4.14 ENERGY

4.14.1 INTRODUCTION

This section of the Revised Draft EIR evaluates potential impacts associated with the consumption of energy that would result from the implementation of the proposed Student Housing West project ("proposed project"). The section follows the guidance for the evaluation of energy impacts provided in Appendix F, Energy Conservation, of the State CEQA Guidelines.

It also presents potential energy impacts from the anticipated construction and operation of the separate, but related, Porter and Rachel Carson Colleges dining facilities expansion project, which would serve residents of the SHW project and the existing colleges (see **Section 4.14.5** below).

This section is revised from the section in the Draft EIR due to project description changes, which include changes in the amount of building space to be constructed and construction schedule. As the project would not involve a substantial change in the number of beds to be built at each site, operational energy use would be similar to what was analyzed in the Draft EIR. No energy related comments were received on the Draft EIR.

4.14.2 ENVIRONMENTAL SETTING

Electricity Supply

Electricity

Approximately 67 percent of electricity used within California in 2015 was generated within the state from natural gas (40 percent), nuclear (6 percent), large hydroelectric (4 percent), renewable resources (16 percent), and coal (<1 percent) (CEC 2016a). The remaining portion of electricity was generated in the southwest United States (21 percent) and within the Pacific Northwest (12 percent). The State of California power mix, including in-state generation and out of state purchase in 2015, comprised natural gas (44 percent), renewable resources (22 percent), large hydroelectric (5 percent), coal (6 percent), nuclear (9 percent), and additional unspecific sources of power (14 percent) (CEC 2016a). In 2015, the total system power for California was 295,405 gigawatt-hours (GWh), which is almost 4 percent higher than 2014 (CEC 2016a).

Pacific Gas and Electric (PG&E) currently provides most of electricity to the UC Santa Cruz campus. The PG&E point of service connection is the Slug Substation, located northeast of the Hagar Court employee housing complex. From there, the 21 kilovolts (kV) of electricity is directed to the Merrill Substation in the

northeastern quadrant of the campus, where two transformers reduce the voltage to 12 kV. There are four campus electrical feeders that distribute power to most of the campus buildings (UCSC 2006). Lower campus buildings receive power from a separate, single line and the Family Student Housing and employee housing complexes are served by separate PG&E connections as well. Electricity is "master metered" at the whole-campus level by PG&E, except for FSH and employee housing, but the campus Energy Department maintains a sub-metering system to monitor energy use at the building level (UCSC 2006).

In 2014, the campus used 48,370,319 kilowatt hours per year (kWh/year), with peak daily consumption of 163,394 kWh/day occurring in May. In general, the campus uses between 120,000 kWh/day and 150,000 kWh/day during the school year. During the summer months and school breaks, when the campus population drops significantly, average daily usage drops to between 110,000 kWh/day and 130,000 kWh/day (CES 2017).

In 2015-2016, the campus purchased approximately 22,000,000 kWh from PG&E, the smallest purchase of electricity since before 2007, and a significant decrease from 2014-2015, when the campus purchased nearly 55,000,000 kWh. This decrease is associated with the installation and operation of a new natural-gas-powered combustion turbine generator at the campus cogeneration plant (described below), which provides approximately 4.1 MW usable output or about 56 percent of the campus' electricity needs (CES 2017). The substantial decrease in electricity purchased in 2015-2016 is reflected in an equally substantial increase in natural gas purchased.

UC Santa Cruz Cogeneration Plant

Some of the electricity utilized at UC Santa Cruz is produced on campus by the cogeneration plant, located in the Central Heat Plant area on campus. The plant provides backup for emergency responders, safety systems, and research equipment, as well as supplementing the electricity purchased from PG&E. In 2012, the cogeneration facility was remodeled into a 4,900 sq. foot multi-story building, which is managed and maintained by Physical Plant staff. The building houses a Solar Mercury CTG single combustion turbine and associated heat recovery unit (HRU) to produce hot water and electricity. The electric power generated by the turbine is fed into the campus' 12 kV distribution systems. This auxiliary electricity is especially useful when PG&E power failures occur (UCSC 2011).

