

## CHAPTER 2: ENERGY USE & FORECAST

*Chapter 2 summarizes the 2010 baseline, 2015 re-inventory and 2035 forecast of community-wide energy consumption as well as the 2010 baseline and 2015 re-inventory of municipal-operations energy consumption.*

SBC completed an inventory of baseline energy use for 2010, a re-inventory of energy use in 2015, and forecasted energy consumption out to 2035 under a business as usual scenario to inform the strategies for improving energy efficiency, expanding utilization of renewable energy resources, and addressing the water-energy nexus. The baseline inventory and re-inventory serve as a benchmark against which future progress can be measured.

### 2010 BASELINE COMMUNITY-WIDE INVENTORY

The City's community-wide energy consumption data is expressed as aggregated residential and non-residential energy consumption by energy source. The City's municipal energy use for facilities located within the City is included with the aggregated non-residential energy use. Electricity and propane consumption were the largest energy sources in the City of Sonora built environment. In 2010, the City's community wide residential electricity consumption totaled 18,539,471 kWh, residential propane consumption totaled 1,143,480 gallons, and residential wood consumption totaled 1,529 cords. In addition, in that year, nonresidential electricity consumption totaled 41,072,137 kWh and nonresidential propane consumption totaled 760,471 gallons (See Figure 2-5). As an additional point of insight, electricity used by potable water and wastewater services provided for City residents by Tuolumne Utilities District was analyzed separately from nonresidential energy. In 2010, the City's wastewater services used 238,023 kWh of electricity and potable water services used 457,164 kWh of electricity (See Figure 2-6). It should be noted that 2010 residential and non-residential propane use was estimated using data from the 2010 Tuolumne County greenhouse gas inventory.

### 2015 COMMUNITY-WIDE RE-INVENTORY

Similarly to the 2010 baseline, electricity and propane consumption were the largest energy sources in the City of Sonora built environment. In 2015, the City's community wide residential electricity consumption totaled 17,061,713 kWh, residential propane consumption totaled 883,074 gallons, and residential wood consumption totaled 1,902 cords. This represents an 8.0% decrease in residential electricity use, 22.8% decrease in residential propane use and 24.4% increase in residential wood combustion. In addition, in that year, nonresidential electricity consumption totaled 41,180,580 kWh and nonresidential propane consumption totaled 745,372 gallons (See Figure 2-5). This represents a less than 0.3% increase in nonresidential electricity use and a 2.0% decrease in nonresidential propane use. As an additional point of insight, electricity used by potable water and wastewater services provided for City residents by Tuolumne Utilities District was again analyzed separately from nonresidential energy. In 2015, the City's wastewater services used 254,942 kWh of electricity and potable water services used 267,373 kWh of electricity (See Figure 2-6). This represents a 7.1% increase in wastewater services electricity use and a 41.5% decrease in potable water services electricity use. These changes in energy consumption illustrate the progress that has already been made towards achieving the 2035 energy reduction goals in this report. It should be noted that 2015 residential and non-residential propane use was estimated using data from the 2010 Tuolumne County greenhouse gas inventory and scaled based on the City of Sonora's change in occupied housing for residential propane use and employer establishments for non-residential propane use between 2010 and 2015, and then weighted by the difference in heating degree days between 2010 and 2015.

### 2035 BUSINESS-AS-USUAL COMMUNITY-WIDE FORECAST

The City's community-wide residential and non-residential energy use was forecasted out to 2035 under a business-as-usual (BAU) scenario and is presented in Figure 2-5. Since the City's municipal energy use is included with the community-wide energy use, a separate forecast for municipal energy use was not completed. The BAU forecast scenario was completed using the Statewide Energy Efficiency Collaborative (SEEC) ClearPath California toolkit. The BAU forecast estimates how energy use would change from 2010 to 2035 in the absence of any energy efficiency, renewable energy, or water efficiency policies or programs. The two required inputs for a forecast — baseline energy consumption data and growth rates — are presented in Appendices A and B, respectively. The baseline data was collected from PG&E and TPPA

for electricity use and estimated for propane and wood use in 2010. The growth rates were calculated using projections of the number of households and in-City employment prepared by state agencies.

