



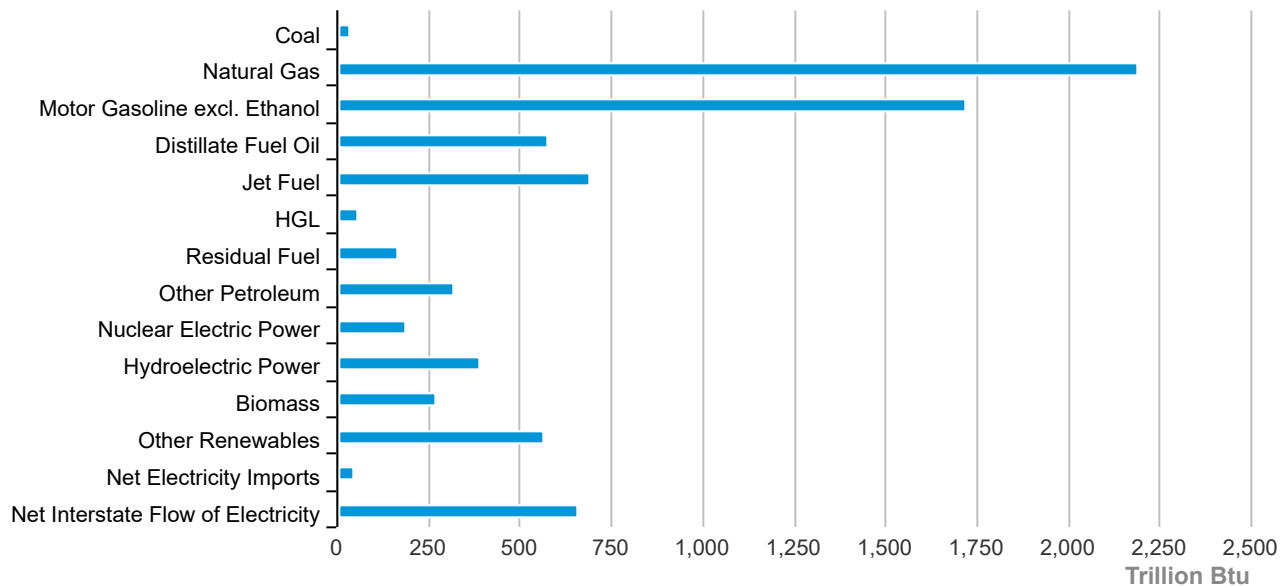
## California State Energy Profile

### California Quick Facts

- California was the fourth-largest producer of crude oil among the 50 states in 2017, after Texas, North Dakota, and Alaska, and, as of January 2018, third in oil refining capacity after Texas and Louisiana.
- California is the largest consumer of jet fuel among the 50 states and accounted for one-fifth of the nation's jet fuel consumption in 2016.
- California's total energy consumption is second-highest in the nation, but, in 2016, the state's per capita energy consumption ranked 48th, due in part to its mild climate and its energy efficiency programs.
- In 2017, California ranked second in the nation in conventional hydroelectric generation and first as a producer of electricity from solar, geothermal, and biomass resources.
- In 2017, solar PV and solar thermal installations provided about 16% of California's net electricity generation.

Last Updated: November 15, 2018

### California Energy Consumption Estimates, 2017



Source: Energy Information Administration, State Energy Data System

## Data

Last Update: June 20, 2019 | Next Update: July 18, 2019

### Energy Indicators

Demography	California	Share of U.S.	Period
Population	39.6 million	12.1%	2018
Civilian Labor Force	19.2 million	11.9%	Apr-19
Economy	California	U.S. Rank	Period
Gross Domestic Product	\$ 2,968.1 billion	1	2018
Gross Domestic Product for the Manufacturing Sector	\$ 316,764 million	1	2018
Per Capita Personal Income	\$ 62,586	7	2018
Vehicle Miles Traveled	343,862 million miles	1	2017
Land in Farms	25.6 million acres	16	2012
Climate	California	U.S. Rank	Period
Average Temperature	60.1 degrees Fahrenheit	12	2018
Precipitation	18.0 inches	42	2018

### Prices

Petroleum	California	U.S. Average	Period	find more
<a href="#">Domestic Crude Oil First Purchase</a>	\$ 65.34 /barrel	\$ 57.47 /barrel	Mar-19	
Natural Gas	California	U.S. Average	Period	find more
<a href="#">City Gate</a>	\$ 3.57 /thousand cu ft	\$ 4.06 /thousand cu ft	Mar-19	<a href="#">find more</a>
<a href="#">Residential</a>	\$ 13.64 /thousand cu ft	\$ 9.48 /thousand cu ft	Mar-19	<a href="#">find more</a>
Coal	California	U.S. Average	Period	find more
<a href="#">Average Sales Price</a>	--	\$ 33.72 /short ton	2017	
<a href="#">Delivered to Electric Power Sector</a>	\$ 0.00 /million Btu	\$ 2.07 /million Btu	Mar-19	
Electricity	California	U.S. Average	Period	find more
<a href="#">Residential</a>	19.30 cents/kWh	12.83 cents/kWh	Mar-19	<a href="#">find more</a>
<a href="#">Commercial</a>	14.58 cents/kWh	10.44 cents/kWh	Mar-19	<a href="#">find more</a>
<a href="#">Industrial</a>	11.23 cents/kWh	6.73 cents/kWh	Mar-19	<a href="#">find more</a>

**Reserves**

<b>Reserves</b>	<b>California</b>	<b>Share of U.S.</b>	<b>Period</b>	<a href="#">find more</a>
Crude Oil (as of Dec. 31)	2,209 million barrels	5.6%	2017	<a href="#">find more</a>
Expected Future Production of Dry Natural Gas (as of Dec. 31)	1,560 billion cu ft	0.4%	2017	<a href="#">find more</a>
Expected Future Production of Natural Gas Plant Liquids	78 million barrels	0.4%	2017	<a href="#">find more</a>
Recoverable Coal at Producing Mines	--	--	2017	<a href="#">find more</a>
<b>Rotary Rigs &amp; Wells</b>	<b>California</b>	<b>Share of U.S.</b>	<b>Period</b>	<a href="#">find more</a>
Natural Gas Producing Wells	3,780 wells	0.8%	2017	<a href="#">find more</a>
<b>Capacity</b>	<b>California</b>	<b>Share of U.S.</b>	<b>Period</b>	
Crude Oil Refinery Capacity (as of Jan. 1)	1,892,471 barrels/calendar day	10.2%	2018	
Electric Power Industry Net Summer Capacity	76,236 MW	6.9%	Mar-19	

**Supply & Distribution**

<b>Production</b>	<b>California</b>	<b>Share of U.S.</b>	<b>Period</b>	<a href="#">find more</a>
Total Energy	2,431 trillion Btu	2.9%	2016	<a href="#">find more</a>
Crude Oil	14,021 thousand barrels	3.8%	Mar-19	<a href="#">find more</a>
Natural Gas - Marketed	209,327 million cu ft	0.7%	2017	<a href="#">find more</a>
Coal	--	--	2017	<a href="#">find more</a>
<b>Total Utility-Scale Net Electricity Generation</b>	<b>California</b>	<b>Share of U.S.</b>	<b>Period</b>	<a href="#">find more</a>
Total Net Electricity Generation	16,960 thousand MWh	5.2%	Mar-19	
<b>Utility-Scale Net Electricity Generation (share of total)</b>	<b>California</b>	<b>U.S. Average</b>	<b>Period</b>	
Petroleum-Fired	*	0.2 %	Mar-19	<a href="#">find more</a>
Natural Gas-Fired	36.8 %	34.8 %	Mar-19	<a href="#">find more</a>
Coal-Fired	0.1 %	24.3 %	Mar-19	<a href="#">find more</a>
Nuclear	6.7 %	20.1 %	Mar-19	<a href="#">find more</a>
Renewables	55.5 %	19.8 %	Mar-19	
<b>Stocks</b>	<b>California</b>	<b>Share of U.S.</b>	<b>Period</b>	<a href="#">find more</a>

