

# Comparative Energy Analysis Report



Prepared for  
**City of Orange**

Prepared by  
**The Energy Coalition**

On Behalf of  
**The Southern California Regional Energy Network Public Agency Programs**

Date  
**October 19, 2020**

## Table of Contents

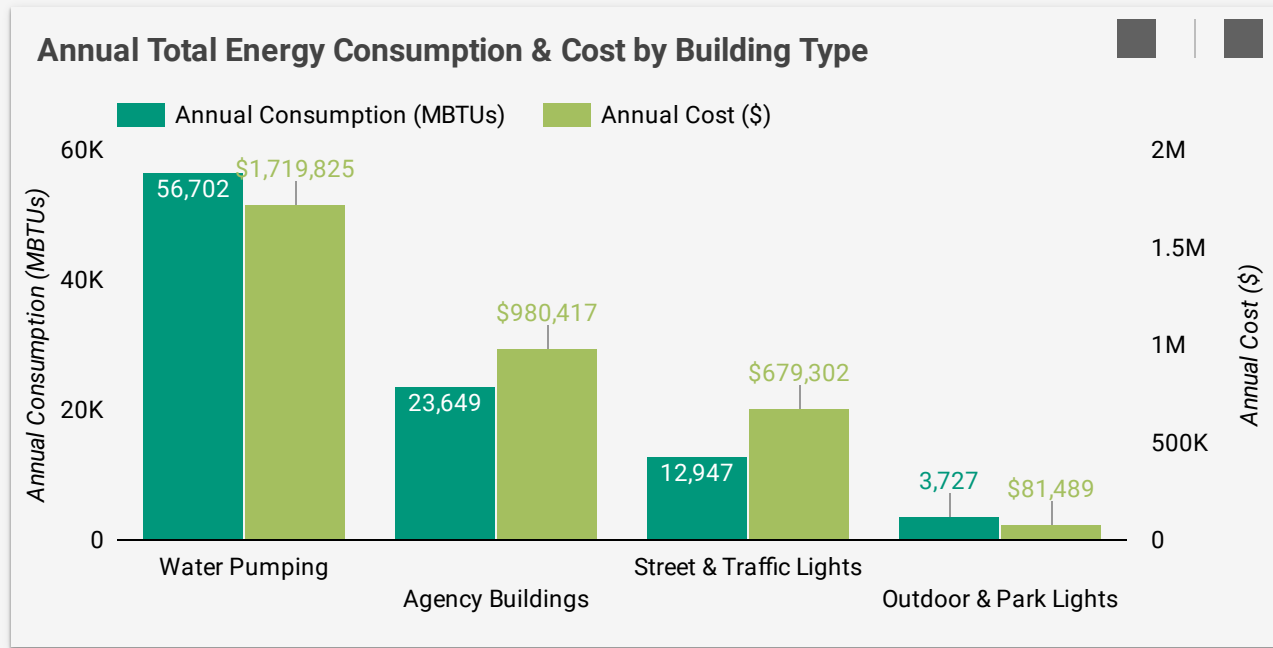
1. Overview
2. Total Energy Portfolio
3. Water Pumping
4. Street & Traffic Lights
5. Outdoor & Park Lights
6. Agency Buildings
8. Appendix A - Methodology

