

## 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 Orchard Park Redevelopment component of the 2018 LRDP would result in inefficient, wasteful, and unnecessary consumption of energy.

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 the Orchard Park Redevelopment component.

Comments received in response to the NOP included concerns regarding energy demand in student housing and vehicle commuting. As they pertain to implementation of the Orchard Park Redevelopment component of the 2018 LRDP, these impacts are described and addressed within this section.

For an analysis of greenhouse gas (GHG) production and Orchard Park Redevelopment component impacts on climate change, please see Section 3.8, “Greenhouse Gas Emissions and Climate Change.”

### 3.6.1 Regulatory Setting

Plans, policies, regulations, and laws (applicable to and/or considered for the Orchard Park Redevelopment component) are provided in Volume 1 of this EIR. As the regulatory setting provided in Volume 1 considers potential development, including the Orchard Park Redevelopment component, within the entirety of the UC Davis campus as envisioned through the 2018 LRDP, no additional regulatory setting is provided for the Orchard Park Redevelopment component.

### 3.6.2 Environmental Setting

Refer to Section 3.6, “Energy,” in Volume 1 of this EIR for a discussion of the regional environmental setting for the UC Davis campus, including the Orchard Park site. Thus, the Orchard Park Redevelopment component has the same environmental setting as for the entire UC Davis campus. No additional environmental setting is provided.

### 3.6.3 Environmental Impacts and Mitigation Measures

#### SIGNIFICANCE CRITERIA

Refer to Section 3.6, “Energy,” in Volume 1 of this EIR for a discussion of applicable Significance Criteria.

## 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 CEQA Air Quality Handbook (SCAQMD 1993: Table A9-3E).

### Operation

Operation of the Orchard Park Redevelopment component would require electricity and natural gas usage for lighting, space and water heating, appliances, and landscaping maintenance equipment. Indirect energy use would include wastewater treatment and solid waste removal. Operation of on-site vehicles would include consumption of diesel and gasoline fuel from on-road vehicles. Building energy use was estimated using CalEEMod v. 2016.3.2 assuming that the proposed apartment and parking lot land uses at the site would have energy use factors that are 20 percent more efficient than the 2016 Building Energy Efficiency Standards under Title 24, as required in the UC Sustainable Practices Policy goals to be achieved by the 2018 LRDP (UCOP 2016). In addition, UC Davis implements Green Building practices under the U.S. Green Building Council’s Leadership in Energy and Environmental Design program (LEED). UC Davis is targeting to achieve LEED Gold Certification for all renovated and new buildings, including the Orchard Park Redevelopment component.

Transportation fuel-use estimates were calculated by applying average fuel usage rates per vehicle mile to vehicle miles traveled (VMT) data specific to the 2018 LRDP provided by Fehr and Peers. 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 provided daily VMT, by speed bin and vehicle class, attributable to the trips entering and exiting the UC Davis campus cordon. Fuel usage rates representing Yolo County in 2016 and 2030 were applied to the 2018 LRDP VMT data. (Behrens, pers. comm., 2018; CARB 2017). See Section 3.16, “Transportation, Circulation, and Parking,” for an explanation of the assumptions behind the VMT modeling. 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 H in volume 1 for calculation details.

On-site solar electricity generation anticipated as part of the Orchard Park Redevelopment component was based off generation rates typical to the Sacramento region using default values in the National Research Energy Laboratory’s (NREL) PV Watts Calculator web tool (NREL 2018). Assuming a standard module type, fixed array, a 20 percent tilt, and a commercial-type array, a 1 megawatt (MW) solar system would generate 1,535 megawatt-hours per year on a 1.45-acre footprint. This result was scaled to the Orchard Park Redevelopment component’s available rooftop space assuming 20 percent of the space is taken up by solar thermal water heating and other rooftop structures or utilities. The projected square footage (300,000 square feet [sf] of family apartments and 342,000 sf of student apartment) was divided by the maximum number of stories by apartment type (two-story family apartments and six-story student apartment) to give a total of 165,600 sf of available rooftop space for solar.