**Supply & Distribution**

Motor Gasoline (Excludes Pipelines)	141 thousand barrels	0.9%	Mar-19	
Distillate Fuel Oil (Excludes Pipelines)	6,298 thousand barrels	6.1%	Mar-19	<a href="#">find more</a>
Natural Gas in Underground Storage	331,705 million cu ft	6.0%	Mar-19	<a href="#">find more</a>
Petroleum Stocks at Electric Power Producers	166 thousand barrels	0.7%	Mar-19	<a href="#">find more</a>
Coal Stocks at Electric Power Producers	0 thousand tons	0.0%	Mar-19	<a href="#">find more</a>
<b>Fueling Stations</b>	<b>California</b>	<b>Share of U.S.</b>	<b>Period</b>	
Motor Gasoline	7,471 stations	6.7%	2016	
Liquefied Petroleum Gases	253 stations	8.2%	2019	
Electricity	5,088 stations	24.0%	2019	
Ethanol	155 stations	4.6%	2019	
Compressed Natural Gas and Other Alternative Fuels	237 stations	19.4%	2019	

**Consumption & Expenditures**

Summary	California	U.S. Rank	Period	
Total Consumption	7,881 trillion Btu	2	2017	<a href="#">find more</a>
Total Consumption per Capita	199 million Btu	48	2016	<a href="#">find more</a>
Total Expenditures	\$ 124,724 million	2	2017	<a href="#">find more</a>
Total Expenditures per Capita	\$ 2,872	44	2016	<a href="#">find more</a>
<b>by End-Use Sector</b>	<b>California</b>	<b>Share of U.S.</b>	<b>Period</b>	
Consumption				
» Residential	1,416 trillion Btu	7.1%	2017	<a href="#">find more</a>
» Commercial	1,473 trillion Btu	8.2%	2017	<a href="#">find more</a>
» Industrial	1,818 trillion Btu	5.7%	2017	<a href="#">find more</a>
» Transportation	3,175 trillion Btu	11.3%	2017	<a href="#">find more</a>
Expenditures				
» Residential	\$ 22,640 million	9.2%	2017	<a href="#">find more</a>
» Commercial	\$ 22,426 million	12.1%	2017	<a href="#">find more</a>

## Consumption & Expenditures

» Industrial	\$ 14,242 million	7.5%	2017	<a href="#">find more</a>
» Transportation	\$ 65,416 million	12.7%	2017	<a href="#">find more</a>
<b>by Source</b>	<b>California</b>	<b>Share of U.S.</b>	<b>Period</b>	
Consumption				
» Petroleum	683 million barrels	9.4%	2017	<a href="#">find more</a>
» Natural Gas	2,115 billion cu ft	7.8%	2017	<a href="#">find more</a>
» Coal	1 million short tons	0.2%	2017	<a href="#">find more</a>
Expenditures				
» Petroleum	\$ 71,487.0 million	11.3%	2017	<a href="#">find more</a>
» Natural Gas	\$ 14,480.4 million	10.2%	2017	<a href="#">find more</a>
» Coal	\$ 127.4 million	0.4%	2017	<a href="#">find more</a>
<b>Consumption for Electricity Generation</b>	<b>California</b>	<b>Share of U.S.</b>	<b>Period</b>	<a href="#">find more</a>
Petroleum	NM	NM	Mar-19	<a href="#">find more</a>
Natural Gas	43,867 million cu ft	5.4%	Mar-19	<a href="#">find more</a>
Coal	5 thousand short tons	*	Mar-19	<a href="#">find more</a>
<b>Energy Source Used for Home Heating (share of households)</b>	<b>California</b>	<b>U.S. Average</b>	<b>Period</b>	
Natural Gas	64.4 %	48.0 %	2017	
Fuel Oil	0.2 %	4.7 %	2017	
Electricity	26.5 %	39.0 %	2017	
Propane	3.2 %	4.7 %	2017	
Other/None	5.6 %	3.6 %	2017	

## Environment

<b>Renewable Energy Capacity</b>	<b>California</b>	<b>Share of U.S.</b>	<b>Period</b>	<a href="#">find more</a>
Total Renewable Energy Electricity Net Summer Capacity	31,284 MW	13.9%	Mar-19	
Ethanol Plant Operating Capacity	219 million gal/year	1.4%	2018	
<b>Renewable Energy Production</b>	<b>California</b>	<b>Share of U.S.</b>	<b>Period</b>	<a href="#">find more</a>
Utility-Scale Hydroelectric Net Electricity Generation	4,407 thousand MWh	17.3%	Mar-19	

## Environment

Utility-Scale Solar, Wind, and Geothermal Net Electricity Generation	4,557 thousand MWh	13.6%	Mar-19	
Utility-Scale Biomass Net Electricity Generation	454 thousand MWh	9.2%	Mar-19	
Distributed (Small-Scale) Solar Photovoltaic Generation	1,251 thousand MWh	42.2%	Mar-19	
Ethanol Production	5,320 Thousand Barrels	1.4%	2016	
<b>Renewable Energy Consumption</b>	<b>California</b>	<b>U.S. Rank</b>	<b>Period</b>	<a href="#">find more</a>
Renewable Energy Consumption as a Share of State Total	13.4 %	16	2016	
Ethanol Consumption	38,179 thousand barrels	1	2017	
<b>Total Emissions</b>	<b>California</b>	<b>Share of U.S.</b>	<b>Period</b>	<a href="#">find more</a>
Carbon Dioxide	363.3 million metric tons	7.0%	2016	
<b>Electric Power Industry Emissions</b>	<b>California</b>	<b>Share of U.S.</b>	<b>Period</b>	<a href="#">find more</a>
Carbon Dioxide	44,433 thousand metric tons	2.4%	2017	
Sulfur Dioxide	1 thousand metric tons	0.1%	2017	
Nitrogen Oxide	69 thousand metric tons	4.4%	2017	

## Analysis

Last Updated: November 15, 2018

### Overview

California is the most populated state in the nation, has the largest economy, and is second only to Texas in total energy consumption.<sup>1,2,3</sup> Although California has the world's fifth-largest economy, the state has one of the lowest per capita energy consumption levels in the United States.<sup>4,5</sup> California's extensive efforts to increase energy efficiency and implement alternative technologies have restrained growth in energy demand.<sup>6</sup> California is also rich in energy resources. The state has an abundant supply of crude oil and is a top producer of conventional hydroelectric power.<sup>7,8</sup> California also leads the nation in electricity generation from solar, geothermal, and biomass resources.<sup>9</sup>

Stretching two-thirds of the way up the West Coast, California is the nation's third-largest state by land area.<sup>10</sup> Transportation dominates California's energy consumption profile.<sup>11</sup> More motor vehicles are registered in California than in any other state, and commute times in California are among the longest in the country.<sup>12,13</sup> The state also accounts for one-fifth of the nation's jet fuel consumption.<sup>14</sup> California leads the nation in agricultural and manufacturing gross domestic product (GDP), and the industrial sector is the state's second-largest energy consumer.<sup>15,16</sup> However, per capita energy use in California's residential

*Residential energy use per person in California is lower than that of any other*

sector is lower than that of any other state except Hawaii.<sup>17</sup> In most of California's more densely populated areas, the climate is dry and relatively mild.<sup>18,19</sup> More than two-fifths of state households report that they do not use air conditioning, and about one-seventh do not use space heating.<sup>20</sup>

*state except  
Hawaii.*

## Electricity

Almost half of California's net electricity generation was from renewable resources, including hydropower, in 2017.

