4.5 ENERGY CONSUMPTION

4.5.1 INTRODUCTION

This section describes the existing setting of the project site, identifies associated regulatory requirements, evaluates potential impacts, and identifies mitigation measures related to implementation of the SDSU New Student Housing project (project or proposed project). Information described herein is primarily from the Energy Resources Technical Report for the proposed project, prepared by Dudek in February 2017. The Energy Resources Technical Report is included as **Appendix F** to this DEIR.

4.5.2 METHODOLOGY

Information contained in the Energy Resources Technical Report is based on data gathered from SDSU; default assumptions within the California Emissions Estimator Model (CalEEMod), Version 2016.3.1; and best engineering judgment.

Following the issuance of the Notice of Preparation (NOP) for the proposed project, CSU/SDSU received one comment letter regarding energy. This comment addresses concerns reduced sunlight on the homes to the west, leading to reduced solar PV system output.

4.5.3 EXISTING CONDITIONS

4.5.3.1 ENVIRONMENTAL SETTING

In 2013, California's estimated annual energy use included:

- Approximately 280,617 gigawatt hours of electricity (CEC 2014);
- Approximately 12,767 million therms natural gas (approximately 3.5 billion cubic feet of natural gas per day); and
- Approximately 18 billion gallons of gasoline (CEC 2013).

Electricity

According to the California Energy Commission's (CEC) California Energy Demand Updated Forecast 2015–2025, California used approximately 280,617 gigawatts per hour (2,806 trillion kilowatt-hours (kWh)) of electricity in 2013 (CEC 2014), which is the most recent year of data available. Electricity usage in California for different land uses varies substantially by the types of uses in a building, type of construction materials used in a building, and the efficiency of all electricity-consuming devices within a building. Due to the state's energy efficiency standards and efficiency and conservation programs, California's per-capita use has remained stable for more than 30 years, while the national average has steadily increased.

San Diego Gas & Electric (SDG&E) provides electric services to 3.6 million customers through 1.4 million electric meters and 873,000 natural gas meters throughout a 4,100-square-mile service area in San Diego County and southern Orange County (SDG&E 2016). SDG&E is a subsidiary of Sempra Energy and will provide electricity to the project site. According to the California Public Utilities Commission (CPUC), SDG&E consumed approximately 16.467 billion kWh of electricity in total in 2014 (CPUC 2016).

SDG&E receives electric power from a variety of sources. According to the CPUC's 2016 Biennial Renewables Portfolio Standard (RPS) Program Update, 36.4% of SDG&E's power came from eligible renewables in 2014, including biomass/waste, geothermal, small hydroelectric, solar, and wind sources (CPUC 2016). This is an improvement from the 15.7% that SDG&E maintained in 2011.

Based on recent energy supply and demand projections in California, statewide annual peak demand is projected to grow an average of 890 megawatts per year for the next decade, or 1.4% annually, while per capita consumption is expected to remain relatively constant at 7,200–7,800 kWh per person (CEC 2015a). In the County of San Diego (County), the CEC reported an annual electrical consumption of approximately 19.9 billion kWh in total, with 13.1 billion kWh for non-residential use and 6.8 billion kWh for residential use in 2014 (CEC 2016a).

Natural Gas

CPUC regulates natural gas utility service for approximately 10.8 million customers that receive natural gas from Pacific Gas and Electric (PG&E), Southern California Gas (SoCalGas), SDG&E, Southwest Gas, and several smaller natural gas utilities. CPUC also regulates independent storage operators Lodi Gas Storage, Wild Goose Storage, Central Valley Storage, and Gill Ranch Storage (CPUC 2017). SDG&E provides natural gas service to the City of San Diego.

The vast majority of California's natural gas customers are residential and small commercial customers, referred to as "core" customers, who accounted for approximately 32% of the natural gas delivered by California utilities in 2012. Large consumers, such as electric generators and industrial customers, referred to as "noncore" customers, accounted for approximately 68% of the natural gas delivered by California utilities in 2012 (CPUC 2017).

CPUC regulates the California utilities' natural gas rates and natural gas services, including in-state transportation over the utilities' transmission and distribution pipeline systems, storage, procurement, metering, and billing. Most of the natural gas used in California comes from out-of-state natural gas basins. However, California gas utilities may soon also begin receiving biogas into their pipeline systems.

In 2012, California customers received 35% of their natural gas supply from basins located in the Southwest, 16% from Canada, 40% from the Rocky Mountains, and 9% from basins located within California (CPUC 2017).

Natural gas from out-of-state production basins is delivered into California via the interstate natural gas pipeline system. The major interstate pipelines that deliver out-of-state natural gas to California consumers are the Gas Transmission Northwest Pipeline, Kern River Pipeline, Transwestern Pipeline, El Paso Pipeline, the Ruby Pipeline, Questar Southern Trails, and Mojave Pipeline. Another pipeline, the North Baja–Baja Norte Pipeline, takes gas off the El Paso Pipeline at the California/Arizona border, and delivers that gas through California into Mexico. While the Federal Energy Regulatory Commission regulates the transportation of natural gas on the interstate pipelines, CPUC often participates in Federal Energy Regulatory Commission regulatory proceedings to represent the interests of California natural gas consumers (CPUC 2017).

Most of the natural gas transported via the interstate pipelines, as well as some of the California-produced natural gas, is delivered into the PG&E and SoCalGas intrastate natural gas transmission pipeline systems (commonly referred to as California's "backbone" natural gas pipeline system). Natural gas on the utilities' backbone pipeline systems is then delivered into the local transmission and distribution pipeline systems, or to natural gas storage fields. Some large noncore customers take natural gas directly off the high pressure backbone pipeline systems, while core customers and other noncore customers take natural gas off the utilities' distribution pipeline systems. The CPUC has regulatory jurisdiction over 150,000 miles of utility-owned natural gas pipelines, which transported 82% of the total amount of natural gas delivered to California's gas consumers in 2012 (CPUC 2017).

SDG&E and Southwest Gas' southern division are wholesale customers of SoCalGas and currently receive all of their natural gas from the SoCalGas system. (CPUC 2017).

Some of the natural gas delivered to California customers may be delivered directly to them without being transported over the regulated utility systems. For example, the Kern River/Mojave pipeline system can deliver natural gas directly to some large customers, "bypassing" the utilities' systems. Much of California-produced natural gas is also delivered directly to large consumers (CPUC 2017).

