

APPENDIX D

UCSF Greenhouse Gas Reduction Strategy

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UCSF GREENHOUSE GAS REDUCTION STRATEGY

1.0 BACKGROUND AND OBJECTIVES

UC San Francisco (UCSF) prepared this greenhouse gas (GHG) reduction strategy (the UCSF GHGRS) in conjunction with the 2014 Long Range Development Plan (LRDP) to ensure that the LRDP is implemented in alignment with the *UC Sustainable Practices Policy*,¹ particularly the directives on greenhouse gases (GHGs), and to fulfill the GHG reduction requirements of the *State of California Assembly Bill 32 (AB): The California Global Warming Solutions Act of 2006*.² *AB 32* requires the State of California as a whole to reduce GHG emissions to 1990 levels by the year 2020.

The UCSF GHGRS:

- Consolidates GHG reduction efforts already underway and planned by UCSF over the life of the LRDP (through 2035);
- Reflects and reinforces the policy direction regarding GHG reduction provided in the *UCSF Climate Action Plan (2009)*;³
- Quantifies the impact on GHG emissions of projected land use as represented by the LRDP;
- Creates a framework for the ongoing monitoring and revision of the UCSF GHGRS; and
- Helps streamline *California Environmental Quality Act (CEQA)*⁴ review of future campus development projects as consistent with the LRDP growth projections and the GHG reduction policies and programs contained in this document.

The UCSF GHGRS was prepared in accordance with *CEQA Guidelines Section 15183.5*, which specifically addresses how lead agencies can analyze and mitigate GHGs at a programmatic level and streamline environmental review of future projects that are consistent with the policies and programs contained in the UCSF GHGRS. Development of this strategy was also informed by the Governor's Office of

Policy and Research (OPR) *CEQA Guidelines*⁵ and its technical advisory *CEQA and Climate Change*,⁶ and by the Bay Area Air Quality Management District (BAAQMD) *California Environmental Quality Act Air Quality Guidelines*.⁷

For UCSF, with land use authority over a significant urban area, adoption of campus-wide plans, policies, and programs for reducing GHG emissions is an effective way to reduce the cumulative impact of UCSF operations on climate change, and to streamline later project-specific CEQA reviews. The UCSF GHGRS is intended to minimize the effects of GHGs at a programmatic level across the UCSF campuses through the year 2035. It is designed to be a "qualified" strategy under the streamlining provisions of *CEQA Guidelines Section 15183.5*, to provide CEQA coverage of GHG emissions for future development projects that are consistent with LRDP growth projections and the policies and strategies that are contained in the UCSF GHGRS. As future individual projects are proposed, project-specific environmental review documents can tier from or incorporate by reference the programmatic environmental review of the LRDP and GHGRS to determine if the project's GHG impact is cumulatively considerable. Future environmental documents that rely on the GHGRS for cumulative impact analysis of GHGs must identify the requirements specified herein that apply to the project, and, if those requirements are not otherwise binding and enforceable, incorporate those requirements as mitigation measures applicable to the project. The procedure for determining if a future project is consistent with UCSF's LRDP and GHGRS is in Section 7.0: CEQA Project Review.

The essential requirements of a qualified GHG reduction strategy, under *CEQA Guidelines Section 15183.5*, and as interpreted by OPR and BAAQMD,⁸ are as follows:

1 policy.ucop.edu/doc/3100155/Sustainable%20Practices

Note: all web links provided in this document are active and correct as of May, 2014.

Links will be updated as necessary in conjunction with any future updates to this document.

2 www.leginfo.ca.gov/pub/05-06/bill/asm/ab_0001-0050/ab_32_bill_20060927_chaptered.pdf

3 sustainability.universityofcalifornia.edu/documents/ucsf_cap_09.pdf

4 resources.ca.gov/ceqa

5 Governor's Office of Policy and Research (OPR), *CEQA Guidelines*, 2014. opr.ca.gov/s-ceqaguidelines.php

6 OPR. *CEQA and Climate Change: Addressing Climate Change Through California Environmental Quality Act (CEQA) Review*, 2008. opr.ca.gov/docs/june08-ceqa.pdf

7 Bay Area Air Quality Management District (BAAQMD), *California Environmental Quality Act Air Quality Guidelines*, updated May 2012. www.baaqmd.gov/~media/Files/Planning%20and%20Research/CEQA/BAAQMD%20CEQA%20Guidelines_Final_May%202012.ashx?la=en

8 Ibid Section 4.3. www.baaqmd.gov/~media/Files/Planning%20and%20Research/CEQA/BAAQMD%20CEQA%20Guidelines%20May%202011.ashx?la=en

See also BAAQMD's *GHG Plan Level Guidance*, May 2012. www.baaqmd.gov/~media/Files/Planning%20and%20Research/CEQA/GHG%20Quantification%20Guidance%20May%202012.ashx?la=en

- Establish a baseline GHG inventory for 2008 or earlier using accepted accounting protocols;
- Establish a business-as-usual GHG forecast for 2020 based on reasonable assumptions;
- Establish a level, based on substantial evidence, below which the contribution to GHG emissions from activities covered by the strategy would not be cumulatively considerable;
- Identify and analyze the GHG emissions resulting from specific actions or categories of actions anticipated within the geographical area;
- Specify GHG reduction measures and performance standards, that, substantial evidence demonstrates, if implemented on a project-by-project basis, will collectively achieve the specified emissions target;
- Establish a mechanism by which to monitor the plan's progress toward achieving its targets and one which will trigger required amendment if the plan is not achieving specified levels; and
- Be adopted in a public process following environmental review.

UCSF's existing *Climate Action Plan*, dated December 2009, meets many but not all of these requirements. It establishes a 1990 baseline, which in turn informs a 2020 campus-wide target (consistent with *AB 32* and the *UC Sustainable Practices Policy*), forecasts emissions through 2020, and includes a comprehensive set of prescriptive GHG reduction measures. However, the *Climate Action Plan* did not undergo CEQA review and it was not adopted in a public process; in addition, it does not include a clear monitoring plan for tracking GHG emissions reductions and adjusting the plan over time to meet the 2020 target. As a result, the *Climate Action Plan* cannot be considered a "qualified" GHG reduction strategy. This document, however, will meet the criteria to be a qualified GHG reduction strategy.

As of 2014, qualified GHG reduction strategies are constructed around target year 2020, since that is the *AB 32* planning horizon. However, as the 2014 LRDP has a planning horizon of 2035, and as future legislation is anticipated that will mandate a new (post-2020) statewide GHG emissions level, the UCSF GHGRS provides a framework for meeting requirements and maintaining qualification through the year 2035.⁹

⁹ www.arb.ca.gov/cc/scopingplan/document/updatescopingplan2013.htm

With respect to environmental review of a given project under the LRDP (the "project"), the GHGRS is intended to ensure that UCSF can answer "no" to the following questions regarding "Greenhouse Gas Emissions" in the Environmental Checklist Form (Appendix G) of the *CEQA Guidelines*:

- VII.a. Will the project generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?
- VII.b. Will the project conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHGs?¹⁰

The UCSF GHGRS may require revision over time in response to changes in GHG regulations; changes to existing or planned state, UC, or UCSF GHG reduction programs and policies; or development patterns that diverge from the assumptions made when the LRDP was adopted. Circumstances that may lead to revision of this document are outlined in Section 6.0: Implementation and Monitoring.

2.0 POLICY AND REGULATORY SETTING

The UCSF GHGRS addresses applicable federal, state, regional, local, UC system-wide, and UCSF-specific policies and regulations in effect as of April 2014. These are outlined in the following sections.

2.1 POLICIES AND PLANS OF THE BOARD OF REGENTS OF THE UNIVERSITY OF CALIFORNIA AND UNIVERSITY OF CALIFORNIA OFFICE OF THE PRESIDENT

In 2007, the Chancellor of UCSF signed the *American College and University President's Climate Commitment (ACUPCC)*¹¹ to complete an emissions inventory, set target dates and interim milestones for becoming climate-neutral,¹² take steps to reduce GHG emissions, and prepare public progress reports. As an intermediate target, the University of California Office of the President (UCOP) established the goals of reducing GHG emissions to 2000 levels by 2014; 1990 levels by 2020; and achieving climate neutrality as soon as possible after reaching the 2014 and 2020 reduction targets. More recently, UCSF committed to achieving climate neutrality by

¹⁰ Applicable plans include *AB 32* and the *AB 32 Scoping Plan*, adopted UC policy, and the UCSF *Climate Action Plan*.

¹¹ www.presidentclimatecommitment.org/about/commitment

¹² Climate neutrality is defined as the University having a net-zero impact on the Earth's climate; it will be achieved by minimizing GHG emissions as much as possible and by using other measures to mitigate the remaining GHG emissions (UCSF *Climate Action Plan*, December 2009).

the year 2047.¹³ These goals pertain to Scope 1 and Scope 2 emissions¹⁴ of the six Kyoto greenhouse gases originating from sources specified in the ACUPCC,¹⁵ as well as Scope 3 emissions from business airline travel and commuting by UCSF staff and students. The *Sustainable Practices Policy* of the Board of Regents of the University of California (Regents) and the UCOP specifies that these goals will be pursued while maintaining the primary research and education mission of the University.

As outlined in UCSF's *Climate Action Plan* of 2009, the Regents approved and the UC President issued the *Sustainable Practices Policy* in 2007, which committed UC to implementing actions intended to minimize the University's impact on the environment and reduce the University's dependence on non-renewable energy. The policy was most recently revised in November 2013, and now covers the areas of green building, clean energy, transportation, climate protection, sustainable operations, waste reduction and recycling, environmentally preferable purchasing, sustainable foodservice, and sustainable water systems. The UC *Sustainable Practices Policy* will continue to be updated over time.¹⁶

The *Sustainable Practices Policy* sets the following requirements and goals relevant to GHG emissions reduction:

- Each UC campus must develop a long-term strategy for voluntarily meeting the requirements of California's *Global Warming Solutions Act of 2006 (AB 32)*;
- All campuses are instructed to attempt to achieve climate neutrality as soon as possible after meeting 2014 and 2020 reduction targets;
- New construction and renovations are required to achieve energy performance 20 percent better than that mandated

13 This is the current commitment made to ACUPCC and the goal that is referenced in UCSF's Annual Progress Report to the Board of Regents of the University of California (Regents). Carbon neutrality refers to achieving net zero carbon emissions by balancing a measured amount of carbon released with an equivalent amount sequestered. At UC this means scopes 1 and 2 emissions by the year 2025. The carbon neutrality concept may be extended to include other greenhouse gases measured in terms of their carbon dioxide equivalence—the impact a GHG has on the atmosphere expressed in the equivalent amount of CO₂.

14 For a definition of Scope 1, Scope 2 and Scope 3 GHG emissions, see Section 3.0: UCSF GHG Emissions Inventory and Forecasts.

15 The six greenhouse gases identified in the Kyoto Protocol/ACUPCC are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), sulfur hexafluoride (SF₆), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs / CXYF). These are the same six greenhouse gases identified in CEQA Section 15364.5.

16 The current version of the Policy is available at: sustainability.universityofcalifornia.edu/policy.html

by *Title 24* (policy maintained as *Title 24* is revised), and to strive to achieve 30 percent;

- New laboratory buildings must meet Labs21 Environmental Performance Criteria (EPC);¹⁷
- All new construction and major renovation projects must meet a minimum standard of LEED-NC Silver, and are to strive for LEED-NC Gold designation when possible;¹⁸
- The University is to use energy efficiency retrofits to reduce system-wide energy consumption by 10 percent or more, from the 2000 baseline, by 2014;
- Renovation projects greater than \$5 million that do not qualify for LEED-NC must be certified under LEED-CI;
- Renovation projects that require 100 percent equipment replacement, and 50 percent non-shell areas, must achieve LEED Silver certification at a minimum, and strive for Gold;
- Each campus is to submit one pilot LEED-EBOM building for certification by July 1, 2014;
- The University of California system is to have the capacity to provide up to 10 megawatts (MW) of renewable energy on-site by 2014 (approximately one MW per UC campus);
- Campuses are to develop goals for reducing transportation-related GHGs and report on progress annually;
- Transportation Demand Management (TDM) programs and projects are to be expanded and enhanced as appropriate to each campus;
- Campuses are to divert 50 percent of solid waste by 2008 and 75 percent by 2012, and are to achieve zero waste by 2020 (defined as diverting 95 percent or more of municipal solid waste);
- Each campus is to develop a *Water Action Plan* and reduce water consumption by 20 percent by 2020;
- All new buildings are to achieve at least two points in the LEED NC Water Efficiency category;
- Campuses are instructed to maximize procurement of environmentally preferable products and services; and
- By 2020, 20 percent of food products purchased by the University must be sustainable food products.

