastructure in multi-unit dwellings in disadvantaged communities, and public transit.

d. California Public Resources Code 25725-25726: Local Vehicle Fleet¹⁵

When awarding a vehicle procurement contract, each city, county, and special district may necessitate that 75% of the passenger cars and/or light-duty trucks acquired be energy-efficient vehicles. This includes hybrid electric vehicles and alternative fuel

¹² Sustainable Communities Act, SB 375, Chapter 728, Statutes of 2008

¹³ Link: [California Global Warming Solutions Act of 2006, AB 32](#)

¹⁴ Link: [US Department of Energy - Zero Emission Vehicle Initiative](#)

¹⁵ Link: [US Department of Energy - Fleet Vehicle Procurement Requirements](#)

vehicles that meet California's advanced technology partial zero emission vehicle (AT PZEV) standards.

4. Strategies

A. Transit

Increase ridership.

Several recommendations have been made to improve transit services including increasing service frequency, slight alterations to routes to improve directness, adding bidirectional service, increasing service between CLU and Thousand Oaks Blvd, developing a flex service to serve less-dense neighborhoods, and increasing marketing. These are incremental changes which may bring in some new passengers and increase ridership, but given survey results residents would need to be persuaded that public transit offers a better alternative to personal vehicle use to adopt public transit on a broad scale.

In evaluating strategies to most efficiently manage and deliver transportation services to the City it is useful to understand needs, costs and impacts. Alternatives to the conventional fixed route service and vehicles should be considered, although funding sources, which earmark funds to particular services and provide very little flexibility, limit options. The City's transit services are funded through three mechanisms – approximately 70% of funds come from Transportation Development Act (TDA) funding (¼ cent sales tax and sales tax on gasoline and diesel fuel revenue), 20% from federal funds and 10% from fares. These funding sources are earmarked specifically for public transit and cannot be used for other purposes. In the past, and for smaller cities, a portion of funds could be used for street maintenance if the City had no unmet transit needs, but this was eliminated with the passage of SB 716. Thus, any unused funds are currently reserved for future transit projects and it is possible that the City's allocation of future funding could be reduced if the City does not utilize them consistently.

- A.1.** Re-route fixed routes as recommended in draft Transit Master Plan.
- A.2.** Investigate feasibility of innovative alternatives such as on-demand services offered by a third party (e.g. Lyft, Uber) where possible.
- A.3.** Pilot new technologies as they become available – driverless/autonomous vehicles and vehicles that communicate with each other.
- A.4.** Investigate use of "Green commuter" ¹⁶ or similar services to provide electric commuter vans and utilize during the day for transit services.

¹⁶ Link: [LACI - Green Commuter](#)

B. Vehicles

Increase number of low- and no- emission fleet vehicles.

B.1. Establish a database of city-owned and leased vehicles.

- Database should contain key information in a standardized format (including year, make, model, type and fuel type) for easy access and sharing.
- Utilize database to record fuel usage, mileage and compute greenhouse gas emissions as part of the City's GHG inventory.

B.2. Develop a replacement policy for all city vehicles that includes prioritization of low- and no- emission alternatives wherever feasible.

- Electric vehicles and plug-in hybrids should be strongly considered in the selection of the City's vehicle and bus fleet. Such vehicles can also play an active role in energy storage, particularly under a smart energy control environment such as a microgrid.
- Register and sell LCFS credits to partially recoup costs of alternative fuel vehicles where feasible

B.3. Investigate alternative fuel vehicles for use in Public Works where engines do not have to be left idling while standing.

B.4. Analyze efficacy of transit vehicle replacement with electric buses.

B.5. Consider adding CNG fueling station to Transportation Center to avoid unnecessary fueling trips to MSC.

B.6. Evaluate cost-benefits of use of HCTP methane for vehicle fuel.

- Convert methane generated at HCTP to biogas for use in CNG vehicles.
- Install fueling station at HCTP or transport CNG to MSC via tanks/canisters.

C. Transportation services

Implement the most cost-effective and efficient solutions to meeting the City's transportation needs.

C.1. Develop plan for EV chargers and their placement at City facilities.

The electrification of transportation will require both public and private investment in supporting charging infrastructure. The electric utility companies are leading the deployment of EV chargers and have incentive programs in place. Public EV chargers are in short supply in Thousand Oaks, and those few that were deployed by the City several years ago have unattractive charging fees and are not conveniently sited for public use. Although the development of a citywide strategy for public EV chargers is

- a subject for discussion in a future community climate action plan, the City should plan for charger placement on its own facilities.
- C.2.** Deploy bicycle-sharing stations to increase bicycle tourism and reduce use of cars.
 - C.3.** Add bike lanes wherever feasible and improve bicycle lane striping and safety marking.
 - C.4.** Consider enrolment in Zimride for encouraging or incentivizing carpooling for City employees.
 - C.5.** Install “smart” system to track and communicate transit vehicle position and status, and install electronic dashboards at bus stops to indicate time of arrival of next bus.
 - C.6.** Consider the impact of transportation electrification in planning for and assessing new development projects.

Green Space



1. Overview

Access to green space is vital to both the public and wildlife. In addition to its impacts on public health, studies also show a correlation between lack of access to green space and crime due to human response to stress¹. Other benefits of green space include nature conservation, habitat preservation, wildlife movement corridor retention, no-cost passive outdoor recreation opportunities, reduction of the urban heat island effect, improved air quality, traffic reduction, rainwater infiltration, water retention, shade, and beauty.

Green space includes open space (natural, undeveloped land), parks, street medians and parkway strips. Almost 40% (15,200 acres) of the City's planning area is open space², described in the Open Space Element of the City's General Plan³ and managed by the Conejo Open Space Conservation Agency (COSCA), created in 1977 by a joint powers agreement between the City and the Conejo Recreation and Park District (CRPD). An additional 400 acres of green space are landscaped by the City in the public right-of-way. This section of the Plan includes the management of those areas which are administered wholly or in part by the City, but does not include the City's parks which are managed by CRPD.

Green Space Goals

- A. Open Space:** Balance resource conservation with recreation and public use of open space.
- B. Trees:** Maintain the health and vitality of the urban forest and landscape under the stresses of the built environment, climate change, and drought.
- C. Landscaped areas:** Manage landscaped areas using sustainable practices.
- D. Educate and engage:** Involve the community best practices and green space management.



¹ Link: [Green Space, Violence, and Crime](#) and references therein

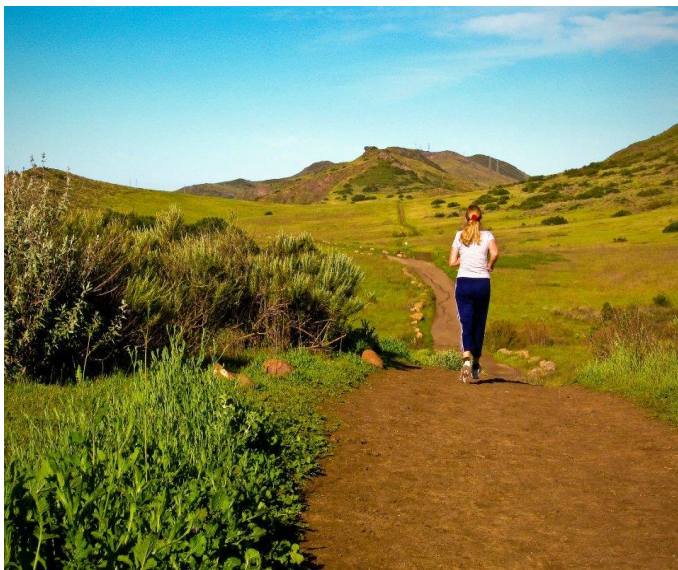
² Link: [Thousand Oaks General Plan - Conservation Element](#)

³ Link: [Thousand Oaks General Plan - Open Space Element](#)

2. Status

2.1. Open Space

Many residents have chosen to live in the City because of the abundance of permanently protected open space and the recreational opportunities afforded by over 150 miles of multi-use trails. In the City's Community Attitude Surveys⁴, limiting growth and preserving open space consistently ranks in the top five concerns of residents, and 91% of residents indicated satisfaction with the job the City is doing in that arena⁵. The approval of Measure W, an extension of urban development restrictions through 2050, in November 2016 by 76% of residents is evidence of the strong community desire to restrict urban growth and preserve open space.



Open space provides the necessary environment for the region's diverse native plants and wildlife species to succeed. It is essential that plant and vegetative resources be conserved due to their importance of providing wildlife habitat, watershed protection, climate moderation, erosion control, and aesthetic beauty. Although it is not clear how species and habitats will respond to climate change, the City's extensive open space system, which provides more than 15,000 acres of natural habitat, provides the best opportunity for species to thrive.

The majority of the more than fifteen thousand acres of open space in the Conejo Valley is managed by the Conejo Open Space Conservation Agency (COSCA), created in 1977 by a joint powers agreement between the City and CRPD.

COSCA, the largest landowner in the City, manages and maintains natural, undeveloped land which includes mountains, creeks, hillsides, arroyos and barrancas, oak woodlands, chaparral, coastal sage scrub, riparian woodlands, and grasslands. This open space contains extensive ecologically diverse native plant and wildlife communities, including rare and endangered species. COSCA has a strong commitment to preserving and managing this valuable resource in a responsible way as described in its Strategic Plan⁶. In order to protect

⁴ Link: [Community Attitude Survey](#)

⁵ Link: [Community Opinion Survey](#)

⁶ Link: [COSCA Strategic Plan](#)

open space, COSCA's Ordinance⁷ lays out the rules and regulations for its public use which prohibits vehicular use, firearms, fishing, swimming, and non-sponsored camping.

Sustainably balancing public use with ecosystem protection is a key concern for COSCA. Two full-time City staff provide administrative and management support for the Agency, and CRPD employs six rangers for patrol and maintenance in addition to management staff who oversee operations.

Open space systems not only provide a refuge from urbanization for both people and wildlife, but are also an investment in the future. Open space appreciates in value for both people and wildlife as the years go by and natural lands elsewhere are developed and lost.

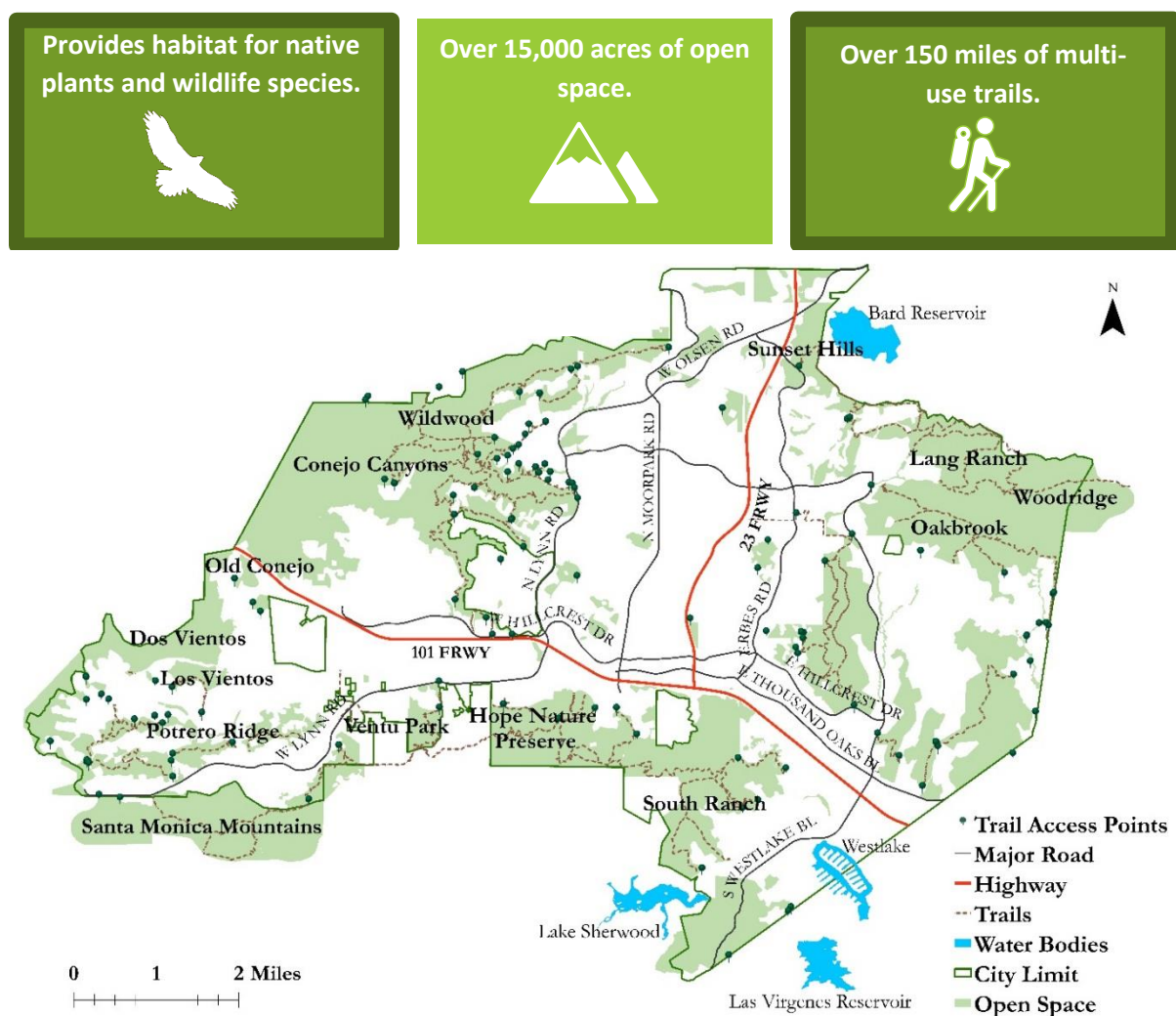


Figure GS-1: Thousand Oaks open space map

⁷ Link: [COSCA Ordinance](#)

2.2. Street Trees and Oaks

Trees provide many social and environmental benefits. They provide respite from the sun and remove pollutants from the air. Trees additionally provide food and habitat for many insects, birds and animals. In periods of heavy rain, they reduce storm water runoff, assist in groundwater recharge, and provide erosion control. Trees add beauty and improve the scenic quality of the environment. To protect the City's valuable resource, history, and its very name, there are ordinances in place that govern tree care and preservation, and protection from removal.



Thousand Oaks is a "Tree City, USA"⁸ and has been so designated since 1998. In achieving this honor, the City meets four core standards of sound urban forestry management – (i) maintains a department with professional tree care professionals; (ii) has a tree ordinance that provides clear guidance for planting, maintaining and removing trees from streets, parks and other public spaces; (iii) spends at least \$2 per capita on urban forestry (the City spent \$13.60 per capita in 2016); and (iv) observes and celebrates Arbor Day. The City maintains some 27,000 trees, providing trimming services to approximately 4,000 every year, removing 300 – 400 a year due to disease, mortality, development, and risk. In turn, the City plants close to 500 trees per year to preserve and grown its urban forest. Most of these trees exist in public right-of-ways, of which the City maintains over 400 acres.

Under a new Forestry Master Plan, the City's goal is a 25% canopy coverage Citywide.

Within neighborhoods, street trees were planted when development first took place and residents are required to maintain and water these trees. Removal of one of these trees requires the property owner to obtain an encroachment permit from the City and tree replacement is normally required. In the case of landmark trees, an additional oak/landmark tree permit is required and if removal permission is granted it is normally accompanied by strict conditions. If removal involves a protected size oak or landmark tree that is a healthy non-hazardous specimen, replacement for the approved removal typically occurs at 3-to-1 basis. The City's tree ordinances were set in place to preserve the aesthetic and character of the City. The Landscape Maintenance Division is working to re-plant streets where trees have been removed and increase the urban tree canopy. Under a new Forestry Master Plan⁹, the City's goal is a 25% canopy coverage Citywide. This will help to mitigate the urban heat island effect, provide shade which reduces building energy demands for cooling, afford habitat for birds and wildlife, and enrich the beauty of the surroundings.

⁸ Link: [Tree City USA](#)

⁹ Link: <http://www.toaks.org/custom/Documents/PublicWorks/FMPReport.pdf>

Many residents of Thousand Oaks are passionate about the preservation of the City's landmark trees, oaks in particular, and the impact of any new or re-development on landmark trees is of primary importance to the City¹⁰. Individuals can assist in oak preservation efforts through the Adopt-An-Oak program¹¹, in which they sponsor an oak tree located on public land with funds being used to support open space.



2.3. Landscaping

The City has updated its 1989 Forestry Master Plan¹², and developed a new plan¹³, which will provide a blueprint and practical guide for City-maintained trees and plantings in the public right-of-way as well as recommendations for residents' trees and landscaping. A series of Community Workshops¹⁴ were held in early 2017 to solicit input from the community on the types of trees and plantings they favor. New landscaping will incorporate the preferences of the community as communicated through these workshops and the Visioning 2064 process¹⁵. It will also build resilience to drought through incorporation of drought-tolerant and native plantings. The City is committed to maintaining a healthy urban forest by planting species that are well adapted to local environmental conditions, building resilience through diversification of species, and providing for Citywide uniformity in streetscapes.

Drought conditions and their ongoing threats have precipitated the City's move towards more drought-tolerant and native plantings, and in recent years landscaping has been redesigned to conserve water and decrease grassy areas. An example area was established at City Hall in 2008 that includes plant identification tags, a drip-irrigation system, and mulch for moisture retention and weed abatement.

Landscaped areas throughout the City are being converted to direct delivery hard pipe bubbler irrigation to save water and provide more direct watering to plant roots. This in turn encourages deeper and more resilient plants and trees. Evaporation is being further limited by the use of compost and mulch in planting areas, which also provide nutrients to the soil. The City employs biochar, which enhances soil fertility and long-term carbon sequestration, in landscaped areas on a regular basis and incorporates it into all new plantings. Only organic fertilizers are utilized in public landscaped areas. Sprinklers on 21 acres of turf grass medians

¹⁰ Link: [Section 5-14.01 of Thousand Oaks Municipal Code, Oak Tree Preservation and Protection Guidelines](#)

¹¹ Link: [Thousand Oaks Adopt an Oak Program](#)

¹² Link: [Thousand Oaks Forestry Master Plan](#)

¹³ Link: [City of Thousand Oaks Forestry Master Plan](#)

¹⁴ Link: [Community Workshops](#)

¹⁵ Link: [Visioning 2064](#)

have been turned off under a State mandate. This is saving the City over 10 million gallons of water a year.

The City's Landscape Division chips all wood waste obtained through its tree maintenance program, generating over 20 cubic yards of wood chips a week. Chips are employed in medians, parkways, and planter areas for moisture retention and weed abatement by the City, CRPD, and CVUSD. This saves on water use and landscape maintenance costs by preventing weeds. Free mulch is provided for City residents via a self-serve enclosure located next to the Thousand Oaks Library.

The City employs grass-cycling as a method of fertilization on areas where it still maintains lawns. Los Robles Greens Golf Course, Sunset Hills Country Club, CVUSD, and CRPD report grass-cycling on at least part of their lawns.