Natural Gas

In 2012, natural gas used within California was extracted in the state (9 percent), Canada (16 percent), the Rocky Mountain region of the United States (40 percent), and in the southwest United States (35 percent) (CPUC 2016). In 2012, natural gas was used in California to produce electricity (45.6 percent), in

residential uses (21 percent), in industrial uses (25 percent), and in commercial uses (8.6 percent). The total natural gas usage in 2012 was 2,313,000 BBTU/year (CEC 2016a).

UC Santa Cruz currently uses natural gas to run the cogeneration plant and affiliated natural gas compressors, producing electricity and heating for water and buildings. The two compressors increase the pressure of the fuel gas to maximize combustion efficiency. Natural gas is purchased by UC Santa Cruz from PG&E and delivered via a high-pressure transmission line that runs along the railroad tracks south of Mission Street. A distribution line running along Western Drive delivers the gas to the PG&E point of connection, located at a master gas metering station at High Street. From the point of connection, gas is delivered to the cogeneration plant via an 8-inch line that runs on the west side of the campus to the cogeneration plant (UCSC 2011).

Petroleum Based Fuel

In 2015, approximately 12 billion gallons of gasoline (non-diesel) and 1.6 billion gallons of diesel fuel were sold statewide (CEC 2016a). It is estimated that in Santa Cruz County, 96 million gallons of gasoline were purchased in 2015, in addition to 6 million gallons of diesel fuel (CEC 2016b). Both gasoline and diesel consumption in 2015 were slightly lower than the California Energy Commission's (CEC) projections. UC Santa Cruz has a transportation fleet of approximately 700 vehicles. There is an on-campus fueling station, located behind the Fleet Services' Central Garage near the southern end of campus that provides unleaded and diesel fuel, as well as compressed natural gas (CNG) for campus vehicles.

4.14.3 REGULATORY CONSIDERATIONS

4.14.3.1 Federal Regulations

Energy Independence and Security Act

In 2007, Energy Independence and Security Act (EISA) was signed into law. EISA aims to increase building, product, and vehicle efficiency; accelerate clean renewable fuel production; and institute other measures aimed at increasing U.S. energy independence and security.

Executive Order 13693

On 19 March 2015, the President signed Executive Order (EO) 13693, *Planning for Federal Sustainability in the Next Decade*. The overarching goal of EO 13693 is to maintain Federal leadership in sustainability and greenhouse gas emission reductions. Among other goals, 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
- 25 percent of energy supply (electricity and natural gas) from renewable energy
- 25 percent reduction in transportation-related greenhouse gas emissions (2008 baseline)
- 30 percent reduction in fleet petroleum use (2014 baseline)
- New buildings to be zero net energy (and where feasible, zero net waste and water) that enter the design process after 2020

Energy Policy and Conservation Act

Enacted in 1975, this legislation established fuel economy standards for new light-duty vehicles sold in the U.S. The law placed responsibility on the National Highway Traffic and Safety Administration (a part of the U.S. Department of Transportation) for establishing and regularly updating vehicle standards. The U.S. Environmental Protection Agency (U.S. EPA) administers the Corporate Average Fuel Economy (CAFE) program, which determines vehicle manufacturers' compliance with existing fuel economy standards. Since the inception of the CAFE program, the average fuel economy for new light-duty vehicles (autos, pickups, vans, and SUVs) steadily increased from 13.1 mpg for the 1975 model year to 27.5 mpg for the 2012 model year and is proposed to increase to 54.5 by 2025.

Energy Star Program

In 1992, the U.S. EPA introduced Energy Star as a voluntary labeling program designed to identify and promote energy-efficient products to reduce greenhouse gas 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 specifications for maximum energy use established under the program are certified to display the Energy Star label. In 1996, US EPA joined with the Energy Department to expand the program, which now also includes qualifying commercial and industrial buildings, and homes.

4.14.3.2 State Regulations

Title 24

Title 24, Part 6, of the California Code of Regulations contains the California Energy Commission's (CEC) Energy Efficiency Standards for Residential and Nonresidential Buildings. Title 24 was first established in 1978, in response to a legislative mandate to reduce California's energy consumption. Since that time,

Title 24 has been updated periodically to allow for consideration and possible incorporation of new energy efficiency technologies and methods.