PG&E and SoCalGas own and operate several natural gas storage fields that are located in Northern and Southern California. These storage fields, and four independently owned storage utilities – Lodi Gas Storage, Wild Goose Storage, Central Valley Storage, and Gill Ranch Storage – help meet peak seasonal natural gas demand and allow California natural gas customers to secure natural gas supplies more efficiently (CPUC 2017).

California's regulated utilities do not own any natural gas production facilities. All of the natural gas sold by these utilities must be purchased from suppliers and/or marketers. The price of natural gas sold by suppliers and marketers was deregulated by the Federal Energy Regulatory Commission in the mid-1980s and is determined by "market forces." However, the CPUC decides whether California's utilities have taken reasonable steps in order to minimize the cost of natural gas purchased on behalf of their core customers (CPUC 2017).

As indicated in the preceding discussion, natural gas is available from a variety of in-state and out-of-state sources and is provided throughout the state in response to market supply and demand. Complementing available natural gas resources, biogas may soon be available via existing delivery systems, thereby increasing the availability and reliability of resources in total. CPUC oversees utility purchases and transmission of natural gas to ensure reliable and affordable natural gas deliveries to existing and new consumers throughout the state (CPUC 2017).

Petroleum

There are more than 27 million registered vehicles in California, and those vehicles consume an estimated 18 billion gallons of fuel each year (CEC 2013). Gasoline and other vehicle fuels are commercially provided commodities, and would be available to the SDSU Student Housing project via commercial outlets.

Petroleum accounts for approximately 92% of California's transportation energy sources. Technology advances, market trends, consumer behavior, and government policies could result in significant changes in fuel consumption by type and in total. At the federal and state levels, various policies, rules, and regulations have been enacted to improve vehicle fuel efficiency, promote the development and use of alternative fuels, reduce transportation-source air pollutants and greenhouse gas (GHG) emissions, and reduce vehicle miles traveled. Market forces have driven the price of petroleum products steadily upward, and technological advances have made use of other energy resources or alternative transportation modes increasingly feasible.

Largely as a result of, and in response to these multiple factors, gasoline consumption within the state has declined in recent years, while availability of other alternative fuels/energy sources has increased. In total, the quantity and availability and reliability of transportation energy resources have increased in recent years, and this trend may likely continue and accelerate (CEC 2013). Increasingly available and diversified transportation energy resources act to promote continuing reliable and affordable means to support vehicular transportation within the state.

4.5.4 RELEVANT PLAN, POLICIES, AND ORDINANCES

Federal, state, and local agencies regulate energy use and consumption through various means and programs. On the federal level, the U.S. Department of Transportation, the U.S. Department of Energy, and the U.S. Environmental Protection Agency (EPA) are three federal agencies with substantial influence over energy policies and programs. On the state level, CPUC and the CEC are two agencies with authority over different aspects of energy. Relevant federal, state, and local energy-related regulations are summarized below.

Federal

Federal Energy Policy and Conservation Act

In 1975, Congress enacted the Federal Energy Policy and Conservation Act, which established the first fuel economy standards for on-road motor vehicles in the United States. Pursuant to the act, the National Highway Traffic Safety Administration is responsible for establishing additional vehicle standards. In 2012, new fuel economy standards were approved for model year 2017 passenger cars and light trucks at 54.5 miles per gallon (77 FR 62623–63200). Fuel economy is determined based on each manufacturer's average fuel economy for the fleet of vehicles available for sale in the United States.

Intermodal Surface Transportation Efficiency Act of 1991

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) promoted the development of intermodal transportation systems to maximize mobility, as well as address national and local interests in air quality and energy. ISTEA contained factors that metropolitan planning organizations were to address in developing transportation plans and programs, including some energy-related factors. To meet the new ISTEA requirements, metropolitan planning organizations adopted explicit policies defining the social, economic, energy, and environmental values guiding transportation decisions.

The Transportation Equity Act for the 21st Century

The Transportation Equity Act for the 21st Century (TEA-21) was signed into law in 1998 and builds upon the initiatives established in the ISTEA legislation, discussed above. TEA-21 authorizes highway, highway safety, transit, and other efficient surface transportation programs. TEA-21 continues the program structure established for highways and transit under ISTEA, such as flexibility in the use of funds, emphasis on measures to improve the environment, and focus on a strong planning process as the foundation of good transportation decisions. TEA-21 also provides for investment in research and its application to maximize the performance of the transportation system through, for example, deployment of Intelligent Transportation Systems, to help improve operations and management of transportation systems and vehicle safety.

Energy Independence and Security Act of 2007

On December 19, 2007, the Energy Independence and Security Act of 2007 (EISA) was signed into law. In addition to setting increased Corporate Average Fuel Economy standards for motor vehicles, the EISA includes other provisions related to energy efficiency:

- Renewable Fuel Standard (RFS) (Section 202)
- Appliance and Lighting Efficiency Standards (Sections 301–325)
- Building Energy Efficiency (Sections 411–441)

This federal legislation requires ever-increasing levels of renewable fuels—the RFS—to replace petroleum. The EPA is responsible for developing and implementing regulations to ensure that transportation fuel sold in the United States contains a minimum volume of renewable fuel. The RFS program regulations were developed in collaboration with refiners, renewable fuel producers, and many other stakeholders.

- The RFS program was created under the Energy Policy Act of 2005 and established the first renewable fuel volume mandate in the United States. As required under the Act, the original RFS program (RFS1) required 7.5 billion gallons of renewable fuel to be blended into gasoline by 2012. Under the EISA, the RFS program was expanded in several key ways that lay the foundation for achieving significant reductions of GHG emissions from the use of renewable fuels, for reducing imported petroleum, and encouraging the development and expansion of our nation's renewable fuels sector. The updated program is referred to as RFS2 and includes the following:

- EISA expanded the RFS program to include diesel, in addition to gasoline.
- EISA increased the volume of renewable fuel required to be blended into transportation fuel from 9 billion gallons in 2008 to 36 billion gallons by 2022.
- EISA established new categories of renewable fuel and set separate volume requirements for each one.
- EISA required the EPA to apply lifecycle GHG performance threshold standards to ensure that each category of renewable fuel emits fewer GHGs than the petroleum fuel it replaces.