Thousand Oaks is proud to be recognized as a *Bee City, USA* since February 2017. The certification acknowledges the efforts of the Landscaping Maintenance Division to support pollinator habitat in the community through the use of appropriate landscaping plants and trees, the protection of foraging areas, and an integrated pest management program¹⁶. Entire species of native bees and other pollinators, which are vital to the survival of most flowering plants and trees, are disappearing at an alarming rate due to loss of habitat, pesticide use, disease and parasites. The reproduction of 90% of the world's wild plant species and one in every three bites of food consumed rely on imperiled pollinators, such as bees, butterflies, moths, bats, and hummingbirds. *Bee City, USA* is a national nonprofit organization that encourages individuals to support pollinators by providing them with healthy habitats.



The City supports these goals with the use of landscape plants that provide a nectar source, utilizing native species and protecting intact ecosystems that provide nesting sites. In addition, when beehives are discovered in places that pose a potential risk, rather than being destroyed, they are carefully relocated to a more appropriate location. The City employs a Pesticide Use Policy¹⁷ to effectively manage pests in an environmentally sensitive manner. These strategies include the release of millions of ladybugs, lacewings, and praying mantises annually into public parks and landscaped public right-of-ways. This practice, utilized by the City since 1994, serves as an economical and reliable solution to minimizing pests. It sustains healthier, cohesive ecosystems, and avoids the use of neonicotinoid insecticides, which have been linked to bee decline worldwide.

Another important component of the program has been to discontinue the use of anticoagulant rodenticides at City facilities since 2015 and urge businesses and residents to discontinue selling, buying, and using them. The City has conducted public outreach on integrated pest management, including web-based and printed materials with grant funding

¹⁶ Link: [Integrated Pest Management](#)

¹⁷ Link: [Pesticide Use Policy](#)

received from CalRecycle. All community members are encouraged to follow these same environmentally responsible practices on their own properties.

3. Related policies and regulations

a. Government Code Section 65563: Thousand Oaks General Plan

Government Code Section 65563 mandates that every city and county prepare and adopt a local Open Space plan. This plan is contained in the Open Space Element of the City's General Plan¹⁸, which by law, must also include an inventory of those lands and resources, as well as an "action program" containing specific techniques to protect from development those lands identified as prominent and necessary to achieve open space policy goals. Under State law, local government cannot issue any building permit, or approve any subdivision map unless the proposed construction or subdivision is consistent with this action program.

b. Section 9-13.102(b): Thousand Oaks Municipal Code

Section 9-13.102(b) of the City's Municipal Code defines City-owned open space. The Land Use Map¹⁹ in the City's General Plan identifies a land use category referred to as "Parks, Golf Courses, Open Space" on which development is not permitted. The ordinance that prohibits areas falling within this use designation from being re-categorized to a developable land use designation in the General Plan without a vote of the people was recently extended from 2030 to 2050 when Measure W was approved by City residents in 2016.

c. Ordinance No. 1217-NS: Thousand Oaks Landmark Tree Ordinance

The City's Landmark Tree Ordinance No. 1217-NS provides for proper care, protection and preservation oak/landmark trees under the Forestry Master Plan.



¹⁸ Link: [Thousand Oaks General Plan - Open Space Element](#)

¹⁹ Link: [Thousand Oaks Land Use Map](#)

4. Strategies

A. Open space

Balance resource conservation with recreation and public use of open space.

Challenges faced by open space managers include maintaining closures during hazardous conditions and in sensitive areas, high visitation of popular areas, trail cutting, social trails, non-native plants and insects, off-leash dogs and dog feces, and fuel modification areas. Climate change threatens the health of open space vegetation through drought, heat stress, and the impact of non-native invasive pests.

A.1. Reduce public use of overused open space locations.

- Limit public access to overused open space locations through closure days.
- Disincentivize use of overused open space locations through marketing of alternative trails and access points.

A.2. Develop a non-native plant management plan for open space.

- Develop a program and schedule for removing invasive plants; include volunteers in this effort.
- Budget for annual non-native plant management in open space.
- Hire additional rangers dedicated to maintenance of trails and knowledgeable about resource management.
- Employ the Early Detection and Rapid Response management approach for non-native invasive pest species.

A.3. Develop additional educational literature on plants for open space visitors and trail patrol personnel.

A.4. Develop an app. for reporting issues in open space such as development of informal trails, erosion, and non-native invasive plants.



B. Trees

Maintain the health and vitality of the urban forest and landscape under the stresses of the built environment, climate change and drought.

- B.1.** Develop and utilize City tree inventory (GIS) for managing and maintaining trees.
- B.2.** Utilize aerial imagery for tree canopy analysis.
- B.3.** Strategically plant trees for shading (e.g. deciduous trees to south of buildings).
- B.4.** Re-plant neighborhood street trees where these have been removed.



C. Landscaped areas

Manage landscaped areas using sustainable practices.

- C.1.** Generate liquid fertilizer/compost tea from organic waste and experiment with use of compost tea as a soil conditioner.
- C.2.** Utilize mulching for weed suppression and moisture retention.
- C.3.** Compost green waste.
- C.4.** Convert wood chips to biochar (beneficial re-use) and provide free wood chips to residents through community site(s).
- C.5.** Expand native and climate-appropriate plantings and consistency of planting palates with new Forestry Master Plan.
- C.6.** Investigate use of hydrogels in turf areas for moisture retention and reduced water demand.
- C.7.** Utilize biochar for better carbon retention in soils and reduced water demand.
- C.8.** Replace mulched areas with new drought-tolerant plantings.
- C.9.** Develop process improvements such as expanded use of laptops and tablets in the field for GIS data entry and to reduce trips back to office.
- C.10.** Install resilient direct delivery hard pipe bubbler irrigation and replace overhead sprinklers.
- C.11.** Install smart irrigation technology at all installations to allow for central remote control.



D. Educate and engage

Involve the community in best practices and green space management.

- D.1.** Provide signage throughout the community regarding landscaping changes (e.g. “Brown is the New Green”).
- D.2.** Provide signage throughout the community on Bee City, USA and Tree City, USA.
- D.3.** Provide workshops on native plant landscaping, turf removal, biochar, and composting.
- D.4.** Provide outreach materials on native plant landscaping, turf removal, biochar, and composting.
- D.5.** Conduct bird counting and pollinator identification to monitor change over time.



Water Utility



1. Overview

Reliable access to adequate potable water is essential for the public's health and welfare. Commercial and industrial facilities are reliant on ready access to water both to conduct business and for health and safety reasons; interruptions in the supply may require them to close temporarily due to regulations related to hand washing, cleaning or fire safety. Although a readily-available source of safe drinking water is assumed to be the norm in the U.S., incidents like lead contamination of the water in Flint, Michigan illustrate the importance of water infrastructure and operations.

Since the City relies on imported water for all of its current supply, changes in snowpack and precipitation in the Sierra Nevada mountains will directly affect the availability of imported water. A shift from snowfall to rain and the likelihood of early runoff as the result of climate change will require smart water policies such as increased storage and groundwater banking. Drought, such as the recent one occurring between 2011 and 2016, has led to an increased focus on resilience at both State and regional levels.

The City's imported water is purchased from Calleguas Municipal Water District (Calleguas), which receives its supply from the Metropolitan Water District (MWD), whose sources are the State Water Project and the Colorado River. MWD has historically been responsible for all water treatment, however Calleguas has emergency capacity in the event MWD water is not available.

This section of the plan covers the operations of the City's water utility, which provides water to 36% of water users within the City of Thousand Oaks¹. The remaining homes and businesses in the City are in the service areas of California Water Service (Westlake area) and California American Water Company (western part of the City), with a very small area at the north end of the City supplied by Camrosa Water District.

Water Utility Goals

- A. Infrastructure and quality:** Enhance system reliability, safety, monitoring, and control.
- B. Water supply:** Reduce reliance on imported water and improve resilience to drought and emergencies.
- C. Conservation and efficiency:** Prepare for state conservation mandates and future droughts.
- D. Customer service:** Improve customer service, usage transparency, and customer engagement.

¹ CTO 2015 Urban Water Management Plan pg 2-1

2. Status

2.1. Infrastructure

The City's water supply infrastructure was designed to take advantage of gravity through the natural topography of the City. At some Calleguas turnouts there is sufficient pressure to bring water to the City's reservoirs for Utility use and to meet regulatory, emergency, and fire supplies. At other turnouts, the City must pump the water to its reservoirs, which are located on high ground and primarily use gravity to supply the end system distribution. There is limited use of hydro-pneumatic systems at higher elevations where the gravity cannot provide sufficient pressure. Gravity feed is the preferred mode of operation for reasons of cost and reliability, and provides the best system safety. There are 19 separate pressure zones within the water service area, each corresponding to a geographic area. Lift charges are incurred by properties where pumping is necessary to compensate for the equipment and energy needed to provide water to that property. These apply to approximately 60% of City water accounts.

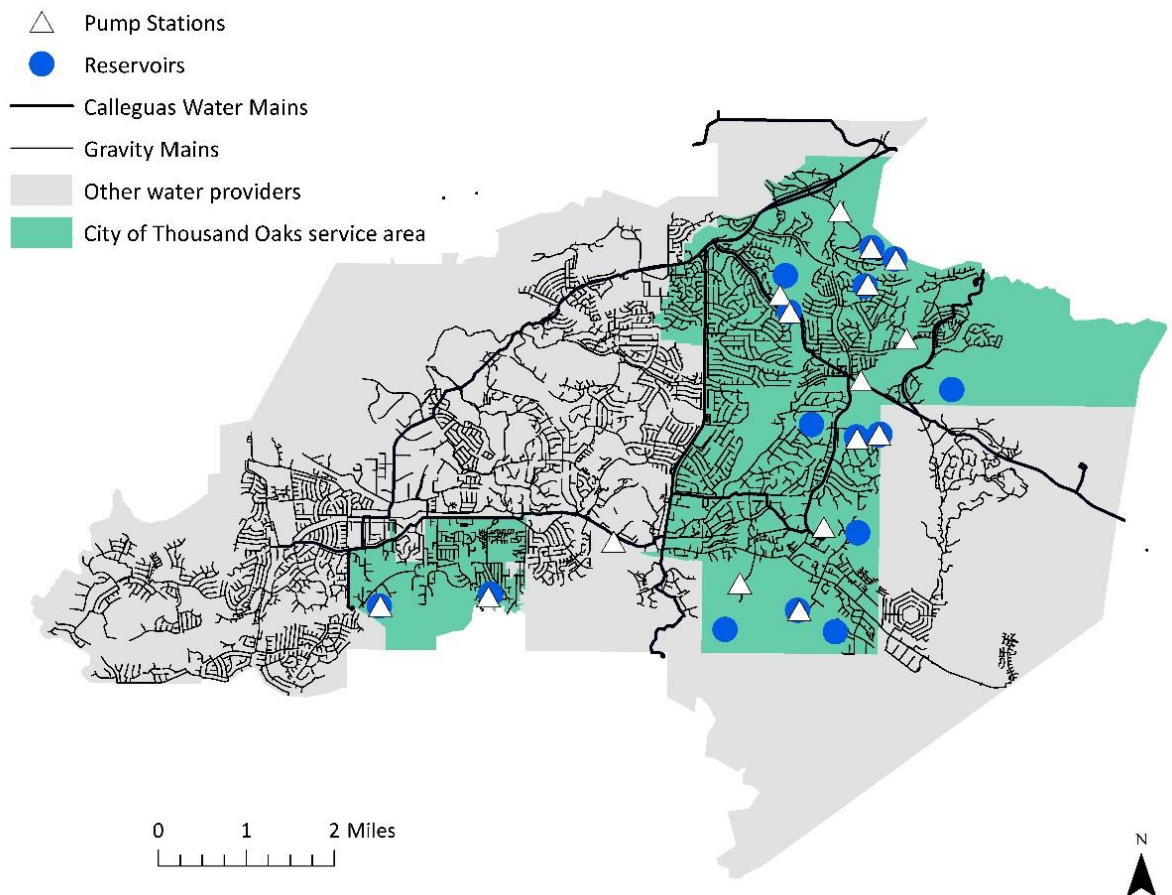


Figure WU-1: City of Thousand Oaks water service area. Map of infrastructure.

The City's water utility infrastructure has a capital valuation of \$490 million but is aging and requires ongoing investment.² It comprises approximately 232 miles of transmission and distribution pipelines³, Calleguas turnouts which deliver water into the system, reservoirs, and pumping stations. The ten Calleguas turnouts have a combined capacity of 28,900 gallons per minute (gpm); an additional turnout is available for emergency use to the Conejo Oaks area.

The City owns, operates and maintains 16 reservoirs with a combined capacity of 35.5 million gallons, 15 pump stations (including 4 hydro-pneumatic ones), 5,423 valves, 1,977 fire hydrants, 170 vacuum-air release valves, and 310 blow-off valves⁴. To be resilient, the majority of the water zones within the City's service area have redundant storage and sources of supply. The City's goal is to provide at least two storage sources and two sources of supply for each zone.⁵

Tara, Lang Ranch, La Granada and Wilder Reservoirs all require maintenance that will remove interior corrosion, recoat, and apply new exterior tank coating. New seismic standards also require the tanks to be retrofitted to minimize damage in the event of an earthquake; costs range from \$1.45 million to \$2.15 million for each tank retrofit.



Figure WU-2: La Granada reservoir

Water infrastructure is connected with a centralized control system at MSC through a Supervisory Control and Data Acquisition (SCADA) system via networked data communications lines. The existing SCADA system does not support seismic valves or mixers and does not relay all the data and information necessary for full remote control of the

² Water Financial Plan – Page 9

³ Transmission lines are typically from pump station to reservoir and distribution lines are to the end points.

⁴ 2016 Draft Water Master Plan

⁵ TO Water Systems Manual – Chapter 5

system. It is scheduled for an update in 2018-19 to integrate new programmable logic control and communications systems at pump stations, reservoirs, and turnouts.

The City utility has recently begun to implement disinfection boosting to supplement treatment provided by MWD and Calleguas. During the drought, turnover of the water in the tanks was reduced due to a decrease in water use, resulting in nitrification from degradation of the chloramine disinfectant, especially during the hotter months. To combat this issue, the City purchased two portable systems to add chloramines to the water system for supplemental disinfection boosting. Active mixing capabilities have been added to ten reservoirs and six more are budgeted,⁶ which will decrease stratification of stored water and increase the chloramine residual. In addition, automated chemical/chlorine monitoring stations are planned for each reservoir site. The new systems are required in order to maintain water quality and provide accurate and continuous testing of water chloramine residual in compliance with Federal and State Health Department regulations.

Technology to identify emerging or potential leaks, particularly on water main lines is currently being evaluated. Early detection will allow repairs to be planned and scheduled during work hours reducing repair and overtime costs and disruptions on the surrounding area. Reduction of main water leaks will also be a key mechanism to comply with the annual SB 555 state mandated reports documenting reductions in water losses.

2.2. Emergencies and alternative water supply

In the event of a major earthquake or other catastrophic event, water deliveries from MWD may be curtailed for an extended period. In addition, the City's water supply is dependent on the health of the Sacramento Bay-Delta, where its water originates. According to a 2016 report by USGS⁷, within the next 30 years the Bay region has a 98% chance of a 6.0 magnitude or greater earthquake and a 50% chance of one greater than 7.0. Such an earthquake could damage critical aqueduct or other delivery infrastructure or cause catastrophic failure of the



unreinforced levees and result in seawater intrusion into the freshwater system⁸. Sea level rise and drought are already causing seawater intrusion into that area. If this supply channel was cut off, the City, like other MWD and Calleguas customers, would be forced to rely on the emergency (six-month) water supply maintained by MWD at Pyramid and Castaic Lakes. Any local catastrophic failure of infrastructure could isolate Calleguas from even this

⁶ FY 2017-2018/2018-2019 CIP Budget April 11, 2017 Study Session – page 142

⁷ Earthquake outlook for the San Francisco Bay region 2014–2043 (Fact Sheet 2016-3020) by USGS

⁸ Link: [Californians for Water Security](#)

supply and lead to reliance on local storage (Lake Bard) with about one month's supply at a normal use rate.

The City's water supply is dependent on the health of the Sacramento Bay-Delta, where its water originates.

Calleguas is actively implementing an Emergency Water Supply Plan⁹ to expand its ability to meet water demand during an extended outage. Interconnections are being installed to allow for the sharing of water between neighboring agencies during an emergency, and to provide redundancy in the case of local infrastructure failure or maintenance. In a 2009 study by the City, six potential interconnection locations with CalWater were identified and an additional six with Cal-Am. Since the study, three of these have been completed.¹⁰ The City is considering options in building resilience to catastrophic disruptions, including the development of local supplies such as groundwater and potable re-use.



Climate change effects that may impact the City were analyzed as part of a regional study conducted by the Watersheds Coalition of Ventura County (WCVC) in the Integrated Regional Water Management Plan of 2014. The study found that primary regional climate stressors to include changes in air temperature, precipitation patterns, and sea level rise. Related impacts include longer, more frequent droughts, more extreme flood events, and more frequent and intense wildfires. The key vulnerabilities of the region include water demand, supply and quality, water-related infrastructure, agriculture, ecosystems and habitats; and human populations.¹¹

Changes in precipitation patterns and quantity in the Sierra Nevada mountains will have a profound effect on the City's water supply, which originates from snowmelt and runoff from this mountain range.

On a local level, the region is expected to receive roughly the same amount of total precipitation throughout the 21st century as it received in the last few decades of the 20th century. In the present-day climate, the region experiences wide swings in precipitation from year to year, and researchers expect this variability to continue under climate change¹².

⁹ Appendix G of Calleguas' Urban Water Management Plan

¹⁰ 2016 Water Master Plan Update page 3-2. The interconnection with Cal-Am at Moorpark and Gainsborough Rds was recently completed.

¹¹ CTO UWMP page 2-6 – (Appendix E has complete findings of the study)

¹² Link: [Twenty-First-Century Precipitation Changes over the Los Angeles Region](#)

The key vulnerabilities of the region include water demand, supply and quality, water-related infrastructure, agriculture, ecosystems and habitats; and human populations.

A study on the potential for using groundwater to replace potable water for irrigation was completed by the City in February 2016. This Study provides a framework for developing new local water supply options and identifies strategies to provide some measure of independence from imported water in the future. One of the objectives of the Study was to develop an estimate of the sustainable yield of the Conejo Valley Groundwater Basin, determined to be approximately 3,500 AF per year. Because the groundwater is high in total dissolved solids and iron, it requires treatment before use. The east side of the basin is generally of poorer quality, so the development of groundwater resources will give preference to those areas of higher quality and greater potential.¹³

The Capital Improvement Program includes \$2.2 million to design and construct a treatment system and wellhead improvements at Los Robles Greens Golf Course, which are expected to yield a treated supply for the golf course, a Cal-Am customer. This project could also provide water to other customers in Thousand Oaks, and will decrease the City's reliance on imported water by providing a new local source at a lower cost.