On April 23, 2008, the CEC adopted the 2008 standards, which applied to projects that submitted an application for a building permit on or after January 1, 2010. The CEC adopted the 2008 standards for a number of reasons: (1) to provide California with an adequate, reasonably priced, and environmentally sound supply of energy; (2) to respond to Assembly Bill 32 (AB 32; the Global Warming Solutions Act of 2006), which requires California to reduce its greenhouse gas emissions to 1990 levels by 2020; (3) to pursue the statewide policy that energy efficiency is the resource of choice for meeting California's energy needs; (4) to act on the findings of California's Integrated Energy Policy Report, which indicate that the 2008 Standards are the most cost-effective means to achieve energy efficiency, reduce the energy demand associated with water supply, and reduce greenhouse gas emissions; (5) to meet the West Coast Governors' Global Warming Initiative commitment to include aggressive energy efficiency measures in the update of all state building codes; and (6) to meet the Executive Order in the Green Building Initiative to improve the energy efficiency of nonresidential buildings through aggressive standards.[1] In 2013, updates were made to the 2008 Title 24 standards (effective January 1, 2014).

The California Green Building Standards Code, which is Part 11 of the Title 24 Building Standards Code, is commonly referred to as the CALGreen Code. The 2008 edition, the first edition of the CALGreen Code, contained only voluntary standards. The CALGreen Code was last updated in 2016 and became effective January 2017. The CALGreen Code identifies mandatory requirements for new residential and nonresidential buildings (including buildings for retail, office, public schools, and hospitals) throughout California. The CALGreen Code contains requirements for construction site selection, stormwater control during construction, construction solid waste reduction, indoor water use reduction, building material selection, natural resource conservation, site irrigation conservation, and more. Additionally, this code encourages buildings to achieve exemplary performance in the area of energy efficiency.

AB 32, Executive Order S-3-05, Executive Order B-30-15, and SB 32

In addition to Title 24, a number of state laws and regulations, including AB 32, Executive Order S-3-05, Executive Order B-30-15, and SB 32, are anticipated to result in the future regulation of energy resources in California. (See **Section 4.4, Greenhouse Gas Emissions,** for additional information on AB 32, SB 32, and the two executive orders.) In order to achieve the GHG emission reductions targeted under these state laws, it is generally accepted that California will need to improve its overall energy efficiency as well as continue to increase its use of renewable energy resources. Pursuant to AB 32 and SB 32, the

1 See http://www.energy.ca.gov/title24/2008standards/index.html, 2013.

California Air Resources Board (CARB) will work with other state agencies (including the CEC), to implement feasible programs and regulations that reduce emissions and improve energy efficiency.[2]

Senate Bill 350

Senate Bill 350 (SB 350) was signed into law in 2015. The legislation requires that, by 2030, 50 percent of all electricity provided by power plants in California must be from renewable sources. SB 350 further requires the CEC to establish annual targets for statewide energy efficiency savings and demand reduction that would achieve a cumulative doubling of statewide energy efficiency savings in electricity and natural gas by retail customers by 2030. The bill requires the Public Utilities Commission to establish efficiency targets for investor-owned electrical and gas corporations consistent with the 2030 goal, and the CEC to establish annual targets for energy efficiency savings and demand reductions for local publicly-owned electric utilities consistent with the 2030 goal. Each retailer of electricity must regularly file an integrated resource plan (IRP) for review and approval. This bill requires that the amount of electricity generated and sold to retail customers per year from eligible renewable energy resources be at 50 percent of the total sold energy by December 31, 2030.

Other Energy Related Statutes and Executive Orders

Additional legislation and executive orders focused on energy efficiency in California are highlighted briefly below:

- Senate Bill 107: This legislation, which addresses California's Renewables Portfolio Standard (RPS), required retail sellers of electricity to procure 20 percent of retail sales from renewable energy.

- Assembly Bill 1613: This legislation, also known as the Waste Heat and Carbon Emissions Reduction Act, was designed to encourage the development of new combined heat and power systems in California with a generating capacity of up to 20 megawatts (MW).

- Senate Bill 1: This legislation enacted the Governor's Million Solar Roofs program and has an overall objective of installing 3,000 MW of solar photovoltaic systems.

