4.6 Energy

This section analyzes whether implementation of the proposed 2021 LRDP would result in wasteful, inefficient, or unnecessary consumption on energy resources during construction or operation and conflict or obstruct an applicable plan for renewable energy or energy efficiency. The analysis in this section is based upon energy modeling outputs that are included in Appendix F, Energy Supporting Information.

4.6.1 Environmental Setting

Energy Fundamentals

Energy is generally transmitted either in the form of electricity, measured in kilowatts (kW) or megawatts (MW), or natural gas measured in British thermal units (BTU), cubic feet, or therms. Fuel, such as gasoline or diesel, is measured in gallons or liters.

Electricity

Electricity is used primarily for lighting, appliances, cooking purpose, HVAC equipment, and other uses associated with building and vehicle operations. Electricity sources range from renewable (hydroelectric, solar, wind, geothermal, biomass) to nonrenewable (natural gas, oil, nuclear, coal).

Natural Gas

Natural gas is used primarily for heating, water heating, and cooking purpose and is typically associated with building operations.

Fuel

Fuel is used primarily for powering off-road equipment and vehicles (commercial trucks and other vehicles). The typical fuel types used are diesel and gasoline.

Electricity Generation, Distribution, and Use

California

GENERATION

According to the California Energy Commission (CEC), California generated approximately 285,448 gigawatt-hours (GWh) of electricity in 2018. As shown in Table 4.6-1, approximately 35 percent of this electricity was sourced from natural gas, 31 percent from renewable sources, 11 percent from large hydroelectric sources, and the remaining 23 percent was sourced from coal, nuclear, oil, other and unspecified sources. Specifically, the 31 percent of California's 2018 retail electric sales that were served by renewable resources included sources from wind, solar, geothermal, biomass, and small hydroelectric. (CEC 2019a).

Table 4.6-1 California 2018 Total System Electric Generation

Fuel Type	In-State Generation (GWh)	Percent of In-State Generation	Northwest Imports (GWh)	Southwest Imports (GWh)	State Energy Mix (GWh)	State Power Mix
Coal	294	0.15%	399	8,740	9,433	3.30%
Large Hydro	22,096	11.34%	7,418	985	30,499	10.68%
Natural Gas	90,691	46.54%	49	8,904	99,644	34.91%
Nuclear	18,268	9.38%	0	7,573	25,841	9.05%
Oil	35	0.02%	0	0	35	0.01%
Other (Petroleum/ Waste Heat)	430	0.22%	0	9	439	0.15%
Renewables	63,028	32.35%	14,074	12,400	89,502	31.36%
Biomass	5,909	3.03%	772	26	6,707	2.35%
Geothermal	11,528	5.92%	171	1,269	12,968	4.54%
Small Hydro	4,248	2.18%	334	1	4,583	1.61%
Solar	27,265	13.99%	174	5,094	32,533	11.40%
Wind	14,078	7.23%	12,623	6,010	32,711	11.46%
Unspecified	N/A	N/A	17,576	12,519	30,095	10.54%
Total	**194,842**	**100.00%**	**39,516**	**51,130**	**285,488**	**100.00%**

GWh = gigawatt-hours

Source: CEC 2019a

DISTRIBUTION

Electricity is distributed through the various electric load-serving entities (LSEs) in California. These entities include investor-owned utilities, publicly owned LSEs, rural electric cooperatives, community choice aggregators, and electric service providers (CEC 2021a).

USE

According to the U.S. Energy Information Administration (USEIA), total electricity direct consumption within California in 2018 was 12,859.245 GWh, up 0.5 percent, or 64.385 GWh, from 2017. California electricity consumption in 2018 represented approximately 9 percent of total U.S. electricity consumption in 2018 (USEIA 2020).

Riverside County

Riverside County is serviced by two electrical utilities: Riverside Public Utilities (RPU) and Southern California Edison (SCE). However, the UCR main campus is located solely in the RPU service territory. Therefore, this discussion is limited to RPU.

GENERATION

RPU electricity generation consists of renewable and nonrenewable sources. The renewable sources include geothermal, hydroelectric, solar, wind, and other renewables. RPU internal electricity

generation includes coal, large hydroelectric, natural gas, nuclear, and other generic power. Table 4.6-2 indicates RPU composition from both internal generation and renewables.

According to the 2018 Power Content Label, which discloses power sources from retail electricity suppliers, RPU receives its energy from renewables, hydroelectric, natural gas, nuclear, and unspecific sources. Table 4.6-2 shows the breakdown of energy resources from RPU compared to California's breakdown of energy sources. Both RPU's General Power Mix and 100 Percent Renewable Energy Mix have a higher share of renewable energy compared to Statewide (RPU 2019). RPU has also reported that it was likely to achieve 44 percent renewable power mix by 2020. RPU does not offer customers, including UCR, the option to purchase 100 percent renewable-sourced electricity. In addition, there is no separate community choice aggregation available to UCR.

Table 4.6-2 RPU and California 2018 Power Mix

Source	RPU General Power Mix[1]	2018 California Power Mix[1]
Eligible Renewable Resources		
Biomass & biowaste	0	2
Geothermal	18	5
Eligible Hydroelectric	0	2
Solar	12	11
Wind	4	11
Coal	29	3
Large Hydroelectric	1	11
Natural Gas	4	35
Nuclear	4	9
Other	0	<1
Unspecified sources of power[2]	28	11
Eligible Renewable Resources Percent of Power Mix	**34**	**31**
Non-Renewable Resources Percent of Power Mix	**66**	**69**
Total	**100**	**100**

[1] Percent of Total Power. Percentages are estimated annually by the CEC based on the electricity sold to California consumers during the identified year.

[2] "Unspecified sources of power" means electricity from open market transactions that are not traceable to specific generation sources.

Numbers are rounded.

Sources: RPU 2019; RPU 2021

DISTRIBUTION

RPU provides electricity to many of the cities and entities throughout Riverside County, including UCR. Riverside County consumed approximately 15,877.5 GWh of electricity (CEC 2018a). RPU owns 13,912 distribution transformers, more than 1,300 circuit miles of distribution cables connecting them with more than 22,000 poles overhead and more systems underground. The transmission system has almost 100 miles of cable.

RPU operates the Riverside Energy Resource Center, a power generation plant on 16 acres in the City of Riverside (City) and provides 192-megawatt (MW) gas-fired power used to offset power shortages during times of peak demand. All of RPU imported energy comes through a single power connection via the SCE Vista Substation, located in the City of Grand Terrace. RPU owns 13,912

distribution transformers, 14 substations, 65 transformers, 54 switchgears, and 1,300 circuit miles of distribution cables (RPU 2021).

USE

RPU serves approximately 317,000 people in a 90 square-mile area with 109,327 metered electric customers (RPU 2021). Table 4.6-3 shows the breakdown of 2018 electricity consumption within the RPU service area by sector. Commercial and residential uses constitute the greatest users of electricity. As shown in Table 4.6-3, RPU provided approximately 2,186 GWh of electricity in 2018 which equates to 6,900 kWh per capita.

Table 4.6-3 RPU Service Area 2018 Electricity Consumption

Consumption (kWh)	2018 Service Area Population	RPU Service Area Consumption Per Capita (kWh)
2,186,000,000	317,000	6,900

kWh = kilowatt hour

Sources: RPU 2021; CEC 2018b

UCR Main Campus

GENERATION

In addition to obtaining electricity from RPU, UCR campus solar power is generated from SunPower photovoltaic (PV) systems. UCR purchases such solar-powered electricity through a power purchase agreement for on-site generation that on average annually produces approximately 11.6 megawatt-hours (MWh) of electricity, or almost 10 percent of the campus's total annual energy needs. Specifically, in 2018 electricity was generated by the following solar facilities on the UCR campus:

- 5,734 annual MWh system via solar panel canopies at UCR Parking Lot 30;
- 1,099 MWh system via solar panel canopies at UCR Parking Lot 32; and
- 5,040 MWh Solar Farm Tracking System scattered throughout the campus, including
  - a solar farm adjacent to agricultural research land and
  - a smaller system above the parking lot of the College of Engineering's Center for Environmental Research and Technology (CE-CERT).

CE-CERT's solar PV array feeds into a 500 kWh battery. In addition, the campus produces solar hot water on the rooftops of the Glen Mor student housing facility (UCR 2021a). Furthermore, eight chillers provide 12,250 tons of chilled water capacity and utilize an innovative system of three thermal energy storage (TES) tanks that hold seven million gallons of chilled water. The TES tanks allow the University to implement demand management strategies to purchase electricity during off-peak hours, to produce and store chilled water for use during daytime on-peak hours (UCR 2005). The TES tanks provide cooling for 65 percent of the campus, reducing peak energy load of the campus by 2.5 MW (UCR 2021a).

DISTRIBUTION

Electricity used on the UCR campus to provide power for space cooling, heating and ventilation, lighting, research activities, office equipment, and refrigeration is distributed via an extensive network of power distribution infrastructure. The UCR Sustainable Integrated Grid Initiative (SIGI)

was designed as a smart, flexible, micro-grid capable of responding to the critical needs of the electrical grid. There is 0.5 MW of PV power capacity distributed between the three buildings at CE-CERT. The administration building has an energy scheduling system installed that controls large loads and 0.1 MW of the PV capacity. The multidisciplinary research building has a 500-kW stationary electrical energy storage system that will store or discharge energy in response to a remote command or to a scheduling algorithm and 100 kW of the PV capacity. The remaining 260 kW PV capacity is allocated to the Atmospheric Processes Laboratory. Additionally, 500 kW of battery energy storage is installed in a trailer for mobile deployment (UCR 2021b).

Heat waves challenge local utilities to satisfy record-breaking peak energy demands. During a previous heat wave in 2014, RPU requested that their largest customers reduce electricity use in the afternoon. UCR responded to this request by utilizing its SIGI battery system, PV generation, and smart demand management controllers. The combined effect not only curtailed 265 kW of power consumption but also provided 225 kW back to the grid, resulting in a 590 kW energy swing for the critical-period during the afternoon hours. In addition to the demonstration of these functionalities, UCR CE-CERT's SIGI test-bed has the ability to supply reactive power and voltage support, efficiency evaluation of system components, and islanding operations. The other capacity of UCR SIGI is fast electric-vehicle charging, along with vehicle-to-grid energy transfer capability (UCR 2021c).

USE

Table 4.6-4 provides a summary of UCR electricity sources, data type, and activity data for 2018. As shown in Table 4.6-4, total UCR main campus electricity use in 2018 was 118,960,675 kWh. Approximately 11,872,475 kWh is produced on campus through solar SunPower and used by UCR. Therefore, 107,088,200 kWh were purchased from RPU in 2018. In addition, non-UCR fleet/department vehicles traveling to and from the UCR main campus generated passenger vehicle miles traveled (VMT) some of which used electricity and accounted for 75,551 kWh of electricity consumed for mobile vehicles in 2018 (see Appendix F).

Table 4.6-4 UCR 2018 Electricity Consumption

Source	Data Type	Use (kWh)	Campus Population (2018)	UCR Consumption Per Capita (kWh)
Stationary Electricity Use				
Riverside Public Utility	Usage summarized by RPU	107,088,200	28,661	3,736
SunPower Lot 30	Production/usage summarized by SunEdison	5,733,909		200
SunPower Lot 32	Production/usage summarized by SunEdison	1,098,690		38
Solar Farm	Production/usage summarized by SunEdison	5,039,876		175
Mobile Electricity Use				
Non-UCR Fleet mobile	Daily VMT, vehicle class, and fuel distribution	75,551	28,661	2.6

kWh = kilowatt hour; RPU = Riverside Public Utilities; UCR = University of California, Riverside; VMT = vehicle miles traveled

All presented data was provided by UCR and is based on 2018 calendar year.

A summary of the electricity purchased from RPU and generated by on-site solar was provided by UCR Energy Manager in the form of an Annual Utilities Summary Spreadsheet.

All data and calculations presented are rounded to the nearest whole number.

Source: Appendix F compiled by Rincon Consultants.

Natural Gas Distribution and Use

California

DISTRIBUTION

According to the California Public Utilities Commission (CPUC), natural gas from out-of-state production basins is delivered into California via the interstate natural gas pipeline system. The major interstate pipelines that deliver out-of-state natural gas to California gas utilities are Gas Transmission Northwest Pipeline, Kern River Pipeline, Transwestern Pipeline, El Paso Pipeline, Ruby Pipeline, Mojave Pipeline, and Tuscarora (CPUC 2021). Because natural gas is a dispatchable energy resource that provides load when the availability of hydroelectric power generation and/or other energy sources decrease, distribution varies greatly from year to year. The availability and distribution of hydroelectric-sourced energy, increasing renewable-source energy, and overall consumer demand are the variables that shape the need for natural gas.

