3.6 ENERGY

This section was prepared pursuant to CEQA Guidelines Section 15126 and Appendix F of the CEQA Guidelines, which require that EIRs include a discussion of the potential energy impacts of projects, with emphasis on considering if the proposed 2018 LRDP would result in inefficient, wasteful, and unnecessary consumption of energy. This section discusses the energy impacts of implementing transportation projects in the 2018 LRDP, as well as the energy-related consequences of land use decisions that are consistent with the proposed 2018 LRDP.

Energy related to land use is primarily associated with direct energy consumption for space heating and on-site electricity/heating/cooling facilities at residential and commercial uses, industrial plant energy consumption, and indirect energy consumed in generation of electricity at power plants. Transportation energy use is related to the efficiency of cars, trucks, and public transportation; choice of travel modes (e.g., automobile, carpool, vanpool, and transit); and miles traveled by these modes. Energy is also consumed with construction and routine operation and maintenance of land uses.

Comments received in response to the NOP included concerns regarding energy demand in student housing and vehicle commuting. These items are addressed in this section.

For an analysis of greenhouse gas (GHG) production and the 2018 LRDP's impacts on climate change, please see Section 3.8, "Greenhouse Gas Emissions and Climate Change."

3.6.1 Regulatory Setting

FEDERAL

Regulations for Greenhouse Gas Emissions from Passenger Cars and Trucks and Corporate Average Fuel Economy Standards

In October 2012, the U.S. Environmental Protection Agency (EPA) and the National Highway Traffic Safety Administration (NHSTA), on behalf of the Department of Transportation, issued final rules to further reduce GHG emissions and improve corporate average fuel economy (CAFE) standards for light-duty vehicles for model years 2017 and beyond (77 FR 62624). NHTSA's CAFE standards have been enacted under the Energy Policy and Conservation Act since 1978. This national program requires automobile manufacturers to build a single light-duty national fleet that meets all requirements under both federal programs and the standards of California and other states. This program would increase fuel economy to the equivalent of 54.5 miles per gallon (mpg) limiting vehicle emissions to 163 grams of carbon dioxide (CO_2) per mile for the fleet of cars and light-duty trucks by model year 2025 (77 FR 62630).

In January 2017, EPA Administrator Gina McCarthy signed a Final Determination to maintain the current GHG emissions standards for model year 2022-2025 vehicles. However, on March 15, 2017, EPA Administrator Scott Pruitt, and Department of Transportation Secretary Elaine Chao announced that EPA intends to reconsider the Final Determination. On April 2, 2018, EPA Administrator Scott Pruitt officially withdrew the January 2017 Final Determination, citing information that suggests that these current standards may be too stringent due to changes in key assumptions since the January 2017 Determination. According to the EPA, these key assumptions include gasoline prices and overly optimistic consumer acceptance of advanced technology vehicles. The April 2nd notice is not EPA's final agency action. The EPA intends to initiate rulemaking to adopt new standards. Until that rulemaking has been completed, the current standards remain in effect. (EPA 2017, EPA 2018).

Energy Policy and Conservation Act

The Energy Policy and Conservation Act of 1975 sought to ensure that all vehicles sold in the U.S. would meet certain fuel economy goals. Through this Act, Congress established the first fuel economy standards for on-road motor vehicles in the U.S. Pursuant to the Act, the National Highway Traffic and Safety Administration, which is part of the U.S. Department of Transportation (USDOT), is responsible for establishing additional vehicle standards and for revising existing standards. Since 1990, the fuel economy standard for new passenger cars has been 27.5 miles per gallon (mpg). Since 1996, the fuel economy standard for new light trucks (gross vehicle weight of 8,500 pounds or less) has been 20.7 mpg. Heavy-duty vehicles (i.e., vehicles and trucks over 8,500 pounds gross vehicle weight) are not currently subject to fuel economy standards. Compliance with federal fuel economy standards is determined based on each manufacturer's average fuel economy for the portion of its vehicles produced for sale in the U.S. The CAFE program, administered by EPA, was created to determine vehicle manufacturers' compliance with the fuel economy standards. EPA calculates a CAFE value for each manufacturer based on city and highway fuel economy test results and vehicle sales. Based on the information generated under the CAFE program, the USDOT is authorized to assess penalties for noncompliance.

Energy Policy Act of 1992

The Energy Policy Act of 1992 (EPAct) was passed to reduce the country's dependence on foreign petroleum and improve air quality. EPAct includes several parts intended to build an inventory of alternative fuel vehicles (AFVs) in large, centrally fueled fleets in metropolitan areas. EPAct 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 included in EPAct. Federal tax deductions will be 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.

Energy Policy Act of 2005

The Energy Policy Act of 2005 was signed into law on August 8, 2005. Generally, the act provides for 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 a clean renewable energy and rural community electrification; and establishes a federal purchase requirement for renewable energy.

STATE

Warren-Alquist Act

The 1975 Warren-Alquist Act established the California Energy Resources Conservation and Development Commission, now known as the California Energy Commission (CEC). The Act established state policy to reduce wasteful, uneconomical, and unnecessary uses of energy by employing a range of measures. The California Public Utilities Commission (CPUC) regulates privately-owned utilities in the energy, rail, telecommunications, and water fields.

Assembly Bill 2076: Reducing Dependence on Petroleum

Pursuant to Assembly Bill (AB) 2076 (Chapter 936, Statutes of 2000), CEC and the California Air Resources Board (CARB) prepared and adopted a joint agency report in 2003, *Reducing California's Petroleum Dependence.* Included in this report are recommendations to increase the use of alternative fuels to 20 percent of on-road transportation fuel use by 2020 and 30 percent by 2030, significantly increase the efficiency of motor vehicles, and reduce per capita vehicle miles traveled (VMT) (CEC and CARB 2003). Further, in response to the CEC's 2003 and 2005 *Integrated Energy*

Policy Reports, Governor Davis directed CEC to take the lead in developing a long-term plan to increase alternative fuel use. A performance-based goal of AB 2076 was to reduce petroleum demand to 15 percent below 2003 demand by 2020.