The UC President has set a goal for UC to become carbon

17 Website: www.labs21century.gov ; EPC document: www.i2sl.org/documents/toolkit/epc_3-0_508.pdf

18 Leadership in Energy and Environmental Design (LEED) definitions, details, and standards are available on the website of the US Green Building Council (USGBC, the organization that sets the standards). www.usgbc.org/leed

neutral by 2025 and purchase only clean energy.¹⁹ This goal has not been formally adopted by the Regents as a policy, but UC is actively working on the President's initiative to be the first major research university to achieve carbon neutrality, with efforts planned or underway to:

- Create a shared service center, which both owns electricity-generation resources and purchases long-term forward contracts, and which will manage the supply of wholesale electricity to campuses eligible for direct access;
- Continue energy-efficient projects and expand them to include small- to medium-scale renewable energy sources²⁰ at all campus sites, and seek additional funding sources for these projects;
- Effectively manage the purchase of natural gas to mitigate risk tolerance to price changes, develop renewable natural gas (biogas), and purchase biogas contracts through outside producers; and
- Manage emissions allowances and offsets, comply with California's cap-and-trade program and other environmental attribute programs, and generate new funds to support projects resulting in GHG emission reductions.

2.2 UCSF POLICY AND PLANS

UCSF has a robust sustainability program covering sustainability activities across the entire campus. Through its Office of Sustainability, UCSF has created work groups addressing sustainability in the following areas, most of which have direct implications for GHG emissions: Carbon Neutrality, Zero Waste, Water Conservation, Sustainable Food, Toxics Reduction, Green Procurement, Green Buildings, and Sustainable Operations.

UCSF's Sustainability Governance consists of the Academic Senate Sustainability Committee and the Chancellor's Advisory Committee on Sustainability (CACS). The Academic Senate Sustainability Committee identifies faculty recommendations for improving sustainability at UCSF. The charge of the CACS is to:

- Annually examine UCSF's effect on the environment from a comprehensive perspective;
- Evaluate existing UCSF policies, procedures, and programs that affect the environment;

¹⁹ University of California, Office of the President Business Operations, November 2013. *President's Initiative: The First Research University to Achieve Carbon Neutrality*. sustainability.universityofcalifornia.edu/documents/carbon-neutrality2025.pdf

²⁰ Renewable energy is power generated from inexhaustible sources, such as the sun or wind, or from sources that can quickly be replenished, such as biomass. For the purposes of this document, an energy source is renewable if it has been designated as such by the California Energy Commission. For details, see www.cpuc.ca.gov/PUC/energy/Renewables/FAQs/01REandRPSeligibility.htm.

- Serve as a coordinating body for groups or individuals concerned with sustainability issues;
- Advise selected work groups in the development and implementation of UCSF's sustainability initiatives and goals; and
- Support reduction of greenhouse gas emissions to 1990 levels by 2020.

UCSF includes a Sustainability Dashboard on its Living Green website that includes performance metrics for multiple issue areas including GHG emissions. UCSF also publishes an annual sustainability report on its web-site.²¹

UCSF Climate Action Plan (2009)

As part of implementing the UC *Sustainable Practices Policy*, UCSF developed a *Climate Action Plan* in 2009, as mentioned in Section 1. The *UCSF Climate Action Plan* is a long-term strategy for voluntarily meeting the State of California's goal for reducing GHG emissions to 1990 levels by 2020, pursuant to *AB 32*. The *Climate Action Plan* also addresses the UCOP goals for 2014 and 2020 target-year GHG emissions, and attaining climate neutrality²² as soon as possible after achieving the 2014 and 2020 reduction targets. GHG emissions inventories are included for the years 1990, 2000, and 2008. The *Climate Action Plan* forecasts future emissions, and it assesses the impact of UCSF sustainability policies and programs on future GHG emissions and the prospects for achieving GHG reduction goals. The *Climate Action Plan* concluded that UCSF is expected to meet the goal of reducing GHG emissions to 2000 levels by 2014, but that the goal of reaching 1990 levels by 2020²³ likely would not be met without the use of additional reduction measures or carbon offsets.

UC Strategic Energy Plan

The UC *Strategic Energy Plan (SEP)*²⁴ was prepared in 2008 for all UC campuses, to fulfill a goal of UC's *Sustainable Practices Policy* to implement energy efficiency projects in

²¹ Annual Sustainability Reports are available on the UCSF LivingGreen website: sustainability.ucsf.edu/

²² The *Climate Action Plan* defines climate neutrality as having a net zero impact on the Earth's climate, to be achieved by minimizing GHG emissions as much as possible and using carbon offsets or other measures to address the remaining GHG emissions.

²³ During development of the UCSF GHGRS it was discovered that the 1990 emissions estimate in the 2009 *Climate Action Plan* is inaccurate, due to an error in energy accounting. The actual emissions were significantly higher, which means the 2020 target in the *Climate Action Plan* should have been higher as well. (See Section 3.4.1 for further detail).

²⁴ System-wide *SEP*: sustainability.universityofcalifornia.edu/documents/ucsep_sw.pdf

existing buildings. The UCSF portion of the *SEP*²⁵ analyzes energy use and GHG trends, and identifies potential energy efficiency retrofit projects (primarily lighting, HVAC, commissioning, and central plant measures) at all buildings at UCSF having areas of 50,000 gross square feet (gsf) or larger. Energy savings, GHG emissions savings, and financial returns are estimated in the *SEP* for hundreds of projects, which are grouped into Tier 1 (high priority) and Tier 2 (longer-term planning) projects based on their energy savings and financial payback. The *SEP* project list is intended to be regularly updated by each campus to evaluate the feasibility of additional energy-saving measures.

Annual GHG Inventory Reporting

The UC *Sustainable Practices Policy* requires each campus to report a GHG emissions inventory to an independent reporting organization.

UCSF reported Scope 1 and Scope 2 emissions²⁶ for calendar-year 2008 to the California Climate Action Registry (CCAR). UCSF currently reports its annual Scope 1 and Scope 2 GHG emissions inventory to The Climate Registry (TCR). The most recent inventory reported to TCR was for calendar year 2012.²⁷ UCSF emissions inventories reported to outside agencies are verified by accredited independent auditors.

Since 2008, UCSF has also been required to report its annual Scope 1 emissions from the Parnassus Central Utility Plant (CUP) to the California Air Resources Board (CARB) under the AB 32 Reporting Rule. (The CUP is the only UCSF facility that reaches the threshold for required reporting of emissions to the CARB under AB 32 and federal regulations.)

UCSF tracks and reports its progress towards meeting its GHG emissions goals in its *Annual Sustainability Report*.²⁸ UCSF also reports to the UC Regents annually on its progress in meeting the goals in the UC *Sustainable Practices Policy*. (See Section 3 for more on UCSF's inventories and reporting.)

25 UCSF *SEP*: sustainability.universityofcalifornia.edu/documents/ucsep_ucsf_mc.pdf

26 For more information on UCSF's Scope 1, Scope 2, and Scope 3 GHG emissions, see Section 3.0: UCSF GHG Emissions Inventory and Forecasts.

27 As of April 2014, UCSF was completing 2013 calendar year TCR reporting documents.

28 UCSF Office of Sustainability, *Annual Sustainability Report*, FY12-13: sustainability.ucsf.edu/what_ucsf_is_doing_2/annual_report_fy12_13

2.3 FEDERAL REGULATIONS

Under the *Mandatory Reporting of Greenhouse Gases Rule (74 FR 56260)*²⁹ of the United States Environmental Protection Agency (USEPA or EPA), large emitters of GHGs are required to report their emissions annually to a public database. Under this rule, GHG emissions from the CUP have been reported annually to the EPA since 2010.

2.4 STATE OF CALIFORNIA AND PROGRAMS AND POLICIES

California is a leader in developing climate change mitigation and adaptation strategies. Since 2005, California has been developing policy and passing legislation that seeks to control emissions of GHGs. These have included regulatory approaches, such as mandatory reporting for significant sources of GHG emissions and caps on emission levels, as well as market-based mechanisms, such as the market-based cap-and-trade exchange. Some regulations apply at the state level, but others are state-imposed mandates that are applicable at the municipal level and required of local agencies and jurisdictions.

Governor's Office of Planning and Research

The California Governor's Office of Planning and Research (OPR) provides guidance for agency compliance with CEQA, which requires that public agencies analyze and document the environmental impacts of proposed projects. OPR has developed guidance on the analysis and mitigation of GHG emissions in CEQA documents. This guidance states that lead agencies should develop their own approach to performing climate change analysis for projects that generate GHG emissions, and that compliance with CEQA can be achieved by identification and quantification of GHG emissions, assessment of significance of the impact on climate change, and identification of mitigation measures and/or alternatives if the impact is found to be significant.

OPR developed, and the California Resources Agency has adopted, amendments to the *CEQA Guidelines* to incorporate this guidance. *CEQA Guidelines Section 15183.5(b)* states that a lead agency may choose to analyze and mitigate significant greenhouse gas emissions in a plan for the reduction of greenhouse gases or similar document, and that such a plan may be used in a cumulative impacts analysis of a project. A lead agency may determine that an individual project's incremental contribution to a cumulative effect on climate change is not cumulatively considerable if the project

29 epa.gov/climate/ghgreporting/basic-info/index.html

complies with the requirement of the previously adopted plan to reduce greenhouse gas.

State of California Executive Order S-3-05: Greenhouse Gas Emission Reduction Targets

In June 2005, the Governor of California signed *Executive Order S-3-05*,³⁰ which identified the California Environmental Protection Agency (Cal/EPA) as the lead coordinating state agency for establishing climate change emission reduction targets in California. A “Climate Action Team,” a multi-agency group of state agencies, was established and tasked with implementing *Executive Order S-3-05*. The Governor’s order established aggressive emissions reductions goals: by 2010, GHG emissions must be reduced to 2000 levels; by 2020, GHG emissions must be reduced to 1990 levels; and by 2050, GHG emissions must be reduced to 80 percent below 1990 levels. GHG emission reduction strategies and measures to reduce global warming were identified by the California Climate Action Team in 2006.

State Assembly Bill 32 (AB 32): The California Global Warming Solutions Act of 2006

In 2006, the California legislature adopted *AB 32*, requiring that California cap GHG emissions state-wide at 1990 levels by 2020, as already discussed. *AB 32* requires CARB to establish a program for statewide GHG emissions reporting, and monitoring/enforcement of that program.

The *Climate Change Scoping Plan*,³¹ adopted in 2008 and being updated in 2013-2014, outlines the State’s plan to achieve the GHG reductions required in *AB 32*. The actions vary by type, which include direct regulations, alternative compliance mechanisms, incentives, voluntary actions, and other mechanisms. The scoping plan identifies local governments as “essential partners” in achieving California’s goals to reduce GHG emissions, and encourages the adoption of reduction targets for community and municipal operations emissions that are consistent with the State’s commitment (identified as equivalent to 15 percent below “current” levels). *AB 32* spawned many high-impact State measures that target emissions from transportation and power generation, including the Pavley vehicle emissions standards (*Assembly Bill 1493*), the *Renewables Portfolio Standard*, and the *Low Carbon Fuel Standard*, each of which is described below.

Assembly Bill 1493 (Pavley): Clean Car Standards

30 www.resources.ca.gov/ceqa

31 www.arb.ca.gov/cc/scopingplan/document/updatescopingplan2013.htm

Assembly Bill 1493 (AB 1493, also known as the Pavley bill),³² directed CARB to adopt regulations to reduce emissions from new passenger vehicles. *AB 1493* required GHG emission reductions from passenger trucks and light cars beginning in 2011. CARB’s *AB 32 Early Action Plan*, released in 2007, included a strengthening of the Pavley regulation for 2017. The USEPA granted California the authority to implement GHG emission reduction standards for new passenger cars, pickup trucks, and sport utility vehicles in June, 2009. In September of that year, CARB adopted amendments to Pavley that mandated ever-greater reductions to GHG emissions from new passenger vehicles from 2009 through 2016. It is expected that the Pavley regulations will reduce GHG emissions from California passenger vehicles by about 22 percent in 2012 and about 30 percent in 2016, while improving fuel efficiency and reducing motorists’ costs.

Senate Bill 1078 (SB 1078): Renewables Portfolio Standard

California’s *Renewables Portfolio Standard (RPS)* was established in 2002 under *SB 1078*;³³ it was accelerated in 2006 under *SB 1073*³⁴ and further expanded in 2011 under *SB 2*.³⁵ Under *AB 32*, the *Renewables Portfolio Standard* requires increased production of energy from renewable sources, like solar, wind, geothermal, and biomass generation. Investor-owned utilities, electric service providers, and community choice aggregators must increase their renewable portfolio to reach 33 percent of total procurement by 2020. UCSF’s primary electricity provider, Pacific Gas and Electric (PG&E), expects to meet in excess of 33 percent of its retail energy demand with eligible renewable resources prior to 2020.

