

Zero Emissions
2028
Roadmap 2.0



Letters



MAYOR ERIC GARCETTI

In Los Angeles, climate change is a daily fact of life. We see the floods on our streets, the fires on our hillsides, the skyrocketing temperatures in our communities. We understand the magnitude of this crisis — and the urgent, massive, far-reaching action required to confront it. And we know what Angelenos and families and workers worldwide ask themselves each day: will the earth survive, and if it does, will there be a place for any of us in the future economy?

The size and scope of this challenge can seem overwhelming and all-consuming. But we have the technology, knowledge, will, and determination to step up to the plate right now, and we have to harness the power of our collective action.

We have to work across city limits, state lines, and national borders to accelerate the progress we’ve made so far. We have to apply our talent, our resources, and our innovative spirit to essential efforts like the Transportation Electrification Partnership.

That’s why cooperation is absolutely paramount to our success. And with this unprecedented public-private partnership up and running, ready to accelerate the electrification of transportation across Southern California, we are igniting a catalyst for local change and developing a greenprint for cities at home and abroad.

Our generation may well be the first to see the full effects of climate change — and the last with the ability to reverse it. We know that this crisis has never been more intense, but the solutions have never been more achievable.

Los Angeles will continue to lead by our example and, more importantly, by our investments in clean energy, zero-emissions transportation, buildings, and electricity, and a cleaner future. That’s how we can build the sustainable city and the healthy planet our children and grandchildren will inherit — **and that’s the future we can forge through the work of the Transportation Electrification Partnership.**

Sincerely,

LA Mayor Eric Garcetti



MARY NICHOLS

Regional partnership is a critical part of our effort to create a zero emissions transportation future. The Zero Emissions 2028 Roadmap 2.0 report doubles down on the bold steps we must take to accelerate clean air and climate action in Los Angeles and across the state.

The Roadmap 2.0 highlights the ways elected officials, public agencies, industry leaders, unions, startups, NGOs and others can work together to achieve our shared goals. Together, we can serve as a model for California, the nation, and the world by building a state of the art transportation system that moves people and goods cleanly, efficiently and sustainably throughout the region.

Let’s get to work.

Mary D. Nichols
Chair, California Air Resources Board



“The Zero Emissions 2028 Roadmap 2.0 report doubles down on the bold steps we must take to accelerate clean air and climate action in Los Angeles and across the state.”

– Mary Nichols

“We have to work across city limits, state lines, and national borders to accelerate the progress we’ve made so far. We have to apply our talent, our resources, and our innovative spirit to essential efforts like the Transportation Electrification Partnership.”

– Mayor Eric Garcetti



SUPERVISOR JANICE HAHN

Clean air is a critical issue for all of us, especially the communities that have shouldered the burden of our transportation system and the harmful air pollution that it creates. For too long—we have been told we had to choose between clean air and good jobs. I know that we can and should have both.

As Chair of the Board of Supervisors and a Director on the LA Metro Board, I have championed efforts to aggressively move us towards a zero-emissions transportation future, one in which we can move goods and people efficiently while also protecting the health of our communities, reducing emissions, and creating jobs in the green sector.

The County of Los Angeles is proud to support the work of the Transportation Electrification Partnership and the goals outlined in this update of the Zero Emissions 2028 Roadmap. The bold yet achievable targets are critical to getting us to a zero emissions future not only in LA County but across the country.

I look forward to working with LACI and know that—with this 2028 Roadmap as a guide—together we will forge the future of transportation for the health and welfare of all those in our communities.

Sincerely,

Janice Hahn
Los Angeles County Board of Supervisors



“The County of Los Angeles is proud to support the work of the Transportation Electrification Partnership and the goals outlined in this update of the Zero Emissions 2028 Roadmap. The bold yet achievable targets are critical to getting us to a zero emissions future not only in LA County but across the country.”

– Supervisor Janice Hahn



MATT PETERSEN

In 2018, we formed the Transportation Electrification Partnership—an unprecedented regional collaboration—and together set the bold goal to reduce GHGs and air pollution an additional 25 percent beyond existing commitments by 2028. Over the past year, we have modeled hundreds of data sets, held more than 40 meetings with our partners and other stakeholders, and started rolling out innovative pilots to advance zero emission mobility options.

As a result, the Partnership has identified a clear pathway of concrete targets for achieving our 25 percent goal by the time the world arrives in LA for the Olympic and Paralympic Games. To succeed, we will need by 2028:

- 30 percent of all the light-duty passenger vehicles on the road across the County to be EVs (and 80 percent of all cars sold);
- 20 percent of trips by public or active transit, moving people out of single occupancy vehicles;
- 60 percent of medium-duty & 40 percent of heavy-duty short-haul and drayage trucks to be zero emissions.

To help us succeed, the Partnership has grown in the last year with new members from industry (e.g., Nissan, Audi, Engie Impact), local government (e.g., Culver City, Santa Monica), electric utilities (e.g., SCPPA, CPA), and startups (e.g., Proterra, Amply). Together, we will make 2020 a year of action, focusing on the policy solutions and pilots needed to hit these targets.

Southern California has already made significant progress on curbing air pollution and greenhouse gas emissions thanks to agencies like CARB and AQMD, local governments, utilities, and others. However, we have much further to go. Together, we will welcome the world in 2028 to a region leading in electric mobility, active and public transit, and zero emissions goods movement. Join us!

In partnership,

Matt Petersen
President & CEO, LACI

About the Transportation Electrification Partnership



The **Transportation Electrification Partnership** (the Partnership) is an unprecedented multi-year partnership among local, regional, and state stakeholders to accelerate transportation electrification and zero emissions goods movement in the Greater Los Angeles region (LA) in advance of the 2028 Olympic and Paralympic Games.

The Partnership was established by LACI in May 2018 following conversations between several individuals who now comprise some of the Leadership Group members. The Leadership Group is the governing body of the Partnership with the top principals representing each organization, and includes the key entities needed to accelerate zero emissions mobility and goods movement by the time of the 2028 Olympic and Paralympic Games in the Greater Los Angeles region.

The Leadership Group is complemented by a growing and influential Advisory Group, comprised of representatives key to achieving the Partnership goal and targets, including: leading automakers, industry organizations, public sector agencies, startup companies and labor organizations.

LEADERSHIP GROUP



ADVISORY GROUP FOUNDING PARTNERS



ADVISORY GROUP ASSOCIATE PARTNERS



ADVISORY GROUP SUPPORTING PARTNERS



What is the Zero Emissions 2028 Roadmap Version 2.0?

The Partnership developed both the 1.0 and 2.0 versions of the Roadmap through a series of stakeholder meetings, workshops and interviews to assess the technology, policy, infrastructure, financing, and behavioral gaps and opportunities for people movement, goods movement and the energy-transportation nexus.