USE

In 2018, total California natural gas demand for industrial, residential, commercial, and electric power generation was 2,137,920 million cubic feet per year (MCF/year).

Riverside County

Riverside County, including UCR, is located within the natural gas utility service territory of Southern California Gas (SCG), which covers the majority of southern California. This discussion below is limited to SCG natural gas distribution and use within Riverside County.

DISTRIBUTION

SCG obtains more than 90 percent of its natural gas from basins in Texas and New Mexico and is the nation's largest natural gas distribution utility with 21.8 million consumers across approximately 24,000 square miles throughout central and southern California (SCG 2021). Riverside County is serviced via SCG high-pressure distribution lines under roadways and transmission pipelines throughout the County. The high-pressure distribution lines operate at pressures above 60 pounds per square inch (psi) and deliver gas in smaller volumes to the lower pressure distribution system. Transmission lines are generally large diameter pipelines that operate at pressures above 200 psi and transport gas from supply points to the gas distribution system.

USE

Riverside County consumed approximately 398.5 millions of therms of natural gas in 2018 (CEC 2018). According to the California Department of Finance (DOF), Riverside County population in 2018 was 2,400,762 persons. As such, Table 4.6-5 indicates that Riverside County had a 2018 per capita natural gas consumption of approximately 166 therms.

Table 4.6-5 Riverside County 2018 Natural Gas Consumption

County Population	County Consumption (Therms)	County Consumption Per Capita (Therms)
2,400,762	398,500,000	166

Sources: DOF 2020; CEC 2018c

UCR Main Campus

DISTRIBUTION

Natural gas for UCR is exclusively distributed from Shell Energy.[1] UCR privately distributes medium pressure gas throughout East and West Campus. Distribution lines exist under Iowa Avenue and Martin Luther King Boulevard, and under a portion of West Campus. East Campus is served by a distribution line under Blaine Street (SCG 2016). UCR purchases natural gas, 95 percent of which is combusted in four steam boilers at the UCR Central Plant to generate steam for distribution. The Central Plant has the capability to produce up to 150,000 pounds per hour (lbs/hour) of steam that is distributed to most buildings in the Academic Center primarily for heating. Some natural gas is also used in the residential dining hall kitchens; on-campus restaurant kitchens; and science, research and teaching laboratories (UCR 2005). One high-pressure natural gas distribution line runs north-south under West Campus between Martin Luther King Boulevard and Le Conte Drive (SCG 2016).

USE

In 2018, UCR collected energy activity data, measured in million British Thermal Unit (MMBtu), of natural gas used in facilities and buildings; gallons of diesel used for portable generators, heaters, etc.; and gallons of fuel used by the UCR vehicle fleet. UCR disaggregated the source data in order to provide activity data for solely the main campus included in the proposed 2021 LRDP area. Table 4.6-6 provides a summary of UCR natural gas sources, data type, and activity data for 2018. As shown in Table 4.6-6, total UCR main campus natural gas use in 2018 was 3,466,942 therms.

Table 4.6-6 UCR 2018 Natural Gas Consumption

Source	Data Type	Use (therms)	Campus Population (2018)	UCR per Capita Consumption (therms)
Natural Gas Use				
Natural Gas (Shell Energy) [1]	Annual utility data	3,466,942	28,661	121

[1] Natural gas is transported to the UCR main campus by Southern California Gas and is procured through Shell Energy.

Notes:

All presented data was provided by UCR and is based on 2018 calendar year.

All data and calculations presented in this report are rounded to the nearest whole number.

Source: Appendix F compiled by Rincon Consultants.

Fuel Distribution and Use

State of California

DISTRIBUTION

According to the 2015 CEC market share data, California consists of distributors of gasoline, which include companies or individuals who make the first distribution of gasoline in California. Aircraft manufacturers and certificated or licensed carriers by air may be included within the definition of

[1] Natural gas is transported to the UCR main campus by Southern California Gas and is procured through Shell Energy.

distributor. Distributors can also be "Brokers," which includes every person, other than a distributor or a retailer, who deals in lots of 200 or more gallons of gasoline (CEC 2015).

Based on the California Transportation of Petroleum Second Northern California Refinery Safety Forum, output from the refineries is usually placed in intermediate tanks before blending finished products. Most gasoline is shipped from refinery by pipeline, which serves over 60 distribution terminals, which is then transported to retail and nonretail stations by tanker trucks (Schremp 2015).

USE

The main category of fuel use in California is transportation fuel, specifically gasoline and diesel. Gasoline is the most used transportation fuel in California: 97 percent of all gasoline sold in California is consumed by light-duty cars, pickup trucks, and sport utility vehicles. In 2018, an estimated 143,080 million gallons of gasoline annually were used (i.e. 392 million gallons gasoline per day), marking a record level of consumption between 1997 and 2020 (CEC 2021b). Diesel is the second largest transportation fuel used in California. Many heavy duty-trucks, delivery vehicles, buses, trains, ships, boats and barges, farm, construction, and heavy-duty military vehicles and equipment have diesel engines. According to the 2019 California Annual Retail Fuel Outlet Report Results (CEC-A15), in 2018, 1,752 million gallons of diesel annually (i.e. 4.8 million gallons of diesel per day), including off-road diesel, was sold (CEC 2021c).

Riverside County

DISTRIBUTION

Riverside County distributes gasoline through retail and non-retail gas stations throughout the County. In 2018, Riverside County had an estimated total of 582 retail gasoline stations (CEC 2021d).

USE

According to the California Annual Retail Fuel Outlet Report Results (CEC-A15), retail gasoline sales in Riverside County totaled approximately 1.05 billion gallons (CEC 2021d) and retail diesel sales totaled approximately 132 million gallons in 2018 (CEC 2021c). County consumption of compressed natural gas (CNG) is unknown. Table 4.6-7 indicates that Riverside County had a per capita gasoline consumption of approximately 437 gallons and per capita diesel consumption of approximately 55 gallons.

Table 4.6-7 Riverside County 2018 Gasoline and Diesel Consumption

Fuel Type	County Consumption (gallons per year)	2018 County Population	County Per Capita Consumption (gallons)
Gasoline	1,050,000,000	2,400,762	437
Diesel	132,000,000		55

Sources: DOF 2020; CEC 2018c; CEC 2021d

UCR Main Campus

Unleaded gasoline, CNG, and diesel are the fuels used by the UCR vehicle fleet and department vehicles. It is assumed that these same fuels are utilized by non-UCR vehicles and transit vehicles traveling to and from the campus.

DISTRIBUTION

UCR fleet and department vehicle services have three gasoline fuel dispensers with unleaded 87 octane gasoline and one CNG fuel dispenser. Diesel fuel is not available at the UCR Fleet fueling station and must be purchased at an off-campus fueling station (UCR 2021d).

USE

In addition to diesel fuel use by emergency back-up power generators on the UCR main campus, unleaded gasoline, CNG, and diesel are the fuels used by the UCR vehicle fleet and department vehicles. In 2018, UCR had a couple of electric vehicles used by campus staff and a couple hundred electric carts. In 2018, 135,192 gallons of unleaded gasoline, 4,321 gallon-equivalents of CNG, and 7,306 gallons of diesel were consumed by this UCR fleet for a total of 146,819 gallons of fuel used (see Appendix F). In addition, non-UCR fleet/department vehicles traveling to and from the UCR main campus generated an annual passenger VMT of 81,662,018, which translates into 2,100,859 gallons of gasoline and 247,811 gallons of diesel as fuel in 2018 (see Appendix F). Furthermore, in 2018, UCR campus population traveled 407,912 revenue miles on transit buses, which translates to 125,126 gallons of gasoline equivalents of CNG consumed in 2018 (see Appendix F).[2] Finally, based on 8,273,344 air passenger miles traveled in 2018, 182,979 gallons of aviation gasoline were consumed in 2018 due to UCR faculty and staff air travel.

Table 4.6-8 provides a summary of UCR mobile and stationary fuel sources, data type, and consumption data for 2018. As shown in Table 4.6-8, total UCR main campus fuel use in 2018 was 263,120 gallons of diesel, 2,419,030 gallons of gasoline, and 129,447 gallon-equivalents of CNG.

[2] CNG fuel consumption received by UCR is expressed as gallon equivalents. CNG = 1 gasoline equivalent gallons, and there are 1027 BTUs/standard cubic foot (SCF).

Table 4.6-8 UCR 2018 Fuel Consumption

Source	Data Type	Use (gallons)	Baseline Campus Population	Consumption Per Capita (gallons)
Stationary Fuel Use				
Diesel	Invoice Summary	8,003	28,661	0.3
Mobile Fuel Use				
On-campus Non-UCR Vehicles (campus commuters, commercial vendors, etc.)[3]				
Unleaded Gasoline	Daily VMT, vehicle class, and fuel distribution	2,100,859	28,661	73.3
Diesel	Daily VMT, vehicle class, and fuel distribution	247,811	28,661	8.6
Public Transit Vehicles (Attributed to UCR)				
Transit Vehicle Transportation (RTA/UPASS)[1]	Annual trips, vehicle class, and fuel distribution	125,126 (gallons equivalents)[2]	28,661	4.4
UCR Vehicles (Fleet/Department)				
Unleaded Gasoline	Fleet vehicle, fuel, and mileage data	135,192	28,661	4.7
Compressed Natural Gas	Fleet vehicle, fuel, and mileage data	4,321 (gallon equivalent)[2]	28,661	0.2
Diesel	Fleet vehicle, fuel, and mileage data	7,306	28,661	0.3
UCR Business Air Travel				
Faculty/Staff Air Travel	Air passenger miles and aviation energy use factor	182,979	28,661	6.4

[1] Based on provided fleet information from RTA in email correspondence on August 21, 2020, the transit fleets are operated using only gasoline and compressed natural gas (CNG), therefore does not include diesel fuel usage.

[2] CNG fuel consumption received by UCR is expressed as gallon equivalents. CNG = 1 gasoline equivalent gallons, and there are 1027 BTUs/standard cubic foot (SCF).

[3] Non-UCR fleet mobile fuel combustion calculated using VMT data provided by vehicle class by Fehr & Peers (Appendix J) and has been converted into total fuel consumption for all vehicle classes.

Total fuel usage presented are rounded to the nearest whole number while consumption per capita is rounded to the tenths.

UCR = University of California, Riverside; VMT = vehicles miles traveled; RTA = Riverside Transit Agency

Source: Appendix F compiled by Rincon Consultants.

Available Alternative Vehicle Fuels

Various Statewide regulations and plans encourage alternative fuel use to reduce GHG emissions and criteria pollutant emissions. These include the Low Carbon Fuel Standard and SB 32, as well as myriad other Statewide and local air district regulations. Conventional gasoline and diesel may be replaced with different alternative fuels, depending on the capability of the vehicle. Descriptions of the most widely used alternative fuels include the following:

- **Electricity** can power electric and plug-in hybrid electric vehicles directly from the power grid. Generally, these vehicles draw from the electricity grid and store the energy in their batteries. UCR has 36 electric vehicle charging stations on campus:

  Existing Level II (240 Volt/40 Amp)

  - Lot 1: 4 ports

  - Lot 6: 4 ports
  - Lot 9: 4 ports
  - Lot 15: 4 ports
  - Lot 20: 2 ports
  - Lot 24: 12 ports
  - Lot 30: 2 ports
  - Lot 50: 4 ports
- **Biodiesel** is a renewable alternative fuel that can be manufactured from vegetable oils, animal fats, or recycled restaurant grease. Biodiesel is biodegradable and cleaner-burning than petroleum-based diesel fuel. Generally, biodiesel can run in any diesel engine without alterations, but fueling stations have been slow to make it available. There are eleven biodiesel refueling stations in California, but none in the City. According to the U.S. Department of Energy (USDOE), the closest biodiesel stations to UCR are in the cities of Corona and Ontario (USDOE 2019a). UCR does not have any biodiesel stations on campus or use biodiesel as part of UCR's fleet.
- **Compressed natural gas (CNG) and liquefied natural gas (LNG)** is currently being used in vehicles. CNG is used in light-, medium-, and heavy-duty vehicles and gets about the same fuel economy. LNG is costly to produce and therefore is used in limited applications, typically in medium- and heavy-duty vehicles. There are three CNG stations near the UCR main campus: GNG CNG Station located approximately 3.4 miles southeast of UCR in the City of Moreno Valley; Clean Energy Riverside County CNG Station located approximately 3.9 miles northwest of UCR in the City; and Riverside CNG Station located approximately 5.9 miles southwest of UCR in the City (USDOE 2019b). There is one LNG station approximately 1.3 miles west of UCR in the City (USDOE 2019c). UCR does not have any CNG or LNG stations on campus but does use CNG as part of UCR's fleet.
- **Hydrogen** is being explored for use in combustion engines and fuel cell electric vehicles. The interest in hydrogen as an alternative transportation fuel stems from its clean-burning qualities, its potential for domestic production, and the fuel cell vehicle's potential for high efficiency: hydrogen is two to three times more efficient than gasoline. The closest station to UCR is in Diamond Bar, approximately 27.8 miles west of UCR (USDOE 2019d). Fuel cells are being explored as a way to use electricity generated on-board the vehicle to power electric motors. UCR does not have any hydrogen stations on campus or use hydrogen as part of UCR's fleet.