## Overview

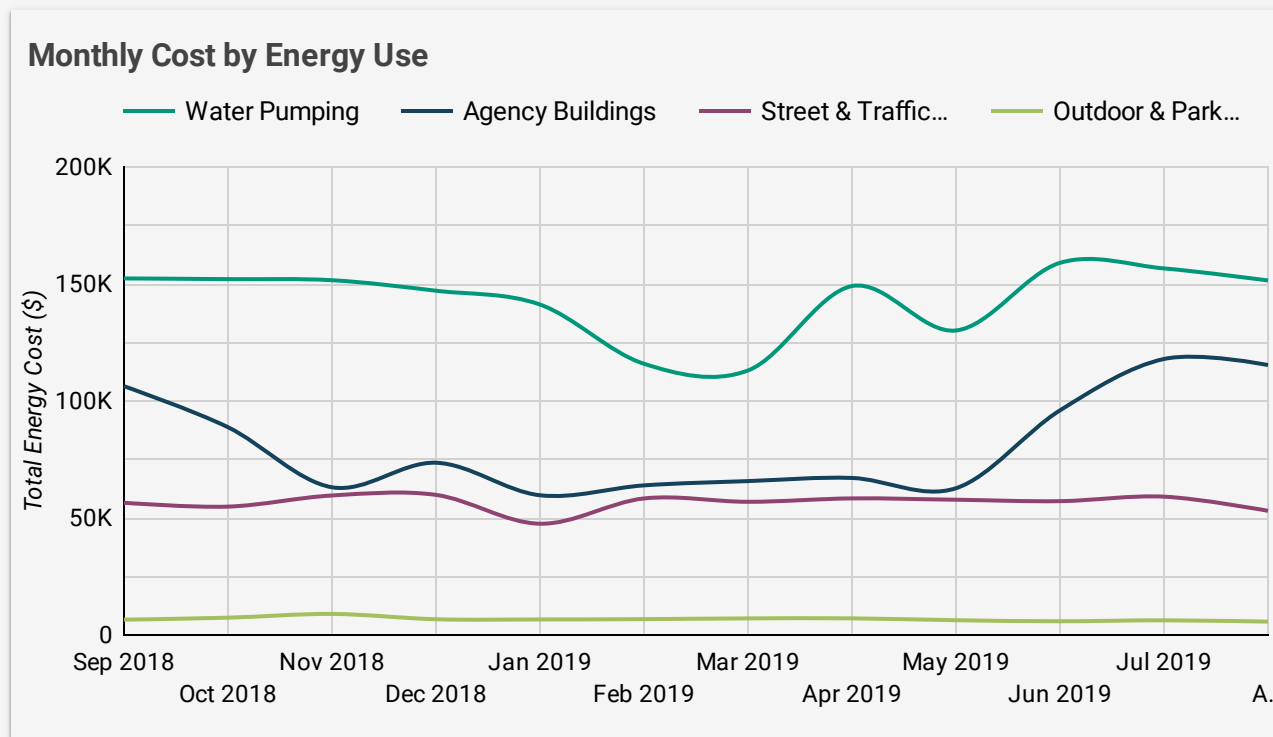
This report summarizes energy consumption and energy cost by sector (Street & Traffic Lights, Agency Buildings, Water Pumping, and Outdoor & Park Lights) for the City Of Orange, referred to as "Agency" herein. This analysis uses energy billing data provided by the Utility and Agency to help identify opportunities for energy efficiency improvements across sectors. Once opportunities are identified, a more detailed screening of those facilities can be performed to further vet potential energy and cost-saving projects.

This report was created by The Energy Coalition on behalf of the Southern California Regional Network ([www.socalren.org](http://www.socalren.org)). Any questions about this report can be directed to your assigned Project Manager, Nataliia Hamidi at [nhamidi@energycoalition.org](mailto:nhamidi@energycoalition.org).

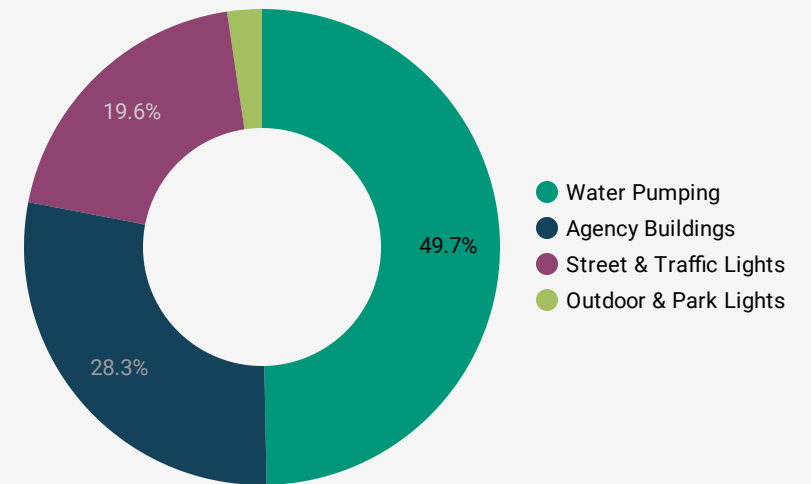
# Total Energy Portfolio (Annual)