Low Carbon Fuel Standard (LCFS) Regulations

The *LCFS* (also known as *EO-S-1-07*)³⁶ regulations require fuel providers in California to decrease lifecycle fuel carbon intensity³⁷ by 2020. The *LCFS* applies, either on a compulsory or opt-in basis, to all fuels used for transportation in California. It is expected that the *LCFS* will reduce tailpipe carbon

32 www.arb.ca.gov/cc/cms/documents/ab1493.pdf

33 www.energy.ca.gov/portfolio/documents/documents/SB1078.PDF

34 www.leginfo.ca.gov/pub/05-06/bill/sen/sb_0101-0150/sb_107_bill_20060926_chaptered.pdf

35 www.leginfo.ca.gov/pub/11-12/bill/sen/sb_0001-0050/sbx1_2_bill_20110412_chaptered.pdf

36 www.arb.ca.gov/fuels/lcfs/lcfs.htm

37 “Attempt to calculate the emissions of greenhouse gases over the full life of a power source, from groundbreaking to fuel sources to waste management back to greenfield status.” en.wikipedia.org/wiki/Comparisons_of_life-cycle_greenhouse_gas_emissions

emissions from passenger vehicles and heavy-duty trucks by approximately 10 percent by 2020. CARB identified specific eligibility criteria in 2009, and the regulation came into effect in January, 2010. In December, 2011, the U.S. District Court for the Eastern District of California issued rulings that struck down the *LCFS* for violation of the Commerce Clause of the U.S. Constitution, and enjoined its further enforcement. CARB appealed the ruling the following month. In 2013, the State of California Court of Appeal, Fifth Appellate District, held that *LCFS* would remain in effect, allowing CARB to continue to implement and enforce the 2013 regulatory standards while making additional amendments. CARB staff will present the revised *LCFS* regulation in the fall of 2014, including 2013 amendments as well as new concepts to improve flexibility, efficiency, and enforcement of the regulation.

2013 Building Energy Efficiency Standards (Title 24 Update)

In 2013, the California Energy Commission (CEC) updated the *California Code of Regulations (CCR), Title 24* of the California Energy Code,³⁸ so as to enhance the energy efficiency requirements of newly constructed buildings. The 2013 standards were adopted in 2012, and are effective as of July 1, 2014. The update to the code supports the goals described in *AB 32* by enhancing energy efficiency of all new residential and non-residential development, and streamlines the compliance process. The 2008 update reduced GHG emissions levels from electricity use by approximately 21 percent, and from natural gas use by 9 percent for California residential buildings, and by approximately 5 percent for electricity and 9 percent for natural gas for non-residential buildings. The 2013 update to the standards (effective 2014) is expected to further reduce the energy use of new buildings by approximately 20 percent (compared with the 2008 standards); the update also has provisions that are designed to save an estimated 200 million gallons of water per year statewide.

Senate Bill 97 (SB 97): CEQA Guidelines Amendments

The legislature enacted *SB 97*³⁹ to augment *AB 32*, which did not discuss how GHGs should be addressed in documents prepared under CEQA. *SB 97* required the OPR to develop and adopt amendments to the *CEQA Guidelines* regarding the mitigation of emissions; these were formalized on March 18, 2010. All CEQA documents prepared subsequently have been required to comply with the OPR-approved amendments to the *CEQA Guidelines*.

38 www.energy.ca.gov/title24/2013standards/index.html

39 resources.ca.gov/ceqa/docs/Adopted_and_Transmitted_Text_of_SB97_CEQA_Guidelines_Amendments.pdf

Senate Bill 375 (SB 375): The Sustainable Communities Act

In 2008, *SB 375*⁴⁰ was enacted to address indirect GHG emissions caused by urban sprawl. *SB 375* develops emissions-reduction goals that regions can apply to planning activities. *SB 375* provides incentives for local governments and developers to create new walkable and sustainable communities, revitalize existing communities, and implement conscientiously planned growth patterns that concentrate new development around public transportation nodes. CARB has been working with the state's metropolitan planning organizations to align their regional transportation, housing, and land use plans so as to reduce vehicle miles traveled and attain regional GHG reduction targets. The legislation also allows developers to bypass environmental review of the project's GHG impact under CEQA if they build projects consistent with the Sustainable Community Strategy of a given planning organization.

SB 375 enhances CARB's ability to reach the goals of *AB 32* by directing the agency to develop regional GHG emission reduction targets for 2020 and 2035 that are to be achieved through these the land use and transportation sector. For example, in September, 2010, CARB adopted placeholder per capita emissions reduction targets for the San Joaquin Valley (including eight planning organizations) of five percent and 10 percent, respectively, to be revised in 2012. On December 14, 2012, the Policy Council adopted a progress report that maintained these target recommendations.

Senate Bill 226 (SB 226): Streamlining for Infill Projects

This 2011 California law streamlines environmental review of eligible infill projects under CEQA. Under *SB 226*,⁴¹ qualifying infill projects can avoid environmental review of impacts that were addressed in prior, program-level analysis, or where local development standards already mitigate them. *SB 226* defines infill projects as residential, retail, commercial or mixed-use development, transit stations, schools and public office buildings, on previously developed urban sites or vacant land at least 75 percent surrounded by urban uses. The project must be consistent with *AB 32* and the regional sustainable community strategy developed pursuant to *SB 375*, and be consistent with state planning priorities, water conservation and energy efficiency standards, transit-oriented development policies, and public health policies.

40 www.leginfo.ca.gov/pub/07-08/bill/sen/sb_0351-0400/sb_375_bill_20080930_chaptered.pdf

41 www.leginfo.ca.gov/pub/11-12/bill/sen/sb_0201-0250/sb_226_bill_20110909_amended_asm_v93.html

2.5 REGIONAL PLANS AND POLICIES

The BAAQMD is the primary agency responsible for regional air quality regulation in the nine-county San Francisco Bay Area Air Basin (SFBAAB). The BAAQMD established a climate protection program to reduce pollutants that contribute to global climate change and affect air quality in the SFBAAB. The climate protection program includes measures that promote energy efficiency, reduce vehicle miles traveled, and develop alternative sources of energy, all of which assist in reducing emissions of GHGs and in reducing air pollutants that affect the health of residents. The BAAQMD also seeks to support current climate protection programs in the region and to stimulate additional efforts through public education and outreach, technical assistance to local governments and other interested parties, and promotion of collaborative efforts among stakeholders.

In June 2010, the BAAQMD issued revised guidelines (*BAAQMD CEQA Air Quality Guidelines*) for determining CEQA significance thresholds for air pollutants including GHG emissions. Updated in May 2012, these guidelines include recommendations for analytical methodologies to determine air quality impacts and identify mitigation measures that can be used to avoid or reduce GHG emissions. The guidelines also define the essential requirements of a qualified GHG reduction strategy under *CEQA Guidelines Section 15183.5*, consistent with the OPR directives.

On March 5, 2012, the Alameda County Superior Court issued a judgment finding that BAAQMD had failed to comply with CEQA when it adopted its 2010 thresholds of significance. However, in August 2013 the State Court of Appeal issued a full reversal of the Superior Court ruling, although at the time of this analysis, BAAQMD has not formally readopted these thresholds. Notwithstanding formal adoption, the 2011 thresholds are based on substantial evidence provided by BAAQMD (BAAQMD, 2009), and have been accepted by the University of California for use in the LRDP EIR.

The threshold for stationary sources is 10,000 metric tons (mt) of CO₂e⁴² per year (i.e., emissions above this level may be considered significant). For non-stationary sources, three

separate thresholds have been established:

- Compliance with a qualified GHG reduction strategy (i.e., if a project is found to be out of compliance with a qualified greenhouse gas reduction strategy, its GHG emissions may be considered significant); or
- 1,100 mt of CO₂e per year (i.e., emissions above this level may be considered significant); or
- 4.6 mt of CO₂e per service population (SP) per year (i.e., emissions above this level may be considered significant). “Service population” is the sum of residents plus employees⁴³ expected for a development project.

For quantifying a project’s GHG emissions, BAAQMD recommends that all GHG emissions from a project be estimated, including a project’s direct and indirect GHG emissions from operations. Direct emissions refer to emissions produced from on-site combustion of energy, such as natural gas used in furnaces and boilers, emissions from industrial processes, and fuel combustion from mobile sources. Indirect emissions are emissions produced off site from energy production and water conveyance due to a project’s energy use and water consumption. BAAQMD has provided guidance on detailed methods for modeling GHG emissions from proposed projects (BAAQMD, 2012). The above-stated thresholds apply only to operational emissions. To date, the BAAQMD has not adopted numeric thresholds for the assessment of construction-related emissions.

2.6 CITY AND COUNTY OF SAN FRANCISCO PLANS AND POLICIES

As outlined in LRDP Appendix C, the 1987 *Memorandum of Understanding* (MOU) between UCSF and the City and County of San Francisco, UCSF maintains constitutional autonomy (per Article 9, Section 9 of the California State Constitution) over the land and facilities it owns or operates within the city of San Francisco. This authority includes University master planning and oversight of land uses and the development, maintenance and use of physical facilities owned or operated by UCSF. Thus, the following City plans and policies apply only to facilities located within the City that UCSF leases from a third party.

City and County of San Francisco Greenhouse Gas Reduction Strategy

San Francisco has a history of environmental protection policies and programs aimed at improving the quality of life for residents and reducing detrimental impacts on the environment. A comprehensive assessment of these policies,

⁴² **Equivalent carbon dioxide (CO₂e)** is a measure for describing how much global warming a given type and amount of greenhouse gas may cause, using the functionally equivalent amount or concentration of carbon dioxide (CO₂) as the reference. Carbon dioxide equivalency is a quantity that describes, for a given mixture and amount of greenhouse gas, the amount of CO₂ that would have the same global warming potential, when measured over a specified timescale (generally, 100 years). Carbon dioxide equivalency thus reflects the time-integrated radiative forcing of a quantity of *emissions* or rate of greenhouse gas emission—a *flow* into the atmosphere—rather than the instantaneous value of the radiative forcing of the stock (concentration) of greenhouse gases *in the atmosphere* described by CO₂e. en.wikipedia.org/wiki/Carbon_dioxide_equivalent

⁴³ For UCSF, “employees” includes staff and faculty.

programs and ordinances was compiled into the City's *Strategies to Address Greenhouse Gas Emissions in San Francisco* in 2010.⁴⁴ The BAAQMD concurs that the strategy meets the criteria for a qualified GHG reduction strategy as outlined in BAAQMD's 2010 *CEQA Air Quality Guidelines*.

The following plans, policies, and legislation demonstrate San Francisco's continued commitment to environmental protection. They include measures applicable to this project that would decrease the amount of GHG emissions emitted into the atmosphere and thus decrease San Francisco's overall contribution to climate change. These programs are collectively referred to as *San Francisco's GHG Reduction Strategy*.

Climate Action Plan for San Francisco

In February 2002, the San Francisco Board of Supervisors passed the *Greenhouse Gas Emissions Reduction Resolution (Resolution Number 158-02)*⁴⁵ that set a goal for the City to reduce GHG emissions to 20 percent below 1990 levels by the year 2012. In September 2004, the San Francisco Department of the Environment and San Francisco Public Utilities Commission (SFPUC) published the *Climate Action Plan for San Francisco: Local Actions to Reduce Greenhouse Gas Emissions*.⁴⁶ This climate action plan provides the context of climate change in San Francisco and examines strategies to meet the 20-percent GHG emissions reduction target. Although the Board of Supervisors has not formally committed the City to perform the actions addressed in the plan, and many of the actions require further development and commitment of resources, the plan serves as a blueprint for GHG emissions reductions, and several actions have been implemented or are now in progress. Through 2010, the City of San Francisco's GHG emissions were 14.5 percent below the 1990 emission levels.⁴⁷ While this reduction has not quite met the goals of the resolution, it does surpass international and statewide emissions targets established as part of the Kyoto Protocol, which called for emission reductions of seven percent by 2012, and *AB 32*, which called for statewide emissions to return to 1990 levels by 2020.

The City updated its *Climate Action Plan* In October 2013,

changing its title to the *San Francisco Climate Action Strategy*.⁴⁸ The update is organized around three main goals:

- Send zero waste to landfills by 2020;
- Source 100 percent of residential and 80 percent of commercial electricity from renewable sources by 2030, an effort tied to energy-efficiency improvements that will reduce usage; and
- Attain a level of 50 percent of all transportation trips in the city being completed without the use of personal vehicles by 2017.

