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SAN DIEGO STATE UNIVERSITY MISSION VALLEY CAMPUS MASTER PLAN PROJECT ADDITIONAL TECHNICAL MEMO

SAN DIEGO STATE UNIVERSITY
SAN DIEGO, CALIFORNIA

RAMBOLL

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ACRONYMS AND ABBREVIATIONS

CalEEMod®	California Emission Estimator Model®
CAP	Climate Action Plan
CEQA	California Environmental Quality Act
CH_4	Methane
CO_2	Carbon Dioxide
CO_2e	CO_2 equivalents
CSU	California State University
DEIR	Draft Environmental Impact Report
EIR	Environmental Impact Report
EMFAC	EMission FACtor model
EV	Electric Vehicle
FEIR	Final Environmental Impact Report
GHG	Greenhouse Gas
HVAC	Heating, ventilation, and air conditioning
LB	Pound
LEED	Leadership in Energy and Environmental Design
MEPs	Mechanical, Electrical and Plumbing Plans
MT	Metric Tons
MVCPU	Mission Valley Community Plan Update
N_2O	Nitrous Oxide
PDF	Project Design Feature
PV	Photovoltaic
SDAPCD	San Diego Air Pollution Control District
SDSU	San Diego State University
TDM	Transportation Demand Management
USEPA	United States Environmental Protection Agency
VMT	Vehicle Miles Traveled
YR	Year

1. INTRODUCTION

This additional technical memo addresses project updates in response to comments on the Draft Environmental Impact Report (DEIR)[1] for the San Diego State University Mission Valley Campus Master Plan. This report includes the quantification of five Project Design Feature (PDF) updates as follows:

1) No natural gas or wood-burning fireplaces in residential units;
2) Additional solar photovoltaic (PV) panel installation;
3) Electric heating, cooling, and ventilation systems (HVAC) and electric water heating systems;
4) Naturally ventilated parking structures; and
5) EV chargers will be built in accordance with the 2019 Title 24 Building Standards.

The methodological parameters and inputs used when quantifying these project design features follow those as included in the Air Quality, Greenhouse Gas (GHG), and Energy Technical Reports for the San Diego State University (SDSU) Mission Valley Campus Master Plan Project, prepared by Ramboll.

1.1 Project Description

This analysis is of the San Diego State University Mission Valley Campus Master Plan as included and described in the Final Environmental Impact Report (FEIR). Analysis of the proposed project's emissions inventories considers and incorporates several PDFs as described in the following section.

Project Design Features

As discussed in the DEIR, the project includes a number of sustainability-oriented PDFs that are intended to move the project "beyond code." Many of these PDFs are consistent with the City of San Diego Climate Action Plan (CAP) and its implementing CAP Consistency Checklist, as well as the City's Mission Valley Community Plan Update (MVCPU). Additions and deletions made to the PDF language in the FEIR as compared to the DEIR are shown in underline and ~~strikeout~~ format.

A subset of the PDFs has been quantitatively included in this analysis, while the remaining PDFs have not been quantified (due to modelling or other calculation-related limitations). PDFs that have been quantified in this report are:

TDM Program

The project's Transportation Demand Management (TDM) Program incentivizes alternative transportation besides single commuter trips. The TDM Program consists of the following:

- Land Use Diversity

[1] Available at: http://missionvalley.sdsu.edu/public-review-draft-eir.html. Accessed: November 2019.

- Neighborhood Site Enhancement
  - New Bicycle Facilities
  - Dedicated Land for Bicycle/Multi-Use Trails
  - Bicycle Parking
  - Showers and Lockers in Employment Areas
  - Increased Intersection Density
  - Traffic Calming
  - Car Share Service Accommodations
  - Enhanced Pedestrian Network
- Parking Policy and Pricing
  - Unbundled Residential Parking
  - Metered On-Street Parking
  - Reduced Parking Supply
- Commute Trip Reduction Services
  - TDM Program Coordinator and Marketing
  - Electric Bike-Share Accommodations
  - Ridesharing Support
  - School Pool
  - Hotel Shuttle Service

The TDM Program strategies described above apply to the project's campus office, residential and retail uses.

TDM Program strategies also have been developed exclusively for the project's stadium land use that are not listed here, as they are not quantitatively accounted for in this analysis (see below). For additional information on the project's TDM Program, with respect to both stadium and non-stadium uses, please see Fehr & Peers' Transportation Impact Analysis (2019) for the project.