Currently, neither reclaimed water nor greywater is available in the City's service territory, with the exception of customer-installed onsite greywater systems. These are typically home systems with greywater coming from clothes washing machines ("laundry-to-lawn") and do not require a permit. Because they are unpermitted, the City does not have information on the number of these. More sophisticated greywater systems that recycle water from showers, sinks or baths require building permits. The only known greywater permit issued by the City was for dual plumbing in the construction of new dormitories at California Lutheran University in the early 2000s, but the rest of the system has not yet been installed.

2.3. Meters

The City's utility serves approximately 17,000 accounts, 70% are residential¹⁴ and the remainder, commercial/industrial (which include meters dedicated to irrigation). Currently, 45% of properties served by the City have older analog water meters. These are being replaced by Badger Automated Meter Readers (AMRs) at an installation rate of approximately 1,500 meters a year; 55% of meters have been upgraded to date and remaining accounts will receive AMRs by the end of 2020. Although AMRs require staff to drive by each meter to collect the data, this is much faster than manual meter reading. Because meter reads are infrequent (bi-monthly for residential and some commercial) the data collected is relatively coarse and does not allow for analytics on customer usage patterns. More granular data

¹³ City of Thousand Oaks Groundwater Study, CDM Smith February 2017.

¹⁴ CTO 2015 Urban Water Management Plan (UWMP) page 2-1

which allow for usage analysis can be obtained for a limited period by customers who request a water survey and have an AMR meter installed. In these cases, staff visit the property and download stored data at the meter to generate a report.

Enhanced AMRs with network connectivity capability are available that provide real time monitoring through a dashboard provided by the meter manufacturer, Badger. Thirty of these have been installed for pilot testing at selected sites to determine if the ability for customers to monitor water usage in real time affects user behavior, prevents leaks and conserves water. If the City moves ahead with the installation of these enhanced meters throughout the service territory, some of the existing AMRs would have to be replaced, but approximately half have migratable transmitters that will automatically connect to a network once that becomes available.

Plans are to develop such a network (Advanced Metering Infrastructure or AMI), which will require placement of data collector towers to allow for the reception and transmission of data. The network will provide real-time two-way communication with an integrated system of smart meters. When this system is deployed, it will allow customers and staff access to interval data remotely, and eliminate the need for staff to drive routes collecting usage data.

2.4. Usage and conservation

In 2017 the City purchased and delivered approximately 10,000 acre-feet (AF) of water. Water losses are estimated at approximately 3.7% of total purchases.

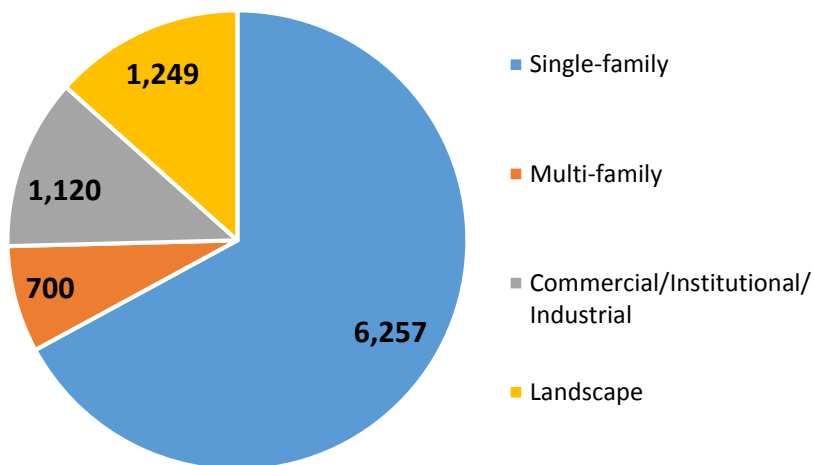


Figure WU-3: 2015 water deliveries by class in acre feet (AF) per year.

Residential customers are billed every two months on a rolling basis, which makes it challenging to accurately compare water purchased on a monthly basis to the amount of water sold. With the rolling two-month billing cycle, water use is aggregated for the prior 60 days, making monthly reporting as required by the State, imprecise. Additionally, high or low

usage in a particular month is not easy to place temporally as it will be attributed to the billing month, rather than the actual usage month(s).

Besides maintaining infrastructure, ensuring water quality and supply, and providing customer billing and service, the City's water utility is also responsible for implementing State and local water conservation measures. The recent drought brought with it a test of the City's appetite for water conservation, which the City's water agency passed successfully, reducing its water consumption by 28% relative to 2013 usage. This reduction was achieved through outreach and education informing customers of mandatory restrictions on water use and seeking voluntary cutbacks. In order to develop the best strategy for achieving conservation goals, the utility's staff conducted tests during the recent drought.

Social norming is recognized as a powerful method to influence behavior. In FY 2015-16 a test was conducted to gauge its effectiveness in helping to meet the State's water conservation mandate. Using a Geographic Information System (GIS) integrated with billing data, water use per square foot of parcel size was calculated for each water agency customer. Customers were divided into four different parcel size groups (< 6,000 sqft, 6,000 - 10,999 sqft, 11,000 - 15,999 sqft, >= 16,000 sqft) and usage percentiles generated within each size category. (Since data on number of occupants was not available, occupancy was not included.) A sample of the resulting GIS map is shown in Figure WU-4.



Figure WU-4: Water use for a single-family home neighborhood. Colors indicate the percentile classification of each parcel. Data labels represent the previous 2-month total usage in HCF. The usage disparity between similar sized parcels is striking.

Staff employed different messaging techniques for the highest 10% of water users in each parcel size category. These users were divided into three groups. The first, a control group, did not receive any outreach. The two other groups both received a letter with the following message.

“California is in the midst of an historic drought. The City of Thousand Oaks has taken measures to reduce water usage citywide and has asked residents to do their part. To assist the City in conserving water, as well as to help reduce household costs, we are reaching out to the City water agency’s highest water users, based on comparable lot size, to help them find ways to reduce water usage. The property at ... has been identified as being in our highest 10 percent of water users for similar sized properties averaged over the last two billing cycles.”

In addition to the letter, the third group received a follow-up phone call. The results of the test were instructive. Multiple phone calls were received from those customers receiving the letter stating that they were making significant cutbacks; some thought there was an error. Many of the larger property owners attributed their usage to having a larger lot, although the study controlled for size. Many customers were shocked to discover that they were using five to twenty times more water than their neighbors. Staff encouraged the callers to look for leaks and many requested water surveys. Renters were also able to use this data to encourage non-responsive landlords into making improvements. The initial response from targeting the top 10% exceeded staff capacity to complete all phone calls, and the test had to be halted before multiple cycles could be run or results compared against the control group. Moving forward, this type of comparative usage data should be provided in water bills to influence behavior change with water conservation in mind.

Although the recent drought restrictions were lifted in spring 2017, another drought threatens and the State is preparing for anticipated long-term water challenges with its new “Making Water Conservation a California Way of Life” policy which will establish water budgets for each water agency. There are likely to be costs associated with compliance and the City’s utility should prepare appropriately.

2.5. Rates

In 2012, the City retained Raftelis Financial Consultants (RFC) to develop a sustainable financial plan for the City’s water utility, including a reserve policy and rates to meet operational and capital needs. An initial plan was completed in 2013¹⁵, and in 2016¹⁶ RFC updated it, performed a cost of service study and developed rates compliant with Proposition 218.¹⁷ The report was again updated in 2017¹⁸. This Financial Plan is based on an estimated water use of 10,780 AF per year, or 91% of the water consumption in FY 2013.¹⁹ Projected operational costs include \$132,805 annually for outreach and advertising to promote water conservation and efficiency.²⁰ The Plan pre-dates the new State water conservation policy.

The revised rate structure makes the cost of water purchased from Calleguas an automatic pass-through to customers. This is significant because purchased water accounts for

¹⁵ Link: [Water Financial Plan Study Report - 2013](#)

¹⁶ Link: [Water Financial Plan and Cost of Service Study - 2016](#)

¹⁷ Raftelis Financial Consultants Inc. February 1, 2016 report page 7

¹⁸ Link: [Water Enterprise Financial Plan Update - 2017](#)

¹⁹ Raftelis page 21

²⁰ Raftelis Page 12

approximately 70% of the cost of providing service and those rates typically increase by 4-5% a year. Calleguas breaks its charges into three components: usage, capacity reservation charge (CRC) and readiness-to-serve (RTS) charge. Usage is recorded monthly and is viewable by turnout through the Calleguas purveyor dashboard. The CRC is levied to support infrastructure costs associated with peak and emergency demands, and includes payments to MWD's CRC as well costs within the Calleguas system. This demand charge is computed from average hourly flows over the highest flow week between May 1 through September 30 of each year and the charge is then divided equally amongst all monthly bills for the following calendar year. The Conejo Valley has been particularly impacted by this charge as it has experienced high peak flows during summer due to outdoor watering. The rate for the CRC is \$41,859 per cfs for 2017-18, representing a 2.2% increase from the prior year. Calleguas is anticipating spending an additional \$143.3 million on related projects over the next five years, which will increase the CRC by about 40% over this time period.

Smart algorithms and software to better control and reduce peak flow would be beneficial for the City in reducing CRC costs. These would also improve water age and quality within the system.²¹ Reservoirs can take a long time to fill and typically, stop filling during the afternoons to avoid peak energy Time-Of-Use charges. If managed correctly, these periods would allow for drawing down of old water and still maintain adequate emergency and regular water supply²². A 10% reduction in the CRC cost would result in a savings of \$75,000 annually.²³

The third component of the Calleguas charge is the Readiness-To-Serve (RTS) charge, which is a fixed charge from MWD passed through to Calleguas purveyors. It is designed to recover the capital costs associated with providing emergency service capacity and operational flexibility. The RTS is allocated to all of Calleguas' purveyors based a ten-year rolling average of fiscal year water sales.

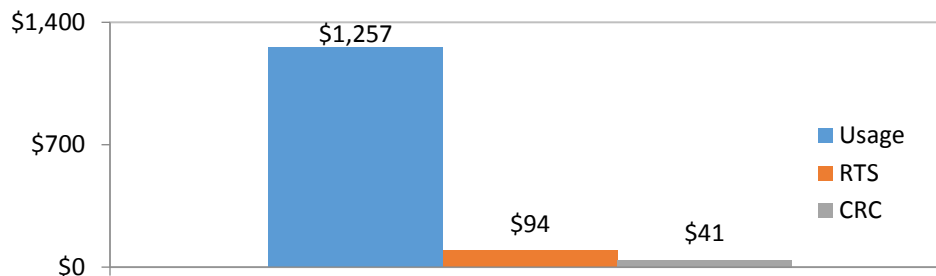


Figure WU-5: 2016 Total water rate per acre foot

2.6. Staffing

The City's water agency services are provided by staff in both the Finance and Public Works Departments. Public Services has assigned 3.5 (full-time equivalent) staff based in the Finance Department, whose work is divided among nine staff providing billing services and responding to customer inquiries. The Public Works Department employs seventeen staff in

²¹ 2016 Water Master Plan Update page 3-7

²² Rick Bratcher discussion

²³ Dan Smith, Calleguas Finance Manager

the Water Distribution Division performing system monitoring and maintenance, and one full-time staff member in the Sustainability Division who conducts data analysis, conservation outreach, usage and leak reporting, and policy recommendations. Public Works also provides engineering staff and administrative support services.

Finance staff use NaviLine software for their primary customer database. Maintenance personnel use Maintstar, and the conservation team use Excel to track usage, conduct analysis and address customer concerns or violations. The lack of software integration can result in duplication, errors and missed information.

3. Related policies and regulations

a. AB 1881: Water Conservation in Landscaping Act of 2006

The Water Conservation in Landscaping Act of 2006 (AB 1881) effective January 1, 2008, requires all new non-single family residential projects with more than 5,000 square feet of irrigated landscape to utilize a separate water meter for irrigation and landscaping.²⁴ Additional bills introduced in 2017 would decrease the square footage requirement.

b. Ordinance 15-16-NS: Water Conservation Ordinance, 2009

The City's Water Conservation Ordinance 15-16-NS²⁵, effective 2009 requires separate meters for each parcel of property, house, dwelling unit or building of separate ownership, including single family detached residences, condominiums and business buildings

c. SB X7-7: The Water Conservation Act of 2009

Senate Bill 7 of special extended session 7 (SB X7-7) signed in November 2009 requires progress towards a 20% reduction in water usage by 2020. The 2011-2016 drought accelerated this progress, and statewide the 20% was met²⁶ in 2017. Continued attentiveness to water consumption is needed to maintain compliance.

d. SB 407: Plumbing Fixture Replacement, 2014

SB 407 effective January 1, 2014, requires all pre-1994 residential, multi-family and commercial customers replace plumbing fixtures not meeting current code when making certain improvements or alterations to a building. By 2017, all single-family homes must replace non-compliant plumbing fixtures, and by 2019, all multi-family and commercial buildings must have compliant water conserving plumbing fixtures in place.²⁷

e. SB 555: Water Loss Management Act of 2015

This law requires each urban retail water supplier, on or before October 1, 2017, and on or before October 1 of each year thereafter, to submit a completed and validated water loss

²⁴ Urban Water Management Plan page 7-2

²⁵ Link: [City of Thousand Oaks Water Conservation Ordinance](#)

²⁶ CTO Urban Water Management Plan page 1-2

²⁷ Urban Water Management Plan page 7-8

audit report for the previous calendar year or previous fiscal year. Each water loss audit report submitted to the department shall be accompanied by information identifying steps taken in the preceding year to increase the validity of data entered into the final audit, reduce the volume of apparent losses, and reduce the volume of real losses.

f. Executive Order B-37-16: Making Water Conservation a California Way of Life, 2018

New regulations “Making Water Conservation a California Way of Life” (Governors Executive Order B-37-16) replace and increase conservation requirements beginning in 2018. The State is developing a water allocation for each retail water agency to meet this mandate. Residential budgets will be based on a 55 gpcd indoor allowance, and an outdoor one based on irrigated or irrigable landscaped area. Commercial, Institutional, and Industrial (CII) entities will be subject to a number of best practices. The formula will be reviewed every five years and allocations adjusted downwards based on the latest water efficiency standards. There are three performance measures for CII: (i) Dedicated irrigation accounts for large landscapes; (ii) Classification of CII accounts by sector using North American Industry Classification System (NAICS); (iii) Water audits or water management plans for large users. The schedule is as follows:

2018 - State provides landscape area to each water agency to set local budgets.

2018 – Interim standards in place to start measuring.

2020 – SB 555 requires water loss performance standards be in place and annual water loss reports submitted to the state.

2021 – Regulations are finalized, and suppliers calculate final water targets.

Annual – revise water budget to reflect prior year evapotranspiration (ET_o) rate.

2025 – Full compliance

4. Strategies

A. Infrastructure and Water Quality

Enhance system reliability, safety, monitoring, and control.

A.1. Participate in water collaboratives and innovation groups to identify software and hardware for improving water reliability, identifying leaks and reducing costs.

- Evaluate new technologies to speed up the deployment of a metering/sensor-based system with smart reporting capabilities.
- To reduce risk of sinkholes or catastrophic breaks and to reduce unaccounted for water loss, evaluate systems that can alert to leaks on a near-real time basis.²⁸

²⁸ Ayyeka monitoring controllers may be a viable candidate to assist. Ayyeka presentation June 8, 2017

- Improve tracking of known uses of water that are unbilled or billed outside of normal processes to reduce water losses (hydrant breaks, etc.). Evaluate use of machine learning algorithms for detection of unbilled usage and leaks.
- A.2.** Accelerate the deployment of an Advanced Metering Infrastructure system. Seek funding opportunities to assist. Investigate use of streetlight poles for this purpose.
- A.3.** Add interconnections to increase system reliability in the event of a major break or supply disruption.
- A.4.** **Develop/purchase smart algorithms and software to better control and reduce peak flow in summer in order to reduce energy costs.**
 - Manage water flows to avoid high time-of-use energy surcharges, reduce water age and improve water quality.
- A.5.** Purchase permanent and portable mixers to use at storage tanks to increase water turnover and add chloramines to the system.
- A.6.** Install new equipment to monitor disinfectant levels in the reservoirs in real-time.
- A.7.** Develop a plan for beneficially using water if tanks need to be drawn down for emergency repair or to turn over stale water.

B. Water supply

Reduce reliance on imported water and improve resilience to drought and emergencies.

- B.1.** Utilize permeable pavement and onsite capture of stormwater for local infiltration in areas of the city with compatible soil.
- B.2.** Increase use of bioretention basins and bioswales to filter and replenish groundwater and reduce runoff.
- B.3.** Replace potable and non-potable water with groundwater where feasible.
- B.4.** Explore potential for direct or indirect potable re-use by the City from HCTP treated water.
- B.5.** Explore feasibility of bringing reclaimed water from HCTP to the City for non-potable use.
- B.6.** Promote tree planting in turf areas as a mechanism to reduce evapotranspiration and conserve water. This would also have a number of co-benefits.²⁹

²⁹ Link: [City-wide Study Shows How Much Water Urban Landscaping Really Uses, August 9, 2017.](#)

C. Conservation and Efficiency

Prepare for new state conservation mandates and future droughts.

Although the City has not yet received its allocation under “Making Water Conservation a Way of Life” , it should begin to prepare for this new approach and for future droughts through an investment in better data management tools and technologies that will allow for analysis of water use at a parcel level including comparison of use with allocation, landscape area and categorization, the analysis of potential budget-based rate structures with flexible tiers that depend on drought conditions, and assessment of costs and benefits of different potential water-saving strategies and incentives.

C.1. Invest in a data management system that will allow for data analytics of allocations and water use at a parcel level.

- Include GIS data such as area of landscaping, landscape categorization, water allocation (budget).
- Allow for user comparisons, the analysis of potential allocation-based rate structures, and assessment of costs and benefits of different potential water-saving strategies and incentives. Potential data management systems include those available through commercial meter vendors, and the California Data Collaborative tool which was developed through a statewide consortium.

C.2. Develop a plan that establishes measures to be enacted when cutbacks in use are necessary.

- Determine water budgets for individual parcels in the event that mandatory cutbacks are necessary.
- Develop a budget-based rate structure that automatically shift rates appropriately for different levels of mandatory conservation.
- Develop a rate structure that generates sufficient funding irrespective of water delivery volume.
- Develop policy on adopting individual budgets, enforcement, and outreach.

C.3. Revise the City water conservation ordinance to facilitate compliance with the adopted regulations for Making Water Conservation a Way of Life.

- Revise water conservation ordinance for water usage plans from commercial and industrial users, who account for 30% of water usage, to be required as necessary.

C.4. Develop outreach materials for compliance with water conservation mandates.

- Research programs and outreach materials in model cities to determine best practices. A special emphasis should be on evaluating California agencies that must comply with Proposition 218 provisions.

- Develop and maintain a water agency customer e-mail list to enable more cost-effective and rapid communications.

C.5. Have a staff member certified as a water auditor to allow for auditing the City agency.