Additional provisions of the EISA address energy savings in government and public institutions, promoting research for alternative energy, additional research in carbon capture, international energy programs, and the creation of "green jobs."

State

<u>California Code Regulations</u>

Part 6 of Title 24 of the California Code of Regulations was established in 1978, and serves to enhance and regulate California's building standards. While not initially promulgated to reduce GHG emissions, Part 6 of Title 24 specifically establishes energy efficiency standards for residential and nonresidential buildings constructed in the State of California in order to reduce energy demand and consumption. Part 6 is updated periodically to incorporate and consider new energy efficiency technologies and methodologies. The 2016 Title 24 building energy efficiency standards, which became effective on January 1, 2017, will further reduce energy used and associated GHG emissions. In general, single-family homes built to the 2016 standards are anticipated to use about 28% less energy for lighting, heating, cooling, ventilation, and water heating than those built to the 2013 standards, and nonresidential buildings built to the 2016 standards will use an estimated 5% less energy than those built to the 2013 standards (CEC 2015c).

Title 24 also includes Part 11, known as California's Green Building Standards (CALGreen). The CALGreen standards took effect in January 2011, and instituted mandatory minimum environmental performance standards for all ground-up, new construction of commercial, low-rise residential and state-owned buildings, as well as schools and hospitals. The 2016 CALGreen standards became effective on January 1, 2017.

The mandatory standards require:

- 20% mandatory reduction in indoor water use.
- 50% of construction and demolition waste must be diverted from landfills.
- Mandatory inspections of energy systems to ensure optimal working efficiency.
- Use of low-pollutant-emitting exterior and interior finish materials, such as paints, carpets, vinyl flooring, and particle boards.

The CALGreen standards also include voluntary efficiency measures that are provided at two separate tiers and implemented per the discretion of local agencies and applicants. CALGreen's Tier 1 standards call for a 15% improvement in energy requirements, more strict water conservation, 65% diversion of construction and demolition waste, 10% recycled content in building materials, 20% permeable paving, 20% cement reduction, and cool/solar reflective roofs. CALGreen's more rigorous Tier 2 standards call for a 30% improvement in energy requirements, more strict water conservation, 75% diversion of construction and demolition waste, 15% recycled content in building materials, 30% permeable paving, 30% cement reduction, and cool/solar reflective roofs.

State of California Energy Action Plan

The CEC is responsible for preparing the State of California Energy Action Plan, which identifies emerging trends related to energy supply, demand, conservation, public health and safety, and the maintenance of a healthy economy. The Energy Action Plan calls for the state to assist in the transformation of the transportation system to improve air quality, reduce congestion, and increase the efficient use of fuel supplies with the least environmental and energy costs. To further this policy, the Plan identifies a number of strategies, including assistance to public agencies and fleet operators and encouragement of urban designs that reduce vehicle miles traveled and accommodate pedestrian and bicycle access.

Senate Bill (SB) 1078. SB 1078 (Sher) (September 2002) established the Renewables Portfolio Standard (RPS) program, which requires an annual increase in renewable generation by the utilities equivalent to at least 1% of sales, with an aggregate goal of 20% by 2017. This goal was subsequently accelerated, requiring utilities to obtain 20% of their power from renewable sources by 2010 (see SB 107, Executive Oder (EO) S-14-08, and EO S-21-09.)

EO S-14-08. EO S-14-08 (November 2008) focuses on the contribution of renewable energy sources to meet the electrical needs of California while reducing the GHG emissions from the electrical sector. This EO requires that all retail suppliers of electricity in California serve 33% of their load with renewable energy by 2020. Furthermore, the EO directs state agencies to take appropriate actions to facilitate reaching this target. The California Natural Resources Agency, through collaboration with the CEC and California Department of Fish and Wildlife (formerly the California Department of Fish and Game), is directed to lead this effort. Pursuant to a Memorandum of Understanding between the CEC and California Department of Fish and Wildlife regarding creating the Renewable Energy Action Team, these agencies will create a "one-stop" process for permitting renewable energy power plants.

EO S-21-09. EO S-21-09 (September 2009) directed the California Air Resources Board (CARB) to adopt a regulation consistent with the goal of EO S-14-08 by July 31, 2010. CARB is further directed to work with the CPUC and CEC to ensure that the regulation builds upon the RPS program and is applicable to investor-owned utilities, publicly owned utilities, direct access providers, and community choice providers. Under this order, CARB is to give the highest priority to those renewable resources that provide the greatest environmental benefits with the least environmental costs and impacts on public health and can be developed the most quickly in support of reliable, efficient, cost-effective electricity system operations. On September 23, 2010, CARB adopted regulations to implement a Renewable Electricity Standard, which would achieve the goal of the EO with the following intermediate and final goals: 20% renewable energy for 2012–2014, 24% for 2015–2017, 28% for 2018–2019, and 33% for 2020 and beyond. Under the regulation, wind; solar; geothermal; small hydroelectric; biomass; ocean wave, thermal, and tidal; landfill and digester gas; and biodiesel would be considered sources of renewable energy. The regulation would apply to investor-owned utilities and public (municipal) utilities.

<u>SB 1368</u>

In September 2006, Governor Schwarzenegger signed SB 1368 (Perata), which requires the CEC to develop and adopt regulations for GHG emissions performance standards for the long-term procurement of electricity by local publicly owned utilities. These standards must be consistent with the standards adopted by the CPUC. This effort was intended to help protect energy customers from financial risks associated with investments in carbon-intensive generation by allowing new capital investments in power plants whose GHG emissions are as low or lower than new combined-cycle natural gas plants, by requiring imported electricity to meet GHG performance standards in California, and by requiring that the standards be developed and adopted in a public process.

SB 1389

SB 1389 (Bowen and Sher) requires that every 2 years, the CEC adopt and transmit to the governor and legislature a report of findings called the Integrated Energy Policy Report. The Integrated Energy Policy Report Committee provides oversight and policy direction related to collecting and analyzing data needed to complete the Integrated Energy Policy Report on trends and issues concerning electricity and natural gas, transportation, energy efficiency, renewables, and public interest energy research.

