UCLA Transportation

UCLA EV READINESS PLAN

ADVANCING CLIMATE GOALS VIA EQUITY IN ELECTRIC MOBILITY

UCLA Transportation

UCLA EV READINESS PLAN

ADVANCING CLIMATE GOALS VIA EQUITY IN ELECTRIC MOBILITY

SUMMARY OF TERMS AND ACRONYMS

a. Academic year (AY)
b. Air Quality Management District (AQMD)
c. Alternating current (AC)
d. Amp (A)
e. Battery electric vehicle (BEV, interchangeably referred to as EV)
f. California Air Resources Board (CARB)
g. Direct current (DC)
h. Electric vehicle supply equipment (EVSE)
i. EV charging stations (EVCS)
j. EVgo Services LLC (EVgo)
k. Fiscal year (FY)
l. Greenhouse gas emissions (GHG)
m. Internal combustion engine (ICE)
n. Kilowatt (kW)
o. Kilowatt hour (kWh)
p. Low Carbon Fuel Standard (LCFS)
q. National Renewable Energy Laboratory (NREL)
r. Original equipment manufacturer (OEM)
s. Plug-in hybrid electric vehicle (PHEV)
t. Radio frequency identification (RFID)
u. Request for proposal (RFP)
v. Single-occupant vehicle (SOV)
w. Transportation demand management (TDM)
x. University of California (UC)
y. Zero-emission vehicle (ZEV)

PREFACE

Undoubtedly, electric propulsion of vehicles is on the rise in California, and the state's efforts to combat climate change include increasing the number of electric vehicles to reduce the impact of greenhouse gas emissions (GHG). The state has a plan to facilitate the introduction of 1.5 million zero-emission vehicles (ZEV) and 250,000 charging stations by 2025. The California Air Resources Board hopes to see that inventory increase to five million vehicles by 2030 (1). Further, the Los Angeles Basin experiences the worst air pollution in the United States, and one of the primary contributors to this is the internal combustion engines within the 12,000,000 vehicles plying the Southern California region's roadway network. Fortunately, electric propulsion eliminates most of the negative environmental externalities caused by internal combustion engines, particularly at the local level.

Beyond the general reduction of air pollutants and greenhouse gases, electric mobility can help address some of the historical inequities of transportation system investments from the past. Traditionally underserved communities have faced the brunt of pollution impacts related to the routing of freeways across the L.A. Basin and Southern California region, and these neighborhoods still to this day experience the highest levels of air pollution in the region. If one looks towards the infrastructure that supports the gasoline fueling network that befouls Los Angeles—gas refineries in particular—these negative impacts go well beyond tailpipe emissions.

Establishing a robust electric vehicle charging ecosystem on campus will position UCLA as a center of rapid adoption of electric vehicles in the Los Angeles region and chip away at perennial sources of greenhouse gas emissions. This will be achieved hand in hand through the combination of strategic infrastructure investments as well as ensuring that the campus community is aware of both the individual total cost of ownership benefits of electric vehicles and the significant public health benefits that will accrue from each internal combustion engine being replaced by an electric motor. In the long run, this will translate to the maximization of infrastructure investment through EV charger utilization and positive changes in commuter behavior.

At the same time, UCLA's own vehicle fleet must be turned over to become a fully zero-emission vehicle inventory, which will reduce emissions, traditional air pollution, and will also reduce fuel costs and maintenance needs for the university. As a national leader in sustainable transportation and vehicle provision, UCLA Transportation's Fleet & Transit team continues its extensive efforts to meet this initiative.

This plan is another step in the continued effort to provide quality mobility service to the UCLA community. Further efforts will continue to expand the university's leadership on sustainable transportation to both serve UCLA and provide a template for others to follow as we work to move the needle on electric vehicle adoption. Given that ~ 40% of California's carbon footprint results from transportation, and that this sector has remained stubbornly carbon-based, it is time for a concerted focus on reducing carbon-based propulsion, while simultaneously reducing historic inequities regarding air pollution exposure and transport opportunities.

EXECUTIVE SUMMARY

UCLA Transportation recognizes and strives to meet the challenges presented by an ever-evolving world where ZEVs usage and demand for charging points are steadily rising. As such, this plan will guide equitable transportation investments that encourage a growing EV commuter base and ultimately foster a more sustainable future. This plan seeks to expand the university's initiatives, charging infrastructure, and policies while delivering a set of operationally strategic goals and milestones.

The plan sets the course for the provision of EV charging infrastructure, how to price it and how to serve commuter vehicles, visitor vehicles, and university fleet vehicles. It includes planning principles, goals, and quantified objectives. It maps out a set of necessary actions to maintain UCLA's position as a leading education and research institution that assists the state in achieving its transportation and climate change goals. As one of the largest employers in the region, UCLA can and should pave the way for mobility innovation, especially given its location in Los Angeles, which suffers from notorious traffic congestion and smog.

At its core, this plan aims to align UCLA Transportation's mission and vision of supporting the campus community with various high-level directives by delivering a set of operationally strategic goals and milestones to ensure its success. Some of these directives include Governor Newsom's executive order introduced in September 2020, directing the state to require that by 2035, all new cars and passenger trucks sold in California be zero-emission vehicles, along with UC-wide sustainable transportation policies directing all UC campuses by 2025 to convert 50% of their fleet from conventional gas power to ZEVs as part of its larger goal of reducing its carbon footprint.

PLAN PURPOSE – THE WHAT

- **Increase the number** of commuter electric vehicles at UCLA
- Ensure that the **UCLA Fleet transition to electric vehicles** occurs in sync with installation of EV charging infrastructure on campus
- Delineate UCLA BruinBus system's pathway to a **fully electrified bus fleet**

PLAN PRINCIPLES

1. Ensure quality customer service for EV users
2. Enable equity through mobility investments (see equity key driver)
3. Reduce air pollutants and greenhouse gas emissions
4. UCLA shall be at the forefront of new transportation technology

NEED/KEY DRIVERS – THE WHY

POLICY: UC Sustainable Practices Policy (zero-emission vehicle goals (ZEV)); CA policies and ZEV goals; UCLA Climate Action Plan, Sustainability Plan, and Sustainable Transportation Plan each have ZEV goals

COMMUTER BEHAVIOR: Early adopters have been joined by the moderate masses and EV mode share has tripled in recent years, with more than 1,600 EVs in the UCLA parking permit database by mid-2021

SUSTAINABILITY: UCLA commuters drive far less than the ambient mode share for the region, yet even if the campus achieves its shared mode goals, there will still be 45% of employees who drive to campus solo. Thus, they should do so in an EV to eliminate local emissions.

EQUITY: Essential employees are often unable to telecommute and must endure daily commutes (along with associated costs). By enabling free, Level 1 trickle charging on campus, UCLA can provide benefits to these employees by alleviating most or all their commute fuel costs.

GOAL 1	Meet commuter needs by ensuring that customers can charge their EV
OBJECTIVE 1.1	EV charging spaces for 5% of the commuter fleet at UCLA by 2025, 10% by 2030
Milestone 1.1.1	EV charging points at 4% of UCLA's total parking space inventory by 2025
Milestone 1.1.2	EV charging points such that 10% of driving commuters have access to charging by 2030
OBJECTIVE 1.2	Balance charger demand vs power availability through data
Milestone 1.2.1	Develop and deploy dashboard visualizing EV charging infrastructure utilization
OBJECTIVE 1.3	Ensure a mix of Level 1, 2, and 3 chargers spread across campus to efficiently serve various customer groups and meet customer charging needs
Milestone 1.3.1	Ensure by 2025 that no campus destination is void of proximate EV charging capability
Metric 1.3.1	Maintain no more than an 85% usage rate for EV charging ports
Metric 1.3.2	100% of campus zones have an inventory of EV chargers within them
OBJECTIVE 1.4	Set pricing for charging for Level 1, 2, and 3 chargers to maintain gratis charging for Level 1, operational cost recovery for Level 2, and a small margin for Level 3 that can be reinvested into the charging ecosystem on campus

GOAL 2	Match UCLA Fleet's needs for charging infrastructure
OBJECTIVE 2.1	Ensure that each electric vehicle within the campus' fleet has convenient access to a charging location
Metric 2.1.1	100% of fleet existing EVs have been allocated access to an EV charger by end of FY 2021-2022
OBJECTIVE 2.2	Add EV chargers concurrent with fleet EV inventory growth
Metric 2.2.1	100% of new fleet EVs have been designated to an EV charging campus zone
OBJECTIVE 2.3	Incentivize campus departments to acquire electric vehicles when replacing or adding vehicles by funding the core infrastructure within parking structures necessary for that vehicle to have access to EVSE equipment (UCLA Transportation funds conduit and panel improvement, providing a hot stub for the department to connect an EV charger to)
Metric 2.3.1	To ensure departments are incentivized to buy electric, reach a minimum of 80% awareness level with department representatives that deal with fleet purchases regarding the fact that UCLA Transportation pays for the infrastructure upgrades
OBJECTIVE 2.4	Ensure electrification of BruinBus fleet is served by appropriate charging infrastructure
Metric 2.4.1	100% of BruinBus charging needs can be accommodated within the Transit Yard

GOAL 3	Increase the number of commuter, resident, and visitor EVs at UCLA
OBJECTIVE 3.1	Educate the campus community as to the benefits of electric vehicles
Milestone 3.1.1	Establish an EV focus on the UCLA Transportation website and communication and marketing collateral, including creating recurrent campaigns focused on advertising EV charging infrastructure, total cost of ownership value, and the sustainability-related benefits of driving electric vehicles
Metric 3.1.1	Reach an 80% awareness level of the general campus community that EVs are affordable, available, and are a good choice for a commuter vehicle
OBJECTIVE 3.2	Increase the awareness level of commuters as to the existence and benefit of the Clean Fuel parking permit
Metric 3.2.1	Reach an 80% awareness level of the existence of Clean-Fuel permits at UCLA
OBJECTIVE 3.3	Connect commuters with the UC-specific incentives offered by vehicle manufacturers
Metric 3.3.1	More than ten transactions per quarter that see UCLA commuter acquiring an EV via the incentive programs
OBJECTIVE 3.4	Explore policy changes that will support the introduction of a multi-passenger clean fuel permit that contributes to reduction of single occupant vehicles and furthers emission reduction efforts
Metric 3.4.1	Carpool mode share and SOV mode share

GOAL 4	Seek strategic partnerships and opportunities while leveraging UCLA's institutional stature to help achieve first three goals
OBJECTIVE 4.1	Pursue external funding opportunities and strategic partnerships that aid the university to encourage EV commuting
Metric 4.1.1	Apply for enough grants to total at least $1 million annually
Milestone 4.1.1	Research and reach out to funding and/or networking opportunities through the California Energy Commission, CARB, AQMD, CAL eVIP, Electrify America, LA DWP, and other external partners
Metric 4.1.2	Achieve at least a 33% approval rate for grant applications per year
OBJECTIVE 4.2	Ongoing exploration of new EVSE technologies and business models related to EV
OBJECTIVE 4.3	Formalize financial resources for future EVSE infrastructure

INTRODUCTION

PLAN PURPOSE

The purpose of this electric vehicle (EV) Readiness Plan is to increase the number of electric vehicles commuting to and from the UCLA campus, to ensure that UCLA's fleet transition to electric vehicles occurs smoothly and in sync with efforts to install EV charging infrastructure on campus, and to delineate the UCLA BruinBus system's pathway to a fully electrified bus fleet. This will be accomplished by developing a framework to serve commuter vehicles, visitor vehicles, and Fleet & Transit vehicles through planning principles, clear goals, milestones, quantified metrics, and a combination of pragmatic and visionary policies that both nurture and sustain demand for electric vehicles and charging facilities at UCLA through 2030.

EV TIMELINE & READINESS PLANNING HORIZON

The EV Readiness Plan forecasting horizon is 2030. However, UC and state guidance regarding EV and EVSE efforts extends to 2050, which is the current target year for Scope 3 commute GHG emissions elimination. For fleet vehicles and buses, the Scope 1 GHG emissions elimination target year is 2025.

The timeline noted on the right lists pertinent milestones related to EV readiness.

2019

2.9% Commuters (875-1,000)
38% Fleet

2021

New fleet procurements EVs only (where alternatives available)

- 5 EV BruinBuses
- 306 EV charging points

2025

5% Commuters (~1,500)
50% Fleet (UC Sustainable Practices Policy)

- 100% of Fleet new procurements to be EVs or ZEVs
- ~800 EV charging points (4% of total parking spaces)
- 6 EV BruinBuses

2028

LA Olympics – UCLA to host Olympic Village and Athlete Transportation Hub

2030

PLAN'S GOALS
10% Commuters (~3,500)
>50% Fleet

- 800-1,000 EV charging points
- Numerous Level 3 chargers
- Fully electrified BruinBus fleet

2035

Gov. Newsom's Executive Order, N-79-20: 100% of in-state sales of new passenger cars and trucks will be zero-emission

2050

30% Commuters (~9,000)
>50% Fleet

FIGURE 1 – EV READINESS TIMELINE

FUTURE PROOFING UCLA'S ELECTRIFICATION STRATEGY

A plan's success depends on its temporal nature and the present knowledge that will influence future decisions. An added challenge is new Electric Vehicle Supply Equipment (EVSE) technologies seem to emerge daily, and keeping up, much less predicting the future of EV charging, can be difficult. For that reason, this plan starts by asking about the things we do not know today. For example:

- How many Bruins will commute in EVs to UCLA in five or ten years?
- How will battery electric vehicle (BEV) technology and range capability evolve over time?
- How much power will be needed to meet the demand of future EV commuters?
- Where do UCLA EV commuters travel from every day? And where will they travel from in the future?
- How can we improve access to EV charging infrastructure for those with limited or no access at their residence, as we know that just over 60% of Angelenos live in multi-family structures?