D. Customer Service

Improve customer service, usage transparency, and customer engagement.

D.1. Develop an information system that connects meter data collection with data reporting and accounting services.

- Evaluate software solutions that facilitates usage comparisons between similar customers and provides a visualization dashboard for residents and businesses. To encourage behavior change, bills should provide customers with feedback on their water usage. Social norming is a powerful method to influence behavior by showing customers how their usage compares to similar households. Frequently utilities also allow customers to track usage online and in near real time.
- Develop a portal that will allow staff to access water usage history of a parcel, past customer interactions, and provide better quality information and data to customers.

D.2. Evaluate layout of bills to help customers better understand their usage.

- Use software to convert HCF (metered) units to gallons for customers so bills are easier to understand.
- Provide usage comparison information on bill. Compare usage with neighborhood usage.

D.3. Capture updated email and phone information for both property owner and tenants and for multiple adults in the same residence to facilitate general communications and individual contacts.

D.4. Evaluate moving to monthly billing to assist customers in controlling costs, provide quicker feedback on water usage and improve water loss identification and reporting.

- Monthly billing would also assist in developing consistency between the water purchased and sold for reporting purposes and for analytical purposes.
- Monthly billing would increase staff time for Finance Department but reduce operations and maintenance staff time if incorporated with an AMI system.

D.5. Make electronic copies of hardcopy bills available for online customers to increase the number enrolled in online bill pay.

D.6. Improve communications between operations staff, Public Services staff, and conservation staff through quarterly update meetings.

Wastewater



1. Overview

The collection and treatment of domestic sewage and other wastewater is vital to public health. Wastewater includes all used water coming from households, industry, commercial activities or agriculture and can contain chemical pollutants such as pesticides, salts and poisons, biological pathogens such as bacteria, viruses and parasites, and physical contaminants such as heavy metals, trash and food. In order to maintain water quality in U.S. surface waters, point sources (such as large industries and wastewater treatment plants) are subject to regulations that prohibit contaminated discharge.

Under the National Pollution Discharge Elimination System (NPDES) permit system, created in 1972 by the Clean Water Act, permits are issued which entitle a facility to discharge pollutants up to specific limits established for each. In this area, the Los Angeles Regional Water Quality Control Board is the oversight agency that issues the NPDES Wastewater Discharge permit whose conditions must be met by the City.

In order to meet these stringent water quality standards, wastewater undergoes a series of treatments. Preliminary treatment removes trash, rags, non-flushables and large objects such as branches and rocks through the use of screens. Grit chambers remove items such as sand, coffee grounds, and heavier particles. The water then flows into the primary treatment phase, which has large settling tanks used to separate heavier solids from ones that remain in suspension. Afterwards water flows to secondary treatment, where it enters bioreactors, or aeration tanks which utilize microorganisms to digest any organic materials and treat constituents such as ammonia and nitrates. Wastewater then undergoes a second round of sedimentation to settle solids and microorganisms out which are then returned to the bioreactors. Some treatment plants, including the City's, employ a third or tertiary level of treatment to remove finer particles remaining in the water after secondary treatment. This is accomplished through filters. Before release into open waters, the effluent undergoes disinfectant, often some form of chlorination, to kill any remaining pathogens. Solids are removed along the way from both the primary and secondary treatment processes. These solids are treated in bio-digesters (or digesters), where organic material is broken down and converted into methane gas.

- A. **Wastewater quality:**
Ensure wastewater discharge meets water quality standards.
- B. **Energy management:**
Develop an energy management plan for optimizing efficiency and minimizing costs in the treatment of wastewater.
- C. **Expand capabilities:**
Investigate options for water re-use, organics recycling and biogas

2. Status

Hill Canyon is the location of the City's wastewater treatment plant. Before its construction by the Conejo Valley Sanitary Company in 1961, septic tanks were employed throughout the Conejo Valley. After incorporation in 1964, the City purchased the Sanitary Company and its treatment plant, which following expansion now provides wastewater treatment for about 90% of the City. Wastewater generated in the easternmost portion of the City is collected and treated by the Las Virgenes Municipal Water District.



Hill Canyon Treatment Plant (HCTP) has the capacity to treat some 14 million gallons of wastewater per day (currently averaging around 8 million gallons a day), which arrives to the plant via two main lines fed from the City's network of dedicated pipelines. Sewer (or wastewater) lines bring in untreated water from toilets and drains in homes, businesses and industrial sites throughout the City. This water is confined in pipes and for the most part is gravity fed, which saves City residents thousands of dollars annually in avoided pumping costs. Two lift stations located throughout the City are employed to move a small portion of the wastewater uphill where necessary. At the treatment plant wastewater is treated to a level of cleanliness which renders it suitable for unrestricted reuse and is then discharged into Conejo Creek joining untreated stormwater.

The combined effluent flows northwards out of Hill Canyon to the Santa Rosa Valley, from where it travels west and downhill into the Oxnard Plain. Approximately 7 miles downstream of the Plant, Camrosa Water District pumps some of the water from the Conejo Creek into storage ponds for eventual distribution to agriculture customers for irrigation. Through this process an average of 9,000 AF per year of treated wastewater is provided for various beneficial uses. The unpumped water continues and joins with Calleguas Creek which flows to the Pacific Ocean through Mugu Lagoon. By the time the treated water is discharged, it is completely suitable for reclamation, is low in nitrogen and crystal clear in appearance. The City receives \$104.89 per acre-foot for the supply of the treated effluent to Camrosa, an



amount adjusted annually by the Consumer Price Index¹, resulting in an annual revenue of \$500,000 – \$800,000. In addition, for each acre-foot of provided water that offsets groundwater pumping, the City receives one-half an acre-foot credit from a potable water conservation bank for use in future water shortages. The City splits the credit three ways between the City water agency, Cal-Am, and CalWater.²

HCTP is the highest user of energy in the City due to the energy intensity of the water treatment process. The Plant has worked to reduce its consumption over the past ten to fifteen years and has invested heavily in onsite generation and energy-saving technologies. Since 2010, these include:

- Anoxic and aeration basin 3-6 mixing fix
- Change in digester mixing & heat pumps
- 14 motor control centers - Adding flap-covered louvers in doors and using temperature and humidity to control the fan of one existing air conditioning unit
- Exterior and interior LED lighting upgrades
- Filter influent pumps rebuilt and adjusted control logic
- Replaced chiller for administration building and chilled water pumps with more efficient units
- Replaced the 75 HP South Headworks blowers with 12 HP blowers

HCTP is a state-of-the-art facility recognized as one of the most advanced treatment plants in California through a number of sustainability and environmental awards over the past decade. It utilizes anaerobic digestion within a series of three large tanks (digesters) to generate methane gas, the primary constituent of natural gas, which is then burned in a co-located co-generation facility. This facility has a potential total electricity generating capacity of 1,120 kW although the current generator installation is only permitted for 666 kW output; its construction was largely funded by a grant from the California Public Utility Commission (CPUC) Self-Generation Incentive Program (SGIP). The co-gen facility is operated under a Power Purchase Agreement (PPA) by CHP Clean Energy to whom the City pays \$0.075/kWh for electricity produced. In addition to electricity production, heat from the co-gen facility is used to heat the digesters, where a temperature close to ninety-eight degrees must be maintained to accomplish the digestion process. Furthermore, the co-gen facility also provides heat to the administration building. Production is increased by the FOG (Fats, Oils and Greases) program, in which local haulers transport approximately 16,420 gallons of FOG per day of oil, grease, fatty liquids and other organic or food-based byproducts generated by restaurants to the facility for disposal (Figure WW-3). HCTP also receives 1,680 gallons of FRAPPO material, a non-hazardous organic byproduct from brewed “Frappuccino” coffee drinks at its plant. Disposal fees from these activities generate approximately \$400,000 - \$500,000 a year, with a net annual benefit after costs of about \$315,000. Without these trucked high-fat wastes, digester gas production would fall significantly and, because of the

¹ Camrosa/City contract May 28, 2013.

² CTO 2015 UWMP page 4-8

conditions of the contract with CHP, the unit electricity rate would increase to as much as \$0.097/kWh.

In addition to the co-generation facility, the HCTP facility includes a 584 kW DC (500 kW AC) single axis tracking PV array (Figure WW-1). The system was installed in 2006-2007, beginning operation in April 2007, and is operated under a 20-year Power Purchase Agreement (PPA) with Solar Star TO, LLC (now MMA Energy Capital) in which the City pays \$0.1686/kWh for the generated electricity. The system operates under a net metering (NEM 1.0) agreement with Southern California Edison, in which excess generation is banked for credit to be used when the sun goes down or at other times when onsite production does not meet the Plant's demand and energy from the grid is needed. The NEM system tracks usage and bills monthly but the "bank" is netted out every 12 months at the end of the "relevant period". For HCTP this occurs on June 22 each year. At that time, if the facility has generated more energy that it has consumed over the year, the excess electricity is purchased by the utility at the wholesale (net compensation) rate, around \$0.025/kWh³.



Figure WW-1: Hill Canyon Treatment Plant solar array.

Because of the interplay between co-generated electricity and solar production, although it is possible for HCTP to operate with 100% self-generated renewables this is seldom economically beneficial because any overproduction costs the City \$0.075/kWh (co-gen) or \$0.17/kWh (solar) but generates only \$0.025/kWh revenue. When the methane cannot be used on site excess from biodigesters is flared. Staff recognize the need to address this issue through careful analysis of the energy management strategy and possible renegotiation of existing contracts.

³ on.sce.com/nemsurplusrate

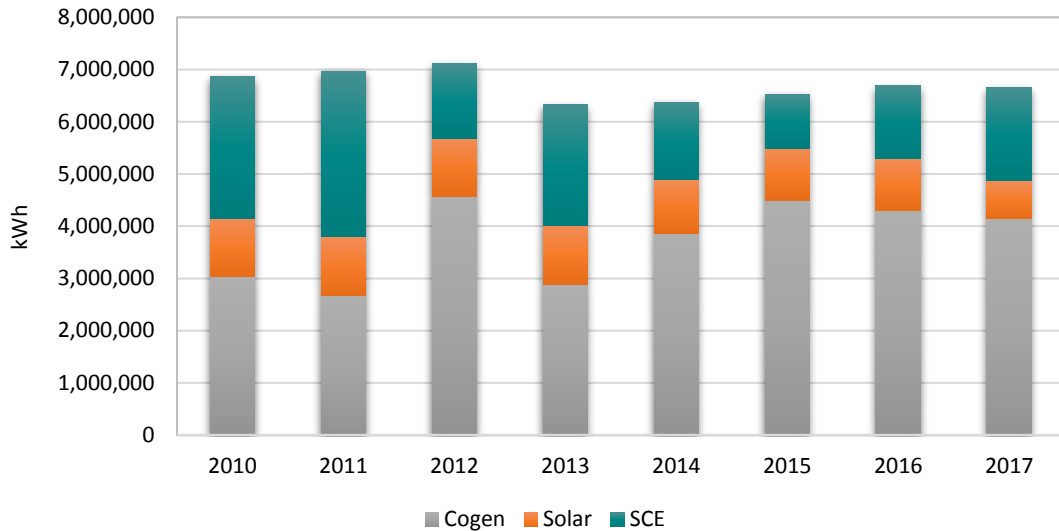


Figure WW-2: Electricity supply for HCTP (2010 – 2017)

Biosolids from wastewater treatment are removed from the biodigestion tanks once anaerobic digestion is complete, and pumped through a screw press to remove excess water. Over 11,000 tons of biosolids are produced each year (Figure WW-3), which are currently trucked to H.M. Holloway gypsum mine in Kern County where they are used to backfill the mine and as a cover material. Although this was formerly classified as a beneficial use by CalRecycle and thus contributed towards meeting the City’s waste diversion target, CalRecycle has now determined that landfilling biosolids will not be eligible for recycling credits by 2020 so the City now needs to find an alternative beneficial use for the product. The current contract with Holloway expires in 2018. Because this material has potentially high proportions of metals and pathogens due to pharmaceuticals, regulations deem it unsafe for direct use on agricultural fields.

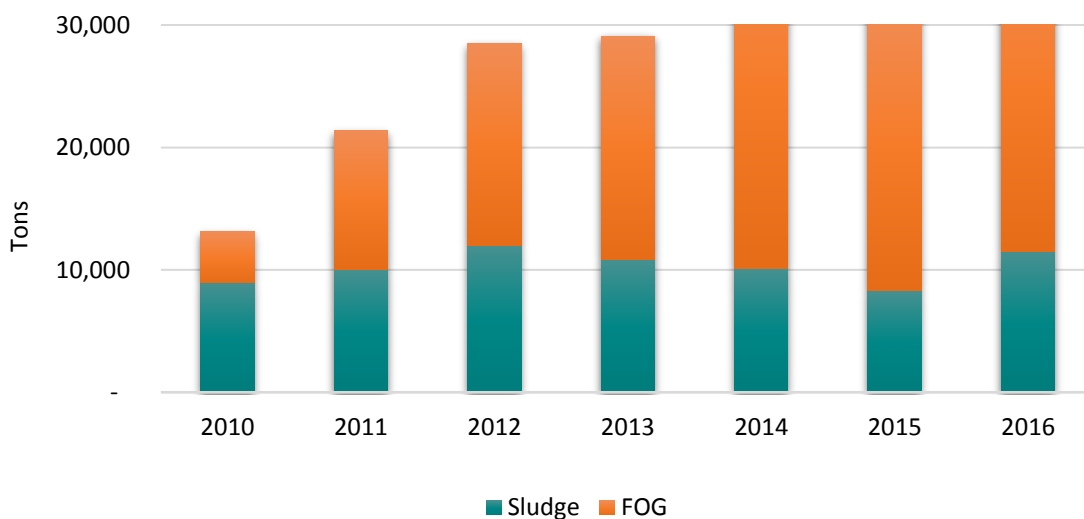


Figure WW-3: FOG and biosolids tonnage

3. Related policies and regulations

a. Clean Water Act Section 303(D)

Requires that states develop Total Maximum Daily Loads (TMDLs) at a level consistent with State water quality standards. The TMDL establishes a target for the total load of pollutants the water body can assimilate and allocates the load to point and non-point sources. The Clean Water Act requires states to calculate the pollutant reduction needed when accounting for seasonal variations and a margin of safety.

b. National Pollution Discharge Elimination System (NPDES) Wastewater Discharge Permit

The City must abide by the conditions of the wastewater discharge permit issued by the Los Angeles Regional Water Quality Control Board (one of nine regional boards under the jurisdiction of the State Water Resources Control Board) in order to discharge its wastewater downstream. Permit requirements include meeting certain limitations for bacteria, OCs/PCBs (organochlorine pesticide/polychlorinated biphenyls), salts, nutrients, metals, selenium, mercury, chlorpyrifos, and other pollutants. The discharge permit is issued pursuant to section 402 of the federal Clean Water Act and serves as a permit for point source discharges to surface waters of the United States.

c. Ventura County Air Pollution Control District (VCAPCD)

The City is regulated by a VCAPCD permit which requires the facility to meet certain limitations on gas emissions related to the anaerobic digesters, standby emergency engines, above ground fueling stations, and a plant boiler.

4. Strategies

A. Wastewater quality

Ensure wastewater discharge meets water quality standards.

A.1. Investigate options to test incoming FOG for contaminants.

FOG is an important component of anaerobic digestion, aiding and accelerating the process. However, the City currently has no controls in place for testing the composition of the incoming materials. To ensure compliance with water quality discharge requirements it would be prudent to investigate alternatives for checking that introduced organics do not adversely affect quality.

A.2. Investigate use of sensors to optimize processes.

- Additional wastewater sensor controls to optimize treatment quality and aeration blower control
- Ammonia analyzers, dissolved oxygen and nitrate sensors
- Screw Press operation optimization through solids feed sensors
- Methane sensors to help optimize FOG injection and digester gas percent methane content for co-digestion
- BOD sensors to optimize carbon source addition (aka glycerol)

A.3. Investigate long term replacement and right-sizing of aeration blowers.

A.4. Investigate use of large bubble diffusers for mixing.

Reduced energy consumption for mechanical mixers without unwanted transfer of oxygen in anoxic zones.

A.5. Integrate SCADA with additional sensors to enable further monitoring and smart control.

A.6. Investigate addition of carbon source (glycerol) to aid with denitrification process.

A.7. Investigate side stream treatment for screw press filtrate.

B. Energy management

Develop an energy management plan for optimizing efficiency and minimizing costs.

B.1. Gain better control and efficiency of solar production through buyout of PPA agreement.

The solar system has seen good production since its installation in 2007, though there have been a number of maintenance issues with the inverters. In 2017 one of the inverters failed completely and caused low output for most of the year (Fig. WW-2). In the preceding two years there had also been periodic equipment issues, primarily related to the inverters, that resulted in low output.

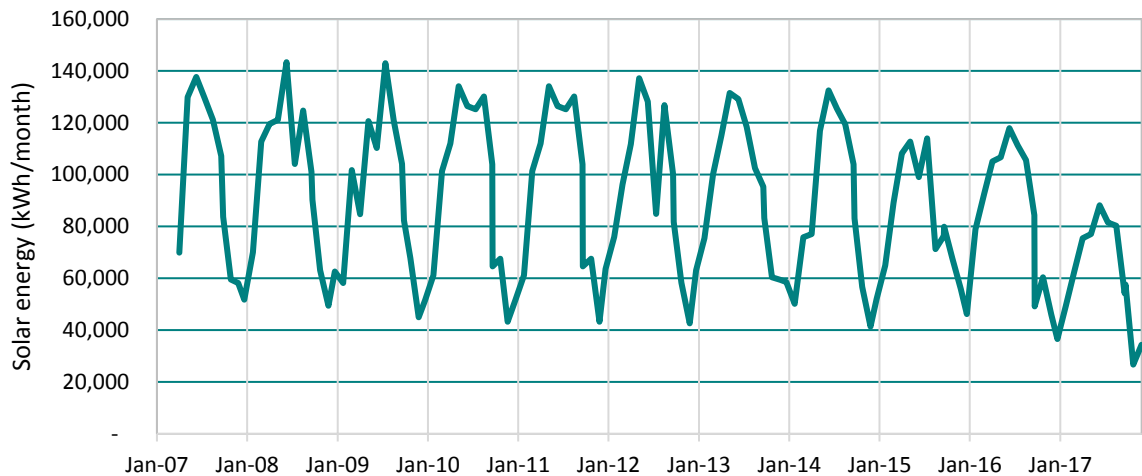


Figure WW-3. Solar generation at HCTP

In 2017, the City was approached to gauge its interest in purchasing the system from the PPA owners. Before entering into negotiations, the City contracted with a third-party for a complete assessment of the solar facility. This revealed several shortcomings – 1. One of the larger (225 kW Xantrex) inverters was non-functioning; it also had a broken disconnect switch; 2. The second large inverter also had a broken disconnect switch; 3. Sixty-six of the (210W) solar panels were bad (2.4% of total); 4. The onsite power monitoring system was not working. Besides these failures, some of which have since been rectified through the service agreement, there are some limitations with the existing system - The early Sunpower solar panels employed are positively-grounded, whereas current panels are all negatively grounded (or impartial). This leads to an incompatibility between new inverters (negatively grounded) and the existing (failing) inverters (positively grounded). Thus, replacements for both modules and inverters will be difficult to locate.