Integrated Energy Policy Report

Senate Bill (SB) 1389 (Chapter 568, Statutes of 2002) required CEC to: "[C]onduct assessments and forecasts of all aspects of energy industry supply, production, transportation, delivery and distribution, demand, and prices. The Energy Commission shall use these assessments and forecasts to develop energy policies that conserve resources, protect the environment, ensure energy reliability, enhance the state's economy, and protect public health and safety" (Public Resources Code [PRC] Section 25301(a)). This work culminated in the Integrated Energy Policy Report (IEPR).

CEC adopts an IEPR every two years and an update every other year. The 2015 IEPR is the most recent IEPR, which was adopted February 24, 2016. The 2015 IEPR provides a summary of priority energy issues currently facing the State, outlining strategies and recommendations to further the State's goal of ensuring reliable, affordable, and environmentally-responsible energy sources. Energy topics covered in the report include progress toward statewide renewable energy targets and issues facing future renewable development; efforts to increase energy efficiency in existing and new buildings; progress by utilities in achieving energy efficiency targets and potential; improving coordination among the State's energy agencies; streamlining power plant licensing processes; results of preliminary forecasts of electricity, natural gas, and transportation fuel supply and demand; future energy infrastructure needs; the need for research and development efforts to statewide energy policies; and issues facing California's nuclear power plants.

Senate Bill 1078: California Renewables Portfolio Standard Program

SB 1078 (Chapter 516, Statutes of 2002) establishes a renewable portfolio standard (RPS) for electricity supply. The RPS requires that retail sellers of electricity, including investor-owned utilities and community choice aggregators, provide 20 percent of their supply from renewable sources by 2017. This target date was moved forward by SB 1078 to require compliance by 2010. In addition, electricity providers subject to the RPS must increase their renewable share by at least 1 percent each year. The outcome of this legislation will impact regional transportation powered by electricity. As of 2016, the State has reported that a minimum of 25 percent of electricity has been sourced from certified renewable sources (CPUC 2017).

Senate Bill X1-2: California Renewable Energy Resources Act

SB X1-2 of 2011 requires all California utilities to generate 33 percent of their electricity from renewables by 2020. SB X1-2 sets a three-stage compliance period requiring all California utilities, including independently-owned utilities, energy service providers, and community choice aggregators, to generate 20 percent of their electricity from renewables by December 31, 2013; 25 percent by December 31, 2016; and 33 percent by December 31, 2020. SB X1-2 also requires the renewable electricity standard to be met increasingly with renewable energy that is supplied to the California grid from sources within, or directly proximate to, California. SB X1-2 mandates that renewables from these sources make up at least 50 percent of the total renewable energy for the 2011-2013 compliance period, at least 65 percent for the 2014-2016 compliance period, and at least 75 percent for 2016 and beyond.

Senate Bill 350: Clean Energy and Pollution Reduction Act of 2015

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 savings in electricity and natural gas for retail customers through energy efficiency and conservation by December 31, 2030.

Energy Action Plan

The first Energy Action Plan (EAP) emerged in 2003 from a crisis atmosphere in California's energy markets. The State's three major energy policy agencies (CEC, CPUC, and the Consumer Power and Conservation Financing Authority [established under deregulation and now defunct]) came together to develop one high-level, coherent approach to meeting California's electricity and natural gas needs. It was the first time that energy policy agencies formally collaborated to define a common vision and set of strategies to address California's future energy needs and emphasize the importance of the impacts of energy policy on the California environment.

In the October 2005 *Energy Action Plan II*, CEC and CPUC updated their energy policy vision by adding some important dimensions to the policy areas included in the original EAP, such as the emerging importance of climate change, transportation-related energy issues and research and development activities. The CEC recently adopted an update to the EAP II in February 2008 that supplements the earlier EAPs and examines the State's ongoing actions in the context of global climate change.

Assembly Bill 1007: State Alternative Fuels Plan

AB 1007 (Chapter 371, Statues of 2005) required CEC to prepare a state plan to increase the use of alternative fuels in California. CEC prepared the State Alternative Fuels Plan (SAF Plan) in partnership with CARB and in consultation with other state, federal, 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 the 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 fuel use, reduce greenhouse gas (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

Executive Order (EO) S-06-06, signed on April 25, 2006, establishes 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 Executive Order 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 within California by 2010, 40 percent by 2020, and 75 percent by 2050. The Executive Order 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; and
- reduce fire danger, improve air and water quality, and reduce waste.

As of 2016, 2.7 percent of the total electricity system power in California was derived from biomass (CEC 2017a).

California Building Standards Code

The California Building Standards Code or Title 24 of the California Code of Regulations (CCR) contains the regulations that govern the construction of buildings in California. Within the Building Standards Code, two parts pertain to the incorporation of both energy efficient and green building elements into land use development. Part 6 is California's Energy Efficiency Standards for Residential and Non-Residential Buildings and Part 11 is the California Green Building Standards, also known as CALGreen. Title 24 was established by CEC in 1978 in response to a legislative mandate to create uniform building codes to reduce California's energy consumption, and provide energy efficiency standards for residential and non-residential buildings. In 2013, CEC updated Title 24 standards with more stringent requirements, effective July 1, 2014. All buildings for which an application for a building permit is submitted on or after July 1, 2014 must follow the 2013 standards. Energy efficient buildings require less electricity; therefore, increased energy efficiency reduces fossil fuel consumption and decreases greenhouse gas emissions. The CEC *Impact Analysis for California's 2013 Building Energy Efficiency Standards* estimates that the 2013 standards are 23.3 percent more efficient than the previous 2008 standards for residential construction and 21.8 percent more efficient for non-residential construction. In 2016, CEC updated Title 24 standards again, effective January 1, 2017. While the impact analysis of these standards has not yet been released, CEC estimates that the 2016 standards are 28 percent more efficient than 2013 standards for residential construction and are 5 percent more efficient for non-residential construction. The building efficiency standards are enforced through the local plan check and building permit process. Local government agencies may adopt and enforce additional energy standards for new buildings as reasonably necessary because of local climatologic, geologic, or topographic conditions, provided that these standards exceed those provided in Title 24.