4.6.2 Regulatory Setting

Additional regulatory information related to energy efficiency standards is included throughout the other resource sections including Section 4.17, *Utilities and Service Systems*, which includes discussion of water use efficiency standards, solid waste standards, and wastewater standards, Section 4.3, *Air Quality*, which includes discussion of air quality related regulations, and Section 4.8, *Greenhouse Gas Emissions*, which includes discussion of greenhouse gas related regulations.

Federal

Energy Policy and Conservation Act

Enacted in 1975, this legislation established fuel economy standards for new light-duty vehicles (autos, pickups, vans, and sport-utility vehicles). The law placed responsibility on the National

Highway Traffic and Safety Administration, a part of the U.S. Department of Transportation (USDOT), for establishing and regularly updating vehicle standards. The U.S. Environmental Protection Agency (US EPA) administers the Corporate Average Fuel Economy (CAFE) program, which determines vehicle manufacturers' compliance with existing fuel economy standards. Since the inception of the program, the average fuel economy for new light-duty vehicles steadily increased from 13.1 miles per gallon (mpg) for the 1975 model year to 30.7 mpg for the 2014 model year and can increase to 54.5 by 2025.

On August 2, 2018, the NHTSA and US EPA, operating under the direction of the Trump Administration, proposed the Safer Affordable Fuel-Efficient Vehicles Rule (SAFE Rule). This rule addresses emissions and fuel economy standards for motor vehicles and is separated in two parts as described below.

- Part One, "One National Program" (84 FR 51310) revokes a waiver granted by US EPA to the State of California under Section 209 of the CAA to enforce more stringent emission standards for motor vehicles than those required by US EPA for the explicit purpose of GHG reduction, and indirectly, criteria air pollutants and ozone precursor emission reduction. This revocation became effective on November 26, 2019, potentially restricting the ability of CARB to enforce more stringent GHG emission standards for new vehicles and set zero emission vehicle mandates in California.
- Part Two addresses CAFE standards for passenger cars and light trucks for model years 2021 to 2026. This rulemaking proposes new CAFE standards for model years 2022 through 2026 and would amend existing CAFE standards for model year 2021. The proposal would retain the model year 2020 standards (specifically, the footprint target curves for passenger cars and light trucks) through model year 2026. The proposal addressing CAFE standards was jointly developed by NHTSA and US EPA, with US EPA simultaneously proposing tailpipe CO_2 standards for the same vehicles covered by the same model years.

US EPA and NTHSA published final rules to amend and establish national CO^2 and fuel economy standards on April 30, 2020 (Part Two of the SAFE Vehicles Rule) (85 FR 24174). California and 22 other states are currently challenging this new rule in the court system, and it is reasonably foreseeable that the State will be successful in its legal challenges, for the reasons outlined in the State's lawsuit[3] and on the CARB website (CARB 2021). Furthermore, on January 20, 2021, President Biden signed an executive order directing the Government to revise fuel economy standards with the goal of further reducing emissions (US White House 2021). In February 2021 the Biden administration Department of Justice also asked courts to put the litigation on hold while the administration "reconsidered the policy decisions of a prior administration." Most Recently, on April 22, 2021 the Biden Administration proposed to formally roll back portions of the SAFE Rule thereby restoring California's right to enforce more stringent fuel efficiency standards (USDOT 2021).

It is, however, legally infeasible for individual agencies (in this case, the UC system) to adopt more stringent fuel efficiency standards for commuter vehicles. The CAA (42 United States Code [USC] Section 7543[a]) states that "no state or any political subdivision therefore shall adopt or attempt to enforce any standard relating to the control of emissions from new motor vehicles or new motor vehicle engines subject to this part." Therefore, UCR abides by federal and State transportation fuel efficiency standards related to commuter vehicles.

[3] *State of California et al. v. Chao et al.* (Case 1:19-cv-02826) available at: https://oag.ca.gov/system/files/attachments/press_releases/California%20v.%20Chao%20complaint%20%2800000002%29.pdf

Construction Equipment Fuel Efficiency Standard

US EPA sets emission standards for construction equipment. The first federal standards (Tier 1) were adopted in 1994 for all off-road engines over 50 horsepower (hp) and were phased in by 2000. A new standard was adopted in 1998 that introduced Tier 1 for all equipment below 50 hp and established the Tier 2 and Tier 3 standards. The Tier 2 and Tier 3 standards were phased in by 2008 for all equipment. The current iteration of emissions standards for construction equipment are the Tier 4 efficiency requirements are contained in 40 Code of Federal Regulations Parts 1039, 1065, and 1068 (originally adopted in 69 Federal Register 38958 [June 29, 2004], and most recently updated in 2014 [79 Federal Register 46356]). Emissions requirements for new off-road Tier 4 vehicles were to be completely phased in by the end of 2015.

Energy Policy Act

The Energy Policy Act of 1992 was passed to reduce the U.S.'s dependence on foreign petroleum and improve air quality. The act includes several parts intended to build an inventory of alternative fuel vehicles (AFVs) in large, centrally fueled fleets in metropolitan areas. The act requires certain federal, State, and local government and private fleets to purchase a percentage of light-duty AFVs capable of running on alternative fuels each year. In addition, financial incentives are also included in the act. Federal tax deductions are allowed for businesses and individuals to cover the incremental cost of AFVs. States are also required by the act to consider a variety of incentive programs to help promote AFVs. The Energy Policy Act of 2005 provides renewed and expanded tax credits for electricity generated by qualified energy sources, such as landfill gas; provides bond financing, tax incentives, grants, and loan guarantees for clean renewable energy and rural community electrification; and establishes a federal purchase requirement for renewable energy.

Energy Independence and Security Act

The Energy Independence and Security Act of 2007 was designed to improve vehicle fuel economy and help reduce nationwide dependence on foreign oil. It expands the production of renewable fuels, reducing dependence on oil, and confronting global climate change. Specifically, it increases the supply of alternative fuel sources by setting a mandatory Renewable Fuel Standard by requiring fuel producers to use at least 36 billion gallons of biofuel in 2022 and reduces U.S. demand for oil by setting a national fuel economy standard of 35 mpg by 2020.

The Act also set energy efficiency standards for lighting (specifically light bulbs) and appliances. Development would also be required to install photosensors and energy-efficient lighting fixtures consistent with the requirements of 42 USC Section 17001 et seq.

U.S. Executive Order (EO) 13693 (Energy Independence and Security Act Expansion)

In March 2015, EO 13693 *Planning for Federal Sustainability in the Next Decade* was signed into action. The goal of this EO is to expand on the Energy Independence and Security Act of 2007 and maintain federal leadership in sustainability and GHG emission reductions. The EO includes the following goals related to energy:

- 25 percent reduction in energy use intensity (2015 baseline).
- 30 percent of electricity supply from renewable energy by 2025.
- 25 percent of total building energy (electric and alternative energy) from renewable energy by 2025.

Energy Star Program

In 1992, the US EPA introduced Energy Star© as a voluntary labeling program designed to identify and promote energy-efficient products to reduce GHG emissions. The program applies to major household appliances, lighting, computers, and building components such as windows, doors, roofs, and heating and cooling systems. Under this program, appliances that meet specification for maximum energy use established under the program are certified to display the Energy Star© label. In 1996, the US EPA joined with the Energy Department to expand the program, which now also includes qualifying commercial and industrial buildings, as well as homes.

State

California Energy Action Plan (Increase Efficient Use of Fuel Supplies)

The CEC, in collaboration with CPUC, is responsible for preparing the California Energy Action Plan, which identifies emerging trends related to energy supply, demand, conservation, public health and safety, and maintenance of a healthy economy. The 2003 Energy Action Plan calls for the State to assist in transformation of the transportation system to improve air quality, reduce congestion, and increase efficient use of fuel supplies with the least environmental and energy costs. The Energy Action Plan identifies strategies including assistance to public agencies and fleet operators in implementing incentive programs for zero-emission vehicles and addressing their infrastructure needs, and encourages urban designs that reduce VMT and accommodate pedestrian and bicycle access.

In the 2005 Energy Action Plan, the CEC and CPUC updated the energy policy vision by adding dimensions to the policy areas, such as information on the emerging importance of climate change, transportation-related energy issues, and research and development activities. The CEC adopted an update to the 2005 Energy Action Plan in 2008 that supplements the earlier Energy Action Plans and examines the State's ongoing actions in the context of global climate change.

California Energy Code (Building Energy Efficiency Standards)

The Building Energy Efficiency Standards were first adopted in 1976 and have been updated periodically since then. The standards contain energy and water efficiency requirements (and indoor air quality requirements) for newly constructed buildings, additions to existing buildings, and alterations to existing buildings. The goal is to reduce energy costs for owners, increase reliability and availability of electricity for the State, improve building occupant comfort, and reduce environmental impact.

Senate Bill 1389 (Integrated Energy Policy)

SB 1389 (Chapter 568, Statutes of 2002) required the CEC to conduct assessments and forecasts of all aspects of energy industry supply, production, transportation, delivery and distribution, demand, and prices. The CEC uses these assessments and forecasts to develop energy policies and recommendations to conserve resources, protect the environment, ensure energy reliability, enhance the State's economy, and protect public health and safety.

Senate Bills 350 and 100 (Renewable Portfolio/Clean Energy and Pollution Reduction Act)

The Clean Energy and Pollution Reduction Act of 2015 (SB 350) requires the amount of electricity generated and sold to retail customers per year from eligible renewable energy resources to be increased to 50 percent by December 31, 2030. This act also requires doubling of the energy efficiency in existing buildings by 2030.

Adopted on September 10, 2018, SB 100 supports the reduction of GHG emissions from the electricity sector by accelerating the State's Renewables Portfolio Standard Program, which was last updated by SB 350 in 2015. SB 100 requires electricity providers to increase procurement from eligible renewable energy resources to 33 percent of total retail sales by 2020, 44 percent by 2024, 60 percent by 2030, and 100 percent by 2045.

Assembly Bill 1493 (Reduce GHG Emissions from Vehicle Use)

AB 1493 (Chapter 200, Statutes of 2002), known as the Pavley Bill, amended Health and Safety Code Sections 42823 and added 43018.5 requiring the California Air Resources Board (CARB) to develop and adopt regulations that achieve maximum feasible and cost-effective reduction of GHG emissions from passenger vehicles, light-duty trucks, and other vehicles used for noncommercial personal transportation in California.

Assembly Bill 1007 (State Alternative Fuels Plan)

AB 1007 (Chapter 371, Statutes of 2005) required the CEC to prepare a State plan to increase the use of alternative fuels in California. The CEC prepared the State Alternative Fuels Plan (SAF Plan) in partnership with CARB and in consultation with other federal, State, and local agencies. The SAF Plan presents strategies and actions California must take to increase the use of alternative non-petroleum fuels in a manner that minimizes costs to California and maximizes the economic benefits of in-state production. The SAF Plan assessed various alternative fuels and developed fuel portfolios to meet California's goals to reduce petroleum consumption, increase alternative fuels use, reduce GHG emissions, and increase in-State production of biofuels without causing a significant degradation of public health and environmental quality.

Executive Order S-06-06 (Bioenergy Action Plan)

On April 25, 2006, Governor Schwarzenegger signed EO S-06-06 that established targets for the use and production of biofuels and biopower, and directs State agencies to work together to advance biomass programs in California, while providing environmental protection and mitigation. The EO establishes the following target to increase the production and use of bioenergy, including ethanol and biodiesel fuels made from renewable resources: produce a minimum of 20 percent of its biofuels in California by 2010, 40 percent by 2020, and 75 percent by 2050. EO S-06-06 also calls for the State to meet a target for use of biomass electricity. The 2011 Bioenergy Action Plan identifies those barriers and recommends actions to address them so that the State can meet its clean energy, waste reduction, and climate protection goals. The 2012 Bioenergy Action Plan updates the 2011 Plan and provides a more detailed action plan to achieve the following goals:

- Increase environmentally and economically sustainable energy production from organic waste.
- Encourage development of diverse bioenergy technologies that increase local electricity generation, combined heat and power facilities, renewable natural gas, and renewable liquid fuels for transportation and fuel cell applications.