Natural gas-fired power plants fueled more than two-fifths of the total in-state net electricity generation.<sup>21</sup> Nuclear power, which until 2012 provided almost one-fifth of the state's total net electricity generation, now supplies less than one-tenth of net generation, as one of the two nuclear power plants in the state was permanently retired in mid-2013.<sup>22,23</sup>

California has the nation's second-largest conventional hydroelectric generating capacity after Washington state, and is among the top three hydropower-producers in the nation.<sup>24,25</sup> In 2015, because of prolonged drought, hydropower supplied only about 7% of California's net generation. However, by 2017, hydropower's share rebounded with increased precipitation, and hydroelectric power plants provided one-fifth of the state's net generation.<sup>26,27</sup>

Reductions in California's hydroelectric generation and nuclear capacity and generation have been largely offset by other renewable generation. Non-hydroelectric renewable technologies, such as solar, wind, geothermal, and biomass, provided more than one-fourth of the state's net generation in 2017.<sup>28</sup> There are no utility-owned coal-fired power plants in California.<sup>29</sup> In 2017, less than 0.2% of the total net electricity generated in California came from industrial coal-fired cogeneration units.<sup>30,31</sup>

Expanded transmission capability helps the Southern California electric grid address the decreased nuclear generation. The Sunrise Powerlink Transmission project, which was put into service in June 2012, added approximately 800 megawatts of transmission capability to the Southern California electric grid. It was designed to link electricity generated from renewable resources in the southeastern corner of the state to San Diego.<sup>32</sup> Additional transmission projects, many aimed at improved system reliability, have come online or are in the planning and construction phase.<sup>33</sup>

More than one-fourth of California's electricity supply comes from generating facilities outside the state.<sup>34</sup> In 2017, at least half of the power delivered to California from states in the Pacific Northwest was from renewable energy sources. States in the Southwest delivered power generated from coal, renewable resources, natural gas, and nuclear energy. Slightly more than one-fourth of the southwestern power came from renewables, including from hydroelectric power plants with capacities greater than 30 megawatts, and another one-fourth from coal-fired power plants.<sup>35</sup> Electricity supplied from out-of-state coal-fired power plants has decreased following the enactment of a state law in late 2006 that requires California utilities to limit new long-term financial investments in base-load generation to those power plants that meet California emissions performance standards. Essentially all of California's imports of coal-fired generation will end by 2026.<sup>36</sup> In 2017, almost all the coal-fueled electricity generation consumed in the state was imported and provided about 4% of California's power.<sup>37</sup>

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In 2003, as a response to unstable electricity prices and blackouts in 2000 and 2001, a California Energy Action Plan was adopted to eliminate outages and excessive price spikes. The Energy Action Plan's goals are to ensure that adequate, reliable, and reasonably priced electric power and natural gas supplies, including prudent reserves, are provided. The plan calls for increased energy conservation and efficiency, new in-state generation facilities, and upgraded and expanded electricity transmission and distribution infrastructure to ensure that generating facilities can quickly come online when needed. The plan was updated in 2008.<sup>38,39</sup> A 2015 state law requires that annual targets be set in order to double statewide energy-efficiency by 2030.<sup>40</sup>

Although California has the second-highest retail electricity sales in the nation, after Texas, retail sales are the lowest in the nation on a per capita basis.<sup>41,42</sup> More than one-fourth of California households use electricity for home heating.<sup>43</sup>

California has encouraged use of non-carbon-emitting vehicles, and, by the end of 2017, California drivers owned 8% of the global electric vehicle fleet, and more than one-fourth of the nation's electric vehicle charging stations are in California.<sup>44,45</sup>

## Renewable energy

California is among the top states in the nation in electricity generation from renewable resources. In 2017, the state was the leader in total utility-scale electricity generation from renewable resources, including hydroelectric power. California typically leads the nation in generation from solar, geothermal, and biomass energy. In 2017, the state was also the nation's second-largest producer of electricity from conventional hydroelectric power and the fifth-largest producer from wind energy.<sup>46</sup>

In 2014, California became the first state in the nation to get more than 5% of its utility-scale electricity generation from solar resources.<sup>47</sup> In 2017, solar resources, both photovoltaic (PV) and thermal, provided more than one-tenth of the state's utility-scale net electricity generation. When distributed (customer-sited, small-scale) generation is included, solar energy provided about one-sixth of the state's net generation. Electricity generation from solar PV in California accounts for more than two-fifths of the U.S. total. About one-third of the solar PV generation in the state is from distributed generation. Almost three-fourths of all U.S. solar thermal electricity generation is in California as well.<sup>48</sup> California's greatest solar resource is in the state's southeastern deserts where all the solar thermal facilities and the largest solar PV plants are located. However, solar PV facilities are located throughout the state.<sup>49,50,51</sup> On a smaller scale, the California Solar

Initiative encourages Californians to install solar power systems on the rooftops of their homes and businesses.<sup>52</sup> By 2017, California had about 10,700 megawatts of utility-scale solar power generating capacity installed, more than any other state, and, when distributed generation was included, the state had almost 20,000 megawatts of installed solar capacity.<sup>53,54</sup> By mid-2018, total installed solar capacity was almost 23,000 megawatts.<sup>55</sup> The state's 2019 building energy efficiency standards require solar PV systems on all homes built in 2020 and later.<sup>56</sup>

California is the nation's top producer of electricity from geothermal energy with almost 2,700 megawatts of installed capacity and 43 operating geothermal power plants. The state accounts for almost three-fourths of the nation's total electricity generation from geothermal energy.<sup>57,58</sup> Substantial geothermal resources are found in California's coastal mountain ranges, in the volcanic areas of northern California, near the Salton Sea in southern California, and along the state's border with Nevada.<sup>59</sup> The Geysers, located in the Mayacamas Mountains north of San Francisco, is the largest complex of geothermal power plants in the world and has more than 700 megawatts of installed capacity.<sup>60</sup>

California also leads the nation in utility-scale electricity generation from biomass.<sup>61</sup> Nearly three-fifths of California's biomass generating capacity comes from the state's more than two dozen power plants fueled by wood and wood waste.<sup>62</sup> Wood pellets made of renewable materials, mainly recycled wood waste, are used for heating as well as for electricity generation. A facility in northern California has the capacity to manufacture 100,000 tons of wood pellets per year.<sup>63</sup>

California produces more than 5% of the U.S. total utility-scale wind generation, ranking fifth in the nation behind Texas, Oklahoma, Iowa, and Kansas.<sup>64</sup>

California's wind power potential is widespread, especially along the state's many mountain crests to the south and east, as well as offshore along the northern California coast.<sup>65</sup> There are six major wind resource areas in the state and many smaller wind sites.<sup>66</sup> As of mid-2018, California had nearly 5,700 megawatts of installed wind capacity.<sup>67</sup>

*Solar energy provides more than one-tenth of California's utility-scale net electricity generation.*

*California is the top producer of electricity from geothermal energy in the nation.*



Concern over the environment prompted several state policy initiatives to reduce greenhouse gas (GHG) emissions. California's Low Carbon Fuel Standard, issued in January 2007, called for a reduction of at least 10% in the carbon intensity of the state's transportation fuels by 2020. The standard requires fossil fuel substitutes that demonstrate lower lifecycle GHG emissions than the fuels they replace.<sup>68</sup> A number of alternative pathways have been identified that reduce the levels of GHG emissions in the production of ethanol, biodiesel, and renewable diesel.<sup>69</sup> California does produce some biodiesel.<sup>70</sup> There are seven ethanol production plants in the state, but California consumes more than one-tenth of the nation's fuel ethanol supply, which is seven times more than the state produces.<sup>71,72,73</sup>

California established an emissions cap-and-trade program as part of the state's Global Warming Solutions Act of 2006. The program's goal is the reduction of the state's GHG emissions to 1990 levels by 2020, to 40% of 1990 levels by 2030, and eventually to 80% of 1990 levels by 2050. To minimize the costs of pollution controls, a system for trading emissions allowances was created, and auctions began in November 2012.<sup>74</sup> The program sets statewide limits on the sources responsible for 85% of California's GHG emissions.<sup>75</sup>