Assembly Bill 32, Climate Change Scoping Plan and Update

In December 2008, CARB adopted its first version of its *Climate Change Scoping Plan*, which contained the main strategies California will implement to achieve the mandate of AB 32 (2006) to reduce statewide GHG emissions to 1990 levels by 2020. In May 2014, CARB released and subsequently adopted the *First Update to the Climate Change Scoping Plan* to identify the next steps in reaching the goals of AB 32 (2006) and evaluate the progress made between 2000 and 2012 (CARB 2014). After releasing multiple versions of proposed updates in 2017, CARB adopted *California's 2017 Climate Change Scoping Plan* (2017 Scoping Plan) in December of that same year (CARB 2017a). The 2017 Scoping Plan indicates that California is on track to achieve the 2020 statewide GHG target mandated by AB 32 of 2006 (CARB 2017a:9). It also lays out the framework for achieving the mandate of SB 32 of 2016 to reduce statewide GHG emissions to at least 40 percent below 1990 levels by the end of 2030 (CARB 2017a). The 2017 Scoping Plan identifies the GHG reductions needed by each emissions sector (e.g., transportation, building energy, agriculture).

The measures identified in the proposed 2017 Scoping Plan will have the co-benefit of reducing California's dependency of fossil fuels and making land use development and transportation systems more energy efficient. More details about the Statewide GHG reduction goals and Scoping Plan measures are provided in the regulatory setting of Section 3.8, "Greenhouse Gas Emissions and Climate Change."

Senate Bill 375

SB 375, signed by the Governor in September 2008, aligns regional transportation planning efforts, regional GHG emission reduction targets, and land use and housing allocation. SB 375 requires metropolitan planning organizations (MPOs) to adopt a Sustainable Communities Strategy (SCS) or Alternative Planning Strategy, showing prescribed land use allocation in each MPO's Regional Transportation Plan. CARB, in consultation with the MPOs, is to provide each affected region with reduction targets for GHGs emitted by passenger cars and light trucks in their respective regions for

2020 and 2035. Implementation of SB 375 will have the co-benefit of reducing California's dependency of fossil fuels and making land use development and transportation systems more energy efficient.

The Sacramento Area Council of Governments (SACOG) serves as the MPO for Sacramento, Placer, El Dorado, Yuba, Sutter, and Yolo Counties, excluding those lands located in the Lake Tahoe Basin. UC Davis campus, including all housing, is primarily in Yolo County. SACOG adopted its Metropolitan Transportation Plan/Sustainable Communities Strategy (MTP/SCS) 2035 in 2012, and completed an update adopted on February 18, 2016. SACOG was tasked by CARB to achieve a 9 percent per capita reduction compared to 2012 emissions by 2020 and a 16 percent per capita reduction by 2035, which ARB confirmed the region would achieve by implementing its SCS (CARB 2013). The MTP/SCS forecasted land use development by community types: Center and Corridor Communities, Established Communities, Developing Communities, Rural Residential Communities, and Lands Not Identified for Development in the MTP/SCS Planning Period.

Executive Order B-30-15

On April 20, 2015 Governor Edmund G. Brown Jr. signed Executive Order B-30-15 to establish a California GHG reduction target of 40 percent below 1990 levels by 2030. The Governor's executive order aligns California's GHG reduction targets with those of leading international governments such as the 28-nation European Union which adopted the same target in October 2014. California is on track to meet or exceed the target of reducing GHG emissions to 1990 levels by 2020, as established in the California Global Warming Solutions Act of 2006 (AB 32, discussed above). California's new emission reduction target of 40 percent below 1990 levels by 2030 will make it possible to reach the goal of reducing emissions 80 percent below 1990 levels by 2050. This is in line with the scientifically established levels needed in the U.S. to limit global warming below 2 degrees Celsius, the warming threshold at which major climate disruptions are projected, such as super droughts and rising sea levels.

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

In January 2018, Governor Brown signed Executive Order B-48-18 requiring all State entities to work with the private sector to put at least 5-million zero-emission vehicles on the road by 2030, as well as install 200 hydrogen fueling stations and 250,000 zero-emissions chargers (10,000 of which to be direct current fast chargers) by 2025. This order also requires all State entities to continue to partner with local and regional governments to streamline the installation of zero-emission vehicle 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 the updating the 2016 Zero-Emissions Vehicle Action Plan to help expand private investment in zero-emissions vehicle infrastructure with focus in low income and disadvantaged communities. Additionally, the all State entities are to support and recommend policies and actions to expand infrastructure in homes, through the Low Carbon Fuel Standard, and recommend how these actions can strengthen the economy, create jobs, and ensure affordability and accessibility for all drivers.

Senate Bill 32 and Assembly Bill 197 of 2016

In August 2016, Governor Brown signed SB 32 and AB 197, which serve to extend California's GHG reduction programs beyond 2020. SB 32 amended the Health and Safety Code to include Section 38566, which contains language to authorize CARB to achieve a statewide GHG emission reduction of at least 40 percent below 1990 levels by no later than December 31, 2030. SB 32 codified the targets established by EO B-30-15 for 2030, which set the next interim step in the State's continuing efforts to pursue the long-term target expressed in EOs S-3-05 and B-30-15 of 80 percent below 1990 emissions levels by 2050. Achievement of these goals will have the co-benefit of reducing

California's dependency of fossil fuels and making land use development and transportation systems more energy efficient.