- Senate Bill 1389: This legislation requires the CEC to prepare a biennial integrated energy policy report that contains an assessment of major energy trends and issues facing the state's electricity, natural gas, and transportation fuel sectors and provides policy recommendations to conserve resources; protect the environment; ensure reliable, secure, and diverse energy supplies; enhance the state's economy; and protect public health and safety.

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2 See http://www.arb.ca.gov/cc/ghgsectors/ghgsectors.htm#electric, September 13, 2013 (highlights targeted improvements for the energy sector).

- Executive Order S-14-08: This order established accelerated RPS targets—specifically 33 percent by 2020.
- Executive Order S-21-09: This order required CARB to adopt regulations, increasing California's RPS to 33 percent by 2020.
- Senate Bill SBX1-2: This legislation established new RPS goals of 20 percent of retail sales from renewables by the end of 2013, 25 percent by the end of 2016, and 33 percent by the end of 2020.[3]

4.14.3.3 Local Plans and Policies

University of California Sustainable Practices Policy

The University of California Sustainable Practices Policy ("Policy"), most recently updated in September 2016, is a system-wide commitment to minimize the University's impact on the environment and reduce its dependence on non-renewable energy sources. The Policy establishes goals in nine areas of sustainable practices: green building, clean energy, transportation, climate protection, sustainable operations, waste reduction and recycling, environmentally preferable purchasing, sustainable foodservice, sustainable water systems. More information on the Policy is presented in **Section 4.6, Greenhouse Gas Emissions**.

UC Santa Cruz Climate and Energy Strategy

The UC Santa Cruz Climate and Energy Strategy (CES) report was prepared in 2016. The CES report resulted from an eighteen-month process led by campus staff in partnership with a team of consultants to develop a detailed plan for achieving UC Santa Cruz's two climate and energy goals:

- Achieve carbon neutrality by 2025 for scopes 1 and 2 emissions, and
- Mitigate the impacts of Cap and Trade regulation.

Campus Sustainability Plan 2017-2022

The Campus Sustainability Plan 2017-2022 lays out UC Santa Cruz's sustainability goals for the next five years. Goals and strategies addressed within the plan are grouped into five topics:

Learning and Culture

The goals and strategies under this topic provide mechanisms for engaging students, staff, faculty and the Santa Cruz community in sustainability through research, curricular and co-curricular efforts,

3 PG&E is currently under contract through 2020 to procure 37 percent of retail sales from renewable energy sources.

outreach, education and collaboration; identify opportunities for integrating prosperity, equity, and fairness into our campus' business and operations; and strategies to encourage the use of the campus as a living laboratory for academic research on sustainability and justice issues (UCSC 2017).

Material Management and Food Systems

The goals and strategies under this topic highlight of the environmentally preferred product purchases, address the UC Office of the President Sustainable Practices Policy goal of Zero Waste, and provide food security and access for the campus community.

Natural Environment & Infrastructure

The goals and strategies under this topic highlight the interrelated nature of campus lands and physical infrastructure and explore synergies related to the operational topics of Transportation, Land & Habitat Stewardship, Watershed & Stormwater, and Water Conservation.

Climate & Energy

The goals and strategies under this topic addresses the Carbon Neutrality Initiative, a system-wide challenge issued by President Napolitano for all campuses to achieve carbon neutrality by 2025 for their onsite sources of combustion, such as cogeneration and boilers, purchased electricity and the campus vehicle fleet.

4.14.4 IMPACTS AND MITIGATION MEASURES

4.14.4.1 Significance Criteria

Public Resources Code (PRC) Section 21100(b)(3) and State CEQA Guidelines Section 15126.4 require EIRs to describe, where relevant, the wasteful, inefficient, and unnecessary consumption of energy caused by a project. Neither Appendix F of the State CEQA Guidelines nor PRC Section 21100(b)(3)) offer a threshold of significance that might be used to evaluate the potential significance of energy consumption of a proposed project. Rather, the emphasis is on reducing "the wasteful, inefficient, and unnecessary consumption of energy."

Additionally, UC Santa Cruz has determined that a project's impacts would be considered significant if the project would require new or expanded energy facilities, the construction of which would result in significant environmental impacts.