Residential Hearths

~~The proposed project is incorporating a limited number of natural gas fireplaces, and no wood-burning fireplaces, within project residences. Of all residential units in the project, up to 5% of the units may include a natural gas fireplace.~~ Residential units in the proposed project shall not have natural gas fireplaces or wood-burning fireplaces.

Solar Photovoltaic (PV) Panels

The proposed project is incorporating solar PV panels on a total of approximately 428,458 square feet of available roof space that is located throughout the project's campus/office, hotel, stadium and residential development areas; these panels are estimated to create a total generation capacity equivalent to 10,895,660 ~~10,819,478~~ kilowatt-hour of electricity, or

15.0% ~~14.9%~~ of the proposed project's total project electricity demand. In the event that the final stadium design does not accommodate the approximately 3,000 square feet of solar PV coverage called for in this PDF, the PV panels shall be installed in other on-site development areas.

Building Heating and Cooling

As part of the Mechanical, Electrical and Plumbing Plans (MEPs) for all non-stadium buildings, CSU/SDSU shall require all heating, cooling and ventilation systems (HVAC) and water heating systems to be electric.

Naturally Ventilated Parking Structures

All structured parking on the project site shall be naturally ventilated.

Electric Vehicle (EV)-Ready Infrastructure and EV Chargers

The project is equipping ~~3%~~ 10% of total residential parking spaces and 6% of total non-residential parking spaces with appropriate electric supply equipment to allow for the future installation of EV chargers (i.e., "EV ready"). Of these EV ready spaces, 50% will be equipped with EV charging stations. In total, approximately ~~500~~ 901 spaces will be designated as "EV ready" and ~~252~~ 451 of the "EV ready" spaces will be equipped with operable EV charging stations.

Additional PDFs that have not been quantified in this report include:

- The layout of the project's development areas has been designed to maximize the unique infill opportunity presented at this Mission Valley location. This includes benefits from the existing Metropolitan Transit System's Green Line transit station that runs through the project, as well as the planned Purple Line transit station.
- The development locates buildings in close proximity to one another, which would facilitate the use of common heating/cooling sources, where feasible, as project-level development proceeds. (The use of common heating/cooling sources will be evaluated as the building plans for individual development parcels are developed; relevant factors that will influence the use of such sources include the temporal proximity of development, type of use, and market forces.)
- Project development areas would maximize natural ventilation.
- The proposed project would include adaptive lighting controls, where appropriate and feasible, in order to maximize energy efficiency and minimize light pollution.
- The proposed project would achieve Leadership in Energy and Environmental Design (LEED) Version 4 at a Silver or better certification level, as well as a Neighborhood Development designation for sitewide design. LEED certification is based on standards that encourage the development of energy-efficient and sustainable buildings.
- Events at the proposed project's multipurpose stadium would benefit from the implementation of TDM Program strategies specifically developed for application to stadium-related events. These strategies focus on the use of alternative modes of transportation, including transit, to reduce single-occupancy vehicle usage and parking demand on event days.

- As part of the scoring system for evaluating responses to Requests for Proposals and through the builder/developer review and selection process for each future building site within the Mission Valley Campus Master Plan Area, CSU/SDSU shall include "Sustainability" as a component of the scoring criteria and weigh each builder/developer's commitment to implementing strategies above and beyond CBC Title 24, CalGreen and LEED Silver (Version 4.0) as at least 10% of the overall scoring.
- CSU/SDSU shall require that all electrical conduit for the project site be designed, sized and installed to enable the future electrification of the entire project.
- CSU/SDSU either (1) shall require that purple pipe be installed in all streets with landscaping and stubbed to all parks, recreation and open space areas to provide reclaimed water for irrigation purposes or (2) shall otherwise provide for future connections to the City of San Diego's Pure Water Phase 2 program to reduce potable water usage.
- CSU/SDU shall utilize pre-consumer organic food composting for the proposed Stadium and University-constructed buildings, and shall encourage the incorporation of composting facilities in the residential units developed through public-private partnerships (the P3 process). CSU/SDSU also shall utilize post-consumer organic food composting for the proposed Stadium and University-constructed buildings when feasible (e.g., when the University's solid waste provider operates a facility that is permitted to accept post-consumer compost).