The City's residential energy usages were all forecasted to increase by 5.45%, resulting in 19,550,718 kWh of electricity usage (an increase of 1,011,247 kWh), 1,205,848 gallons of propane combustion (an increase of 62,368 gallons), and 1,612 cords of wood combustion (an increase of 83 cords) in 2035 (See Figure 2-5). This forecast is based on the projected change in the number of households in the City of Sonora. The annualized growth rates for the number of households in the City were calculated based on the projected change in the number of households in Tuolumne County from 2010 to 2035 reported by the CalTrans Long-Term Socio-Economic Forecast of households for Tuolumne County.<sup>1</sup> This projected growth would result in an additional 134 households in the City of Sonora based on the 2010 baseline of 2,463 households. The use of Tuolumne County data as a proxy for the City of Sonora for the residential forecast was justified by a comparison of County and City residential population data. Residential population data taken from California's Department of Finance shows that the population of City of Sonora has made up a slightly increasing percentage of Tuolumne County's overall population, as it rose from 8.18% in 2000 to 8.94% in 2015 (See Figure 2-1 & 2-2).<sup>2,3</sup>

The City's non-residential energy usages were all forecasted to increase by 19.58%, resulting in 49,115,004 kWh of electricity usage (an increase of 8,042,867 kWh) and 909,391 gallons of propane usage (an increase of 148,920 gallons) in 2035 (See Figure 2-5). This forecast is based on the projected change of in-City employment in the City of Sonora. The annualized growth rates for employment in the City of Sonora were calculated based on the actual change from 2010 to 2015 of in-County employment reported by the California Employment Development Department estimates for Tuolumne County and the projected change from 2015 to 2035 of in-County employment based on the California Department of Transportation economic forecast for Tuolumne County.<sup>4,5</sup> This projected growth would result in an additional 1,006 people working in Sonora based on the 2010 baseline of 5,139 people working in Sonora. The use of Tuolumne County data as a proxy for the City of Sonora for non-residential forecasts was justified by a comparison of the number of people employed within the County and the City. Employment data taken from the US Census Bureau's On the Map tool shows that the number of people employed in City of Sonora has made up between 33.0% and 35.7% of the number of people employed in Tuolumne County (See Figure 2-3 & 2-4).<sup>6</sup>

The City's wastewater and potable water services electricity use was forecasted to increase 5.45% to 251,101 kWh (an increase of 13,078 kWh) and 481,985 kWh (an increase of 24,821 kWh) in 2035 respectively, based on the projected change in the number of households in the City of Sonora. The annualized growth rates for the number of households in the City were calculated based on the projected change in the number of households from 2010 to 2035 reported by the CalTrans Long-Term Socio-Economic Forecast of households for Tuolumne County.<sup>7</sup>

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<sup>1</sup> Caltrans Long-Term Socio-Economic Forecasts by County – Tuolumne County 2016. [http://www.dot.ca.gov/hq/tpp/offices/eab/socio\\_economic.html](http://www.dot.ca.gov/hq/tpp/offices/eab/socio_economic.html), Households. (Accessed June 22, 2017).

<sup>2</sup> California Department of Finance E-4 Population Estimates – Tuolumne County and City of Sonora 2000 - 2010. <http://www.dof.ca.gov/Forecasting/Demographics/Estimates/E-4/2001-10/>. (Accessed January 11, 2018)

<sup>3</sup> California Department of Finance E-5 Population and Housing Estimates – Tuolumne County and City of Sonora 2011 – 2015. <http://www.dof.ca.gov/Forecasting/Demographics/Estimates/E-5/>. (Accessed January 11, 2018)

<sup>4</sup> California Employment Development Department, Labor Market Information Division, Industry Employment & Labor Force – by Annual Average (March 2016 Benchmark). <http://www.labormarketinfo.edd.ca.gov/county/tuolu.html> In-County Number of Employed, All Industries (Accessed June 22, 2017).