Fortunately, there are factors known today that can mitigate concerns about the future and assist in making educated decisions toward building a broad electrification strategy:

- The trend line of EV commuters to and from the UCLA campus and campus fleet EVs has steadily risen over the last several years, mirroring that of sales of EVs in the state of California
- Battery technology continues to improve and extend the average range of EVs
- Smart charging technologies, like adjustable load management and bidirectional charging, have become more widely available
- Expansion of smart Level 2 and 3 charging stations will be necessary to maximize charging potential and reduce transportation derived GHGs

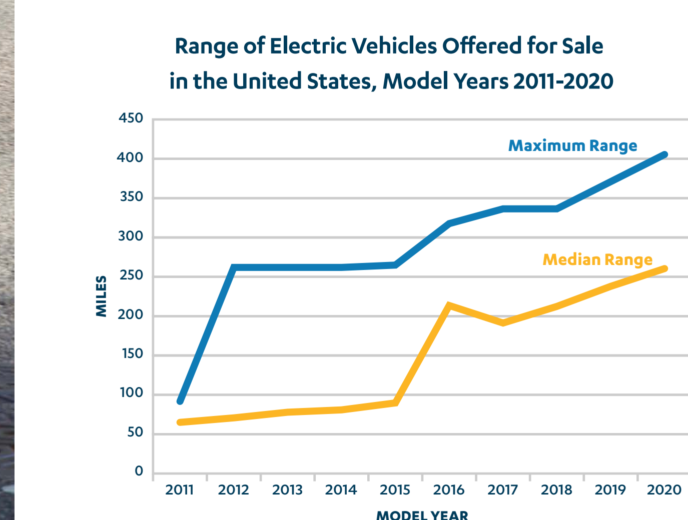


FIGURE 2 – RANGE OF EVS OFFERED FOR SALE IN THE US, 2011 – 2020

PLANNING PRINCIPLES AND GOALS

PRINCIPLES AND PRIORITIES

1. Ensure quality customer service for EV users
2. Enable equity through mobility investments
3. Reduce air pollutants and greenhouse gas emissions
4. Be at the forefront of new transportation technology

GOALS AND OBJECTIVES

Over the last decade, much work has been done on campus to build a robust EV charging infrastructure network that meets today's demands from EV commuters and university fleet vehicles. Yet more work is needed to bridge the gap between the swift rise in EV demand and a future-proof EV charging infrastructure. This plan calls for a multi-pronged approach that is tethered to the following goals and objectives:

Customer service

Reducing pollutants and emissions

Equity through mobility investments

UCLA at the forefront of new transportation technology

GOAL 1: Meet commuter needs by ensuring that customers can conveniently charge their electric vehicles on campus

OBJECTIVE 1.1: Provide EV charging for a minimum of 5% of the commuter fleet at UCLA by 2025 and 10% by 2030

Milestone 1.1.1: Provide EV charging points at 4% of UCLA's total parking space inventory by 2025

Milestone 1.1.2: Provide EV charging points such that 10% of EV commuters have access to charging by 2030

OBJECTIVE 1.2: Balance charger demand vs. power availability through data – the strategic expansion of EV charger inventory based on available power

Milestone 1.2.1: Develop and deploy a dashboard to help visualize EV charging infrastructure utilization from sources such as semi-smart meters, Level 3 charger usage data, and EV charging points utilization from parking space counts by end of fiscal year 2022-2023

OBJECTIVE 1.3: Ensure a mix of Level 1, 2, and 3 chargers spread across campus to efficiently serve various customer groups and meet customer charging needs

Milestone 1.3.1 Ensure by 2025 that no campus destination is void of proximate EV charging capability

Metric 1.3.1: Maintain no more than an 85% usage rate for EV charging ports

Metric 1.3.2: 100% of campus zones have an inventory of EV chargers within them

OBJECTIVE 1.4: Level 3 charger pricing shall be market-based price based on a public-private partnership model so as to maintain gratis charging for Level 1, implement an operational cost recovery process for Level 2, and a small margin that can be reinvested into the charging ecosystem on campus

GOAL 2: Match UCLA Fleet's needs for charging infrastructure

OBJECTIVE 2.1: Ensure that each electric vehicle within the university's fleet has convenient access to a charging location

Metric 2.1.1: 100% of the existing EVs in the university's fleet have been allocated access to an EV charger by end of fiscal year 2022-2023

OBJECTIVE 2.2: Add EV chargers concurrent with fleet EV inventory growth

Metric 2.2.1: 100% of new fleet EVs have been designated to an EV charging campus zone

OBJECTIVE 2.3: Incentivize campus departments' transition to electric vehicles when replacing or adding vehicles by enrolling in the upcoming fleet motor pool along with providing sufficient infrastructure within parking structures necessary for those vehicles to have access to EVSE

Metric 2.3.1: To ensure departments are incentivized to transition to EVs, reach a minimum of 80% awareness level with department representatives who deal with fleet purchases and inform them of UCLA Transportation's Motor Pool Program and EVSE infrastructure upgrades available

OBJECTIVE 2.4: Ensure electrification of BruinBus fleet is served by appropriate charging infrastructure

Metric 2.4.1: 100% of BruinBus charging needs can be accommodated within the Transit Yard

GOAL 3: Increase the number of commuter, resident, and visitor electric vehicles at UCLA

OBJECTIVE 3.1: Educate the campus community as to the benefits of electric vehicles

> ***Milestone 3.1.1:*** Establish an EV focus on UCLA Transportation's website and communication and marketing collateral, including creating recurrent campaigns focused on advertising EV charging infrastructure, the total cost of ownership value, and the sustainability-related benefits of driving electric vehicles, with a focus on frontline staff

> ***Metric 3.1.1:*** Reach an 80% awareness level of the general campus community that EVs are affordable, available, and a good choice for a commuter vehicle

OBJECTIVE 3.2: Increase the awareness level of commuters of the existence and availability of free or low-cost charging options on campus

> ***Metric 3.2.1:*** Reach an 80% awareness level of the existence of free and/or low- cost charging options at the UCLA campus

OBJECTIVE 3.3: Connect commuters with the UC-specific incentives offered by vehicle manufacturers

> ***Metric 3.3.1:*** More than ten transactions per quarter that see a UCLA commuter acquiring an EV via the incentive programs

OBJECTIVE 3.4: Explore policy changes that will support the introduction of a multi-passenger Clean Fuel permit that contributes to the reduction of single occupant vehicles and furthers emission reduction efforts while taking advantage of the daily decision parking option

> ***Metric 3.4.1:*** Carpool mode share and SOV mode share

GOAL 4: Seek strategic partnerships and opportunities while leveraging UCLA's institutional stature to help achieve first three goals

OBJECTIVE 4.1: Pursue external funding opportunities and strategic partnerships that aid the university in encouraging EV commuting

> ***Metric 4.1.1:*** Apply for enough grants totaling at least $1 million annually

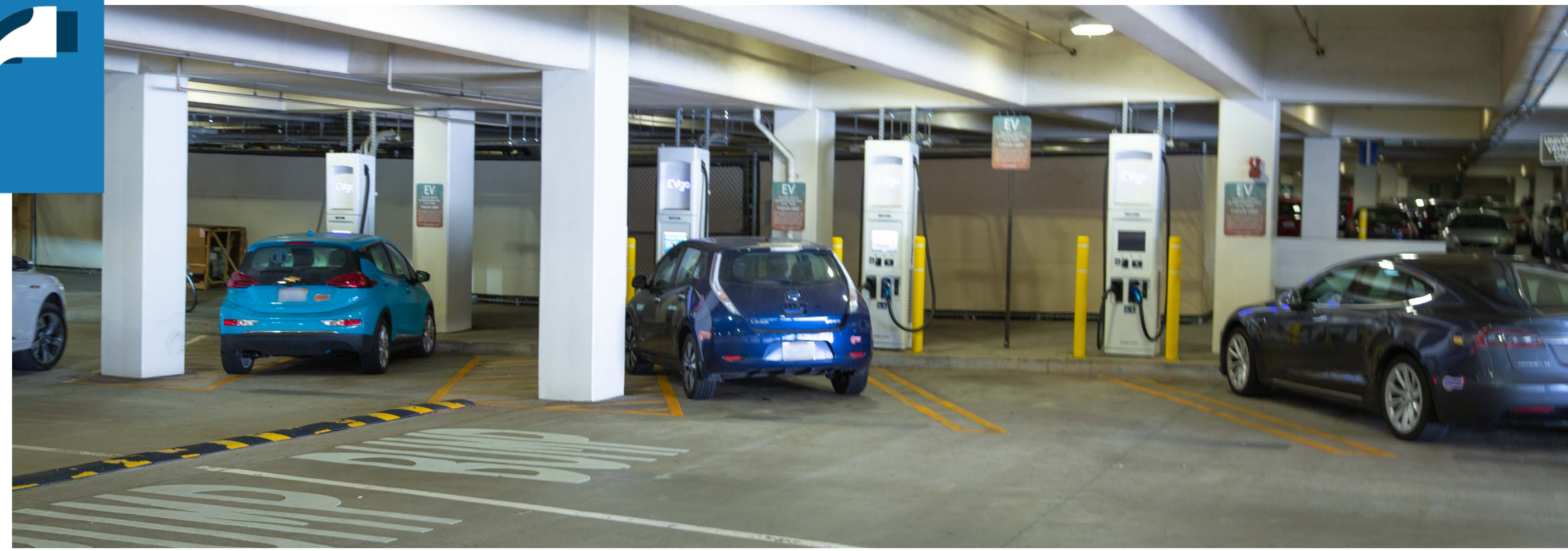
> ***Milestone 4.1.1:*** Research and reach out to funding and/or networking opportunities through the California Energy Commission, CARB, AQMD, CAL eVIP, Electrify America, LA DWP, and other external partners

> ***Metric 4.1.2:*** Achieve at least a 33% approval rate for grant applications per year

OBJECTIVE 4.2: Ongoing exploration of new EVSE technologies and business models related to EV and EVSE deployment

OBJECTIVE 4.3: Formalize financial resources for future EVSE infrastructure

KEY DRIVERS



KEY DRIVER: POLICY

With the debate over the negative effects of global warming on the environment in the rearview mirror, eliminating carbon as a fuel component is inevitable and necessary. There is now a race at the federal, state, and local levels to accelerate EV adoption through policies and incentives that will make it easier for more individuals and organizations to transfer to cleaner fuels within the next few years. However, this intensive drive to electrification reveals that today's EV charging infrastructure is still in its nascent stages, which is reflected in recent policies adopted by the State of California and the UC system.

Figure 3 illustrates the hierarchy of high-level sustainability policies that govern the progression of EVs and ZEVs at UCLA and will further help decrease GHG emissions derived from transportation. Starting at the top is Governor Newsom's Executive Order to shift sales of new vehicles to only ZEVs by 2035 in California. Beneath that, UC's Sustainable Practices Policy – Sustainable Transportation sets UC systemwide EV adoption standards by decreeing that all UC campuses shall convert 50% of their fleet to ZEVs by 2025, and each location shall strive to have at least 4.5% of commuter vehicles be ZEVs by 2025. At the campus level, the UCLA Sustainability Plan and UCLA Transportation's Sustainable Transportation Plan reinforce the need to encourage EV commuting by calling for 5% ZEVs by 2025. At the bottom of the pyramid, this plan reinforces the aforementioned high-level goals and connects them with the individual operational units responsible for achieving their success within UCLA Transportation.

FIGURE 3 – POLICY HIERARCHY

Gov. Newsom's Executive Order	• Order, N-79-20: 100% of in-state sales of new passenger cars and trucks will be zero-emission by 2035
UC's Sustainable Practices Policy - Sustainable Transportation	• By 2025, each location shall strive to have at least 4.5% of commuter vehicles be ZEV • By 2050, each location shall strive to have at least 30% of commuter vehicles be ZEV • By 2025, zero-emission vehicles or hybrid vehicles shall account for at least 50% of all new fleet light-duty vehicle acquisitions
UCLA Sustainability Plan	• Provide enough electric vehicle charging infrastructure on campus to encourage demand
UCLA Transportation's Sustainable Transportation Plan	• Increase the zero-emission vehicle commuter fleet percentage to 5% of all commuting vehicles by 2025 • Minimize toxic emissions from campus vehicle operations in support of a carbon-neutral fleet by 2025
EV Readiness Plan	• Ensure that customers can charge their electric vehicle • Match UCLA Fleet's needs for charging infrastructure • Increase the number of commuter, resident, and visitor electric vehicles at UCLA • Seek strategic partnerships and opportunities while leveraging UCLA's institutional stature to help achieve first 3 goals

KEY DRIVER: COMMUTER BEHAVIOR

As a top-rated public university in the United States, it follows that UCLA's campus population has mushroomed over the last several years and, on a day-to-day basis, the densely built campus often resembles a pocket-sized city. For example, in 2021, UCLA enrolled more than 45,000 students, and employed 38,000 faculty and staff members. Additionally, its world-class facilities and medical center attract more than 12,000 visitors per weekday during the academic year (AY). These populations create the bulk of the approximately 102,000 daily vehicle trips to and from campus during the AY.

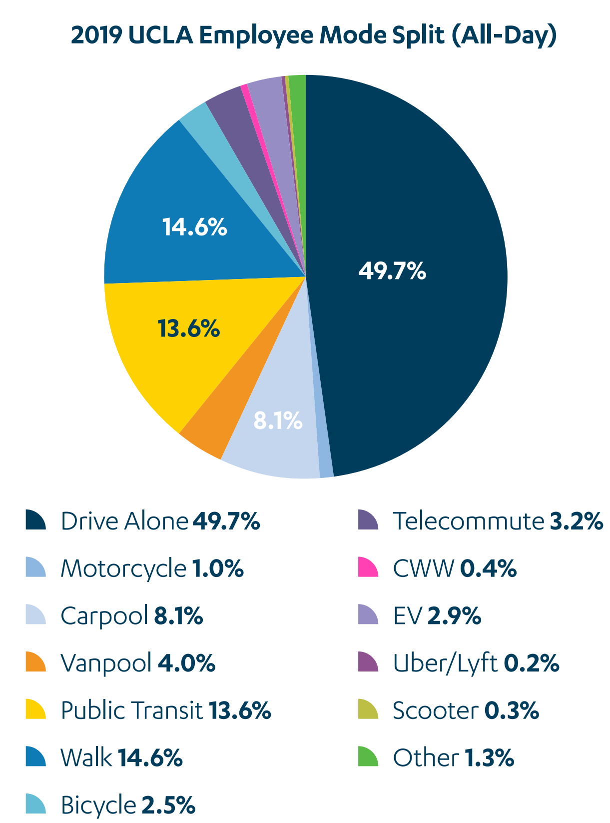
Paralleling this growth, the number of commuters driving EVs to the UCLA campus daily has skyrocketed, as revealed by the 2019 South Coast Air Quality Management District (AQMD) survey. The AQMD survey is a mandatory evaluation that UCLA Transportation completes annually for regulatory air quality purposes, and it measures mode split, or the type of transportation individuals use to commute to and from their place of employment, school, etc. This survey is one of the most important evaluation tools used by UCLA Transportation, as it helps manage and continuously improve the department's transportation demand management (TDM) programs.

Furthermore, the focus on the survey's mode split revolves around the "drive alone" rate, or the percentage of the commuting population that are driving alone in their vehicle to campus (for survey purposes, solo commuters are referred to as SOV--single-occupant vehicle--commuters). In contrast, in 2019, the last clean pre-COVID view of UCLA employees' mode split, the Los Angeles region had a commute mode split of approximately 74% SOV, while survey results indicated 47.9% of UCLA employees to be SOV commuters.

To further illustrate this, according to 2014 AQMD survey results, EV commuters made up less than half of one percent of all survey respondents. By contrast, that mode share increased to 2.9% in 2019 (Figure 4 - Mode Split at UCLA). This figure is significant as it is expected to continue rising and meet or exceed the goals set forth by the UC Sustainable Transportation Policy, UCLA Sustainability Plan, and UCLA Transportation's Sustainable Transportation Plan of reaching 5% EV commuters by 2025.

Going forward, the AQMD survey will continue to serve as a barometer to measure the demand for EVSE infrastructure. Through future AQMD survey results, UCLA Transportation will be able to determine how much real demand from EV commuters exists and the level of resources necessary to invest appropriately in expanding its EV charging network.

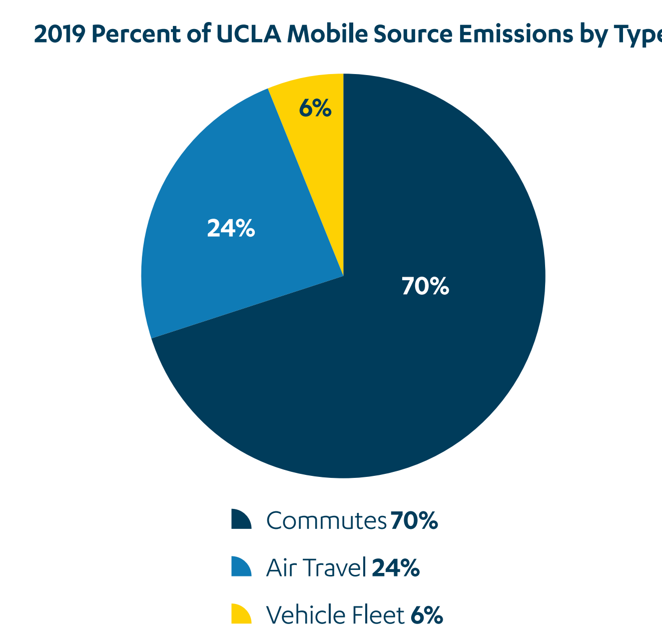
FIGURE 4 – MODE SPLIT AT UCLA



KEY DRIVER: ENVIRONMENTAL AND SUSTAINABILITY BENEFITS

Although pollution stemming from ICEs has declined over the last several decades, it still chokes the Los Angeles region, and with it comes long-term environmental impacts and detriments to human health. According to CARB's GHG emissions inventory, as of 2018, the transportation sector was the highest emitter of pollutants, representing almost 40% of all emissions. At UCLA, surface transportation comprised 18.9% (FY 2018-2019) of the campus's overall GHG emissions, further emphasizing how much work remains to be accomplished to reach the UC commitment to achieve carbon neutrality for Scopes 1 and 2 by 2025.