Electricity Resource Plan (Revised December 2011)

The 2013 *San Francisco Climate Action Strategy* concludes that moving to 100-percent-renewable electricity is the single biggest step the City can take to reduce GHG emissions. The purpose of the 2011 update to San Francisco's 2002 *Electricity Resource Plan*⁴⁹ was to identify strategies for San Francisco to achieve a GHG-free electric system by 2030, meeting all of its energy needs from renewable and zero-GHG electric energy sources. The plan affects not only the SFPUC in its role of providing electric power to serve municipal facilities (17 percent of San Francisco's total energy usage), but also the 83 percent of electric energy currently being supplied to San Francisco by PG&E and various energy service providers.

Green Building Ordinance

In August, 2008, the City enacted the *San Francisco Green Building Ordinance* for newly constructed residential and commercial buildings and major renovations to existing buildings. The ordinance (Chapter 13C of the San Francisco Building Code⁵⁰) goes beyond the State's CALGreen mandatory green building measures, and specifically requires newly constructed commercial buildings larger than 5,000 gsf, residential buildings over 75 feet in height, and renovations on buildings over 25,000 gsf to achieve a Leadership in Energy and Environmental Design (LEED) rating of Gold or higher starting in 2012. As a result, San Francisco has achieved the highest per-capita density of LEED-certified square footage of any U.S. city.

44 City of San Francisco Planning Department, *Strategies to Address Greenhouse Gas Emissions in San Francisco*, November 2010. sfmea.sfplanning.org/GHG_Reduction_Strategy.pdf

45 www.sf-planning.org/ftp/files/MEA/GHG-Reduction_Rpt.pdf

46 www.sf-planning.org/ftp/files/MEA/GHG-Reduction_Rpt.pdf

47 San Francisco Department of the Environment. *San Francisco Climate Action Strategy*, 2013 Update. www.sfenvironment.org/sites/default/files/engagement_files/sfe_cc_ClimateActionStrategyUpdate2013.pdf

48 *Ibid.*

49 San Francisco Public Utilities Commission. *San Francisco's 2011 Updated Electricity Resource Plan: Achieving San Francisco's Vision for Greenhouse Gas Free Electricity*, March, 2011. sfwater.org/Modules/ShowDocument.aspx?documentID=40

50 Updated version of the San Francisco Building Code: www.energy.ca.gov/title24/2008standards/ordinances/sanfrancisco/2010-12-29_San_Francisco_Green_Building_amendments.pdf

Existing Commercial Buildings Energy Performance Ordinance (San Francisco Environment Code, Chapter 20)

Under this ordinance, passed in 2011, nonresidential buildings of 10,000 square feet and larger must benchmark and publically report energy use every year, and undergo a professional energy audit every five years. This ensures that property owners, managers, and tenants know how their buildings are performing and can make informed decisions about effective energy-efficiency strategies for their buildings.

Transit First Policy

In 1973, the City instituted the *Transit First* policy,⁵¹ which added *Article 8A, Section 8A.115* to the City Charter with the goal of reducing San Francisco's reliance on freeways and meeting transportation needs by emphasizing mass transportation. The *Transit First* policy gives priority to public transit investments, adopts street capacity and parking policies to discourage increased automobile traffic, and encourages the use of transit, bicycling, and walking instead of single-occupant vehicles. The University is committed to supporting the City's *Transit First* policy.

San Francisco Municipal Transportation Agency's Zero Emissions 2020 Plan

The *Zero Emissions 2020 Plan* focuses on the purchase of cleaner emission transit buses, including hybrid diesel-electric buses. Under this plan, hybrid buses will replace the oldest diesel buses, some dating back to 1988. The hybrid buses emit 95 percent less particulate matter (soot) than the buses they replace; they produce 40 percent less nitrogen oxides and reduce GHGs by 30 percent.

Zero Waste

In 2004, the City committed to a goal of diverting 75 percent of its waste away from landfills by 2010, with the ultimate goal of zero waste by 2020. San Francisco recovered 80 percent of discarded material in 2012, the most recent year for which the San Francisco Department of the Environment has published data.⁵²

Mandatory Recycling and Composting Ordinance

In 2009, the City adopted an ordinance that requires all businesses and residences to compost food scraps and biodegradable products.⁵³ Businesses and residents are provided with green, blue, and black bins to sort their food and other biodegradable waste, recycling, and trash, respectively. Businesses and residents that do not comply with the ordinance are subject to fines, depending on the level and duration of noncompliance.

Waste Reduction Ordinances

The City has in place ordinances to reduce waste from retail and commercial operations. *Ordinance No. 295-06*,⁵⁴ the *Food Waste Reduction Ordinance*, prohibits the use of polystyrene foam disposable food serviceware and requires use of biodegradable/compostable or recyclable food serviceware by restaurants, retail food vendors, city departments, and city contractors. *Ordinance No. 81-07*,⁵⁵ the *Plastic Bag Reduction Ordinance*, requires stores located within the city to use compostable plastic, recyclable paper, and/or reusable checkout bags.

Construction and Demolition Debris Recovery Ordinance

City *Ordinance No. 27-06* (2006)⁵⁶ requires that all construction and demolition debris be transported to a registered facility that can divert a minimum of 65 percent of the material from landfills. This ordinance applies to all construction, demolition, and remodeling projects within the city.

3.0 UCSF GHG EMISSIONS INVENTORY AND FORECASTS

UCSF has inventoried its campus-wide GHG emissions for several calendar years, including 1990, 2000, and every year since 2007, using standard accounting protocols from the California Climate Action Registry (CCAR), The Climate Registry (TCR), the California Air Resources Board (CARB), and the United States Environmental Protection Agency (USEPA), as discussed in Section 2.2. Reporting rules, protocols, and registries have evolved over this time, with the CCAR no longer active and TCR taking over as the leading

51 San Francisco's *Transit First* policy is part of the *Transportation Element of the San Francisco General Plan*. www.sf-planning.org/ftp/general_plan/14_Transportation.htm#TRA_TF

52 San Francisco Public Utilities Commission. *Departmental Climate Action Plan Annual Report, Fiscal Year 2011-2012*, May 2013. sfwater.org/modules/showdocument.aspx?documentid=4138

53 *Ordinance No. 100-09*. www.sfenvironment.org/sites/default/files/policy/sfe_zw_sf_mandatory_recycling_composting_ord_100-09.pdf

54 www.sfgov2.org/ftp/uploadedfiles/fswr/documents_forms/FSWR_RulesAndRegs.pdf

55 www.sfgov2.org/ftp/uploadedfiles/fswr/documents_forms/FSWR_RulesAndRegs.pdf

56 www.sfgov2.org/ftp/uploadedfiles/fswr/documents_forms/FSWR_RulesAndRegs.pdf www.sfenvironment.org/sites/default/files/fliers/files/cd_ordinance.pdf

national registry for voluntary reporting. As a major stationary source (greater than 25,000 mt CO₂e per year) and electric power producer, the Parnassus Central Utility Plant (CUP) falls under state and federal reporting requirements. Since 2008, CUP emissions have been reported to CARB under California's *GHG Mandatory Reporting Regulation* (part of AB32); and since 2010 CUP emissions have been reported to the USEPA under the *Greenhouse Gas Reporting Rule* (74 FR 56260).

3.1 ORGANIZATIONAL BOUNDARY

All of the standardized GHG reporting protocols and methodologies require a clear delineation of the organizational and operational boundaries used to account for emissions in an inventory. The organizational boundary includes all facilities and GHG sources over which the reporting entity has management control. Management control can be defined in either financial or operational terms, but the boundary definition must be applied consistently across the organization. Through calendar year 2011, the UCSF inventory based its organizational boundary on the operational control criterion, which requires inclusion of all wholly-owned facilities, and all facilities for which UCSF has operational control through an operational lease or other means. Facilities with which UCSF has an affiliation agreement but not operational control, such as San Francisco General Hospital and Trauma Center (SFGH) or the San Francisco Veterans Affairs Medical Center (SFVAMC), have reported their emissions separately through their own documents.

Starting with the 2012 GHG inventory reported to TCR, UCSF now delineates its organizational boundary using the financial control criterion. Under this criterion, UCSF reports emissions from facilities and sources that are wholly owned, and from facilities and sources that are partially owned but where UCSF retains financial control (e.g., through a capital or financial lease, or where majority ownership establishes management control). Due to this organizational boundary change, pre-2012 inventories in the UCSF GHGRS are presented with boundary adjustments to enable direct comparison with current and future inventories. (Essentially, emissions associated with leased facilities are removed from the pre-2012 inventories.)

3.2 OPERATIONAL BOUNDARY

The operational boundary describes the direct and indirect sources of GHG emissions included in the inventory. GHG reporting protocols generally break emissions down into three source categories related to the level of operational control exercised by the organization over the emission source. For UCSF, the following sources are included:

- **Scope 1 Emissions** – Direct emissions, including stationary combustion such as boilers, hydrofluorocarbon (HFC) refrigerant use, and some medical gases (anesthesia), as well as non-stationary combustion of fuels in University-owned vehicles.
- **Scope 2 Emissions** – Indirect stationary sources, including emissions from purchased electricity and purchased steam for leased facilities.
- **Scope 3 Emissions** – Other indirect emissions from business air travel and from commuting by students, faculty, and staff. Scope 3 is defined as emissions that are a consequence of the activities of the institution, but occur from sources not owned or controlled by the institution.

UC's *Sustainable Practices Policy* stipulates that each UC campus will annually inventory its GHG emissions in accordance with ACUPCC and TCR requirements, to include Scope 1 and Scope 2 emissions as well as Scope 3 emissions from business air travel and from commuting by students, faculty and staff.⁵⁷ Inclusion of Scope 3 emissions is optional for TCR reporting, and when reported they are generally not third-party verified.

The standardized reporting methodology also incorporates protocols for carbon sequestration accounting – e.g., 'credits' for items such as institution-owned large tracts of forest land held as 'permanent' (100-year) open space. Although UCSF owns the Mount Sutro Open Space Reserve located at the Parnassus Heights campus site, UCSF GHG inventories do not account for carbon sequestration in the Reserve. UCSF has no plans to develop buildings in the Reserve and intends to leave it in a forested state. Forest land policy is currently being discussed by UC at the system level. Future updates of UCSF's *Climate Action Plan* may include offsets attributable to forest management. If a change in land use or forest coverage were to occur, the net change in sequestered carbon associated with that change would be evaluated and may be included in the inventory.

3.3 ESTABLISHING A BASELINE

There are different requirements for and varying guidance regarding the various reporting rules for establishing a GHG emissions baseline. BAAQMD's guidance for a qualified GHG reduction strategy is to set the baseline inventory as calendar-year 2008 or earlier. Important considerations in setting the baseline include the accuracy and completeness of underlying data, and the role of the baseline in forecasting future

⁵⁷ Although UCSF has in the past (e.g., 2009 *Climate Action Plan*) included estimates of Scope 3 emissions from wastewater treatment and off-site disposal of solid waste, UC policy does not require their inclusion in annual inventory reporting to the UC Regents or to TCR. Together, these sources accounted for approximately two percent of total emissions in UCSF's 1990 and 2008 inventories.

emissions and setting reduction targets.

AB 32 requires the state to reduce GHG emission to 1990 levels by 2020. Since most communities and facilities covered under AB 32 do not have access to high quality data for estimating 1990 GHG emissions, CARB and the California Attorney General recommend that plan-level GHG reduction strategies target 2020 emissions at 15 percent below a 2008 (or earlier) baseline. From a statewide perspective, CARB has determined that 15 percent below 2008 is approximately equivalent to 1990 levels.⁵⁸ This approach to setting a 2020 target is supported by BAAQMD⁵⁹ and OPR,⁶⁰ and represents current best practice for climate action plans and general plans adopted by cities and public agencies throughout California. (More on the UCSF GHGRS approach to setting future emission targets and establishing a CEQA threshold is provided in Section 4.0.)

3.4 INVENTORY RESULTS

Table 1 provides a summary of campus-wide GHG inventories for 1990, 2008, and 2012 (the most recently reported year). The inventories contain all sources within the operational boundary prescribed by UCOP's *Sustainable Practices Policy*, which includes all Scope 1 and Scope 2 emissions as well as Scope 3 emissions from business air travel and commuting by students, faculty and staff. A subtotal is provided for Scope 1 and Scope 2 emissions, reflecting the operational boundary associated with the UC President's carbon neutral initiative. The results show that total Scope 1, 2, and 3 GHG emissions increased from 109,817 mt CO₂e in 1990 to 156,339 mt CO₂e in 2008 (a 42 percent increase), and subsequently dropped to 150,258 mt CO₂e in 2012.

The following sections provide more detail on each inventory, highlighting similarities, differences, and data quality.