Therefore, based on the above, the impact of the proposed project related to energy would be considered significant if it would exceed the following standards of significance:

- Involve the wasteful, inefficient, and unnecessary consumption of energy, especially fossil fuels such as coal, natural gas, and oil, associated with project design, project location, the use of electricity and/or natural gas, and/or the use of fuel by vehicles anticipated to travel to and from the project; or
- Exceed the LRDP EIR standard of significance by resulting in the construction of new or expanded electrical or natural gas facilities, the construction of which would cause significant environmental effects. (see Section 3.15 of the 2005 LRDP EIR.)

Appendix F of the State CEQA Guidelines describes the means of achieving the goal of conserving energy to include:

- Decreasing overall per capita energy consumption;
- Decreasing reliance on natural gas and oil; and
- Increasing reliance on renewable energy sources.

4.14.4.2 CEQA Checklist Items Adequately Analyzed at the 2005 LRDP Level or Not Applicable to the Project

Although redevelopment of the FSH complex on the Heller site was evaluated in the 2005 LRDP EIR, the currently proposed Heller site housing is substantially different from the previous proposal. With regard to the Hagar site, that site was not envisioned for any development under the 2005 LRDP. Therefore, although the analysis below uses the prior LRDP level analysis to the extent appropriate, neither of the CEQA checklist items listed above under Significance Criteria are scoped out; both items are addressed in the project-level analysis below.

4.14.4.3 Methodology

Appendix F requires an EIR to present the total energy required by a project by fuel type and end use, during construction, operation and removal of the project. The methodology used to estimate the construction-phase energy use is described in **SHW Impact EN-1** below. With respect to energy consumption during occupancy/operation, the increased electricity and natural gas demand due to operation/occupancy of the proposed project were obtained from the project description.

4.14.4.4 2005 LRDP EIR Impacts and Mitigation Measures

Table 4.14-1, 2005 LRDP EIR Mitigation Measures, presents an energy-related mitigation measure in the 2005 LRDP EIR that is applicable to the proposed project. Since this previously adopted mitigation measure is already being carried out as part of implementation of the 2005 LRDP, it is included in and is a part of the proposed project and will not be readopted. Implementation of the mitigation measure is assumed as part of the project impact analysis.

Table 4.14-1
2005 LRDP EIR Mitigation Measures

Mitigation Measure	Description
UTIL-5	Where feasible, new campus buildings will be added to the Campus Energy Management System and heating and cooling will be controlled based on time of use of building and outside temperature..

Source: UC Santa Cruz 2006

4.14.4.5 Project Impacts and Mitigation Measures

SHW Impact EN-1: Construction and operation of the proposed project would increase the use of energy resources on the project site but would not result in wasteful, inefficient or unnecessary consumption of energy resources. (*Less than Significant*)

Construction

During construction of the proposed project, energy would be consumed in the form of petroleum-based fuels used to power off-road construction vehicles and equipment on the project site, construction worker travel to and from the project site, as well as delivery truck trips; and to operate generators to provide temporary power for lighting and electronic equipment. The manufacture of construction materials used by the proposed project would also involve energy use. Due to the large number of materials and manufacturers involved in the production of construction materials (including manufacturers in other states and countries), upstream energy use cannot be reasonably estimated. However, it is reasonable to assume that manufacturers of building materials such as concrete, steel, etc., would employ all reasonable energy conservation practices in the interest of minimizing the cost of doing business. Furthermore, UC

Santa Cruz has no control over or the ability to influence energy resource use by the manufacturers of construction materials. Therefore, this analysis does not evaluate upstream energy use.

At the Heller site, the project would require site preparation (i.e., demolition and grading); pavement and asphalt installation; building construction; architectural coating; and landscaping and hardscaping. The Hagar site would involve the same construction activities but no demolition would be required. All construction would be typical for the region and building type. The total consumption of gasoline and diesel fuel during project construction was estimated using the same assumptions and factors from CalEEMod that were used in estimating construction air emissions in **Section 4.2, Air Quality**. The estimated amounts of energy resources that would be consumed at each site are presented in **Table 4.14-2, Construction Period Diesel Fuel and Petroleum Fuel Consumption** below (see **Appendix 4.14** for detailed breakdown).