FIGURE 5 – MOBILE SOURCES BY EMISSIONS



GHG EMISSIONS SAVINGS

While the focus of this plan is to encourage the transition from ICEs to EVs, UCLA Transportation's primary goal in the long-term fight against climate change remains to promote heathier alternative active modes of transportation, like bicycling, walking, and public transit to shift behaviors away from a car-centric culture. But with an average distance of more than 13 miles for a one-way commute, active transportation is not a practical or safe option for most UCLA employees at this point in time. Therefore, switching to EVs in many cases may be the best, next alternative to drive down emissions at the campus and regional level.

Encouraging commuters to transition from ICEs to EVs and reaching the plan's goal of 5% EV commuters by 2025 could result in a reduction of over 2,500 metric tons annually. Simultaneously, with UCLA Fleet en route to electrifying 50% of all vehicles in the university's inventory, further reductions in the overall campus carbon footprint would occur.

KEY DRIVER: EQUITY THROUGH TRANSPORTATION INVESTMENTS

According to the California Employment Development Department, UCLA is one of the largest employers in the region (3). With a significant portion of Bruins living in multifamily dwellings or having more than a 90-minute one-way commute to work or school, finding readily accessible EV charging can be both challenging and a necessity. As such, this element of the plan represents UCLA Transportation's ongoing commitment to increasing social equity and benefits through investments in sustainable transportation. To further this component along, this plan advocates for the development of a communication campaign that takes advantage of UCLA's various media outlets to inform commuters about the various benefits of driving EVs to UCLA, as well as resources and incentives offered to individuals to make the transition possible.

In addition to high-level mandates, there are external, market-driven factors, such as the growing transition in the car manufacturing industry from gas-powered engine vehicles to ZEVs and, more specifically, EVs. For instance, in early 2021, General Motors announced it will sell EVs exclusively by 2035. Around the same time, Ford revealed plans to phase out gas-powered vehicles in Europe with ZEVs by 2030, as dozens of cities in Europe, including Rome, London, and Paris, plan to limit center city traffic to emission-free vehicles during the next decade. Most noticeably, Tesla has climbed in recent years to capture the largest share of the EV market, with nearly 400,000 sales in 2019 (4).

By some margins, California's ban on sales of ICE vehicles by 2035 may seem on the cutting edge of sustainability policy. However, in recent years, other countries have also recognized the environmental benefits of EV adoption and are making leaps and bounds towards ensuring the transition. Norway, for example, is leading the race to electrification by banning sales of ICE vehicles by 2025, and EVs already make up about 60% of monthly sales. Great Britain announced it would enact a similar ban by 2030, and China, the world's largest car manufacturer, plans to shift 50% of its car production to 50% ZEVs by 2035 (5). Therefore, this plan acknowledges the urgent pace at which EV technology adoption is progressing and seeks to position UCLA at the vanguard of electrification.

CAMPUS INFRASTRUCTURE – CHARGING AT UCLA

CHARGING ON CAMPUS TODAY

Charging an EV at the UCLA campus today is virtually synonymous with the university's parking facilities. At only 419 acres, the campus's small, densely built footprint confines the majority of all existing EV charging infrastructure to various parking structures and surface lots.

In total, the university's parking inventory consists of approximately 22,000 parking stalls, with well over 300 of those currently outfitted with charging points serving commuters and fleet EVs and PHEVs alike. Historically, the location and type of EV chargers installed have been largely dictated by customer demand and power supply availability. The latter poses the biggest challenge as most campus parking facilities were built between the 1960s and 1990s when no provisions or considerations would have been taken to accommodate future power demand associated with EV charging infrastructure.

The existing EV charging infrastructure on campus is made up of three types of chargers:

Level 1 Charging

These are the most ubiquitous types of chargers and make up 80% (264) of the existing charging infrastructure on campus, delivering 120 volts of charging power. Level 1 chargers are characterized as standard wall outlets, requiring the least amount of power demand and thereby power upgrades, making them the most accessible charging installation alternative. While these provide the slowest charging option and rely on trickling power at about 3.5 – 6.5 miles of driving range per hour of charging time, they prove ideal for commuters spending extended periods of time on campus studying, conducting research, or working. In addition to wall outlets, UCLA offers Level 1 charging through an array of solar powered EV chargers at multiple surface lots where obtaining hardwired power is neither logistically feasible nor cost-effective. These solar powered EV chargers also offer operational flexibility as they can be relocated as needed.

Level 1 Charging Policies

- Complimentary with a parking permit
- EV commuters must use a personal charging cord to connect to the port
- No time restrictions

Level 2 Charging

This type of charger relies on a dedicated 208-volt or 240-volt electrical circuit and offers about 14-35 miles of range per hour of charging time, depending on battery type. Thus far, UCLA Transportation has installed 16 customer-accessible Level 2 chargers in addition to 16 chargers specifically for ADA customers.

Level 2 Charging Policies

- Complimentary with a parking permit
- 4-hour time limit, vehicle required to be moved after 4 hours

Level 3 Charging

Level 3, or DC fast charging, provides the fastest charging option and can add up to 10 miles of range per minute of charging time. The UCLA campus currently offers eight of these through the service provider EVgo. While providing the fastest charge, installing these chargers is the most complicated as it requires a 480-volt connection converting AC to DC power and is not universally compatible with all EVs depending on the charging connector and battery.

Level 3 Charging Policies

- Provided by an external vendor, requires online signup for payment
- Priced by time, approximately $0.35/charging minute

UCLA Electric Vehicle Charger Inventory (Spring 2021)

Distribution and type of customer-accessible electric vehicle chargers on the UCLA campus

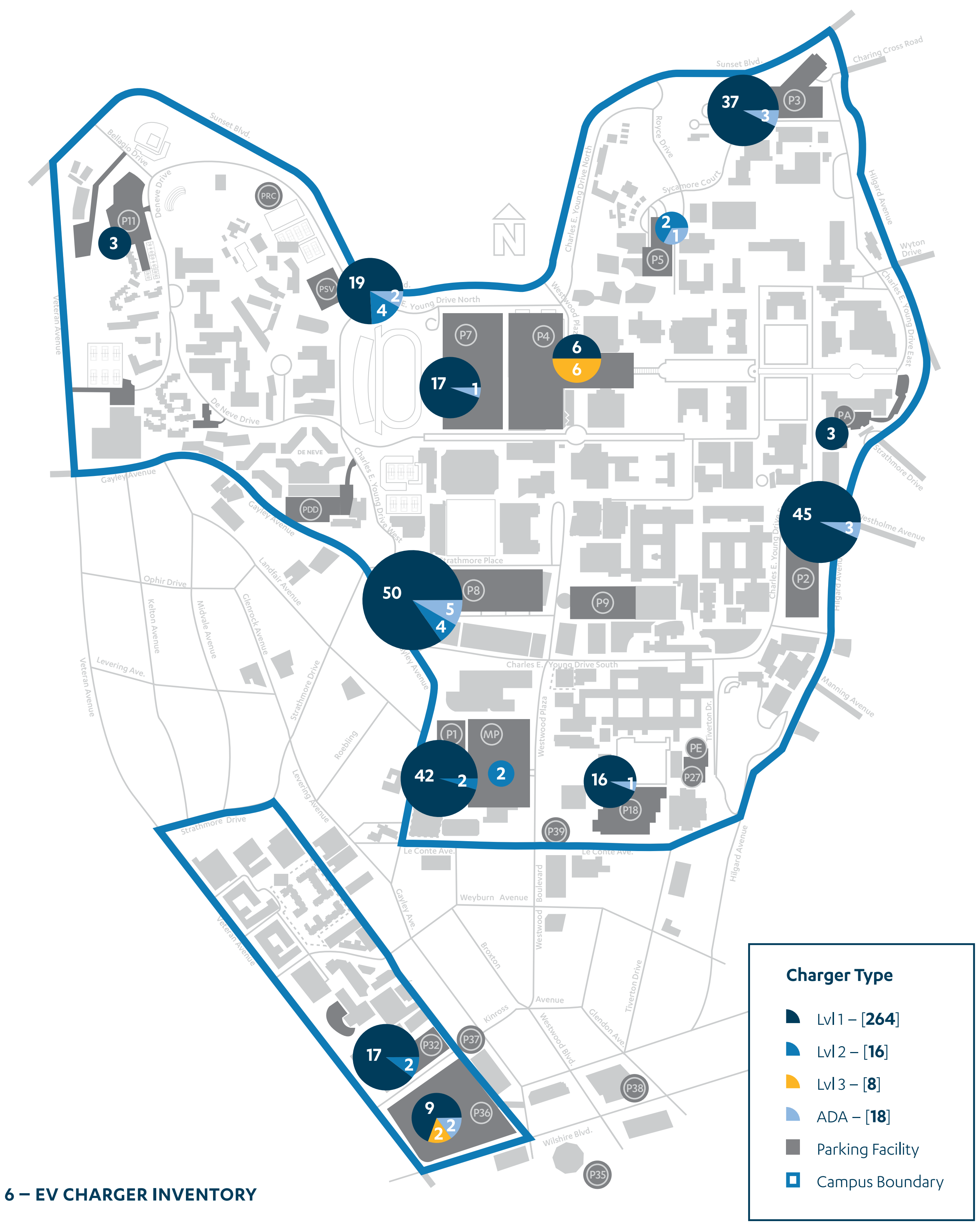


FIGURE 6 – EV CHARGER INVENTORY

CHARGING ON CAMPUS TOMORROW

EV CHARGER INSTALLATION AND FUTURE COMMUTER DEMAND

Part of UCLA Transportation's mission to support the campus community involves exercising financial stewardship and investing resources efficiently and equitably. When it comes to EV charging infrastructure, this means taking a strategic approach to expanding the available infrastructure that serves commuters and university fleet vehicles while making business prudent decisions that maximize the return on investment per charger installation. However, achieving a balance between what is needed and what is logistically feasible also means that the installation cost of EV chargers is more often than not dictated by the physical infrastructure already in place. The following are some of the cost-affecting factors to take into consideration:

- Trenching
- Power supply upgrades (panel, transformer)
- EVSE location
- Labor costs
- ADA requirements
- Operation and maintenance

Thus far, Level 1 chargers have proven the most logistically feasible type of charger to install throughout the campus. Today, 80% of all customer-accessible chargers at UCLA are Level 1, thanks partly to the availability of 120-volt power. And with hundreds more planned to be installed over the next few years, coupled with advances in EV battery capacity and range technology, they will serve a commuting population with the ability to come to campus, plug in their vehicle, and go about their day conducting research, studying, teaching, or working, all the while charging without time restrictions and easing range anxiety. Table 1 shows the amount of charging power and time, along with the needed power supply for each charger type (7).

The university will also see more customer and fleet-accessible Level 2 chargers installed over the coming years. One example includes the installation of 20 Level-2 chargers exclusively for fleet use. This project will require partnering with a private vendor to supply charging stations and use grant-awarded funding to pay for the installation. The installation of these chargers broke ground in Fall 2022.

Additionally, UCLA Transportation will increase the number of Level 3 chargers on campus from 8 to nearly 20 by the end of FY 2022-2023. Having partnered with EVgo to deliver its existing Level 3 chargers, the department recently completed necessary power upgrades to Parking Structure 8 in central campus with the goal of expanding its charging infrastructure at that site and will soon engage in the planning and designing process prior to construction.

Table 1 – Charging and Power Requirements

Charging Level	Vehicle Range Added per Charging Time and Power	Supply Power
AC Level 1	4 mi/hour @ 1.4kW	120VAC/20A (12-16A continuous)
	6 mi/hour @ 1.9kW	
AC Level 2	10 mi/hour @ 3.4kW	208/240VAC/20-100A (16-80A continuous)
	20 mi/hour @ 6.6kW	
	60 mi/hour @ 19.2 kW	
DC Fast Charging (Level 3)	24 mi/20 minutes @24kW	208/480VAC 3-phase (input current proportional to output power; ~20-400A AC)
	50 mi/20 minutes @50kW	
	90 mi/20 minutes @90kW	

Part of the project's scope involved installing a new transformer in order to provide sufficient power to six new DC fast chargers to be installed on the rooftop of that parking facility. Additionally, the Parking Kiosk 2 parking lot has been identified as a feasible site to install 2 or 3 more Level 3 chargers.

As we look to the near future, the UCLA campus continues to grow and transform as more buildings are under construction or in the planning stages. Inevitably, this will equate to more commuters. Hence, this plan's primary commuter milestones consist of increasing the number of EV commuters from 2.9% to 5% by 2025 and 10% by 2030. In order to meet the scale of future demand for charging infrastructure, far more EVSE will be needed than can be funded through internal revenue alone.

COMMUTER ACCESSIBLE EVSE EXPANSION IMPLEMENTATION

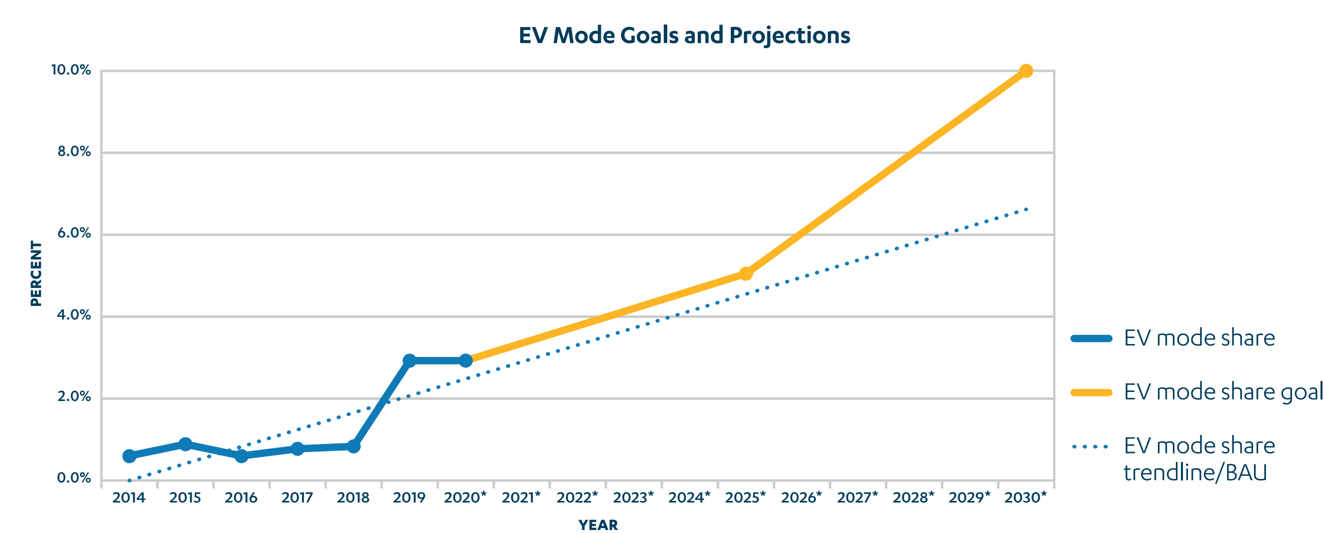
The first step in reaching the number of EV charging points needed to meet this plan's goals will require overcoming power limitations at campus parking facilities and the deft installation of Level 3 chargers deemed convenient. UCLA Transportation, in partnership with UCLA Facilities Management, began conducting electricity load capacity assessments in 2021. The scope of these involves an assessment of the university's parking system to determine how much power is available at each facility, identify the next suitable locations to install additional EVSE, and select where further power upgrades are needed.