3.4.1 1990 Inventory

UCSF's earliest GHG inventory (calendar year 1990) is largely based on 1990 activity data, but there are several sources for which accurate or complete data is not available, leaving a certain amount of uncertainty in the GHG emissions estimates for those sources. As mentioned in Section 2.2 / footnote 21 and explained further below, this data reflects an

adjustment made to the 1990 inventory as it appeared in the 2009 *Climate Action Plan* to correct for an accounting error discovered during development of the UCSF GHGRS; when the 1990 inventory was first developed, only half of the utility data was aggregated, so the initial 1990 emissions estimates for energy included in the 2009 *Climate Action Plan* were erroneously low. In **Table 1**, the adjusted values for natural gas and electricity emissions have been corrected to account for a full year of energy data. In addition, also as previously discussed, emissions from electricity used by leased buildings were removed from the calculations shown in **Table 1** to maintain consistency with the organizational boundary change that was made starting with the 2012 inventory (from operational to financial control). The 1990 inventory has not been independently audited, nor has it been submitted to a GHG emissions registry.

The largest of the 1990 inventory contributing sectors, Buildings and Facilities - Natural Gas (40.9 percent of total) and Buildings and Facilities - Electricity (22.3 percent), are based on actual utility consumption data tracked in the billing system. However, the utility data represents fiscal year 1989-1990, which is an approximation of calendar-year 1990.

The third-largest contributor to 1990 GHG emissions, the commute to work (15.6 percent of total), was estimated based on a comprehensive transportation survey that UCSF prepared in 1991, which accounts for both mode-split and trip lengths, as explained in the 2009 UCSF *Climate Action Plan*. Other sectors of this inventory, such as UCSF Fleet fuel consumption, did not have centralized record keeping in place in 1990, and were estimated based on an algorithm combining 2008 data scaled to the facility size and population at that time (i.e., fleet emissions are based on 2008 actual fuel consumption data scaled to the 1990 facility size and population). Similarly, Refrigerants and Medical Gases emissions data are an estimate based on 2008 known usage scaled to the conditions that existed in 1990. (Medical gas use is largely dependent on hospital stays; UCSF did not experience a significant change in the size or use of inpatient clinical facilities between 1990 and 2008.)

Following standard GHG accounting protocol, the CCAR acquisition adjustment accounts for the transfer of historical emissions associated with land and buildings purchased by UCSF after 1990. This adjustment methodology is in place so that an institution that has goals related to meeting 1990 emissions levels can accurately account for enterprise-wide emissions source changes through time. In a series of acquisitions, starting in 1998, UCSF acquired a new 57-acre campus site in the formerly industrial Mission Bay South Redevelopment Area of San Francisco. The 1990 historical emissions from this acquired site are represented by the CCAR acquisition adjustment, and are now included in all UCSF inventories since 2008.

⁵⁸ In its *Climate Change Scoping Plan* of September 2008, CARB recommends that local governments adopt a GHG reduction target consistent with the State's commitment to reach 1990 levels by 2020. This is identified as equivalent to 15 percent below "current" levels at the time of writing (2008).

⁵⁹ BAAQMD's *CEQA Guidelines* (updated May, 2012).

⁶⁰ Based on conversations with OPR, and expected to be articulated in OPR's forthcoming *Climate Action Plan* Technical Advisory, (publication expected in 2014).

Table 1: UCSF GHG Emissions Inventories (values in mt CO₂e)

Scope	Emissions Category	1990	1990%	2008	2008%	2012	2012%
1	Buildings & Facilities - Natural Gas	44,923	40.9%	90,026	57.6%	84,605	56.3%
1	Buildings & Facilities - Other Fuels	114	0.1%	NA	NA	NA	NA
1	UCSF Fleet	1,944	1.8%	3,200	2.0%	2,710	1.8%
1	Refrigerants and Medical Gases	3,500	3.2%	3,500	2.2%	1,079	0.7%
1	CCAR Acquisition Adjustment	10,178	9.3%	NA	NA	NA	NA
1	LRDP Construction Emissions	NA	NA	NA	NA	NA	NA
2	Buildings & Facilities - Electricity	24,529	22.3%	24,962	16.0%	23,781	15.8%
	Scopes 1 and 2 SUBTOTAL	85,188	77.6%	121,688	77.8%	112,175	74.7%
3	Business Air Travel	7,549	6.9%	12,582	8.0%	13,385	8.9%
3	Commute	17,080	15.6%	22,069	14.1%	24,698	16.4%
	Scopes 1, 2, and 3 TOTAL	109,817	100.0%	156,339	100.0%	150,258	100.0%

3.4.2 2008 Inventory

The 2008 GHG inventory was the first of the UCSF inventories to be audited by an accredited third-party verifier, providing a high degree of confidence in the accuracy and completeness of the underlying data and emissions calculations. The 2008 inventory (Scope 1 and Scope 2 emissions) was reported to the CCAR, while the 2008 emissions from the CUP were reported to CARB under California's *GHG Mandatory Reporting Regulation*. The 2008 figures provided in **Table 1** do not include emissions from electricity used by leased buildings; this is in order to maintain consistency with the organizational boundary change that was made starting with the 2012 inventory (from operational to financial control).

As described in the 2009 *Climate Action Plan*, emissions estimates for all sectors included in the adjusted 2008 inventory are based on actual activity data (utility natural gas and electricity usage, fleet fuel consumption, etc.). As with the 1990 inventory, the Commute emissions estimate is based on a comprehensive transportation survey for 2008.

3.4.3 2012 Inventory

UCSF's latest GHG inventory (calendar year 2012) was third-party verified and reported to TCR. The TCR reporting protocol requires quantification of all Scope 1 and Scope 2 emissions, while reporting of Scope 3 is optional. As mentioned previously, the organizational boundary change made in 2012 means that leased facilities are not included. The 2012 figures in **Table 1** include the emissions reported to TCR, plus the Scope 3 emissions for business air travel and commuting by students, faculty, and staff, so as to match the operational boundaries used for the 1990 and 2008 inventories. In 2012, 96.6 percent of total emissions

were associated with three sectors: Buildings and Facilities - Natural Gas (56.3 percent of total), Buildings and Facilities - Electricity (15.8 percent), and Commute (16.4 percent).

3.5 GHG INVENTORY FORECASTS

Consistent with the requirements for a qualified GHG reduction strategy, 2020 and 2035 forecasts of GHG emissions are based on campus energy-use trends, the anticipated impact of LRDP developments, the anticipated impact of existing energy efficiency and GHG reduction programs, and campus growth assumptions consistent with the LRDP. **Table 2** provides a summary of campus-wide GHG emissions for 1990, 2008, and 2012, along with the forecasts for 2020 and 2035. These forecasts are adjusted to incorporate the impact of state-wide measures for reducing transportation-related emissions, namely the Pavley bill (*AB 1493*), which addresses vehicle fuel efficiency, and *LCFS*. Notes on the assumptions and methodologies used to forecast emissions for each sector are provided below.

Table 3 provides a summary of the LRDP building growth assumptions used in the GHG emissions forecasting, broken down by the five main campus sites covered by the LRDP.

The projected impacts of the state's *Renewables Portfolio Standard (RPS)* and the UCSF *Strategic Energy Plan (SEP)* are incorporated into the 2020 and 2035 forecasts for energy-related emissions. Energy data for the past four years were analyzed by the UCSF Energy and Facilities teams to quantify energy use intensities for buildings on each of the main campus sites and larger properties, as well as the impact of *SEP* projects on energy use intensity over the same time period. **Table 4** provides a summary of the future energy use

Table 2: GHG Emissions History and Forecasts (values in mt CO₂e)

Scope	Emissions Category	1990 Inventory	2008 Inventory	2012 Inventory	2020 Forecast	2035 Forecast
1	Buildings & Facilities - Natural Gas	44,923	90,026	84,605	85,589	87,668
1	Buildings & Facilities - Other Fuels	114	NA	NA	NA	NA
1	UCSF Fleet	1,944	3,200	2,710	2,432	2,718
1	Refrigerants and Medical Gases	3,500	3,500	1,079	1,254	1,550
1	CCAR Acquisition Adjustment	10,178	NA	NA	NA	NA
1	LRDP Construction Emissions	NA	NA	NA	27	129
2	Buildings & Facilities - Electricity	24,529	24,962	23,781	20,302	29,205
	Scopes 1 and 2 SUBTOTAL	85,188	121,688	112,175	109,604	121,270
3	Business Air Travel	7,549	12,582	13,385	14,009	17,257
3	Commute	17,080	22,069	24,698	22,167	24,771
	Scopes 1, 2, and 3 TOTAL	109,817	156,339	150,258	145,780	163,299

Table 3: UCSF Building Space Forecasts

Campus Site	2012 GSF	2020 GSF	2035 GSF
Mission Bay	1,926,700	3,878,200	5,933,900
Parnassus Heights	3,301,800	3,271,300	3,475,500
Mount Zion	776,200	948,700	948,700
Mission Center Building	290,700	290,700	390,800
Laurel Heights	362,800	362,800	362,800
Other UCSF buildings	332,700	507,800	508,700
TOTAL SPACE	6,990,900	9,259,500	11,620,400

Table 4: UCSF Building Energy Use Intensities

Campus Site	Average energy use intensity in kbtu/sf			Est % reduction per year through 2035
	2012	2020 Forecast	2035 Forecast	
Mission Bay	240.4	213.0	169.8	1.50%
Parnassus Heights	304.6	269.9	215.1	1.25%
Mount Zion	314.6	278.8	222.2	1.50%
Mission Center Building	135.3	119.9	95.6	1.50%
Laurel Heights	53.2	47.1	37.6	1.50%

intensities forecasted for buildings at each of the campus sites, based on the analysis.

Average annual energy efficiency gains were calculated for each campus area and carried forward in future energy use intensity forecasts for each campus area. Next, the square footage projections in the LRDP were combined with existing square footage and the results were used as the basis for estimating total energy use in 2020 and 2035.⁶¹ This formed the basis for quantifying net energy consumption and GHG impacts of LRDP construction, demolition, and space-use changes, combined with *SEP* energy-efficiency projects and the anticipated carbon-reducing impact of the RPS on grid-supplied electricity over time (with future emission factor estimates provided by PG&E). Note that the analysis does not account for *Title 24* and UCOP green building policy impacts (20 percent beyond *Title 24*).

Additional notes on forecasting methodology:

- **UCSF Fleet Emissions:** Forecasts are based on the LRDP's anticipated growth of student and staff populations by 2020 and 2035.
- **Commute Emissions:** Forecasts are based on the LRDP's anticipated growth of student and staff populations by 2020 and 2035.
- **Refrigerants and Medical Gases:** Forecasts are based on the LRDP's anticipated growth of students, staff, patients, and visitors by 2020 and 2035.
- **Solid Waste Emissions:** Forecasts are based on the LRDP's anticipated growth of students, staff, patients, and visitors by 2020 and 2035.
- **LRDP Construction Emissions:** Forecasts are calculated using the California Emissions Estimator Model (CalEEMod), developed by the State of California to provide a uniform platform for government agencies, land use planners, and environmental professionals to quantify potential criteria pollutant and GHG emissions associated with both construction and operations from land use projects.
- **Adjustments for Statewide Transportation Measures:** Combined, *AB 1493* (Pavley vehicle efficiency standards) and the *LCFS* are expected to reduce overall emissions from cars and light-duty trucks by approximately 21 percent from 2012 levels by 2020, and 25 percent by 2025. The adjusted forecasts assume that the entire UCSF fleet will be impacted by Pavley and the *LCFS*.
- **Air Travel Emissions:** Forecasts are based on the LRDP's anticipated growth of student and staff populations by 2020 and 2035, and then adjusted to account for the expected continuation of fuel efficiency improvements over time. A study by the Federal Aviation Administration

(FAA) reports that "Aircraft fuel efficiency has historically improved by about one percent per year. This trend is expected to continue for the foreseeable future."⁶²

4.0 GHG TARGETS AND CEQA THRESHOLDS OF SIGNIFICANCE

The UCSF GHGRS utilizes two approaches to establishing campus-wide GHG emissions targets for 2020 that are consistent with UC policy and *AB 32*, as well as other California policy on GHG emissions. One approach is based on UCSF's 1990 emissions inventory, while other is based on UCSF's verified 2008 inventory, using the 15-percent-downward adjustment recommended by CARB to account for emissions growth since 1990. The GHG emissions targets for 2035 were established by determining the midpoint between the state's 2020 target (1990 levels) and 2050 target (80 percent below 1990 levels); this resulted in a target of 40 percent below 1990 levels by 2035. **Table 5** summarizes the 2020 and 2035 targets as determined by these two methods.

The 2035 target may require revision over time, with new developments in UC policy, changes to state policy, or new statewide GHG emissions targets established by the California legislature. As of 2014, CARB's *Draft AB 32 Scoping Plan* recommends setting the 2030 statewide target at 40 percent below 1990 levels; if this target is adopted by law, a straight-line interpolation between CARB's recommended 2030 target and the state's 2050 emissions commitment produces a 2035 target of 50 percent below 1990 levels.