Total Annual Energy Cost  
**\$3,460,998**



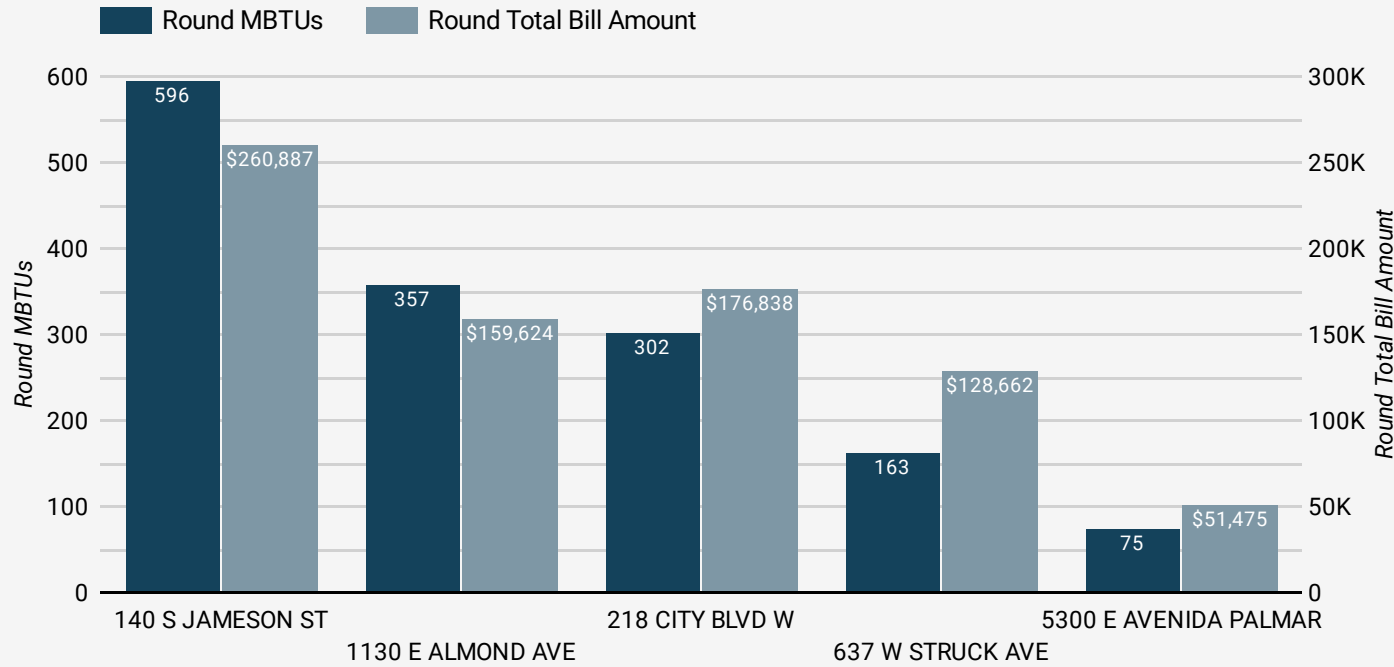
### % of Total Annual Energy Cost by Agency Energy Use



Agency Energy Use	Electric Consumption (kWh)	Electric Cost	Gas Consumption (Therms)	Gas Cost	Total Energy Consumption (MBTu)	Total Energy Cost	Energy Cost % of Total	GHG Emissions (lbs CO2)
Water Pumping	16.6M	\$1.72M	0	\$0	56.7K	\$1.72M	50%	16M
Agency Buildings	5.3M	\$932K	54.2K	\$48.43K	23.6K	\$980.43K	28%	5.8M
Street & Traffic Lights	3.9M	\$679.27K	0	\$0	13.2K	\$679.27K	20%	3.7M
Outdoor & Park Lights	1.1M	\$81.48K	0	\$0	3.7K	\$81.48K	2%	1.1M
<b>Grand total</b>	<b>26.9M</b>	<b>\$3.41M</b>	<b>54.2K</b>	<b>\$48.43K</b>	<b>97.3K</b>	<b>\$3.46M</b>	<b>100%</b>	<b>26.6M</b>



## Top 5 Consuming Accounts



Total Pumping Energy Cost  
**\$1.72M**

Post-Retrofit Cost Savings  
**\$83.84K**

Post-Retrofit Energy Cost  
**\$1.64M**

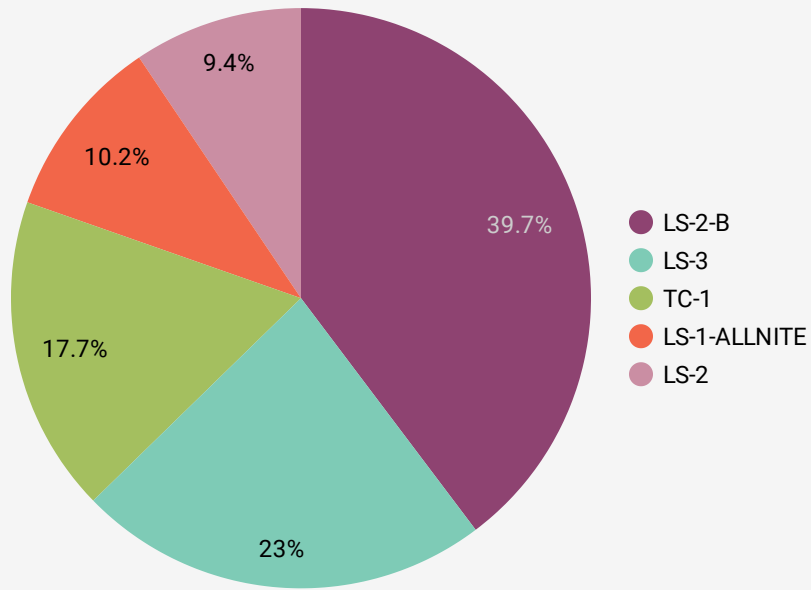
**Assumption** - 65% of all pumps need to be upgraded. Those pumps will reduce consumption by 7.5% kWh post-retrofit.