<sup>5</sup> Caltrans Long-Term Socio-Economic Forecasts by County – Tuolumne County 2016, [http://www.dot.ca.gov/hq/tpp/offices/eab/socio\\_economic.html](http://www.dot.ca.gov/hq/tpp/offices/eab/socio_economic.html) In-County Total Employment, All Industries. (Accessed June 22, 2017).

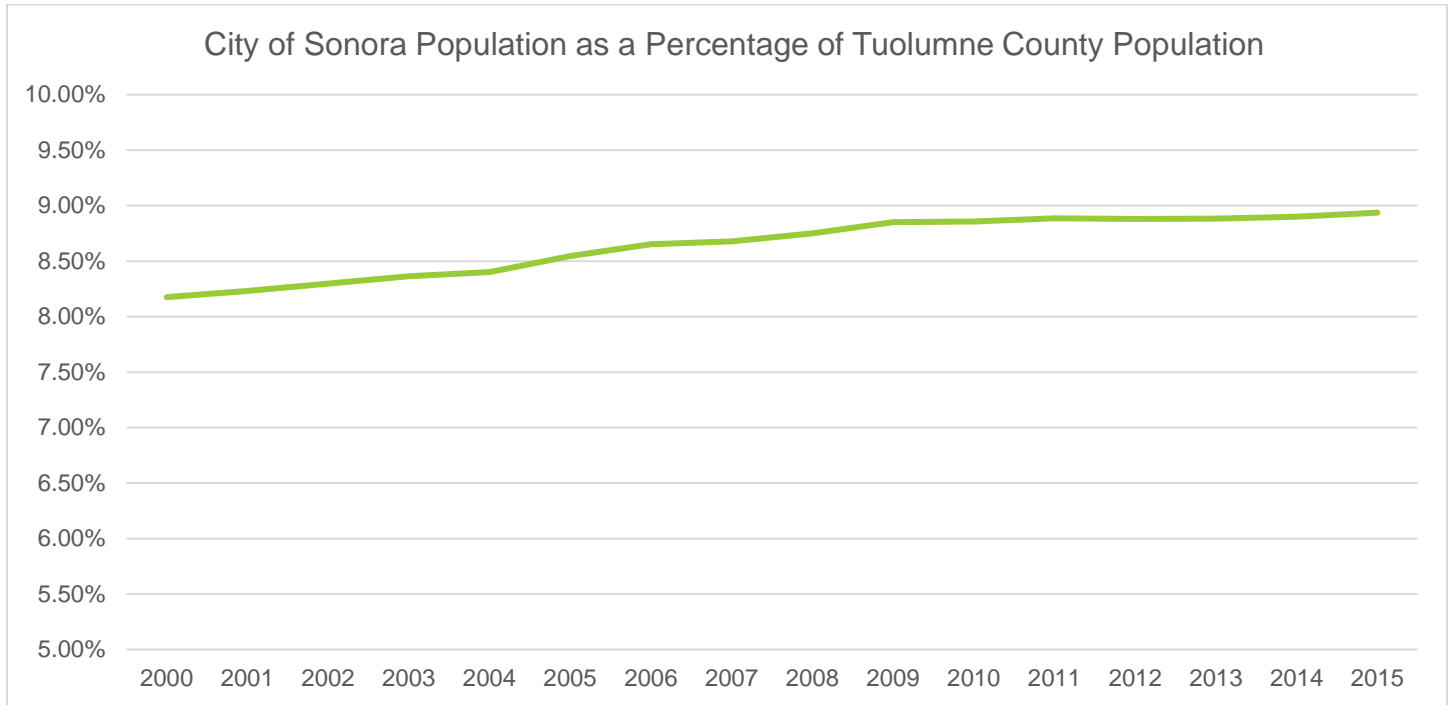
<sup>6</sup> US Census Bureau On the Map Web Tool - Tuolumne County and City of Sonora 2002 -2015. <https://onthemap.ces.census.gov/>. (Accessed January 11, 2018)

<sup>7</sup> Caltrans Long-Term Socio-Economic Forecasts by County – Tuolumne County 2016. [http://www.dot.ca.gov/hq/tpp/offices/eab/socio\\_economic.html](http://www.dot.ca.gov/hq/tpp/offices/eab/socio_economic.html), Households. (Accessed June 22, 2017).