It also is noted that, in 2014, the CSU Board of Trustees adopted its Sustainability Policy.[2] To the extent applicable, project-related development will comply with the principles and goals set forth in the CSU Sustainability Policy.

2. PROJECT EMISSIONS INVENTORY ANALYSIS

This section evaluates changes to the project's emission inventory resulting from the implementation of five PDF updates.

2.1 Methodology

Updates from the DEIR analysis of the project inventory include the following five updates:

1) No natural gas or wood-burning fireplaces in residential units (see **Table 1**);
2) Additional solar photovoltaic (PV) panel installation (see **Table 2**);
3) Electric heating, cooling, and ventilation systems (HVAC) and electric water heating systems (see **Table 3**);
4) Naturally ventilated parking structures (see **Table 4**); and
5) EV chargers will be built in accordance with the 2019 Title 24 Building Standards (see **Table 5**).

The following sections present the methodology used to quantify inventory changes resulting from these updates.

Residential Hearths

The DEIR incorporated a limited number of natural gas fireplaces and no wood-burning fireplaces within project residences. The DEIR provided that, of all residential units in the project, up to 5% of the units could include a natural gas fireplace. In the FEIR, this PDF was revised to include no natural gas or wood-burning fireplaces within project residences. The modeling parameters and inputs used to quantify the associated emissions reductions are based on CalEEMod® defaults.

Solar Photovoltaic (PV) Panels

The DEIR incorporated solar PV panels on the available roof space on the project's campus/office, hotel, and residential development areas. This PDF was revised in the FEIR to include an additional 3,000 square feet of solar PV panels on the proposed project's stadium land use. The modeling parameters and inputs used to quantify this PDF are described in Appendix 4.7-1 of the DEIR.[3]

Electric HVAC and Water Heating Systems

The DEIR incorporated heating and cooling using natural gas and electricity based on CalEEMod® defaults for electricity and natural gas consumption. An additional PDF was included in the FEIR requiring all HVAC systems and water heating systems to be electric. To quantify reductions resulting from this PDF, the required natural gas for space and water heating was calculated for the project. The equivalent amount of electricity that would be needed to achieve the same level of heating was evaluated and the associated GHG emissions from that electricity usage was calculated.

[3] Available at: http://missionvalley.sdsu.edu/eir-appendices.html. Accessed: November 2019.

Naturally Ventilated Parking Structures

The DEIR's calculations were based on a design parameter requiring mechanical ventilation for the project parking structures. A PDF to naturally ventilate the parking structures for the project was added in the FEIR, reducing the amount of electricity needed for parking structures. To quantify this reduction, the electricity needed for ventilation for the parking structures was reduced to zero. (Note, the remaining electricity intensities, for Non-Title 24 uses and lighting, were retained.)

Additional EV Chargers

The DEIR provided that 3% of total residential parking spaces and 6% of total non-residential parking spaces would be supplied with the appropriate infrastructure to allow for future installation of EV chargers. Of these spaces, 50% would be equipped with EV charging stations. This PDF was revised in the FEIR to increase the total percentage of residential parking spaces from 3% to 10% per the 2019 Title 24 Building Standards.[4] The methodology used to quantify greenhouse gas reductions from this PDF can be found in Appendix 4.7-1 of the DEIR.

2.2 Criteria Air Pollutant Emissions, Greenhouse Gas Emissions, and Energy Inventories

This section describes the updates to the project emissions and energy inventories.

2.2.1 Area Emissions

Area source emissions included in the DEIR analysis result from landscaping-related fuel combustion sources (such as lawn mowers), consumer products, hearths, and architectural coatings. Changes to the criteria air pollutant and greenhouse gas emissions inventories due to updates to Residential Hearths PDF were calculated according the methodology discussed in **Section 2.1**. The resulting changes to the criteria air pollutant and greenhouse gas emissions inventories from the updated PDF are shown in **Table 1**. Additional calculation details are discussed in Appendix 4.2-1 and 4.7-1 of the DEIR.[5]

2.2.2 Energy Use Emissions, Electricity Consumption, and Natural Gas Consumption

Criteria air pollutant emissions and GHGs are emitted from buildings as a result of activities that typically use electricity and natural gas as energy sources. Combustion of fossil fuels, such as natural gas, emits criteria air pollutants directly into the atmosphere. Combustion of any type of fuel emits CO_2 and other GHGs directly into the atmosphere; these emissions are considered direct emissions associated with a building. GHGs are also emitted during the generation of electricity from fossil fuels; these emissions are considered to be indirect emissions.