**Calculation** - projected savings are 7.5% of 65% of the total PA consumption (for ALL pump accounts)

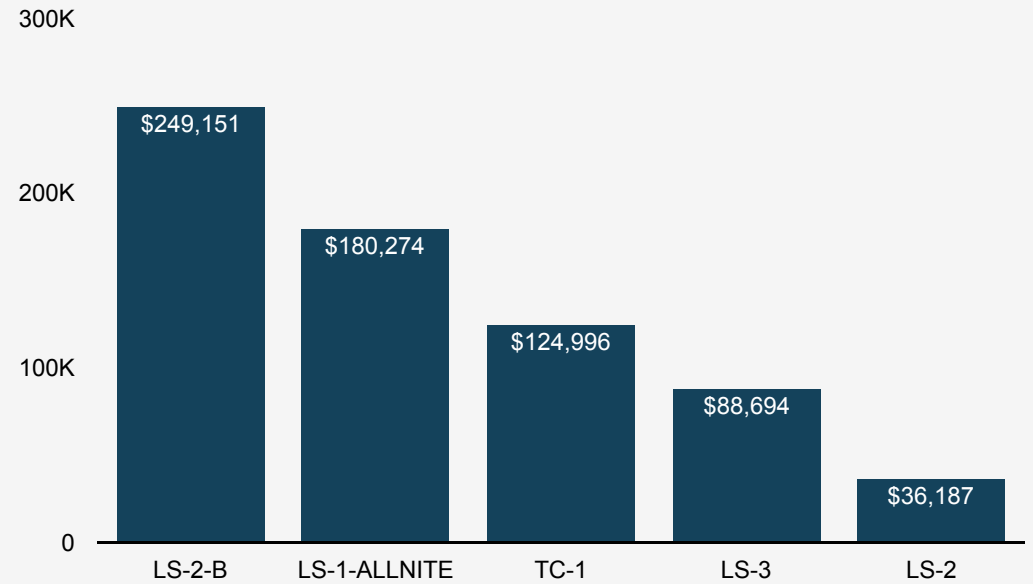
Site Name	Service Street Address	Electric Consumption (kWh) ▾	Electric Cost	Electric Rate (\$/kWh)
Jameson St Water Dept	140 S JAMESON ST	2.8M	\$260.89K	\$0.09
218 CITY BLVD W	218 CITY BLVD W	1.8M	\$176.84K	\$0.1
1130 E ALMOND AVE	1130 E ALMOND AVE	1.8M	\$159.62K	\$0.09
Fire Department	2900 E COLLINS AVE	1.6M	\$159.42K	\$0.1
Fire Station 3	1930 N SHAFFER ST	1.6M	\$140.89K	\$0.09
	<b>Grand total</b>	<b>16.6M</b>	<b>\$1.72M</b>	<b>\$0.1</b>



% of Annual Energy Cost by Account Type



Total Annual Energy Cost by Account Type



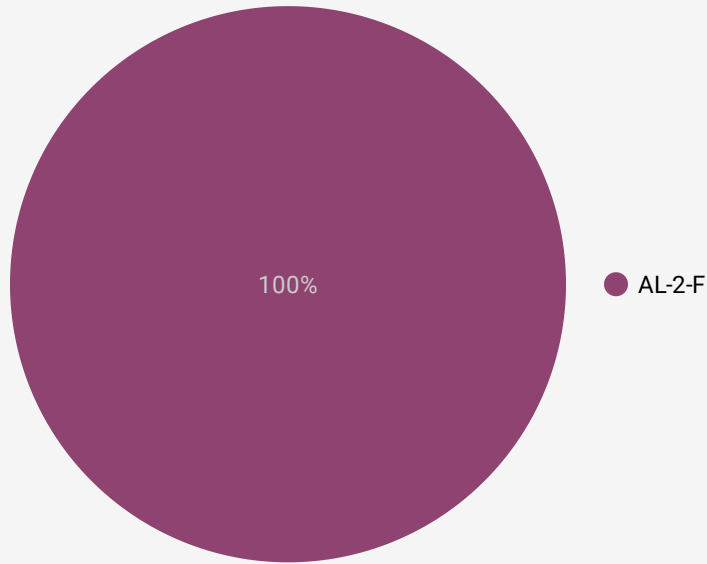
Current Rate	Rate Description	Electric Consumption (kWh) ▾	Electric Cost	Electric Rate (\$/kWh)
LS-2-B	Street Lights (Agency Owned - unmetered)	1.5M	\$249.15K	\$0.16
LS-3	Street Lights (Agency Owned - metered)	892.6K	\$88.69K	\$0.1
TC-1	Traffic Signal Lights (Agency Owned)	685.2K	\$124.97K	\$0.18
LS-1-ALLNITE	Street Lights (SCE Owned)	396.2K	\$180.28K	\$0.45
LS-2	Street Lights (Agency Owned - unmetered)	365.9K	\$36.18K	\$0.1
	<b>Grand total</b>	<b>3.9M</b>	<b>\$679.27K</b>	<b>\$0.18</b>