Assembly Bill 1493

In a response to the transportation sector accounting for more than half of California's carbon dioxide (CO_2) emissions, Assembly Bill 1493 (Pavley) was enacted on July 22, 2002. Assembly Bill 1493 required the CARB to set GHG emission standards for passenger vehicles, light-duty trucks, and other vehicles determined by the state board to be vehicles whose primary use is noncommercial personal transportation in the state. The bill required that CARB set GHG emission standards for motor vehicles manufactured in 2009 and all subsequent model years. CARB adopted the standards in September 2004. When fully phased in, the near-term (2009–2012) standards would result in a reduction of about 22% in GHG emissions compared to the emissions from the 2002 fleet, while the mid-term (2013–2016) standards would result in a reduction of about 30%.

Before these regulations could go into effect, the EPA had to grant California a waiver under the federal Clean Air Act, which ordinarily preempts state regulation of motor vehicle emission standards. The waiver was granted by Lisa Jackson, the EPA Administrator, on June 30, 2009. On March 29, 2010, the CARB Executive Officer approved revisions to the motor vehicle GHG standards to harmonize the state program with the national program for 2012–2016 model years (see the earlier discussion under Federal Energy Policy and Conservation Act). The revised regulations became effective on April 1, 2010.

In 2012, CARB approved a new emissions-control program for model years 2017 through 2025. The program combines the control of smog, soot, and global warming gases and requirements for greater numbers of zero-emission vehicles into a single package of standards called Advanced Clean Cars. By 2025, when the rules would be fully implemented, new automobiles would emit 34% fewer global warming gases and 75% fewer smog-forming emissions (CARB 2011).

Local

City of San Diego land use plans, policies and guidelines are not applicable to California State University (CSU)/SDSU as a state entity. However, these local plans are provided for information and public disclosure purposes only.

City of San Diego General Plan

The Conservation Element of the City of San Diego's General Plan (City of San Diego 2008) includes the following energy-related policies that are applicable to the SDSU Student Housing project.

Policy CE-A.5: Employ sustainable or "green" building techniques for the construction and operation of buildings.

a. Develop and implement sustainable building standards for new and significant remodels of residential and commercial buildings to maximize energy efficiency, and to achieve overall net zero energy consumption by 2020 for new residential buildings and 2030 for new commercial buildings. This can be accomplished through factors including, but not limited to:
    - Designing mechanical and electrical systems that achieve greater energy efficiency with currently available technology
    - Minimizing energy use through innovative site design and building orientation that addresses factors such as sun-shade patterns, prevailing winds, landscape, and sun-screens
    - Employing self-generation of energy using renewable technologies
    - Combining energy efficient measures that have longer payback periods with measures that have shorter payback periods
    - Reducing levels of non-essential lighting, heating and cooling
    - Using energy efficient appliances and lighting.

b. Provide technical services for "green" buildings in partnership with other agencies and organizations.

Policy CE-I.3: Pursue state and federal funding opportunities for research and development of alternative and renewable energy sources.

Policy CE-I.4: Maintain and promote water conservation and waste diversion programs to conserve energy.

Policy CE-I.5: Support the installation of photovoltaic panels, and other forms of renewable energy production.

a. Seek funding to incorporate renewable energy alternatives in public buildings.
b. Promote the use and installation of renewable energy alternatives in new and existing development.

Policy CE-I.7: Pursue investments in energy efficiency and direct sustained efforts towards eliminating inefficient energy use.

Policy CE-I.10: Use renewable energy sources to generate energy to the extent feasible.

Policy CE-I.12: Use small, decentralized, aesthetically-designed, and appropriately-sited energy efficient power generation facilities to the extent feasible.

City of San Diego Energy Strategy for a Sustainable Future

The City of San Diego Environmental Services Department has taken a leadership role to advance policies and practices that support a more sustainable future. In June 2009, the Department published its Energy Strategy for a Sustainable Future, which outlines six objectives to achieve more sustainable generation and use of energy, as follows (City of San Diego 2009):

- Energy Conservation – All City employees will be aware of and implement energy conservation measures by 2010.
- Energy Efficiency – Reduce energy use 10% by 2012, using 2000 as a baseline.
- Renewable Energy – Increase megawatts of renewable energy used at City facilities to 17 by 2012, and to 25 by 2020.
- Management of SDG&E Energy Bills – Continue the use of the Electronic Data Interchange.

- Policy Development and Implementation – Guide City efforts by institutionalizing policies and programs that increase energy conservation, efficiency, and the use of renewable energy.
- Leverage Resources – Ensure that state and federal funds are leveraged to the extent possible with existing programs such as CEC loans and the CPUC Partnership funds.

<u>The California State University</u>

SDSU has signed the American College and University Presidents' Climate Commitment. Additionally, on May 20, 2014, the California State University Sustainability Policy was instated by the Board of Trustees of the California State University. The Sustainability Policy set forth that CSU would set energy efficiency and production goals, including pursuing energy procurement and production to reduce energy capacity requirements from fossil fuels, and promote energy independence using available economically feasible technology for on-site and/or renewable generation (CSU 2014). The policy also states that CSU shall operate in the most energy efficient manner possible, requiring universities to adopt a strategic energy resource plan and an energy management plan to help reduce energy use.

4.5.5 THRESHOLDS OF SIGNIFICANCE

The California Environmental Quality Act (CEQA) Guidelines, Section 15126.4, and Appendix F, Energy Conservation, require that environmental impact reports (EIRs) include a discussion of the potential energy impacts of projects, with particular emphasis on avoiding or reducing inefficient, wasteful, and unnecessary consumption of energy (14 CCR 15000 et seq.).

The following section examines the impacts of the SDSU Student Housing project on energy consumption, including electricity, natural gas, and petroleum. This section presents a summary of the SDSU Student Housing project's anticipated energy needs and compares the energy use estimates of the SDSU Student Housing project to those of the regional and local supply and demand under existing conditions, and to regional and local supply and demand forecasted for the future.

The CEQA Guidelines provide no specific thresholds for impacts associated with energy consumption. However, Appendix F of the CEQA Guidelines presents guidance for evaluating whether a development project may result in significant impacts with regard to energy. Based on this guidance, a project could have a significant impact under CEQA related to energy consumption if the project would:

1. Result in wasteful, inefficient, or unnecessary consumption of energy.
2. Conflict with existing energy standards and regulations.
3. Place a significant demand on local and regional energy supplies or require a substantial amount of additional capacity.

4.5.6 IMPACTS ANALYSIS

Following issuance of the Notice of Preparation (NOP) for the proposed project, CSU/SDSU did not receive any energy related comments submitted by the general public or public agencies.