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## ISSUES NOT EVALUATED FURTHER

The following impacts were identified as part of the analysis of the 2018 LRDP, and are either (1) adequately evaluated at the program level of analysis of the 2018 LRDP, or (2) not applicable to the Orchard Park Redevelopment component.

### **Conflicts with Applicable Plans, Policies, or Regulations Adopted for the Purpose of Avoiding or Mitigating Environmental Effects Related to Energy**

As noted in the programmatic analysis provided for the 2018 LRDP in Volume 1, by adhering to the increasingly stringent building and vehicle efficiency standards as well as 2018 LRDP design features consistent with UC Carbon Neutrality goals and the UC Sustainable Practices Policy would reduce energy consumption to be consistent with applicable plans, policies, and regulations adopted for avoiding or mitigating environmental effects related to energy. No additional project-level analysis is necessary.

## PROJECT-SPECIFIC IMPACTS AND MITIGATION MEASURES

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

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Although development of new student housing at the Orchard Park site would result in energy consumption during construction and operation, the Orchard Park Redevelopment component would exceed the most current energy-efficient standard (i.e., Title 24) by 20 percent and generate electricity through on-site solar photovoltaic panels. Therefore, the Orchard Park Redevelopment component would not result in wasteful, inefficient, and unnecessary consumption of energy. Thus, the impact would be **less than significant**.

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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 (Public Resources Code Section 21100, subdivision (b)(3)). Neither the law nor the State CEQA Guidelines establish criteria that define wasteful, inefficient, or unnecessary use. Exceedance of California Code of Regulations Title 24 Energy Efficiency Standards would result in energy-efficient buildings. 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 Orchard Park site.

#### **Construction-Related Energy**

Energy would be required to construct the Orchard Park Redevelopment component, 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 Orchard Park Redevelopment component would be nonrecoverable. Most energy consumption would result from operation of construction equipment and vehicle trips associated with commutes by construction workers and haul trucks trips. An estimated 107,681 gallons of gasoline and 86,128 gallons of diesel would be consumed during construction. The energy needs for construction would be temporary and would not require additional capacity or increase peak or base period demands for electricity or other forms of energy. Construction equipment use and associated energy consumption would be typical of that associated with construction of new residential land use.

#### **Operational Building Energy**

The Orchard Park Redevelopment component would increase electricity and natural gas consumption in the region relative to existing conditions and would improve existing electrical infrastructure.

However, the Orchard Park Redevelopment component would also generate electricity via on-site rooftop solar PV panels. Table 3.6-1 summarizes the levels of energy consumption alongside electricity generation from solar for the first full year of operation during the buildout year of 2021.

**Table 3.6-1 Operational Energy Consumption**

Operation	Electricity (MWh/year)	Natural Gas (therms/year)
Apartments	2,311	46,264
Outdoor Lighting	76	0
Total Energy Consumption without Solar	2,387	46,264
Electricity Generation from On-site Solar	4,021	0
Net Energy Consumption with Solar	-1,633	46,264
Energy use per resident <sup>1</sup>	-0.9	26.1

Notes: MWh/year = megawatt-hours per year; MMBtu/year = million British thermal units per year, gal = gallons

<sup>1</sup> Based on a population of 1,772 as estimated in CalEEMod.