**Figure 2-1: Department of Finance Population Data**

<b>Department of Finance Population Data</b>					
	Tuolumne County Population	City of Sonora Population	Tuolumne nominal % change	City of Sonora nominal % change	Sonora % of Tuolumne
<b>2000</b>	54,957	4,493	-	-	8.18%
<b>2001</b>	55,619	4,578	1.20%	1.89%	8.23%
<b>2002</b>	56,177	4,662	1.00%	1.83%	8.30%
<b>2003</b>	56,407	4,718	0.41%	1.20%	8.36%
<b>2004</b>	56,411	4,740	0.01%	0.47%	8.40%
<b>2005</b>	56,506	4,829	0.17%	1.88%	8.55%
<b>2006</b>	56,347	4,875	-0.28%	0.95%	8.65%
<b>2007</b>	56,098	4,869	-0.44%	-0.12%	8.68%
<b>2008</b>	55,661	4,870	-0.78%	0.02%	8.75%
<b>2009</b>	55,291	4,894	-0.66%	0.49%	8.85%
<b>2010</b>	55,365	4,903	0.13%	0.18%	8.86%
<b>2011</b>	55,309	4915	-0.10%	0.24%	8.89%
<b>2012</b>	55,249	4906	-0.11%	-0.18%	8.88%
<b>2013</b>	54938	4880	-0.56%	-0.53%	8.88%
<b>2014</b>	55082	4902	0.26%	0.45%	8.90%
<b>2015</b>	54663	4885	-0.76%	-0.35%	8.94%
		Total % Change	-0.53%	8.72%	
		2010-2015 % change	-1.27%	-0.37%	