Updates to the Solar Photovoltaic Panels PDF provide further energy generation and reductions to GHG emissions, as shown in **Table 2**. The additional on-site renewable electricity generation will help to further offset the project's electricity demand.

[4] Available at: https://codes.iccsafe.org/content/CAGBSC2019/chapter-4-residential-mandatory-measures. Accessed: November 2019.

[5] Available at: http://missionvalley.sdsu.edu/eir-appendices.html. Accessed: November 2019.

The Building Heating and Cooling PDF increases the consumption of electricity and reduces natural gas consumption. The changes to the consumption, and corresponding changes in criteria air pollutant and GHG emissions, are presented in **Table 3**.

Additionally, the design update to naturally ventilate the parking structures rather than mechanically ventilate the structures reduces the electricity consumption and corresponding greenhouse gas emissions for the project, as displayed in **Table 4**. The use of natural ventilation in place of mechanical ventilation is expected to result in a reduction to electricity use equivalent to 11,489,244 kWh of electricity per year.

2.2.3 Mobile Source Emissions and Gasoline Consumption

The emissions associated with on-road mobile sources are generated from residents, students, workers, customers, and delivery vehicles visiting the land use types in the project. The emissions associated with on-road mobile sources include running and starting exhaust emissions, evaporative emissions, brake and tire wear, and fugitive dust from paved and unpaved roads.

The methodology used for estimating emissions associated with mobile sources is described in the DEIR. Decreases in the GHG emissions from the additional installation of EV charging stations are shown in **Table 5**. This updated project design feature also results in a reduction to gasoline consumption and increase in electricity consumption.

3. PROJECT INVENTORIES IN CONTEXT

Table 6 reports the total GHG emissions resulting from construction and operation of the project. As shown, the project's GHG emissions inventory is approximately 63,630 MT CO_2e per year. When compared to the GHG emissions inventory presented in the DEIR, the total GHG emissions resulting from the project are now 7.4% lower due to implementation of the updated project design features.

Table 7 presents the project's criteria air pollutant emissions inventory with incorporation of the updated project design features contained in the FEIR. The commitment to zero natural gas fireplaces and all electric heating and cooling reduces the total daily emissions of each criteria air pollutant. The significance conclusions, which continue to be based on the SDAPCD Significance Thresholds, remain the same as those stated in the DEIR.

Table 8 provides the changes to the project's consumption of electricity, natural gas, gasoline, and diesel. As compared to the project contributions presented in the DEIR,[6] the project with updated PDFs contributes even less to the overall City of San Diego and California total consumption of natural gas, gasoline, and diesel. The increase in the electricity contribution represents the replacement of a higher-emitting energy source (natural gas, gasoline, and diesel), with electricity, a cleaner energy source. These updated contributions are presented in **Table 9**.

[6] See Table 6-4 of Appendix 4.5-1 of the DEIR. Available at: http://missionvalley.sdsu.edu/eir-appendices.html. Accessed: November 2019.

TABLES

Table 1. Reductions in CAP and GHG Emissions Associated with Removal of Residential Hearths
SDSU Mission Valley Campus Master Plan Project
San Diego, California

Emission Source	Emission Reductions[1]						
	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$	CO_2e
	(lb/day)						(MT/yr)
Hearth[2]	0.4	3.8	1.6	0.0	0.3	0.3	182

Notes:

[1] Data obtained from Table 4-3 in Appendix 4.2-1 and Table 4-3 in Appendix 4.7-1 of the DEIR. Available at: http://missionvalley.sdsu.edu/eir-appendices.html. Accessed: November 2019.

[2] Represents natural gas fireplaces that were analyzed in the DEIR.