As a result of these challenges the City should try to negotiate a favorable buyout agreement and maintain the equipment for as long as feasible before replacing with new more efficient panels and inverters. This is an opportunity to increase the output of the system by approximately 50% and employ a series of smaller string inverters which avoid catastrophic failure of the system when a single element fails. The payback on such a revamped system is likely to be less than fifteen years.

B.2. Expand solar PV capacity.

In concert with the proposed buyout of the solar system, an analysis should be conducted for expansion of the existing system to approx. 1 MW. This would fit in the existing space and be able to utilize the existing tracking system. A preliminary interconnection application for such a system was filed with SCE in December 2017 in order to meet the deadline for grandfathering under NEM 1.0. If combined solar and co-gen generation exceeds the total use, alternatives should be considered for the methane generated from biodigestion, such as processing as a fuel or sale of the electricity generated (see below).

B.3. Install batteries for storage.

In order to reduce the substantial facility and summer peak demand charges incurred at HCTP, battery storage should be considered. Batteries can be used to store excess energy generated by the co-gen and solar systems, smooth out load, shave peak demand, and provide an instantaneous onsite supply in the event of co-gen plant shutdown or inverter failure. Storage could avoid unnecessary flaring of methane since excess co-gen electricity could be stored.

B.4. Renegotiate co-gen contract to specify how electricity production should account for solar production and institute “smart” controls.

Optimize the production of co-gen electricity in accordance with electricity usage and solar generation through smart algorithms and a contract that supports such controls. These kinds of sophisticated controls are an integral part of microgrids, for which HCTP offers an ideal site (see Energy section).

B.5. Participate in SCE’s Water Infrastructure System Efficiency (WISE) program.

City-owned water systems can benefit from incentive funding to optimize pumping systems and minimize electrical consumption in wastewater treatment plants through the WISE program. Incentives of up to \$0.14/kWh of energy savings are available through the utility for investment in energy efficiency strategies at the treatment plant. (See Energy section).

C. Expand capabilities

Investigate options for biogas alternatives, organics recycling and water re-use.

C.1. Evaluate alternatives for biogas.

Several alternatives exist for use of the biogas produced by the anaerobic digesters. Each should be evaluated for costs and benefits.

- Install a conditioning station to further purify biogas, remove CO₂ and convert to bio-CNG. This can be trucked in canisters or piped to MSC to provide a sustainable energy source for City, public and/or transit vehicles, a CNG station could be installed at HCTP, or the Renewable Natural Gas (RNG) could be fed into a SoCal Gas pipeline. Utilizing CNG from RNG would provide sellable credits on the LCFS Credit Market at a considerably higher value than CNG produced from pipeline natural gas.
- Electricity generated from biogas has high value in the marketplace currently due to the directive by CPUC for California investor-owned utilities to procure up to 250 MW of electricity from bioenergy. The BioMAT program provides a special tariff for energy generated from bio-digesters and waste to energy sources. Currently this rate is over \$0.12/kWh (for reference - the cost of electricity through

Direct Access is \$0.048/kWh) and even in the absence of this incentive there is potential to sell the generated power through the new Clean Power Alliance.

- Storage of biogas could be utilized as fuel storage for additional cogeneration, or to optimize cogeneration.
- Use of biogas to heat and dry biosolids could either reduce trucked biosolids from facility, or provide heat source to compost biosolids for beneficial reuse.

C.2. Assess feasibility of installing a high solids anaerobic digester at HCTP.

It is an optimal time to pursue an additional opportunity for sustainability leadership at HCTP through installation of a high solids anaerobic digester, in view of two State priorities - to reduce greenhouse gas emissions from organics, and to increase electricity production from renewable biogas. The solid waste by-product of wastewater treatment (sludge) is rich in organics but requires additional breakdown in order to be fit for use in agriculture. Given the City's proximity to agriculture, conversion of this organic waste to a material which can be incorporated into our nitrogen- and carbon- depleted soils would seem ideal. A high solids anaerobic digester could accomplish this task by producing a digestate good for composting.

Another beneficial and productive use of such equipment is its potential for processing food (and green) waste. California already requires that commercial entities recycle organic waste, a mandate that is being phased in and will expand to all businesses by 2020. Given that a third of the waste stream comes from organics and that the decomposition of this matter is a significant source of greenhouse gas emissions, it is conceivable that the State will ultimately expand organics collection to residents if its goal of a 50% reduction is not met through the commercial mandate. The County and neighbors to the south are struggling to find facilities able to accept and process food waste. Much of the food waste collected in Los Angeles County is being trucked to Victorville. All of Ventura County's organic waste is processed by Agromin in Oxnard, where it is composted in an open-air facility subject to strict conditions which do not allow it to accept many common biodegradable materials. Although Agromin is seeking to locate a new facility in Santa Paula on the Limoneira site, it has not yet been permitted. With the anticipated increase in organic waste volume over the next five to ten years, a high solids anaerobic digester at HCTP would provide a much-needed local resource for processing food waste.

A high solids digester could utilize biosolids, incorporate FOG, green and food waste, and produce compost and energy thus helping to meet a number of different objectives. There is a strong market for compost in Ventura County, and a state directive for organic waste to be collected and recycled. An additional or re-purposed biodigester could provide a cost-effective solution.

C.3. (Long-term) Assess feasibility of growing food.

Rather than destroying carbon (C), nitrogen (N) and phosphorus (P) resources with their processes, Water Resource Recovery Facilities such as HCTP could benefit from recovering all three as high-value animal- or people-food.

Most advances in C, N, and P recycling have been in the area of converting the carbon to methane (CH₄) or carbon dioxide (CO₂), converting the nitrogen to N₂, and sequestering the phosphorus. Progress is being made on the energy efficiencies of carbon and nitrogen conversions and on nitrogen and phosphorus recovery for use as plant fertilizers. HCTP should explore additional future opportunities in new areas such as recovering these nutrients as high-value food.

Recent technical advances in the industry in this area include:

- INCOVER⁴'s polyhydroxyalkanoates and organic acid from yeast efforts.
- Calysta⁵'s converting CH₄ to fish-food pellets with yeast (a pre-cursor to inland Water Resource Recovery Facilities converting waste-to-organic acid, and eventually food with yeast.)
- The Pasteurization Technology Group⁶'s combination of electricity production with disinfection that is not as sensitive to particulates as chemicals or light. This refers to cost-effective and energy efficient disinfection of primary effluent and biosolids, using "waste" heat from electricity production. The current destroy/dispose-of-waste processes have been driven partly because current disinfection technologies do not work on particulates.

Pasteurization is a key component of making food. With pasteurization, yeast can be grown and most of the incoming C, N, and P can be recycled as feed, food, bio-chemicals, or bio-plastics. This would greatly reduce the volume of biosolids remaining from the wastewater treatment process.

C.4. Evaluate alternatives for water re-use.

- Determine how many credits are currently banked and how tracking is managed for the Conejo Creek Diversion agreement with Camrosa.
- Currently the City receives revenue from Camrosa for treated water. Investigate the system-wide cost-benefit and general sustainability of re-using this treated water in the City for irrigation (would require purple pipe installation and pumping).
- Investigate cost-benefit for additional treatment of water to potable standards for local use (either direct or indirect reuse).
- Integrate re-use studies with other water studies: groundwater, stormwater, etc.

⁴ <http://incover-project.eu/>

⁵ <http://calysta.com/>

⁶ <https://www.ptgwe.com/technology-2/>

Stormwater



1. Overview

Stormwater runoff results from rain that flows over impervious surfaces such as paved streets, parking lots and building rooftops and does not soak into the ground. The City's drainage network collects this stormwater in addition to runoff from irrigation, construction sites and commercial and industrial sources. Runoff picks up pollutants that can harm rivers, streams, lakes, and coastal waters. Common pollutants include pesticides, fertilizers, chemicals, oils, and litter as well as bacteria from both animal and human waste. Even non-toxic and biodegradable products such as silt, dirt and organic waste are contaminants in keeping streams clean and unpolluted.

Historically stormwater was diverted, channeled and routed to the ocean as efficiently as possible with limited treatment and limited capture for beneficial use. This approach has gradually shifted to favoring methods that treat and manage stormwater and runoff onsite. This provides benefits including groundwater recharge, improved water quality, flood control, and potential for green space development.

To protect water resources, stormwater discharge is regulated by the State Water Resources Control Board (SWRCB) and best management practices are increasingly employed to filter out pollutants and prevent them from entering the system. The City is issued a permit which specifies the total maximum daily allowable levels (TMDL) for a number of different contaminants including chemicals, salts, pesticides, etc. In addition, the SWRCB recently adopted an amendment to also control the amount of trash contained in runoff. Compliance with this amendment will require the installation of trash full-capture devices in high priority land use areas to eliminate trash from stormwater before it is discharged downstream.

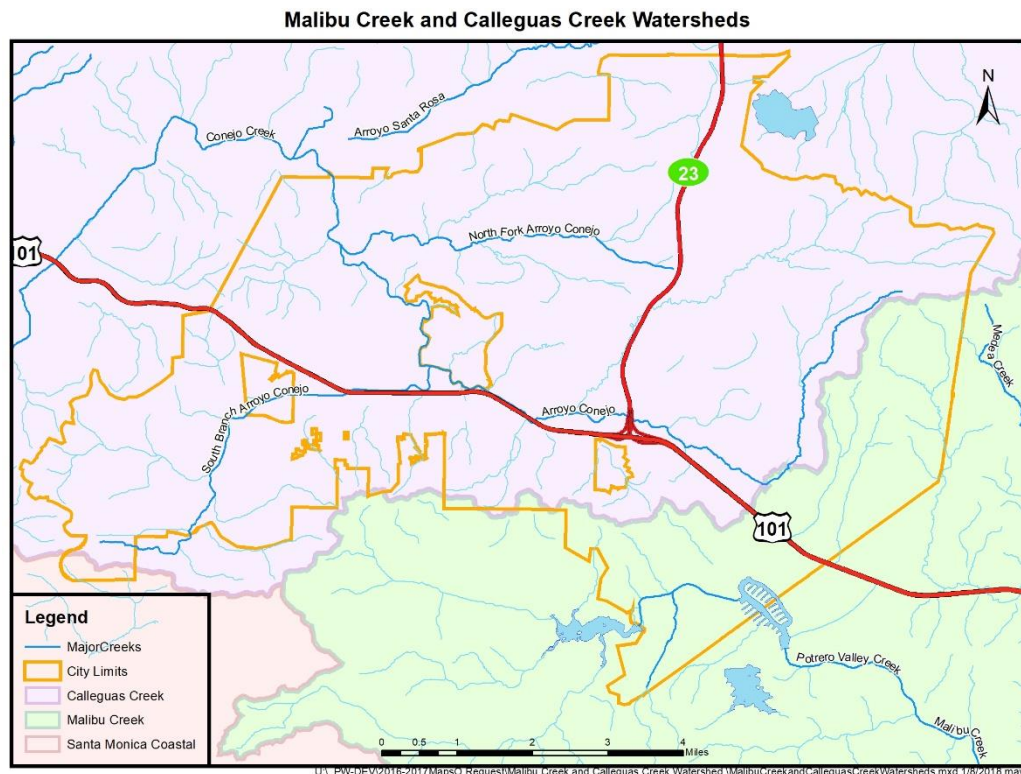
Stormwater Goals

- A. **Stormwater quality:** Ensure stormwater discharge meets water quality objectives and permit requirements.
- B. **Trash:** Eliminate the discharge of trash into waterways including from non-point sources.
- C. **Cost sharing:** Mitigate and fairly share costs of meeting permit requirements across related programs to ensure a financially sustainable solution.



2. Status

The City of Thousand Oaks owns and maintains a Municipal Separate Storm Sewer System (MS4) unlike some older cities which operate combined stormwater and wastewater sewer systems. Such separation is advantageous in that heavy rain events do not appreciably affect sewer volume or significantly impact wastewater treatment operations. However, both the sewer system and the Conejo Creek stormwater system converge at the bottom of Hill Canyon, the location of the City's wastewater treatment plant. (A small part of the stormwater system which is located within the Malibu Creek Watershed flows to Malibu Creek.) The stormwater flows by gravity via a network of storm drain pipes, channels, culverts, and streams to Hill Canyon via the South and North Fork of Arroyo Conejo. This water is untreated and flows downstream to join Calleguas Creek in the Oxnard Plain and eventually into the ocean via the Mugu Lagoon.



2.1. Regional Coordination

Stormwater discharge is regulated under the 1972 Clean Water Act which protects the quality of surface waters throughout the nation. The National Pollution Discharge Elimination System (NPDES) permit system was created as part of this Act and regulates point sources (such as large industries and wastewater treatment plants) that discharge pollutants into waters of the United States.¹ In 1987 the Federal Clean Water Act was amended to include non-point sources or stormwater. The SWRCB administers this legislation at the state level. To facilitate local administration, the SWRCB has nine regional water quality control boards.

¹ Link: [National Pollutant Discharge Elimination System](#)

In the City's region, the Los Angeles Regional Water Quality Control Board (LARWQCB) is the oversight agency that issues NPDES Municipal Separate Storm Sewer System (MS4) permits. In 1994, the County of Ventura, the ten cities, and the Ventura County Watershed Protection District (VCWPD)² were issued the first Ventura County stormwater NPDES permit by LARWQCB. VCWPD is the principal permittee and provides administration for the rest of the members who are co-permittees. The conditions of the permit must be met by all signatories to it. The countywide benefit assessment, established to pay for stormwater compliance, was fixed at the 1994-95 rates and no longer covers the cost of the program.³ As a result of the passage of Proposition 218 in 1996, any increase would require majority balloting approval from property owners.

On July 27, 2000, a second NPDES permit was issued. That five-year permit was given an administrative extension until May 7, 2009, when Regional Board Order 09-0057 was adopted. However, shortly after adoption, the Regional Board rescinded it to hold a new hearing and on July 8, 2010, a new order⁴ was adopted replacing the 2009 order, with a new set of implementation deadlines. This permit expired on July 8, 2015, but is currently on administrative extension awaiting a new permit, which has been delayed by a number of court cases.⁵

In 2015, the SWRCB adopted new Trash Amendments to control the discharge of trash in surface and ocean waters, which were approved by the U.S. EPA on January 12, 2016. These prohibit the discharge of litter, specify implementation requirements and provide a framework for monitoring and reporting requirements. The State has chosen to implement these new requirements separately from the MS4 permit.

All Ventura County cities, the County of Ventura, and VCWPD work together under the Ventura Countywide Stormwater Quality Management Program (VCSQMP), which was developed to improve stormwater quality, monitor watershed health and meet the compliance requirements of the countywide permit.

The City is situated primarily within the Calleguas Creek Watershed. The new NPDES MS4 permit will likely require the City to either develop an Enhanced Watershed Management Plan (EWMP), which is a watershed-based collaborative effort, or a Watershed Management Plan (WMP) which is jurisdiction-specific and prescriptive. The Calleguas Creek Watershed Implementation Plan: Phase II has been developed in preparation for an EWMP for our watershed.

² Link: [Ventura County Public Works - Watershed Protection District](#)

³ Ventura Countywide Stormwater and Total Maximum Daily Load Program Funding Strategies, Preliminary Cost Estimate, and Penalties of non-compliance. December 2016 funding options summary background page 1 (Stormwater Funding Strategies).

⁴ Order No. R4-2010-0108

⁵ These include unfunded mandate test claims filed by several municipalities, including Ventura County, and a Natural Resources Defense Council (NRDC) court case.

The California Water Code requires that Stormwater Resource Plans be developed and provide for community participation in order to be eligible for State funding. Ventura County's was developed to be flexible so that Best Management Practice projects can be revised as necessary for applications for Prop 1 grant funding.

In 2006, a group of local water-related agencies formed the Watershed Coalition of Ventura County (WCVC) to further pursue integrated water management planning in the region. The coalition has expanded to include environmental stewardship organizations, groundwater basin management authorities, community organizations, Native American tribes and state, federal and regional agencies, and universities. The WCVC is a large consensus-based organization and has five committees engaged in local planning and implementation. An Integrated Regional Water Management Plan (IRWMP) was developed by the group in 2006 (and updated in 2014) to integrate regional efforts related to water supply reliability, water recycling and conservation, access and recreation, flood control and habitat and environmental resource protection.⁶

2.2. Stormwater Quality

The County monitors stormwater quality for the Calleguas Creek Watershed just above the Hill Canyon outfall, measuring and documenting ten classes of pollutants for a list of water quality objectives in the MS4 permit.

To address the monitoring requirements for TMDLs in the watershed, the Calleguas Creek Watershed TMDL Implementation Program was established (CCWTIP). During the first years of the CCWTIP, stakeholders collected data to guide implementation and establish baseline pollutant levels. Initial studies have now been completed and seven years of data collected. Analysis shows that some constituents will not meet the TMDL allowable limits without the implementation of additional programs.⁷ The City is challenged in meeting limits for bacteria, trash, salts and pesticides in the City portion of the watershed. It is possible that the State Water Board may delist pesticides and metals in future, which would eliminate any mandate for action on these contaminants. In addition, the pesticides are residuals from historical DDT⁸ use and are degrading naturally, so it may not be necessary to act on these. The CCW does not have an established TMDL for bacteria currently and the expectation is that once established, the City will be allowed twenty years to come into compliance⁹.

The Malibu Creek Watershed is also monitored and has struggled to meet bacteria, nutrients and trash standards. The compliance deadline for the dry weather bacteria TMDL was 2012, the trash TMDL was July 2017, and the wet weather bacteria TMDL is July 2021. So far, the City has been unable to meet these limits to date. The preliminary schedule indicates that full dry weather bacteria compliance is required by January 2023 and full wet weather by July

⁶ Ventura Countywide Municipal Stormwater Resource Plan, September 20, 2016 Geosyntec – Page 12

⁷ Calleguas Creek Watershed Phase II – ES-1

⁸ DDT (dichloro-diphenyl-trichloroethane) was developed as the first of the modern synthetic insecticides in the 1940s. In 1972, EPA issued a cancellation order for DDT based on its adverse environmental effects, such as those to wildlife, as well as its potential human health risks.

⁹ Calleguas Creek Watershed Phase II – ES-1

2026.¹⁰ In addition, the State is considering modifying the previously approved Malibu Creek trash TMDL to make it consistent with the new, more rigorous, trash amendments.