- Create jobs and stimulate economic development, especially in rural regions of the State.
- Reduce fire danger, improve air and water quality, and reduce waste.

CARB In-Use On-Road and Off-Road Diesel Rules

The CARB rule imposes limits on idling, restricts the addition of older vehicles, and requires the retirement or replacement of older engines depending on their fleet size category. This policy indirectly impacts energy consumption.

More specifically, the California Air Resources Board (ARB) is also charged with developing air pollution control regulations based upon the best available control measures and implementing every feasible control measure under the State and Federal Clean Air Act. (Health & Saf. Code, §§ 39602.5, 39667, 43013, subds. (a) and (h), 43018, 40600, 40601, 40612(a)(2) and (c)(1)(A).) Pursuant to these directives, stringent emission standards were adopted in 2004 for off-road construction equipment (i.e. "Tier 4" standards) (40 Code of Federal Regulations Parts 1039, 1065, and 1068; Cal. Code Regs., tit. 13, § 2025; AR 2854). ARB also adopted emission standards for on-road heavy duty diesel vehicles (i.e. haul trucks). (Cal. Code Regs., tit. 13, § 1956.8.) These haul truck regulations mandate fleet turn-over to ensure that by January 1, 2023 nearly all on-road diesel trucks will have 2010 model year engines or equivalent [i.e. Tier 4]. In addition, interim steps are incorporated into the regulations (e.g., vehicles older than 1999 will be replaced with newer engines by 2020).

California Advance Clean Trucks Program

In June 2020, CARB approved the Advanced Clean Trucks regulation, which requires manufacturers who certify Class 2b-8 chassis or complete vehicles with combustion engines to sell zero-emission trucks as an increasing percentage of their annual California sales from 2024 to 2035. In addition, the regulation requires company and fleet reporting for large employers and fleet owners with 50 or more trucks. By 2045, all new trucks sold in California must be zero-emission. Implementation of this regulation would reduce consumption of nonrenewable transportation fuels as trucks transition to alternative fuel sources.

CARB Advanced Clean Cars Plan

This CARB policy coordinates regulating smog-causing pollutants and GHG emissions through developing more stringent emissions standards for vehicles and improving the number of zero-emission vehicles on the roadways. This policy indirectly impacts energy consumption.

Executive Order B-48-18: Zero-Emission Vehicles

On January 26, 2018, Governor Brown signed Executive Order B-48-18 requiring all State entities to work with the private sector to have at least 5 million zero-emission vehicles (ZEVs) on the road by 2030, as well as install 200 hydrogen fueling stations and 250,000 electric vehicle (EV) charging stations by 2025. It specifies that 10,000 of the EV charging stations should be direct current fast chargers. This order also requires all State entities to continue to partner with local and regional governments to streamline the installation of ZEV infrastructure. The Governor's Office of Business and Economic Development is required to publish a Plug-in Charging Station Design Guidebook and update the 2015 Hydrogen Station Permitting Guidebook to aid in these efforts. All State entities are required to participate in updating the 2016 Zero-Emissions Vehicle Action Plan, along with the 2018 ZEV Action Plan Priorities Update, which includes and extends the 2016 ZEV Action Plan (Governor's Interagency Working Group on Zero-Emission Vehicles 2016, 2018), to help expand private

investment in ZEV infrastructure with a focus on serving low-income and disadvantaged communities.

Executive Order N-79-20

Governor Gavin Newsom signed Executive Order N-79-20 in September 2020, which sets a statewide goal that 100 percent of all new passenger car and truck sales in the State will be zero-emissions by 2035. It also sets a goal that 100 percent of statewide new sales of medium- and heavy-duty vehicles will be zero emissions by 2045, where feasible, and for all new sales of drayage trucks to be zero emissions by 2035. Additionally, the Executive Order targets 100 percent of new off-road vehicle sales in the State to be zero emission by 2035. CARB is responsible for implementing the new vehicle sales regulation.

California Code of Regulations Title 24 (California Building Code)

Updated every three years through a rigorous stakeholder process, Title 24 of the California Code of Regulations requires California homes and businesses to meet strong energy efficiency measures, thereby lowering their energy use. Title 24 contains numerous subparts, including Part 1 (Administrative Code), Part 2 (Building Code), Part 3 (Electrical Code), Part 4 (Mechanical Code), Part 5 (Plumbing Code), Part 6 (Energy Code), Part 8 (Historical Building Code), Part 9 (Fire Code), Part 10 (Existing Building Code), Part 11 (Green Building Standards Code), Part 12 (Referenced Standards Code). The California Building Code is applicable to all development in California. (Health and Safety Code §§ 17950 and 18938(b).)

The regulations receive input from members of industry, as well as the public, with the goal of "[r]educing of wasteful, uneconomic, inefficient, or unnecessary consumption of energy." (Pub. Res. Code § 25402.) These regulations are carefully scrutinized and analyzed for technological and economic feasibility (Pub. Res. Code § 25402(d)) and cost effectiveness (Pub. Res. Code § 25402(b)(2) and (b)(3)).

PART 6 – BUILDING ENERGY EFFICIENCY STANDARDS

CCR Title 24 Part 6 is the Building Energy Efficiency Standards. This code, originally enacted in 1978, establishes energy-efficiency standards for residential and non-residential buildings in order to reduce California's energy demand. The Building Energy Efficiency Standards is updated periodically to incorporate and consider new energy-efficiency technologies and methodologies as they become available. New construction and major renovations must demonstrate their compliance with the current Building Energy Efficiency Standards through submission and approval of a Title 24 Compliance Report to the local building permit review authority and the CEC. Under the 2019 standards, nonresidential buildings will be 30 percent more energy efficient compared to the 2016 standards, and residential homes will be 7 percent more energy efficient. When accounting for the electricity generated by the solar photovoltaic system, residences would use 53 percent less energy compared to homes built to the 2016 standards.

The 2019 Building Energy Efficiency Standards, adopted on May 9, 2018, became effective on January 1, 2020. The 2019 Standards move toward cutting energy use in new homes by more than 50 percent and will require installation of solar photovoltaic systems for single-family homes and multi-family buildings of three stories and less. The 2019 Standards focus on four key areas: 1) smart residential photovoltaic systems; 2) updated thermal envelope standards (preventing heat transfer from the interior to exterior and vice versa); 3) residential and nonresidential ventilation requirements; 4) and nonresidential lighting requirements. Under the 2019 Standards,

nonresidential buildings will be 30 percent more energy-efficient compared to the 2016 Standards, and single-family homes will be seven percent more energy-efficient. When accounting for the electricity generated by the solar photovoltaic system, single-family homes would use 53 percent less energy compared to homes built to the 2016 standards.

PART 11 – CALIFORNIA GREEN BUILDING STANDARDS

The California Green Building Standards Code, referred to as CALGreen, was added to CCR Title 24 as Part 11 first in 2009 as a voluntary code, which then became mandatory effective January 1, 2011 (as part of the 2010 CBC). The 2016 CALGreen institutes mandatory minimum environmental performance standards for all ground-up new construction of non-residential and residential structures. It also includes voluntary tiers (I and II) with stricter environmental performance standards for these same categories of residential and non-residential buildings. Local jurisdictions must enforce the minimum mandatory Green Building Standards and may adopt additional amendments for stricter requirements.

The mandatory standards require:

- 20 percent reduction in indoor water use relative to specified baseline levels;
- 50 percent construction/demolition waste diverted from landfills;
- Inspections of energy systems to ensure optimal working efficiency;
- Low-pollutant emitting exterior and interior finish materials such as paints, carpets, vinyl flooring, and particleboards;
- Dedicated circuitry to facilitate installation of EV charging stations in newly constructed attached garages for single-family and duplex dwellings; and
- Installation of EV charging stations at least three percent of the parking spaces for all new multi-family developments with 17 or more units.

Similar to the compliance reporting procedure for demonstrating Building Energy Efficiency Standards compliance in new buildings and major renovations, compliance with the CalGreen water-reduction requirements must be demonstrated through completion of water use reporting forms for new low-rise residential and non-residential buildings. Buildings must demonstrate a 20 percent reduction in indoor water use by either showing a 20 percent reduction in the overall baseline water use as identified in CalGreen or a reduced per-plumbing-fixture water use rate.

University of California

UC Policy on Sustainable Practices

UC's official sustainability commitment began in 2003 with a Regental action that led to the adoption of a Presidential Policy on Green Building Design and Clean Energy Standards in 2004. Since adopting that policy, UC expanded its sustainability policies to address climate protection, transportation, building operations, waste, procurement, food, water, and health care facilities. The policy was subsequently renamed the UC Policy on Sustainable Practices, which is updated periodically. In the 2007 revision of the UC Policy on Sustainable Practices, the University of California Office of the President (UCOP) committed UC to implementing actions to achieve a reduction in GHG emissions from UC operations and activities to 2000 levels by 2014 and 1990 levels by 2020. Today, UC's official commitment to sustainability across the above-listed sectors is integrated into the UC Policy on Sustainable Practicesupdated in July 2020 (UC 2020). The following

UCR existing policies pertain to direct or indirect energy-related operations of UCR. The following policies are noted from the UC Policy on Sustainable Practices:

- Policy A.1: All new building projects, other than acute care facilities, shall be designed, constructed, and commissioned to outperform the CBC energy-efficiency standards by at least 20 percent or meet the whole-building energy performance targets listed in Table 1 of Section V.A.3 of the UC Policy on Sustainable Practices. The University will strive to design, construct, and commission buildings that outperform CBC energy efficiency standards by 30 percent or more, or meet the stretch whole-building energy performance targets listed in Table 1 of Section V.A.3 of the UC Policy on Sustainable Practices, whenever possible within the constraints of program needs and standard budget parameters.
- Policy A.3: No new building or major renovation that is approved after June 30, 2019 shall use on-site fossil fuel combustion (e.g., natural gas) for space and water heating (except those projects connected to an existing campus central thermal infrastructure). Projects unable to meet this requirement shall document the rationale for this decision, as described in Section V.A.4 of the UC Policy on Sustainable Practices.
- Policy A.4: All new buildings will achieve a U.S. Green Building Council (USGBC) LEED "Silver" certification at a minimum. All new buildings will strive to achieve certification at a USGBC LEED "Gold" rating or higher, whenever possible within the constraints of program needs and standard budget parameters.
- Policy A.5: The UC will design, construct, and commission new laboratory buildings to achieve a minimum of LEED "Silver" certification as well as meeting at least the prerequisites of the Laboratories for the 21st Century (Labs21) Environmental Performance Criteria (EPC). Laboratory spaces in new buildings also shall meet at least the prerequisites of Labs21 EPC. Design, construction, and commissioning processes shall strive to optimize the energy efficiency of systems not addressed by the CBC energy efficiency standards.
- Policy A.7: Major Renovations of buildings are defined as projects that require 100 percent replacement of mechanical, electrical, and plumbing systems and replacement of over 50 percent of all non-shell areas (interior walls, doors, floor coverings, and ceiling systems) shall at a minimum comply with III.A.4 or III.A.5 of the UC Policy on Sustainable Practices. Such projects shall outperform CBC Title 24, Part 6, currently in effect, by 20 percent. This does not apply to acute care facilities.
- Policy A.8: Renovation projects with a project cost of $5 million or greater that do not constitute a Major Renovation as defined in Policy A.7 shall, at a minimum, achieve a LEED-ID+C Certified rating and register with the utilities' Savings by Design program, if eligible. This does not apply to acute care facilities.
- Policy B.1: Each location will implement energy efficiency actions in buildings and infrastructure systems to reduce the location's energy use intensity by an average of least 2 percent annually.
- Policy B.2: Campuses and health locations will install additional on-site renewable electricity supplies and energy storage systems whenever cost-effective and/or supportive of the location's Climate Action Plan or other goals.
- Policy B.3: By 2025, each campus and health location will obtain 100 percent clean electricity. By 2018, the University's Wholesale Power Program will provide 100 percent clean electricity to participating locations.[4]

[4] UCR is not currently a participating location under the Wholesale Power Program.