Table 6 compares the two UCSF campus-wide GHG targets against the forecasts for 2020 and 2035, showing the annual GHG reductions needed to meet them. **Table 6** also includes the annual reductions by 2020 and 2035 expected from implementation of the UCSF GHGRS. At minimum, a reduction of 35,963 mt CO₂e per year will be needed to meet the 2020 target, while an annual reduction of 97,408 mt CO₂e will be needed to meet the 2035 target.

The UCSF GHGRS includes two categories of GHG reduction measures: those to which UCSF is already committed in terms of funding and/or implementation (called "Tier 1" measures); and those that are in the planning stages (called "Tier 2" measures). As summarized in **Table 6**, Tier 1 measures are expected to provide annual reductions estimated at 12,878 mt CO₂e by 2020, and 26,830 mt CO₂e by 2035. These measures are described in detail in the following section. Tier 2 measures will provide the additional reductions needed to meet the 2020 and 2035 targets. Tier 2 measures are described in Section 5.3 and in **Table 8**.

61 The 2035 gsf estimate includes Phase 2 of the Medical Center at Mission Bay.

62 Federal Aviation Administration (FAA) Office of Environment and Energy, *Aviation & Emissions: A Primer*, 2005. www.faa.gov/regulations_policies/policy_guidance/envir_policy/media/AEPRIMER.pdf

Table 5: UCSF Campus-wide GHG Emissions Targets (values in mt CO₂e)

Based on 1990 Inventory			Based on 2008 Inventory		
1990	2020 Target	2035 Target	2008	2020 Target	2035 Target
109,817	109,817	65,890	156,339	132,888	79,733

Table 6: UCSF GHG Reduction Targets and Annual Reductions Needed (values in mt CO₂e)

	2020	2035
Emissions Forecast	145,780	163,299
1990-based Target	109,817	65,890
Annual Reductions Needed	35,963	97,408
2008-based Target	132,888	79,733
Annual Reductions Needed	12,892	83,566
Annual Reductions from Tier 1 GHG Measures (from Table 7)	12,878	26,830
Minimum Annual Reductions from Tier 2 GHG Measures	23,085	70,578
Total Annual Reductions Expected from UCSF GHGRS	35,963	97,408

Figure 1 shows the changes in UCSF GHG emissions over time, beginning with the 1990, 2008, and 2012 inventories, and continuing with the emissions forecasts for 2020 and 2035. The solid line indicates historical emissions between 1990 and 2012 based on inventory results. The orange dashed line represents the emissions forecasts provided in Table 2, while the green dashed line represents the annual emissions that result with implementation of the Tier 1 measures in the UCSF GHGRS, as presented in the following section. The blue dotted line accounts for the additional impact of Tier 2 measures, representing the path to carbon neutral that passes through the 2020 and 2035 targets and achieves carbon neutrality by 2047, reflecting the UCSF commitment to ACUPCC and the goal that is referenced in UCSF’s Annual Progress Report to the UC Regents. The horizontal dotted lines represent the 2020 and 2035 GHG emissions targets based on the 1990 inventory.

5.0 GHG REDUCTION MEASURES

This section describes the GHG reduction measures currently underway at UCSF, as well as those measures that are funded or to which UCSF is currently committed. Tier 1 GHG reduction measures are organized into two major categories: Energy and Transportation.

Table 7 summarizes the significant Tier 1 strategies (comprised of programs, policies, and actions) that are expected to reduce GHG emissions between now and the planning horizon for the LRDP (2035). Most of the programs and policies associated with these strategies are outlined in the 2009 *Climate Action Plan* and on the UCSF Office of Sustainability’s website. GHG reduction estimates associated with these measures, if not already incorporated into future emissions forecasts (e.g., EN1: SEP Implementation), are provided for 2020 and 2035. The following sections provide more detail about the key programs, policies and actions comprising each of the measures. Detailed worksheets showing assumptions, methodologies and emissions calculations are provided.

The following sections describe in more detail the implementing actions associated with each Tier 1 measure, and the GHG reductions expected to result from those actions.

Figure 1: UCSF GHG Emissions Timeline

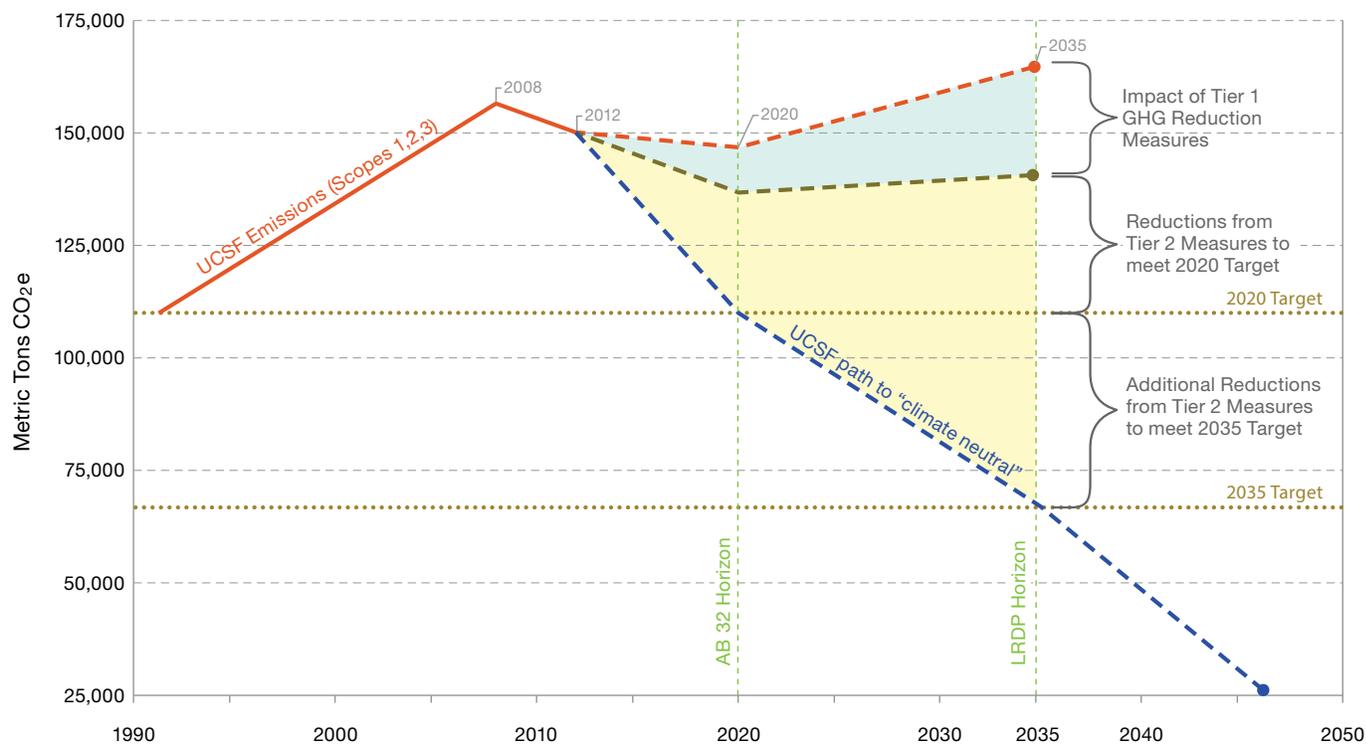


Table 7: UCSF Tier 1 GHG Reduction Measures

Strategy ID	Strategy Name	Annual GHG Reduction by 2020 (mt CO ₂ e)	Annual GHG Reduction by 2035 (mt CO ₂ e)
Energy			
EN1	Improve Energy Efficiency of Existing Buildings and Operations (SEP Implementation)	NA	NA
EN2	Green Building Standards	5,235	10,792
EN3.1	Renewable Energy: On-Site Solar PV	128	377
EN3.2	Renewable Energy: Purchasing Green Electricity	-	6,721
EN3.3	Renewable Energy: Purchasing Biogas	6,379	6,379
Transportation			
TR1	Reduce Vehicle Trips	1,137	2,561
TR2	Clean Vehicle Strategies	-	-
	TOTAL	12,878	26,830

5.1 TIER 1 ENERGY MEASURES

Strategy EN1: Improve Energy Efficiency of Existing Buildings and Operations (SEP Implementation)

Key Implementing Actions:

- Continue to revise and implement the *SEP* to achieve energy efficiency improvements consistent with the results of the past four years.
- Continue to participate in the system-wide UC/CSU Investor Owned Utility Energy Partnership.

Annual GHG reduction by 2020: 12,786 mt CO₂e
(incorporated into forecast)

Annual GHG reduction by 2035: 22,292 mt CO₂e
(incorporated into forecast)

Implementation Timeframe/Status: In progress; to continue through 2035.

Discussion: UCSF owns or leases space in 189 buildings throughout San Francisco, and energy consumption varies considerably by building use (among other variables, such as building age). For example, research and clinical, or complex space, comprises about 25 percent of UCSF assignable square footage but uses about 70 percent of the total energy consumed. The typical laboratory uses far more energy and water per square foot than the typical office building, due to intensive process and ventilation requirements.

Since the early 1990s, UCSF has periodically written *Strategic Energy Plans (SEPs)* to identify and prioritize implementation of campus investments in energy efficiency projects for existing buildings and infrastructure. The most recent UCSF *SEP* was completed in September 2008.⁶³ These plans, with three-year to seven-year timelines, examine UCSF facilities of 50,000 gsf or larger for application of new efficiency technologies, implementation of best practices, and available financial incentive programs. Focused primarily on electrical infrastructure, the projects are expected to produce savings equal in value to investment costs within 10 years.

Over the past five years (2009 through 2013), implementation of *SEP* projects has saved more than 12,000 megawatt hours (MWh) of electricity and more than 1,700,000 therms of natural gas, according to estimates provided by the UCSF energy engineer. These energy efficiency gains translate directly into GHG emissions reductions. The *SEP* projects

undertaken by UCSF over the past 20 years have contributed to a 35-percent reduction of GHGs compared to a business-as-usual scenario.

SEP projects cover a wide variety of improvements, from changing lighting fixtures to building new power plants. Lighting and HVAC (heating, ventilation, and air conditioning) projects are particularly effective tools for achieving reductions. UCSF will continue to convert existing T12 and 32-watt T8 fluorescent light fixtures to 28 watt T8 lamps. Other projects include broader use of occupancy sensor controls, daylight harvesting (using daylight to offset the amount of electric lighting needed to properly light a space), and more energy-efficient stairwell fixtures. The replacement of lighting in parking structures and interior high intensity discharge (HID) fixtures with fluorescent is also being evaluated. As new technologies such as LED lighting, bi-level fixtures (which allow dimming to lower intensity during unoccupied periods), and induction lamps (long-lasting fluorescent lamps without electrodes or filaments) become readily available (anticipated in the near future), these technologies will be incorporated into energy efficiency retrofit projects as appropriate. HVAC improvements in the 2008 *SEP* include meeting basic efficiency standards for air handlers with a horsepower of 10 and greater by: controlling variable air volume with economizers, operating only the hours necessary, providing demand control ventilation where warranted, and controlling static pressure reset to optimize HVAC systems to actual operating conditions.

The *SEP* includes projects for upgrading laboratory fume hoods with more energy-efficient high-performance models. As explained in the 2009 *Climate Action Plan*, fume hoods use large amounts of energy, and if all of the fume hoods campus-wide⁶⁴ were retrofitted and operated to maximize energy efficiency, as much as 4,600 mt CO₂e per year could be avoided.

UCSF is a participant in the system-wide UC/CSU Investor Owned Utility Energy Partnership (Partnership). The Partnership is designed to help campuses implement energy efficiency programs that decrease their energy use. The Partnership encourages energy-efficient operations and maintenance practices by offering incentives for equipment improvements, and offering training and providing tools to reduce energy consumption and peak demand. The total incentive funds received to date (2014) exceed \$3.5 million. Over the past four years, energy efficiency strategies have reduced energy use across UCSF buildings by approximately

⁶³ This five-tiered *SEP*, sponsored by the University of California Office of the President (UCOP), serves to identify, quantify, prioritize and assist UC campuses in realizing energy-saving opportunities in new construction, retro-commissioning, deferred maintenance, and facility renewal and retrofit projects.

⁶⁴ Due to an increased awareness of risks associated with exposure to chemicals, and an expanding research program, the number of fume hoods at UCSF has increased from ~400 in 1990 to more than 750 in 2009. The operational energy cost of UCSF's 750 fume hoods is about \$4.9 million per year.

17 percent on a per-square-foot basis.

The largest single *SEP*-type project undertaken by UCSF since 1990 has been the Parnassus Central Utility Plant (CUP). The CUP is a 12-MW cogeneration facility constructed between 1995 and 1997; it replaced a far less efficient 50-year-old facility that had significantly higher emissions per MWh.