Abbreviations:

CAP - criteria air pollutant
CO - carbon monoxide
CO_2e - carbon dioxide equivalents
DEIR - Draft Environmental Impact Report
GHG - greenhouse gas
lb - pound
MT - metric tons
NO_x - nitrogen oxide compounds ($NO + NO_2$)
PM_{10} - particulate matter less than 10 microns in diameter
$PM_{2.5}$ - particulate matter less than 2.5 microns in diameter
SO_x - sulfur oxide compounds
SDSU - San Diego State University
VOC - volatile organic compounds
yr - year

Table 2. Reductions in GHG Emissions and Additional Electricity Generation from Solar PV
SDSU Mission Valley Campus Master Plan Project
San Diego, California

Scenario	Rooftop Area for Solar Panels (square feet)	Electricity Generation from Solar PV (kWh/yr)	Annual GHG Emissions Reduction (MT CO_2e/yr)
DEIR[1]	425,458	10,819,478	1,793
FEIR[2]	428,458	10,895,660	1,806
Difference	3,000	76,182	13

Notes:

[1] Data obtained from Table 5-1 in Appendix 4.7-1 of the DEIR. Available at: http://missionvalley.sdsu.edu/eir-appendices.html. Accessed: November 2019.

[2] GHG emission reductions and electricity generation from solar PV are estimated based on the methodologies described in Appendix 4.7-1 of the DEIR. Available at: http://missionvalley.sdsu.edu/eir-appendices.html. Accessed: November 2019.

Abbreviations:

CO_2e - carbon dioxide equivalents	MT - metric tons
DEIR - Draft Environmental Impact Report	PDF - project design feature
FEIR - Final Environmental Impact Report	PV - photovoltaic
GHG - greenhouse gases	SDSU - San Diego State University
kWh - kilowatt-hour	yr - year
lb - pound	

Conversion Factors:

lb/MT	2204.62
MT/gram	1.00E-06
MWh to KWh	0.001
(lbs CO_2e/MWh delivered)	365.37
foot/meter	3.28

Table 3. Reductions in CAP Emissions, GHG Emissions, and Natural Gas Consumption Associated with Electric HVAC and Water Heating Systems
SDSU Mission Valley Campus Master Plan Project
San Diego, California

	Natural Gas Consumption			Equivalent Electricity Consumption	
	Total[1]	HVAC Systems[2,3]	Water Heaters[4,5]	HVAC Systems[6]	Water Heaters[7]
Land Use Type	(kBtu/yr)			(kWh/yr)	
Residential	27,689,620	12,916,666	14,772,954	3,649,613	2,870,665
Non-residential	43,186,731	22,559,699	20,627,032	6,411,480	4,008,223
Total Consumption for HVAC and Water Heating Systems		70,876,351		16,939,981	

Reductions in CAP Emissions from Reductions in Natural Gas Consumption[8]					
VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)
2.1	18.7	13.2	0.1	1.4	1.4

Greenhouse Gas Emissions		
Increase from Additional Electricity Consumption[9]	Decrease from Reduced Natural Gas Consumption[9]	Net Change
($MT CO_2e$/yr)		
2,807	4,217	-1,410

Notes:

[1] Data obtained from Appendix B-4 in Appendix 4.7-1 of the DEIR. Available at: http://missionvalley.sdsu.edu/eir-appendices.html. Accessed: November 2019.

[2] Natural gas consumption for residential HVAC systems was estimated by scaling total residential natural gas usage in Pacific census division by a percentage of natural gas that is used for space heating as given in Table CE4.5 in the EIA's 2015 RECS Survey. Available: https://www.eia.gov/consumption/residential/data/2015/c&e/pdf/ce4.5.pdf. Accessed: November 2019. Note, EIA data assumes that air conditioning (space cooling) does not utilize natural gas.

[3] Natural gas consumption for non-residential HVAC systems was estimated by scaling total non-residential natural gas use by a percentage of natural gas that is used for space heating and cooling as calculated from the California CEUS data. Available at: http://capabilities.itron.com/CeusWeb/Chart.aspx. Accessed: November 2019.

[4] Natural gas consumption for residential water heating systems was estimated by scaling total residential natural gas usage in Pacific census division by a percentage of natural gas that is used for water heating as given in Table CE4.5 in the EIA's 2015 RECS Survey. Available: https://www.eia.gov/consumption/residential/data/2015/c&e/pdf/ce4.5.pdf. Available at: http://capabilities.itron.com/CeusWeb/Chart.aspx. Accessed: November 2019.

[5] Natural gas consumption for non-residential water heating systems was estimated by scaling total non-residential natural gas use by a percentage of natural gas that is used for water heating as calculated from the California CEUS data. Available at: http://capabilities.itron.com/CeusWeb/Chart.aspx. Accessed: November 2019.