- Policy B.4: By 2025, at least 40 percent of the natural gas combusted on-site at each campus and health location will be biogas.
- Policy D.1: Each location will reduce GHG emissions from its fleet and report annually on its progress. Locations shall implement strategies to reduce fleet emissions and improve the fuel efficiency of all university-owned or operated fleet vehicles and equipment where practical options exist through acquisition and fleet operation protocols.
  - By 2025, zero-emission vehicles or hybrid vehicles shall account for at least 50 percent of all new light-duty vehicle acquisitions. Lawrence Berkeley National Laboratory will follow federal fleet requirements in the case where federal and UC fleet requirements conflict.
- Policy D.2: The University recognizes that single-occupant vehicle (SOV) commuting is a primary contributor to commute GHG emissions and localized transportation impacts.
  - By 2025, each location shall strive to reduce its percentage of employees and students commuting by SOV by 10 percent relative to its 2015 SOV commute rates;
  - By 2050, each location shall strive to have no more than 40 percent of its employees and no more than 30 percent of all employees and students commuting to the location by SOV.
- Policy D.3: Consistent with the State of California goal of increasing alternative fuel – specifically electric – vehicle usage, the University shall promote purchases and support investment in alternative fuel infrastructure at each location.
  - By 2025, each location shall strive to have at least 4.5 percent of commuter vehicles be ZEV.[5]
  - By 2050, each location shall strive to have at least 30 percent of commuter vehicles be ZEV.

University of California, Riverside

UCR Transportation Demand Management

UCR's Transportation Demand Management (TDM) programs include multi-pronged efforts such as marketing, incentives, expanded vanpool offerings, on- and near-campus housing amenities, parking pricing, and more. UCR encourages students to use designated bike paths to commute to and travel within the campus. Registered bicyclists or walkers are eligible to receive a complimentary bicycle parking allotment and are eligible to utilize the day-use locker and shower facilities at the SRC without charge. UCR has also encouraged ride-sharing services, and the average vehicle ridership has increased from approximately 1.36 to 1.57 occupants per vehicle over the last 15 years. However, it is legally infeasible to mandate ridesharing. (See Health and Safety Code § 40717.9; *Merced Alliance for Responsible Growth v. City of* Merced 2012 WL 5984917.)

Regional and Local (Non-Binding)

As noted in Section 4, "University of California Autonomy," UCR, a constitutionally created State entity, is not subject to municipal regulations of surrounding local governments for uses on property owned or controlled by UCR that are in furtherance of the university's educational purposes. However, UCR may consider, for coordination purposes, aspects of local plans and policies of the communities surrounding the campus when it is appropriate and feasible, but is not bound by those

[5] ZEV stands for a zero-emissions vehicle.

plans and policies in its planning efforts. No regional or local plans related to energy apply to the proposed 2021 LRDP.

4.6.3 Environmental Impacts and Mitigation Measures

Significance Criteria

UCR utilizes the following 2020 CEQA Guidelines Appendix G significance criteria questions related to Energy.

Would the proposed 2021 LRDP:

a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?
b) Conflict with or obstruct a State or local plan for renewable energy or energy efficiency?

Issues Not Evaluated Further

All issues applicable to energy listed under the CEQA significance criteria above are addressed in this section.

Analysis Methodology

The approach to analysis related to energy is based on Public Resources Code Section 21100(b)(3) states that an EIR shall include "mitigation measures proposed to minimize significant effects on the environment, including, but not limited to, measures to reduce the wasteful, inefficient, and unnecessary consumption of energy." Guidance for implementing this section is provided in CEQA Guidelines Appendix F (Energy Conservation). Guidelines § 15126.2(b) further explains that "This [energy] analysis may be included in related analyses of air quality, greenhouse gas emissions, transportation or utilities in the discretion of the lead agency." Consistent with that approach, additional discussion of physical environmental impacts associated with production of energy is also included in the other resource chapters of this EIR included but not limited to Greenhouse Gases, Air Quality, Transportation, and Alternatives. The Alternatives discussion includes an overview of whether the project should be implemented (i.e. the No Project Alternative), and discussion of alternative locations.

Energy consumption associated with the proposed 2021 LRDP construction and operation was calculated with regard to stationary and mobile energy demand. The input data and energy demand estimates related to the proposed 2021 LRDP are discussed below.

Construction Energy Consumption

Campus construction stationary and mobile energy demand (related to fuel [diesel, gasoline, and CNG]) associated with the proposed 2021 LRDP was calculated. Construction energy demand considers diesel fuel consumption associated with operation of construction equipment and vendor/hauling truck trips, as well as gasoline fuel consumption associated with worker trips to and from construction sites. Construction stationary and mobile energy consumption (related to diesel and gasoline) from the proposed 2021 LRDP construction were calculated using activity data and assumptions from the CalEEMod output files utilized for the proposed 2021 LRDP's Air Quality analysis and are included in Section 4.3, *Air Quality,* and Appendix C of the EIR. CalEEMod uses activity data (e.g., trip lengths, equipment specifications) provided by the various California air districts to account for local requirements and conditions, and/or user-defined inputs. Construction

equipment estimates are based on surveys of construction projects within California conducted by members of the California Air Pollution Control Officers Association (CAPCOA) (CAPCOA 2017). Construction input data for CalEEMod included but were not limited to: (1) the anticipated construction activity; (2) inventories of construction equipment to be used; (3) areas to be excavated and graded; and (4) volumes of materials to be exported from and imported to the campus.

The manufacturing of construction materials would also involve energy use. However, the California Natural Resources Agency (CNRA) acknowledges that a full lifecycle analysis that would account for energy used in building materials and consumer products will generally not be required (CNRA 2018). Additionally, consistent with CEQA Guidelines Section 15145, this analysis does not evaluate upstream energy use as it is too speculative.

STATIONARY ENERGY DEMAND

Construction stationary energy demand for off-road construction equipment is based on anticipated equipment, usage hours, horsepower, load factors, and construction phase duration provided in the CalEEMod output files from the proposed 2021 LRDP's Air Quality analysis (Appendix C). Fuel consumption is calculated based on compression-ignition engine brake-specific fuel consumption factors in *Exhaust and Crankcase Emission Factors for Nonroad Compression Ignition Engines* (US EPA 2018).

MOBILE ENERGY DEMAND

Construction mobile energy demand considers diesel fuel consumption associated with vendor/hauling truck trips, as well as gasoline fuel consumption associated with worker trips to and from construction sites. According to the USDOT, hauling, vendor, and worker trip fuel consumption considers anticipated daily trips, default trip lengths, and average fuel efficiency values obtained from the Bureau of Transportation Statistics (USDOT 2018).

Operational Energy Consumption

Campus operational stationary and mobile energy demand (related to electricity, natural gas, and fuel [diesel, gasoline, and CNG]) associated with the proposed 2021 LRDP was calculated as explained in detail below.

STATIONARY ENERGY DEMAND

Operational stationary energy demand from new building construction under the proposed 2021 LRDP was determined using specific growth factors. Indicator growth rates were developed from 2018 baseline activity (i.e., energy use) levels, existing building square footage, and campus population. Energy use from existing buildings (i.e., natural gas and electricity consumption) is based on actual energy data provided by UCR from the respective utilities, RPU, and Shell Energy. Energy use in the form of diesel consumption for diesel generators is also based on gallons of diesel consumption provided by UCR. The developed growth rates were then multiplied by the anticipated building square footage growth in the proposed 2021 LRDP to develop the anticipated energy demand projection that is representative of future operational energy demand (i.e., natural gas, electricity, and diesel) for buildings. While the UC Policy on Sustainable Practices requires all new buildings to be fully electric and not heated using natural gas (UC 2020), it was conservatively assumed that natural gas consumption on campus would increase following the same growth rates as determined for the 2018 baseline year.

The energy use intensity (EUI) factors and building gross square footage provided by UCR were utilized to estimate annual natural gas and electricity use by building type for both existing buildings and future building (see Appendix F for details). Energy use for existing buildings was based on the EUI associated with the current level of energy performance at the time of the study, while energy use for future buildings was based on the EUI for the escalating California Title 24 code. UCR distinguished existing and future buildings by building or land use type allowing for the application of the appropriate EUI. Existing building EUIs and EUIs for new buildings built to the current code were determined by UCR in the Brightworks Study for four building types. Existing and new building EUIs by building type utilized for the operational energy calculations are as follows:

- Academic/Administrative
  - Existing EUI: 107 thousands of British thermal units per square foot per year (kBtu/sf-yr)
  - New EUI: 65 kBtu/sf-yr
- Lab/Complex
  - Existing EUI: 253 kBtu/sf-yr
  - New EUI: 149 kBtu/sf-yr
- Residential
  - Existing EUI: 83 kBtu/sf-yr
  - New EUI: 57 kBtu/sf-yr
- Social
  - Existing EUI: 180 kBtu/sf-yr
  - New EUI: 107 kBtu/sf-yr

EUIs for existing and future buildings were applied to the 2021 LRDP buildings gross square feet based on building type defined as academic/admin, lab/complex, residential, or social. See Appendix F for details regarding designation of the proposed 2021 LRDP buildings by type and calculations of energy use based on EUI. Additional energy efficiency improvements from State legislation (i.e., Title 24) were incorporated under the legislative-adjusted scenario as described in detail in Appendix F.

MOBILE ENERGY DEMAND

Operational mobile energy demand would be related to the UCR vehicle fleet/department vehicles, as well as fuel consumption due to VMT associated with student, faculty, commercial vendor and visitor populations commuting to campus via their own vehicle or using transit. In addition, mobile energy consumption also occurs from UCR business air travel activity.

UCR Vehicle Fleet

Fuel consumption by the UCR vehicle fleet are based on fuel consumption data tracked by UCR for the 2018 baseline year. Unleaded gasoline, CNG, and diesel are the fuels used by the vehicle fleet and department vehicles.

Indicator growth factors were developed from this 2018 baseline activity (i.e., fuel use) levels and existing campus population. The growth factor was multiplied by the anticipated campus population growth in the proposed 2021 LRDP to develop the projected fuel demand, which is representative of future operational fuel demand (i.e., unleaded gasoline, CNG and diesel) for the UCR fleet.

Non-UCR Vehicles

With respect to non-UCR fleet, non-transit mobile sources, daily VMT for the 2018 baseline year and for future buildout years under the proposed 2021 LRDP are based on the TIA prepared by Fehr & Peers (Appendix J). Project-generated VMT was estimated using the Origin/Destination method and was categorized by the following vehicle categories: passenger, light-heavy duty, medium-heavy duty, and heavy-heavy duty.[6] Daily VMT were adjusted to annual VMT using a conversion factor of 315 which accounts for UCR's academic schedule, holidays, and enrollment levels during summer and regular academic quarters. EMFAC2017 was used to determine the percent distribution of fuel type (i.e., gasoline, diesel, electric) across the above-mentioned vehicle categories. EMFAC2017 incorporated the latest data on California's vehicle fleet and travel activity at the time of publication, including vehicle age distributions and turn-over assumption, as well as changes in emission standards due to federal and State rulemaking and projected technology penetration in the vehicle market including projected ZEV sales based on State goals and policies. The projected fuel distribution percentage by vehicle category was multiplied by the VMT traveled by the corresponding vehicle class to determine the mileage traveled by fuel type by vehicle class. This was then divided by the average fuel efficiency values for the fuel type and vehicle class to determine the fuel consumed (i.e., gasoline, diesel, electricity) for non-UCR fleet, non-transit vehicle trips attributed to UCR (USDOE 2020a; 2020b). Fuel efficiency values were conservatively based on current average fuel economy by vehicle class (USDOT 2018; USDOE 2021a).

Transit Vehicles

Fuel consumption due to UCR staff and student travel on transit systems were calculated based on the UCR population that rides bus transit lines that stop, originate, or terminate on the UCR campus. UCR provided ridership data for the Riverside Transit Agency (RTA) bus routes that are subsidized through the UPASS bus subsidy program for the 2018 baseline year. UPASS ridership data indicates the number of rides taken under a UPASS and affiliated with UCR. Indicator growth factors were developed from this 2018 baseline activity (i.e., UCR transit VMT) levels and existing campus population. The growth factor was multiplied by the anticipated campus population growth in the proposed 2021 LRDP to estimate the annual total VMT traveled on transit buses attributed to UCR. Transit VMT was divided by the average fuel efficiency (miles per gasoline gallon equivalent [GGE]) for transit buses obtained from the USDOE to estimate the gallons of gasoline equivalent consumed for transit buses (USDOE 2020a; 2021a). Fuel efficiency values were conservatively based on current average fuel economy for transit vehicles (USDOE 2020a; 2021b).

Aviation Travel

Fuel consumption due to UCR faculty business travel via aviation were calculated based on the passenger miles traveled by air by UCR staff in 2018. UCR tracks faculty and staff air travel through an invoice tracking system (Balboa Carbon Emission Air Detail). Recorded passenger air miles by UCR faculty and staff does not include other faculty travel booked separately outside the UCR travel booking system. Indicator growth factors were developed from this 2018 activity (i.e., UCR air-line passenger miles) levels and existing campus population. The growth factor was multiplied by the anticipated faculty/staff population growth in the proposed 2021 LRDP to estimate the annual passenger miles traveled via aviation attributed to UCR. Passenger miles were converted to energy use in British Thermal Units (BTU) based on the Federal Aviation Administration (FAA) energy

[6] Origin-Destination Model includes 50 percent of trips from internal-external and external internal, 100 percent of internal-internal trips, and excludes external-external trips.

intensity factor of 2,654 BTU per passenger mile (FAA 2015). Energy use was converted to gallons of aviation gasoline based on the fuel's standard heat content of 0.120 MMBtu per gallon of aviation gasoline (TCR 2020).