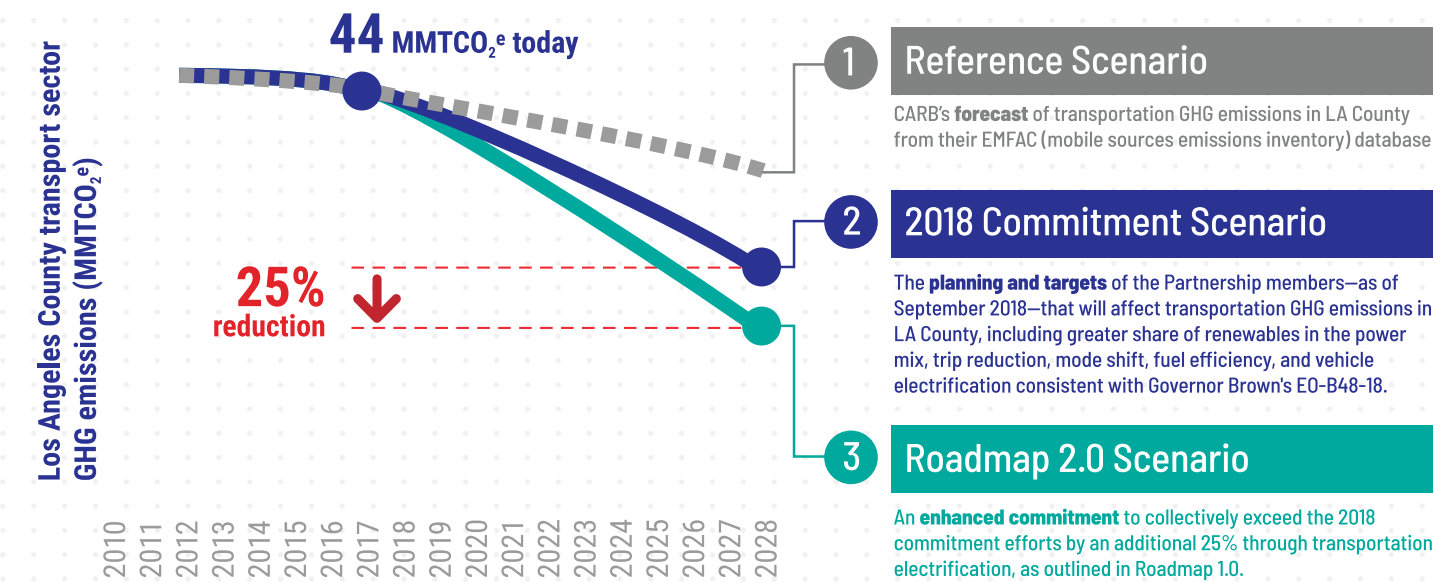
The Transportation Electrification Partnership Leadership Group and Advisory Group partners have made ambitious commitments to transportation electrification for Greater Los Angeles that are aligned with long-term local plans (e.g., the City of Los Angeles’s Green New Deal: Sustainable City pLAn and OurCounty: The Los Angeles Countywide Sustainability Plan) and state climate change and air quality goals, along with the Paris Climate Agreement.

As noted in the 1.0 version of the Zero Emissions 2028 Roadmap, released in September 2018, the Leadership Group committed to helping the Greater LA region go further, faster.

That’s why we are moving toward an additional 25 percent reduction in greenhouse gas emissions and air pollution — through accelerating transportation electrification — by the time the world arrives in Los Angeles for the 2028 Olympic and Paralympic Games.

- What is in the Roadmap 2.0?**
- Based on extensive modeling in the process of developing the Roadmap version 2.0 (see pages 28-29 for more on our modeling and methodology), we have laid out several steps the Partnership will take to achieve the 25 percent goal, including:
- Pursuing sector by **sector targets** we have set and which are needed to achieve the 25 percent goal by 2028;
 - Establishing a **call to action** by the Partnership that includes three new bold commitments, including a new target for achieving mode shift;
 - Reaffirming and **detailing plans** to enact the Roadmap’s Guiding Principles; and
 - Identifying the kinds of **policy actions and pilots** needed, which we will explore and pursue in the coming year.

Where We Are And Where We Need to Go




Transportation Electrification Partnership: A Call to Action

In September 2018, the Transportation Electrification Partnership—an unprecedented regional collaboration created to go further, faster together—released the 1.0 version of our Zero Emissions 2028 Roadmap. **In the Roadmap, the partners set a goal to move toward an additional 25 percent reduction in greenhouse gas emissions (GHG) and associated air pollution through accelerating transportation electrification by the time the world arrives in Los Angeles for the 2028 Olympic and Paralympic Games.**

Here in this version 2.0 of the Roadmap, we detail the pathway and targets we will work toward to create the zero emissions future we want and need for the greater Los Angeles region*, along with a firm commitment to equity for our region’s most “disadvantaged communities.” Equity considerations must include the disproportionate public health impacts (e.g., higher

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Accelerating the adoption of light-duty passenger electric vehicles (EVs) to be 30 percent of all vehicles on the road, and at least 80 percent of all vehicles sold by 2028.



Example actions, pilots and policies we will explore to achieve this commitment include:

Light-duty Vehicles:

Exploring the creation of consistent programs to facilitate the transition in an efficient and equitable manner, including:

- Incentives designed to ensure consumer EV adoption, including significant support for low-income, vulnerable, and disadvantaged communities to access EVs as well as public and active transit.
- Income-sensitive feebate programs that encourage removal of older internal combustion vehicles (e.g., buy-back or scrap-and-replace programs) and provide rebates and sales/registration incentives for EVs.

rates of asthma, heart attacks and premature deaths upon low income and vulnerable communities), as well as lack of access to EVs and first and last mile mobility options.

The Partnership members agree that we must work together to achieve these measures—and doing so will take the integrated work of all the Partnership members and many others. Our collective action will also help the LA region be more competitive for the resources needed to facilitate this transition, and support the actions and policies needed at the state or other levels.

Therefore, in order to achieve the Partnership’s GHG and air pollution reduction goal, the members all commit to work individually and collectively on policies, pilots, and other actions to achieve the targets in Roadmap 2.0 along with the following three-pronged call to action:

Ride Hailing Firms:

Supporting policies to accelerate the transition of ride hailing vehicles to electric, such as those that leverage ride hailing fees to facilitate EV adoption by ride hailing drivers.

Infrastructure:

Accelerating deployment to reach 84,000 public and workplace charging stations by: providing up-front incentives for charging infrastructure costs; streamlining permitting and interconnection; waiving permitting fees; piloting charging infrastructure solutions in multi-unit dwellings; installing curbside charging solutions and DCFC charging plazas; and more.

*We have used LA County data and established goals specific to LA County, but the key challenges and opportunities identified through the Partnership are applicable across the larger LA region, including Orange, Riverside, San Bernardino and Ventura Counties.

Transportation Electrification Partnership: A Call to Action

2

Shifting over 20 percent of all trips in single occupancy vehicles to zero emissions public and active transit by 2028.



Example actions, pilots and policies we will explore to achieve this commitment include:

Public Transit:

Supporting the creation of a world-class public transit system—including 100 percent electric buses on the road—as well as explore tools such as LA Metro’s congestion pricing study to encourage more discretionary transit riders to shift out of their cars and reduce single occupancy vehicle trips, and amplify considerations of equity including minimizing undue cost burdens on individuals with limited options.