Advanced Clean Cars Program

In January 2012, CARB approved the Advanced Clean Cars program which combines the control of GHG emissions and criteria air pollutants, as well as requirements for greater numbers of zero-emission vehicles, into a single package of standards for vehicle model years 2017 through 2025. The new rules strengthen the GHG standard for 2017 models and beyond. This will be achieved through existing technologies, the use of stronger and lighter materials, and more efficient drivetrains and engines. The program's zero-emission vehicle regulation requires battery, fuel cell, and/or plug-in hybrid electric vehicles to account for up to 15 percent of California's new vehicle sales by 2025. The program also includes a clean fuels outlet regulation designed to support the commercialization of zero-emission hydrogen fuel cell vehicles planned by vehicle manufacturers by 2015 by requiring increased numbers of hydrogen fueling stations throughout the state. The number of stations will grow as vehicle manufacturers sell more fuel cell vehicles. By 2025, when the rules will be fully implemented, the statewide fleet of new cars and light trucks will emit 34 percent fewer global warming gases and 75 percent fewer smog-forming emissions than the statewide fleet in 2016 (CARB 2016).

UNIVERSITY OF CALIFORNIA

UC Sustainable Practices Policy

The UC has a system-wide policy regarding sustainability practices and performance goals and targets. The policy, which is regularly updated (most recently in January 2018) to further sustainability within the UC system, covers the following nine areas of operational sustainability:

- Green Building Design,
- Clean Energy,
- Climate Protection,
- Sustainable Transportation,
- Sustainable Building Operations,
- Recycling and Waste Management (proposed to be renamed Zero Waste in the 2018 issuance),
- Environmentally Preferable Purchasing,
- Sustainable Foodservices, and
- Sustainable Water Systems.

Of these, the most relevant targets related to energy use are established in the Green Building, Clean Energy, Climate Protection, Sustainable Transportation, and Sustainable Water Systems sections. In particular, through targets established with respect to Green Building Design, UC Davis is committed to achieving a Leadership in Energy and Environmental Design (LEED) certification of Gold or higher with new construction, which would carry forward to structures and facilities constructed under the 2018 LRDP.

In September 2017, the UC Sustainability Steering Committee approved additional changes to the Clean Energy section, which would establish the following goals and practices:

- 100 percent clean electricity by 2025 (clean electricity is defined as having a residual greenhouse gas emission factor that is less than 150 pounds [lbs] of carbon dioxide [CO_2] per

megawatt hour [MWh]), to be met through a campus-determined mix of on-site and off-site renewables;

- implementation of energy efficiency actions in buildings and infrastructure systems to reduce the location's (campus's) energy use intensity by an average of at least 2 percent annually; and
- by 2025, at least 40 percent of the natural gas combusted on-site at each location will be biogas.

It is important to note that as of the writing of this analysis, the changes to the Clean Energy section listed above have not yet been formally issued by UCOP. However, based on confirmation with UCOP staff, campus staff are proceeding on the assumption that these policy changes will be issued by summer 2018, and are planning for the changes to take effect.

In addition, a policy change to the Green Building section of the UC Sustainable Practices Policy was recently approved by the UC Sustainability Steering Committee on January 30, 2018. The policy change states that no new building or major renovation that is approved after June 30, 2019 shall use on-site fossil fuel combustion for space and water heating, except those projects connected to an existing campus central thermal infrastructure, and that projects unable to meet the requirement shall document the rationale for that decision. The documentation must include a plan to mitigate associated greenhouse gas emissions, among other requirements.

UC Davis Climate Action Plan

As described in further detail in Section 3.8, "Greenhouse Gas Emissions and Climate Change," the Climate Protection section of the UC Sustainable Practices Policy targets three goals: reduction of GHG emissions to 2000 levels by 2014, to 1990 levels by 2020, and ultimately climate neutrality as soon as feasible. Climate neutrality is defined in the Policy as the University having a net zero impact on the earth's climate, which is to be achieved by minimizing GHG emissions as much as possible and purchasing carbon offsets or other measures to mitigate the remaining GHG emissions.

UC Davis has prepared the 2009-2010 Climate Action Plan (CAP), which includes both the Davis and Sacramento campuses, as well as outlying facilities. The CAP describes and addresses policy and regulatory requirements of (1) the UC Sustainable Practices Policy, (2) AB 32, including CARB's GHG Mandatory Reporting Program (3) the American College and University Presidents Climate Commitment, (4) CEQA, and (5) EPA reporting requirements. The CAP provides documentation of how campus GHG emissions are calculated, a report of 2008 emissions, estimates of past (to 1990) and future emissions (to 2020), a statement of GHG emission reduction goals, a characterization of options and methods to reduce emissions, and a blueprint for future action.

The 2009-2010 CAP was written before the UC Carbon Neutrality Initiative was announced and written into the UC Sustainable Practices Policy. As such, the CAP focuses on the 2014 and 2020 targets, with an understanding that climate neutrality will require fundamental shifts in global and national energy policy, energy production, and technologies currently using fossil fuels. The CAP mainly focuses on emissions related to campus operations, rather than commuting and business air travel, because the share of operations-related emissions is much larger (3 to 4 times greater) than the share attributable to commuting and air travel or commuting alone, respectively. The CAP provides analysis of commuting and air travel reduction options, but does not quantify emissions reductions for those options (UC Davis 2010). UC Davis is currently in the process of updating its CAP. UC Davis is also conducting a transportation demand management planning study to determine options for additional GHG reduction related to commuting.