For a detailed description of all aforementioned energy model input and output parameters, and assumptions, see Appendix F.

To determine whether the proposed 2021 LRDP would result in significant impacts related to energy under criterion "a" above, the following methodology would apply.

- Utilize larger amounts of operational per capita energy use compared to:
  - UCR existing baseline (2018) per capita energy use; or
  - Annualized regional (2018) per capita energy use

A comparison is first provided in terms of UCR per capita energy use in 2035 against existing UCR per capita energy use in 2018. If UCR per capita energy use in 2035 shows to be higher than UCR per capita energy use in 2018 for a particular energy type, then UCR per capita energy use in 2035 for that energy type is also compared to annualized regional energy use for that energy type. UCR has decided to utilize the comparative change in per capita energy use. In addition, UCR has jurisdiction over campus land uses and the associated energy efficiency and renewable energy use levels.

To determine whether the proposed 2021 LRDP would result in significant impacts related to energy under significance criterion "b," the following methodology would apply.

- Result in an inconsistency with any of the following applicable regulations for increased energy efficiency and increased renewable energy use:
  - CBC Title 24 (including CALGreen and State Energy Efficiency Standards)
  - SB 100 – State 2045 100 percent clean energy goal
  - UC Policy on Sustainable Practices

The proposed 2021 LRDP is considered consistent with the provisions of the identified plans if it will further the objectives and policies of the plans and not obstruct their attainment. A given plan or project need not be in perfect conformity with every policy nor does State law require precise conformity of a proposed plan or project with every policy. Courts have also acknowledged that plans attempt to balance a range of competing interests, and that it is nearly, if not absolutely, impossible for a plan or project to be in perfect conformity with each and every policy set forth in applicable plans.

2021 LRDP Objectives and Policies

The proposed 2021 LRDP contains objectives and policies relevant to energy:

Mobility (M)

- Objective M1: Reduce future vehicular traffic, parking demand, and GHG emissions, by increasing student housing on campus up to 40 percent of the projected enrollment in 2035.
  - Policy: Continue to grow and support on-campus residency by focusing on more affordable student housing options, as well as the capacity for returning students (upperclassmen) and graduate students.
  - Promote public transit as a convenient and preferred mode of commuting to campus and connecting campus residents to the community and regional destinations.

  - Policy: Develop the University Avenue and Canyon Crest Drive Gateway streetscapes to support increased use and functional efficiency of the RTA system, improved clarity of drop-off and pick-up locations for ride-sharing services, reduced conflict, and improved safety for cyclists, pedestrians, and emerging micro-mobility[7] solutions in these increasingly busy mixed-mode circulation areas.
  - Policy: Improve access to public transit on campus by providing connectivity to access points via pathways or shuttles, as well as comfortable waiting facilities, proximate to commuter related services, where appropriate.
  - Policy: Advocate and support the development of a Metrolink train platform along Watkins Drive adjacent to campus to provide direct access and significantly reduce commute times. Consider dedicated vanpools or shuttles to nearby stations in the interim.
- Objective M2: Invest in infrastructure to increase bicycle use and support other active transportation modes to integrate desired routes with the campus' and City's circulation framework.
  - Policy: Support and facilitate City-led initiatives to extend bikeways to campus from every direction, including routes proposed along Canyon Crest Drive, Martin Luther King Boulevard, and the Gage Canal.
  - Policy: Develop wayfinding systems to interconnect preferred bicycle routes and invest in safe and secure pathways along all bicycle routes.
  - Policy: Provide adequate support amenities to facilitate and encourage the use of bicycles and other alternative transportation modes.
  - Policy: Develop a comprehensive improvement plan for Campus Drive to improve function, safety and utility for each mode of travel, as incremental growth occurs.
- Objective M3: Emphasize safe and pleasing passage for pedestrians and bicycle riders through the careful, continued development and integration of the campus' multi-modal circulation framework and its extensions into the immediate community.
  - Policy: Identify and address gaps within the existing non-motorized circulation network, both on-campus and within the adjacent community.
  - Policy: Implement University policies to improve pedestrian safety and encourage social interaction in zones of high pedestrian activity.

Campus Utility Infrastructure (INF) – Energy (E)

- Objective INF E1: Prioritize redundancy and overall reliability in the campus' power distribution network.
  - Policy: Ensure infrastructure services and demands are regularly monitored and expanded as needed to meet applicable planned campus development.
- Objective INF E2: Emphasize high-performance new construction and building retrofits in support of the UC Policy on Sustainable Practices and minimize the need to purchase carbon offsets.

[7] Micro-mobility is a category of modes of transport that are provided by very light vehicles such as electric scooters, electric skateboards, shared bicycles and electric pedal assisted bicycles. The primary condition for inclusion in the category is a gross vehicle weight of less than 500 kg.

  - Policy: For mechanical systems in existing facilities, a 30 percent reduction in electrical energy use is projected, inclusive of a 30 percent reduction in electrical energy usage in existing facilities' mechanical systems.
  - Policy: Take the fullest possible advantage of RPU's clean energy plans and the City's "greening of the grid" initiatives.
  - Policy: Achieve a 5 percent improvement in energy performance for new building mechanical systems through retro-commissioning.
- Objective INF E3: Support alternative measures (e.g. alternative fuels, energy sources, practices, carbon offsets, etc.) and mixed energy source portfolios in support of green sustainability practices.
  - Policy: Continuously explore the potential to use alternative fuels over time as they become feasibly available.
  - Policy: Evaluate procurement options for alternative energy while considering long-term financial viability for the University.
  - Policy: Incorporate solar panels on the roofs of new construction to the maximum feasible extent.
  - Policy: Incorporate solar panels as integral elements of new construction design and applicable green building certifications to the maximum feasible extent.

Campus Utility Infrastructure (INF) – Natural Gas (NG)

- Objective INF NG1: Reduce reliance on natural gas in conformance with UC policies.
  - Policy: Future projects shall not employ or expand demand for natural gas as an energy source.
  - Policy: Continue to work with RPU and UCOP to reduce current natural gas demand through efficiency improvements to the existing system, conversion of steam boilers to electricity as they are replaced over time, and, rigorous pursuit of obtaining sources for biogas, or renewable energy credit purchases to fully offset GHG emissions in conformance with UC policies.
  - Policy: Take the fullest possible advantage of RPU's clean energy plans, and the City's "greening of the grid" initiatives.

Campus Utility Infrastructure (INF) – Potable Water, Wastewater and Irrigation (WWI)

- Objective INF WWI1: Commit to a multi-prong approach to conserving potable water use.
  - Policy: Reduce potable water use in an existing building in the Academic Center by 20 percent.
  - Policy: Reduce potable water use in student residential buildings by 30 percent.
  - Policy: Reduce potable water use in new facilities by exceeding applicable codes by a minimum of 20 percent.
  - Policy: Retrofit existing urinals, toilets, showerheads, and faucets for existing buildings with higher water efficiency rated equipment.
- Objective INF WWI2: Explore options to shift away from potable water use where feasible.
  - Policy: Design new building irrigation and efficient toilet flushing systems for use with future non-potable water sources.

- Policy: Achieve a further 20 percent reduction of potable water use for irrigation by extending Gage Canal water to also irrigate the UCR Botanic Gardens and reducing turf on campus and replacing with lower use landscaping.

Campus Sustainability (CS)

- Objective CS1: Continue to build on this commitment to environmental stewardship to account for the impacts of development and expansion of campus infrastructure. Major planning and policy issues of the University will be subject to include the following:
  - Policy: Carbon Neutrality Initiative: Carbon Neutral by 2025 – Climate neutrality from Scope 1 & Scope 2 sources by 2025.
  - Policy: Climate neutrality from specific Scope 3 sources by 2050 or sooner - At a minimum, meet the UC intermediate goal in pursuit of climate neutrality (See Assembly Bill [AB 32], and California Global Warming Solutions Act of 2006: emission limit [SB 32].
  - Policy: Energy Efficiency: UC Annual 2 percent Energy Use Intensity (EUI) Reduction Policy (Energy Efficiency) – Each location will implement energy efficiency actions in buildings and infrastructure systems to reduce the location's energy use intensity by an average of at least 2 percent annually.
  - Policy: On-Campus Renewable Electricity – Campuses and health locations will install additional on-site renewable electricity supplies and energy storage systems whenever cost-effective and/or supportive of the location's Climate Action Plan or other goals.
  - Policy: Off-Campus Clean Electricity: 100% Renewable Electricity by 2025 – By 2025, each campus and health location will obtain 100% clean electricity.
  - Policy: On-Campus Combustion – By 2025, at least 40 percent of the natural gas combusted on-site at each campus and health location will be biogas.

Impact Analysis

Impact E-1 RESULT IN WASTEFUL, INEFFICIENT, AND UNNECESSARY USE OF ENERGY.

THE PROPOSED 2021 LRDP WOULD CONSUME ELECTRICITY, NATURAL GAS, AND FUEL DURING CONSTRUCTION AND OPERATION THAT WOULD EXCEED THE UCR 2018 PER CAPITA ENERGY USE AND ANNUALIZED REGIONAL 2018 PER CAPITA ENERGY USE THRESHOLD. IMPACTS WOULD BE LESS THAN SIGNIFICANT WITH THE IMPLEMENTATION OF MITIGATION.

Construction Energy Demand

During construction of projects under the proposed 2021 LRDP, energy would be primarily consumed in the form of petroleum-based fuels used to operate heavy equipment, light-duty vehicles, machinery, power off-road construction vehicles and equipment on the campus, construction worker travel to and from the campus, and vehicles used to deliver construction materials to the campus. Other types of energy consumption expended during construction (i.e., temporary lighting during winter hours) would be negligible. Therefore, only gasoline and diesel fuels are included in the construction energy analysis.

Construction equipment use and associated energy consumption would be typical of that associated with construction of new residential and educational land uses on campus. In other words, there are no unusual project characteristics that would necessitate the use of construction equipment that

would be less energy efficient than those used at comparable construction sites in other parts of the region. Idling of on-site equipment during construction would be limited to no more than five minutes in accordance with California Code of Regulations Title 13, Section 2485, Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling. CALGreen includes specific requirements related to recycling, construction materials, and energy efficiency standards that would apply to future development envisioned by the proposed 2021 LRDP. As discussed in greater detail in Section 4.17, *Utilities and Service Systems,* UCR has a successful solid waste diversion program for construction materials which will continue to be implemented.

Construction equipment would also be required to comply with federal and State fuel efficiency standards for on-road and off-road construction equipment. As discussed in the Regulatory Setting discussion, stringent emission standards were adopted for off-road construction equipment (i.e. "Tier 4" standards) (40 Code of Federal Regulations Parts 1039, 1065, and 1068; Cal. Code Regs., tit. 13, § 2025; AR 2854). ARB also adopted emission standards for on-road heavy duty diesel vehicles (i.e. haul trucks). (Cal. Code Regs., tit. 13, § 1956.8.) These haul truck regulations mandate fleet turn-over to ensure that by January 1, 2023 nearly all on-road diesel trucks will have 2010 model year engines or equivalent [i.e., Tier 4]. In addition, interim steps are incorporated into the regulations (e.g., vehicles older than 1999 will be replaced with newer engines by 2020). ARB regularly evaluates and updates these regulations to implement the best available control measures and implementing every feasible control measure.

Further, on-site construction equipment may include alternatively-fueled vehicles (such as natural gas) where feasible. Finally, the selected construction contractors would use the best available engineering techniques, construction and design practices, and equipment operating procedures, thereby ensuring that the wasteful consumption of fuels and use of energy would not occur. Energy efficiency is also expected for the off-site production of construction materials, based on the economic incentive for efficiency and cost savings. Furthermore, such construction energy expenditures are necessary to implement the UC's constitutional obligations and are necessary to meet the project objectives.

As such, the proposed 2021 LRDP would not **r**esult in a wasteful, inefficient, or unnecessary use of energy during construction. Therefore, the proposed 2021 LRDP impacts related to construction energy consumption would **be less than significant**.

Operational Energy Demand

Operation of the proposed 2021 LRDP would include consumption of fuel (gasoline, diesel, and CNG) related to on-road vehicle travel and UCR business air travel. In addition, operation of campus buildings and other facilities anticipated under the proposed 2021 LRDP would require electricity and natural gas usage for lighting, space and water heating, appliances, lab equipment, water conveyance, and landscaping maintenance equipment. Furthermore, emergency operation of backup energy generators (when applicable) would require diesel fuel consumption.