First and last mile solutions:


Supporting first and last mile solutions such as e-bikes, scooters, EV car share, and other programs.

Active Transit:

Supporting and investing in active transit solutions such as bike lanes, zero emissions zones, and safer streets throughout LA County.

3

Ensuring that by 2028 all public investments into goods movement, freight vehicles (i.e., trucks and cargo handling equipment), and related infrastructure to support goods movement will advance zero emissions solutions, and ensure that the I-710 is the first zero emissions goods movement corridor in the nation.



Example actions, pilots and policies we will explore to achieve this commitment include:

Infrastructure:

Aggressively increase over the coming years the public investment in zero emissions vehicles and infrastructure, while focusing efforts toward creating the nation’s first zero emissions freight corridor along the I-710 by 2028.

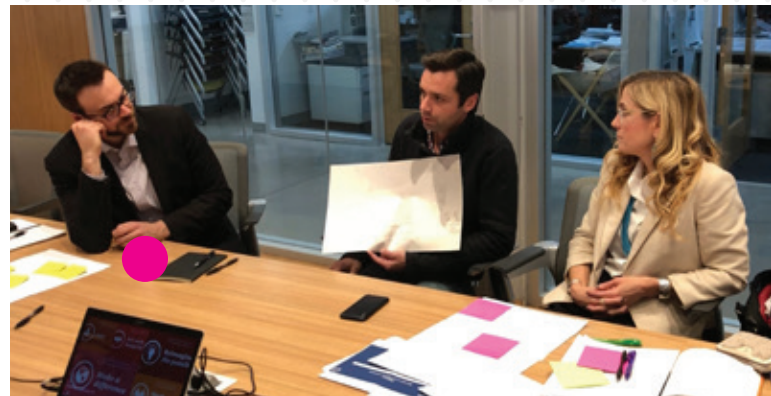
Providing up-front incentives for charging infrastructure costs; streamlining permitting and interconnection; and more.

Vehicles:

Continuing and targeting medium- and heavy duty-vehicle incentives to key needs and use cases.

Last-mile Innovation:

Creating a voluntary last-mile zero emissions zone pilot project for goods deliveries to reduce polluting truck traffic in a congested area, and other related solutions needed.



The Partnership's Next Steps for 2020

In addition to the three-pronged 'Call to Action', over the coming year, the Partnership will work toward the next steps highlighted below, along with other actions detailed throughout Roadmap 2.0:



Policy

- Detailing the policy pathway needed at the local, regional, and state levels to achieve the Partnership goal, targets, and call to action with a firm commitment to equity for our region's most disadvantaged communities. The policy pathway may include legislative and budget proposals for consideration by the State legislature.
- Identifying which Partnership members will lead on recommended policies and proposals needed to achieve our collective 25 percent goal, as well as engage additional actors in the transportation electrification ecosystem to join us.



Innovation and Pilots

- Addressing gaps in technology, infrastructure, and funding through a set of recommended carrots, sticks, and measures to shape consumer behavior.
- Accelerating pilot projects underway, and scoping new pilot concepts to address barriers to achieving our goals.
- Inviting innovation from startups and corporate players to find solutions for obstacles that are identified in this next phase of the work.

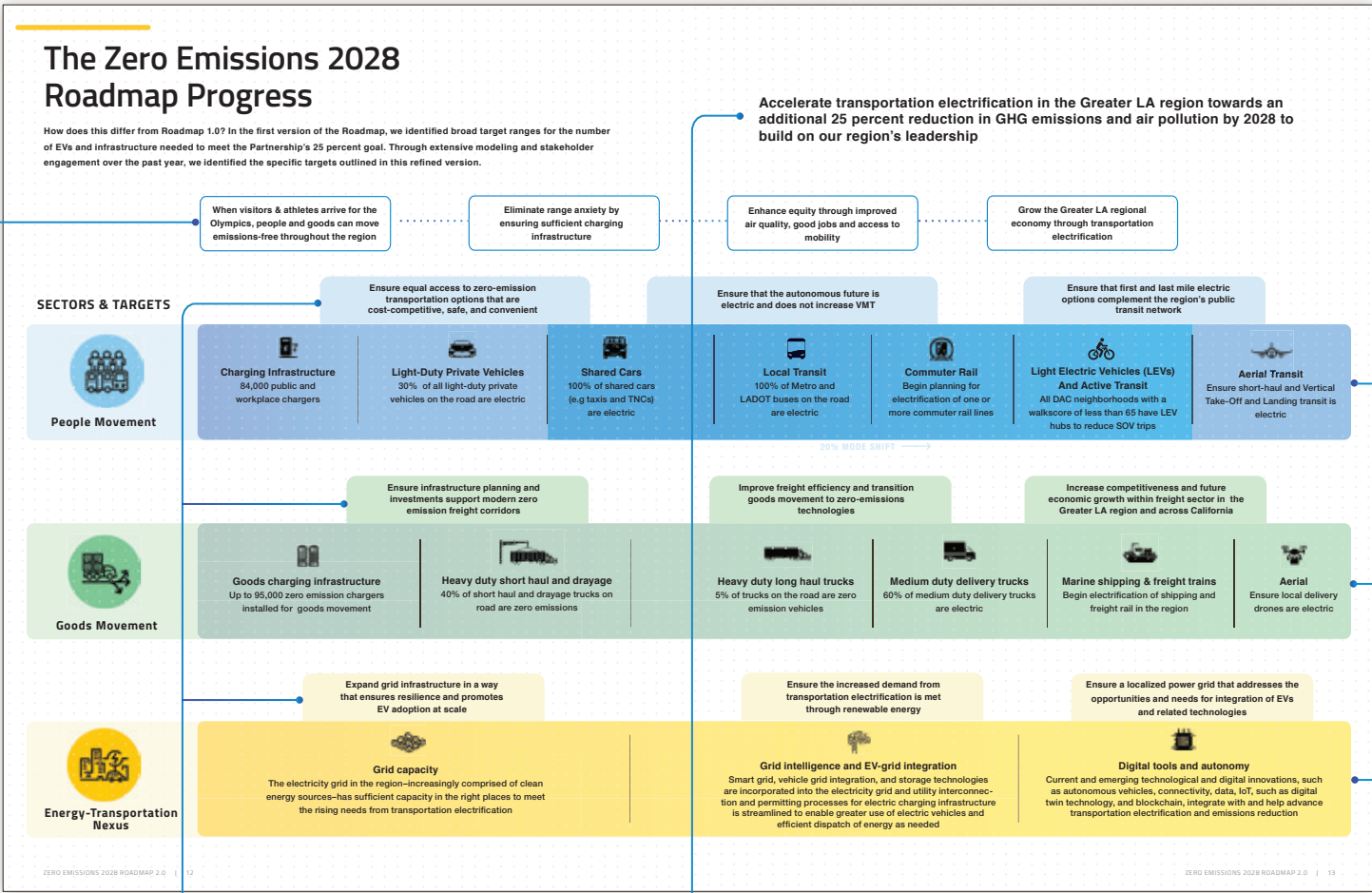


Stakeholder Engagement and Data

- Working with stakeholders of the Los Angeles 2028 Olympic and Paralympic Games to contribute to the development of a zero emissions mobility strategy.
- Documenting the jobs created, public health benefits, and the economic benefits from these actions.