UC Davis Conservation Programs

The UC Davis Office of Sustainability and the Energy Conservation Office offer various behavior-based programs to encourage individuals to reduce their energy consumption on campus and report energy waste. The Office of Sustainability offers the Green Workplace program, which includes office and lab programs for groups and individuals, and the Aggie Green Pledge program, which is aimed at individual actions. These programs address a wide variety of sustainable/green actions, covering more than energy. The Energy Conservation Office offers energy-specific programs, including thermal comfort reporting (TherMOOstat), an energy education campaign (Trim the Waste), and building energy education (Campus Energy Education Dashboard).

UC Davis Energy Efficiency Programs

The Energy Conservation Office has formed an Energy & Controls Engineering team, to take on campus-wide energy efficiency projects and develop tools for expanding and sustaining the savings achieved through the Statewide Energy Partnership program. In 2017, the Energy Conservation Office completed the first year of savings from an in-house ongoing operational commissioning program called Active Commissioning Enterprise (ACE), and implemented a sliding "comfort band" for classroom temperature set-points based on outside air temperature. The ACE program is designed to tune selected buildings' HVAC systems, including their temperature settings and schedules; integrate the systems into occupancy sensors; and maintain that improved energy efficiency performance. The Energy Conservation Office also installed thermal feedback-controlled ceiling fans in a classroom to test comfort & energy optimization potential. UC Davis is also preparing a phased plan for conversion of steam heating to heating hot water using electricity. Over time, this conversion would result in further reductions in campus natural gas use.

UC Davis Smart Lighting Initiative

In 2010, UC Davis established the Smart Lighting Initiative, with a goal to reduce electricity used on indoor and outdoor lighting by 30 million kilowatt-hours, which is 60 percent of 2007 levels used (calculated at 50,400,000 kilowatt hours [kWh] per year), and is in process towards meeting that goal. Campus design standards for all new construction projects require interior light-emitting diode (LED) lights. To date, two phases of the project have been completed, and annual savings are totaling about 12,488,400 kWh/year. The work includes retrofits of lighting in parking structures, parking lots, pathways and roadways (the majority of which have been LED), wallpacks, and retrofit of 43 buildings, representing 2.5 million square feet, with highly efficient lamp and ballast replacements, LED fixture retrofits, and advanced lighting controls. The campus is planning the next phases of the SLI, which will include retrofit of selected additional exterior lighting and buildings.

LOCAL

As noted in Section 3.0.2, "University of California Autonomy," UC Davis, a constitutionally created State entity, is not subject to municipal regulations of surrounding local governments for uses on property owned or controlled by UC Davis that are in furtherance of the university's education purposes. However, UC Davis may consider, for coordination purposes, aspects of local plans and policies for the communities surrounding the campus when it is appropriate and feasible, but it is not bound by those plans and policies in its planning efforts. With respect to Energy, there are no local plans or policies addressing energy that pertain to the 2018 LRDP.

3.6.2 Environmental Setting

PHYSICAL SETTING

Energy Facilities and Services in the Plan Area

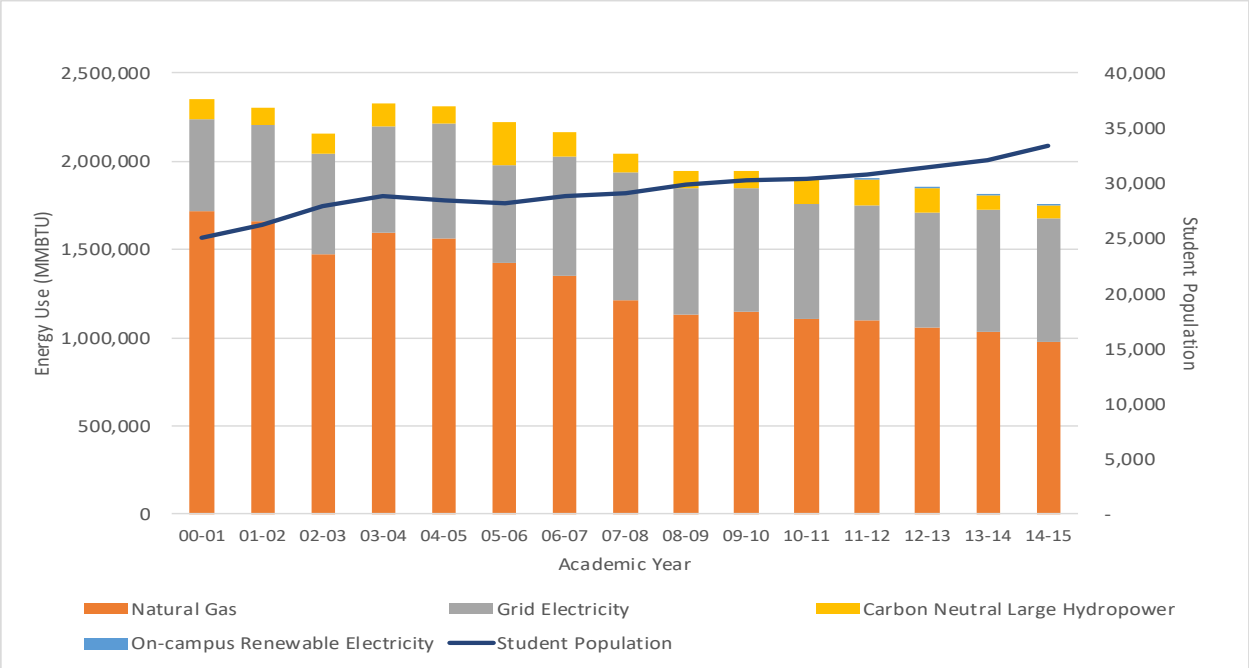
Electric and natural gas services in UC Davis are purchased via a Direct Access contract from the Western Area Power Association (WAPA), a federally-run utilities company that markets and transmits wholesale electricity from multi-use water projects (hydropower). Direct Access service is a retail electric service that allows customers to purchase electricity from third party providers instead of from a regulated electric utility, such as the Pacific Gas and Electric company (PG&E), even though such a utility may provide the infrastructure to deliver the electricity. WAPA's supply of hydropower is contingent upon atmospheric conditions and precipitation events, and therefore varies widely year to year. Due to the inherent uncertainty of hydropower availability, WAPA supplements their energy with other sources (e.g., natural gas, solar).