Operational Mobile Energy Consumption

The proposed 2021 LRDP operation would entail mobile energy consumption (electricity, natural gas, and fuel [gasoline, diesel, and CNG]) related to VMT associated with UCR operation.

Taking the State operational energy standards and requirements into account, Table 4.6-9 shows mobile energy types and amounts that would be consumed during the proposed 2021 LRDP operational activities.

Table 4.6-9 Proposed 2021 LRDP Operational Mobile Energy Consumption

Mobile Fuel Source (Units)[1]	Baseline Annualized Fuel Use (2018)	Baseline Per Capita Fuel Use (2018)[2]	Total 2021 LRDP Fuel Use (2022-2035) [3]	2021 LRDP Annualized Fuel Use	2021 LRDP per Capita Annualized Fuel Use (2035)[4]	Regional Baseline per Capita Fuel Use (2018)[5]
UCR Vehicles (fleet/department)						
Unleaded Gasoline (gallons)	135,192	4.72	2,458,971	175,641	4.13	See total below
Diesel (gallons)	7,306	0.25	132,887	9,492	0.22	See total below
CNG (gallon equivalents)[6]	4,321	0.15	78,594	5,614	0.13	N/A
On-Campus Non-UCR Vehicles (campus commuters, commercial vendors, etc.)						
Unleaded Gasoline (gallons)	2,100,859	73	40,448,937	2,889,210	68	See total below
Diesel (gallons)	247,811	9	2,356,454	168,318	4	See total below
Mobile Electricity (kwh)	75,551	3	10,276,772	734,055	17	N/A
Public Transit Vehicles (attributed to UCR)						
CNG (gallon equivalents)[6]	125,126	4	2,275,891	162,564	4	N/A
Air travel (attributed to UCR)						
Aviation Gasoline (gallons)	182,979	6	3,498,459	249,890	6	N/A
Total Use by Fuel Type (gallons)[5]						
Unleaded Gasoline	**2,236,051**	**78**	**42,907,908**	**3,064,851**	**72**	**437**
Diesel	**255,117**	**8.9**	**2,489,341**	**177,810**	**4.2**	**55**

[1] Mobile fuel use attributed to UCR is based on type of activity (i.e., UCR fleet, transit, air travel and non-UCR fleet), vehicle type, fuel use and activity data provided by UCR and described in above sections.

[2] Based on 2018 campus population of 28,661.

[3] Total fuel consumption of LRDP is based on buildout starting in 2022 and ending in 2035 (i.e., 14 years). Vehicle fuel usage is based on EMFAC2017 data which accounts for federal and State emission standards, forecasts ZEV penetration based on State goals, and incorporates State regulations as time of publication including SB 1 and therefore intrinsically accounts for changes in fuel distribution, vehicle turn-over, and vehicle activity. EMFAC2017 does not account for the SAFE rule.

[4] Based on 2021 LRDP academic year 2035 campus population of 42,545.

[5] Regional totals don't include mobile electricity, transit, or air travel, as there is not a regional equivalent.

[6] CNG fuel consumption by fleet vehicles received by UCR is expressed as gallon equivalents. CNG = 1 gasoline equivalent gallons and there are 1027 BTUs/standard cubic foot (SCF).

Totals may not add up due to rounding.

CNG = compressed natural gas; kWh = kilowatt hour

Sources: CARB 2018; Data and calculations compiled by Rincon Consultants (see Appendix F)

As shown in Table 4.6-9, with annualization over 14 years of the proposed 2021 LRDP development, operational per capita gasoline fuel use in 2035 would be approximately 72 gallons, and operational per capita mobile diesel fuel use in 2035 would be approximately 4.2 gallons.

Comparatively, operational per capita gasoline fuel use for 2018 baseline was approximately 78 gallons, and operational per capita mobile diesel fuel use for 2018 baseline was approximately 8.9 gallons. And while per capita 2035 electricity consumption by commuter vehicles is estimated to be greater than UCR per capita 2018 electricity consumption by commuter vehicles, such electricity consumption by commuter vehicles would be in lieu of comparable gasoline fuel use. Thus, UCR per

capita 2035 operational mobile energy use would be less than UCR per capita 2018 (i.e., baseline) operational mobile energy use for gasoline and diesel.

For informational purposes, UCR per capita 2035 operational mobile energy use would also be less than annualized regional (2018) per capita operational mobile energy use for gasoline and diesel. While mobile operation would also entail consumption of some CNG fuel by UCR fleet/department vehicles and some electricity by commuter vehicles, there are no respective mobile CNG and mobile electricity annualized regional (2018) numbers for comparison purposes. In addition, UCR would incorporate the VMT reduction and mobile energy efficiency strategies discussed immediately below as part of the UC Policy on Sustainable Practices and its TDM Program. However, UCR-specific operational energy policies were not incorporated into the operational mobile energy modeling to provide a conservative estimate related to operational mobile energy consumption.

UC Policy D.2 focuses upon reducing VMT by reducing personal vehicles use. More specifically that policy provides that by 2025, each location shall strive to reduce its percentage of employees and students commuting by SOV by 10 percent relative to its 2015 SOV commute rates; By 2050, each location shall strive to have no more than 40 percent of its employees and no more than 30 percent of all employees and students commuting to the location by SOV. However, as noted in the Regulatory Setting, it is legally infeasible to mandate ridesharing, however the UCR TDM program has been successful in reducing SOV trips. Over the last 15 years this program has increased average ridership per vehicle from approximately 1.36 to 1.57 occupants per vehicle. Furthermore, to further reduce VMT, UCR has proposed to substantially increase the amount of on-campus housing to avoid commuter trips. More specifically, the 2021 LRDP proposed to house approximately 40 percent of the eligible student population on campus (approximately 68 percent of the increase in students). Additional discussion of increased on-campus housing alternatives is provided in Section 7.5.3, *Alternative 3: Increased Student Housing.*

As discussed in Section 4.6.2, *Regulatory Setting*, federal and State law control fuel efficiency standards for cars and light-duty trucks. While the Trump Administration sought to relax those standards through recission of California's Clean Air Act waiver, California will likely retain the ability to enforce its more stringent fuel economy standards through the lawsuit the State filed, or through the Biden Administrations formal proposal to reissue California's waiver. It is, however, legally infeasible for individual agencies to adopt more stringent fuel efficiency standards for members of the public. The CAA (42 USC Section 7543[a]) states that “no State or any political subdivision therefore shall adopt or attempt to enforce any standard relating to the control of emissions from new motor vehicles or new motor vehicle engines subject to this part.” However, UCR is subject to several Executive Orders and UC Policies designed to increase the number of electric vehicles owned by UCR, thereby reducing fossil fuel demand. More specifically, EO N-79-20 targets 100 percent of new off-road vehicle sales in the State to be zero emission by 2035. Similarly, UCOP Policy D.1 provides “By 2025, zero-emission vehicles or hybrid vehicles shall account for at least 50 percent of all new light-duty vehicle acquisitions.”

As such, the proposed 2021 LRDP would not result in a wasteful, inefficient, or unnecessary consumption of energy during operation compared to UCR 2018 (i.e., baseline) per capita energy use and annualized regional 2018 per capita energy use regarding gasoline and diesel. Therefore, the proposed 2021 LRDP impacts related to operational mobile energy consumption would be **less than significant**.

Operational Stationary Energy Consumption

The proposed 2021 LRDP operation would entail stationary energy consumption (electricity, natural gas, and fuel [gasoline, diesel, and CNG]) related to increased University capacity and overall building square footage. All newly constructed buildings under the proposed 2021 LRDP would comply with all building design standards set in the CBC Title 24, which are statutorily adopted to avoid the wasteful, inefficient, or unnecessary consumption of energy resources during operation**.** CALGreen (California Code of Regulations, Title 24, Part 11) requires implementation of energy efficient light fixtures and building materials into the design of new construction projects. Furthermore, the 2019 Building Energy Efficiency Standards (CBC Title 24, Part 6) requires newly constructed buildings to meet energy performance standards set by the CEC. As the name implies, these standards are specifically crafted for new buildings to result in energy efficient performance so that the buildings do not result in wasteful, inefficient, or unnecessary consumption of energy. The standards are updated approximately every three years and each iteration is more energy efficient than the previous standards. Future campus projects would be required to comply with the most current CBC Title 24 requirements.

UCR would incorporate other green building strategies as part of the UC Policy on Sustainable Practices into new development including energy consumption reduction targets and water use reduction. However, UCR-specific operational energy policies were not incorporated into the operational stationary energy modeling to provide a conservative estimate related to operational stationary energy consumption.

Table 4.6-10 shows stationary energy types and amounts that would be consumed during the proposed 2021 LRDP operational activities.

Table 4.6-10 Proposed 2021 LRDP Operational Stationary Energy Consumption

Energy Source (Units)	Baseline Energy Use (2018)	Baseline Per Capita Energy Use (2018)[1]	Total 2021 LRDP Energy Use (2022-2035)[2]	2021 LRDP Annualized Energy Use	2021 LRDP per Capita Annualized Energy Use (2035)[3]	Regional Baseline per Capita Energy Use (2018)
Stationary and Mobile Electricity Use[4] (kWh)	119,036,226	4,153	3,734,880,755	266,777,197	6,270	6,900[5]
Natural Gas (therms)	3,466,942	121	105,251,203	7,517,943	177	166[6]
Diesel (gallons)	8,003	0.28	226,586	16,185	0.38	N/A[7]

[1] Based on 2018 campus population of 28,661.

[2] Total 2021 LRDP energy use is based on buildout starting in 2022 and ending in 2035 (i.e., 14 years)

[3] Based on 2021 LRDP academic year 2035 campus population of 42,545.

[4] Mobile electricity usage is based on the VMT assumed to be traveled by EVs given the EMFAC2017 forecasted fuel distribution associated with EV penetration included in the model based on State ZEV goals. VMT was converted to electricity usage using the conversion factor of 25 kWh per 100 miles (USDOE 2020b).

[5] RPU service area per capita energy use is used for comparison in terms of electricity use.

[6] Riverside County (SoCalGas) per capita energy use is used for comparison in terms of natural gas use.

[7] There is no regional per capita stationary diesel gas use equivalent.

kWh = kilowatt hour

Source: Data and calculations compiled by Rincon Consultants (see Appendix F).

As shown in Table 4.6-10, with annualization over 14 years of the proposed 2021 LRDP development, operational per capita stationary and mobile electricity use in 2035 would be approximately 6,270 kWh, operational per capita stationary natural gas use for the LRDP in 2035 would be approximately 177 therms, and operational per capita stationary diesel use for LRDP in 2035 would be approximately 0.38 gallon. Comparatively, operational per capita stationary and mobile electricity use for 2018 (i.e., baseline) was approximately 4,153 kWh, operational per capita stationary natural gas use for 2018 baseline was approximately 121 therms, and operational per capita stationary diesel use for 2018 baseline was approximately 0.28 gallon. Thus, UCR per capita 2035 operational stationary energy use would be greater than UCR per capita 2018 (i.e., baseline) operational stationary energy use for all energy types (electricity, natural gas, and diesel).

And while UCR per capita 2035 stationary electricity use would be less than annualized regional (2018) per capita stationary electricity use, UCR per capita 2035 mobile natural gas use would still be greater than annualized regional (2018 baseline) per capita stationary natural gas use. Furthermore, while emergency operation of backup diesel generators (when applicable) is estimated to be greater than UCR per capita 2018 backup diesel generator use, emergency generator use is unpredictable, uncommon in occurrence, and has no comparative annualized regional per capita amount. Nevertheless, the proposed 2021 LRDP would result in a potentially significant environmental impact due to consumption of energy during operation (stationary) compared to UCR 2018 (i.e., baseline) per capita operational (stationary) energy use with regard to all energy types and compared to annualized regional 2018 per capita operational (stationary) energy use with regard to natural gas. Therefore, impacts would be **significant** related to operational stationary energy consumption.

Overall, the 2021 LRDP would result in potentially significant impact related to operational energy consumption. Implementation of Mitigation Measure **MM GHG-1** (Measures EN3 and EN5) would be required to reduce the proposed 2021 LRDP operational stationary consumption related to electricity and natural gas to **less than significant levels**.

Mitigation Measures

Implementation of Mitigation Measure **MM GHG-1** (Measures EN3 and EN5) is required for operational (stationary) energy impacts. Refer to Mitigation Measure **MM GHG-1** in Section 4.8, *Greenhouse Gas Emissions.* No mitigation is required for operational (mobile) energy impacts. No mitigation is required for construction (stationary and mobile) energy use impacts.