How to Read the Zero Emissions 2028 Roadmap



Top Line Guiding Principles

These are the four key principles that inform and guide the entire Roadmap.

Category Guiding Principles

These are the principles contained within each sector that underpin the targets we commit to and efforts we are undertaking.

Goal of the Zero Emissions 2028 Roadmap

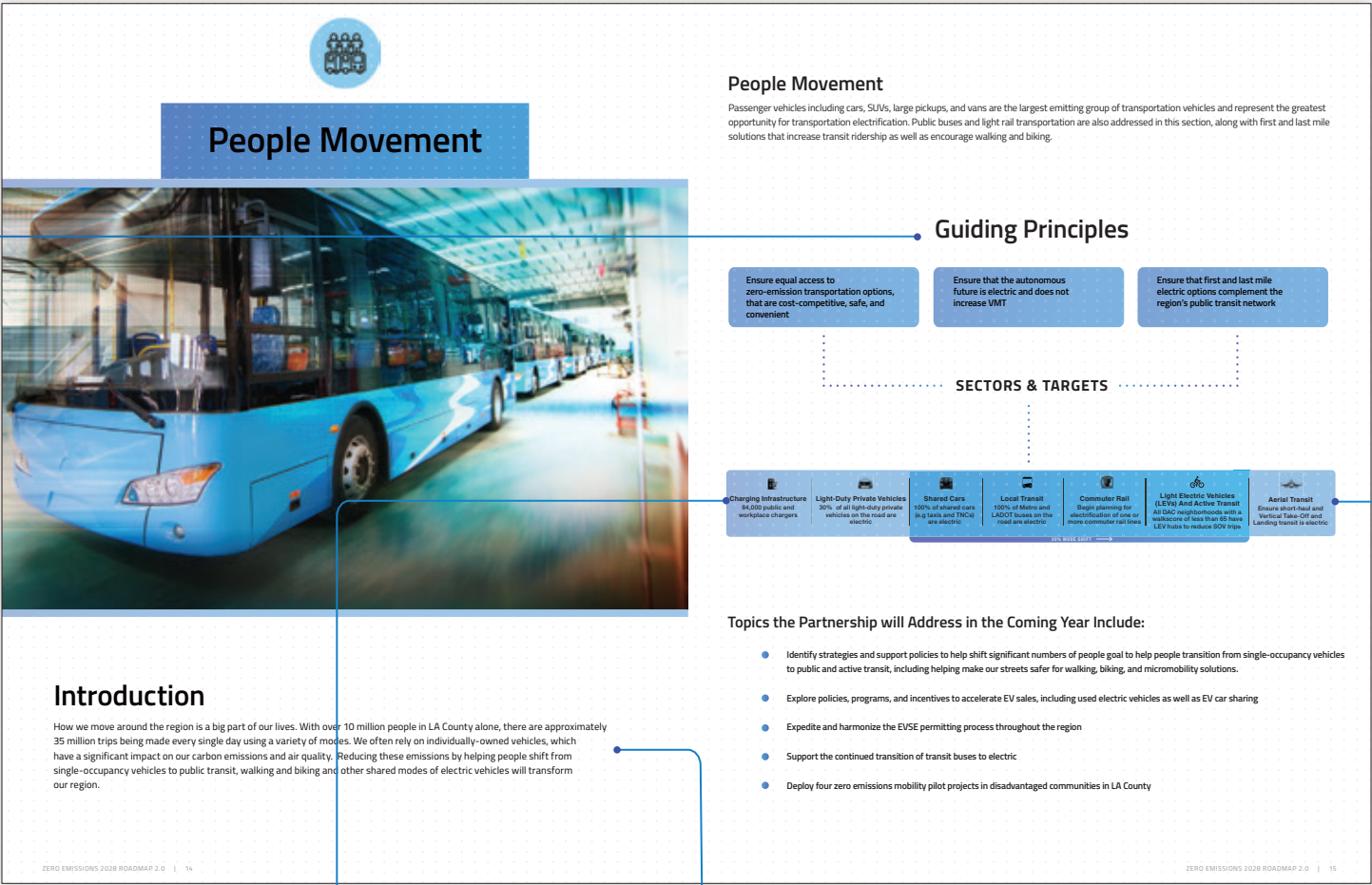
This the foundational purpose and objective of the entire Partnership and Roadmap.

Sectors & Targets

For each sector, specific targets are identified, as a result of extensive modeling. Achieving these targets will allow LA County to meet the goal of 25 percent additional reduction in greenhouse gas emissions and air pollution by 2028. These targets were narrowed from the ranges set in the Roadmap 1.0.

Understanding the Goals

The Roadmap focuses on three overarching categories for identifying goals necessary to achieving a holistic transportation transformation. These three categories address the vast majority of the region's transportation needs: People Movement, Goods Movement, and the Energy-Transportation Nexus. In addition, the Roadmap 2.0 includes a major focus within People Movement on mode shift, which is critical to meeting the 25 percent goal.



Category Guiding Principles

These are the principles contained within each sector that underpin the targets we commit to and efforts we will undertake.

Sectors

These sectors are the key issue areas within each category that the Roadmap tackles.

Category Introduction

The category introduction explains the significant of this category to the Roadmap's purpose, and the rationale for change.

Target & Outcomes

The targets identified in this 2.0 version of the Roadmap were arrived at through extensive modeling that established a transportation emissions baseline for LA County, and projected various rates of deployment for infrastructure and vehicles by 2028 to achieve the goal of 25 percent additional reductions in GHGs and air pollution.