The CUP cogeneration system is a highly efficient generator of energy that uses a single source of clean fuel (natural gas) to produce two energy products, electricity and heat. The heat is used locally for buildings, instead of being discarded as in a conventional electrical generation facility; the captured heat can be used for either heating or cooling buildings. Further efficiencies are gained by the proximity of the cogeneration plant to the end user, both because transmission losses due to resistance are reduced and because supply can be more quickly matched to demand. Conventional energy production transmits electricity from remote generation sites with low efficiency rates (35 percent); when this is combined with the high efficiency rates (80 percent) of natural gas burned on-site in boilers, UCSF reaches an overall institutional efficiency rate of about 54 percent. In contrast, on-site cogeneration directly employs the thermal energy by-products associated with electricity production, and accompanied with much lower transmission losses, provides an overall institutional efficiency rate of about 76 percent.

As noted in the preceding section, the GHG-reducing impact of EN1 is already incorporated into the future GHG emissions forecasts for 2020 and 2035.

Strategy EN2: Green Building Standards

Key Implementing Actions:

- Exceed *Title 24* energy requirements by at least 20 percent (for all new buildings and major renovations except acute care facilities); strive to achieve 30 percent improvement over *Title 24*. This requirement is maintained over time as *Title 24* is revised.
- Pursuant to the *UC Sustainable Practices Policy*, design and build all new buildings (except for laboratory and acute care facilities) to a minimum standard that is equivalent to a LEED Silver rating. Strive to achieve a standard equivalent to a LEED-NC Gold rating or higher for all such projects whenever possible, within the constraints of program needs and standard budget parameters.
- Design the UCSF Medical Center at Mission Bay to LEED Gold standards. (Facilities that are already constructed or are planned or under construction were designed to meet a LEED Gold standard; future building projects are also expected to meet or exceed this standard.)
- Per the *UC Sustainable Practices Policy*, design all new UCSF laboratory buildings so as to meet Labs21

Environmental Performance Criteria (EPC).

Annual GHG reduction by 2020: 5,235 mt CO₂e

Annual GHG reduction by 2035: 10,792 mt CO₂e

Implementation Timeframe/Status: In progress; to continue through 2035.

Discussion: To improve energy efficiency of new buildings, UCSF relies on several available tools, programs and building codes. *Title 24* of the California Energy Code enhances the energy efficiency requirements of all newly constructed buildings and major renovations. The 2013 *Title 24* update, effective July 1, 2014, improves energy performance of new buildings by as much as 23 percent over the 2008 standard, depending on the type of building and its intended use. Major renovations also benefit with respect to energy savings, though to a lesser degree.

The *UC Sustainable Practices Policy* states that the University of California shall incorporate the principles of energy efficiency and sustainability in all capital and renovation projects within budgetary constraints and programmatic requirements. Given the importance of energy efficiency to green building design, the University has set a goal for all new building projects, other than acute care facilities, to outperform the requirements of *Title 24* energy-efficiency standards by at least 20 percent.⁶⁵

UCSF is committed already to designing and building all new buildings (except for laboratory and acute care facilities, addressed separately below) so as to meet a minimum standard of sustainability that is equivalent to a LEED-NC Silver rating. In addition, and at the same time, UCSF will continue to strive to achieve a standard equivalent to a LEED-NC Gold rating or higher for such new buildings, whenever possible within the constraints of program needs and standard budget parameters. Over time, this will help achieve the energy savings and GHG emissions reductions associated with EN2, as well as providing the myriad long-term economic, social, and health benefits that accrue to the communities occupying green building spaces, compared with those in conventional buildings.

Central to its academic mission, research laboratories make up a large percentage of the new space developed by UCSF. These types of facilities, filled with specialized equipment, consume significantly more energy per square foot than the average building. Given the importance of specifically

⁶⁵ Although the *Title 24* building code does not apply to hospitals, new UCSF medical facilities must be designed to a LEED Silver standard or higher, which achieves energy savings similar to *Title 24*. The Medical Center at Mission Bay is being designed to a LEED Gold standard.

addressing sustainability in laboratory facilities, UCSF has also committed to designing all new laboratory buildings to a minimum standard equivalent to a LEED-NC Silver rating and the Laboratories for the 21st Century (Labs21) Environmental Performance Criteria (EPC), as appropriate. The UCSF design process includes attention to energy efficiency for UCSF buildings that meet LEED standards for New Construction (listed by standard achieved and year completed):

- Aldea Center on Mount Sutro, 2013 – Gold
- Cardiovascular Research Institute (CVRI), 2012 – Gold
- Dolby Regeneration Medicine, 2011 – Gold
- The Osher Building, 2010 – Silver

UCSF buildings that meet LEED standards for Existing Buildings Operations and Maintenance:

- Arthur and Toni Rembe Rock Hall (Rock Hall), 2009 – Silver

UCSF buildings that meet LEED standards for Commercial Interiors:

- 1500 Owens Street (leased), third floor clinics, 2012 – Gold
- HSE5 Center for Bioengineering and Tissue Regeneration, 2012 – Gold
- Pharmaceutical Packaging Facility, 2011 – Gold
- HSE 15 S/D Craniofacial & Mesenchymal Biology Program Lab Renovation, 2010 – Gold
- MSB S1372 Anatomy Department Renovation, 2013 – Silver
- Campus Data Center, 2009 – Silver
- 654 Minnesota Street, 2009 – Certified
- HSW Dentistry Lab, 2005 - Certified

UCSF must ensure that all regulatory obligations are met when the University considers design or operational strategies for reducing GHG emission. Agencies such as the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO), the Occupational Safety and Health Administration (OSHA), and the Institutional Animal Care and Use Committee (IACUC) often have safety protocols in place that constrain UCSF's ability to satisfy GHG reduction goals and simultaneously maintain an acceptable safety margin.

Strategy EN3.1: Renewable Energy: On-Site Solar PV

Key Implementing Actions:

- Build solar photovoltaic (PV) energy installation (750 kW) at Mission Bay Hospital; to be operational by 2020.
- Implement Priority 1 solar PV projects (as determined by

UCSF engineer) over the next 20 years.

Annual GHG reduction by 2020: 128 mt CO₂e

Annual GHG reduction by 2035: 377 mt CO₂e

Implementation Timeframe/Status: In progress; to continue through 2035.

Discussion: Planned and financed solar PV installations expected to be operational by 2020 represent approximately 750 kW capacity, capable of displacing 128 mt CO₂e per year using conservative assumptions about PV panel efficiency and electrical productivity in San Francisco. Longer-term, additional solar PV projects deemed Priority 1 because of their financial payback potential are expected to add 1,465 kW for a total capacity of 2,215 kW, displacing approximately 377 mt CO₂e per year by 2035.

Strategy EN3.2: Renewable Energy: Purchasing Green Electricity

Key Implementing Actions:

- Implement UC's Wholesale Electricity Program to increase the supply of low-carbon electricity sources through direct access suppliers;
- Continue, on an on-going basis, to pursue the possibility of increasing purchases of low carbon electrical power from the grid.

Annual GHG reduction by 2020: TBD

Annual GHG reduction by 2035: TBD

Implementation Timeframe/Status: In progress; to continue through 2035.

Discussion: The UC President's goal for UC to become carbon-neutral by 2025 means that UCSF is serious about purchasing green power. In support of this goal, the UC Wholesale Electricity Program is actively seeking to increase the supply of low-carbon electricity sources through direct access suppliers. Under the Wholesale Electricity Program, UC will become its own registered Energy Service Provider and procure wholesale power for participating campuses (including UCSF), with a target commencement date of January 1, 2015. The Wholesale Electricity Program will serve to stabilize UC's energy costs and provide an opportunity to procure larger proportions of carbon-free energy than would be otherwise available through traditional channels.

As of 2014, almost all of UCSF's outside electrical power is purchased from PG&E, one of the cleanest investor-owned large utilities in the country. PG&E is currently forecasting even lower average carbon content for its grid-supplied electricity through the year 2020. This analysis assumes that PG&E

electricity represents the lowest-carbon electricity alternative for UCSF through 2020. Thus, there are no GHG reductions associated with this measure by 2020.

This GHGRS uses PG&E's 2020 emission factor to forecast 2035 electricity-related GHG emissions (PG&E does not currently provide emission factor forecasts beyond 2020). After 2020, however, it is reasonable to assume that UCSF will continue to lower the average carbon content of its electricity supply due to cleaner electricity from PG&E, or by increasing its allocation of clean Western Area Power Authority (WAPA) hydropower, or purchasing renewable power through its direct access supplier. The annual GHG reduction estimate for 2035 therefore conservatively assumes a 25 percent reduction in the carbon content of grid-supplied electricity from 2020 to 2035.

Strategy EN3.3: Renewable Energy: Purchasing Biogas

Key Implementing Actions:

- Purchase biogas for use at CUP to reduce anthropogenic GHG emissions from the facility, if appropriate sources are available and approved by CARB.

Annual GHG reduction by 2020: 6,379 mt CO₂e (incorporated into forecast)

Annual GHG reduction by 2035: 6,379 mt CO₂e (incorporated into forecast)

Implementation Timeframe/Status: The University is currently examining its options in the marketplace.

Discussion: CO₂ emissions from combustion of biogas are considered biogenic and represent a net-zero addition of GHG emissions to the atmosphere. UCSF is currently committed to purchasing 120,000 MMBTU⁶⁶ per year of biogas for use in the CUP, which would avoid the production of approximately 6,379 mt CO₂e per year from combustion of natural gas.

5.2 TIER 1 TRANSPORTATION MEASURES

Strategy TR1: Reduce Vehicle Trips

Key Implementing Actions:⁶⁷

- As development occurs under the LRDP, increase on-site

⁶⁶ MMBTU signifies [one] million British Thermal Units; the BTU is a traditional unit of energy equal to about 1055 joules. In reference to natural gas, 1 MMBTU (1 million BTU) = 1.054615 GJ. One therm equals 100,000 BTUs.

⁶⁷ Measure assumes implementation of Transportation Demand Management programs, as described in the *Transportation Demand Management Program Improvement Measures Evaluation* report by Fehr & Peers, August 30, 2012.

amenities (such as child care, food services, banking, retail shops, laundry, and fitness facilities), and limit parking for on-campus housing and staff.

- Add on-site housing for faculty and students.
- Enhance and expand existing car-share, vanpool, and carpool programs and incentives.
- Modify existing shuttle routes and implement NextBus Technology Application, which displays schedule, stop locations, and estimated time of arrival for UCSF shuttles.
- Encourage departments to allow flexible work schedules and telecommuting.
- Implement LRDP plans to realign supply chain, warehousing, and deliveries so as to streamline all parts of the process and minimize truck trips.

Annual GHG reduction by 2020: 1,137 mt CO₂e (incorporated into forecast)

Annual GHG reduction by 2035: 2,561 mt CO₂e (incorporated into forecast)

Implementation Timeframe/Status: In progress; to continue through 2035.

Discussion: Reductions in UCSF GHG emissions attributable to transportation come from both local institutional actions and from technological and regulatory changes driven by the state and federal government. State and federal government actions to-date have focused on cleaner vehicle technologies, transportation system efficiency improvements, and land use policy. Actions taken by UCSF to address transportation-related GHG emissions have been aimed at reducing vehicle miles traveled (VMT), and include: implementation of various transportation demand management measures, improvements to the campus transportation system, and improving the jobs-to-housing balance. Emissions from transportation are greatly dependent on the length of trips, and the mode of travel used. Generally, bicycle and walking trips produce almost zero carbon emissions, and a trip on public transit produces about half the quantity of GHG emissions as would a comparable trip by private automobile.

As stated in the 2014 LRDP, key features of UCSF's existing TDM program include the following:

- 60 shuttles serving 17 locations, with over 2.3 million passengers per year
- 33 vanpools that travel as far as Sacramento and operate using the Green Road Safety System, which improves fuel consumption and safety
- 62 reserved carpool stalls at various sites
- Marin Commute Club buses with about 55 daily riders who live in Marin and Sonoma Counties to the north of the city
- 18 City CarShare vehicles with dedicated parking spaces,

along with 1,500 UCSF members who can use these vehicles by scheduling their use online

- Over 1,900 UCSF users of the ZimRide online carpool matching program
- 972 bicycle parking spaces with another 100 planned at Mission Bay, as well as bike racks on shuttles, a cyclist shower program that allows bicyclists to use UCSF showers at a discount, and other bicycle-related benefits
- Bay Area Bike Share station at Mission Bay (due to begin construction in July 2014), where members will have access to bicycles (and a regional network of stations) provided by the Bay Area Air Quality Management District
- More than 400 off-street motorcycle parking stalls in garages and surface parking lots
- An “emergency ride home” program to encourage use of alternative modes of transportation
- Clipper Card (public transit pass) sales at easily accessible locations, including through UCSF’s website
- Close to 1,800 UCSF employees participate in a pretax transit program, which saved UCSF employees over \$700,000 on public transit commute costs in 2013

UCSF’s shuttle system services all primary UCSF campuses, as well as select secondary campus locations, and is free to UCSF faculty, staff, students, patients, and visitors. On average, a total of 7,435 people ride the system daily, with demand for additional service growing by around five percent per year. The 2014 UCSF *Shuttle Operations Study* estimates a demand for 401 additional trips by 2020, and an additional 3,611 trips by 2035. The study also contains recommendations for expanding service lines to meet increasing demand as development occurs under the 2014 LRDP.