Table 4.14-2
Construction Period Diesel Fuel and Petroleum Fuel Consumption

Fuel Type	Diesel Fuel (in gallons)[a]	Petroleum Fuel (in gallons)
Heller Site	251,458	297,257
Hagar Site	61,054	23,144
Total	312,512	320,401

Source: CalEEMod Model Data; Illingworth & Rodkin 2018
Notes:
a. Includes consumption from off-road construction equipment, vendor trips, and hauling trips.
b. Includes consumptions from worker trips.

As shown in **Table 4.14-2**, above, off-road construction equipment, vendor trips, and hauling trips would consume a total of approximately 312,512 gallons of diesel over the project construction period. Worker trips would consume a total of 320,401 gallons of gasoline over the project's construction period. These would be consumed over a period of 50 months and would represent a small percentage of the total energy used in the state and by UC Santa Cruz. More importantly, for reasons presented below, this consumption would not represent a wasteful and inefficient use of energy resources.

There is growing recognition among developers and retailers that sustainable construction is not any more expensive than "business as usual" construction methods, and further, that there are long-term significant cost-savings potential in utilizing green building practices and materials. In addition, the proposed project would feature a sustainable design to comply with CALGreen, which would also result in the use of sustainable materials and recycled content that would reduce energy consumption during

project construction. Construction materials would be products originating from nearby sources to the extent feasible in order to comply with CALGreen and to reduce costs of transportation.

CARB has adopted an Airborne Toxic Control Measure (ATCM) to limit heavy-duty diesel motor vehicle idling in order to reduce public exposure to diesel particulate matter and other toxic air contaminants. This measure prohibits diesel-fueled commercial vehicles greater than 10,000 pounds from idling for more than 5 minutes at any given time. Furthermore, to reduce public exposure to diesel particulate matter, **SHW Mitigation AIR-1** is proposed (see **Section 4.2, Air Quality),** which requires that construction equipment be selected to minimize emissions, and that all diesel-powered off-road equipment larger than 25 horsepower and operating on the site for more than two days in a row shall, at a minimum, meet U.S. EPA emissions standards for Tier 3 engines or equivalent and shall be fitted with CARB-certified Level 3 Diesel Particulate Filters. Idling restrictions and the use of newer engines and properly maintained equipment would result in less fuel combustion and energy consumption. Furthermore, contractors have a strong financial incentive to avoid wasteful, inefficient, and unnecessary consumption of energy during construction.

For the reasons listed above, the proposed project would not involve the inefficient, wasteful, and unnecessary use of energy during construction and the construction-phase impact related to energy consumption would be less than significant.

Operation

As presented in **Table 3.0-2**, the proposed project would result in a net new demand of approximately 31,920 cubic feet per hour (cfh) of natural gas or 31,920,000 British thermal units (BTU) and a net new electricity demand of 12,952 kilovolt-ampere (KVA).

Title 24 represents the state policy on building energy efficiency. The goals of the Title 24 standards are to improve energy efficiency of residential and non-residential buildings, minimize impacts during peak energy-usage periods, and reduce impacts on state energy needs. UC Policy requires buildings to exceed Title 24 by 20% or meet energy performance targets. The proposed project is pursuing compliance with the Policy by meeting the energy performance target of an EUI of 26 kBTU/sf/yr. Therefore, the proposed project would exceed the Title 24 energy requirements. The University also requires all UC projects to achieve a minimum of a Silver rating under United States Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) Building Design and Construction (BD+C) v4.0 Green Building Rating System (the "LEED Rating System"). The proposed project will achieve a Gold rating and is targeting to achieve a LEED Platinum certification (the highest rating). Thus, the proposed project

would comply with the *UC Sustainable Practices Policy*, which requires 20 percent better energy performance than Title 24 (and strives to achieve 30 percent).

Furthermore, UC Santa Cruz will implement LRDP Mitigation UTIL-5, and is also proposing to include the following features to minimize energy consumption, which would further reduce the amount of electricity and natural gas consumed by the proposed project from the estimates reported above:

Heller Site

- All buildings would be designed and constructed to be energy efficient. The exterior envelope would be optimized to improve thermal isolation. The exterior walls and roofs would have enhanced insulating qualities. High-performance glass would be used to promote daylighting and passive solar heat gain in the winter without excessive use of glazing. Horizontal sun shades at south-facing elevations, and vertical sun shades at unshaded west-facing elevations would be installed to reduce solar heat gains during the summer and allow passive solar heating during winter months.