Another contamination issue that the City's stormwater faces is the high concentration of dissolved salts in its discharge, specifically chlorides and total dissolved solids (TDS). The Hill Canyon Wastewater Treatment Plant contributes to this issue. Strategies for reducing chlorides, such as a salt balance mechanism,¹¹ which considers watershed-wide measures, should be considered together with reductions from sources such as treatment plants, runoff and agricultural sources. Local springs and imported water both contribute to the salt imbalance, so reducing imported water and the use of desalters could both be effective methods of reducing salts.¹²

In Thousand Oaks, over-irrigation is a significant contributor to stormwater pollution as it can carry bacteria, pesticides and fertilizers that are used on lawns, as well as increase salt content. Although excessive runoff and overspray on hardscapes are violations of the City's permanent water conservation ordinance, the practice is widespread and specific areas within the City, such as the North Fork of the Conejo Creek through CLU and along Avenida de Los Arboles, have perennial flow due to natural springs and overirrigation. The proposed use of groundwater for irrigation could introduce additional salts into the system unless it is mitigated at its source, or discharged into a regional brine line.

Another component of stormwater pollution is trash, often originating from littering with additional contributions from exposure to wind and rain of commercial trash enclosures when bins are left with lids open. Although both are code violations, they are difficult to monitor and enforce.

The City currently employs five environmental compliance staff to oversee stormwater quality. Staff respond to illicit discharge complaints, generally related to cleaning activities or wash downs of properties, and less frequently, dumped substances which staff trace back to the source. Typical discharges are oil, paint, concrete slurry, and outflow from mobile car washes not equipped with proper containment devices. Staff respond to 80-120 calls annually. In a proactive approach, staff perform regular commercial and industrial inspections. Their schedule includes approximately 420 restaurants and 180 automotive maintenance facilities twice every five years, and 130 industrial facilities, typically fleet or storage yards or outside work areas. Nine facilities have an industrial waste discharge permit that allows them to discharge industrial waste water directly to the sewer system; these are inspected twice a year. To reduce bacterial contamination, the City in collaboration with the Conejo Recreation and Park District, supplies dog waste bags at trailheads, parks, and other public locations to encourage dog walkers to clean up after their pets. In addition, staff conduct drinking water sampling, quality testing and pretreatment inspections. A number of different divisions within the Public Works Department support stormdrain maintenance and improvement, and Engineering Services staff ensure that property developers integrate rainwater capture and prevent runoff in their plans.

¹⁰ VC MS4 Permit Structural Implementation Cost Estimate – Pg 4



















¹¹ CCW Plan by Larry Walker and Associates

¹² Calleguas Creek Watershed Phase II, Pg 57

2.3. Best Management Practices

There are many Best Management Practices (BMPs) to keep treat stormwater or keep it onsite, including landscape swales, filters, and rain gardens. Increasingly, NPDES MS4 permits require that new development and redevelopment projects use green infrastructure practices to retain rainfall on site rather than allowing it to run off and enter stormwater systems. Ventura County's MS4 permit requires retention of the 85th percentile storm volume (roughly 3/4 inch of rain) on site. Where stormwater BMPs are mandated, they are recorded on property deeds and passed on to title successors. Affected property owners must provide documentation annually confirming that BMPs have been maintained. Typically, these apply to commercial properties but hillside or large residential lots may also be subject to BMPs.

Many cities and states are encouraging the use of green infrastructure to capture and infiltrate rain onsite through incentives, zoning, and permitting programs, or by investing in such infrastructure on public property.¹³ Green roofs, trees, rain gardens and permeable pavement are components of green infrastructure that reduce runoff, and provide additional benefits.¹⁴ Cost effectiveness of such practices can be evaluated using online software or the American Forests CITYgreen ArcGIS extension.

Benefit	Reduces Stormwater Runoff					Improves Community Livability												
	Reduces Water Treatment Needs	Improves Water Quality	Reduces Grey Infrastructure Needs	Reduces Flooding	Increases Available Water Supply	Increases Groundwater Recharge	Reduces Salt Use	Reduces Energy Use	Improves Air Quality	Reduces Atmospheric CO ₂	Reduces Urban Heat Island	Improves Aesthetics	Increases Recreational Opportunity	Reduces Noise Pollution	Improves Community Cohesion	Urban Agriculture	Improves Habitat	Cultivates Public Education Opportunities
Practice																		
Green Roofs	●	●	●	●	○	○	○	●	●	●	●	●	●	○	○	○	●	●
Tree Planting	●	●	●	●	○	○	○	●	●	●	●	●	●	●	●	○	●	●
Bioretention & Infiltration	●	●	●	●	○	○	○	●	●	●	●	●	●	○	○	○	●	●
Permeable Pavement	●	●	●	●	○	○	○	●	●	●	●	○	○	○	○	○	○	●
Water Harvesting	●	●	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	●

● Yes

○ Maybe

○ No

● Yes ○ Maybe ○ No

Table SW-1: Five common green infrastructure practices and their potential co-benefits across multiple desirable attributes.¹⁵

However, a significant drawback to the use of infiltration practices in Thousand Oaks is that less than 5% of land in the City is considered permeable due to the presence of clay soils and proximity to bedrock. Potential solutions include dry wells filled with gravel to increase

¹³ Looking Up: How Green Roofs and Cool Roofs Can Reduce Energy Use, Address Climate Change, and Protect Water Resources in Southern California – NRDC & Emmett Center on Climate Change and the Environment – UCLA School of Law – Page 6

¹⁴ The Value of Green Infrastructure: A Guide to Recognizing its Economic, Environmental and Social Benefits – Center for Neighborhood Technology (funded by USEPA and Kresge Foundation). Page 1

¹⁵ Link: [The Value of Green Infrastructure](#)

percolation time, and buried modular structures such as Silva Cells¹⁶ that support paving while creating open space below ground to hold lightly compacted soil. These types of modular structure allow stormwater to be captured onsite and encourage the growth of stronger tree root systems.

Solid waste activities that benefit water conservation and stormwater quality include source reduction activities that promote grasscycling, home composting, and elimination or reduction in the use of fertilizers and chemicals applied outdoors. Water conservation and stormwater capture onsite may prove to be more cost-effective when stormwater benefits are integrated into the cost-benefit analysis.

In addition to BMPS the following have been identified as co-beneficial.¹⁷

Project Name	Location	Project Description	Benefits Expected					Source
			Water Quality	Water Supply	Flood Management	Environmental	Community	
Calleguas Creek IP Project TO-1	Wildflower Playfield	Capture & Reuse	X	X	X	X	X	Calleguas Creek Implementation Plan
Calleguas Creek IP Project TO-1	Thousand Oaks Community Park	Capture & Reuse	X	X	X	X	X	Calleguas Creek Implementation Plan
Calleguas Creek IP Project UC-2	Santa Rosa Valley Park	Infiltration Basin	X	X	X	X	X	Calleguas Creek Implementation Plan
Watershed Mgt. Strategy Study Projects	Various Locations	Alternatives intended to convey the 100-year flood using various strategies including channel conveyance, bridge replacement, culvert enlargement, storage (detention basin), or local drainage improvements	X	X	X	X	X	Upper Calleguas Creek Watershed Management Strategy Study (July 2013)

Table SW-2: Projects and co-benefits.

¹⁶ Link: [Silva Cell](#). Each cell holds 13.23 ft³ of planting soil and approximately 19.70 gal of stormwater and costs are estimated at \$14-\$18 per cubic foot installed

¹⁷ Ventura Countywide Municipal Stormwater Resource Plan, September 20, 2016 Geosyntec – Page 20

2.4. Regulatory Compliance and Costs

The SWRCB Enforcement Policy sets the policy for how its regional boards will enforce water quality regulations. Enforcement actions include Notices of Violation, Cleanup and Abatement Orders, Time Schedule Orders, Cease and Desist Orders, Modification or rescission of Waste Discharge Requirements, and Administrative Civil Liabilities. The Enforcement Policy, in conjunction with the California Water Code Section 13385 determines mandatory enforcement obligations for violations of the NPDES permit. Failure to comply could result in the following minimum fines:

1. Serious violation (exceedance of an effluent limitation by greater than 40% for Group 1 pollutants, or greater than 20% for Group 2 pollutants) = \$3,000 per violation
2. Non-serious violation (exceedance by less than the percentages above) = \$3,000 per violation for the fourth and any subsequent violation occurring within a 180-day period.¹⁸
3. Administrative Civil Liabilities can be added for a total of up to \$10,000/day in fines. These are more likely to be applied if violations are a result of non-implementation of agreed upon measures; less likely if good faith efforts have been made.¹⁹

Preliminary cost estimates for the annual watershed management program development, implementation, operations and maintenance, ongoing VCSQMP, and stormwater program minimum control measures range from \$95 million to \$310 million over 20 years.²⁰ Annual countywide costs vary significantly over the 20-year period from a low estimate of \$1.35-\$17 million and high of \$5-\$120 million depending on the year.

¹⁸ Stormwater Funding Strategies, Compliance Memo, Page 2

¹⁹ Stormwater Funding Strategies, Compliance Memo, Page 3

²⁰ Larry Walker & Associates in the Ventura Countywide Stormwater and Total Maximum Daily Load (TMDL) Program Funding Strategies, Preliminary Cost Estimate, and Penalties of Non-Compliance produced June 15, 2017

3. Related Policies and Regulations

a. Clean Water Act Section 303(D), 1972 (+ subsequent amendments)

Requires that states develop TMDLs at a level consistent with State water quality standards. The TMDL establishes a target for the total load of pollutants the water body can assimilate and allocates the load to point and non-point sources. The Clean Water Act requires states to calculate the pollutant reduction needed when accounting for seasonal variations and a margin of safety.

b. National Pollution Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit (under Clean Water Act)

The City must abide by the conditions of the MS4 permit issued by the LARWQCB in order to discharge its wastewater and stormwater downstream. Permit requirements include meeting certain thresholds for bacteria, OCs/PCBs (organochlorine pesticide/polychlorinated biphenyls), salts, nutrients, metals, selenium, mercury, chlorpyrifos, trash and sediment before it is transported to the ocean²¹.

c. Trash Amendment to the Water Quality Control Plan, 2016

The Trash Amendment is not part of the MS4 permit, but rather, a separate requirement enacted by the SWRCB that prohibits the discharge of trash. The U.S. EPA approved the Trash Amendments on January 12, 2016.

d. SB 231 (Hertzberg, 2017)

Clarifies that stormwater that is beneficially reused for potable water, or as part of wastewater, is exempt from Proposition 218.



²¹ Calleguas Creek Watershed Implementation Plan Phase II – ES-2

4. Strategies

A. Stormwater quality

Ensure stormwater discharge meets water quality objectives and permit requirements.

A.1. Reduce source pollution

- Determine the sources of salts through analysis of amount coming from imported water. Conduct a cost benefit analysis to compare alternative mechanisms of reducing salt.
- Administer Notices of Violation in the field followed by fines for stormwater violations. This would be especially useful for mobile violators who are harder to track.
- Track down and repair leaks to reduce water loss in the water distribution system.
- Develop mitigation measures for human discharges to the environment in transient population areas.

A.2. Increase outreach and education on stormwater and related programs.

- Conduct outreach to Conditionally Exempt Small Quantity Generators (CESQGs) on Chlordane and Toxaphene bans for structural pest control and landscaping.
- Develop or promote an IPM certificate for pest control companies.
- Conduct targeted outreach on Household Hazardous Waste collection services to specific audiences and businesses.
- Promote and assist local landscapers to be certified as EPA certified Water Sense Irrigation professionals.
- Increase water conservation education to reduce dry weather runoff. Decrease over-irrigation through outreach and water efficiency programs.
- Conduct water softener education and outreach.
- Increase public outreach and promotion of Stormwater BMPs on private properties, such as installation of rain barrels and landscape retention.

A.3. Explore new methods for stormwater capture and retention.

- Pilot use of Silva Cell-style stormwater capture devices in areas with dense hardscaping, incorporate trees and encourage pedestrian usage, e.g. on Thousand Oaks Blvd.
- Implement a pilot BMP Project²². A rainwater harvesting system using a subsurface storage tank at North Ranch Playfield has been identified as a potential stormwater capture BMP. The park is owned by CRPD and requires 10,500 HCF

²² Ventura Countywide Municipal Stormwater Resource Plan, September 20, 2016 Geosyntec – Pg 64

annually for irrigation. A tank adequate to capture the historical rainfall was modeled and could be installed without impacting the developed areas of the park. With a storage volume of 460,000 cu. ft., the tank would capture 71% of the 85th percentile of a 24-hour storm event from drainage from 1,030 acres in the Malibu Creek Watershed.

- A.4. Develop procedures to ensure new developments are periodically monitored for compliance with required BMPs.**
- A.5. Assess costs and feasibility of diverting stormwater through the wastewater processing system for treatment.**

B. Trash

Eliminate the discharge of trash into waterways including from non-point sources.

In order to attain compliance with the Trash Amendment, which requires that the stormwater system have the capability of capturing trash resulting from a one-hour storm runoff event, the City can pursue one of two routes.

The first requires placement of full capture devices or Connector Pipe Screens (CPS) at catch basins in high priority areas. Current estimates are that there are 3,600 storm drain inlets and 616 of these inlets will require full capture devices at a cost of approximately \$1,000-\$1,200 each, installed. Full deployment of these devices would therefore result in a total capital cost of approximately \$600,000-\$725,000. Aggregate annual maintenance costs at full implementation are estimated at \$115,000. Some jurisdictions are developing mobile apps to take pictures before and after maintenance to determine if the maintenance schedule is adequate. If these devices are installed and maintained adequately then the City is deemed compliant with the trash amendment mandate. In addition to high maintenance costs, this approach does not account for catch basins on commercial properties, which are believed to be a significant source of trash. Staff are evaluating how many private catch basins are within the City and potential options for cleaning. In some cases, City staff are already performing cleanups on private property.



Connector pipe screen - this device captures trash after it has entered the storm drain while allowing water to flow through.



Trash excluder - this keeps trash from entering the stormwater system and can be used in conjunction with connector pipe screens.

The second option is to install a centralized capture system in a major stormwater artery that traps trash after it has entered the stormdrain system and before it reaches the outfall. Centralized capture systems are more expensive than individual pipe screens but have a significantly lower cost of maintenance because there is only a single device to clean out. These systems require ongoing monitoring to ensure that trash is being adequately captured. In addition to these devices the City would need to develop a plan to ensure implementation of BMPs like street sweeping and inspections.

B.1. Develop the City’s trash amendment compliance plan and implementation schedule.

This plan should achieve approximately 10% of City coverage each year so that after ten years the jurisdiction is 100% covered for public inlets. The plan is enforceable through the “13383 Letter” (refers to section 13383 of the California Water Code) issued by the SWRCB on August 18, 2017. The implementation plan must be submitted to the SWRCB by February 18, 2019.

- Map out areas generating trash and identify problem sites. Levy fines/fees or require sweeping.
- Develop plans and schedule for trash capture device deployment in stormdrains throughout the City.

B.2. Reduce public trash.

- Evaluate additional street sweeping, including on private lots.
- Increase litter ordinance enforcement.
- Deploy additional public waste containers.
- Provide trash disposal options in areas frequented by transient populations.
- Increase enforcement requiring that solid waste bins in commercial establishments have their lids closed and the area around the bin kept clean. This would also reduce the access to food for rats, birds and other animals and could reduce the use of rodenticides providing a co-benefit.

C. Cost sharing

Mitigate and fairly share costs of meeting permit requirements across related programs to ensure a financially sustainable solution.

In November 1996, California voters passed Proposition 218, the “Right to Vote on Taxes Act”. This constitutional amendment protects taxpayers from tax or fee increases by limiting the methods by which local governments can create or increase taxes, fees and charges without taxpayer consent. Proposition 218 requires voter approval prior to imposition or increase of general taxes, assessments, and certain user fees. Proposition 218 has exemptions from balloting for water, wastewater and solid waste collection. Therefore, quantifying the costs associated with stormwater management that have a nexus to one or more of these

exemptions would allow for the costs to be shifted to those funding sources and reduce the need for general fund dollars.

In expanding the universe of stormwater contributors, it would be useful to quantify proportional stormwater impacts and find funding streams that would compensate for those impacts. For instance, the Orange County Transportation Authority awarded \$3.1 million from sales tax transportation funds to 16 cities for projects reducing transportation-related water pollution.²³

C.1. Evaluate use of solid waste funding to meet trash requirement.

- Provide additional street sweeping where necessary.
- Utilize California Redemption Value (CRV) block grant and discretionary grants for litter abatement and combination trash/recycling containers in public places.
- Utilize used oil block grants for trash excluders that capture used oil entering storm drains.
- Utilize used oil block grants for the costs of stenciling storm drains with warnings that they “lead to the ocean.”
- Conduct catch basin clean outs.
- Implement trash excluders, connector pipe screens and/or a centralized capture system.

C.2. Evaluate use of wastewater funding to help meet stormwater quality standards.

- Perform monitoring and testing associated with wastewater (fecal coliform, etc.).
- Address illicit connections, discharges, and overflows.
- Redirect stormwater through treatment plant processes as necessary.

C.3. Evaluate opportunities for Best Management Practices in other projects.

- Evaluate use of BMPs in all capital investment projects. Where feasible, mitigation projects could be a component of a larger project, for example large street capital projects could have a spreading/calming component integrated as part of their costs.
- Work with the Community Development Department to integrate “Green Streets” concepts into development projects.

C.4. Evaluate options to increase enforcement of water conservation ordinance in the City, reducing runoff.

²³ OCTA awards \$3.1 million to 16 cities for water-quality improvement projects – Jessica Kwong, August 14, 2017 - Orange County Register

Engagement



1. Overview

Local governments hold substantial influence that can propel sustainability efforts in their jurisdictions. In addition to managing their own resource practices and leading by example, local governments can significantly influence behavior to benefit the environment through policies, plans, and actions.

Many of the strategies identified in this Plan will “green” City facilities by increasing efficiencies and reducing waste, energy and water consumption. As well as greening facilities themselves, the City should encourage and foster a culture of sustainability amongst employees as this will bring about wider adoption of best practices at work and in the community. Specific training for staff, incentives and competitions for sustainability achievements, and more visible messaging will assist in developing a stronger internal sustainability culture. As the City’s ambassadors to the public, it is important that staff are able to articulate the City’s sustainability vision and actions, and model best practices.

A 2012 GlobeScan survey found that 83% of employees of large companies expect to be engaged with their company’s sustainability strategy¹. They also expect to have the company educate them on how to be more sustainable in their own lives. Satisfied and engaged employees have a clear understanding of their company’s sustainability strategy, can explain it to others, and understand what their role is within the overall strategy.

Engagement Goals

- A. Awareness:**
Increase staff awareness and literacy in sustainability.
- B. Public Engagement:**
Utilize the City’s unique position to educate and engage its constituents.
- C. Research:** Expand research in practices, policies, and innovation.



¹ Link: Greenbiz.com “You’re talking to employees about sustainability wrong”

2. Status

The City has been regionally and nationally recognized as an environmental leader, demonstrated through awards such as Green Fleet, Bee City USA, Tree City USA, Environmental Public Outreach, Cool Planet, Beacon Awards, and more. Each City facility should highlight the City's environmental commitment through posters and messaging so sustainability becomes a point of pride.