Source: Data provided by Ascent Environmental, Inc. in 2018 based on modeling using CalEEMod 2016.3.2 and the National Renewable Energy Laboratory's PV Watts Calculator

As shown in Table 3.6-1, on average, 0.9 MWh per year of electricity would be generated and 26.1 therms per year of natural gas would be consumed per resident. Although the Orchard Park Redevelopment component would result in an increase in natural gas usage, the Orchard Park Redevelopment component would generate more electricity from on-site solar than it consumes. This is largely because of the high rates of energy efficiency planned for the Orchard Park Redevelopment component. The Orchard Park Redevelopment component would be subject to attainment of the UC Office of the President (UCOP) requirement to exceed applicable California Code of Regulations Title 24 requirements by 20 percent, requiring the Orchard Park Redevelopment component 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. Also, the Orchard Park Redevelopment component would implement a variety of energy efficiency measures, such as:

- ▲ demand reduction through research, monitoring, and quantifying occupant needs;
- ▲ passive strategies including high-performance building envelope, daylighting, natural ventilation and cooling;
- ▲ high efficiency building designs and equipment;
- ▲ control strategies that optimize equipment operational efficiencies;
- ▲ alternative energy sources - roof areas would support solar thermal panels to generate hot water for washing and building heating with remaining roof space reserved for on-site photovoltaic (PV) panels and conduit pathways connect them to the main electrical room;
- ▲ capturing waste energy (recover heating and cooling from exhaust); and
- ▲ use of recycled and regional building materials to reduce transportation energy use and minimize embodied energy.

The Orchard Park Redevelopment component would also meet the U.S. Green Building Council's LEED standards, achieving a Gold rating or higher, in alignment with UCOP's and UC Davis requirements.

### **Operational Transportation Energy**

Table 3.6-2 summarizes the gasoline, diesel, natural gas, and electricity used for transportation generated by the Orchard Park Redevelopment component in 2021. The Orchard Park Redevelopment component would result in the consumption of 253,906 gallons of gasoline per year, 4,961 gallons of diesel per year, 49 diesel equivalent gallons of natural gas, and 6,814 kilowatt-hours (kWh) per year of transportation fuels.

**Table 3.6-2 Transportation Energy Consumption in 2021**

Vehicle Category	Gasoline (gal/year)	Diesel (gal/year)	Natural Gas (DEG/year)	Electricity (kWh/year)
Passenger Vehicles	62,270	240	0	5,550
Trucks with 2 axles	58,117	3,055	0	1,263
Trucks with 3 axles or more	133,519	1,665	49	0
Total (All Vehicle Types)	253,906	4,961	49	6,814

Notes: gal/year = gallons per year; DEG = diesel equivalent gallons

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 make up 71 percent of total anticipated transportation-related gasoline and diesel use. This is likely because of the low percentage of trips taken with passenger vehicles that would occur at the Orchard Park site as most trips generated by residents are taken by transit or bicycle for commuting trips. Like the existing West Village development, the Orchard Park Redevelopment component is within 2 miles of the Davis campus. For the existing West Village development, less than 5 percent of trips to campus use a passenger vehicle while most other trips are either taken via bicycle or transit, as reported in UC Davis's 2015–2016 Campus Travel Report (UC Davis 2016). In comparison, a total of 28 percent of total trips to campus from all sources, including West Village, are associated with persons taking passenger vehicles. Given that the Orchard Park Redevelopment component would be like the existing West Village development in terms of proximity and bicycle connectivity to the campus, the majority of trips associated with Orchard Park would not result in a substantial use of transportation fuels. Thus, trips generated by the Orchard Park Redevelopment component 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 construction and operational phases. Construction-related energy would be used during construction activities and would not represent a long-term increase in energy demand. Construction cost is directly linked to the time and materials consumed to complete the work. Thus, construction would progress in an efficient manner such that costs and associated fuel/energy needs are reduced. Operational-related energy demand would result from building energy use and increases in vehicular traffic. The Orchard Park Redevelopment component would comply with the most current energy-efficient standard (i.e., Title 24) and is committed to achieving LEED Gold, which is also designed to reduce the wasteful use of materials (through recycling building materials) and increase building energy efficiency. These project design features, in combination with State energy efficiency requirements, would reduce overall energy use.

The Orchard Park Redevelopment component's energy consumption through construction, building operation, or transportation would not be considered wasteful, inefficient, or unnecessary. This impact would be **less than significant**.

### **Mitigation Measures**

No mitigation is necessary.

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