Additionally, UC Davis operates several renewable electricity installations on campus, including solar generators and a biodigester. The University operates several rooftop solar installations throughout the campus and recently completed the 62-acre UC Davis South Campus Large Solar Power Plant that began generating electricity in August 2015. Combined, these on-site solar systems have 21 megawatt (MW) capacity. The large solar power plant alone generates approximately 33,000 megawatt-hours (MWh) per year, or 14 percent of the campus's electricity needs (UC Davis 2017a). In 2014, the campus began operating the UC Davis Renewable Energy Anaerobic Digester (READ), a biodigester that converts food and other organic waste to methane through anaerobic digestion and uses the methane to power four-200 kilowatt (kW) micro-turbines, generating electricity (CEC 2017b).

With respect to transportation fuels, the University operates a self-service fueling facility offering unleaded gasoline, diesel, oil, and compressed natural gas for University-owned and operated fleet vehicles (UC Davis 2016a).

Energy Types and Sources

During the 2016 calendar year, UC Davis purchased 226 gigawatt-hours (GWh) of electricity from WAPA and 1,061,733 million British thermal units (MMBTU) of natural gas (Kirk, pers. comm., 2018). UC Davis retired 11,256 MWh of Renewable Energy Certificates for the 2016 calendar year. According to the Campus Energy Education Dashboard, campus building energy demand has decreased by 25 percent between academic year 2000/2001 and 2014/2015 despite a 39 percent increase in students over the same period (UC Davis 2017b). Correspondingly, the energy use per student decreased by 44 percent from 93.9 MMBTU to 52.6 MMBTU per student over the same 15-year period. The trends in building energy demand and student population are shown in Exhibit 3.6-1.



Source: UC Davis 2017b

Exhibit 3.6-1: UC Davis Energy Use and Student Population Trends between 2000/2001 and 2014/2015

ENERGY USE AND GLOBAL WARMING

Scientists and climatologists have produced evidence that the burning of fossil fuels by vehicles, power plants, industrial facilities, residences and commercial facilities has led to an increase of the earth's temperature. For an analysis of greenhouse gas production and proposed 2018 LRDP impacts on climate change, please see Section 3.8, "Greenhouse Gas Emissions and Climate Change."

3.6.3 Environmental Impacts and Mitigation Measures

SIGNIFICANCE CRITERIA

Based on Appendix F and G of the State CEQA Guidelines, the proposed project would result in a potentially significant impact on energy use if it would:

- result in the wasteful or inefficient use of energy as a result of project construction or operation; or
- 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 use.

ANALYSIS METHODOLOGY

Construction

Regarding energy use (e.g., fuel use) during construction, it is assumed that only diesel fuel would be used in construction equipment and a mix of diesel and gasoline fuel in on-road vehicles for hauling

materials and worker commute trips. The same assumptions of construction equipment numbers, horsepower ratings, and load factors used to estimate construction emissions (see Section 3.3 "Air Quality") were used to calculate construction-related fuel use. Diesel fuel use from construction was estimated based on a factor of 0.05 gallons of diesel fuel per horsepower-hour available from the South Coast Air Quality Management District's (SCAQMD) CEQA Air Quality Handbook (SCAQMD 1993: Table A9-3E).

Operations

Operation of uses anticipated under the 2018 LRDP would require electricity and natural gas usage for lighting, space and water heating, appliances, lab equipment, water conveyance, and landscaping maintenance equipment. Indirect energy use would include wastewater treatment and solid waste removal. Project operation would include consumption of diesel and gasoline fuel from on-road vehicles. Building energy use was mainly estimated using CalEEMod v. 2016.3.2 (SCAQMD 2017), assuming that the land uses within the campus would have energy use factors that are at least 20 percent more efficient than the 2016 Building Energy Efficiency Standards under Title 24, as required in UC Davis's sustainability goals to be achieved by the 2018 LRDP (UCOP 2016).

Transportation fuel-use estimates were calculated by applying average fuel usage rates per vehicle mile to VMT data related to the 2018 LRDP (see Section 3.16, "Transportation, Circulation, and Parking," for an explanation of the assumptions behind the VMT modeling). CARB's EMFAC2017 model includes average fuel usage rates by vehicle class, fuel type (e.g., diesel, gasoline, electric, and natural gas), speed bin, calendar year, and county. Fehr and Peers (project traffic consultant) provided daily VMT, by speed bin and vehicle class, attributable to the trips entering and exiting the Davis campus cordon. Fuel usage rates representing Yolo County in 2016 and 2030 were applied to the 2018 LRDP VMT data (Behren pers. comm., 2018; CARB 2017b). Daily VMT were adjusted to annual VMT using a conversion factor of 287 which accounts for UC Davis's academic schedule, holidays, and enrollment levels during summer and regular academic quarters. See Appendix C for calculation details.

Diesel fuel use in the new emergency generators operating under the 2018 LRDP was based on the CalEEMod default assumptions, and no diesel fuel was assumed to be used in the planned biomass boiler. Although CalEEMod was used to calculate emissions from emergency generators, CalEEMod does not provide fuel estimates for these equipment types. Like the construction fuel estimates, fuel use related to the occasional operation of emergency generators was estimated based on a factor of 0.05 gallons of diesel fuel per horsepower-hour available from the SCAQMD's CEQA Air Quality Handbook (SCAQMD 1993: Table A9-3E). See Section 3.2 "Air Quality" for a description of assumptions used for stationary sources.