**Figure 2-2: Sonora Population as a Percentage of Tuolumne Population**

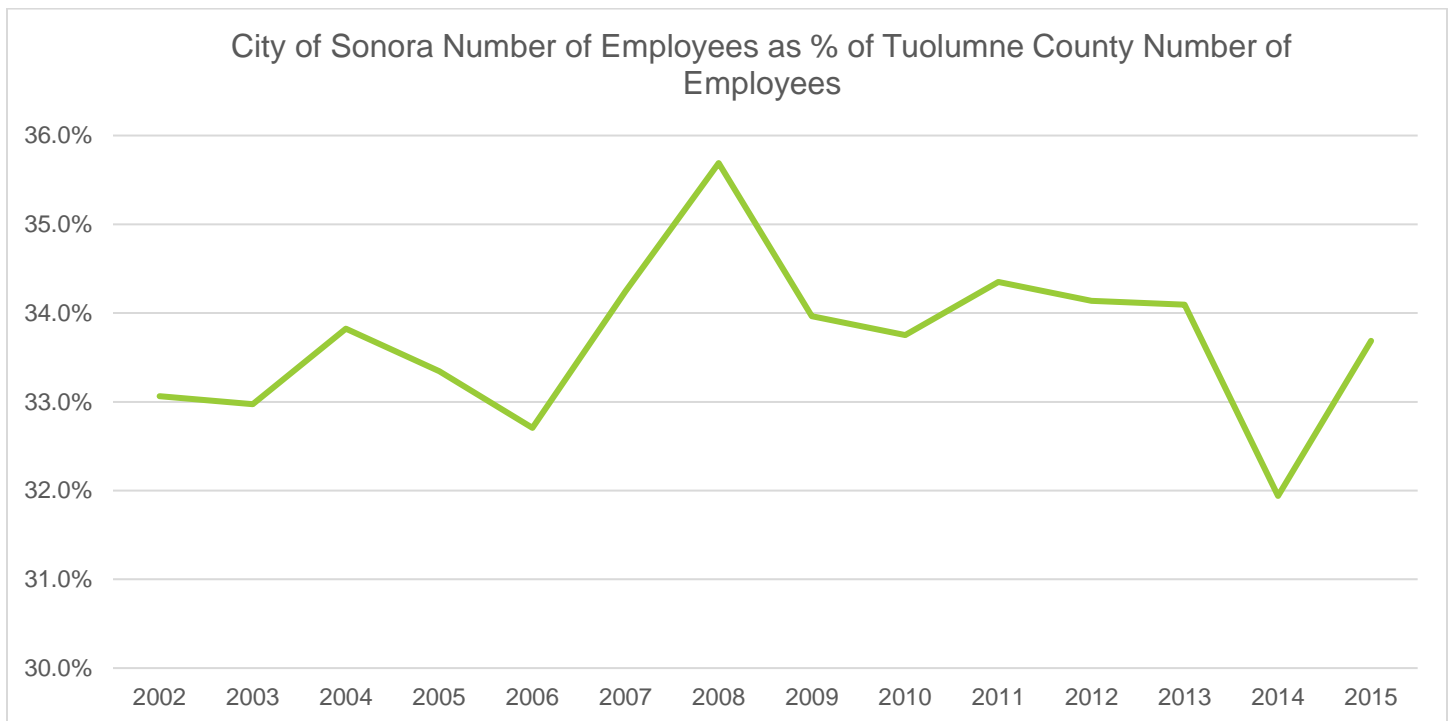


**Figure 2-3: On The Map Number of Employees Data**

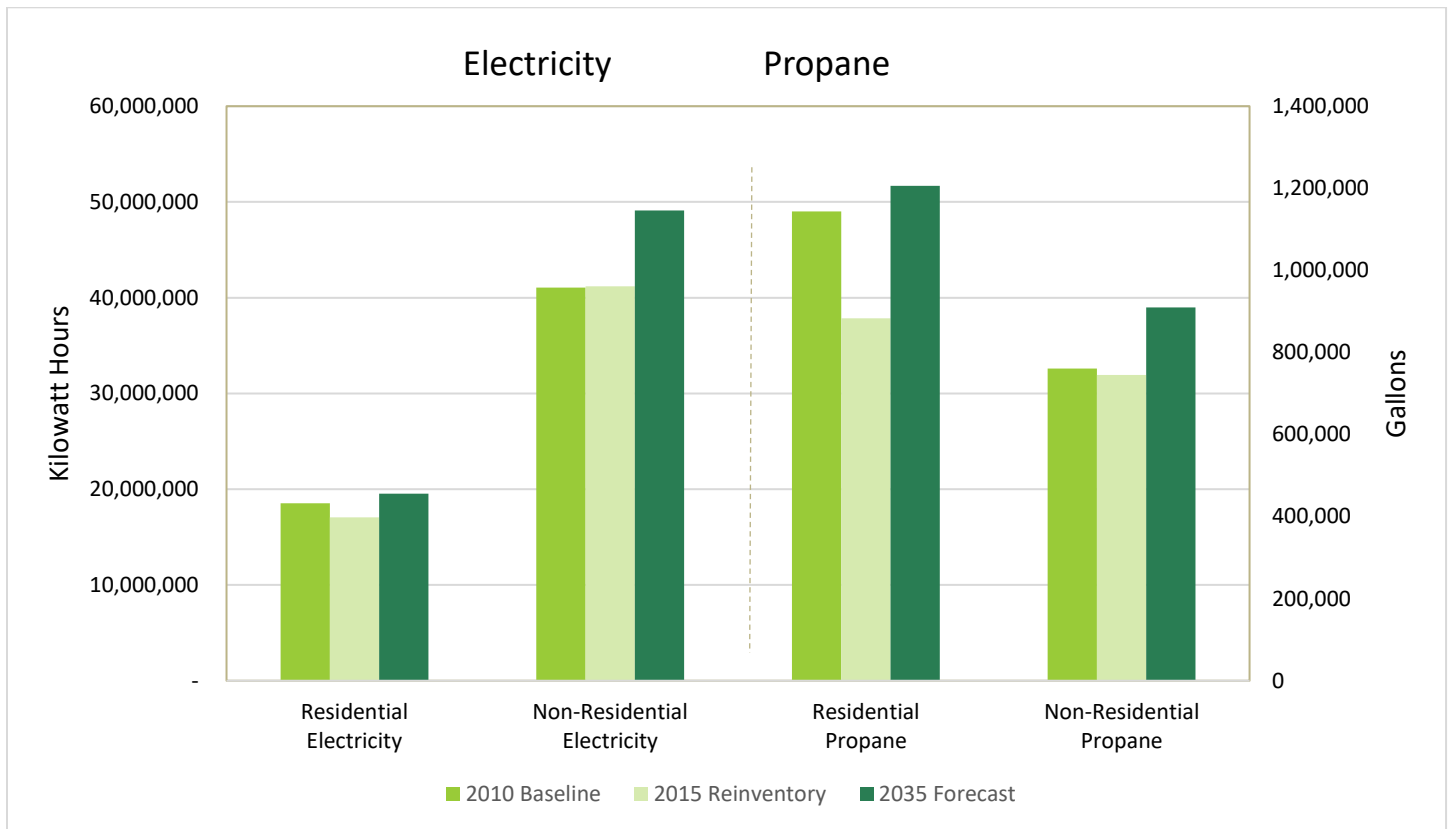
On The Map Number of Employees Data					
	Tuolumne County Number of People Employed	City of Sonora Number of People Employed	Tuolumne Nominal % change	City of Sonora Nominal % change	Sonora % of Tuolumne
<b>2002</b>	15,261	5,046			33.1%
<b>2003</b>	15,397	5,077	0.89%	0.61%	33.0%
<b>2004</b>	15,468	5,232	0.46%	3.05%	33.8%
<b>2005</b>	15,966	5,324	3.22%	1.76%	33.3%
<b>2006</b>	16,253	5,316	1.80%	-0.15%	32.7%
<b>2007</b>	15,792	5,408	-2.84%	1.73%	34.2%
<b>2008</b>	15,817	5,645	0.16%	4.38%	35.7%
<b>2009</b>	15,363	5,218	-2.87%	-7.56%	34.0%
<b>2010</b>	15,226	5,139	-0.89%	-1.51%	33.8%

<b>2011</b>	15,540	5,338	2.06%	3.87%	34.4%
<b>2012</b>	14,764	5,040	-4.99%	-5.58%	34.1%
<b>2013</b>	15,005	5,116	1.63%	1.51%	34.1%
<b>2014</b>	14,540	4,644	-3.10%	-9.23%	31.9%
<b>2015</b>	14,970	5,043	2.96%	8.59%	33.7%
		Total % Change	-1.91%	-0.06%	
		2010-2015 % change	-1.68%	-1.87%	