The first several electric load studies for parking structures on campus have revealed that the age—many structures are several decades old—and initial intended use of electricity for lighting the structures means that there is scant electrical capacity for more than a few dozen Level 1 chargers in each of the studied structures. This reality, therefore, adds substantial cost and effort related to installing additional EVSE in UCLA's parking structures and will be an impediment to the rapid deployment of EVSE on campus. By late July 2021, these parking structures so far have been identified as having limited capacity for charger inventory increases:

- Parking Structure 1 – 40 (Level 1 120v outlets)
- Parking Structure 2 - 20
- Parking Structure 9 - 25
- Parking Structure 5 - 45
- Parking Structure 4 - 60

Based on data projections, the number of daily EV commuters who will need access to EVSE is projected to grow to approximately 1,200 by 2025 and reach more than 2,500 by 2030. For that reason, this plan recommends the installation of at least 880 EV charging points by 2025 and enough charging capacity to service 10% of driving commuters by 2030 on the UCLA campus. In keeping with its dedication to financial stewardship, UCLA Transportation will look beyond internal funding resources and must take advantage of existing and future grant and incentive programs.

FIGURE 7 – ELECTRIC VEHICLE MODE SHARE



WALKSHED ANALYSIS

To meet the plan's objective of providing convenient EVSE access to all customers at the UCLA campus, UCLA Transportation carried out several geospatial models employing Geographic Information Systems technology (GIS) to better assess the geographical relationships between buildings, occupancy, and that of on and off-street parking. The first model focused on calculating walking distances, or "walksheds," from existing EVSE to various points of interest throughout the campus. Although, according to the Federal Highway Administration, the standard for estimating walking speeds is 3.5 feet per second, for this analysis, four feet per second was used to account for the perceived speed at which most of the UCLA community walks.

Using ESRI's ArcMap, a shapefile displaying walkways throughout UCLA was placed on a base map that focused on the main part of campus. Another shapefile that illustrates which parking lots and structures contain electric vehicle charging was also placed on the map. Walkways to various campus buildings from the parking EV charging stations were measured in total feet, and the average time it would take an individual to traverse that distance on foot to various buildings and landmarks on campus was calculated. Using the four feet per second benchmark for an individual's average walking distance, a minimum service standard of seven minutes was used to determine if there existed any gaps in accessibility for pedestrian access to charging stations. Any figure above that time limit points to a deficiency in charging stations in that section of campus, speaking to a need to add additional charging stations there or close enough where the minimum service standard would be achieved.

UCLA Electric Vehicle Charger Walkshed Analysis

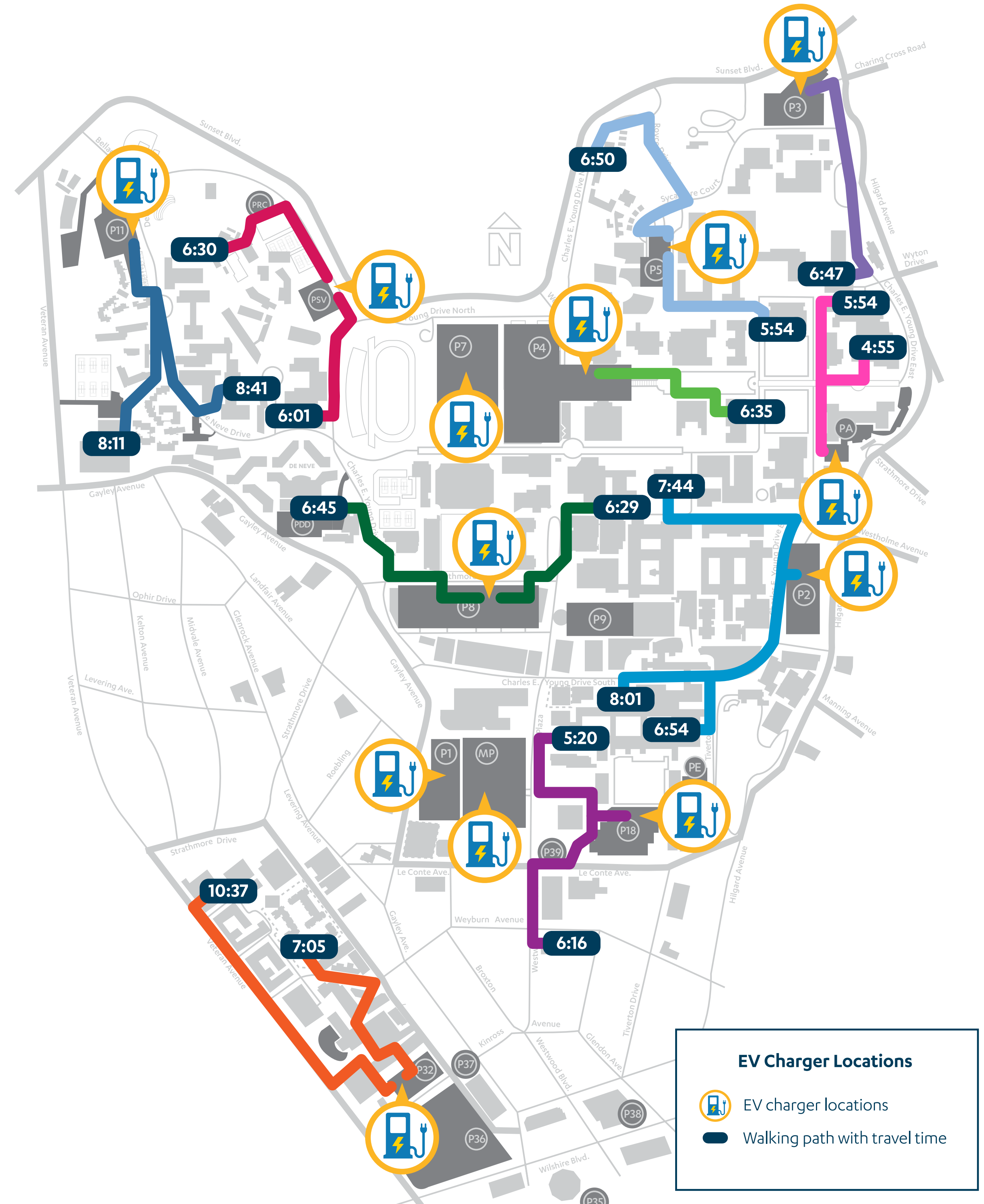


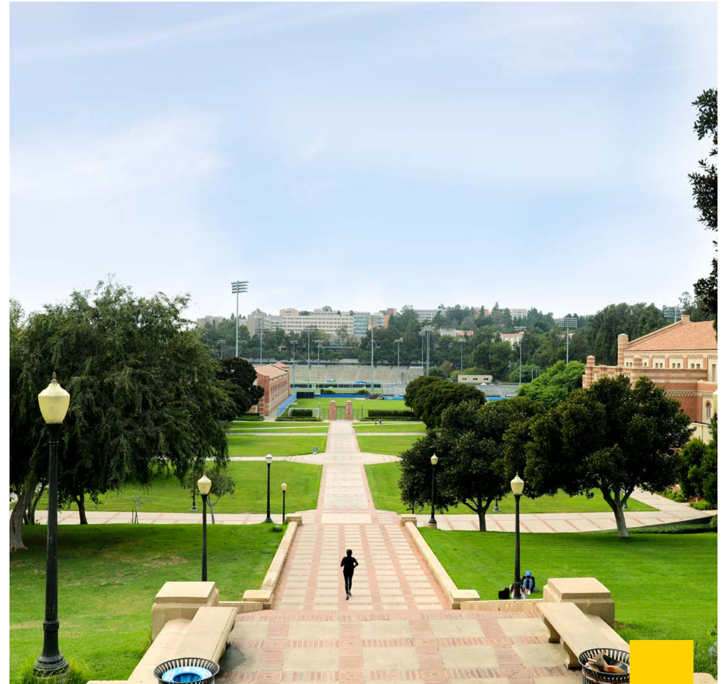
FIGURE 8 – WALKSHED ANALYSIS MAP

PARKING FACILITIES AND BUILDING OCCUPANCY ANALYSIS

To better help visualize the geographical distribution of existing EVSE and its relation to surrounding land use, the UCLA campus was broken down into geographical areas, or clusters, matching those used to maintain parking inventory. The first step in this exercise was to create a map illustrating the location of existing EV chargers. For this, a polygon layer of the university's parking facilities was digitized in order to have a base layer to work with. From there, the layer's symbology was classified by the number of spaces to convey both the physical location of the parking facilities as well as the number of spaces within it, as seen by the blue gradient representing the parking space density. It should be noted that this layer includes all parking facilities, including underground, surface, and street parking lots. Additional classification was done to highlight the largest parking facilities and facilitate identifying the most logical locations where EV charging infrastructure may be needed. A point layer was created to geocode and more easily denote the location of parking facilities with and without existing EV chargers.

Similarly, a polygon layer of each building on the UCLA campus was digitized and joined to a table with every building's occupancy number classified to illustrate the density that various parts of the university experience on any given day. This enabled the classification of each building's population figures by usage type to differentiate special event venues, which may experience infrequent higher populations, versus buildings consisting mostly of office, classroom, or laboratory spaces, which are presumed to have lower occupancy.

The result of this analysis revealed that most parking facilities with more than 500 and 1,000 parking spaces already have EVSE of some sort, with the exceptions of Parking Structure 9, Lot 38, and the Wilshire Center in the Westwood Village geographical area. All these parking areas serve parts of the campus with high building populations, so it would seem logical to install EVSE there. The east side of campus, specifically near the UCLA School of Law and UCLA Luskin School of Public Affairs are areas with on-street parking facilities devoid of any charging infrastructure.



Parking Facilities and Building Occupancy
On-street and garage parking facilities with and without EVSE, number of spaces in each parking facility, and campus building occupancy

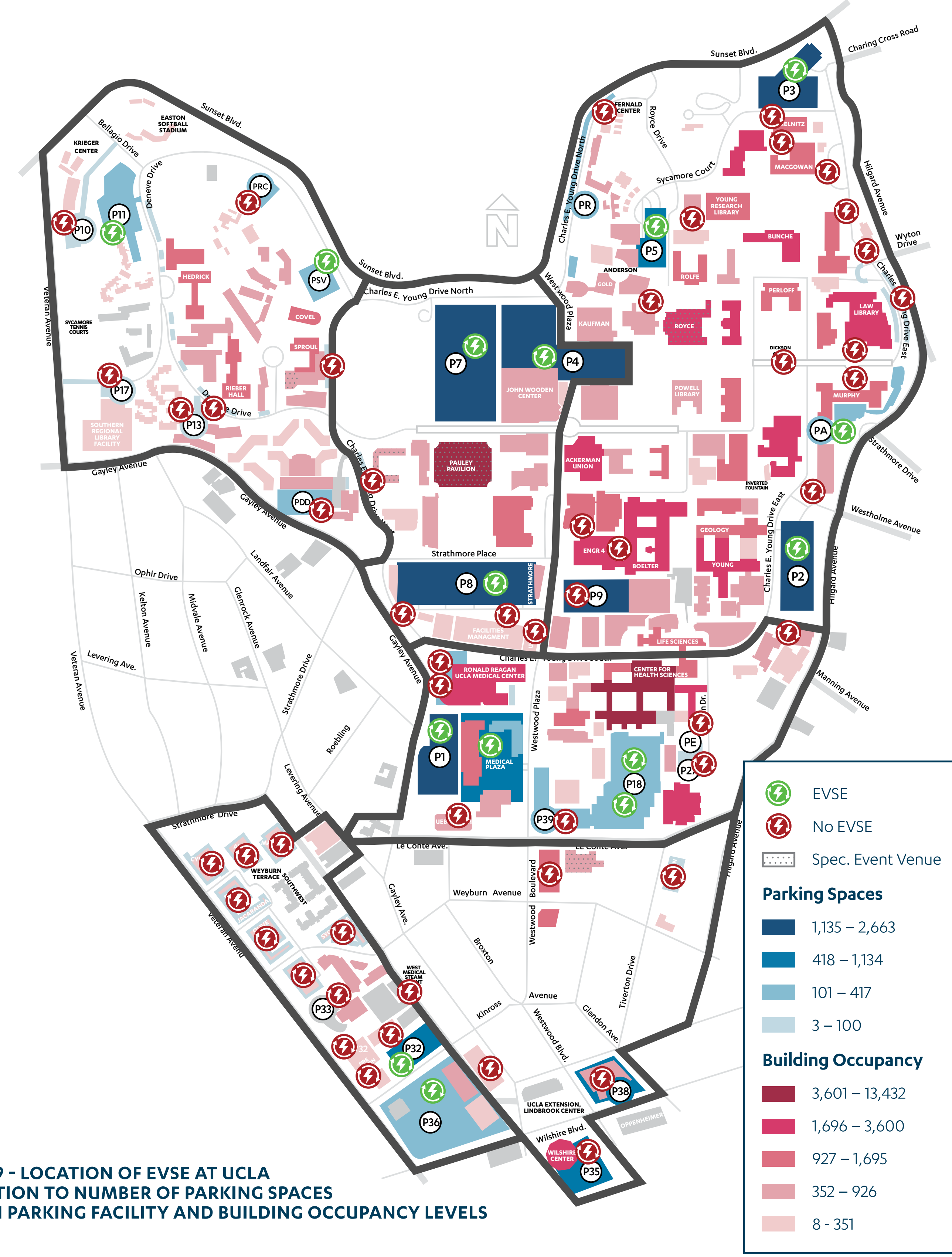


FIGURE 9 - LOCATION OF EVSE AT UCLA IN RELATION TO NUMBER OF PARKING SPACES AT EACH PARKING FACILITY AND BUILDING OCCUPANCY LEVELS

LEVEL OF SERVICE ANALYSIS

Having ascertained candidate locations where new EVSE should be installed, the next step consisted of calculating the level of service currently provided with the existing charging infrastructure and determining the level of service that would be offered by installing enough infrastructure to cover 4% of the total parking inventory (880 spaces). The same parking inventory system of dividing the campus into geographical clusters was used to calculate the number of EV charging points as well as the ratio of parking stalls to charging points within each campus area. This revealed that with the existing 306 charging points, the average ratio of parking spaces to charging points is 58 to 1 (Table 2), providing charging capability to produce approximately 500 daily charging sessions (Table 3).

By increasing the number of EVSE to a total of 4% of the total parking inventory found on the UCLA campus, or in other words, installing an additional 482 Level 1 chargers by 2025, in addition to the existing number of Level 2 and 3 chargers, the university charging capacity will exceed 1,200 daily charging sessions, thereby reaching its goal of servicing 5% of EV commuters. Simultaneously, the parking stall-to-charging point ratio will improve to 27 to 1. Beyond 2025, UCLA will need to strategically increase its charging capacity twofold through the installation of additional Level 2 and 3 chargers, or emerging EVSE technologies, if it is to keep up with demand forecasts and reach this plan's goal of servicing 10% driving commuters by 2030.