[6] Electricity that would be needed to achieve the same level of space heating as natural gas was estimated based on typical annual fuel utilization efficiencies (AFUE) of electric and natural gas furnaces. AFUE for electric furnace was obtained from https://www.energy.gov/energysaver/home-heating-systems/furnaces-and-boilers. Accessed: November 2019. AFUE for natural gas furnace was obtained from: https://www.energy.gov/eere/femp/energy-cost-calculator-electric-and-gas-water-heaters-0. Accessed: November 2019.

[7] Electricity that would be needed to achieve the same level of water heating as natural gas was estimated based on the electric and gas energy factors found in Office of Energy Efficiency and Renewable Energy's Energy Cost Calculator for Electric and Gas Water Heaters. Available at: https://www.energy.gov/eere/femp/energy-cost-calculator-electric-and-gas-water-heaters-0. Accessed: November 2019.

[8] Consistent with the methodologies in Appendix 4.2-1 of the DEIR, CAP emissions associated with natural gas consumption were calculated using the default emission factors in CalEEMod®.

[9] GHG emissions were calculated using the CO_2e intensity factor from Appendix B in Appendix 4.7-1 of the Draft EIR.

Abbreviations:

AFUE - annual fuel utilization efficiency
Btu - British thermal unit
CalEEMod® - CALifornia Emissions Estimator MODel
CAP - criteria air pollutant
CO - carbon monoxide
CO_2e - carbon dioxide equivalents
DEIR - draft environmental impact report
DOE - Department of Energy
EIA - Energy Information Administration
GHG - greenhouse gas
kWh - kilo-watt hour
lb - pound
MT - metric tons
NG - natural gas
NOx - nitrogen oxide compounds (NO + NO_2)
PDF - project design feature
$PM_{2.5}$ - particulate matter less than 2.5 microns in diameter
PM_{10} - particulate matter less than 10 microns in diameter
RECS - Residential Energy Consumption Survey
RPS - renewable portfolio standard
SDG&E - San Diego Gas & Electric
SO_x - sulfur oxide compounds
VOC - volatile organic compounds
yr - year

Conversion Factors:

lb/MT	2204.62
MT/gram	1.00E-06
MWh to KWh	0.001
kBtu/MMBtu	1000
Btu/kWh	3412.14
days/year	365

Table 4. Reductions in GHG Emissions and Energy Consumption Associated with Naturally Ventilated Parking Structures
SDSU Mission Valley Campus Master Plan Project
San Diego, California

Scenario	Type of Parking Structure	Electricity Consumption (kWh/yr)	CO_2e Emissions from Energy Use (MT/yr)
DEIR[1]	Mechanically Ventilated	20,234,764	3,354
FEIR[2]	Naturally Ventilated	8,745,520	1,449
Difference		-11,489,244	-1,904

Notes:

[1] Data obtained from Appendix 4.7-1 of the DEIR. Available at: http://missionvalley.sdsu.edu/eir-appendices.html. Accessed: November 2019.

[2] Electricity consumption for a naturally ventilated parking structure was estimated by using CalEEMod® defaults for an "Unenclosed Parking with Elevator" land use sub-type. GHG emissions associated with the electricity consumptions were calculated using the CO_2e intensity factor from Appendix B in Appendix 4.7-1 of the DEIR.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel
CO_2e - carbon dioxide equivalents
DEIR - Draft Environmental Impact Report
FEIR - Final Environmental Impact Report
GHG - greenhouse gases
kWh - kilowatt-hour
MT - metric tons
SDSU - San Diego State University
yr - year

Table 5. Reductions in GHG Emissions and Gasoline Consumption from EV Chargers
SDSU Mission Valley Campus Master Plan Project
San Diego, California

Scenarios	Number of Charging Stations	Annual GHG Emissions Reduction (MT CO_2e/yr)	Reduction in Gasoline Consumption (gallons/yr)	Increase in Electricity Consumption (kWh/yr)
DEIR[1]	252	2,031	344,383	2,874,375
FEIR[3]	451	3,634	616,336	5,144,219
Difference	199	1,604	271,953	2,269,844

Notes:

[1] Data obtained from Table 5-2 in Appendix 4.7-1 of the DEIR. Available at: http://missionvalley.sdsu.edu/eir-appendices.html. Accessed: November 2019.