The California renewable portfolio standard (RPS), implemented in 2002 and revised several times since then, requires that 33% of retail sales of electricity in California come from eligible renewable resources by 2020, 60% by 2030, and 100% by 2045.<sup>76</sup> By August 2017, 32% of the state's retail electricity sales were generated from renewables.<sup>77</sup> The state requires that retail electricity suppliers disclose the fuel sources used to generate the power they supply as well as the GHG emissions intensity of those sources.<sup>78</sup> California recognizes cost-effective energy-efficiency as an important resource for meeting the state's clean energy targets. In addition to the RPS, California created an energy-efficiency resource standard. The standard's goal is to lower electricity and natural gas consumption through increased energy efficiency and reduced demand. Targets were set for the state's three natural gas utilities and three large investor-owned electric utilities.<sup>79</sup>

## Petroleum

California has the fourth-largest share of the nation's crude oil reserves after Texas, North Dakota, and the Gulf of Mexico, and the state is the fourth-largest producer of crude oil among the 50 states, after Texas, North Dakota, and Alaska.<sup>80,81</sup> Reservoirs in the geologic basins along California's Pacific Coast, including the Los Angeles basin, and in the state's Central Valley contain major crude oil reserves. The most prolific oil-producing area in the state is the San Joaquin basin in the southern half of the Central Valley, where several of the nation's largest oil fields are located.<sup>82,83,84</sup> Overall, California's crude oil production has declined during the past 30 years, but the state remains one of the top producers of crude oil in the nation, accounting for about 5% of total U.S. production in 2017.<sup>85,86</sup>

Federal assessments of California's offshore areas indicate the potential for large, undiscovered recoverable crude oil resources in the federally administered Outer Continental Shelf (OCS).<sup>87</sup> Concerns about the cumulative impacts and risks of offshore oil and natural gas development after the 1969 Santa Barbara oil spill resulted in state legislation that imposed a permanent moratorium on offshore oil and natural gas leasing in state waters.<sup>88</sup> Congress imposed a federal moratorium on oil and natural gas leasing in California federal waters in 1982. The federal moratorium expired in 2008.<sup>89</sup> No lease sales for the California federal OCS are included in the current 2017-22 lease sale schedule, but some have been proposed in a revised schedule.<sup>90,91</sup>

California ranks third in the nation in petroleum refining capacity after Texas and Louisiana, and the state accounts for one-tenth of the total U.S. refining capacity.<sup>92</sup> A network of crude oil pipelines connects California's oil production to the state's refining centers, which are located primarily in the Central Valley, the Los Angeles area, and the San Francisco Bay area.<sup>93,94</sup> California refiners also process large volumes of foreign and Alaskan crude oil received at the state's ports. As crude oil production in California and Alaska has declined, California refineries have become increasingly dependent on imports to meet the state's needs.<sup>95,96,97</sup> Led by Saudi Arabia, Ecuador, and Colombia, foreign suppliers now provide more than half of the crude oil refined in California.<sup>98,99</sup>

*California ranks third in the nation in petroleum refining capacity, and more than half*

Many of California's largest refineries are highly sophisticated and can process a wide variety of crude oil types. To meet strict state environmental regulations, California refineries are configured to produce cleaner fuels, including reformulated motor gasoline and low-sulfur diesel. Refineries in the state often operate at or near maximum capacity because of the high demand for those petroleum products.<sup>100</sup> California requires that all motorists use, at a minimum, a specific blend of motor gasoline called CaRFG (California Reformulated Gasoline) as part of an overall program to reduce emissions from motor vehicles.<sup>101</sup> When unplanned refinery outages occur, replacement supplies must be brought in by marine tanker from refineries in the state of Washington or on the U.S. Gulf Coast. Refineries in several other countries can also supply CaRFG. Locating and transporting replacement motor gasoline that conforms to California's strict fuel specifications from overseas can take several weeks.<sup>102,103</sup>

*is refined from  
foreign crude oil  
supplies.*

California is the second largest consumer of petroleum products in the nation and the largest consumer of motor gasoline and jet fuel. Almost all of the petroleum consumed in the state is used in the transportation sector.<sup>104,105</sup> The industrial sector, the second-largest consuming sector, uses less than one-eighth as much petroleum as the transportation sector.<sup>106</sup> Less than 0.3% of California households heat with fuel oil or kerosene, and only 3% heat with hydrocarbon gas liquids (HGL) such as propane.<sup>107</sup>

## Natural gas

California accounts for less than 1% of total U.S. natural gas reserves and production.<sup>108,109</sup> As with crude oil, California's natural gas production has experienced a gradual overall decline in the past three decades.<sup>110</sup> The state's reserves and production are located primarily in geologic basins in the northern portion of the Central Valley. Some natural gas fields are also located in the southern portion of the Central Valley, in coastal areas in northern California, and offshore along the Southern California coast.<sup>111</sup>

California's natural gas output equals about one-tenth of state demand.<sup>112,113</sup> Almost two-thirds of California households use natural gas for home heating, and more than two-fifths of California's utility-scale net electricity generation is fueled by natural gas.<sup>114,115</sup> Several interstate pipelines bring natural gas into California from the Southwest, and from the Rocky Mountain region, as well as from western Canada, by way of Arizona, Nevada, and Oregon. In 2011, natural gas supplies first arrived via the Ruby Pipeline, which runs from Wyoming to Oregon, and directly links natural gas produced in the Rocky Mountain region to markets in Northern California.<sup>116,117</sup> Almost all the natural gas delivered to California is used in the state or is placed in storage. Some natural gas is exported to Mexico, and a much smaller amount is liquefied and shipped to Hawaii.<sup>118,119</sup>

California has 14 natural gas storage fields that help stabilize supply; together those fields have an annual natural gas storage capacity of about 600 billion cubic feet with an annual working capacity of almost 375 billion cubic feet.<sup>120</sup> In October 2015, a natural gas leak was detected at the Aliso Canyon natural gas storage facility in Los Angeles County. The leak was plugged in February 2016 after almost 6 billion cubic feet of methane had escaped into the atmosphere, and almost 7,000 households and several schools were relocated.<sup>121</sup> In 2017, state regulators gave permission for natural gas injections at Aliso Canyon to resume with a reduced maximum storage capacity and at lower maximum injection pressures.<sup>122</sup> As a result of the incident new rules covering the management of natural gas storage facilities were put in place at the state level. The new state rules mandate the creation of approved risk assessment and emergency response plans and put in place new testing, monitoring, and data management requirements.<sup>123</sup>

## Coal

California does not have any coal reserves or production and has phased out almost all use of coal for electricity generation.<sup>124,125</sup> In 2017, coal fueled less than 0.2% of the state's utility-scale net generation, and all of that power was generated at industrial facilities.<sup>126,127</sup> Most of the coal consumed in California arrives by rail from mines in Utah.<sup>128</sup> Much more coal is exported through California ports than is consumed in the state.<sup>129</sup>

## Energy on tribal lands

California has the largest Native American population in the nation.<sup>130</sup> The state is home to more than 100 federally recognized tribal groups.<sup>131</sup> Although tribal areas are spread throughout the state, they account for less than 1% of state lands, and most California reservations and rancherias are lightly populated.<sup>132,133</sup> Many of the tribal lands are small, including the nation's smallest reservation, the 1.32-acre Pit River Tribe cemetery.<sup>134</sup> The largest is the Hoopa Valley Reservation in northern California's Humboldt County. Two-thirds of that reservation's almost 144-square-mile area is commercial timberland.<sup>135</sup> The Colorado River Tribe Reservation, which straddles the Colorado River and the California-Arizona border, is among the larger reservations in the state, although only about 67 square miles of the reservation's 420-square-mile area is within California.<sup>136</sup>