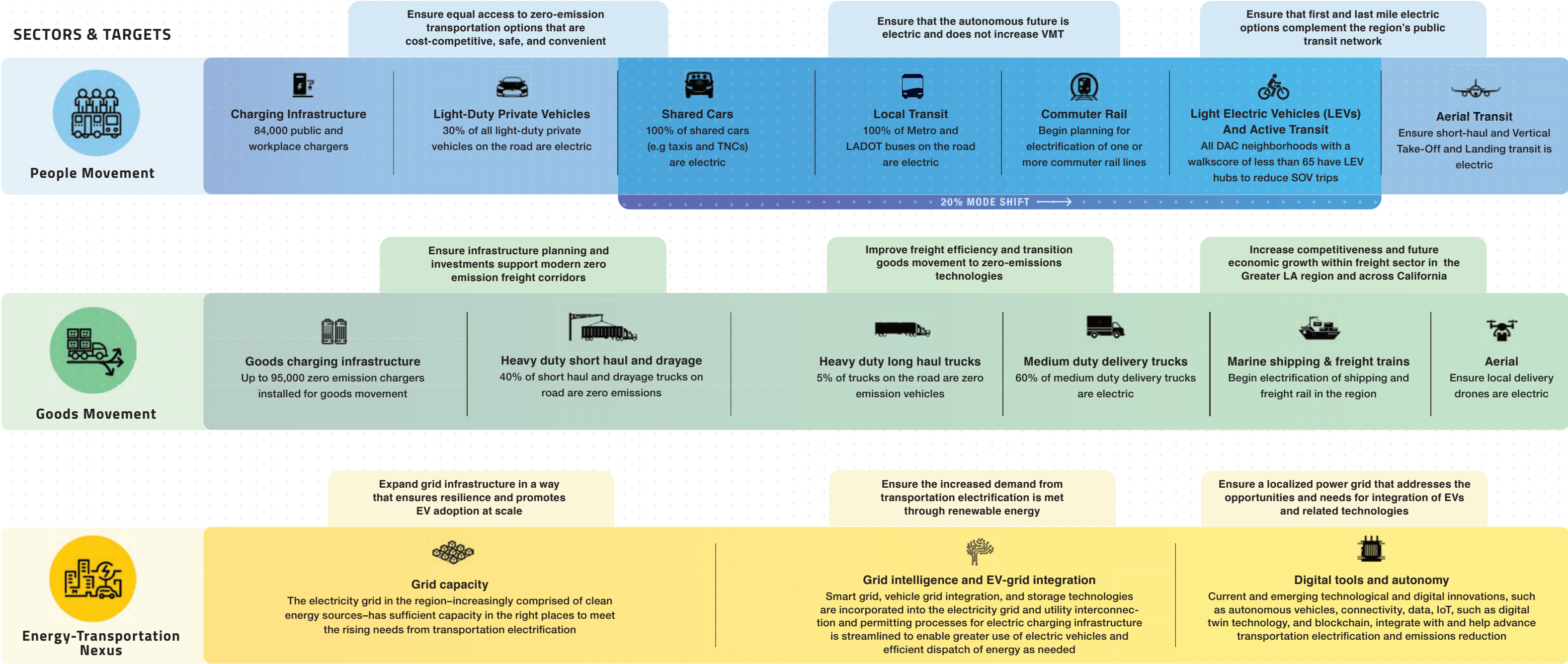
The Zero Emissions 2028 Roadmap Progress

How does this differ from Roadmap 1.0? In the first version of the Roadmap, we identified broad target ranges for the number of EVs and infrastructure needed to meet the Partnership’s 25 percent goal. Through extensive modeling and stakeholder engagement over the past year, we identified the specific targets outlined in this refined version.

Accelerate transportation electrification in the Greater LA region towards an additional 25 percent reduction in GHG emissions and air pollution by 2028 to build on our region’s leadership



SECTORS & TARGETS





People Movement



Introduction

How we move around the region is a big part of our lives. With over 10 million people in LA County alone, there are approximately 35 million trips being made every single day using a variety of modes. We often rely on individually-owned vehicles, which have a significant impact on our carbon emissions and air quality. Reducing these emissions by helping people shift from single-occupancy vehicles to public transit, walking and biking and other shared modes of electric vehicles will transform our region.

People Movement

Passenger vehicles including cars, SUVs, large pickups, and vans are the largest emitting group of transportation vehicles and represent the greatest opportunity for transportation electrification. Public buses and light rail transportation are also addressed in this section, along with first and last mile solutions that increase transit ridership as well as encourage walking and biking.








Guiding Principles

Ensure equal access to zero-emission transportation options, that are cost-competitive, safe, and convenient

Ensure that the autonomous future is electric and does not increase VMT

Ensure that first and last mile electric options complement the region's public transit network

SECTORS & TARGETS

 Charging Infrastructure 84,000 public and workplace chargers	 Light-Duty Private Vehicles 30% of all light-duty private vehicles on the road are electric	 Shared Cars 100% of shared cars (e.g taxis and TNCs) are electric	 Local Transit 100% of Metro and LADOT buses on the road are electric	 Commuter Rail Begin planning for electrification of one or more commuter rail lines	 Light Electric Vehicles (LEVs) And Active Transit All DAC neighborhoods with a walkscore of less than 65 have LEV hubs to reduce SOV trips	 Aerial Transit Ensure short-haul and Vertical Take-Off and Landing transit is electric
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20% MODE SHIFT →

Topics the Partnership will Address in the Coming Year Include:

- Identify strategies and support policies to help shift significant numbers of people goal to help people transition from single-occupancy vehicles to public and active transit, including helping make our streets safer for walking, biking, and micromobility solutions.
- Explore policies, programs, and incentives to accelerate EV sales, including used electric vehicles as well as EV car sharing
- Expedite and harmonize the EVSE permitting process throughout the region
- Support the continued transition of transit buses to electric
- Deploy four zero emissions mobility pilot projects in disadvantaged communities in LA County

People Movement: Highlights

Partnership Wins

Today there are more than 4,000 public and workplace chargers throughout LA County, which is approximately 5 percent of the anticipated public and workplace charging need for 2028. The Partnership’s People Movement Working Group focused its efforts on simplifying and standardizing the processes for permitting EVSE and connecting it to the electricity grid.



LACI announced the Zero Emissions Mobility and Community Pilot Project Fund to help bring the benefits of the green economy to neighborhoods that lack the solutions required for emissions-free mobility, yet are burdened with poor air quality from various sources. Pilot projects will be deployed with and within selected disadvantaged communities of Huntington Park, Long Beach, Pacoima, and San Pedro. Lessons from these projects will be shared and used to inform new projects and policy recommendations.

- **Provided** permitting resources and tools to 45 cities across LA, Orange and Riverside Counties in partnership with the Southern California Association of Governments (SCAG) to educate city officials from across the Greater LA region about expedited permitting.
- **Convened** a focus group to identify opportunities for LADWP to improve its process for connecting electric service for EVSE.
- **Coordinating** with the Governor’s Office of Business and Economic Development (GO-Biz)’s Electric Vehicle Charging Station Permitting Guidebook, we created materials to help local cities streamline their permitting.

Partner Wins

Micro-Mobility

BMW launched a micro-mobility pilot at the La Kretz Innovation Campus in partnership with LADWP, LACI and LACI startups Clevr and Perch. The BMW Motorrad X2City is an electric kick-scooter offering emission-free transportation over short distances as a supplement to cars and public transit. The X2City has come to the city of Los Angeles for the first time, as BMW and LACI begin a pilot project to study user preferences for this type of vehicle in urban environments.



LA County launched its pilot permit program to enable the use of shared electric scooters in the unincorporated portions of LA County to serve the more than 1 million people who live in these areas. These services will provide residents with first and last mile solutions that connect to transit and provide an alternative to motor vehicles for short trips. A shared e-bike service will complement an existing effort managed by the San Gabriel Valley Council of Governments on behalf of several cities to fill gaps in service in the region—set to begin in early 2020.

EV Adoption

LADWP recently expanded its EV rebate program, including increasing rebates for used EVs up to \$1,500 per vehicle.