**Assumption** - agencies can save 50% on annual street & traffic light kWh consumption by converting HPS to LED.

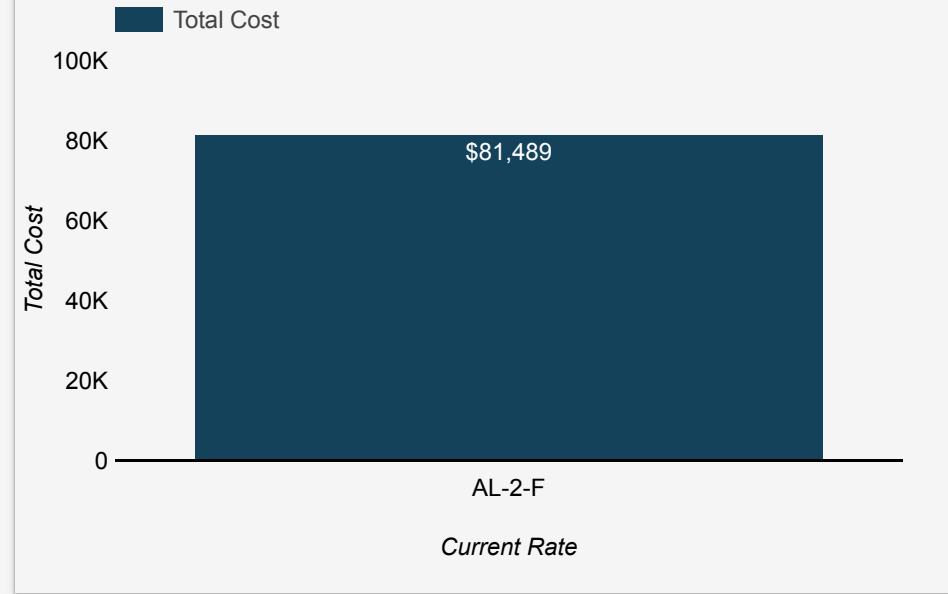
**Calculation** - projected savings are 50% of the total kWh consumption of agency owned street and traffic lights (TC-1, LS-2, and LS-3). LS-1 street lights are not included in projected savings.