California's diverse geography gives tribes access to a variety of renewable energy resources, and several tribes are developing those resources. In 2018, 3 California tribes were among 15 U.S. tribes selected to receive funding from the U.S. Department of Energy (DOE) for deployment of energy infrastructure projects on tribal lands. All three projects involved distributed solar PV. The Bishop Paiute Tribe will install solar panels on 38 existing single-family homes that belong to low-income families, adding to the more than 50 residential solar installations already completed.<sup>137</sup> A second 2018 DOE-funded project will install solar PV at the Tolowa Dee-ni' Nation's tribally owned fish hatchery in northern California. The third project involves the installation of a hybrid solar PV-battery storage-liquid propane microgrid system for five tribal buildings for the San Pasqual Band of Indians.<sup>138</sup> The Ramona Band of Cahuilla is one of the first reservations in the nation to become independent of the grid. They have established a microgrid for an eco-tourism project and have met the project's energy needs with renewable resources.<sup>139</sup> Other reservations in the state have pursued similar goals. In 2015, the Bear River Band of the Rohnerville Rancheria in Northern California became the first California tribe to install a hybrid solar, wind, and advanced energy storage microgrid for power generation.<sup>140</sup> In 2016, as part of the construction of its microgrid, the members of the Blue Lake Rancheria installed a 500-kilowatt solar array, and in 2017, the microgrid became operational.<sup>141,142</sup> The project won an industry project of the year award in 2018.<sup>143</sup>

In 2010, the Campo Kumeyaay Nation in Southern California was the first tribe in the nation to develop a utility-scale wind project with 25 wind turbines constructed on land leased from the tribe.<sup>144,145</sup> The Agua Caliente Band of Cahuilla Indians, whose reservation includes 6,700 acres in the city of Palm Springs, is working on the development of a combined wind and solar project on their large reservation in Southern California.<sup>146,147</sup> Other tribes are in areas of abundant biomass potential. The Blue Lake Rancheria Tribe in Humboldt County uses wood waste from timber harvesting to fuel a first-of-a-kind biogas fuel-cell system.<sup>148</sup> In addition to the tribes that have abundant solar, wind, and biomass resources, some California tribal lands have geothermal electricity generation potential, particularly in the Imperial Valley in southern California, in the Geysers area in northern California, and along the state's eastern border.<sup>149</sup>

## Endnotes

<sup>1</sup> U.S. Census Bureau, U.S. and World Population Clock, Most Populous States, 2017.

<sup>2</sup> U.S. Bureau of Economic Analysis, Interactive Data, Regional Data, GDP and Personal Income, Annual Gross Domestic Product (GDP) by State, GDP in current dollars, NAICS, All industry total, All Areas, 2017.

<sup>3</sup> U.S. Energy Information Administration (EIA), State Energy Data System, Table C10, Energy Consumption by End-Use Sector, Ranked by State, 2016.

<sup>4</sup> Cooper, Jonathan J., "California Is Now World's 5th Largest Economy, Surpasses UK," NBC Bay Area News (May 4, 2018).

<sup>5</sup> U.S. EIA, State Energy Data System, Rankings: Total Energy Consumed per Capita, 2016.

<sup>6</sup> California Energy Commission, Tracking Progress, Energy Efficiency, updated September 2018.

<sup>7</sup> U.S. EIA, Crude Oil Proved Reserves, Reserves Changes, and Production, as of December 31, 2016.

<sup>8</sup> U.S. EIA, Electric Power Monthly (February 2018), Table 1.10.B.

<sup>9</sup> U.S. EIA, Electric Power Monthly (February 2018), Tables 1.15.B, 1.16.B, 1.17.B, 1.18.B.

<sup>10</sup> NETSTATE, California, The Geography of California, updated February 25, 2016.

<sup>11</sup> U.S. EIA, State Energy Data System, Table C10, Energy Consumption by End-Use Sector, Ranked by State, 2016.

- <sup>12</sup> U.S. Census Bureau, Statistical Abstract of the United States: 2012 (131st Edition) (August 2011), Table 1098, State Motor Vehicle Registrations, 1990 to 2009, Motorcycle Registrations and Licensed Drivers by State: 2009.
- <sup>13</sup> Index Mundi, United States, Average Commute Time by State, Rank, accessed September 27, 2018.
- <sup>14</sup> U.S. EIA, State Energy Data System, Table F2, Jet fuel consumption, price, and expenditure estimates, 2016.
- <sup>15</sup> U.S. EIA, State Energy Data System, Table C10, Energy Consumption by End-Use Sector, Ranked by State, 2016.
- <sup>16</sup> U.S. Bureau of Economic Analysis, Interactive Data, Regional Data, GDP and Personal Income, Annual Gross Domestic Product (GDP) by State, GDP in current dollars, NAICS, Agriculture and Manufacturing, All Areas, 2016.
- <sup>17</sup> U.S. EIA, State Energy Data System, Table C13, Energy Consumption per Capita by End-Use Sector, Ranked by State, 2016.
- <sup>18</sup> U.S. Census Bureau, 2010 Census: California Profile, Population Density by Census Tract.
- <sup>19</sup> Western Regional Climate Center, Climate of California, accessed September 27, 2018.
- <sup>20</sup> U.S. EIA, Residential Energy Consumption Survey (RECS), 2009 RECS Survey Data, Tables HC6.11, HC7.11.
- <sup>21</sup> U.S. EIA, Electric Power Monthly (February 2018), Tables 1.3.B, 1.7.B, 1.10.B, 1.11.B.
- <sup>22</sup> U.S. Nuclear Regulatory Commission, Plans for Decommissioning of San Onofre Nuclear Generating Station Units 2 and 3, updated July 8, 2018.
- <sup>23</sup> U.S. EIA, Electricity Data Browser, California net generation for all sectors, All fuels, Nuclear, 2001-17.
- <sup>24</sup> U.S. EIA, Electric Power Monthly (September 2018), Table 6.2.B.
- <sup>25</sup> U.S. EIA, Electric Power Monthly (February 2018), Table 1.10.B.
- <sup>26</sup> U.S. EIA, "Current drought reduces hydro generation forecast for California," Today in Energy (February 6, 2014).
- <sup>27</sup> U.S. EIA, Electric Power Monthly (February 2018), Tables 1.3.B, 1.10.B.
- <sup>28</sup> U.S. EIA, Electric Power Monthly (February 2018), Tables 1.3.B, 1.11.B.
- <sup>29</sup> U.S. EIA, California Electricity Profile 2016, Table 5, Electric power industry generation by primary energy source, 1990 through 2016.
- <sup>30</sup> U.S. EIA, Electric Power Monthly (February 2018), Tables 1.3.B, 1.4.B.
- <sup>31</sup> U.S. EIA, Form EIA-860 detailed data with previous form data (EIA-860A/860B), 2017 Form EIA-860 Data, Schedule 3, 'Generator Data' (Operable Units Only).
- <sup>32</sup> U.S. EIA, "New transmission project will help California meet summer electric demand," Today in Energy (July 11, 2012).
- <sup>33</sup> California Energy Commission, Tracking Progress, Transmission Expansion for Delivering Renewable Energy, updated June 2018, p. 3-4.
- <sup>34</sup> U.S. EIA, California Electricity Profile 2016, Table 10, Supply and disposition of electricity, 1990 through 2016.
- <sup>35</sup> California Energy Commission, Total System Electric Generation, 2017 Total System Electric Generation in Gigawatt Hours, updated June 21, 2018.
- <sup>36</sup> California Energy Commission, Tracking Progress, California's Declining Reliance on Coal, Overview, updated December 2017.
- <sup>37</sup> California Energy Commission, Total System Electric Generation, 2017 Total System Electric Generation in Gigawatt Hours, updated June 21, 2018.
- <sup>38</sup> California Energy Commission, State of California Energy Action Plan, accessed October 4, 2018.
- <sup>39</sup> California Public Utilities Commission and California Energy Commission, 2008 Update Energy Action Plan, CEC-100-2008-001 (February 2008).
- <sup>40</sup> U.S. EIA, Annual Energy Outlook 2016 with projections to 2040, DOE/EIA-0383(2016) (August 2016), p. LR-16.
- <sup>41</sup> U.S. EIA, State Energy Data System, Table C11, Energy Consumption Estimates by Source, Ranked by State, 2016.
- <sup>42</sup> U.S. Census Bureau, Data, State Population Totals and Components of Change: 2010-2017, Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2010 to July 1, 2017 (NST-EST2017-01).
- <sup>43</sup> U.S. Census Bureau, American FactFinder, Advanced Search, California, B25040 House Heating Fuel, 2017 American Community Survey 1-Year Estimates.
- <sup>44</sup> Next 10, 2018 California Green Innovation Index, Tenth Edition (2018), p. 9.