UCSF faces considerable constraints outside of its control in developing affordable housing. Housing is an auxiliary enterprise of the University, serving as a support service to its primary educational mission; and therefore, by UC policy, it must be financially self-supporting. Land in San Francisco is extremely expensive to acquire, and UCSF has limitations on new development on land it already owns (such as Aldea Housing at Parnassus Heights). UCSF will continue to implement the goals of the 2005 *Housing Master Plan* to provide more reasonably priced housing for up to 1,400 individuals in targeted groups of the campus community. The 2014 LRDP includes plans for over 1,600 new housing units to be built at Parnassus Heights and Mission Bay by 2035.

Emission reduction estimates for this measure are based on data provided in the report *Transportation Demand Management Program Improvement Measures Evaluation* by Fehr & Peers (2012).

Strategy TR2: Expand Fleet of Clean Vehicles

Key Implementing Actions:

- Continue to incentivize UCSF departments to purchase fuel efficient vehicles (hybrid, electric, CNG) by waiving the annual permit fee of \$1,932.00 per vehicle. This has been an effective strategy in encouraging departments to purchase fuel-efficient and alternative-fuel vehicles.
- Continue and expand use of low-emitting fuels and vehicles for shuttle system and across UCSF fleet of vehicles.

Annual GHG reduction by 2020: 1 mt CO₂e
(Incorporated into forecast)

Annual GHG reduction by 2035: 1 mt CO₂e
(Incorporated into forecast)

Implementation Timeframe/Status: In progress; to continue through 2035.

Discussion: In addition to vehicle miles traveled, transportation emissions are dependent on the type of fuel used to power vehicles. UCSF is gradually transitioning its vehicle fleet to alternative fuel vehicles and more fuel efficient vehicles. UCSF currently has 43 low-emitting alternative-fuel and hybrid vehicles, including cars, shuttles, golf carts, and trucks. The UCSF shuttle fleet is currently run entirely on diesel; however, the University is monitoring alternative fuel options, including battery electric options, for future vehicle replacements.

UCSF has also instituted programs and developed infrastructure to encourage commuters to use a mix of more fuel-efficient and alternative-fuel vehicles. The University offers an employee benefit program to encourage the purchase of EVs (electric vehicles); in 2012, five EVs were purchased as part of the program.

The 2012 UCSF *Commute Survey*⁶⁸ indicated that the commuter vehicle fleet is composed of 12.6 percent fuel-efficient and alternative fuel vehicles, including hybrid, electric, CNG, and biodiesel-fueled vehicles. The University has installed 18 electric-vehicle charging stations at Parnassus Heights, Mount Zion, and Mission Bay, and plans to install another 20 at Mission Bay in the Owens Street Garage plus 10 at other locations in the near future. UCSF also has 35 priority parking spaces reserved for fuel-efficient and low-carbon emitting vehicles.

Due to the concerted state effort to improve vehicle fuel efficiency (Pavley bill) and the lack of a formal “green” or

68 UCSF Transportation Services Annual Commute Survey, UCSF Commute Survey Results 2009-2012.

“clean fuel” vehicle replacement program at UCSF, no additional GHG reductions are associated with this measure.

5.3 CLOSING THE GAP WITH TIER 2 MEASURES

As discussed previously and summarized in **Figure 1**, additional reductions beyond Tier 1 measures (summarized in **Table 7**) are needed over the planning horizon of the LRDP to meet the 2020 and 2035 GHG emission targets.

Table 8 lists the Tier 2 measures that UCSF has identified to accomplish the additional reductions needed. The maximum potential reductions for each Tier 2 measure reflect the inventory forecasts for 2020 and 2035, and do not include the reductions expected from Tier 1 measures.

Tier 2 measures are at various stages in the planning process. Some combination of them will be sufficient to meet the 2020 goals identified in **Table 5**. UCSF is committed to meeting the 2020 and 2035 targets described in this document, as well as the goals of the UC President’s *2025 Carbon Neutrality Initiative*. However, the exact mix of future actions to be taken by UCSF is dependent on both the results of the next CARB Scoping Plan Update (due in late 2014), and the recommendations identified in the future implementation plan due from UCOP in 2014 regarding the Presidents *2025 Carbon Neutrality Initiative* and the *Sustainable Practices Policy*.

6.0 IMPLEMENTATION AND MONITORING

Successful implementation of the Tier 1 measures described in the previous section will nearly enable UCSF to achieve

the 2020 GHG target based on a 2008 emissions baseline. Deeper reductions provided by the Tier 2 measures enable UCSF to achieve the 1990-based 2020 target and the 2035 targets. Robust monitoring of campus-wide GHG emissions and the effectiveness of individual programs and policies will be needed to ensure that UCSF is on track to meeting its 2020 and 2035 targets, and to enable UCSF to tier CEQA analysis of future projects from this GHGRS, as described in Section 7.0.

UCSF annually quantifies its GHG emissions and reports them to TCR and CARB. The annual verified emissions report for TCR, augmented by estimates of Scope 3 emissions from commuting and air travel, will serve as the metric for comparison with the 2020 and 2035 targets.

Staff from the UCSF Office of Sustainability will present annual reports to the UCOP Office of Physical and Environmental Planning summarizing progress of the implementation of the UCSF GHGRS. The report will evaluate the successes and challenges in implementing the GHGRS and evaluate progress toward GHG reduction targets. Staff will provide the status of program implementation (e.g., initiated, ongoing, completed), assess the effectiveness of the strategies and programs included in the plan against the established objectives, and recommend adjustments to programs or tactics as needed. The annual report will also assess whether UCSF’s actual growth and development is consistent with the forecasts made in the LRDP. If necessary, UCSF shall modify the geographic scope of the inventory and emissions targets accordingly.

Table 8: UCSF Tier 2 GHG Reduction Measures

Tier 2 Measure	Scope	GHG Inventory Category	Maximum potential reductions by 2020	Maximum potential reductions by 2035
Expand or intensify existing and planned programs for reducing direct emissions associated with stationary sources owned and controlled by UCSF.	1	Buildings & Facilities - Natural Gas	85,589	87,668
Purchase more low-carbon biogas as a replacement for natural gas used by the CUP.	1	Buildings & Facilities - Natural Gas	85,589	87,668
Expand or intensify existing and planned programs for reducing direct emissions associated with mobile sources owned and controlled by UCSF.	1	UCSF Fleet	2,432	2,718
Intensify energy conservation efforts to exceed the reductions of electricity-related emissions currently expected from implementation of the SEP.	2	Buildings & Facilities - Electricity	20,302	29,205
Purchase a greater percentage of grid-supplied electricity from renewable, low-carbon sources.	2	Buildings & Facilities - Electricity	20,302	29,205
Invest in renewable energy projects at UCSF or other UC campuses (where available land exists).	2	Buildings & Facilities - Electricity	20,302	29,205
Invest in offsite projects that reduce GHG emissions, preferably within the UC system where the full range of benefits will be retained, to offset emissions in the UCSF emissions inventory.	all	LRDP Construction Emissions	unlimited	unlimited
Purchase accredited carbon offsets that can be used to offset emissions in the UCSF emissions inventory.	all	Buildings & Facilities - Electricity	unlimited	unlimited

An update of the GHGRS should occur at least once every five years to ensure that the strategies remain effective in reducing GHG emissions to the extent needed for achieving the 2020 and 2035 targets. In addition, the following situations, should they occur over the LRDP planning horizon, would likely necessitate a revision to the GHGRS:

- A change in regulations affecting GHG targets or thresholds. The state is likely to legislate a new GHG reduction goal for post-2020; the GHGRS can only estimate what that goal will be based on the *Draft AB 32 Scoping Plan* revision and other documents. The BAAQMD may also develop new guidelines for CEQA as the state regulations are developed.
- A proposed new project that exceeds the total new square footage (summarized in **Table 3**) included in the LRDP through 2020 (the *AB 32* target date).
- A change in the mix of proposed new project types (e.g., another new hospital) that would result in significantly higher energy-use intensities than predicted and summarized in **Table 4**.
- An operational change at UCSF that results in a significant change in projected GHG emissions. UCSF may institute new policies or programs, or abandon current or planned programs, and by doing so, affect GHG emissions. A new long-term contract to purchase a large amount of zero-carbon electricity is one example of such a change.
- The required monitoring of the GHGRS reveals that UCSF's GHG reduction programs are not reducing emissions adequately to meet its targets.

7.0 CEQA PROJECT REVIEW

Under CEQA, the effects of GHG emissions are considered a potentially significant environmental impact. In addressing climate change, CEQA provides a useful mechanism for local agencies to evaluate new development on a comprehensive basis rather than on an individual project basis. The *CEQA Guidelines* recognize this, and include a provision for streamlining the analysis of projects that are consistent with a more comprehensive plan for the reduction of GHG emissions (*CEQA Guidelines, Section 15183.5*). The UCSF GHGRS meets an important requirement of *CEQA Guidelines Section 15183.5(b)(1)* as a plan that analyzes cumulative GHG impacts. The UCSF GHGRS uses established protocols, methodologies, and forecasts of existing and future land uses to quantify existing and projected future GHG emissions within the scope of the LRDP. It also establishes a reduction target based on California state law (*AB 32*), and lays out policies, actions, and performance standards that UCSF will enact and implement over time to reduce emissions. As demonstrated in this document, the UCSF GHGRS does provide the emissions reductions needed to achieve the reduction targets identified in the *UC Sustainable Practices Policy* and in the state-mandated reduction target embodied in *AB 32*.

By implementing the Tier 1 measures along with a mix of the Tier 2 measures identified in Section 5.3, UCSF will close the gap to meet the *AB 32* derived emissions target for 2020, allowing it to utilize the CEQA streamlining provision in *CEQA Guidelines Section 15183.5(b)(1)*. A future development project would be considered consistent with the revised GHGRS if it were consistent with the GHGRS assumptions regarding the amount and type of future development, and was consistent with the GHG reduction measures included in the revised GHGRS. Projects consistent with the revised GHGRS, including conformance with any performance measures applicable to the project, would not require additional GHG emissions analysis under *CEQA Guidelines Sections 15064(h)* and *15183.5(b)(2)*.⁶⁹

7.1 SCREENING PROJECT FOR CONSISTENCY WITH THE GHG REDUCTION STRATEGY

In order to assist with determining project consistency with the UCSF GHGRS, a project consistency checklist is provided in **Table 9**. This checklist is intended to provide the opportunity for individual projects to demonstrate that they are minimizing GHG emissions, while ensuring that new development at UCSF will achieve its 'fair share' of emissions reductions. The UCSF GHGRS stipulates a range of prescribed and planned GHG reductions measures for meeting the 2020 GHG reduction target. The project review checklist would screen projects for important GHG reduction measures that, when implemented, will provide confidence that the project will not impede UCSF's ability to meet its 2020 GHG emissions target. This checklist may evolve over time as the mix of Tier 2 reduction measures is better defined and implemented.

For the project checklist to be valid, UCSF would need to ensure that total development through 2020 does not exceed the following growth assumptions used to develop the emissions forecasts in this GHGRS.

- 2020 total building space = 9,259,500 gross square feet (gsf), with campus specific growth limits provided in **Table 3**
- 2020 population of students + staff + faculty = 36,613
- 2020 population of students + staff + faculty + patients + visitors = 44,628

⁶⁹ If there is substantial evidence that the effects of a particular project may be cumulatively considerable, notwithstanding the project's compliance with the qualified GHG reduction strategy, CEQA requires that an EIR be prepared.

Table 9: UCSF Project Consistency Checklist

Project is consistent with the 2014 LRDP growth assumptions in Section 7.1.
Proposed use is consistent with 2014 LRDP functional zones. (See LRDP Table 3.)
New building or major renovation project (except for laboratory and acute care facilities) must incorporate UC and UCSF green building requirements, including the provision that the energy performance exceeds Title 24 requirements by at least 20 percent.
New laboratory and acute care facilities must be designed and built to achieve a LEED-NC Gold rating or higher.
New laboratory buildings must be designed to meet Labs21 Environmental Performance Criteria (EPC).

APPENDIX E

Technical Analyses – Air Quality, Greenhouse Gas Emissions, Health Risk Assessment, and Energy

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TECHNICAL ANALYSIS

Air Quality