% of Annual Energy Cost by Account Type



Total Annual Energy Cost by Account Type



Total Outdoor & Park Lights Energy Cost

**\$81,481**

Post-Retrofit Cost Savings

**\$40.74K**

Post-Retrofit Energy Cost

**\$40.74K**

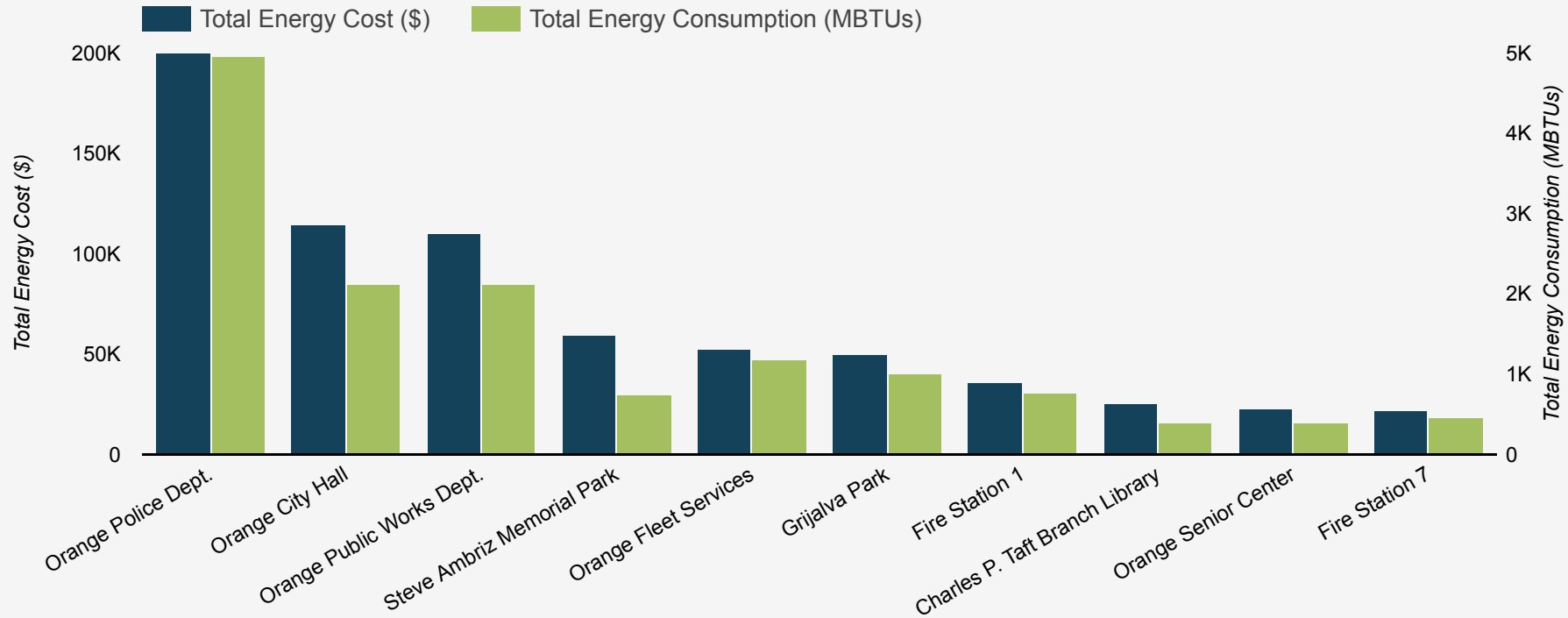
Building Name	Current Rate	kWh Consumption ▾	Electric Cost	Electric Rate (\$/kWh)
Area Lighting	AL-2-F	1.1M	\$81.48K	\$0.07
	<b>Grand total</b>	<b>1.1M</b>	<b>\$81.48K</b>	<b>\$0.07</b>

**Assumption** - agencies can save 50% on annual outdoor & park light kWh consumption by converting HPS to LED.

**Calculation** - projected savings are 50% of the total kWh consumption of outdoor & park lights.



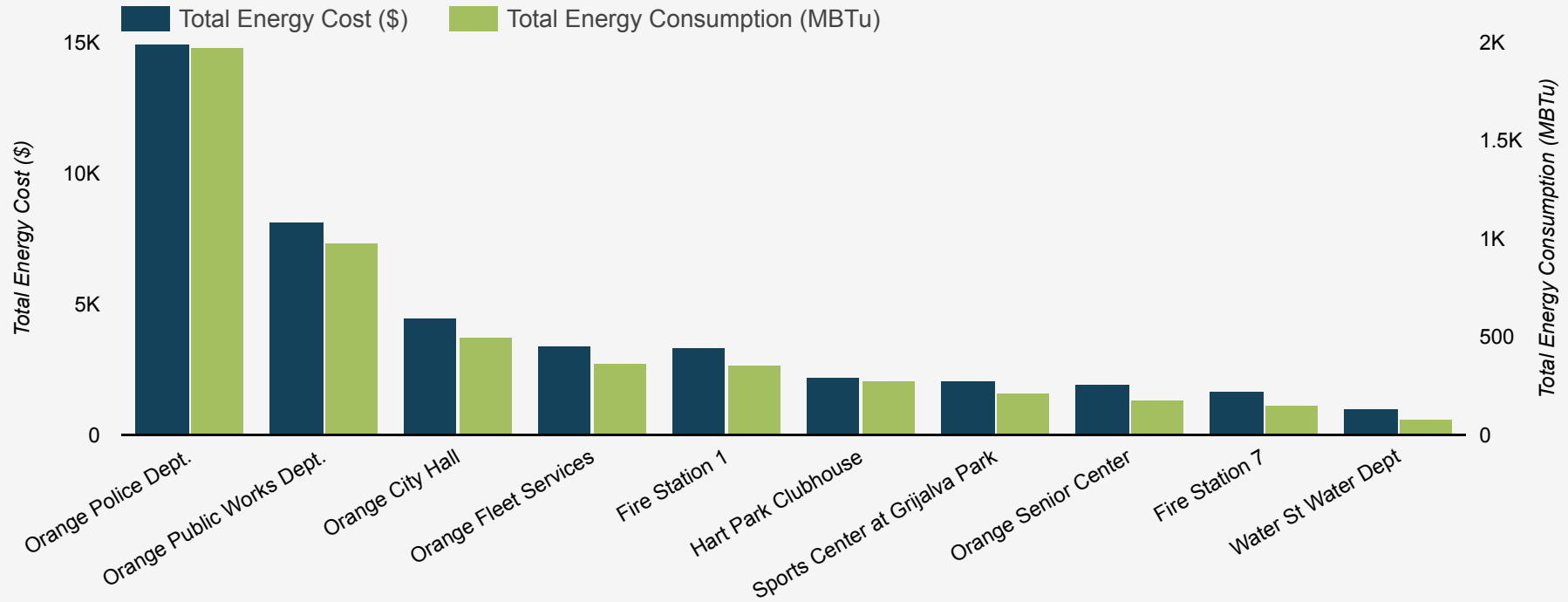
## Total Annual Electric Cost and Consumption by Site