On-site solar electricity generation is also being considered for the West Village Expansion and Orchard Park Redevelopment components of the 2018 LRDP, especially within surface parking areas. Though solar facilities may be installed elsewhere on campus as part of the 2018 LRDP, it is conservatively assumed that those facilities would not be operated as part of the analysis in this section. For a description of the methodology used to estimate solar electricity generation from the West Village Expansion and Orchard Park Redevelopment sites, refer to Section 3.6 in Volumes 2 and 3, respectively.

ISSUES NOT EVALUATED FURTHER

All issues identified above in Significance Criteria are addressed below.

IMPACTS AND MITIGATION MEASURES

Impact 3.6-1: Result in unnecessary, inefficient, and wasteful use of energy.

Implementation of the 2018 LRDP would increase electricity and natural gas consumption at the site relative to existing conditions during construction activities, as well as long-term operational activities. However, the energy needs for construction would be temporary and not require additional capacity or increase peak or base period demands for electricity or other forms of energy. The 2018 LRDP is committed to meeting the UC Sustainable Practices Policy and the UC Davis Campus Design Guidelines (including achievement of LEED Gold) in all new/renovated facilities, which is designed to reduce the wasteful use of materials (through recycling building materials) and increase building energy efficiently. Therefore, implementation of the 2018 LRDP would not result in wasteful, inefficient, and unnecessary consumption of energy, and impacts would be **less than significant.**

Appendix F of the State CEQA Guidelines requires the consideration of the energy implications of a project. CEQA requires mitigation measures to reduce "wasteful, inefficient and unnecessary" energy usage (PRC Section 21100, subdivision (b)(3)). Neither the law nor the State CEQA Guidelines establish criteria that define wasteful, inefficient, or unnecessary use. Compliance with CCR Title 24 Energy Efficiency Standards would result in energy-efficient buildings and, as described below, UC Davis is committed to achievement of higher standards. However, compliance with building codes does not adequately address all potential energy impacts during construction and operation. For example, energy would be required to transport people and goods to and from the project site. Energy use is discussed by anticipated use type below.

Construction-Related Energy

Energy would be required to construct the 2018 LRDP, operate and maintain construction equipment, and transport construction materials. The one-time energy expenditure required to construct the physical buildings and infrastructure associated with the 2018 LRDP would be nonrecoverable. Most energy consumption would result from operation of off-road construction equipment and on-road vehicle trips associated with commutes by construction workers and haul trucks trips. Table 3.6-1 summarizes the levels of energy consumption from the West Village Expansion component, Orchard Park Redevelopment component, additional academic and administrative space, and other facilities that could be operated under the 2018 LRDP. An estimated 355,218 gallons of gasoline and 518,007 gallons of diesel would be consumed to enable construction of new land uses under the 2018 LRDP. Construction equipment use and associated energy consumption would be typical of that associated with construction of new residential, educational, and industrial land uses. 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 State. Idling of on-site equipment during construction would be limited to no more than five minutes in accordance with YSAQMD requirements. 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. Non-renewable energy would not be consumed in a wasteful, inefficient, or unnecessary manner when compared to other construction sites in the region.

Table 3.6-1 Construction Energy Consumption

2018 LRDP Component	Off-road Diesel Use (gallons)	On-Road Diesel Use (gallons)	Total Diesel Use (gallons)	On-Road Gasoline Use (gallons)
West Village Expansion	169,700	167,143	336,843	237,5051
Orchard Park Redevelopment	59,536	48,145	107,681	86,128
Academic and Administrative Land Uses	39,454	9,781	49,235	6,371
Other 2018 LRDP Land Uses	2,371	21,876	24,247	25,214
Total	271,061	246,946	518,007	355,218

Notes: Totals may not sum due to rounding. LRDP = Long Range Development Plan

Source: Data compiled by Ascent Environmental in 2018.

Operational Building Energy and Stationary Sources

The 2018 LRDP would increase electricity and natural gas consumption in the region relative to existing conditions. However, improvements to existing facilities to increase efficiency and use of renewable electricity would also occur under the 2018 LRDP as part of the planned solar PV systems in the West Village Expansion and Orchard Park Redevelopment components. With respect to stationary sources, the 2018 LRDP would include the operation of 22 new diesel emergency generators and one biomass boiler. Table 3.6-2 summarizes the levels of energy consumption associated with the operation of new facilities built under the 2018 LRDP.

Table 3.6-2 Net Operational Energy Consumption at 2018 LRDP Buildout

New Facilities under the 2018 LRDP	Electricity (MWh/year)	Natural Gas (therms/year)	Diesel from Stationary Sources (gallons/year)
West Village Expansion	9,037	0	0
Orchard Park Redevelopment	2,387	46,264	0
Academic and Administrative Land Uses	16,240	298,400	0
Other 2018 LRDP Land Uses	12,128	257,743	578
Total Energy Consumption without Solar	**39,792**	**602,407**	**578**
Electricity Generation from On-site Solar at West Village Expansion and Orchard Park Redevelopment components	-16,073	0	0
Net Energy Consumption with Solar	23,719	602,407	578

Notes: Totals may not sum due to rounding. gallons/year = gallons per year; MWh/year = megawatt-hours per year; MMBtu/year = million British thermal units per year, LRDP = Long Range Development Plan

Source: Calculations by Ascent Environmental in 2018.