[2] Reductions in GHG emissions, reductions in gasoline consumption, and increase in electricity consumption are estimated based on the methodologies described in Appendix 4.7-1 of the DEIR. Available at: http://missionvalley.sdsu.edu/eir-appendices.html. Accessed: November 2019.

Abbreviations:

CO_2e - carbon dioxide equivalents
DEIR - Draft Environmental Impact Report
EV - electric vehicle
FEIR - Final Environmental Impact Report
GHG - greenhouse gases
kWh - kilo-watt hour
lb - pound
MT - metric tons
MWh - mega-watt hour
PDF - Project Design Feature
SDSU - San Diego State University
yr - year

Conversion Factors:

lb/MT	2204.62
MT/gram	1.00E-06
MWh to kWh	0.001
(lbs CO_2e/MWh delivered)	365.37

Table 6. Summary of GHG Emissions Inventory (With Project Design Features)
SDSU Mission Valley Campus Master Plan Project
San Diego, California

Emissions Category	Project GHG Emissions[7,8] MT CO_2e/yr
DEIR Area Sources[1]	240
Updates to Residential Hearth PDF[2]	*-182*
DEIR Energy Usage[1]	17,528
DEIR Solar PV Panels PDF[1]	*-1,793*
Updates to Solar PV Panels PDF[3]	*-13*
Building Heating and Cooling PDF[4]	*-1,410*
Naturally Ventilated Parking Structures PDF[5]	*-1,904*
DEIR Water[1]	2,772
DEIR Waste Disposed[1]	2,253
DEIR Traffic[1]	54,496
DEIR EV Ready Infrastructure and EV Chargers PDF[1]	*-2,031*
Updates to EV Ready Infrastructure and EV Chargers PDF[6]	*-1,604*
DEIR TDM Program[1]	*-5,812*
DEIR Stationary[1]	40
Operational Sub-Total	*62,580*
DEIR Construction Amortized[1]	1,077
DEIR Vegetation[1]	-26
DEIR Total	68,742
Total	63,630

Notes:

[1] Data obtained from Table 6-1 in Appendix 4.7-1 of the DEIR. Available at: http://missionvalley.sdsu.edu/eir-appendices.html. Accessed: November 2019.

[2] Data obtained from Table 1.

[3] Data obtained from Table 2.

[4] Data obtained from Table 3.

[5] Data obtained from Table 4.

[6] Data obtained from Table 5.

[7] Emissions are presented as CO_2e, which include CO_2, CH_4, and N_2O emissions, weighted by their respective global warming potentials.

[8] Emissions reductions associated with project design features are shown as negative values due to the decrease in emissions.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel
CH_4 - methane
CO_2 - carbon dioxide
CO_2e - carbon dioxide equivalents
DEIR - Draft Environmental Impact Report
EV - electric vehicle
GHG - greenhouse gases
N_2O - nitrous oxide
PDF - project design feature
PV - photovoltaic
SDSU - San Diego State University
TDM - Transportation Demand Management
yr - year

Table 7. Operational CAP Emissions Compared to Thresholds with Project Design Features
SDSU Mission Valley Campus Master Plan Project
San Diego, California

Emission Source	Maximum Daily Unmitigated Emission Estimates					
	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
	(lbs/day)					
DEIR Area[1]	210	8.19	381	0.04	2.42	2.42
Updates to Residential Hearth PDF[2]	*-0.4*	*-3.8*	*-1.6*	*0.0*	*-0.3*	*-0.3*
DEIR Energy[1]	3.0	26.8	19.0	0.16	2.08	2.08
Building Heating and Cooling PDF[3]	*-2.1*	*-18.7*	*-13.2*	*-0.1*	*-1.4*	*-1.4*
DEIR Mobile[1]	86.1	382	1,168	5.35	639	172
DEIR Stationary[1]	0.5	2.1	1.2	0.0	0.1	0.1
Total Daily Emissions	297	397	1,554	5	641	175
SDAPCD Significance Thresholds[4,5]	137	250	550	250	100	67
Exceeds Threshold?	YES	YES	YES	NO	YES	YES

Notes:

[1] Data obtained from Table 9-3 in Appendix 4.2-1 of the DEIR. Available at: http://missionvalley.sdsu.edu/eir-appendices.html. Accessed: November 2019.