Total Annual Energy Cost for Buildings

# \$980,429

## Total Annual Natural Gas Cost and Consumption by Site



# Agency Buildings (Cont'd)

Building Summary									
	Site Name	Address	DAC?	kWh Consumption	Electric Cost	Electric Rate (\$/kWh)	Gas Consumption	Gas Cost	Gas Rate (\$/therm)
1.	Orange Police Dept.	1107 N BATAVIA ST	yes	1.5M	\$199.67K	\$0.14	19.7K	\$14.94K	\$0.76
2.	Orange Public Works Dept.	300 E CHAPMAN AVE	no	620.4K	\$110.09K	\$0.18	9.8K	\$8.11K	\$0.83
3.	Orange City Hall	407 E CHAPMAN AVE	no	619.5K	\$114.39K	\$0.18	5K	\$4.46K	\$0.9
4.	Orange Fleet Services	637 W STRUCK AVE	yes	346.8K	\$51.99K	\$0.15	3.7K	\$3.41K	\$0.93
5.	Fire Station 1	176 S GRAND ST	no	221.1K	\$36.15K	\$0.16	3.6K	\$3.36K	\$0.94
6.	Grijalva Park	368 N PROSPECT ST	no	294.4K	\$49.86K	\$0.17	0	\$0	null
7.	Steve Ambriz Memorial Park	611 RIVERBEND PKWY B	no	195.5K	\$56.02K	\$0.29	0	\$0	null
8.	Fire Station 7	8501 E FORT RD	no	134.3K	\$21.54K	\$0.16	1.5K	\$1.68K	\$1.09
9.	Orange Senior Center	170 S OLIVE ST	no	114K	\$22.88K	\$0.2	1.8K	\$1.94K	\$1.07
10.	Charles P. Taft Branch Library	740 E TAFT AVE	no	113.5K	\$25.57K	\$0.23	0	\$0	null

Annual Energy Consumption Comparison								Sep 1, 2018 - Aug 31, 2019	
	Site Name	Address	kWh Consumption	% Δ	Gas Consumption	% Δ	MBTUs	% Δ	
1.	Orange Police Dept.	1107 N BATAVIA ST	14.5M	-8.1% ↓	215.7K	-4.6% ↓	71K	-7.0% ↓	
2.	Orange Public Works Dept.	300 E CHAPMAN AVE	6.1M	2.7% ↑	106.7K	32.4% ↑	31.4K	11.2% ↑	
3.	Orange City Hall	407 E CHAPMAN AVE	6.1M	-1.7% ↓	53.7K	-0.4% ↓	26.2K	-1.4% ↓	
4.	Orange Fleet Services	637 W STRUCK AVE	3.4M	-7.6% ↓	39.3K	59.5% ↑	15.7K	3.3% ↑	
5.	Fire Station 1	176 S GRAND ST	2.2M	-8.1% ↓	38.3K	34.0% ↑	11.2K	3.0% ↑	
6.	Grijalva Park	368 N PROSPECT ST	2.9M	-5.3% ↓	0	-	9.9K	-5.3% ↓	
7.	Steve Ambriz Memorial Park	611 RIVERBEND PKWY B	2M	-5.1% ↓	0	-	6.8K	-5.1% ↓	
8.	Fire Station 7	8501 E FORT RD	1.3M	-6.9% ↓	15.9K	24.5% ↑	6.1K	-0.4% ↓	
9.	Orange Senior Center	170 S OLIVE ST	1.1M	4.3% ↑	19K	50.8% ↑	5.6K	16.4% ↑	
10.	Charles P. Taft Branch Library	740 E TAFT AVE	1.1M	32.0% ↑	0	-	3.9K	32.0% ↑	