Table 2 – Current and Future Level of Service Analysis with Existing and Additional EVSE

Existing Daily Utilization Estimate											
Parking		Existing Number of EVSE					Estimate Daily Charging Capacity w/ Existing EVSE				
Parking Facility	Parking Spaces	Level 1	Level 2	Level 3	ADA	Total EVSE	Lvl 1 (1.3 Sessions)	Lvl 2 (2.2 Sessions)	Lvl 3 (12 Sessions)	ADA (1.3 Sessions)	# of Estimated Possible Charging Sessions
Parking Structure 8	2,663	50	4	0	5	59	65	8.8	0	6.5	80.3
Parking Structure 2	2,250	45	0	0	3	48	58.5	0	0	3.9	62.4
Parking Structure 1	1,678	42	2	0	0	44	54.6	4.4	0	0	59
Parking Structure 3	1,893	37	0	0	3	40	48.1	0	0	3.9	52
Parking Structure SV	722	19	4	0	2	25	24.7	8.8	0	2.6	36.1
Parking Structure 7	1,484	17	0	0	1	18	22.1	0	0	1.3	23.4
Parking Structure 32	919	17	2	0	0	19	22.1	4.4	0	0	26.5
Parking Structure 18	417	16	0	0	0	16	20.8	0	0	0	20.8
Parking Lot 36	397	9	0	2	2	13	11.7	0	24	2.6	38.3
Parking Structure 4	1,708	6	0	6	0	12	7.8	0	72	0	79.8
Parking Lot 11	356	3	0	0	0	3	3.9	0	0	0	3.9
Parking Lot A	154	3	0	0	0	3	3.9	0	0	0	3.9
Parking Structure 5	661	0	2	0	1	3	0	4.4	0	1.3	5.7
Parking Structure 18 Visitor	219	0	0	0	1	1	0	0	0	1.3	1.3
Medical Plaza	1,134	0	2	0	0	2	0	4.4	0	0	4.4
TOTAL	**16,665**	**264**	**16**	**8**	**18**	**306**	**343.2**	**35.2**	**96**	**23.4**	**497.8**

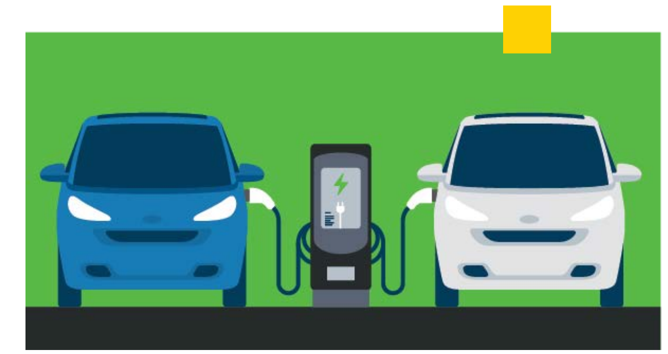
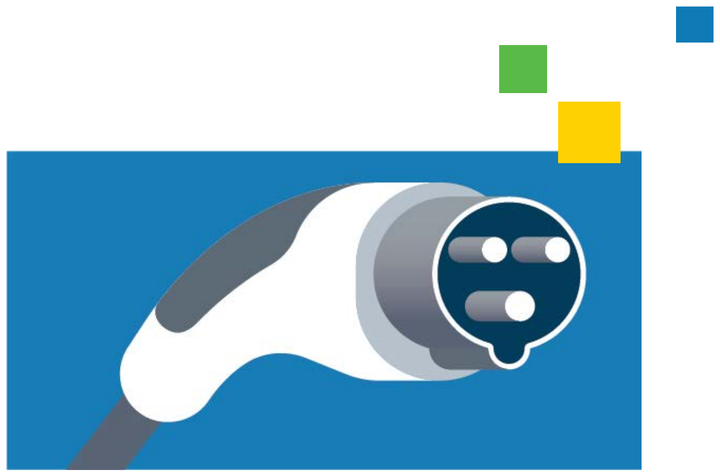


TABLE 3 AND 4 – CURRENT AND FUTURE LEVEL OF SERVICE ANALYSIS WITH EXISTING AND ADDITIONAL EVSE

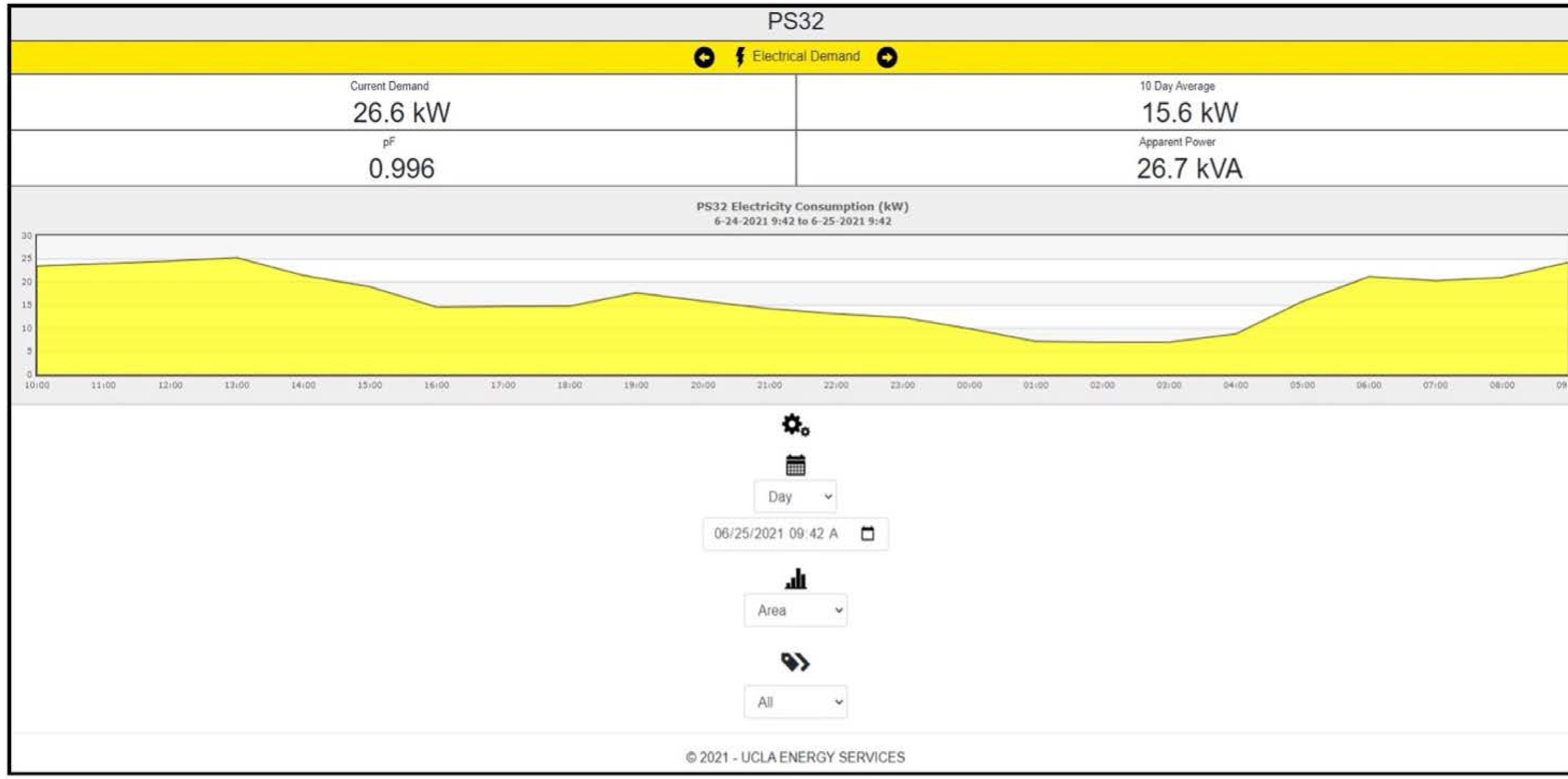
EVSE Level of Service Estimate														
Campus Area	Parking Spaces	University Vehicle Spaces	Visitor Spaces	% of Parking Inventory	Level 1	Level 2	Level 3	ADA	Total Charging Points	% of EVSE Inventory	Current Spaces to Charging Points Ratio LOS	4% of Total Parking Inventory Ratio LOS	Total Charging Points Needed to 4% Inventory & LOS	% of EVSE Inventory
Dorms	1,710	53	142	7%	22	4	0	2	28	7%	61	27	63	7%
East Cluster	8,960	30	1,023	38%	91	2	6	7	106	30%	85	27	337	38%
Medical	4,142	6	234	18%	59	4	0	1	63	19%	66	27	153	17%
South West	2,664	74	88	11%	26	2	2	2	32	8%	83	27	99	11%
Village	1,838	-	-	8%	0	0	0	0	-	0%	0	26	70	8%
West Cluster	4,221	102	403	18%	67	4	0	6	77	22%	55	27	158	18%
GRAND TOTAL	**23,535**	**265**	**1,890**		**264**	**16**	**8**	**18**	**306**		**77**	**27**	**880**	

EVSE Level of Service Estimate											
Parking Area	Parking Spaces	Level 1	Level 2	Level 3	ADA	Total EVSE	Lvl 1 (1.3 Sessions)	Lvl 2 (2.2 Sessions)	Lvl 3 (12 Sessions)	ADA (1.3 Sessions)	# of Estimated Possible Charging Sessions
Dorms	1,710	57	4	0	2	63	74	9	0	3	85
East Cluster	8,960	322	2	6	7	337	418	4	72	9	504
Medical	4,142	148	4	0	1	153	193	9	0	1	203
South West	2,664	93	2	2	2	99	121	4	24	3	152
Village	1,838	70	0	0	0	70	91	0	0	0	91
West Cluster	4,221	148	0	0	6	15	193	9	0	8	209
TOTAL	**23,535**	**838**	**8**	**8**	**18**	**880**	**1,089**	**35**	**96**	**23**	**1,244**



SMART CHARGING: STRIVING TOWARDS A DATA-DRIVEN EV CHARGING DEMAND MANAGEMENT SYSTEM

FIGURE 10 – SEMI-SMART METER DASHBOARD



Expanding UCLA's EV charging infrastructure is one of UCLA Transportation's primary goals. Doing so strategically requires reliable data sources to measure and track consumer behavior, usage trends, and patterns. For the first step in this process, UCLA Transportation has partnered with UCLA Facilities Energy Management to expand the installation of "semi-smart meters" in several parking structures.

Semi-smart meters provide the ability to track electrical power consumption at any given point within the grid or electrical system. This data stream is then transmitted and visualized through a web-based dashboard that reports kilowatt usage at all metered facilities. While only a handful of parking EV charging facilities have been outfitted with semi-smart meters so far, additional installations are currently underway at Parking Structures 8 and 32, and all future EV charging installations will have either these meters, be networked, or have intelligent chargers themselves.

Another source of EV charging data is obtained through EVgo's DC fast chargers. These data reports are extremely useful as they include granular information such as the number of charging sessions at each charging station, length of charging sessions, and power consumption. This reporting model, in addition to data collected via semi-smart meters, will serve as the launching point for UCLA Transportation to develop an in-house dashboard that harnesses power utilization data across all level-type chargers and can be used to manage day-to-day EV charging operations. Such a tool can be helpful to improve the customer service experience by revealing over and underutilized facilities and redirecting customers to areas with available charging capacity.

The goal is to explore retrofitting all previously installed EV chargers with metering and program metering into any new EV charging installations so that the department can measure the power demand and supply used by EV commuters. Additionally, the data derived from such meters will be useful in calculating GHG emissions as well as applying for Low Carbon Fuel Standard credits.

Going forward, to ensure the university's EV charging network's success and provide sufficient charging points to commuters and fleet, every new EV charging installation project should include networked and smart chargers or smart metering as a high-level priority within its scope. EVSE usage and power consumption data will play a crucial role in managing power supply and demand while simultaneously measuring the success of transportation-related decarbonization through EV charging and GHG emissions saved. Such metrics can and should be used to apply for external funding opportunities like grant funding offered through various federal, state, and local programs, in addition to incentives and carbon credits.

EV CHARGING-RELATED CARBON CREDITS & INCENTIVES

Beyond improving daily operation management, smart metering and measuring EV charging-related kilovoltage usage can help the university leverage its GHG savings. Additionally, it can help recover some of the costs associated with EVSE installation, operations, and maintenance by qualifying for credit earning opportunities programs, such as those offered through the California Air Resources Board's (CARB) Low Carbon Fuel Standard (LCFS).

LCFS stems from California's Assembly Bill 32 (AB 32) Climate Change Scoping Plan, and it has been designed to encourage the use of cleaner, low-carbon transportation fuels in California, reduce GHGs, and decrease petroleum dependence in the transportation sector by providing incentives in the form of carbon credits. In order to qualify for credits, LCFS applicants need to provide supporting evidence of the number of metric tons of low carbon fuels substituting for gasoline and diesel fuels. Moreover, credits received depend on the substituting fuel's carbon intensity.

The key to LCFS credits is to procure EVSE that meters and captures power supply data at the charging point. This technology is already found in Level 2 and 3 chargers offered by various vendors. Often, these offer incentives like equipment installation and maintenance at no upfront cost made possible through state-funded EV infrastructure programs. University of California, San Diego is a prime example of this strategy as the campus has expanded its EV charging infrastructure and today boasts about 300 charging stations that capture electric usage data and allows them to qualify for LCFS credits.

CHARGING ON CAMPUS TOMORROW

UCLA Transportation's Fleet & Transit (F&T) unit is responsible for the procurement and electrification of the university's fleet, ranging from passenger vehicles to heavy-duty vehicles and transit buses. With more than 1,000 vehicles in its inventory and 38% of those already EVs, F&T is on track to meet the UC Sustainable Practices Policy guideline to convert 50% of all fleet vehicles to ZEVs by 2025. Beyond that, F&T plans to purchase EVs or ZEVs in order to complete the university's fleet electrification. The 2025 Carbon Neutrality Initiative goal set by UCOP will be met via the combination of the reduction in ICE vehicles plus the use of carbon offsets until full ZEV inventory is reached.

Furthermore, with the CARB Advanced Clean Truck Program requiring all new medium- and heavy-duty vehicles sold in California to be a ZEV by 2045, F&T is actively exploring procurement alternatives of clean fuel box trucks and street sweepers for departments like Facilities Management and Housing & Hospitality, that play a critical role in supporting campus operations.

Aside from meeting sustainability goals, one impetus behind the electrification of UCLA's fleet is that the routes and charging infrastructures used by campus vehicles are confined to a densely built urban environment, where vehicles use predictable routes, ranges, loads, and for the most part, are within proximity of charging infrastructure. Another EV-related effort involves installing telematics equipment in all fleet vehicles to better understand EV usage, with installation for the bulk of the fleet completed in 2022.

MOTOR POOL PROGRAM

One of Fleet's key strategies for addressing the approaching deadline to electrify 50% of its vehicles along with rightsizing them for future needs and demands is the conversion of department-owned vehicles to a motor pool model. Until now, individual entities on campus could procure vehicles through UCLA Fleet based on budgetary and operational needs, with vehicle utilization varying largely depending on departmental usage. And while this practice will continue based on a given entity's needs, the result of this business model was the underutilization and rapid aging of a portion of the university's fleet.

A motor pool will address the issue of underutilization by providing departments with access to vehicles ready for use but only when needed. As part of this new program, the overall size of the university's fleet will be reduced, or right-sized, to about 75% of its current size. To do this, an effort is underway to identify vehicles most suitable for retirement that prioritizes aging and underutilized ICEs. The motor pool program will also be synchronized with the expansion of fleet-exclusive EVSE so as to ensure charging accessibility and a seamless customer experience. By 2025, the motor pool program will be established at several strategic locations throughout the campus and available to all departments, especially those requiring infrequent vehicle access.

FIGURE 11 – UCLA FLEET VEHICLES INVENTORY 2021

Vehicle by Fuel Type		
Fuel Type	**Count**	**Fleet %**
Alternative Fuels	**639**	**61.68%**
Electric – LSV/NEV	266	25.68%
Electric – Vehicles	48	4.63%
Hybrid (UNL/ELC)	40	3.86%
Dedicated CNG	40	3.86%
Bio Diesel	1	0.10%
Flex Fuel (UNL/E85)	244	23.55%
Traditional Fuels	**397**	**38.32%**
Unleaded	372	35.91%
Diesel	25	2.41%
Total Motor Vehicles	**1,036**	**100.00%**

BRUINBUS

Under F&T's umbrella is BruinBus, which provides public transit services to the UCLA community. BruinBus operates multiple bus routes covering the UCLA campus and connects Bruins to satellite student housing and administrative properties. In 2019, BruinBus transported over one million passengers and traveled more than 178,000 miles. This is all accomplished through 18 transit buses: 12 CNG-powered, one diesel over-the-road coach, and five electric buses as of mid-2022.