2.1. Sustainability Division

The Sustainability Division ("Division") focuses on the primary areas of water, energy and waste. Within the area of water, staff responsibilities include outreach and education on conservation and efficiency, data analysis and reporting, and support to the City utility's team in seeking technology improvements and funding opportunities. Waste and recycling programs for the City are managed by Division staff, whose responsibilities include policy, reporting, education and outreach, in addition to oversight of programs for construction and demolition debris, organics (food and green waste), hazardous waste, recycling and Adopt-A-Highway. Staff manage hauler contracts including quarterly reporting and fee collection, oversee the City's household hazardous waste facility, complete CalRecycle reports, and ensure compliance with State mandates. Climate action and the reduction of carbon emissions (greenhouse gas emissions) have been a goal of the Division for some years, but action has been delayed by the development of the Public Works Strategic Plan and resulting re-organization. Staff are now active in energy management and planning for both City facilities and for the City at large with a focus on energy use and cost analysis, development of a greenhouse gas inventory, and identification of opportunities to expand renewable energy use and assets. Besides these three functional activity areas, the Division embraces a strong outreach, education and customer support component developed over many years.

2.2. Community Outreach

The Division encourages and assists residents and businesses to make environmentally preferable choices at home, school, and work. Programs include recycling, proper hazardous waste disposal, energy efficiency, renewable energy, and water conservation. The *Go Green* website² provides access to sustainability-related information whose content is informed by public interest. Website content addresses common questions from the community on the following topics:

- Beverage container recycling centers (CRV redemption)
- Composting
- C&D permit requirements with links to the Green Halo application
- Energy efficiency and solar energy
- Green business certification program



² Link: [Thousand Oaks Sustainability Website](#)

- Green living and waste reduction opportunities
- Hazardous waste including electronics recycling, used oil centers, and HHW facility
- Integrated pest management (IPM) and rodenticides
- Street sweeping
- Trash and recycling services, commercial and organics recycling
- Water conservation including greywater
- Energy and water rebates

The website has increased staff efficiency significantly by reducing calls from the public by 50-60% over the last five years.

For topical issues and event promotion, the Division maintains a weekly blog. At the end of each month blogs are aggregated into an email-newsletter that currently reaches over 10,000 active subscribers and maintains a low (16%) unsubscribe rate. The open rate is 35-40%. The newsletter has consistently been the primary avenue for getting the word out to residents about sustainability practices, activities, and awards. Residents who are not active online can access similar information via their waste bills. A compilation of the Division's blogs is printed by the waste haulers in a two-page color insert entitled "Green Scene" and placed in bill envelopes quarterly.



The Division's use of email is a high priority, and has been successful in reducing costs. For example, approximately 95% of residents who utilize the City's Household Hazardous Waste (HHW) facility to drop off such materials register online. As this process requires users to submit an email address, the Division is able to further expand its email outreach efforts. Staff also collect email addresses at public events. Emailing has substantially reduced the need for paid advertising. Half of the e-newsletter subscribers' access via desktop and the other half from multiple mobile platforms. 1,527 new contacts were added from January 1, 2017 to September 20, 2017. New contacts came from the following sources:

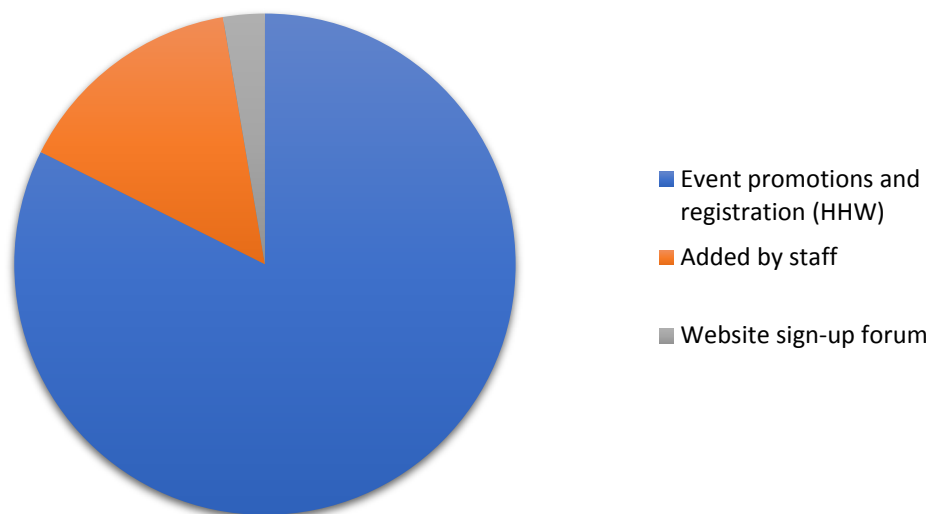


Figure EG-1: E-newsletter sign-ups between January 1, 2017 and September 20, 2017

The Sustainability Division is also active in social media, utilizing Facebook, Pinterest, Twitter, YouTube, and Google+. The Facebook page has 1,739 followers. An organic, unpaid Facebook post is estimated to reach 1-2% (17-35 followers). The Facebook algorithm increases the reach for posts that generate significant public engagement, but promoted or paid posts are required to increase the reach. Facebook paid campaigns have proven cost-effective and can be precisely targeted to the desired market, but the interface and rules change frequently which makes the use of this platform challenging.



Good connectivity between the Division's social media and the City's, which is managed by the City Manager's Office, ensures that communications are distributed widely throughout the community. Since the City transitioned to the Vision platform for management of its website content, staff is exploring how to add automatic postings through the system. Fliers, brochures, newspaper ads, telephone hotlines (805-449-SAVE and 805-376-5007), community and corporate events, and YouTube are other outreach methods that are employed. TOTV has developed educational material in support of sustainability including videos on the Household Hazardous Waste and Hill Canyon Treatment Plant facilities, and segments on "Defeat the Drought" and "How to Go Solar". Several years ago, the Division began using a *Go Green* tag on all outreach materials. In 2017 a more refined design standard was developed for the *Go Green* logo and all marketing materials.

The City Manager's Office includes a sustainability element in their City Hall tours, especially for students, and Division staff also provide environmental program presentations and outreach to Conejo Valley Unified School District (CVUSD) students at schools. Staff participate in local events, including those hosted by business groups and large employers, Earth Day events, and Public Works Week. In addition, the Division, in collaboration with the Library, has developed a new format for the City's Arbor Earth Day beginning in 2018 which will provide for deeper engagement and education on key sustainability issues, and connect the public with community environmental events throughout the month of April.

A two-year schools' outreach effort from 2013 to 2014 was conducted in conjunction with a \$197,000 recycling grant received from CalRecycle. Staff was extensively engaged on CVUSD campuses, especially at middle and high schools, to improve the recycling infrastructure on campuses and promote recycling. Twenty-nine schools participated. Waste audits were conducted at multiple schools to determine waste composition, educating and engaging students and school administrators on the amount of recyclable material being disposed of in the trash. Students participated in many of the waste audits, and many classes participated in demonstrations and tutorials. One clear lesson that emerged was the abundance of food waste from student lunches. This information was shared broadly with parents and staff and gained a lot of traction in social media.

Staff use multiple sources of information to assist in designing and implementing community engagement processes or programs. Local sources of information include Visioning 2064

outreach on environmental priorities, the periodic Community Attitude Survey questions related to sustainability, and specific research carried out with funding from oil grant funds. One such study was a survey performed in August 2015 by Godbe Research, a professional marketing research company, on water saving measures taken as a result of the drought, use of HHW facility, and the Division's outreach. The sample size was 800 and provided useful feedback. Staff utilize Community-Based Social Marketing principles to help guide the most effective ways to reach audiences, and additionally rely on research from a number of respected non-profits and market research firms engaged in sustainability and climate action to inform engagement strategies.

To determine the effectiveness of different forms of outreach and advertising media, a short survey, conducted in 2016, was included as part of the HHW online registration process. According to the survey, internet searches and the City's website were the two primary means of how new registrants heard about the HHW facility (Figure EG-2). This indicates an opportunity to expand on these methods of outreach. The lowest scoring information sources – TOTV and community events - were not employed enough in outreach campaigns for the scores shown here to be statistically significant.

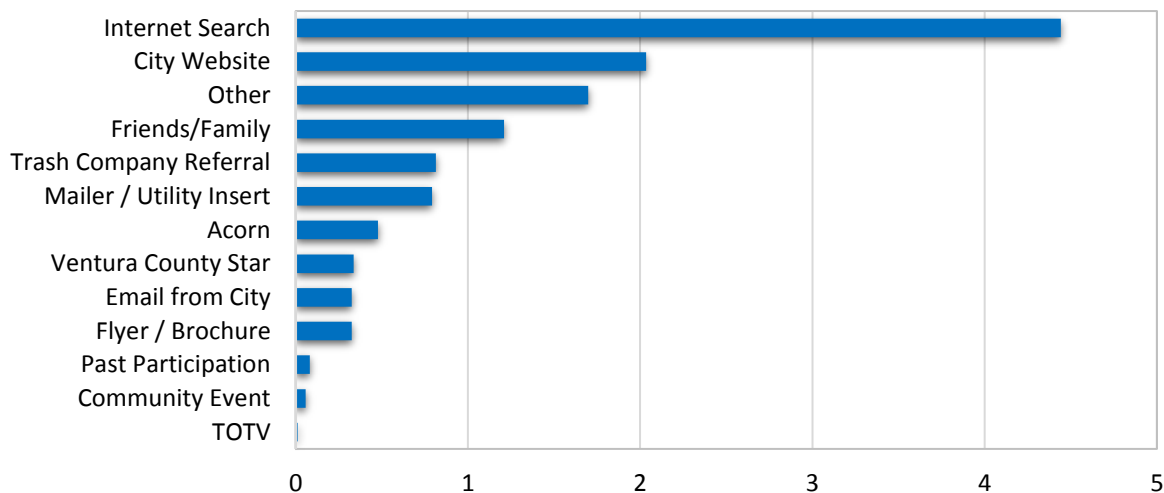


Figure EG-2: Responses from 1st and 2nd time users of the HHW facility on how they heard about the service (2016). Chart shows average number of HHW users per event receiving information from each source. Values less than one indicate that it took multiple events before a single person attended as a result of information from a particular source.

The same survey was additionally utilized to analyze the effectiveness of different forms of advertisement, and to inform future advertising decisions. By examining the cost per advertisement and number of registrants who were notified through each advertisement, it is apparent that the paid advertisements in the Thousand Oaks Acorn are significantly more cost-effective in outreach efforts than other means that have been employed. With regard to print media, the Acorn is consistently the top choice as a source of local news and information. In addition, advertising in print newspapers such as the Acorn is also an important way to ensure Division messaging reaches less computer-literate populations in the community.

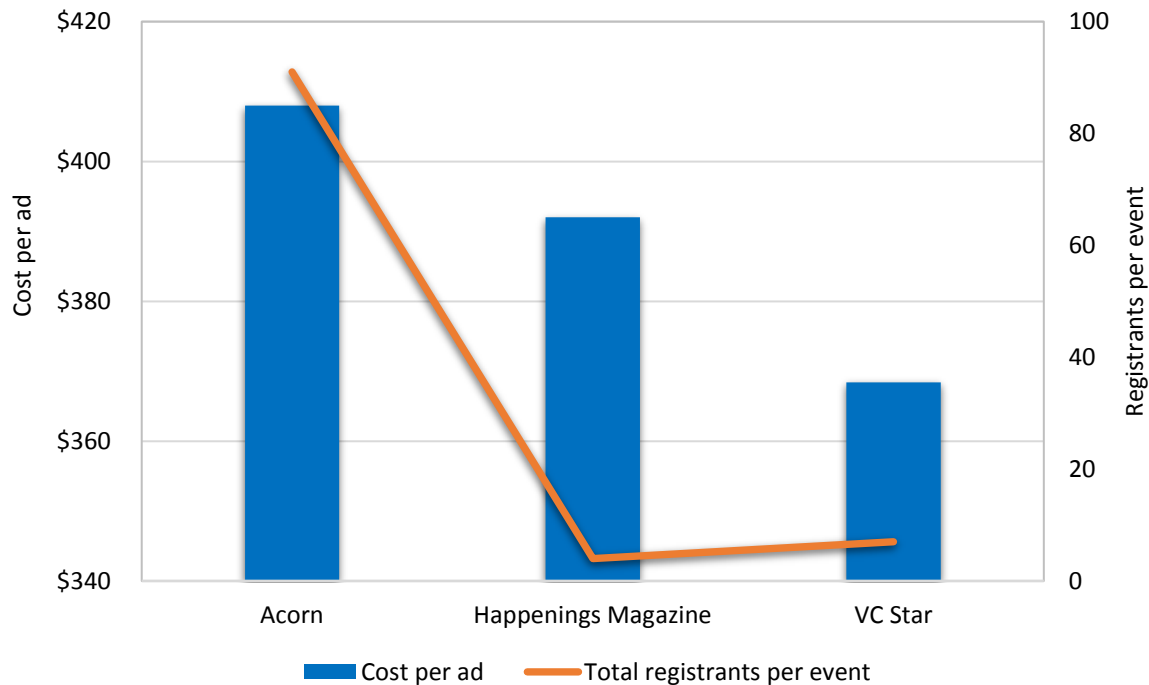


Figure EG-3: Cost effectiveness of selected advertisements in HHW registrations

In addition, the City has collaborated with the *Advertising Campaigns* class at CLU on multiple outreach activities, including the promotion of biochar and green businesses. This mutually beneficial partnership augments Division staffing for specific campaigns, and provides students with a real-world opportunity to develop target markets, write ads, create videos, apps, and social media campaigns.

2.3. Green Business Program

The City operates a Green Business Certification program, modeled after other leading cities and counties throughout California, to recognize small and medium-sized businesses that reduce waste, conserve energy, reduce pollution, and make purchases in an environmentally responsible manner. Businesses must complete a comprehensive checklist of measures, which include waste assessments and energy audits by utility providers. The City is a member and has served on the Board of the California Green Business Network a 501(c)(3), which has been included as part of the FY 17-18 State budget with a \$1 million-line item allocation funneled through CalEPA to support the program. Local programs will each receive funding in 2018 from this allocation. Additional resources include a Google AdWords grant of up to \$10,000/month in AdWords credit to promote businesses that get certified and attract new businesses to the certification program. Beginning in Fall 2017, the City program became part of a new countywide program operated by VCREA. Certified businesses receive recognition from City Council, become part of the statewide CA Green Business Program and online searchable database, and receive marketing resources.



2.4. Employee Engagement & Education

Engagement in sustainability practices by City staff offers a significant opportunity for improvement and expansion. Staff serve as the City's ambassadors and messengers in their interactions with residents and businesses daily, so it is important that they can both articulate the City's sustainability actions and also model best practices.

Currently, new staff do not receive specific training related to the City's environmental commitment, practices, and expectations and existing staff are not well-versed on best practices. The Sustainability Division is focusing effort in providing employees with more information on internal and City-wide efforts. In the 1990's and 2000's, the City had a "green team" led by recycling staff. The team assisted in identifying and implementing recycling and diversion practices within the City to assist with state waste reduction mandates. The team met two to four times per year to identify opportunities to increase paper and cardboard recycling and the purchase of office products with recycled content. Innovative policies included a recycled content purchasing policy and a general prohibition on the use of plastic water bottles³ at City events. Concurrently, the City hosted and supplied a recycled/upcycled store that included purses, bags, and art, to promote the use of recycled content products. The store was discontinued in 2010, as the use of recycled content in products had garnered mainstream attention.

Although an Environmentally Preferred Purchasing (EPP) policy which prioritizes environmentally sustainable purchases was adopted by the City in 2016, the re-organization of Public Works and its Sustainability Division has delayed full implementation, which requires staff training to be conducted by Division staff. Training in EPP, together with the 'Buy Clean California Act' of 2017, is part of this Plan.

In 2017, practices to reduce waste, increase recycling, and collect and process organic waste were piloted by the Public Works Department and have provided a mechanism for engaging staff throughout City Hall. This Plan lays out several strategies designed to raise staff awareness and increase adoption of sustainability practices at work.

Increasingly, California is adding language related to climate change mitigation, adaptation and resilience into policies and regulations that apply to a broad range of local government activities including transportation, development, building codes, utilities and infrastructure. It is incumbent upon the City to develop inter-departmental engagement mechanisms that facilitate communication, cohesive messaging and the implementation of best practices to address these.

³ Link: [Bottled Water Purchasing Policy](#)

3. Related policies and regulations

a. Single-use Plastic Water Bottle Ban, 2009

On April 20, 2009, City Council adopted a single-use plastic water bottle ban for City functions.⁴

b. SB 379: Land Use – General Plan Safety Element, 2015

This bill requires the safety element of the City's General Plan to be reviewed and updated as necessary to address climate adaptation and resiliency strategies applicable to that city or county. The City's General Plan Safety Element was last updated in March 2014 before SB 379 was passed. Climate adaptation must be addressed upon the next revision of the City's local hazard mitigation plan.

c. Environmentally Preferred Purchasing (EPP) Policy, 2016

Sustainability Division staff developed the policy in cooperation with the Purchasing Unit. Staff require training.

d. AB 262: Public contracts: bid specifications. Buy Clean California Act, 2017

For contracts entered into after July 1, 2019, state agencies must include in project bid specifications a condition that the global warming potential for any eligible materials does not exceed the maximum global warming potential for that material determined by the Department of General Services. Agencies must require the successful bidder to submit a current Environmental Product Declaration, developed in accordance with specified standards for the type of product. Although this does not currently apply to the City, that could change in the coming years.

4. Strategies

A. Awareness

Increase staff awareness and literacy in sustainability.

Sustainability Division staff should conduct focused outreach and education Citywide, and assist departments in implementing specific sustainability actions.

A.1. Increase staff training in sustainability.

- Add sustainability training under the City intranet.
- Develop and post sustainability posters in common areas featuring highlights from this Plan.

⁴ Link: [Bottled Water Purchasing Policy](#)

- Host lunchtime brown bags on sustainability topics including open “Ask Us” sessions for general questions.
- A.2. Integrate sustainability overview and training as part of the onboarding process for new hires in all departments.**
- A.3. Recognize staff for sustainability contributions.**
- Initiate competitions between groups of employees. These have proven highly effective in changing behavior. For example, lowest contamination in trash and recycling bins, highest energy reduction over a workweek.
 - Showcase individual staff or groups that embrace sustainability and integrate into their processes.
 - Provide opportunities for green champions to participate in or lead projects. These could be staff at all levels of the organization that are interested in sustainability issues, and would provide opportunities to increase skills or engage in a stretch assignment.
- A.4. Adopt City greening measures that engage staff, such as organics collection, reusable dishware in kitchens, mini bins for waste collection.**
- A.5. Enroll City facilities in the State’s Green Business certification program.**
- City facilities should each seek “Green Certification” through enrollment in the California Green Business program, which is implemented by the County with guidance from the Sustainability Division. This program provides a checklist of actions that can be undertaken by Facilities Management and by employees to be more sustainable.
- A.6. Strengthen inter-departmental communication mechanisms to address climate change policies consistently.**
- Evaluate new laws and regulations. Assess impacts on all City divisions. Assist staff in understanding and implementation.
- A.7. Roll out EPP and AB 262 training.**
- A.8. Educate on sustainability at home as well as the office.**
- It is doubly beneficial for City staff that live within the City to model best practices for residents.
- A.9. Ensure that key contract staff like custodians are well-informed and provide the needed support.**
- A.10. Engage with City-sponsored special groups to determine their needs and the opportunities for collaborative programming.**

Public Engagement

Utilize the City's unique position to educate and engage constituents.