As shown in Table 3.6-2, the 2018 LRDP would result in an increase of 24 GWh of electricity, 602,407 therms of natural gas, and 578 gallons of diesel use per year related to the operation of new facilities built under the 2018 LRDP. Anticipated solar facilities at the West Village Expansion and Orchard Park Redevelopment sites would generate enough electricity to meet 40 percent of the electricity demand from all new 2018 LRDP facilities. The 2018 LRDP and development considered part of plan implementation would be subject to attainment of LEED Gold standards and exceeding CCR Title 24 requirements through implementation of the UC Sustainable Practice Policy and UC Davis Campus Design Guidelines, requiring UC Davis to build energy-efficient buildings that use less electricity, and therefore, reduce fossil fuel consumption (UCOP 2016). The current 2016 Title 24 standards are anticipated to reduce residential electricity and natural gas consumption by 28 percent over the 2013 Title 24 standards. In addition, UC Davis would continue to implement the conservation and efficiency

programs (e.g., TherMOOstat, ACE, and the Smart Lighting Initiative) identified above, and is committed to meeting the goals of the UC Sustainable Practices Policy that would result in further reductions in energy use and increased use of on-site renewable energy.

Operational Transportation Energy

Table 3.6-3 summarizes the gasoline, diesel, natural gas, and electricity associated with the net increase in transportation generated at build-out of the 2018 LRDP compared to existing conditions. At build-out, the 2018 LRDP would result in the net consumption of 6 million gallons of gasoline per year, 192,524 gallons of diesel per year, 5,080 diesel equivalent gallons of natural gas, and 819 MWh per year of transportation fuels.

Table 3.6-3 Net Transportation Energy Consumption with 2018 LRDP Implementation Compared to Existing Conditions

Vehicle Category	Gasoline (gal/year)	Diesel (gal/year)	Natural Gas (DEG/year)	Electricity (kWh/year)
Passenger Vehicles	1,777,420	10,381	0	689,984
Trucks with 2 axles	2,220,404	48,435	0	128,830
Trucks with 3 axles or more	1,915,212	133,708	5,080	0
Total (All Vehicle Types)	5,913,036	192,524	5,080	818,814

Notes: gal/year = gallons per year; DEG = diesel equivalent gallons; kWh = kilowatt-hour

Source: Data provided by Ascent Environmental, Inc. in 2018 based on modeling using vehicle miles travelled data from Fehr and Peers and EMFAC2017 emission factors.

As shown in Table 3.6-2, trucks with two or more axles account for approximately 70 percent of total transportation-related gasoline and diesel use during operation of uses under the 2018 LRDP. This is likely because of a high percentage of non-vehicular trips associated with student commutes. According to a UC Davis Campus Travel Survey, 77 percent of all commuting trips during the 2015-2016 academic year were taken by modes other than single-occupancy vehicles (UC Davis 2016b). The vehicle mode share patterns reflected in Table 3.6-3 would likely be similar to the 2015-2016 academic year. With most trips taken via non-vehicular modes of transportation, trips generated by operation of uses anticipated under the 2018 LRDP would not be considered inefficient, wasteful, and unnecessary.

Summary

According to Appendix F of the State CEQA Guidelines, the means to achieve the goal of conserving energy include decreasing overall per capita energy consumption, decreasing reliance on natural gas and oil, and increasing reliance on renewable energy sources.

As discussed above, energy would be required during the 2018 LRDP's construction and operational phases. Construction-related energy would be used during construction activities and not represent a long-term increase in demand. However, as noted above, construction activities conducted on-campus would not result in unusual or unique construction requirements that would result in potential wasteful energy use/consumption. Best available control technology would be used by contractors, as well as conformance to applicable requirements like YSAQMD requirements related to equipment idling, such that the inefficient or wasteful use in energy during construction would not occur. Operational-related energy demand would result from building energy use and increases in vehicular traffic. The 2018 LRDP would comply with the most current energy-efficient standard (i.e., Title 24) and is committed to achieving LEED Gold and UC Sustainable Practice Policy Green Building targets, which are designed to reduce waste and increase building energy efficiently. As UC Davis has continued to implement energy efficiency measures over the past several years, as shown in

Exhibit 3.6-1, total campus energy use has decreased, and this trend would be anticipated to continue under the 2018 LRDP. The incorporation of design features, consistent with those mentioned above and in combination with State energy efficiency requirements, would reduce overall energy use related to the 2018 LRDP. For the reasons explained above, energy consumption under the 2018 LRDP through construction, building operation, and transportation would not be considered wasteful, inefficient, or unnecessary. This impact would be **less than significant.**

Mitigation Measures

No mitigation measures are necessary.

Impact 3.6-2: 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 2018 LRDP would be required to comply with increasingly stringent building and vehicle efficiency standards that would reduce energy consumption to be consistent with applicable plans, policies, and regulations. The 2018 LRDP would also include design features that would reflect UC Davis's goal to meet the UC Carbon Neutrality Initiative, as written into the UC Sustainable Practices Policy Green Building and Climate Action targets. Thus, this impact would be **less than significant.**

Development under the 2018 LRDP would exceed Title 24 Building Energy Efficiency Standards to reduce energy use, which establish minimum efficiency standards related to various building features, including appliances, water and space heating and cooling equipment, building installation and roofing, and lighting. While WAPA is not subject to California RPS as a federal entity, PG&E, which provides energy service to public-private partnership projects within campus, is subject to California's RPS to increase procurement from eligible renewable energy resource to 33 percent of total procurement by 2020 and to 50 percent of total procurement by 2030. Furthermore, federal and State regulations including the Low Carbon Fuel Standard, Pavley Clean Car Standards, and Low Emission Vehicle Program would reduce the transportation fuel demand. Under the 2018 LRDP, design features that reduce energy use, improve energy efficiency, and increase reliance on renewable energy sources would be needed for UC Davis to meet the goals of the UC Carbon Neutrality Initiative as written into the UC Sustainable Practices Policy.

The adherence to the increasingly stringent building and vehicle efficiency standards as well as 2018 LRDP design features consistent with UC Carbon Neutrality goals would reduce energy consumption to be consistent with applicable plans, policies, and regulations adopted for avoiding or mitigating environmental effects related to energy. Therefore, impacts would be **less than significant**.

Mitigation Measures

No mitigation measures are necessary.