Would the project result in wasteful, inefficient, or unnecessary consumption of energy?

Implementation of the project would increase the demand for electricity and natural gas at the project site and gasoline consumption in the project area during construction and operation relative to existing uses.

Electricity

<u>Construction Use</u>

Temporary electric power for as-necessary lighting and electronic equipment such as computers inside temporary construction trailers would be provided by San Diego Gas & Electric (SDG&E). Based on information provided by SDSU, the construction contractor will utilize various pieces of electric construction equipment throughout the project. **Table 4.5-1** shows the electricity use (in kWh) estimated for electric construction equipment used during the project's construction phase.

Table 4.5-1
Construction Equipment Electricity Use

Construction Phase	Equipment	Qty	kWh
Phase 1			
Building Construction 1.1 – Foundations	Tower Crane	2	59,946.31

Table 4.5-1
Construction Equipment Electricity Use

Construction Phase	Equipment	Qty	kWh
Building Construction 1.2 – Superstructure	Tower Crane	2	67,139.87
Building Construction 1.3 – Building Envelope & Interior Buildout	Personnel Lift	2	46,604.03
Phase 2			
Building Construction 2.1 – Foundations	Tower Crane	1	21,181.03
Building Construction 2.2 – Superstructure	Tower Crane	1	58,747.38
Building Construction 2.3 – Building Envelope & Interior Buildout	Personnel Lift	1	16,660.94
Phase 3			
Building Construction 3.1 – Foundations	Tower Crane	2	60,745.59
Building Construction 3.2 – Superstructure	Tower Crane	1	32,770.65
7Building Construction 3.3 – Building Envelope & Interior Buildout	Personnel Lift	4	92,275.97
		Total	456,071.77

As shown in **Table 4.5-1**, the total electricity use by construction equipment over the entire construction period (2017-2024) is estimated to be 456,072 kilowatt-hours (kWh). According to CPUC, SDG&E consumed approximately 16.467 billion kWh of electricity in total in 2014 (CPUC 2016). As such, the construction electricity demand would account for 0.0004% of SDG&Es consumption during the construction period. The electricity used for such activities would be temporary and negligible; therefore, impacts would be **less than significant**.

Operational Use

The project's operational phase will require electricity for operating the various buildings. The project will include electricity saving features such as natural daylighting and green roofs.. The project would be designed to a minimum Leadership in Energy and Environmental Design (LEED) Silver Certification, which may also drive additional energy efficiency in design. The LEED design requires the building to be fundamentally commissioned (commissioning a building is the testing and balancing of the main systems to assure optimum performance), use at least 10% less energy than the United States Green Building Council baseline, and contain systems that do not use any chlorofluorocarbon-based refrigerants. The annual estimated electricity demand (in kWh per year) for the project was provided by SDSU (based on the design features above) and is shown below in **Table 4.5-2**. The demand for Phases II and III were not provided so it was conservatively estimated that those phases would require the same demand as Phase I without the Food Service Building.

Table 4.5-2
Estimated Electrical Demand

Building	Estimated Electrical Demand (kWh/yr)
Phase I	
Residence Hall 1	7,466,740
Residence Hall 2	5,631,408
Food Service Building	822,000
Phase II	
Residence Hall[1]	13,098,148
Phase III	
Residence Hall[1]	13,098,148
Total	**40,116,444**

Note:

1 The electricity estimates for Phases II and III were not available. The electricity estimates for Residence Halls 1 through 4 were used to estimate use for Phases II and III.

The project is estimated to use 40,116,444 kWh per year for all three phases. SDSU currently supplies 77% of its own power through a natural gas cogeneration plant, with the remaining 19% from a local utility, and 4% from on-site solar production. The SDSU cogeneration plant provides a vital utility to the local grid as it provides the majority of the campus energy needs. Without it, the local utility would be required to purchase or produce the additional energy. Also, the cogeneration plant would be able to meet the increased demand the project would place on the campus grid.

In 2015, SDG&E supplied 19,781 million kWh of electricity to San Diego County (CEC 2016a). Assuming the same power mix for the project, the demand on the local utility would be 7,622,124 kWh annually. The project's annual electricity demand on the utility would account for 0.04% of the County's total demand. Therefore, the project is not expected to have an impact on the local utility and due to the energy efficiency measures designed into the project would not result in a wasteful use of energy. Impacts related to operational electricity use would be **less than significant**.

Natural Gas

<u>Construction Use</u>

Natural gas is not anticipated to be required during construction of the project. Fuels used for construction would primarily consist of diesel and gasoline, which are discussed under the "petroleum" subsection below. Any minor amounts of natural gas that may be consumed as a result of project construction would be temporary and negligible and would not have an adverse effect; therefore, impacts would be **less than significant**.

Operational Use

Natural gas would be directly consumed throughout operations of the project, primarily through building heating and use in the dining hall for cooking. As described above, the project has included energy efficiency design measures that will also help reduce the heating loads and thus natural gas use. The natural gas demand for the project was provided by SDSU based on a consultant study. The demands for Phases II and III were not provided, so it was conservatively estimated that those phases would require the same demand as Phase I without the Food Service Building. **Table 4.5-3** shows the estimated natural gas use (in therms per year) for the project during operation which includes the sustainable design features.

Table 4.5-3
Estimated Natural Gas Demand

Building	Estimated Natural Gas Demand (Therms/yr)
Phase I	
Residence Hall 1	166,463
Residence Hall 2	125,143
Food Service Building	58,220
Phase II	
Residence Hall[1]	292,606
Phase III	
Residence Hall[1]	292,606
Total	**936,038**

Note:

1 The natural gas estimates for Phases II and III were not available. The natural gas estimates for Residence Halls 1 through 4 were used to estimate use for Phases II and III.

As shown in **Table 4.5-3**, the project is estimated to use 936,038 therms of natural gas per year. In 2015, SDG&E supplied 464.5 million therms of natural gas to customers (CEC 2016a). The projects estimated natural gas use would account for 0.2% of the total. This demand would not impact the local utility and due to the energy efficiency measures designed into the project would not result in a wasteful use of energy. Therefore, the project would result in a **less-than-significant** impact relating to natural gas consumption during operation.