## Data Sources

- Building information, energy usage and cost data used in this analysis were derived from: utility consumption billing data provided by agency staff.
- Utility consumption billing data used in this analysis were derived from SCE electric tariffs and SCG gas tariffs.
- For more information about the utility tariffs included in this analysis refer to:
  - SCG Gas Tariffs: <https://www.socalgas.com/regulatory/tariffs/tariffs-rates.shtml>
  - SCE Electric Tariffs: <https://www.sce.com/wps/portal/home/regulatory/tariff-books/rates-pricing-choices>
- Analysis period for electricity and gas results were based on usage during period [September 1, 2018 - August 31, 2019].
- In some cases, multiple meters were associated with a single facility or asset type. For such facilities, to generate estimates of facility-wide energy use, energy usage and cost values were aggregated by summing energy usage and cost values for each day in the analysis period.
- GHG emissions data used in this analysis were calculated using the conversion: 517 lb CO<sub>2</sub>/MWh + 11.91 lbs CO<sub>2</sub>/therm[1,2].

## Total Energy Portfolio

- Total Energy Portfolio data represents an analysis of each agency facility type annual energy costs, annual energy consumption (kWh), GHG Emissions and total annual energy costs for agency facility types based on MMBtus.
- The following agency assets are included in the Total Energy Portfolio:
  - Water Pumping
  - Street & Traffic Lights
  - Buildings
  - Outdoor & Parks Lights

## Water Pumping

- Water pumping data represents an analysis of the top five highest energy consuming water and wastewater pumping SCE service accounts annual energy costs, annual energy consumption (kWh), GHG Emissions, and total annual energy costs based on MMBtus.
- Water pump conversion data used in this analysis is derived on the assumption that 65% of all existing pumps need to be upgraded. Of the 65% of pumps requiring upgrades, it is assumed that the pumps will save 7.5% of their annual kWh consumption [3].

## Street & Traffic Lights

- Street & traffic light data represents an analysis of annual energy costs, annual energy consumption (kWh), GHG Emissions per SCE street & traffic light tariff type.
- Annual cost savings reflects only agency owned street lights in the analysis; assumed cost savings conversion is based on converting HOPS to LED agency owned traffic and street lights [3].
- On average, agencies can save 50% on annual kWh consumption by converting HPS to LED, which also results in cost savings [3].

## Outdoor & Park Lights

- Outdoor & park lights data represents an analysis of annual energy costs, annual energy consumption (kWh), GHG Emissions, and total annual energy costs based on MMBtus per SCE outdoor and park lighting tariff type.
- On average, agencies can save 50% on annual kWh consumption by converting HPS to LED, which also results in cost savings [3].



### Agency Buildings

- Building summary data includes the following metrics for the top ten highest energy-consuming agency buildings' (total annual energy costs): annual energy costs and annual energy consumption (kWh and therms).
- Annual comparison data includes the following metrics for the agency buildings with the greatest change (absolute value) in annual energy consumption (MMBtu) from the baseline period to analysis period: annual energy costs, annual energy consumption (kWh and therms).
- Baseline period for electricity and gas results were based on usage from September 1, 2017 – August 31, 2018.
- Analysis period for electricity and gas results were based on usage from September 1, 2018 – August 31, 2019.

### Data Quality

Multiple service accounts were associated with the below addresses and were therefore aggregated for the purposes of analysis:

- 300 E Chapman Ave
- 170 S Olive St
- 407 E Chapman Ave
- 2900 E Collins Ave
- 637 W Struck Ave
- 1107 N Batavia St
- 615 N Lemon St
- 5725 E Carver Ln
- 1930 N Shaffer St

### End Notes

[1] Corporate Responsibility Report. (2015). In Southern California Edison. Retrieved from [https://www.sce.com/wps/wcm/connect/c0fcef5-e04a-4287-8301-8e66e3e5fbac/2014\\_Corporate+Responsibility+Report\\_FINAL+single-page.pdf?MOD=AJPERES&ContentCache=NONE](https://www.sce.com/wps/wcm/connect/c0fcef5-e04a-4287-8301-8e66e3e5fbac/2014_Corporate+Responsibility+Report_FINAL+single-page.pdf?MOD=AJPERES&ContentCache=NONE)

[2] Adams, L.S., Nicols, M.D., Goldstene, J. N. (2008). Climate Change Scoping Plan. In California Air Resources Board. Retrieved from [https://www.arb.ca.gov/cc/scopingplan/document/appendices\\_volume2.pdf](https://www.arb.ca.gov/cc/scopingplan/document/appendices_volume2.pdf)

[3] Based on SoCalREN previous project estimates.