[2] Data obtained from Table 1.

[3] Data obtained from Table 3.

[4] City of San Diego CEQA Thresholds. Available at https://www.sandiego.gov/sites/default/files/july_2016_ceqa_thresholds_final_0.pdf. Accessed: November 2019.

[5] SDACPD, 2018. Rule 20.2 New Source Review Non-Major Stationary Sources. $PM_{2.5}$ threshold based on SDAPCD Pollutant Thresholds for Stationary Sources Table 20.2-1, which is referenced in the City of San Diego CEQA Thresholds. Available at: https://www.sandiegocounty.gov/content/dam/sdc/apcd/PDF/Rules_and_Regulations/Permits/APCD_20.2-2016.pdf. Accessed: November 2019.

Abbreviations:

CAP - criteria air pollutant
CO - carbon monoxide
DEIR - Draft Environmental Impact Report
lbs - pounds
NO_x - nitrogen oxide compounds (NO + NO_2)
PDF - project design feature
$PM_{2.5}$ - particulate matter less than 2.5 microns in diameter
PM_{10} - particulate matter less than 10 microns in diameter
SDAPCD - San Diego Air Pollution Control District
SDSU - San Diego State University
SO_x - sulfur oxide compounds
VOC - volatile organic compounds

Table 8. Energy Consumption Associated with Project Operation
SDSU Mission Valley Campus Master Plan Project
San Diego, California

Energy Resource	Electricity Consumption (kWh/yr)	Natural Gas Consumption (kBtu/yr)	Gasoline Consumption (gallons/yr)	Diesel Consumption (gallons/yr)
DEIR Consumption[1]	61,900,937	102,012,852	4,120,682	1,014,587
EV Ready Infrastructure and EV Chargers PDF[2]	2,269,844	--	-271,953	--
Updates to Solar PV PDF[3]	-76,182	--	--	--
Building Heating and Cooling PDF[4]	16,939,981	-70,876,351	--	--
Naturally Ventilated Parking Structures PDF[5]	-11,489,244	--	--	--
Updated Total	69,545,336	31,136,501	3,848,729	1,014,587

Notes:

[1] Data obtained from Table 6-4 in Appendix 4.5-1 of the DEIR. Available at: http://missionvalley.sdsu.edu/eir-appendices.html. Accessed: November 2019.

[2] Data obtained from Table 5. Note, electricity consumption for EV chargers was not included in the total electricity consumption presented in the DEIR. Therefore, the consumption presented in this table represents the total electricity consumption associated with the updated PDF.

[3] Data obtained from Table 2.

[4] Data obtained from Table 3.

[5] Data obtained from Table 4.

Abbreviations:

DEIR - Draft Environmental Impact Report
EV - electric vehicle
kWh - kilowatt hours
kBtu - kilo-British thermal unit
PDF - project design feature
PV - photovoltaic
SDSU - San Diego State University
yr - year

Table 9. Operational Energy Resource Summary
SDSU Mission Valley Campus Master Plan Project
San Diego, California

Energy Resource	Operation[1]	City of San Diego		California	
		Consumption[2]	Project's Contribution (%)	Consumption[2]	Project's Contribution (%)
Electricity (kWh/yr)	69,545,336	7,738,649,000	0.899%	288,613,480,216	0.024%
Natural Gas (kBtu/yr)	31,136,501	38,390,822,400	0.081%	1,256,804,127,406	0.002%
Gasoline (gallons/yr)	3,848,729	570,941,352	0.674%	15,540,154,774	0.025%
Diesel (gallons/yr)	1,014,587	67,262,101	1.508%	3,089,833,627	0.033%

Conversions:

99,976.1 Btu/therm
1,000 Btu/kBtu
1,000,000 kWh/GWh
1,000 kWh/MWh

Notes:

[1] Data obtained from Table 8.

[2] Data obtained from Table 6-4 in Appendix 4.5-1 of the DEIR. Available at: http://missionvalley.sdsu.edu/eir-appendices.html. Accessed: November 2019.

Abbreviations:

Btu - British thermal unit
DEIR - Draft Environmental Impact Report
GWh - gigawatt hours
kWh - kilowatt hours
kBtu - kilo-British thermal unit
MWh - megawatt hours
SDSU - San Diego State University
yr - year