Petroleum

<u>Construction Use</u>

Petroleum would be consumed throughout construction of the project. Fuel consumed by construction equipment would be the primary energy resource expended over the course of construction, while vehicle miles traveled (VMT) associated with the transportation of construction materials and construction worker commutes would also result in petroleum consumption. Heavy-duty construction equipment associated with construction activities would rely on diesel fuel, as would haul trucks involved in removing the materials from demolition and excavation. Construction workers would travel to and from the project site throughout the duration of construction. It is assumed in this analysis that construction workers would travel to and from the site in gasoline-powered passenger vehicles.

There are no unusual project characteristics or construction processes that would require the use of equipment that would be more energy intensive than is used for comparable activities, or equipment that would not conform to current emissions standards (and related fuel efficiencies).

Heavy-duty construction equipment of various types would be used during each phase of construction. The CalEEMod was used to estimate construction equipment usage and is included in **Appendix F** Based on that analysis, over all phases of construction, diesel-fueled construction equipment would run for an estimated 38,847 hours as summarized in **Table 4.5-4**.

Table 4.5-4
Hours of Operation for Construction Equipment

Construction Phase (equipment)	Hours of Equipment Use
Demolition–Phase I (concrete saw, excavators, and rubber-tired dozers)	768
Grading–Phase I (crawler tractors, excavators, graders, rubber-tired dozers, rubber-tired loaders, and scrapers)	1,458
Trenching–Phase I (excavators)	480
Building Construction–Phase I-1 (drill rigs, cranes, forklifts, generator sets, pumps, and tractors)	3,675
Building Construction–Phase II-1 (drill rigs, cranes, forklifts, generator sets, pumps, and tractors)	3,192
Building Construction–Phase III-1 (drill rigs, cranes, forklifts, generator sets, pumps, and tractors)	10,000
Paving–Phase I (pavers and rollers)	1,944
Architectural Coating–Phase I (air compressors)	1,584
Grading–Phase II (crawler tractors, excavators, graders, rubber-tired dozers, rubber-tired loaders, and scrapers)	988
Trenching–Phase II (excavators)	368
Building Construction–Phase I-2 (forklifts, pumps, tractors, and welders)	318

Table 4.5-4
Hours of Operation for Construction Equipment

Construction Phase (equipment)	Hours of Equipment Use
Building Construction–Phase II-2 (forklifts, pumps, tractors, and welders)	882
Building Construction–Phase III-2 (forklifts, pumps, tractors, and welders)	858
Architectural Coating–Phase II (air compressors)	1,188
Paving–Phase II (forklifts and tractors)	1,180
Grading–Phase III (crawler tractors, excavators, graders, rubber-tired dozers, rubber-tired loaders, and scrapers)	1,782
Trenching–Phase III (excavators)	384
Building Construction–Phase I-3 (cranes and forklifts)	950
Building Construction–Phase II-3 (cranes and forklifts)	1,025
Building Construction–Phase III-3 (cranes and forklifts)	3,267
Paving–Phase III (forklifts and tractors)	972
Architectural Coating–Phase III (air compressors)d	1,584
Total	**38,847**

Sources: Appendix F.

Fuel consumption from construction equipment was estimated by converting the total carbon dioxide (CO_2) emissions from each construction phase to gallons using the conversion factors for CO_2 to gallons of gasoline or diesel. Construction is estimated to occur in the years 2017-2024 based on the construction phasing schedule. The conversion factor for gasoline is 9.13 kilograms per metric ton CO_2 per gallon (kg/MT CO_2/gallon) and the conversion factor for diesel is 10.35 kg/MT CO_2/gallon (The Climate Registry 2016). The estimated diesel fuel usage from construction equipment is shown in **Table 4.5-5**.

Table 4.5-5
Construction Equipment Diesel Demand

Phase	Pieces of Equipment	Equipment CO_2 (MT)	kg/CO2/Gallon	Gallons
Demolition-Phase I	6	28.48	10.35	2,751.73
Grading-Phase I	8	76.82	10.35	7,422.12
Trenching-Phase I	2	14.19	10.35	1,370.63
Building Construction-Phase I-1	8	125.86	10.35	12,160.46
Building Construction-Phase II-1	7	96.48	10.35	9,322.20
Building Construction-Phase III-1	8	155.93	10.35	15,065.29
Paving-Phase I	3	184.30	10.35	17,806.54
Architectural Coating-Phase I	4	69.89	10.35	6,752.44
Grading-Phase II	7	39.76	10.35	3,841.19
Trenching-Phase II	2	10.44	10.35	1,008.22
Building Construction-Phase I-2	3	6.16	10.35	595.31

Table 4.5-5
Construction Equipment Diesel Demand

Phase	Pieces of Equipment	Equipment CO_2 (MT)	kg/CO2/Gallon	Gallons
Building Construction-Phase II-2	4	17.09	10.35	1,651.20
Building Construction-Phase III-2	4	16.63	10.35	1,606.33
Architectural Coating-Phase II	3	25.28	10.35	2,442.24
Paving-Phase II	3	18.09	10.35	1,747.45
Grading-Phase III	9	85.77	10.35	8,286.83
Trenching-Phase III	2	10.89	10.35	1,052.03
Building Construction-Phase I-3	4	23.02	10.35	2,224.13
Building Construction-Phase II-3	4	24.84	10.35	2,399.69
Building Construction-Phase III-3	5	85.06	10.35	8,218.82
Paving-Phase III	2	13.81	10.35	1,333.97
Architectural Coating-Phase III	4	33.70	10.35	3,256.32
Total				**112,315.14**

Sources: Pieces of equipment and equipment CO_2 (Appendix F; kg/CO_2/Gallon (The Climate Registry 2016)
Notes: CO_2 = carbon dioxide; MT = metric ton; kg = kilogram

Fuel consumption from worker and vendor trips are estimated by converting the total CO_2 emissions from each construction phase to gallons using the conversion factors for CO_2 to gallons of gasoline or diesel. Worker vehicles are assumed to be gasoline fueled and vendor/hauling vehicles are assumed to be diesel fueled.

Calculations for total worker, vendor, and hauler fuel consumption are provided in **Table 4.5-6, Construction Worker Gasoline Demand; Table 4.5-7, Construction Vendor Diesel Demand**; and **Table 4.5-8, Construction Hauler Diesel Demand**.