BruinBus began transitioning to more sustainable alternative fuel buses in 2007 when it acquired its first batch of CNG buses, and new all-electric buses were introduced in 2016. F&T plans to procure two additional electric buses during FY 2022-2023, with the goal of electrifying the entire bus fleet by 2025. Full electrification of its fleet is paramount as BruinBus aims to significantly reduce the university's Scope 1 emissions, especially as it is poised to play a significant role in the 2028 Olympics, where UCLA will co-host the Olympic Village.

BRUINBUS BEV FACTS:

- Average BEV bus costs $800k
- All electric buses have been purchased from BYD so far. Moving forward, BruinBus is considering alternatives offered by Proterra, New Flyer, and Geely
- The average range of an electric BruinBus is 120 miles, and it takes four hours to charge using a Level 3 charger
- For fueling, each electric BruinBus saves on average about $2,500/yr. compared to its CNG counterpart

With both eyes toward the future, F&T will continue exploring different avenues for external funding opportunities to transform the rest of its BruinBus fleet from CNG to all-electric. Some of these include working with UCLA Donor Relations to assess the possibility of soliciting donor contributions, and CARB funding from LADWP for the electrification of medium and heavy-duty vehicles. These external funding opportunities could help procure new electric buses and upgrade charging infrastructure by adopting smart charging technologies, such as RFID (Radio Frequency Identification) tags and smart chargers, among other solutions.

AVAILABLE FLEET CHARGING OPTIONS AND NEEDS

Equally important to its mission to provide EV charging infrastructure to commuters, UCLA Transportation is also responsible for ensuring the present and future availability of charging infrastructure for its growing EV fleet. Currently, the number of charging points available to fleet vehicles is limited to a handful of university departments and parking areas, further highlighting the immediate need for more charging infrastructure dedicated to all fleet vehicles as the transition to EVs continues.

In addition to fleet-exclusive EV chargers, departmental fleet customers can fuel whenever off-campus using Voyager cards. These are offered to EV-owning departments to taper range anxiety when traveling to off-campus sites and can be used at any EVgo charger. The cards are programmed to track usage and recharge the UCLA department's cardholder any time they are used.

Over the next few years, UCLA Transportation will need to solve several challenges to balance F&T's ambitious goals of electrifying 50% of the university fleet by 2025 while simultaneously guaranteeing charging availability. For example, unlike most of the UCLA campus, which receives its power from its COGEN Plant, UCLA's Transit Yard is located at a nearby off-campus site connected to LADWP's electric grid, with limited power supply capacity. With the restricted power, and because BruinBus can only use proprietary BYD portable chargers, only two buses can charge at a time. Similar issues may arise in other areas, such as the Facilities Yard, which houses nearly 40 light and medium-duty vehicles that will eventually be electrified and need direct or adjacent access to EV chargers. Efforts are underway to work with DWP to upgrade the power availability near the Transit Yard, especially with the escalation of electricity demand in the Westwood area.

For fleet vehicles, UCLA Transportation recently created a Request for Proposal (RFP) for electric charging units that will be used to power electric vehicles in the university fleet. The RFP seeks a vendor that can provide several clusters of Level 2 charging units that contain four chargers per unit and the capability to engage in smart charging or adaptive load management, which is the ability of a charger to distribute charging based on grid loads and individual vehicle needs, as well as bidirectional charging or "reverse charge" electricity from the vehicles whenever the need arises.

The RFP was released to the public in the spring of 2021, and the plan is to procure the chargers by the end of the calendar year.

Existing University Fleet Vehicle Parking and EVSE Locations

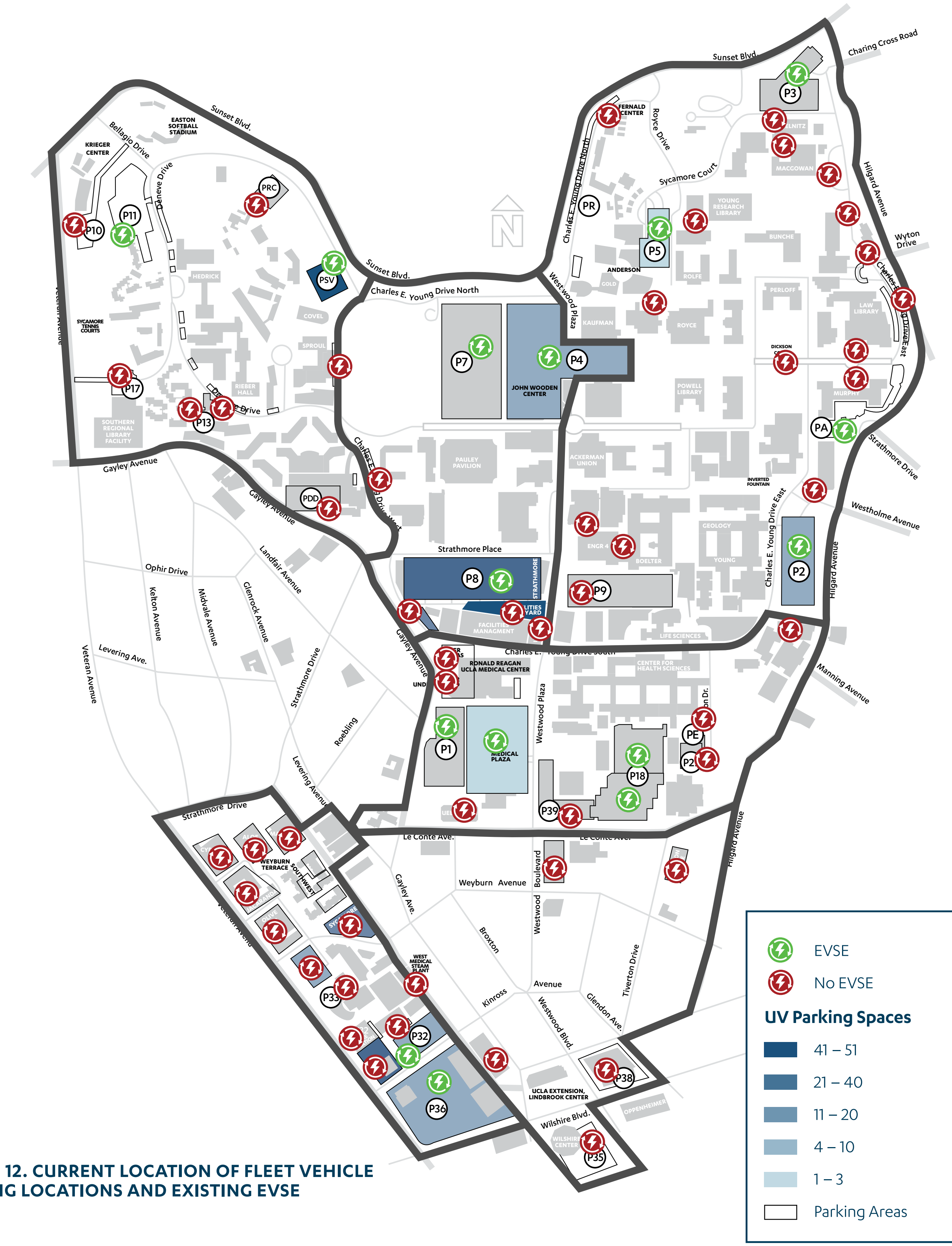


FIGURE 12. CURRENT LOCATION OF FLEET VEHICLE PARKING LOCATIONS AND EXISTING EVSE

FLEET EV CHARGING STRATEGY

Ascertaining how many chargers will be needed to support the university's fleet EV operations will mainly depend on the number of EVs procured over the next three to five years. Currently, there are about 300 BEVs in the fleet; by 2025, that number will increase to approximately 500, and by 2030, there could be as many as 750.

While a 1-to-1 ratio of EV charging points to vehicles would be ideal, power supply, financial, and space limitations complicate achieving this, nor is it likely necessary.

- **Use existing charging infrastructure** – Commuter need for charging stations coincide with fleet EVs utilization. Therefore, charging at night or during off hours is a key strategy for fleet vehicles. However, this strategy will not satisfy all fleet EV charging needs as EVCS locations and availability can play a limiting factor.

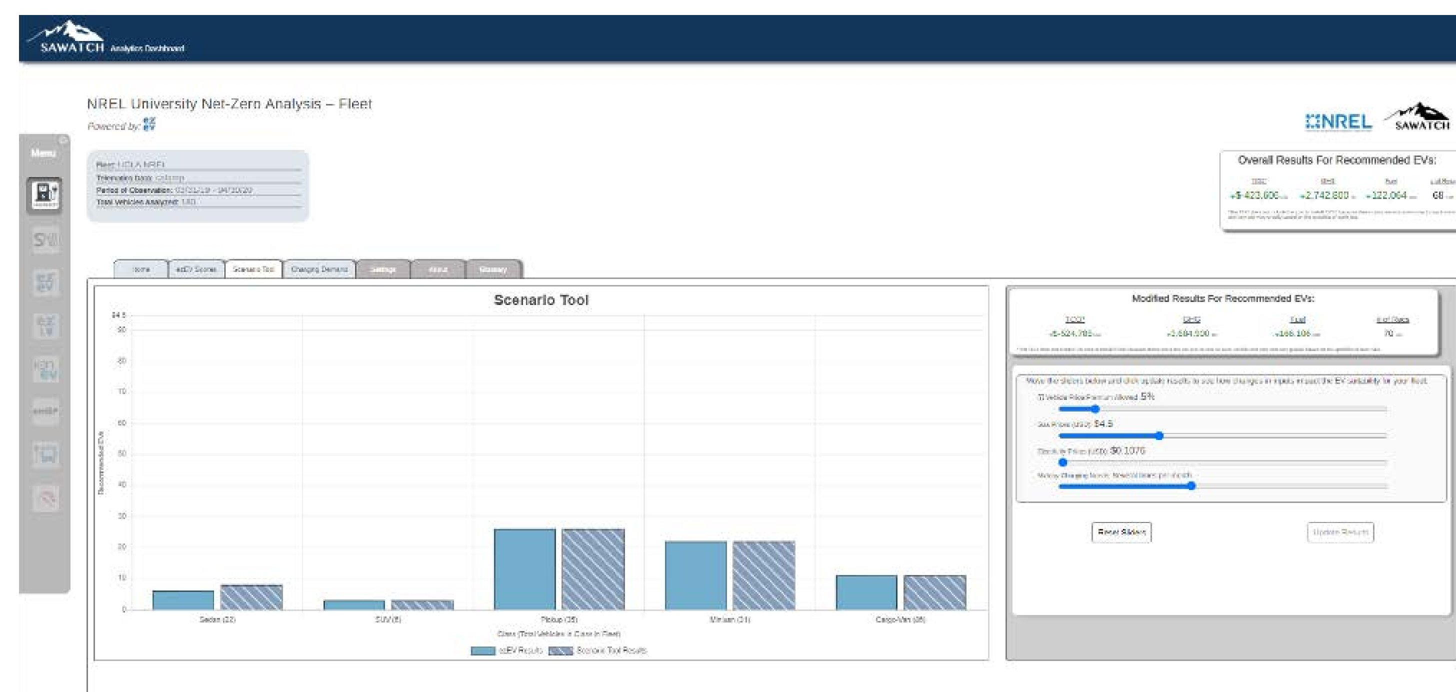
- **Fleet Motor Pool Program** – Implementation of Fleet's motor pool program in combination with the installation of clusters of EVSE in strategic locations throughout the campus will provide a feasible model for adopting and implementing additional chargers where needed – all while reducing the size of the university's fleet and operational costs and improving the customer experience for campus entities that do not need full-time access to vehicles.

- **Schedule charging** – As EV battery capacity and driving ranges improve, fewer charging sessions will be needed, especially on a campus where a fleet vehicle travels an average of 4.2 daily miles.

- **Facilitating EV Adoption and Support** – While UCLA Transportation's F&T team is responsible for procuring all university fleet vehicles, not all departments have the same needs or resources. Departments like Facilities Management and Housing & Hospitality may require fully dedicated ownership of EVSE, while smaller departments with fewer vehicles could be serviced by hubs or shared EVSE. Moving forward, UCLA Transportation must continue working with university departments to transition fleet vehicles to ZEVs and act as a liaison to all things ZEVs and EVSE by facilitating knowledge sharing in funding opportunities, vehicle upgrades, EVSE vendors, etc.

- **Management policies** – Development of clear and consistent policies that steer proper utilization, operation, maintenance, and ownership of fleet-exclusive EVSE.

FIGURE 13. SAWATCH LABORATORY ANALYTICS DASHBOARD



NATIONAL RENEWABLE ENERGY LABORATORY (NREL)

In accordance with UC's Sustainable Practices Policy, UCLA Transportation is working aggressively to transition 50% of its fleet to ZEVs by 2025. For this purpose, and as part of the NREL's University Net-Zero Analysis for fleets, the F&T team collaborated with the NREL and Sawatch Labs to analyze trends and patterns in fleet vehicle utilization. The analysis relied on available data from fleet vehicles outfitted with onboard GPS tracking units, or telematics equipment, that are used to track vehicle location, driving distances, driving speeds, etc. Additionally, the analysis combined engineering and economic assessment of vehicle type, utilization, parking locations, proximity to available chargers, and age of each vehicle to determine which fleet vehicles are best suited for ZEV conversion based on market available alternatives.

This project concluded with the delivery of a dashboard tool that will help F&T (Figure 13):

- Identify and prioritize vehicles to meet sustainability policies
- Determine the relation and impact between available charging infrastructure and allocation of effective charging opportunities for fleet vehicles
- Calculate maintenance cost, fuel, and emissions savings derived from electrification

In the coming years, F&T plans to install telematics equipment in all fleet vehicles. By collecting and having more readily available data, the SAWATCH Analytics Dashboard tool will become more powerful by precisely pinpointing the transition of ICEs to ZEVs. Thereby bolstering UCLA's Fleet EV Charging Strategy and ensuring that all sustainability policy goals are met.

STRATEGY FOR WORKING WITH VENDORS

There is precedent at UCLA for working with vendors to procure and install EVSE, and the knowledge and lessons learned from those ventures should be used and leveraged when working with other vendors in the future. In the past, UCLA Transportation worked with ChargePoint and currently has an active agreement with EVgo to procure, install, and maintain the campus' DC fast chargers. The following is a list of considerations when procuring and installing EVSE at UCLA:

- Prioritize utilizing vendors already in the campus or UC purchasing system
- Leverage lessons learned from working with previous EVSE vendors
- Develop in-house criteria for vetting vendors before and during the request for proposal process
- Consider the duration of purchasing process when contracting new vendors for new EVSE projects
- Benchmark maintenance and operations feedback from vendor's previous clients
- Develop "make-ready" projects that can be delivered to vendors

DRIVING COMMUTERS TO EVS: COMMUNICATION, EDUCATION, AND EQUITY

UCLA students and employees include a broad swath of demographic groups, and approximately 30% of students are the first one in their family to attend college. Forty-nine percent of UCLA students receive some level of financial aid. As a public institution, UCLA notably takes pride in the bootstrap opportunities provided by its best-in-the-nation public higher education. Additionally, its employees range from doctors and professors to custodial staff, groundskeepers, food service workers, etc. The campus is in the Westwood neighborhood in west Los Angeles, surrounded by Bel Air, Holmby Hills, and other affluent areas. The cost of living is extraordinarily high, as these neighborhoods have some of the most expensive housing prices in the U.S. Most UCLA employees, especially those on the lower end of the income spectrum, live some distance from campus due to these high housing costs.