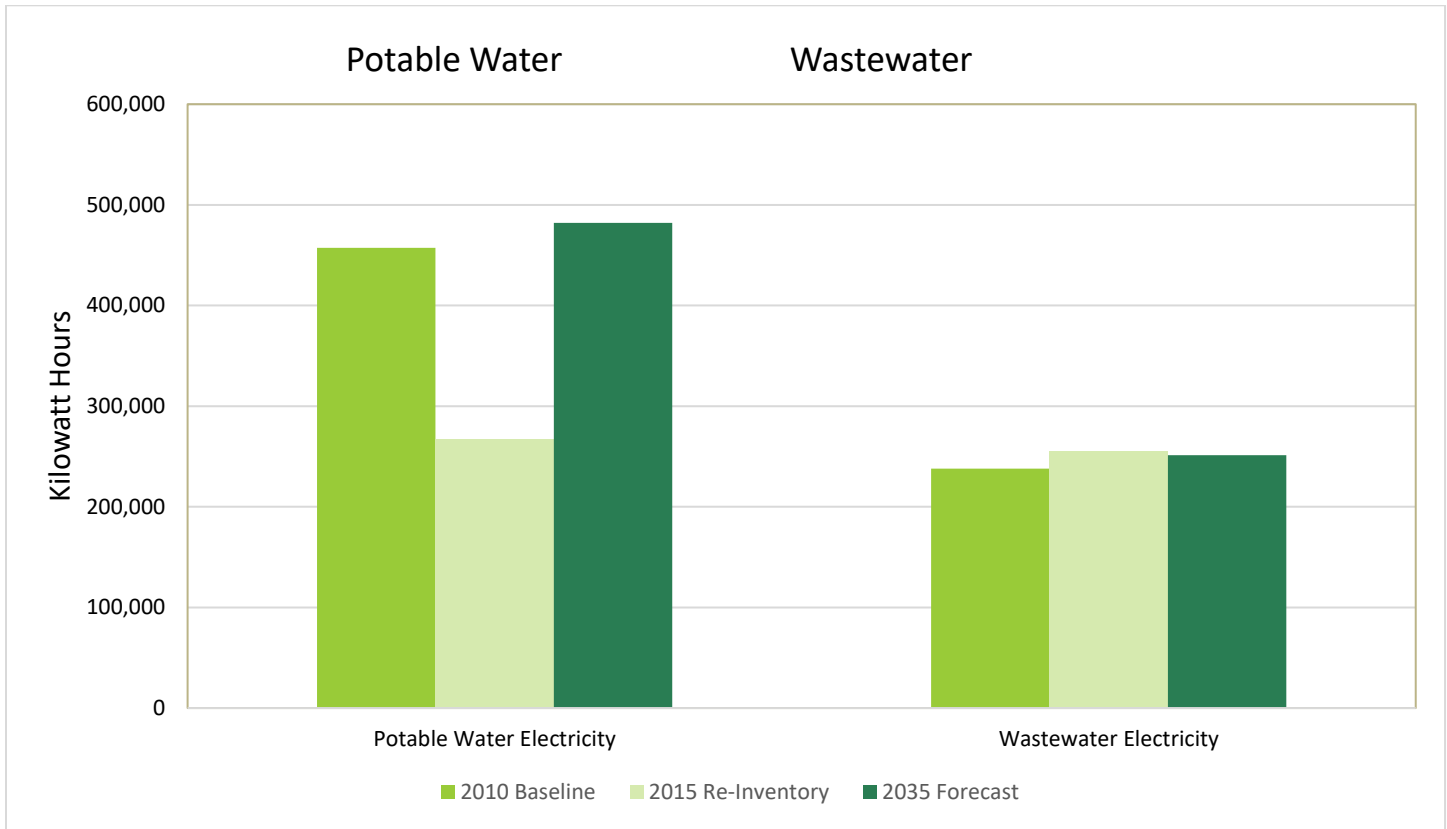
**Figure 2-4: City of Sonora Number of Employees as % of Tuolumne County Number of Employees**



**Figure 2-5: 2010 Baseline, 2015 Re-Inventory & 2035 BAU Forecast of Residential and Non-Residential Electricity and Propane Use**