B.1. Increase public visibility of sustainability as a City priority.

- Post visible messages throughout the workplace for both staff and the public describing City achievements, goals, and progress.
- Use City facilities to model best practices and showcase demonstrations in public venues to serve as examples. Provide signage to explain demonstrations.
- Utilize space at TO Transit bus stops, on buses, and at the Transportation Center to message sustainability highlights and practices to different demographic groups.

B.2. Redesign water/wastewater bills by displaying usage comparisons with similar properties, potential water savings, and educational messages.

B.3. Partner with the Library to host workshops featuring City staff or outside experts on sustainability issues of interest to the public (e.g. drought-tolerant landscaping design, energy efficiency, smart homes, going solar).

B.4. Partner with the Library to set up a Sustainability Information Center.

- Stock with materials on sustainability, including how-to manuals and resource guides on solar, energy efficiency, water conservation, etc. Investigate the feasibility of a loan program for tools or devices.

B.5. Reach out to new residents in the City with sustainability-related information in areas such as water conservation, hazardous waste, recycling, disposal of pharmaceuticals, energy programs etc.

B. Research

Expand research in practices, policies, and innovation.

C.1. Identify new technologies, partnering and piloting opportunities, trainings and funding opportunities to assist all departments and facilitate innovation.

C.2. Conduct tests on technology solutions like hydrogel and drought-tolerant turf, and document results for use in outreach.

C.3. Coordinate inter-divisional and inter-departmental communication on new technologies, opportunities, and solutions.

Summary of Recommendations

Listed in the preceding Plan sections are a hundred and fifty strategies identified to improve sustainability, efficiency and resilience in City operations, and generate long-term cost savings. Recommendations range from relatively simple inexpensive actions to lengthy, complex and costly ones. Budget and personnel resources will clearly constrain the number and types of actions that can be undertaken, impact priorities and dictate implementation timelines. Strategies fall into six general categories – tracking and reporting, feasibility/research studies, development of plans, implementation of technology, outreach and customer service, and capital improvements. The full list of proposed strategies together with preliminary implementation schedule and estimated costs is provided in the Appendix that follows. Capital improvements are separated out to show those strategies that have been previously budgeted under the capital improvement program.

Many of the studies and plans developed under the umbrella of this Sustainability Plan will lead to future capital improvement projects. Some costs have been estimated, but many will follow preceding studies. Capital projects will be budgeted through the bi-annual budget planning process. The upgrade of City facilities to current energy efficiency standards will entail significant investment over the next five to ten years; the proposed schedule, project priorities and estimated costs will be included in the Municipal Energy Plan, which is being developed over the next twelve months. Other large capital projects such as installation of solar and battery energy storage at some of the City's facilities will depend on a cost-benefit analysis that generates reasonable payback times. Water-related infrastructure improvements include irrigation and landscaping replacements that have both tangible and intangible benefits.

There will be additional focus on engaging staff in sustainability activities and helping to build the City's image as a sustainability leader. Customer service and community engagement will include additional apps, electronic communications, and educational opportunities. These activities have already begun and will expand over the next few years.

Implementation and priorities of proposed strategies as listed in the Appendix will be subject to the budget review process and determined by Council.

Appendix:

Sustainability Program Workplan

Sustainability Program Workplan

The Plan's implementation schedule and estimated costs (where available) are shown in the following table. Strategies are listed in the same order as in the Plan, under their respective goals, with numbering as employed in the preceding sections. Costs indicated are estimates over and above staff time. Division indicates where primary responsibility lies.

Workplan Key

Strategy:

EN = Energy
WA = Water (Consumption)
WM = Waste Management
TR = Transportation
GS = Green Space
WU = Water Utility
WW = Wastewater
ST = Stormwater
EG = Engagement

Division:

ACCT = Accounting/Revenue Operations
CMO = City Manager's Office
COSCA = Conejo Open Space Conservation Agency
ENGSR = Engineering Services Division
ENV = Environmental Programs
FAC = Facilities Division
FLT = Fleet Services
HR = Human Resources
LANDSC. = Landscape Division
LIB = Library
PW = Public Works
SUST = Sustainability Division
WU = Water Utility
WW = Wastewater Utility

Previously budgeted capital improvement projects or studies are not included in this table.

STRATEGY		FY				COST	Division
		19	20	21	22		
ENERGY							
Energy tracking and reporting: Improve means to measure, track and analyze energy use.							
EN-A-1.	Acquire and implement a data collection and analytics system for energy and climate data.	x				\$50K + \$10K/yr	SUST
EN-A-2.	Develop a plan and schedule for sub-metering.			x			FAC/SUST
EN-A-3.	Benchmark buildings.	x					SUST
EN-A-4.	Conduct utility tariff optimization.	x					SUST
EN-A-5.	Complete a local government greenhouse gas inventory.	x					SUST
Conservation and efficiency: Identify and implement actions to conserve energy and improve the energy efficiency of facilities and operations.							
EN-B-1.	Identify building- and equipment- level operational changes and upgrade City facilities to current energy efficiency standards.		x	x	x	TBD	FAC
EN-B-2.	Develop and implement a Municipal Energy Plan.	x				\$40K	SUST
EN-B-3.	Enroll facilities in SCE Direct Install Program.			x			SUST
EN-B-4.	Explore energy and cost reductions from streetlights.			x		\$20K	SUST
EN-B-5.	Enroll pump and lift stations in SCE energy efficiency programs.		x				WU/SUST
EN-B-7.	Design and implement strategies to reduce demand and peak electricity charges.		x			\$25K	SUST
EN-B-8.	Explore performance-based contracting for municipal buildings operation and energy savings.		x				FAC
Distributed energy resources: Increase clean, local and resilient energy supply							
EN-C-1.	Develop a plan for distributed energy resources at City facilities.	x				\$25K	SUST
EN-C-2.	Implement a microgrid.			x		TBD	SUST
EN-C-3.	Evaluate electricity purchasing options.	x					SUST
EN-C-4.	Cleaner emergency backup energy.			x		TBD	WW/JMSC
WATER CONSUMPTION							
Water conservation: Use water in a responsible manner and conserve where possible. Prepare for new state water regulations.							
WA-A-1.	Conduct water use audit at each facility, develop a list of water fixtures at each and compare efficiency to current standards. Implement upgrades as necessary.		x				SUST/FAC
WA-A-2.	Evaluate additional water metering needs at each facility.		x				SUST/FAC
WA-A-5.	Identify and implement leak-testing technologies to reduce and/or prevent leaks in irrigation systems.	x	x	x	x	TBD	WU
Water use tracking: Develop methodology for ongoing monitoring, reporting and analysis of water use data							
WA-B-1.	Collect and record existing municipal water use and billing data, including service address, meters, monthly use, and cost.		x				SUST
WA-B-2.	Implement database to provide analysis tools for insight into usage patterns, trends, and anomalies.		x	x			SUST
WA-B-3.	Develop plan for use reduction informed by analytics.			x	x		SUST
WA-B-4.	Automate data collection and reporting through an online platform that is accessible by all departments. Plan for future integration into billing software.		x	x		\$50K	SUST/ACCT

STRATEGY	FY					COST	Division
	19	20	21	22	23		
WASTE MANAGEMENT							
Process improvement: Utilize technology to improve efficiency in data collection and reporting. Use analytics to inform program improvements							
WM-A-1. Procure and implement a waste data collection and reporting system.	x					\$50K + \$10K/yr	SUST
WM-A-2. Utilize various digital technologies to assist with automating waste program administration.	x					\$15K	SUST
WM-A-3. Renegotiate waste hauler contracts to include technologies and innovations.		x	x				SUST
Waste reduction: Support and provide programs that increase efficiency, reduce waste volume, and promote materials reuse							
WM-B-1. Develop policies to restrict landfilling of specific commodities and purchasing expanded polystyrene materials.				x	x		SUST
WM-B-2. Support manufacturer packaging legislation that requires reduction in packaging materials and incorporating recycled content materials in packaging.				x	x		SUST
WM-B-3. Reduce waste from City employees.	x	x					SUST
WM-B-4. Conduct outreach and education to AB 1826 non-compliant businesses and multi-family complexes.	x	x	x	x	x		SUST
WM-B-5. Conduct outreach and education to AB 341 non-compliant businesses and multi-family complexes.	x	x	x	x	x		SUST
WM-B-6. Develop plan for organics collection at all City malls.	x						SUST
WM-B-7. Mandate recycling for non-curb-side recyclables such as mattresses, carpet, and textiles.			x				SUST
WM-B-8. Expand new franchise agreement to include organics.			x				SUST
WM-B-9. Develop zero-waste strategic plan.			x				SUST
Hazardous waste: Ensure environmentally-responsible disposal of hazardous waste and encourage use of less toxic alternatives							
WM-C-1. Automate HHW registration process to ensure ease of access for registrants, up front address validation, and to reduce staff resources required to process and analyze data.	x					\$10K	SUST
WM-C-2. Introduce Extended Product Responsibility ordinance for HHW, pharmaceuticals and/or items that are difficult to recycle (expanded polystyrene, film plastics, toys).			x	x			SUST
TRANSPORTATION							
Transit: Increase ridership							
TR-A-2. Investigate feasibility of transportation alternatives such as on-demand services offered by a third party.		x				TBD	TRANSIT
TR-A-3. Pilot new technologies as they become available – driverless/autonomous vehicles and vehicles that communicate with each other.				x	x		PW
TR-A-4. Investigate use of “Green commuter” or similar services to provide electric commuter vans and utilize during the day for transit services.			x			TBD	TRANSIT
Vehicles: Increase number of low- and no- emission fleet vehicles							
TR-B-1. Establish a database of city-owned and leased vehicles.		x					SUST
TR-B-2. Develop a replacement policy for all city vehicles that includes prioritization of low- and no- emission alternatives wherever feasible.		x					FLT/SUST
TR-B-3. Investigate alternative vehicles for use in Public Works where engines do not have to be left idling while standing.		x					FLT

STRATEGY	FY					COST	Division
	19	20	21	22	23		
TR-B-5. Consider adding CNG fueling station to Transportation Center to avoid unnecessary fueling trips to MSC.			x			TBD	PW
TR-B-6. Evaluate cost-benefits of use of HCTP methane for vehicle fuel.	x					\$25K	SUST
Transportation services: Implement the most cost-effective and efficient solutions to meeting the City's transportation needs							
TR-C-1. Develop plan for EV chargers and their placement at City facilities.	x						SUST
TR-C-4. Consider enrolment in Zimride for encouraging or incentivizing carpooling for City employees.			x				SUST/FLT
GREEN SPACE							
Open Space: Balance resource conservation with recreation and public use of open space.							
GS-A-1. Plan for reducing public use of overused open space locations.		x					COSCA
GS-A-2. Develop a non-native plant management plan for open space.	x					\$25k/yr	COSCA
GS-A-3. Develop additional educational literature on plants for open space visitors and trail patrol personnel.	x	x	x	x	x		COSCA
GS-A-4. Develop an app. for reporting issues in open space such as development of informal trails, erosion, and non-native invasive plants.		x				\$20K	COSCA
Trees: Maintain the health and vitality of the urban forest and LANDSC. under the stresses of the built environment, climate change, and drought							
GS-B-1. Develop and utilize City tree inventory (GIS) for managing and maintaining trees.	x	x	x				LANDSC.
GS-B-2. Utilize aerial imagery for tree canopy analysis.			x	x		\$25K	ENGSR
GS-B-3. Strategically plant trees for shading at City facilities (e.g. deciduous trees to south of buildings).				x	x	\$10K	LANDSC.
GS-B-4. Re-plant neighborhood street trees where these have been removed.				x	x	\$20K	LANDSC.
Landscaped areas: Manage Landscaped areas using sustainable practices							
GS-C-1. Generate liquid fertilizer from organic waste and experiment with use as a soil conditioner.				x	x		LANDSC.
GS-C-10. Install resilient direct delivery hard pipe bubbler irrigation and replace overhead sprinklers.	x	x	x	x	x	TBD	LANDSC.
GS-C-11. Install smart irrigation technology at all installations to allow for central remote control.	x	x	x	x	x	\$250K/5 yr	LANDSC.
GS-C-2. Utilize mulching for weed suppression and moisture retention.	x	x	x	x	x		LANDSC.
GS-C-3. Compost and utilize City green waste.			x	x	x		LANDSC.
GS-C-4. Convert wood chips to biochar					x	TBD	LANDSC.
GS-C-5. Expand native and climate-appropriate plantings in public areas.	x	x	x	x	x	TBD	LANDSC.
GS-C-6. Investigate use of hydrogels in turf areas for moisture retention and reduced water demand.			x			\$25K	WU
GS-C-7. Utilize biochar for better carbon retention in soils and reduced water demand.	x	x	x	x	x		LANDSC.
GS-C-9. Develop process improvements such as expanded use of laptops and tablets in the field and office.	x	x				\$10K/yr	PW
Educate and engage: Involve the community best practices and green space management.							
GS-D-1. Provide signage throughout the community regarding landscaping changes		x				\$10K	LANDSC.
GS-D-2. Provide signage throughout the community on Bee City, USA and Tree City, USA.	x					\$5K	LANDSC.
GS-D-4. Provide outreach materials on native plant landscaping, turf removal, biochar, and composting.		x	x	x	x		SUST/LAN DSC.
GS-D-5. D-5. Conduct bird counting and pollinator identification to monitor change over time.	x	x	x	x	x	\$5K/yr	COSCA

STRATEGY	FY					COST	Division
	19	20	21	22	23		
WATER UTILITY							
Infrastructure and quality: Enhance system reliability, safety, monitoring, and control							
WU-A-1. Participate in water collaboratives and innovation groups to identify software and hardware for improving water reliability, identifying leaks and reducing costs.	x	x				\$10K/yr	WU/WW
WU-A-4. Develop/purchase smart algorithms and software to better control and reduce peak flow in summer in order to reduce energy costs.		x				\$25K	SUST/WW
WU-A-7. Develop a plan for beneficially using water if tanks need to be drawn down for emergency repair or to turn over stale water.			x				WU
Conservation and efficiency: Prepare for state conservation mandates and future droughts							
WU-C-1. Invest in a data management system that will allow for data analytics of allocations and water use at a parcel level.			x	x		\$50K/yr	SUST
WU-C-2. Develop a plan that establishes measures to be enacted when cutbacks in use are necessary. Develop rates.			x	x		\$100K	SUST/PW
WU-C-3. Revise the City water conservation ordinance to facilitate compliance with the adopted regulations for Making Water Conservation a Way of Life.		x					SUST
WU-C-4. Develop outreach materials for compliance with water conservation mandates.		x					SUST
WU-C-5. Have a staff member certified as a water auditor to allow for auditing the City agency.		x					WU
Customer service: Improve customer service, usage transparency, and customer engagement							
WU-D-2. Evaluate layout of bills to help customers better understand their usage.			x	x			SUST/ACCT
WU-D-4. Move to monthly billing to assist customers in controlling costs, provide quicker feedback on water usage and improve water loss identification and reporting.				x		TBD	ACCT/WW
WU-D-5. Make electronic copies of hardcopy bills available for online customers to increase the number enrolled in online bill pay.				x	x	\$25K	ACCT
WASTEWATER							
Wastewater quality: Ensure wastewater discharge meets water quality standards							
WW-A-1. Investigate options to test incoming FOG for contaminants. Pre-process FOG.	x					TBD	WW
WW-A-4. Investigate use of large bubble diffusers for mixing.		x				TBD	WW
WW-A-5. Integrate SCADA with additional sensors to enable further monitoring and smart control.		x				TBD	WW
Energy management: Develop an energy management plan for optimizing efficiency and minimizing costs in the treatment of wastewater							
WW-B-1. Gain better control and efficiency of solar production through buyout of PPA agreement.	x						WW
WW-B-2. Expand solar PV capacity at HCTP.		x				\$2M	SUST
WW-B-3. Install batteries for energy storage at HCTP.		x				\$500K	SUST
WW-B-4. Renegotiate co-gen contract to specify how electricity production should account for solar production and institute “smart” controls.		x				\$50K	WW/SUST
WW-B-5. Participate in SCE’s Water Infrastructure System Efficiency (WISE) program.	x						SUST/WW

STRATEGY	FY					COST	Division
	19	20	21	22	23		
STORMWATER							
Stormwater quality: Ensure stormwater discharge meets water quality objectives and permit requirements.							
ST-A-1. Reduce stormwater source pollution	x	x	x	x	x		SUST
ST-A-2. Increase outreach and education on stormwater and related programs.		x	x				ENV/SUST
ST-A-5. Assess costs and feasibility of diverting stormwater through the wastewater processing system for treatment. Move ahead accordingly.				x	x	\$150k	WW
Trash: Eliminate the discharge of trash into waterways including from non-point sources							
ST-B-2. Reduce public trash.	x	x	x	x	x		SUST
Cost sharing: Mitigate and fairly share costs of meeting permit requirements across related programs to ensure a financially sustainable solution							
ST-C-4. Evaluate options to increase enforcement of water conservation ordinance in the City, reducing runoff.			x				SUST
ENGAGEMENT							
Awareness: Increase staff awareness and literacy in sustainability.							
EG-A-1. Increase staff training in sustainability.	x						SUST
EG-A-2. Integrate sustainability overview and training as part of the onboarding process for new hires in all departments.	x	x	x	x	x		HR/SUST
EG-A-3. Recognize staff for sustainability contributions.			x	x	x		CMO/SUST
EG-A-4. Adopt city greening measures that engage staff, such as organics collection, reusable dishware in kitchens, mini bins for waste collection.	x					\$10K	SUST
EG-A-5. Enroll City facilities in the State's Green Business certification program.		x	x	x	x		SUST
EG-A-6. Establish inter-departmental communication mechanisms to address climate change policies consistently.		x	x	x	x		SUST
EG-A-7. Roll out EPP and AB 262 training.		x	x				SUST
Public Engagement: Utilize the City's unique position to educate and engage its constituents.							
EG-B-1. Increase public visibility of sustainability as a City priority.	x	x	x	x	x		CMO/SUST
EG-B-2. Redesign water/wastewater bills to be user friendly by displaying usage comparisons with similar properties, potential water savings, and educational messages.				x	x		SUST/ACCT
EG-B-3. Partner with library to host workshops on sustainability issues of interest to the public.			x	x	x		LIB/SUST
EG-B-4. Partner with the library to set up a Sustainability Information Center.				x		\$10K	LIB/SUST
EG-B-5. Reach out to new residents in the City with sustainability-related information.			x	x	x		SUST