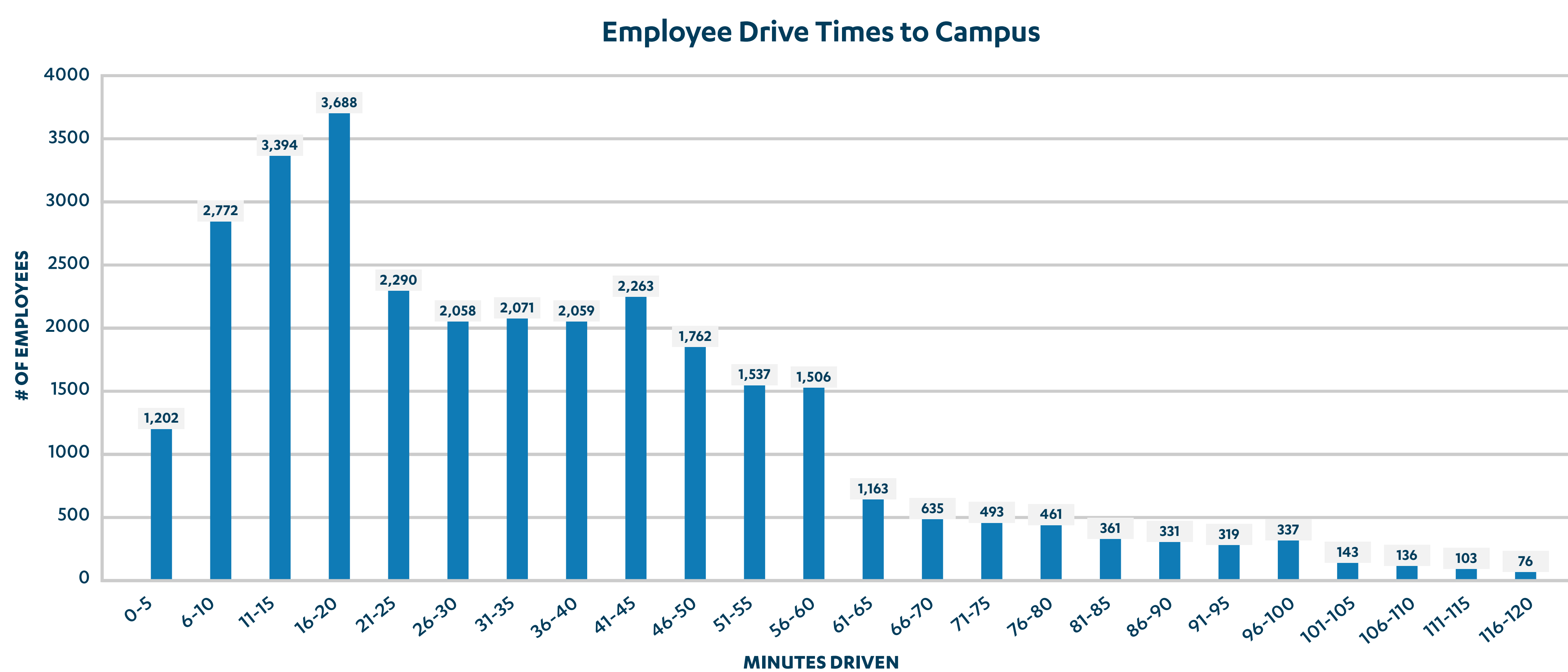
Several years ago, an analysis revealed that approximately 50% of UCLA employees live more than 10 miles from campus. A more recent analysis showed that many UCLA employees complete "extreme commutes" each workday to get to and from campus, traveling at least 50 miles or more than 90 minutes in each direction. These commuters must choose between the high cost of local housing or the high cost of a lengthy commute. For some of these employees, the financial burden of the long commute is substantial and onerous. In figure 14, one can see that hundreds of employees—at the right tail of the histogram—travel more than 90-minutes each morning to get to the UCLA campus. Real estate and housing costs proximate to the UCLA campus inhibit all but the highest paid positions at UCLA to afford housing within several miles of campus. Therefore, the "drive until you qualify" element of housing affordability comes into play, and almost all employees below the highest income cohorts must commute many miles to reach campus, and often even their housing costs are high. This doubles the burden they bear regarding housing and commute costs. For many households, they spend more than 30% of their income on housing and more than 20% of their income on transportation, much of it related to lengthy commutes.

Further, there is a long history of location and mobility bias in California, which resulted in land use patterns—redlining, housing near emissions-producing industry—that reveal significant differences between lower income neighborhoods and upper income enclaves. Over time, mobility system bias resulted in lower income neighborhoods often having freeways at their doorstep but less access to public transit, bike share systems, and the more recent car share and ride-hailing services.

These circumstances, combined with UCLA's efforts to reduce greenhouse gas emissions from commutes, among other sources, provide an opportunity to advance the sustainable transportation aims of UCLA while injecting a measure of equity by constructing a mobility paradigm on campus that gets electric vehicles into the hands of employees that will most benefit from them. Specifically, this means those with lengthy commutes and are part of the lower-income cohorts on campus. A spring 2021 study by UC researchers (7) suggested that policy and efforts to reduce greenhouse gas emissions by encouraging and enabling more zero-emission vehicles in California could also be crafted in such a way as to reduce the historic transportation inequities that are described above.

What needs to be done to encourage electric vehicle adoption—lease or purchase—by the campus community? Much of the effort will involve communication and education, as the cost benefits of utilizing an EV over a traditional ICE vehicle are real but not widely known or understood. It is therefore imperative to teach the value of electric vehicles via the "total cost of ownership" perspective, noting the widely available tax credits, the reduced maintenance costs expected over the vehicle's life, and the reduced fuel cost. The last factor, the cost of fuel, is a highlight of UCLA policy in that UCLA provides Level 1 trickle charging gratis to its community members so long as they have a parking permit. While there is a cost to the university's parking system to provide free charging to permit holders (increased electricity consumption and installation costs for the 120v outlets), this benefit enables commuters to choose electric vehicles with an understanding that they can plug in each day at work, assuming EVSE is available.

FIGURE 14. HISTOGRAM OF DRIVING TIME TO CAMPUS FOR UCLA EMPLOYEES



COMMUNICATION AND EDUCATION FOCUS AREAS

Maximizing the number of Bruins trading their ICE for EVs and ZEVs requires a comprehensive communications approach that educates the UCLA community about the environmental and social benefits and the individual perks of choosing a more sustainable form of transportation. In 2022, several lower-cost EV models have become available in the consumer market, further enabling the adoption of EVs by the general public.

There are eight focus areas for the communication and education efforts related to electric vehicles at UCLA. They generally fall into two categories, “learning about” and “connecting to offers/incentives/benefits.” While efforts will be inclusive of all income cohorts, initial efforts will target low-income cohorts to ensure that the benefits of zero-emission vehicles are clear and attractive to this group and that they can indeed benefit from ZEVs themselves.

1. Streamline information

Disparate state programs for EV benefits, tax credits, and information dissemination make it challenging to find organized EV information in a one-stop shop. UCLA Transportation webpages will be built for and dedicated to pertinent EV information that assists commuters with their vehicle lease and purchase decisions.

2. Teach value of electric vehicles (TCO)

Build educational campaign highlighting environmental benefits and individual incentives for switching to EVs and ZEVs, such as free charging (on a first-come, first-served basis). Infuse equity elements into EV infrastructure educational outreach, such as targeting super commuters or commuters with limited or no access to EVSE. Increase the focus of EV commuting benefits in HR onboarding to educate and encourage new employees to drive EVs and ZEVs.

3. Link incentives

State tax credits, income-based rebates, and the like will be shared so that the available financial incentives are clear to potential vehicle buyers or lessees.

4. Original Equipment Manufacturing (OEM) offerings

Occasionally, original equipment manufacturers provide special incentives to various groups, including UC employees and students, to entice their members to purchase or lease an EV. These will be aggregated, tracked, and made known to the campus community.

5. Campus events

Electric vehicles are a new technology to many, and there is no better way to learn about the value of EVs than to ride in and drive one. Ride and drive events should be hosted on campus when the opportunity arises.

6. Electric vehicle interest group

UCLA Transportation will host a communication channel to enable broad interaction between EV users, enthusiasts, and “vehicle explorers” searching for new wheels and the staff members who manage the EV program at UCLA. By enabling open, transparent communication, customers will be better served while also benefiting from the collective knowledge and experience of the group.

7. Charging availability and affordability

Charging for free or at a low cost while attending classes, going to work, or visiting the UCLA campus is already a reality and should be a point of pride for the university as a beacon for equitable investments in transportation. For example, Level 1 charging is free to all parking permit holders with no time restrictions. Level 2 is also free with a four-hour time limit and Level 3 charging is offered at reasonable market rates. Moving forward, UCLA needs to promote this infrastructure and charging option to further incentivize EV adopters, especially those with long commutes or multi-family dwelling residents with few charging options. Leveraging these assets will contribute to the university’s efforts to reduce commuter-derived emissions and serve as a fringe benefit to those who need it most.

8. E-bikes and other devices

Not every commute requires a car, electric or otherwise. Sometimes, a different size of electric mobility device is more optimal, especially for short commutes. Today, electric bicycles (e-bikes) have grown in capability, range, and sophistication and are a viable, healthy option for some commutes. The EV pages on the UCLA Transportation website will offer information on this point and connect to several bike shops offering discounts to UCLA commuters.

PLAN FUNDING AND RESOURCES

Exercising fiscal stewardship means searching for creative ways to generate and clinch internal and financial opportunities. The following list contains general funding opportunities for the university to expand its EV charging infrastructure and further its fleet electrification. Many of the funding opportunities and incentives offered through these programs can be applied for through vendors who provide EVSE services.

INTERNAL FUNDING ALTERNATIVES

A. UCLA Transportation internally generated funding through parking revenue

B. UCLA Air Travel Mitigation Fund Pilot Program: Funding for projects that locally reduce GHG emissions and decrease the campus carbon footprint

As new smarter chargers are installed on the UCLA campus, additional internal funding could include developing and programming a charging fee structure that considers long-term operation and maintenance costs.

EXTERNAL FUNDING ALTERNATIVES

A. California Air Resources Board

- **a. Low Carbon Fuel Standard Credits** – Provides crediting opportunities to promote zero-emission vehicle adoption, alternative jet fuel, carbon capture and sequestration, and advanced technologies to achieve deep decarbonization in the transportation sector.
- **b. Los Angeles Department of Water and Power Electric Transportation Program** – Funding is available through LADWP for the procurement of electric mid- and heavy-duty vehicles.
- **c. Southern California Edison, Charge Ready Program** – Rebate opportunities are offered for commercial EVSE applications within Southern California Edison's service area.
- **d. Air Quality Management District, Carl Moyer Grant Program** – The Carl Moyer Program provides monetary grants to private companies and public agencies to clean up their heavy-duty engines beyond that required by law through retrofitting, repowering, or replacing their engines with newer and cleaner ones.
- **e. California Energy Commission, California Electric Vehicle Infrastructure Project (CALeVIP)** – CALeVIP provides incentives for EV charger installations and works with local partners to develop and implement projects that meet current and future regional EV needs for Level 2 and DC fast charging.
- **f. California Energy Commission Solicitations** – Funding opportunities that the California Energy Commission offers that advance the state's transition to clean energy and transportation through innovation, efficiency, and the development and deployment of advanced technologies.
- **g. The Infrastructure Investment and Jobs Act (IIJA)** – Passed in November 2021, the IIAJ bill will allocate billions of dollars to provide much needed funding for the country's infrastructure, including transportation networks and climate change mitigation initiatives such as EV adoption and EVSE expansion. Funding from this bill is expected to be made available over the next several years through various channels at the federal, state, and regional metropolitan planning organization level.

B. Other Grant Opportunities

- **a. Volkswagen** – Electrify America offers $800 million in funding for EV projects in the state of California. The program is divided into four 30-month cycles.
- **b. Federal Agencies** – Recently introduced Federal Infrastructure bill provides $15 billion funding for EVSE and public transit EV efforts.

A. Public-Private Partnerships

- **a.** For several years, UCLA has established partnerships with EVSE vendors like ChargePoint and EVgo that provided opportunities for cost sharing the financial and logistical burdens associated with installation and management of the campus' EV charging network infrastructure. Leveraging that experience and knowledge, in conjunction with seeking and securing previously mentioned external funding resources, will play an important role in ensuring that the university is able to meet future EVSE demand while exercising responsible fiscal stewardship.

Whether applying for commuter-facing or fleet-exclusive EVSE, UCLA Transportation will need to invest resources over the next few years to develop a grant application strategy that ensures that the university stays up to date with new external funding sources.

There are two primary components to the funding topic: projected, internal revenue that can be allocated to fulfilling the goals within this plan, and the costs associated with achieving those goals. The plan's capital project table includes the full list of projects necessary to achieve the plan goals, and it identifies by fiscal year which projects are included in the "cost feasible" plan (i.e., those that can be funded by UCLA Transportation itself), while listing the balance of projects that cannot be funded internally in hopes of attracting grant or other external funding to completely achieve the plan's goals.

ADDITIONAL RECOMMENDATIONS

1. EV Charging Demand Management
    a. Fleet charging practices
    b. Off-hours charging

2. Create an EV Services Forum that keeps stakeholders updated and informed about all things EVSE, and includes members of various campus entities like UCLA Transportation business units along with Facilities Management, Energy Management, UCLA Health, Housing & Hospitality, etc. The purpose of the forum council will be to provide updates on EV-related services such as infrastructure, customer needs, and EV services project funding opportunities.

3. Implementation of clean fuel parking should be considered as a built-in option in the daily decision permit purchasing process. Such a permit could be initially tested in a pilot program and would enable EV customers with flexibility and mobility between parking and charging facilities as needed while building in the charging cost into the parking permit fee. Further parking permit policies would need to be adopted to manage and restrict the usage of such permits. Additionally, a clean fuel permit should become a communication piece so as to widen the knowledge of their availability and further encourage EV commuting.

4. Adoption of an on-campus EV car sharing program aimed at replacing ICE car sharing programs for short trips from on-campus resident students, faculty, and/or staff.