Southern California Edison has installed over 1,100 charge ports and placed them at more than 75 locations, with over 47 percent in disadvantaged communities.

The Southern California Public Power Authority (SCPPA) received a grant award, from another TEP partner, the South Coast Air Quality Management District (AQMD), for 546 Level 2 EV Chargers. These chargers are being installed in 10 different SCPPA member municipal utilities’ service territories—Anaheim, Azusa, Banning, Burbank, Colton, Glendale, Los Angeles, Pasadena, Riverside and Vernon—with a focus on installations in disadvantaged communities.



OurCounty

LA County announced the most ambitious and comprehensive regional sustainability plan in the nation, the OurCounty Sustainability Plan. The equity-focused plan aims for carbon neutrality countywide by 2050, phasing out fossil fuel production and transitioning buildings and the transportation system to zero emissions. The plan seeks conversion of the County’s own fleets, calls for the installation of 10,000 EV chargers at County facilities over the next 10 years prioritizing locations in disadvantaged communities, and promotes strategies to increase the use of transit, shared rides, micro-mobility and active transit to significantly reduce vehicle miles traveled.





Goods Movement



Introduction

Our region is a gateway for goods entering California and the nation as a whole, with forty percent of all the goods that enter the U.S. traveling through the Ports of Los Angeles and Long Beach. The goods movement industry is vital to the region's economy, and represents a large portion of vehicles on the road.

A thoughtful and comprehensive approach to commercial fleet electrification will be essential to the roadmap's success, and to achieving the region's economic, environmental and public health goals.

Goods Movement

Medium- and heavy-duty long haul and drayage trucks comprise the second largest categories of GHG emissions in the transportation sector and goods movement represents the region's largest source of air pollution. This category represents a streamlined effort to map out the future of zero emissions goods movement in the region.

Guiding Principles

Ensure that infrastructure planning and investments support modern zero emission freight corridors


Improve freight efficiency and transition goods movement to zero emissions technologies


Increase competitiveness and future economic growth within the freight sector in the Greater LA region and across California

SECTORS & TARGETS


Goods charging infrastructure
Up to 95,000 zero emission chargers installed for goods movement


Heavy duty short haul and drayage
40% of short haul and drayage trucks on road are zero emissions


Heavy duty long haul trucks
5% of trucks on the road are zero emission vehicles


Medium duty delivery trucks
60% of medium duty delivery trucks are electric


Marine shipping & freight trains
Begin electrification of shipping and freight rail in the region


Aerial
Ensure local delivery drones are electric

Topics the Partnership will Address in the Coming Year Include:

- Engage delivery companies, e-cargo bike companies and alternative ecosystem providers to better understand their needs for a successful last-mile zero emissions delivery zones pilot
- Secure funding to pilot medium- and heavy-duty trucks and supporting charging infrastructure along the I-710 freeway, toward building the world's first seamless electrified goods movement corridor
- Advocate for continued incentives for medium- and heavy-duty trucks and charging infrastructure
- Work with the ports to advance system optimization strategies to further incentivize the adoption of zero emissions drayage trucks

Goods Movement: Highlights

Partner Wins

Drayage Trucks

In fall 2018, LACI, together with CARB, CEC, and the Ports of Los Angeles and Long Beach, issued a Request for Information (RFI), asking industry stakeholders about their zero emissions goods movement plans. We received nearly 40 responses from across the goods movement ecosystem and a range of compelling pilot concepts for charging infrastructure.

Based on the findings, LACI and the RFI partners agreed on the need for a coordinated EV infrastructure and truck pilot along the lower I-710 corridor. Given the market share of goods traveling along this freeway, concentrating investment in a comprehensive pilot could serve as the linchpin to transitioning the regional movement of goods at ports and cities across the country.



Drayage trucks



Last-mile delivery demonstration: Urb-E

Last-Mile Deliveries

The Partnership’s Goods Movement Working Group has explored the concept of last-mile zero emissions delivery zones with electric delivery trucks and electric cargo bikes delivering cargo. This last-mile zone could be a critically important step to reducing harmful emissions, truck congestion and noise pollution, and pave the way for a full Fossil Fuel Free Zone, as committed to by Los Angeles Mayor Garcetti by 2030.

LACI has signed a Memorandum of Understanding with the Los Angeles Convention Center (LACC) to conduct a Feasibility Analysis on the potential of executing an innovative voluntary Zero Emissions Delivery Zone pilot.

Partner Wins

EV Truck and Transit Charging

Southern California Edison launched the largest truck and transit charging program in the nation, Charge Ready Transport. This program provides funding for installation of infrastructure to support the adoption of nearly 8,500 electric trucks, buses, shuttles and handling equipment vehicles. Since launch, the program has generated over 40 applications across a variety of medium/heavy duty market segments.



SCE Charge Ready Transport



BYD electric hostler

Battery Power

BYD delivered 14 commercial battery-electric yard hostlers to BNSF rail yards in Southern California—7 to Commerce and 7 to San Bernardino—in April 2019 as part of a CARB demonstration project. The hostlers have since been deployed daily, providing immediate emission reductions to these disadvantaged communities.

BYD delivered 12 commercial battery electric trucks to the Port of Long Beach. The equipment was funded by the CEC Clean Transportation Program. Infrastructure to support most of the trucks was provided by SCE’s Charge Ready Port Electrification pilot. These will be the first battery-electric deployments of more than 5 units at a San Pedro terminal.

EV Trucks

Volvo, Greenlots, SCE and AQMD are among the partners on the Volvo LIGHTS project—23 trucks from Volvo and 58 chargers powered by Greenlots—to demonstrate the ability for heavy-duty, battery electric trucks to reliably move freight between the Ports of LA and Long Beach and inland warehouses with less noise and zero emissions.



Volvo LIGHTS project



Energy-Transportation Nexus



Introduction

As millions of electric vehicles are deployed onto our roads between now and 2028, there will be a growth not just in the need for EV charging stations, but also increased grid capacity, integration of emerging technologies, and other opportunities. The electrical grid that powers those charging stations is the lynchpin to this Roadmap. The foundation of an electric transportation future will be the grid and relevant infrastructure that can support this rapid escalation of electric vehicle charging demand. It is necessary to expand infrastructure and integrate a variety of emerging technologies to support electric vehicle adoption at scale.

Energy-Transportation Nexus

The Roadmap recognizes a future grid infrastructure that is dependent on renewable energy and is able to meet the increased capacity of vehicle electrification. Achieving this end goal will ensure that the transition to electrified passenger cars and trucks is frictionless for consumers and businesses, and integrates emerging technologies.

Guiding Principles

Ensure that infrastructure planning and investments support modern zero emission freight corridors

Improve freight efficiency and transition goods movement to zero emissions technologies

Increase competitiveness and future economic growth within the freight sector in the Greater LA region and across California

Partner Wins

Software

Itron is exploring the use of digital twin technology to decarbonize grid infrastructure, engage communities and help smart city planners make informed investments. Starting with the Lincoln Heights neighborhood of Los Angeles, Itron has demonstrated how digital twins may be used to conduct what-if analyses to add clean energy and battery storage to the neighborhood grid. Itron plans to expand the platform to use cases including EV charging deployment and grid stability/resilience.