- <sup>45</sup> U.S. Department of Energy, Energy Efficiency and Renewable Energy, Alternative Fuels Data Center, Electric Vehicle Charging Station Locations, California and U.S., Electric, accessed October 17, 2018.
- <sup>46</sup> U.S. EIA, Electric Power Monthly (February 2018), Tables 1.10.B, 1.11.B, 1.14.B, 1.15.B, 1.16.B, 1.17.B, 1.18.B.
- <sup>47</sup> U.S. EIA, "California first state to generate more than 5% of electricity from utility-scale solar," Today in Energy (March 24, 2015).
- <sup>48</sup> U.S. EIA, Electric Power Monthly (February 2018), Tables 1.3.B, 1.17.B, 1.18.B.
- <sup>49</sup> California Energy Commission, Solar Resource Potential in California., updated July 2008.
- <sup>50</sup> U.S. EIA, Form EIA-860 detailed data with previous form data (EIA-860A/860B), 2017 Form EIA-860 Data, Schedule 3, 'Generator Data' (Operable Units Only).
- <sup>51</sup> California Energy Commission, California Energy Maps, Map of Power Plants in California, updated May 16, 2018.
- <sup>52</sup> Go Solar California, About the California Solar Initiative (CSI), accessed October 4, 2018.
- <sup>53</sup> U.S. EIA, Electric Power Monthly (February 2018), Table 6.2.B.
- <sup>54</sup> Solar Energy Industries Association, Solar Spotlight, California (September 2018).
- <sup>55</sup> Solar Energy Industries Association, Solar Spotlight, California (September 2018).
- <sup>56</sup> California Energy Commission, 2019 Building Energy Efficiency Standards, Frequently Asked Questions (March 2018).
- <sup>57</sup> California Energy Commission, California Geothermal Energy Statistics and Data, accessed October 4, 2018.
- <sup>58</sup> U.S. EIA, Electric Power Monthly (February 2018), Table 1.16.B.
- <sup>59</sup> California Energy Commission, California Energy Maps, Map of Known Geothermal Resource Areas in California, updated February 2015.
- <sup>60</sup> Calpine, The Geysers, About Geothermal Energy, Welcome to the Geysers, accessed October 4, 2018.
- <sup>61</sup> U.S. EIA, Electric Power Monthly (February 2018), Table 1.15.B.
- <sup>62</sup> U.S. EIA, Form EIA-860 detailed data with previous form data (EIA-860A/860B), 2017 Form EIA-860 Data, Schedule 3, 'Generator Data' (Operable Units Only).
- <sup>63</sup> U.S. EIA, Monthly Densified Biomass Fuel Report, Table 1. Densified biomass fuel manufacturing facilities in the United States by state, region, and capacity, July 2018.
- <sup>64</sup> U.S. EIA, Electric Power Monthly (February 2018), Tables 1.14.B.
- <sup>65</sup> U.S. Department of Energy, Energy Efficiency and Renewable Energy, WINDEXchange, Wind Energy in California, accessed October 4, 2018.
- <sup>66</sup> California Energy Commission, California Energy Maps, California Wind Projects and Wind Resource Areas 2018, Statewide, updated August 2018.
- <sup>67</sup> U.S. Department of Energy, Energy Efficiency and Renewable Energy, WINDEXchange, U.S. Installed and Potential Wind Power Capacity and Generation, Q2 2018 Installed Wind Power Capacity (MW), accessed October 4, 2018.
- <sup>68</sup> California Energy Commission, Low Carbon Fuel Standard, accessed October 4, 2018.
- <sup>69</sup> U.S. EIA, Biofuels Issues and Trends (October 2012) p. 24-25.
- <sup>70</sup> U.S. EIA, Monthly Biodiesel Production Report, accessed October 4, 2018.
- <sup>71</sup> Nebraska Energy Office, Ethanol Facilities Capacity by State and Plant, updated July 3, 2018.
- <sup>72</sup> U.S. EIA, State Energy Data System, Table F4, Fuel ethanol consumption estimates, 2016.
- <sup>73</sup> U.S. EIA, State Energy Data System, Table P1, Primary Energy Production Estimates in Physical Units, 2016.
- <sup>74</sup> California Air Resources Board, Cap-and-Trade Program, Background Information, updated October 5, 2018.
- <sup>75</sup> California Air Resources Board, Overview of ARB Emissions Trading Program (February 9, 2015).
- <sup>76</sup> NC Clean Energy Technology Center, DSIRE, California Renewables Portfolio Standard, updated September 24, 2018.
- <sup>77</sup> California Energy Commission, Tracking Progress, Renewable Energy Overview, updated July 2018, p. 1.
- <sup>78</sup> California Energy Commission, Power Source Disclosure, accessed October 17, 2018.
- <sup>79</sup> NC Clean Energy Technology Center, DSIRE, California Energy Efficiency Resource Standard, updated May 25, 2016.
- <sup>80</sup> U.S. EIA, Crude Oil Proved Reserves, Reserves Changes, and Production, Proved Reserves as of 12/31, 2016.