Table 4.5-6
Construction Worker Gasoline Demand

Phase	Trips	Vehicle CO_2 (MT)	kg/CO2/Gallon	Gallons
Demolition-Phase I	384	1.52	9.13	167.00
Grading-Phase I	540	2.14	9.13	234.84
Trenching-Phase I	420	1.63	9.13	178.54
Building Construction-Phase I-1	4,500	17.36	9.13	1,901.96
Building Construction-Phase II-1	2,520	9.72	9.13	1,065.10
Building Construction-Phase III-1	12,000	45.55	9.13	4,988.53
Paving-Phase I	3,240	12.13	9.13	1,328.11
Architectural Coating-Phase I	1,584	5.93	9.13	649.30
Grading-Phase II	416	1.51	9.13	165.14
Trenching-Phase II	230	0.83	9.13	91.30

Table 4.5-6
Construction Worker Gasoline Demand

Phase	Trips	Vehicle CO_2 (MT)	kg/CO2/Gallon	Gallons
Building Construction-Phase I-2	4,770	17.29	9.13	1,893.57
Building Construction-Phase II-2	10,290	36.67	9.13	4,016.73
Building Construction-Phase III-2	12,870	45.08	9.13	4,937.42
Architectural Coating-Phase II	1,056	3.70	9.13	405.13
Paving-Phase II	1,416	4.96	9.13	543.23
Grading-Phase III	540	1.75	9.13	191.95
Trenching-Phase III	336	1.09	9.13	119.43
Building Construction-Phase I-3	33,440	108.52	9.13	11,886.50
Building Construction-Phase II-3	19,680	62.89	9.13	6,887.93
Building Construction-Phase III-3	95,040	296.29	9.13	32,452.71
Paving-Phase III	3,240	10.10	9.13	1,106.34
Architectural Coating-Phase III	1,584	4.94	9.13	540.88
Total				**75,751.62**

Sources: Construction worker CO_2 (Appendix F; kg/CO_2/Gallon (The Climate Registry 2016)
Notes: CO_2 = carbon dioxide; MT = metric ton; kg = kilogram

Table 4.5-7
Construction Vendor Diesel Demand

Phase	Trips	Vehicle CO_2 (MT)	kg/CO2/Gallon	Gallons
Demolition-Phase I	0	0.00	10.35	0.00
Grading-Phase I	0	0.00	10.35	0.00
Trenching-Phase I	4	1.28	10.35	124.14
Building Construction-Phase I-1	20	20.07	10.35	1,939.56
Building Construction-Phase II-1	10	11.24	10.35	1,086.15
Building Construction-Phase III-1	20	53.32	10.35	5,151.29
Paving-Phase I	8	8.61	10.35	831.69
Architectural Coating-Phase I	2	1.75	10.35	169.42
Grading-Phase II	0	0.00	10.35	0.00
Trenching-Phase II	2	0.61	10.35	58.64
Building Construction-Phase I-2	30	20.98	10.35	2,026.76
Building Construction-Phase II-2	30	57.92	10.35	5,595.78
Building Construction-Phase III-2	30	56.08	10.35	5,418.25
Architectural Coating-Phase II	2	1.73	10.35	166.71
Paving-Phase II	4	3.09	10.35	298.07
Grading-Phase III	0	0.00	10.35	0.00
Trenching-Phase III	4	1.21	10.35	117.07
Building Construction-Phase I-3	24	23.02	10.35	2,224.44

Table 4.5-7
Construction Vendor Diesel Demand

Phase	Trips	Vehicle CO_2 (MT)	kg/CO2/Gallon	Gallons
Building Construction-Phase II-3	24	24.78	10.35	2,394.11
Building Construction-Phase III-3	24	59.60	10.35	5,758.43
Paving-Phase III	8	8.13	10.35	785.24
Architectural Coating-Phase III	2	1.66	10.35	159.96
Total				**34,305.71**

Sources: Construction vendor CO_2 (Appendix F; kg/CO_2/Gallon (The Climate Registry 2016)

Notes: CO_2 = carbon dioxide; MT = metric ton; kg = kilogram

Table 4.5-8
Construction Haul Diesel Demand

Phase	Trips	Vehicle CO_2 (MT)	kg/CO2/Gallon	Gallons
Demolition-Phase I	140	3.12	10.35	301.36
Grading-Phase I	2,200	49.01	10.35	4,735.68
Trenching-Phase I	0	0.00	10.35	0.00
Building Construction-Phase I-1	10	0.22	10.35	21.41
Building Construction-Phase II-1	10	0.22	10.35	21.41
Building Construction-Phase III-1	10	0.22	10.35	21.29
Paving-Phase I	0	0.00	10.35	0.00
Architectural Coating-Phase I	0	0.00	10.35	0.00
Grading-Phase II	715	15.55	10.35	1,502.58
Trenching-Phase II	0	0.00	10.35	0.00
Building Construction-Phase I-2	0	0.00	10.35	0.00
Building Construction-Phase II-2	0	0.00	10.35	0.00
Building Construction-Phase III-2	0	0.00	10.35	0.00
Architectural Coating-Phase II	0	0.00	10.35	0.00
Paving-Phase II	0	0.00	10.35	0.00
Grading-Phase III	1,071	21.95	10.35	2,120.31
Trenching-Phase III	0	0.00	10.35	0.00
Building Construction-Phase I-3	0	0.00	10.35	0.00
Building Construction-Phase II-3	0	0.00	10.35	0.00
Building Construction-Phase III-3	0	0.00	10.35	0.00
Paving-Phase III	0	0.00	10.35	0.00
Architectural Coating-Phase III	0	0.00	10.35	0.00
Total				**8,724.05**

Sources: Construction haul CO2 (Appendix F); kg/CO2/Gallon (The Climate Registry 2016)

Notes: CO2 = carbon dioxide; MT = metric ton; kg = kilogram

In summary, the project is estimated to consume 231,097 gallons of petroleum during the construction phase, which would last approximately 75 months (extending approximately from 2017 to 2024). By comparison, California's consumption of petroleum is approximately 52.9 million gallons per day (CEC 2016b). Based on these assumptions, approximately 121 billion gallons of petroleum would be consumed in California over the course of the construction period. Construction of the project would equate to 0.0002% of the total amount of petroleum that would be used statewide during the course of the construction period. Therefore, because petroleum use during construction would be temporary and negligible, impacts would be **less than significant**.