Establishing Professional Qualifications

As part of their commitment to workforce safety and development, the Leadership Group recommends that bidders on all public agency EVSE-related projects require Electric Vehicle Infrastructure Training Program (EVITP) certification of their skilled professionals to ensure safety and quality.

The EVITP course is a safety and quality standard for the installation of electric vehicle supply equipment (EVSE) and related technologies, demonstrating a commitment to the safety of those who use, install, and come in close proximity to EVSE.

EVITP training is offered to all certified electricians across California by utility training centers, electrical industry training apprenticeship facilities, and community colleges.

Topics the Partnership will Address in the Coming Year Include:

- Scope and begin a multi-stakeholder smart charging pilot project, drawing on and expanding upon lessons from previous pilots such as the BMW ChargeForward program conducted in Northern California in partnership with PG&E.
- Scope and launch an innovative multi-stakeholder research project that leverages the structure of the electricity grid to provide DCFC opportunities to residents of multi-unit dwellings.
- Focus on Vehicle-Grid Integration technologies with utilities, industry leaders, and start-ups to ensure that electric vehicles support a clean electricity grid and vice versa, tackling tough issues such as how much of the smart charging experience should involve active decision-making from EV drivers and how much is better served by seamless behind-the-scenes demand response programs.



Enacting the Zero Emissions 2028 Roadmap Guiding Principles



Guiding Principle: When visitors & athletes arrive for the Olympics, people and goods can move emissions-free throughout the region

How we will enact this Guiding Principle:

Los Angeles is hosting the Olympic and Paralympic Games in 2028. Just as the 1984 Olympic Games served as a rallying point for changes in LA's transportation infrastructure, so too can the 2028 Games. By 2028, we will demonstrate to the world that the Los Angeles region is firmly leading the way to an equitable zero emissions transportation future.

Our Partnership is committed to advancing and supporting initiatives that support zero emissions transportation options across the region in 2028 and beyond, including:

Work with stakeholders to contribute to the development of a zero emissions mobility strategy

Study the feasibility of zero emissions zones in key areas, while identifying opportunities for electric transit options across the city

Explore policies that could encourage mode shift and ways to reduce congestion beyond 2028



Guiding Principle: Eliminate range anxiety by ensuring sufficient charging infrastructure

How we will enact this Guiding Principle:

More electric vehicles are driven in the LA region than in any other area of the country, yet much work remains to be done to support increased adoption.

Our Partnership is committed to working towards a 2028 in which it is as convenient to charge your car as it is to fill up your tank with gas today. This includes:

A future in which drivers can easily access a nearby charger—regardless of what neighborhood they are in or which direction they are heading

A future in which they can charge their vehicle no matter their income and with a variety of payment types

And where drivers can make informed decisions on where to charge, with upfront, easily understood information on the price of charging at that location and at that time

Enacting the Zero Emissions 2028 Roadmap Guiding Principles



Guiding Principle: Enhance equity through improved air quality, goods jobs and access to mobility

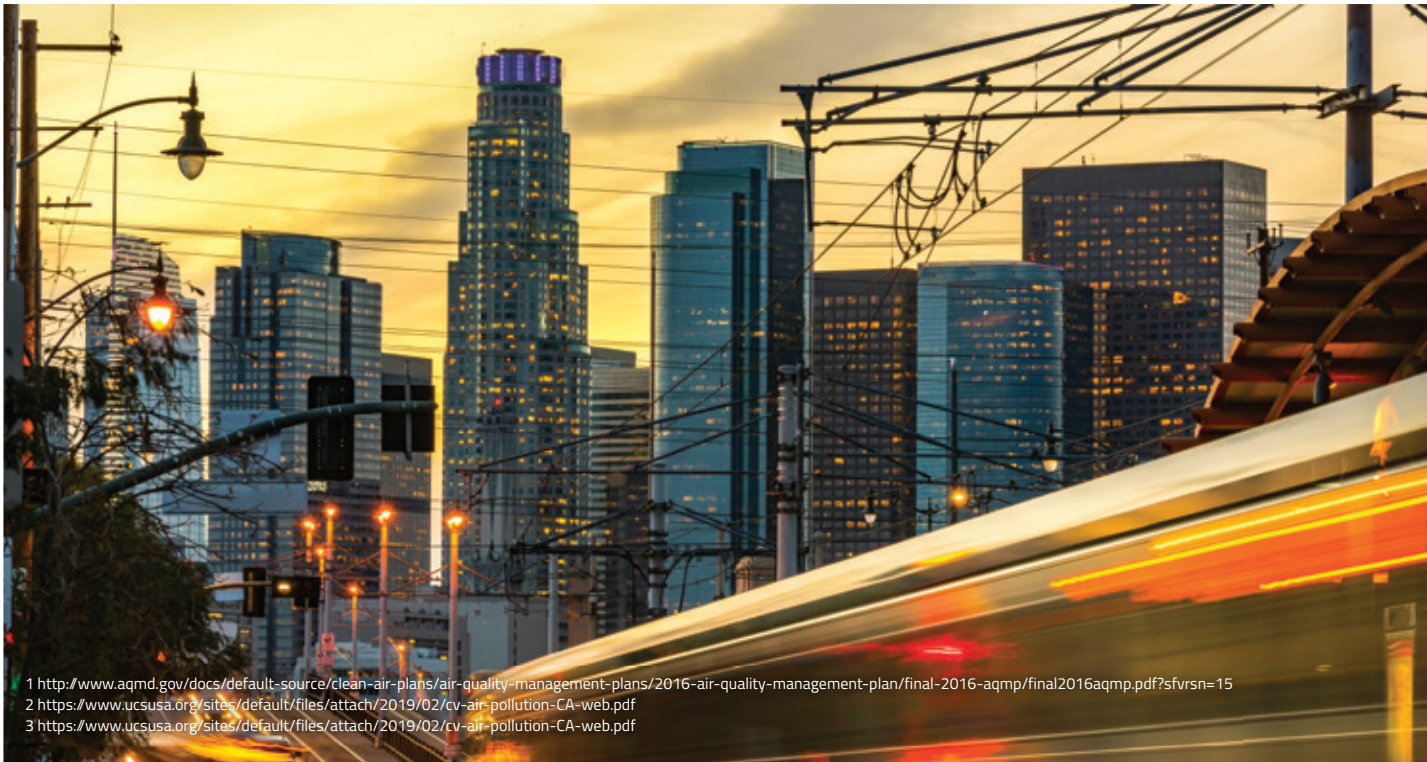
How we will enact this Guiding Principle:

The Partnership is committed to ensuring that the transportation electrification revolution benefits everyone, either from clean air, accessing new zero emissions mobility solutions or quality green jobs.