- The general lighting in the buildings would be accomplished through a combination of daylighting and general artificial lighting. In areas of special function, specialty lighting would be utilized. Light fixtures and lighting system would be selected based on performance and aesthetics.

- The student housing units would be provided with heating-only mechanical systems. Ventilation would be provided by unit exhaust with makeup air through trickle vents in the exterior wall. The units would also be provided with operable windows to provide natural ventilating and passive cooling whenever conditions are appropriate. Cooling would be provided only for certain spaces such as main electrical rooms.

- Roof-top photovoltaics would be included in at the Heller site to provide electricity to the project.

- High efficiency electrical fixtures and appliances would be included in the proposed housing.

Hagar Site

- Buildings will be oriented and located to be energy efficient and sustainable.

- The street network will be designed to encourage multi-model circulation.

- Climate-appropriate plant materials will be used.

- The project will also seek to utilize renewable sources of energy including solar PVs, sewer heat recovery, and water recycling.

- Low-flow water fixtures, energy star appliances, high-efficiency irrigation systems, high-performance exterior building envelopes, insulated glazing, LED lighting, and natural ventilation will also be utilized.

As the project would be in compliance with Title 24 and include the above sustainable project features, electricity and natural gas use would not be inefficient, wasteful, and unnecessary. The impact would be less than significant.

Petroleum-Based Fuel

The proposed project would not result in a substantial increase in petroleum-based fuel consumption because it would not result in a substantial increase in vehicle trips. This is because students living in the proposed on-campus housing would walk, ride a bike or take a UC Santa Cruz shuttle to travel between the project site, classes, and other campus facilities. In addition, the project would reduce daily trips compared to existing conditions and also compared to the no project scenario because students who would otherwise live off campus and make trips to the campus would instead live on campus.

In summary, the proposed building would be energy efficient and by virtue of its location and design features such as limited parking, provision of bicycle facilities and convenient access to transit, the project would minimize petroleum-based fuel use, and the proposed project would not involve the inefficient, wasteful, and unnecessary use of energy during operation,. The impact related to operation-phase energy consumption would be less than significant.

Mitigation Measures: No mitigation is required.

SHW Impact EN-2: The proposed project would not require or result in the construction of new or expanded electrical or natural gas facilities, which would cause significant environmental effects. (*Less than Significant*)

Construction

Some electricity, obtained from the electrical distribution system, would be used during project construction for activities. However, it is not anticipated that the usage of electricity would be so high as to require new or expanded electricity generation or transmission facilities. The construction-phase impact would be less than significant.

Operation

As mentioned above and in **Table 3.0-2**, the proposed project would result in a net new electricity demand of 12,952 kilovolt-ampere (KVA). The project would not routinely use natural gas; natural gas would be used only when needed to operate the emergency generators during power outages and during

maintenance testing. The electrical loads and natural gas demand that would be required by the proposed project are within the parameters of projected load growth under the 2006 LRDP. Although the proposed project would increase demand for energy, the project-generated demand would be typical for a project of this size and not significant in the context of the overall consumer demand in the City of Santa Cruz and the state.

It is anticipated that natural gas and electricity would be provided to the project site using existing and proposed infrastructure. A new 21 kV line would be installed to serve the proposed Heller site development from the existing point of connection on Empire Grade to the southwest corner of the Heller site within the existing utility easement. This line is not necessary to serve the Kresge College project and extension to Kresge College is not part of the Kresge College project. While the capacity is large enough that it could serve future development on the campus, there are no currently planned projects that would rely on it. The Campus could also use it in the future to address existing redundancy needs.

The project's demand for electricity by itself would not require the construction of new power generation facilities. Therefore, the proposed project would not result in the consumption of energy resources that could not be accommodated within the long-term electricity and natural gas supply and distribution system of PG&E.