- <sup>81</sup> U.S. EIA, Crude Oil Production, Annual, Thousand Barrels, 2017.
- <sup>82</sup> California Department of Conservation, Division of Oil, Gas, and Geothermal Resources, Oil, Gas, and Geothermal Fields in California 2001 (Map S-1).
- <sup>83</sup> U.S. EIA, Top 100 U.S. Oil and Gas Fields (March 2015), p. 5-7, 11.
- <sup>84</sup> California Department of Conservation, Division of Oil, Gas, and Geothermal Resources, 2016 Report of California Oil and Gas Production Statistics (September 2017), p. 1.
- <sup>85</sup> U.S. EIA, California Field Production of Crude Oil, Annual, accessed September 27, 2018.
- <sup>86</sup> U.S. EIA, Crude Oil Production, Annual, Thousand Barrels, 2017.
- <sup>87</sup> U.S. Department of the Interior, Bureau of Ocean Energy Management, Assessment of Undiscovered Oil and Gas Resources of the Nation's Outer Continental Shelf, 2016a, BOEM Fact Sheet RED-2017-12.
- <sup>88</sup> Frisk, Carla, "California Coastal Sanctuary Act of 1994," Environmental Defense Center (December 22, 2017).
- <sup>89</sup> Eversheds-Sutherland, "Congress Allows Moratorium on Offshore Drilling to Expire," Legal Alert (October 1, 2008).
- <sup>90</sup> U.S. Department of the Interior, Bureau of Ocean Energy Management, Oil and Gas Energy, Leasing, 2017-2022 Lease Sale Schedule, accessed September 28, 2018.
- <sup>91</sup> U.S. Department of the Interior, Bureau of Ocean Energy Management, 2019-2024 National Outer Continental Shelf Oil and Gas Leasing Program, accessed September 28, 2018.
- <sup>92</sup> U.S. EIA, Refinery Capacity Report (June 2018), Table 1, Number and Capacity of Petroleum Refineries by PAD District and State, as of January 1, 2018.
- <sup>93</sup> California Office of the State Fire Marshal, Pipeline Safety Division, Crude Oil Pipelines (January 10, 2014).
- <sup>94</sup> California Energy Commission, California Energy Maps, Oil Refinery Locations in California, updated July 28, 2016.
- <sup>95</sup> U.S. EIA, Alaska Field Production of Crude Oil, accessed September 28, 2018.
- <sup>96</sup> U.S. EIA, California Field Production of Crude Oil, accessed September 28, 2018.
- <sup>97</sup> California Energy Commission, Oil Supply Sources To California Refineries, accessed September 28, 2018.
- <sup>98</sup> California Energy Commission, Foreign Sources of Crude Oil Imports to California 2017, updated March 1, 2018.
- <sup>99</sup> California Energy Commission, Oil Supply Sources To California Refineries, accessed September 28, 2018.
- <sup>100</sup> California Energy Commission, California's Oil Refineries, accessed September 28, 2018.
- <sup>101</sup> Lawson, B.K., U.S. Gasoline Requirements as of January 2018, American Petroleum Institute and ExxonMobil, accessed September 28, 2018.
- <sup>102</sup> California Energy Commission, California's Oil Refineries, accessed September 28, 2018.
- <sup>103</sup> California Energy Commission, State of California Energy Assurance Plan (June 2014), p. 64.
- <sup>104</sup> U.S. EIA, State Energy Data System, Table C4, Total End-Use Energy Consumption Estimates, 2016.
- <sup>105</sup> U.S. EIA, State Energy Data System, Table C8, Transportation Sector Energy Consumption Estimates, 2016.
- <sup>106</sup> U.S. EIA, State Energy Data System, Table F15, Total Petroleum Consumption Estimates, 2016.
- <sup>107</sup> U.S. Census Bureau, American FactFinder, Advanced Search, California, Table B25040, House Heating Fuel, 2017 American Community Survey 1-Year Estimates.
- <sup>108</sup> U.S. EIA, Natural Gas Reserves Summary as of December 31, 2016, Dry Natural Gas.
- <sup>109</sup> U.S. EIA, Natural Gas Gross Withdrawals and Production, Gross Withdrawals, 2017.
- <sup>110</sup> U.S. EIA, California Natural Gas Gross Withdrawals, accessed October 2, 2018.
- <sup>111</sup> California Department of Conservation, Division of Oil, Gas, and Geothermal Resources, Oil, Gas, and Geothermal Fields in California 2001 (Map S-1).
- <sup>112</sup> U.S. EIA, Natural Gas Gross Withdrawals and Production, Gross Withdrawals, 2017, Annual, accessed October 2, 2018.
- <sup>113</sup> U.S. EIA, Natural Gas Consumption by End Use, Total Consumption, 2017, Annual, accessed October 2, 2018.
- <sup>114</sup> U.S. Census Bureau, American FactFinder, Advanced Search, California, B25040 House Heating Fuel, 2017 American Community Survey 1-Year Estimates.
- <sup>115</sup> U.S. EIA, Electric Power Monthly (February 2018), Tables 1.3.B, 1.7.B.
- <sup>116</sup> California Energy Commission, Natural Gas Resource Areas and Interstate Pipelines Into California, accessed October 2, 2018.

- <sup>117</sup> U.S. EIA, "Ruby Pipeline ramps up rapidly to supply natural gas to Northern California," Today in Energy (September 23, 2011).
- <sup>118</sup> U.S. EIA, International and Interstate Movements of Natural Gas by State, California, accessed October 2, 2018.
- <sup>119</sup> Hansen, Michael, "Liquefied Natural Gas (LNG) for Hawaii: Sourcing and Transportation Options; A Maritime Perspective," Hawai'i Free Press (September 8, 2012).
- <sup>120</sup> U.S. EIA, Underground Natural Gas Storage Capacity, Total Number of Existing Fields, Total Storage Capacity, and Total Working Gas Capacity, accessed October 2, 2018.
- <sup>121</sup> California Air Resources Board, Determination of Total Methane Emissions from the Aliso Canyon Natural Gas Leak Incident (October 21, 2016), p. 2, 25.
- <sup>122</sup> California Department of Conservation, Aliso Canyon Updates, accessed November 6, 2018.
- <sup>123</sup> California Department of Conservation, Underground Natural Gas Storage, Update, Final Text of Regulations, accessed November 6, 2018.
- <sup>124</sup> U.S. EIA, Annual Coal Report 2016 (November 2017), Table 14, Recoverable Coal Reserves and Average Recovery Percentage at Producing Mines by State, 2016 and 2015.
- <sup>125</sup> California Energy Commission, Tracking Progress, California's Declining Reliance on Coal, Overview, updated December 2017.
- <sup>126</sup> U.S. EIA, Annual Coal Report 2016 (November 2017), Table 26, U.S. Coal Consumption by End Use Sector, Census Division, and State, 2016 and 2015.
- <sup>127</sup> U.S. EIA, Electric Power Monthly (February 2018), Tables 1.3.B, 1.4.B.
- <sup>128</sup> U.S. EIA, Annual Coal Distribution Report 2016 (November 2017), By Coal Destination State, California, Table DS-5.
- <sup>129</sup> U.S. EIA, Quarterly Coal Report, April-June 2018 (October 2018), Tables 13, 34.
- <sup>130</sup> World Atlas, "US States With The Largest Native American Populations," updated April 25, 2017.
- <sup>131</sup> U.S. Department of the Interior, Bureau of Indian Affairs, "Indian Entities Recognized and Eligible to Receive Services from the United States Bureau of Indian Affairs," Federal Register, Vol. 83 No. 20 (January 30, 2018), p. 4235-41.
- <sup>132</sup> California Department of Water Resources, South Central Region Office, California Indian Tribal Homelands and Trust Land Map, revised July 19, 2011.
- <sup>133</sup> U.S. Forest Service, Forest Service National Resource Guide to American Indian and Alaska Native Relations, Appendix D: Indian Nations, The American Indian Digest (April 1997), p. D-3.
- <sup>134</sup> U.S. Department of the Interior, Bureau of Indian Affairs, Frequently Asked Questions, What is a federal Indian reservation?, accessed October 7, 2018.
- <sup>135</sup> San Diego State University Library & Information Access, American Indian Studies, California Indians and Their Reservations: An Online Dictionary, Hoopa Valley Reservation, accessed October 7, 2018.
- <sup>136</sup> U.S. Department of the Interior, Bureau of Indian Affairs, Colorado River: Strategic Planning Map, Colorado River Summary, accessed October 7, 2018.
- <sup>137</sup> U.S. Department of Energy, Office of Indian Energy Policy and Programs, "Bishop Paiute Tribe Celebrates a Milestone in Quest for Energy Self-Sufficiency," Press Release (May 10, 2017).
- <sup>138</sup> U.S. Department of Energy, Office of Indian Energy Policy and Programs, "Department of Energy to Fund 15 Tribal Energy Infrastructure Deployment Projects," Press Release (August 15, 2018).
- <sup>139</sup> Gomez, John Jr., Ramona Band of Cahuilla Indians (November 17, 2009).
- <sup>140</sup> "California Tribe Installs First Renewable Hybrid Microgrid," Business Wire (April 24, 2015).
- <sup>141</sup> Rada, Jake, "500kW Solar Array Installed for BLR Microgrid Project," Schatz Energy Research Center, Humboldt State University (September 6, 2016).
- <sup>142</sup> Wood, Elisa, "Tribal Microgrid in Northern California Shows How Communities Can Lead on Climate," Microgrid Knowledge (April 28, 2017).
- <sup>143</sup> "POWERGRID International Magazine Names Projects of the Year Winners," Houston Business Journal (January 23, 2018).
- <sup>144</sup> Campo, Kumeyaay Nation, Muht Hei, Inc., Kumeyaay Wind, accessed October 7, 2018.
- <sup>145</sup> Standen, Amy, "Tribal Lands Struggle to Bring Clean Power Online," National Public Radio (August 20, 2010).