<u>Operational Use</u>

During operations, the majority of fuel consumption resulting from the project would involve the use of motor vehicles traveling to and from the project site, as well as fuels used for alternative modes of transportation that may be used by employees, visitors, and guests. The project would create on-campus freshman housing and free up existing campus housing for sophomore students otherwise living off-campus. Adding on campus housing for freshman and sophomores would result in less VMT by a larger percentage of students and result in reduced automobile fuel consumption.

Petroleum fuel consumption associated with motor vehicles traveling to and from the project site is a function of the VMT as a result of project operation. As shown in **Appendix F** (CalEEMod outputs), the annual VMT attributable to the proposed project is expected to be 4,182,170 VMT. Similar to the construction worker and vendor trips, fuel consumption is estimated by converting the total CO_2 emissions from each land use type to gallons using the conversion factors for CO_2 to gallons of gasoline or diesel. Based on the annual fleet mix provided in CalEEMod, 92.5% of the fleet range from light-duty to medium-duty vehicles and motorcycles are assumed to run on gasoline. The remaining 7.5% of vehicles represent medium-heavy duty to heavy-duty vehicles and buses/RVs and are assumed to run on diesel. Calculations for annual mobile source fuel consumption are provided in **Table 4.5-9, Mobile Source Fuel Consumption**.

Table 4.5-9
Mobile Source Fuel Consumption

Fuel	Vehicle MT CO_2	kg/CO_2/Gallon	Gallons
Gasoline	3,041.63	9.13	333,146.45
Diesel	247.28	10.35	23,892.07
Total			**357,038.52**

Sources: Mobile Source CO_2 (Appendix F); kg/CO_2/Gallon (The Climate Registry 2016)

Notes: CO_2 = carbon dioxide; MT = metric ton; kg = kilogram

Mobile sources from the proposed project will require a net increase in approximately 333,147 gallons of gasoline per year and 23,892 gallons of diesel per year beginning in 2025. By comparison, California as a whole consumes approximately 19.3 billion gallons of petroleum per year (CEC 2016b). The anticipated increase in consumption associated with 1 year of project operation is 0.002% of the statewide use.

It should be noted that over the lifetime of the project, the fuel efficiency of the vehicles being used by the visitors, employees, and guests is expected to increase. As such, the amount of petroleum consumed as a result of vehicular trips to and from the project site during operation would decrease over time. There are numerous regulations in place that require and encourage increased fuel efficiency. For example, CARB has adopted a new approach to passenger vehicles by combining the control of smog-causing pollutants and GHG emissions into a single coordinated package of standards. The new approach also includes efforts to support and accelerate the numbers of plug-in hybrids and zero-emissions vehicles in California (CARB 2013). Additionally, in response to SB 375, CARB has adopted the goal of reducing per-capita GHG emissions from 2005 levels by 8% by the year 2020 and 13% by the year 2035 for light-duty passenger vehicles in the San Diego Association of Governments planning area. This reduction would occur by reducing VMT through the integration of land use planning and transportation (SANDAG 2015). As such, operation of the project is expected to use decreasing amounts of petroleum over time, due to advances in fuel economy.

In summary, although the project would see an increase in petroleum use during construction and operation, the use is a small fraction of the statewide use and due to efficiency increases will diminish over time. Given these considerations, the petroleum consumption associated with the project would not be considered inefficient or wasteful and therefore would result in a **less-than-significant** impact.

Would the project conflict with existing energy standards and regulations?

As outlined in **Section 4.5.2** above, the City of San Diego land use plans, policies and guidelines are not applicable to CSU/SDSU as a state entity. However, the SDSU has signed the American College and University Presidents' Climate Commitment (PCC). On May 20, 2014, the California State University Sustainability Policy was instated by the Board of Trustees of the California State University. The Sustainability Policy set forth that CSU would set energy efficiency and production goals, including pursuing energy procurement and production to reduce energy capacity requirements from fossil fuels, and promote energy independence using available economically feasible technology for on-site and/or renewable generation (CSU 2014). The policy also states that CSU shall operate in the most energy efficient manner possible, requiring universities to adopt a strategic energy resource plan and an energy management plan to help reduce energy use. Additionally, as previously stated, the project would be designed to a minimum LEED Silver Certification, which may also drive additional energy efficiency in design. For the reasons stated, the proposed project would not conflict with existing energy standards and regulations, and impacts are determined to be **less than significant**.

Would the project place a significant demand on local and regional energy supplies or require a substantial amount of additional capacity?

Electricity

As described under the first threshold analysis, the project's annual electricity demand on the utility would account for 0.04% of the County's total demand. Therefore, the project is not expected to have an impact on the local utility. In addition, the project proposes a minimum LEED Silver Certification which would implement energy efficiency measures designed into the project. Implementation of the proposed project would not result in substantial amounts of local or regional energy supplies compared to existing conditions. The resultant increase in energy demand would not exceed the available capacity of SDG&E servicing infrastructure to the site or beyond. Therefore, impacts would be **less than significant**.

Natural Gas

As described above, the project is estimated to use 936,038 therms of natural gas per year. In 2015, SDG&E supplied 464.5 million therms of natural gas to customers (CEC 2016a). The project's estimated natural gas use would account for 0.2% of the total. This demand would not impact the local utility and therefore would result in a **less-than-significant** impact.

Petroleum

The anticipated increase in consumption of petroleum associated with one year of project operation is 0.002% of the statewide use. Although the project would see an increase in petroleum use during construction and operation, the use is a small fraction of the statewide use and due to efficiency increases, will diminish over time. Given these considerations, the petroleum consumption associated with the project would not be considered a substantial demand on local or regional supply, and therefore would result in a **less-than-significant** impact.

4.5.7 MITIGATION MEASURES

All potential impacts related to energy, as a result of implementation of the proposed project are determined to be less than significant. Therefore, no mitigation measures are required.

4.5.8 LEVEL OF SIGNIFICANCE AFTER MITIGATION

The energy analysis provides an evaluation of the potential for significant adverse impacts to the use of energy due to construction and operation of the project. Construction of the proposed facilities would result in a temporary use of electricity and petroleum due to the use of construction equipment, worker vehicles, vendor trucks, and hauling trucks. The analysis concludes that the construction energy use would result in a less-than-significant impact. Operational energy impacts were also evaluated and were based on energy use from the buildings, resident vehicle use, and employee vehicle use. The operational energy impacts were also found to be minor compared to the regional use and impacts would be less than significant. No mitigation is required, and impacts would remain less than significant.

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