APPENDICES

References

1. EO B-48-18 **https://www.ca.gov/archive/gov39/2018/01/26/governor-brown-takes-action-to-increase-zero-emission-vehicles-fund-new-climate-investments/index.html**
2. CARB California Greenhouse Gas Emissions for 2000 to 2018 **https://ww3.arb.ca.gov/cc/inventory/pubs/reports/2000_2018/ghg_inventory_trends_00-18.pdf**
3. California Employment Development Department **https://www.labormarketinfo.edd.ca.gov/majorer/countymajorer.asp?CountyCode=000037**
4. Fossil fuel-based vehicle bans across the world **https://www.reuters.com/article/climate-change-britain-factbox/fossil-fuel-based-vehicle-bans-across-the-world-idINKBN27Y19F**
5. U.S. Department of Energy, costs associated with non-residential electric vehicle supply equipment **https://afdc.energy.gov/files/u/publication/evse_cost_report_2015.pdf**
6. [1]Brown, A. L, Sperling, D., Austin, B., DeShazo, JR, Fulton, L., Lipman, T., et al. (2021). Driving California's Transportation Emissions to Zero. UC Office of the President: University of California Institute of Transportation Studies. **http://dx.doi.org/10.7922/G2MC8X9X**. Retrieved from **https://escholarship.org/uc/item/3np3p2t0**

A. LIST OF EV-RELATED PROJECTS AND TIMELINES

Key
Near-term (present – end of FY 2022 - 2023)
Mid-term (2024 – end of FY 2026)
Long-term (2027 – 2030)
PA: Parking Assets
MPTS: Mobility Planning & Traffic Systems
F&T: Fleet & Transit
C&PS: Commuter & Parking Services
IT: UCLA Transportation Information Technologies
AMC: Administration Marketing & Communications
F: Facilities (Design and Project Management)
EM: Energy Management
CHR: Campus Human Resources

EV READINESS PLAN STRATEGIC INITIATIVES AND RECOMMENDATIONS		
EV Charging Infrastructure: Expand and modernize EV infrastructure to improve user experience and sustain operations & growth	**Team Lead**	**Time Frame**
Expansion of EV charging infrastructure to total 4% of parking inventory by 2025 (4% of overall parking inventory)	PA, F	Near to Long-term
Determine priority list of parking facilities to install new chargers based on power supply availability and parking space occupancy	PA, F	Near-term
Explore and identify possible locations for EV chargers in Weyburn Terrace Housing parking areas and other satellite locations	C&PS	Mid-term
Establish routine monitoring and data collection of EV parking stalls occupancy	PA	Near to Mid-term
Expansion of EV charging infrastructure to service 10% of driving commuters by 2030	PA, F, F&T, MPTS	Mid to Long-term
Develop strategy for additional EVSE expansion and implementation through external funding opportunities and Level 2 and 3 chargers	F&T, MPTS	Near to Mid-term
Expansion of EV charging infrastructure smart metering to capture occupancy, power demand/supply, and other relevant metrics	PA, F, MPTS	Near to Long-term
Establish procedure for future installation combining installations of smart meters with EV chargers	PA, F, MPTS	Near-term
Create dashboard or report of EV charging metrics such as power demand, length of charging sessions, etc., with existing and future data points (e.g., U-Beam and EVgo data)	C&PS, IT, EM, MPTS	Near-term
Continue exploring incentives and new EVSE technologies offered through vendors to expand EV charging infrastructure	PA, C&PS, IT, EM, MPTS	Near-term
Consideration of adaptive load management into future EVSE contract agreements to deal with power limitations	PA	Near-term
Continue to benchmark other universities Strategic Energy Plans, including UCSD	PA, F&T, MPTS	Near-term
Consideration of future EV charging equipment and ownership for other UCLA departments based on available power supply, parking, fleet size, etc.	PA, F&T, MPTS	Near-term
Identify internal UCLA Transportation Full Accounting Unit for LCFS revenue collection	PA, F&T, MPTS	Near-term

Fleet Electrification	Team Lead	Time Frame
Fleet EV Charging		
Establish system to accommodate charging of all Fleet EVs through available EVSE and parking policies	PA, F&T	Near-term
Explore allocation of EV charging facilities for fleet vehicles outside of campus business hours	PA, F&T	Near-term
Analyze university fleet parking occupancy trends and patterns to better manage EV charging availability	PA, F&T, MPTS	Near-term
Explore charging installation options for medium- and heavy-duty EVs	PA, F&T, MPTS	Near to Mid-term
Continue engaging with EVSE vendors to explore best suited charging infrastructure	F&T	Near-term
Fleet EV Conversion		
Complete conversion of 50% total university fleet by 2025 in accordance with UC-wide Sustainable Transportation policy	F&T	Near to Mid-term
100% of all new purchased vehicle to be EVs by 2025	F&T	Near to Mid-term
Incorporate NREL analysis results into Fleet's electrification strategy	F&T	Near-term
Fleet Size Reduction		
75% of campus fleet converted to motor pool by end of FY 2022-2023	F&T	Near-term
Low Carbon Fuel Standard Credits		
Pursue funding opportunities offered by California's Air Resources Board, Low Carbon Fuel Standard through sales of EV-related carbon credits	F&T	Near to Mid-term
Determine quantifiable metrics by which to calculate GHG offsets and credits	F&T	Near to Mid-term
EV Charging Education and Community Outreach	**Team Lead**	**Time Frame**
Outreach Campaigns		
Develop EV charging infrastructure and Clean Fuel parking permit opportunities outreach campaign geared towards commuters	AMC, MPTS, C&PS	Near-term
Include EV commuting benefits in HR onboarding process to educate and encourage new employees to drive EVs and ZEVs	C&PS, CHR	Near to Mid-term
Include links or educational information within UCLA Transportation's website to available EV and/or ZEV government incentives	AMC, MPTS	Near-term

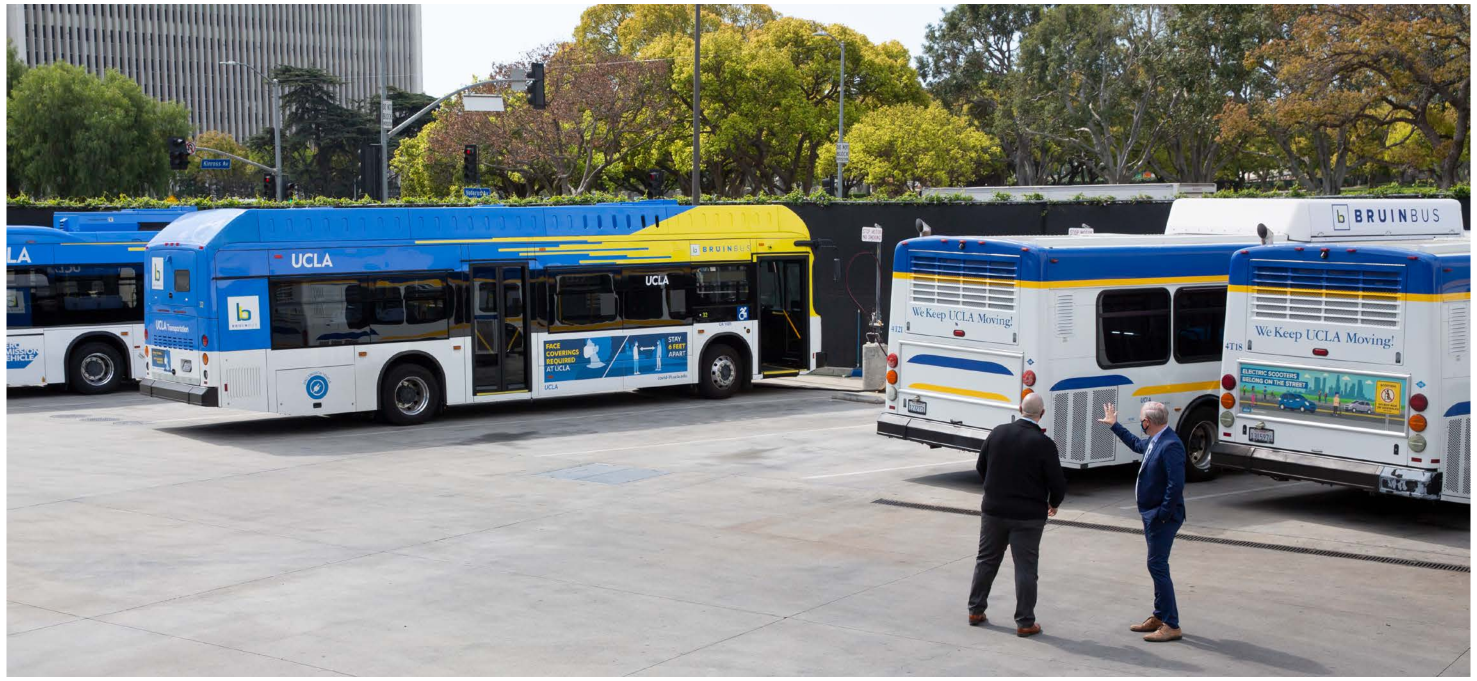
EV Parking and Permit Policy: Update Parking Policies and Practices for Efficient Charging Station Use	Team Lead	Time Frame
Enforcement of EV charging parking stalls		
Expand enforcement efforts of EV charging stalls	PA	Near-term
Explore additional time restriction and signage in areas with higher EV charging occupancy and demand	PA	Near to Mid-term
Clean Fuel Permit		
Assessment of Clean Fuel Permit allocation based on EVSE location and availability	C&PS	Near to Mid-term
Consideration of short- or long-term cost incentives to encourage growth of Clean Fuel permit holders	C&PS	Near to Mid-term
EV-related Funding Opportunities and Private Charging	**Team Lead**	**Time Frame**
Grant Funding		
Explore, identify, and apply for EV-related grant funding through sources like the California Energy Commission, CARB, AQMD, CAL eVIP, Electrify America	PA, MPTS, F&T, C&PS	Near to Long-term
Centralize and streamline external EV funding efforts	PA, MPTS, F&T, C&PS	Near-term
Benchmark and identify qualified EV services vendors	PA, MPTS, F&T, C&PS	Near to Long-term
Establish departmental standard for ownership of EV charging-related credits when vetting vendors	PA, MPTS, F&T, C&PS	Near-term

B. UCLA EV CHARGING INVENTORY TABLE

UCLA EV Charging Inventory				
Parking Facility	**Level 1 Quantity (110 Outlet)**	**Level 2 Quantity (240 Volt)**	**Level 3 Quantity (EVgo Fast Charger)**	**Accessible Charging Stalls**
1	42 (located on 3rd and 4th levels)	2 (located on 2nd level)		
2	45 (located on 3rd and 4th levels)			3 (located on 1st and 3rd levels)
3	37 (located on 2nd and 4th levels)			3 (located on 1st, 2nd, and 4th levels)
4	6 (located on 1st level)		6 (located at the entrance to the structure)	
5		2 (located on 6th level)		1 (located on 6th level)
7	17 (located on P-1 level)			1 (located on P-1 level)
8	50 (located on 1st and 3rd levels)	4 (located on 4th level)		5 (located on 3rd and 4th levels)
11	3 (located at the solar array)			
18	16 (located on level A-2)			1 (located in visitor area of level A-2)
32	17 (located on level 3)	2 (located on 1st level)		
36	9 (located at the solar array)		2 (located behind the K-Rec building)	2 (located outside Geffen Academy)
A	3 (located at the solar array)			
Medical Plaza		2 (located on 1st level)		
Sunset Village	19 (located on level P-3)	4 (located on level P-1)		2 (located on levels P-1 and P-3)
TOTAL	**264**	**16**	**8**	**16**

C. 2020-2021 UCLA FLEET CARD

Vehicles by Vehicle Type		
Vehicle Type	**Count**	**Fleet %**
Vans	**225**	**19.43%**
Cargo Vans-Full Size	31	2.68%
Cargo Vans-Mini	88	7.60%
Pass. Vans-Full Size	46	3.97%
Pass. Vans-Mini	60	5.18%
Low Speed Vehicles (LSVs)	**252**	**21.76%**
Pick Up Truck	**214**	**18.48%**
Pick Up Truck-Compact	13	1.12%
Pick Up Truck-Mid Size	95	8.20%
Pick Up Truck-Full Size	106	9.15%
Sedans	**80**	**6.91%**
Sedans-Compact	61	5.27%
Sedans-Mid Size	17	1.47%
Sedans-Full Size	2	0.17%
Specialty Vehicles	**50**	**4.32%**
SUVs	**50**	**4.32%**
Buses and Shuttles	**25**	**2.16%**
Motorcycles	**4**	**0.35%**
Total Motor Vehicles	**900**	**77.72%**
Vessels	**76**	**6.56%**
Trailers & Equipment	**50**	**4.32%**
Bicycles	**132**	**11.40%**
Total Fleet Vehicles	**1,158**	**100.00%**



Average Age of Motor Vehicles	
Vehicles (900 Total)	**7.99 years**

Vehicles by Fuel Type		
Fuel Type	**Count**	**Fleet %**
Alternative Fuels	**520**	**57.78%**
Electric-LSV/NEV	250	27.78%
Electric-Vehicles	51	5.67%
Hybrid (UNL/ELC)	56	6.22%
Dedicated CNG	34	3.78%
Bio Diesel	1	0.11%
Flex Fuel (UNL/E85)	128	14.22%
Traditional Fuels	**380**	**42.22%**
Unleaded	357	39.67%
Diesel	23	2.56%
Total Motor Vehicles	**900**	**100.00%**

Alt. Fuel Purchase %	Total	Alt. Fuel %
(Epact) Model Year 2020	**46**	**54.76%**

Transit Metrics	
BruinBus Ridership	19,433
BruinBus Operating Hours	9,310
BruinBus Total Mileage	77,869
BruinBus Charter Hours	-
Charter Facilitated Hours	-
BruinCar Metrics	
BruinCar Reservations	249
BruinCar Facilitated Reservations	30
BruinCar Rental Days	2,755
BruinCar Facilitated Rental Days	658
Accident Metrics	
Reported Accidents	135

Vehicles by Classification		
Class Type	**Count**	**Fleet %**
Department Owned	734	63.39%
Fleet Owned	385	33.25%
Donated LSVs	22	1.90%
BruinCar	17	1.47%
Total Fleet Vehicles	**1,158**	**100.00%**

Vehicles by Weight Class		
GVWR Weight Class (lb)	**Count**	**Fleet %**
Class 1 (<6,000)	628	69.8%
Class 2 (6,001-10,000)	179	19.9%
Class 3 (10,001-14,000)	24	2.7%
Class 4 (14,001-16,000)	29	3.2%
Class 5 (16,001-19,500)	10	1.1%
Class 6 (19,501-26,000)	11	1.2%
Class 7 (26,001-33,000)	3	0.3%
Class 8 (33,001+)	16	1.8%
Total Motor Vehicles	**900**	**100.00%**

Vehicles by Manufacturer		
Manufacturer	**Count**	**Fleet %**
GM	333	37.00%
Polaris	205	22.78%
Ford	131	14.56%
Fiat Chrysler	85	9.44%
Other Manufacturers	66	7.33%
Columbia	35	3.89%
Toyota	25	2.78%
Honda	20	2.22%
Total Motor Vehicles	**900**	**100.00%**

D. STATE LEGISLATION

1. **2012** - Governor Brown issues Executive Order B-16-12 establishing a goal that the state's zero emission vehicle infrastructure supports one million ZEVs by 2020 and that 1.5 million zero emission vehicles be on the road by 2025
2. **2018** - Governor Brown issues Executive Order B-48-18 establishing a goal of five million ZEVs on the road by 2030, and that 200 hydrogen fueling stations and 250,000 electric vehicle charging stations, including 10,000 direct current fast chargers, be installed by 2025
3. **2019** - Governor Newsom issues Executive Order N-19-19 to accelerate progress towards meeting the goal of five million ZEVs by 2030
4. **2020** - Governor Newsom issues Executive Order N-79-20 establishing a state goal that 100% of in-state sales of new passenger cars and trucks will be zero-emission by 2035 and that 100% of medium- and heavy-duty vehicles be zero-emission by 2045 with drayage trucks meeting that goal by 2035

E. UC SUSTAINABLE PRACTICES TRANSPORTATION POLICY

The university will implement transportation programs and GHG emissions reduction strategies that reduce the environmental impacts from commuting, fleet, and business air travel related to achieving the Climate Protection section of this Policy (see Section III.C.).

1. Each location will reduce GHG emissions from its fleet and report annually on its progress. Locations shall implement strategies to reduce fleet emissions and improve the fuel efficiency of all university-owned or operated fleet vehicles and equipment where practical options exist through acquisition and fleet operation protocols.

   a. By 2025, zero-emission vehicles or hybrid vehicles shall account for at least 50% of all new light duty vehicle acquisitions. Lawrence Berkeley National Laboratory will follow federal fleet requirements in the case where federal and UC fleet requirements conflict.

2. The university recognizes that single-occupant vehicle (SOV) commuting is a primary contributor to commute GHG emissions and localized transportation impacts.

   a. By 2025, each location shall strive to reduce its percentage of employees and students commuting by SOV by 10% relative to its 2015 SOV commute rates.

   b. By 2050, each location shall strive to have no more than 40% of its employees and no more than 30% of all employees and students commuting to the location by SOV.

3. Consistent with the State of California goal of increasing alternative fuel vehicle usage – specifically electric vehicles – the university shall promote purchases and support investment in alternative fuel infrastructure at each location.

   a. By 2025, each location shall strive to have at least 4.5% of commuter vehicles be ZEV.

   b. By 2050, each location shall strive to have at least 30% of commuter vehicles be ZEV.

4. Each location will develop a business-case analysis for any proposed parking structures serving university affiliates or visitors to campus to document how a capital investment in parking aligns with each campus' Climate Action Plans and/or sustainable transportation policies.

UCLA Transportation

transportation.ucla.edu