<sup>146</sup> San Diego State University Library & Information Access, American Indian Studies, California Indians and Their Reservations: An Online Dictionary, Hoopa Valley Reservation, accessed October 7, 2018.

<sup>147</sup> U.S. Department of Energy, Office of Indian Energy Policy and Programs, "Agua Caliente Band's Pursuit of Energy Self-Sufficiency Gains Momentum" (March 1, 2016).

<sup>148</sup> Clarke, Chris, "Tribe to Launch Biomass-Fueled Fuel Cell Plant in Northern California," KCET Redefine (February 28, 2013).

<sup>149</sup> U.S. Department of Energy, Office of Indian Energy, Developing Clean Energy Projects on Tribal Lands, DOE/IE-0012 (December 2012), p. 45.

## Other Resources

### Energy-Related Regions and Organizations

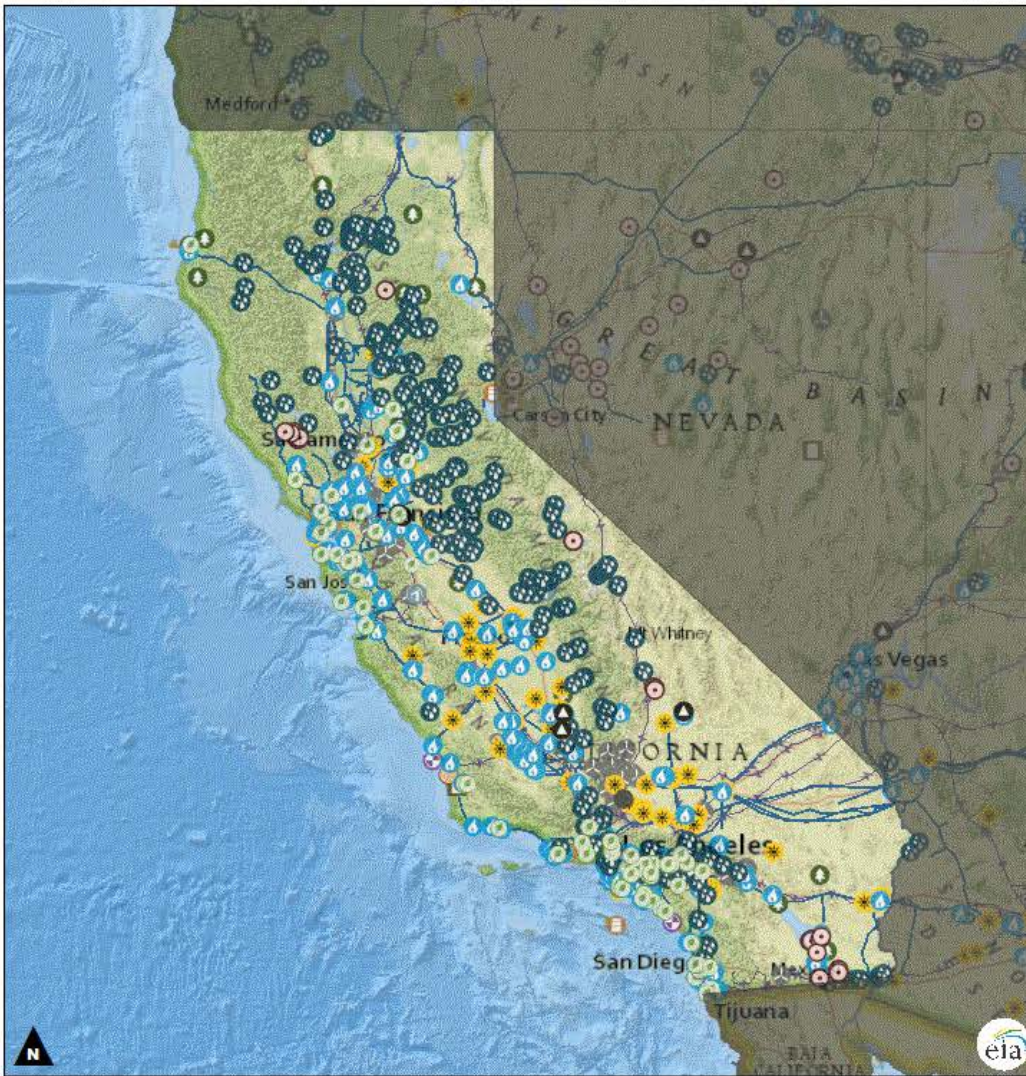
- [Petroleum Administration for Defense District \(PADD\): 5](#)
- [North American Electric Reliability Corporation \(NERC\) Regional Entity: Western Electricity Coordinating Council \(WECC\)](#)
- [Regional Transmission Organization \(RTO\)/Independent System Operator \(ISO\): California Independent System Operator \(CAISO\)](#)

### Other Websites

- [California Energy Commission](#)
- [California Public Utilities Commission \(CPUC\), Energy](#)
- [California Department of Community Services and Development](#)
- [California Department of Conservation, Division of Oil, Gas and Geothermal Resources](#)
- [California Air Resources Board](#)
- [Energy Upgrade California](#)
- [California Energy Commission, Alternative and Renewable Fuel and Vehicle Technology Program Proceedings](#)
- [California ISO \(Independent System Operator\)](#)
- [California Energy Commission, California Energy Almanac](#)
- [California Energy Commission, Energy Maps of California](#)
- [Southern California Daily Energy Report](#)
- [California Department of Water Resources](#)
- [EIA California Flickr Album](#)
- [Western Regional Partnership \(WRP\)](#)
- [Alternative Fuels Data Center, Federal and State Laws and Incentives](#)
- [West Coast Green Highway](#)
- [Benefits.Gov, Housing and Public Utilities](#)
- [NC Clean Technology Center, Database of State Incentives for Renewables and Efficiency \(DSIRE\)](#)
- [National Association of Regulatory Utility Commissioners \(NARUC\)](#)
- [National Association of State Energy Officials \(NASEO\)](#)
- [National Conference of State Legislatures \(NCSL\), Energy](#)
- [National Renewable Energy Laboratory \(NREL\)-Geospatial Data Science](#)
- [U.S. Geological Survey \(USGS\), Publications](#)
- [Interstate Oil and Gas Compact Commission](#)
- [U.S. Bureau of Ocean Energy Management](#)
- [Western Governors Association](#)
- [Western Interstate Energy Board](#)
- [Western Area Power Administration](#)
- [Bonneville Power Administration](#)
- [United States Department of Health and Human Services, Administration for Children and Families, Office of Community Services, Low Income Home Energy Assistance Program](#)
- [United States Department of Energy, Indian Energy Policy and Programs](#)



- [U.S. Geological Survey, Maps](#)
- [Lawrence Livermore National Laboratory, Energy Flow Charts](#)
- [U.S. Department of Energy, State and Local Energy Data \(SLED\)](#)
- [U.S. Department of Energy, Office of Indian Energy, Tribal Energy Atlas](#)
- [EIA Nuclear Reactor Status Report](#)
- [EIA Natural Gas Storage Dashboard](#)



States:Electricity Transmission Lines - Ventyx, Velocity Suite;Grey Base:National

0 45 90 180 Miles

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|--------------------------|----------------------------------|-------------------------------|
| ■ Mask                   | ⊕ Hydroelectric Power Plant      | Ⓜ Pumped Storage Power Plant  |
| ▲ Surface Coal Mine      | ⚡ Natural Gas Power Plant        | ☀ Solar Power Plant           |
| ▼ Underground Coal Mine  | ☢ Nuclear Power Plant            | ⚙ Wind Power Plant            |
| ♻ Biomass Power Plant    | ● Other Power Plant              | 🌲 Wood Power Plant            |
| ⚙ Coal Power Plant       | ⚙ Other Fossil Gases Power Plant | 🏭 Petroleum Refinery          |
| ⊕ Geothermal Power Plant | ⚙ Petroleum Power Plant          | ⬛ Strategic Petroleum Reserve |

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