The proposed project demand would, however, combined with the demand for electricity associated with past, present and reasonably foreseeable future projects in the region could contribute to the need for an expansion of an existing power plant or the construction of a new power plant. Both electricity and gas needed by the cumulative development may, in fact, be generated out of state. It is therefore not reasonable to predict where the new supply sources would be located or to evaluate the environmental consequences from the construction and operation of such facilities. Furthermore, if the new power generation facilities were to be located in California, they would be subject to environmental review and would be required to avoid or minimize their environmental impacts. Accordingly, the impact would be less than significant.

Mitigation Measures: No mitigation measures are required.

4.14.5 PORTER AND RACHEL CARSON DINING FACILITIES EXPANSION PROJECT IMPACTS AND MITIGATION MEASURES

Environmental Setting

The proposed dining facilities expansion project would add to existing facilities on the west side of Rachel Carson College and to the southern end of Porter College. In both instances, the facilities would be located above or adjacent to existing buildings, or would replace the existing buildings with larger buildings.

Impacts and Mitigation Measures

DF Impact EN-1: **Construction and operation of the proposed dining facilities expansion project would minimally increase the consumption of energy but would not result in wasteful, inefficient or unnecessary consumption of energy or exceed the capacity of distribution systems.** (***Less than Significant***)

The proposed dining facilities expansion project would minimally increase diesel fuel and gasoline use during construction due to a small number of construction worker trips and the use of some pieces of construction equipment. However, although energy consumption would temporarily increase due to construction, this use would not be wasteful, inefficient or unnecessary. A less than significant impact would occur.

Similarly, while operation of the expanded dining facilities would involve use of energy resources, the use would not be considered wasteful for the same reasons presented above for the proposed SHW project. The impact would be less than significant.

Mitigation Measures: No mitigation is required.

4.14.6 ALTERNATIVES

Appendix F states that alternatives should be compared in terms of overall energy consumption and in terms of measures to reduce energy use. The energy use and impacts of alternatives to the proposed project are presented in **Chapter 5.0, Alternatives**, of this Revised Draft EIR.

4.14.7 UNAVOIDABLE ADVERSE EFFECTS

Appendix F requires that the EIR report any unavoidable adverse impacts associated with the project's energy use. The analysis presented in **SHW Impacts EN-1** and **EN-2** above shows that the proposed project would not result in a significant unavoidable impact associated with a wasteful use of energy resources or an impact associated with the construction of new electricity and natural gas facilities.

4.14.8 IRREVERSIBLE COMMITMENT OF RESOURCES

Appendix F states that an irreversible commitment of resources could occur if the project preempts future energy development or future energy conservation. The Heller site is currently developed with buildings and the Hagar site has buildings and development in the nearby vicinity. Both sites are located on the UC Santa Cruz campus, which is within a developed portion of the City of Santa Cruz. Construction of new buildings to house undergraduates, graduates, and students with families would not preempt future energy development on the project sites since there are no energy resources located on or near the site. The proposed project would also not preempt future energy conservation, because UC Santa Cruz continues to evaluate and implement ways to reduce its energy use.

4.14.9 SHORT-TERM GAINS AND LONG-TERM IMPACTS

Appendix F suggests that the project's short-term gains and long-term impacts can be evaluated by calculating the project's energy cost over the project's lifetime. The proposed project would operate with an estimated net new energy demand of 12,952 KVA of electricity during full operation. While this would represent an increase in energy use, it would not be a wasteful use of energy. Appendix F identifies as a goal "the wise and efficient use of energy." The proposed project would incorporate the sustainable features listed in **SHW Impact EN-1** above. Consequently, the proposed project would help achieve the short-term gains and would not increase long-term impacts in the area of energy conservation.

4.14.10 GROWTH-INDUCING EFFECTS

Appendix F states that growth-inducing effects may include the energy consumption of the growth induced by the project. As stated in **Chapter 6, Other CEQA Considerations**, the proposed project would add new residents to the campus and reduce the demand on the City's overall housing stock. The proposed project would not promote an increase in enrollment above what was analyzed in the 2006 LRDP Final EIR. Therefore, substantial population growth and associated energy consumption due to new residents and staff would not occur. The proposed project would generate incidental, short-term construction employment that would be filled by the labor force available in the region, and would not induce growth.

4.14.11 REFERENCES

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