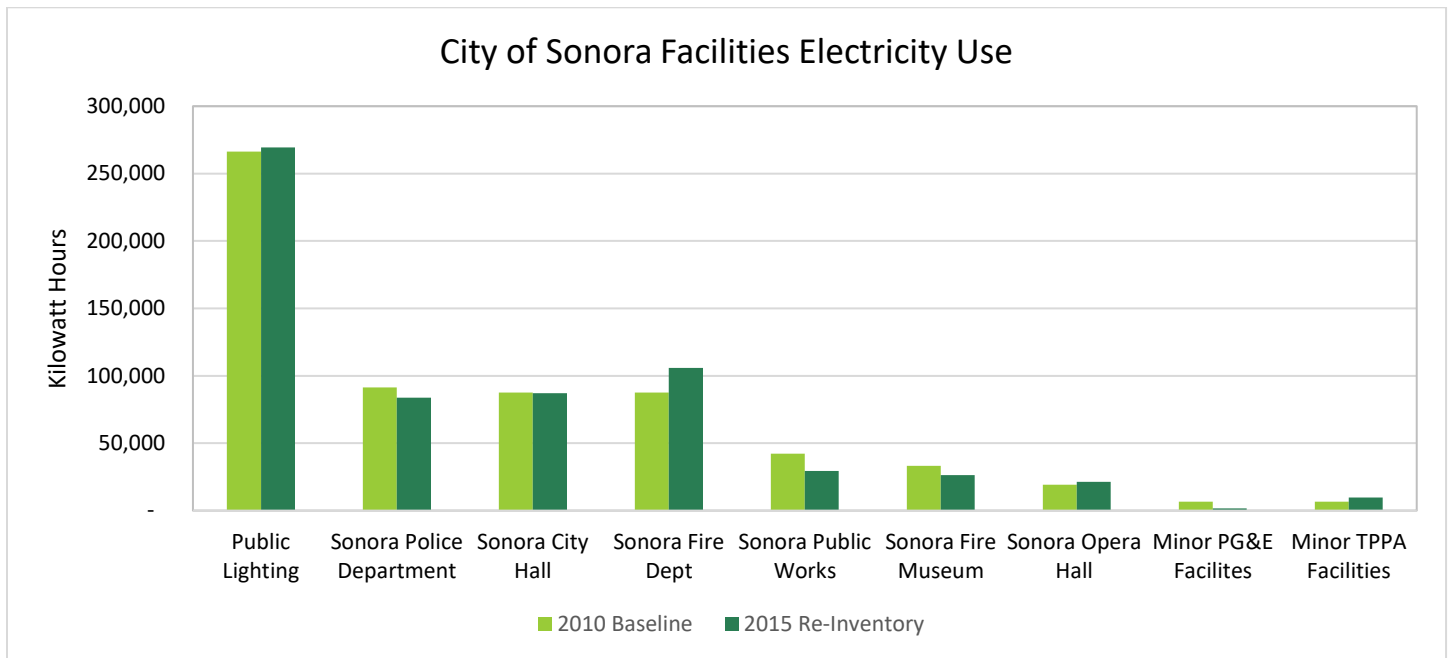
**Figure 2-6: 2010 Baseline, 2015 Re-Inventory & 2035 Forecast of Water and Wastewater Services Electricity Use**



**2010 BASELINE AND 2015 RE-INVENTORY OF CITY OF SONORA'S FACILITIES ENERGY USE**

The City of Sonora's facilities' main uses of energy, presented in Figure 2-7 and 2-8, are electricity and propane. Public lighting in Sonora, Sonora Police Department, Sonora City Hall and Sonora Fire Department used the most electricity of City facilities and the Sonora Fire Department, Public Works, and Sonora Opera Hall used the most propane. In 2010, the City of Sonora's facilities' propane consumption totaled 5,420 gallons and the City's facilities' electricity consumption totaled 640,735 kWh. In 2015, the City's facilities' propane consumption decreased by 30.1% to 3,786 gallons and the City's facilities' electricity consumption decreased by 0.9% to 634,856 kWh. These decreases in energy consumption reflect progress that has already been made toward meeting the energy reduction goals in this report. In 2010, the City facilities accounted for an estimated \$104,038 worth of energy consumption. In 2015, City facilities' energy costs increased by 13.1% to \$117,623. Detailed energy use is presented in Appendix A.

**Figure 2-7: 2010 Baseline & 2015 Re-Inventory City of Sonora Facilities Electricity Consumption**



**Figure 2-8: 2010 Baseline & 2015 Re-Inventory City of Sonora Facilities Propane Consumption**