MM GHG-1 Implement On-Campus GHG Emissions Reduction Measures

UCR shall implement the following GHG emissions reduction measures by scope emissions category:

SCOPE 2 (ELECTRICITY CONSUMPTION AND GENERATION)

Energy (EN)

- Measure EN3: UCR shall work to obtain 100 percent clean-sourced electricity through either Riverside Public Utilities (RPU) and/or through the installation of on-site clean-sourced electricity sources for all new buildings by 2025. In addition, UCR shall establish annual budgets that include funding to purchase 100 percent clean energy. Furthermore, all newly constructed building projects, other than wet lab research laboratories, shall be designed, constructed, and commissioned to outperform the California Building Code (Title 24 portion of the California Code of Regulations) energy efficiency standards by at least 20 percent. Finally, UCR shall

incorporate solar PV as feasibly possible for newly constructed and majorly-renovated buildings with the maximum system size, highest solar panel efficiency, and greatest system performance.[8]

- Measure EN5 (Parts A, B, C): In order to prioritize energy efficiency and green building initiatives for building/facility upgrades and new construction as well as reduced energy use, UCR shall identify aging equipment throughout the campus such as equipment associated with the UCR Central Plant, electrical distribution system, and building HVAC systems and develop a strategy and schedule to upgrade such equipment with high-energy efficiency systems and optimize HVAC systems through heat zoning, high-efficiency filters, and shut-down times expansion. The strategy shall include an evaluation and cost analysis related to upgrading/retrofitting equipment versus retirement of equipment if no longer needed with future initiatives (i.e., Central Plant boiler retirement). The schedule and upgrade strategy must meet a 2 percent energy efficiency improvement annually through 2035. In addition, UCR shall require new buildings to incorporate occupancy sensors and controls such that lighting of shared spaces is on occupancy sensors, building temperature set points are widened and aligned with occupancy schedules, and ventilation systems are converted from constant volume to variable so ventilation rates are occupancy-based. Furthermore, UCR shall develop a plan to identify existing buildings and projects that could undergo upgrades to the control systems and establish a schedule for upgrade incorporation. Finally, UCR shall develop a tracking program to monitor and share campus energy efficiency activities and progress towards increased energy efficiency.

Significance After Mitigation

While implementation of the proposed 2021 LRDP will increase energy use at UCR above UCR 2018 (i.e., baseline) conditions, as detailed in Table 4.6-11, incorporation of energy saving measures would reduce energy consumption under the proposed 2021 LRDP to below regional 2018 (i.e., baseline) conditions. This demonstrates the University's efficient and non-wasteful or unnecessary use of energy in relation to the surrounding community.

Table 4.6-11 Proposed 2021 LRDP Mitigated Operational Stationary Energy Consumption

	Operational Stationary Energy Use (Units)		
	Electricity Use (kWh)[1]	**Natural Gas (therms)**	**Diesel (gallons)**
Before Mitigation			
2021 LRDP Annualized Energy Use Before Mitigation	266,777,197	7,517,943	16,185
2021 LRDP per Capita Annualized Use Before Mitigation (2035)[2]	**6,270**	**177**	**0.38**
UCR Baseline Per Capita Consumption[2]	4,153	121	0.28
Regional Baseline Per Capita Consumption	6,900	166	N/A
Exceeds UCR Baseline per Capita?	***Yes***	***Yes***	***Yes***
Exceeds Regional Baseline per Capita?	***No***	***Yes***	**–**

[8] The EIR GHG modeling effort assumes clean energy is in line with California-defined renewable sources.

	Operational Stationary Energy Use (Units)		
	Electricity Use (kWh)[1]	**Natural Gas (therms)**	**Diesel (gallons)**
With Implementation of Mitigation Measures MM GHG-1, Measures EN3 and EN5			
Annual Mitigation Reduction[4]	52,748,273	1,134,115	0
2021 LRDP Annualized Energy Use with Mitigation[5]	214,028,924	6,383,828	16,185
2021 LRDP per Capita Annualized Use with Mitigation (2035)[3]	**5,031**	**150**	**0.38**
UCR Baseline Per Capita Consumption[2]	4,153	121	0.28
Regional Baseline Per Capita Consumption	6,900	166	N/A
Exceeds UCR Baseline per Capita?	***Yes***	***Yes***	Yes
Exceeds Regional Baseline per Capita?	***No***	***No***	**–**

[1] Includes stationary and mobile energy consumption.

[2] Based on 2018 campus population of 28,661.

[3] Based on 2021 LRDP academic year 2035 campus population of 42,545.

[4] Includes GHG Mitigation Measure MM GHG-1 (Measures EN3 and EN5) that reduce energy use that includes increase energy efficiency by 2 percent each year for existing buildings, replacing aging equipment, exceeding Title 24 by 20 percent for new buildings, and incorporating room-sensors for new buildings.

[5] Based on buildout ending in 2035

kWh = kilowatt hour

Source: Data and calculations compiled by Rincon Consultants (see Appendix F).

Mitigation Measure **MM GHG-1** (Measures EN3 and EN5) requires increased energy efficiency by 2 percent each year for existing buildings, replacement of aging equipment, exceedance of CBC Title 24 standards by 20 percent for new buildings, and incorporation of room-sensors for new buildings. Measures EN3 and EN5 under Mitigation Measure **MM GHG-1** would reduce the proposed 2021 LRDP annual electricity and natural gas consumption resulting in 2021 LRDP per capita 2035 energy use of approximately 5,031 kWh in terms of electricity, which is greater than UCR baseline per capita energy usage but less than regional baseline per capita energy usage, and approximately 150 therms in terms of natural gas, which is also greater than UCR baseline per capita energy usage but less than regional baseline per capita energy use.

Mitigation Measure **MM GHG-1** (Measures EN3 and EN5) does not affect the proposed 2021 LRDP estimated annual diesel consumption related to emergency generator use, which is unpredictable and uncommon in occurrence. The increase in diesel fuel usage is directly related to the increased need for emergency generators due to the proposed campus growth. Backup generators would be used only in the case of an emergency which would not be considered inefficient, wasteful, or unnecessary.

As such, with implementation of Mitigation Measure **MM GHG-1** (Measures EN3 and EN5), the proposed 2021 LRDP would not involve the inefficient, wasteful, and unnecessary use of energy during operation compared to regional baseline per capita energy usage with the help of various on-site energy reduction and increased energy efficiency measures for both new and renovated buildings under the proposed 2021 LRDP as well as existing buildings that exist and would remain in operation throughout campus through 2035. Therefore, impacts would be **less than significant** with mitigation incorporated.

IMPACT E-2 CONFLICT, OR CREATE AN INCONSISTENCY, WITH ANY APPLICABLE PLAN, POLICY, OR REGULATION ADOPTED FOR THE PURPOSE OF AVOIDING OR MITIGATING ENVIRONMENTAL EFFECTS RELATED TO ENERGY.

THE CONSTRUCTION AND OPERATION OF NEW AND RENOVATED BUILDINGS UNDER THE PROPOSED 2021 LRDP ARE REQUIRED TO COMPLY WITH APPLICABLE STATE AND UC ENERGY POLICIES AND REGULATIONS. ACCORDINGLY, THE 2021 LRDP WOULD COMPLY WITH THE CBC TITLE 24, SB 100, AND THE UC POLICY ON SUSTAINABLE PRACTICES AND WOULD NOT CONFLICT WITH OR OBSTRUCT APPLICABLE PLANS RELATED TO RENEWABLE ENERGY AND ENERGY EFFICIENCY. IMPACTS WOULD BE LESS THAN SIGNIFICANT. NO MITIGATION IS REQUIRED.

The proposed 2021 LRDP was evaluated for consistency with applicable State and UC plans that were developed with the intent of increasing use of renewable energy as well as energy efficiency. Applicable State and UC plans are discussed separately below.

Consistency with State Plans (CBC Title 24 [CalGreen Code and State Energy Efficiency Standards] and SB 100)

Energy Efficiency

All newly constructed buildings under the proposed 2021 LRDP would comply with all building design standards set in CBC Title 24. CALGreen Code (CBC Title 24, Part 11) requires implementation of energy efficient light fixtures and building materials into the design of new construction project, and the State Building Energy Efficiency Standards (CBC Title 24, Part 6) require newly constructed buildings to meet energy performance standards set by the CEC. As the name implies, these standards are specifically crafted for new buildings to result in energy efficient performance, so that the buildings do not result in inefficient consumption of energy. The standards are updated every three years and each iteration is more energy efficient than the previous standards. For example, according to the CEC, nonresidential buildings built with the 2019 standards will use about 30 percent less energy due mainly to lighting upgrades (CEC 2019b). LEED certified buildings enable projects to achieve zero net energy consumption by requiring integrative designs that help reduce overall energy consumption and efficiently monitor energy consumption levels (Blackwelder 2018). As such, the 2021 LRDP buildings would be subject to the latest energy efficiency standards pursuant to CALGreen Code (CBC Title 24, Part 11) and State Building Energy Efficiency Standards (CBC Title 24, Part 6).

Renewable Energy

SB 100 mandates 100 percent clean electricity for California by 2045. The proposed 2021 LRDP would further reduce its use of nonrenewable energy resources as the electricity generated by renewable resources provided by RPU continues to increase to comply with State requirements through SB 100, which requires electricity providers to increase procurement from eligible renewable energy resources to 60 percent by 2030 and 100 percent by 2045. Because the proposed 2021 LRDP would be powered by the existing State electricity grid, it would be powered by renewable energy as mandated by SB 100.

Therefore, the proposed 2021 LRDP impacts related to consistency with applicable State plans for increased energy efficiency and renewable energy use would be **less than significant**.

Consistency with UC Policy on Sustainable Practices

Energy Efficiency

As part of the UC system, UCR is required to abide by the UC Policy on Sustainable Practices regarding energy efficiency and renewable energy. While UCR is not currently a participating location under the Wholesale Power Program, UCR must abide by UC Policy on Sustainable Practices A.1 in terms of design, construction, and commission of all new buildings to outperform the CBC Title 24, Part 6 energy-efficiency standards by at least 20 percent and meet a minimum of LEED Silver certification principles. In addition, UCR must abide by UC Policy on Sustainable Practices B.1 in terms of implementation of energy efficiency actions in buildings and infrastructure systems to reduce campus energy use intensity by an average of least 2 percent annually. As such, the 2021 LRDP buildings would be subject to the latest energy efficiency standards pursuant to UC Policy on Sustainable Practices requirements.

Renewable Energy

UCR must abide by UC Policy on Sustainable Practices B.2 and B.4 in terms of installation of additional on-site renewable electricity supplies/energy storage systems and replacement of at least 40 percent of natural gas combusted on campus by biogas. Because the proposed 2021 LRDP would increase on-campus renewable electricity supplies and replace a large portion of its natural gas use with biogas, UCR would increase its renewable energy sources.

Therefore, the proposed 2021 LRDP impacts related to consistency with applicable UC plans for increased energy efficiency and renewable energy use would be **less than significant**.

Mitigation Measures

No mitigation measures are required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

4.6.4 Cumulative Impacts

The geographic scope of the cumulative energy analysis is the RPU service area and Riverside County. Cumulative projects considered as part of this cumulative analysis include those assumed under buildout of the proposed 2021 LRDP plus the cumulative projects listed in Table 4-1.

All cumulative projects would be required to comply with CBC Title 24 minimum 2019 Building Energy Efficiency standards (CBC Title 24, Part 6) and CALGreen Code requirements (CBC Title 24, Part 11). The cumulative buildings would be designed in accordance with these minimum State energy efficiency standards for residential and nonresidential buildings. These standards include minimum energy efficiency requirements related to building envelope, mechanical systems (e.g., heating, ventilation, and air conditioning [HVAC] and water heating systems), and indoor and outdoor lighting. The incorporation of CBC Title 24 standards into the design of the cumulative projects, including the proposed 2021 LRDP, would not result in reduced wasteful, inefficient, or unnecessary use of energy.

As determined, the proposed 2021 LRDP would exceed the applicable UCR 2018 per capita energy use and annualized regional per capita energy use threshold and therefore, would result in a

cumulatively significant impact; however, implementation of Mitigation Measure **MM GHG-1** (Measures EN3 and EN-5) would reduce impacts related to the proposed 2021 LRDP's consumption of energy to a less-than-significant level (represented by a comparatively lower per capita energy use). As such, the proposed 2021 LRDP would not contribute to a significant environmental impact related to the wasteful, inefficient, or unnecessary consumption of energy resources. Therefore, the proposed 2021 LRDP, in conjunction with other existing, planned, and foreseeable future projects, would be **cumulatively less than significant with mitigation incorporated** related to energy use and be consistent with applicable increased energy efficiency and increased renewable energy use plans.

4.6.5 References

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