Thanks to the efforts of local, regional and state agencies, air quality has dramatically improved over time. Nonetheless, the LA region continues to suffer from some of the nation’s worst air pollution, which disproportionately impacts communities in our region that are defined as “disadvantaged communities” by the state, through higher rates of asthma, heart attacks and premature deaths.¹ Climate change is already having disproportionate impacts on disadvantaged communities.

Working hand-in-hand with community leaders, the Partnership is committed to reducing air pollution’s disproportionate impact on low income communities and addressing the lack of adequate mobility solutions, including:

- **Pursue** incentives that help all communities access EVs, charging infrastructure, last and first mile solutions, and zero emissions transportation solutions.
- **Prioritize** equitable mobility access in each policy and pilot, along with air pollution reduction strategies.
- **Adopt** innovative policies and programs to empower residents in severely impacted communities to fully participate in mobility innovations.



¹ <http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2016-air-quality-management-plan/final-2016-aqmp/final2016aqmp.pdf?sfvrsn=15>
² <https://www.ucsusa.org/sites/default/files/attach/2019/02/cv-air-pollution-CA-web.pdf>
³ <https://www.ucsusa.org/sites/default/files/attach/2019/02/cv-air-pollution-CA-web.pdf>

Enacting the Zero Emissions 2028 Roadmap Guiding Principles



Guiding Principle: Grow the Greater LA regional economy through transportation electrification

How we will enact this Guiding Principle:

Given the LA region is home to the western hemisphere’s busiest shipping ports, international airports and major original equipment manufacturers (OEMs), transportation electrification will provide far-reaching benefits to our economy.

The LA region is increasingly a global leader of mobility, climate action, data, smart cities and clean technologies—we are committed to being the home for zero emissions transportation and mobility innovation.

Already, at least two dozen electric mobility companies have established a significant business presence in LA County—founding their companies, establishing North American headquarters, and/or locating manufacturing and assembly operations here. These companies include those focusing on a range of technologies, including electric car manufacturing, electric bus manufacturing, EVSE manufacturing and software, electric scooter companies, electric cargo bike companies, and electric medium-and heavy-duty truck manufacturing.

The Partnership is committed to:

Build on regional economic investment in transportation electrification, including:

- **BYD** choosing Los Angeles as its North American headquarters and a manufacturing factory in Lancaster
- **Greenlots** being headquartered in Los Angeles
- **Proterra** selecting the City of Industry as the home for its West Coast manufacturing plant

Work with traditional industry leaders, new leaders, emerging players, and academia in the LA region to explore other important sectors of the transportation electrification ecosystem

Explore sectors such as electric ground equipment and aviation, battery technology development, and railcar manufacturing

Partner Wins

Educating a New Workforce

Tesla’s service technician training program at Rio Hondo College in Whittier, CA has graduated 49 students, who have each completed the 12-week course that includes 800 hours of training on the most current electric vehicle technology, providing them with the skills needed to be workforce ready.



Workforce Engagement

PCS Energy wanted all their employees to have the experience of owning and driving an EV. The company also wanted to better understand consumer sentiment and behavior regarding EVs, including the nuances that help and hinder adoption. As such, PCS Energy conducted a survey to understand their employees’ concerns, and then purchased various models of EVs for their employees in 2019.

PCS Energy also installed Level 2 Chargers at each employees’ residence in addition to the 6 Level 2 Chargers already installed behind the office for employee and client use. This was in an effort to test PCS Energy’s “book-end approach,” or theory that states EV charger installation is most important in places where people experience long dwelling times —at home and at work.

The Zero Emissions 2028 Roadmap: Methodology

Context

In Roadmap 1.0 we established an overarching goal of reducing transportation sector GHGs and air pollution in LA County 25 percent more than had already been committed to as of September 2018 by 2028. We also identified broad target ranges for the number of EVs and infrastructure needed to meet that goal. For example, we projected that 20-45 percent of all light-duty private vehicles on the road in LA County would need to be electric by 2028, with 60,000-100,000 public chargers to support them.

Outcome

Over the past year, we refined and specified these commitments and extracted key education needs, policy ideas and other findings.



Engaged Stakeholders

Engaged Stakeholders: We worked closely with relevant experts from utilities, government, and industry within and outside of the Partnership—holding more than two dozen meetings with 30 stakeholders—to ensure our process was robust and well-vetted.

Experts from the City of LA’s Office of Sustainability, LADWP, SCE, Audi, BMW Group, Clean Power Alliance, Greenlots, Itron, and AQMD met regularly to provide insights on each phase of the modeling.

Selected GHG Policy Model

We reviewed multiple platforms for modeling GHG emissions and transportation, selecting the Climate Action for Urban Sustainability (CURB) model developed by the World Bank in partnership with C40 Cities Climate Leadership Group. This model was already in use by the City of LA and, as a GHG policy tool, was most closely aligned with the overarching Partnership goal. We modified CURB to better address the Partnership’s specific focus areas, including transportation electrification and mode shift.

Established Baseline Assumptions

We used the CARB Mobile Source Emissions Inventory (EMFAC) databases to construct a comprehensive GHG transportation inventory.

Established Existing Commitments

We reviewed more than 900 state, regional, and local policy commitments and assumptions, and incorporated them as assumptions into the model, to align with current leading thinking. This included the City of LA’s mode share targets from the 2015 pLAn (weighted for LA County and extrapolated to 2028), the LA region’s projected share of Governor Brown’s EO B48-18 zero-emission vehicles, and the 2017 San Pedro Bay Clean Air Action Plan for Drayage Trucks.

Selected Transportation Electrification Scenario

Our modeling ultimately generated 45 possible scenarios for reaching the Partnership’s emissions goal. We selected the most feasible scenario in concert with deep stakeholder review. The output scenario is a specific, integrated path across vehicle classes.

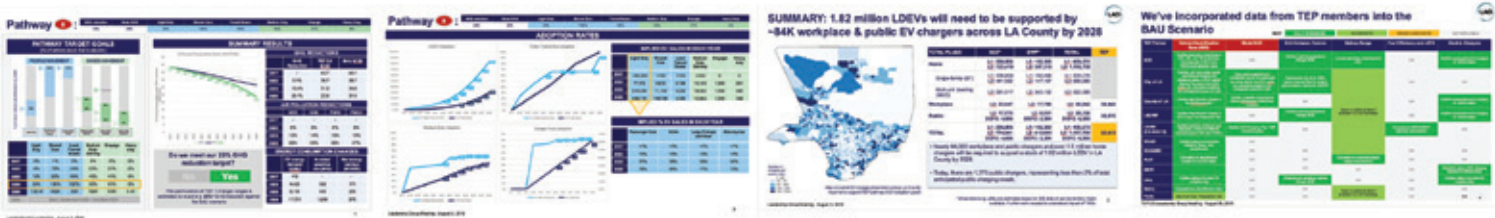
The Zero Emissions 2028 Roadmap: Methodology

Charging Infrastructure Analysis

In addition, we conducted analysis to understand the number of chargers needed to meet the goal and targets, as well as the distribution of charging infrastructure needed to align with equity priorities.

Based on our analytics, we developed more precise targets for EV adoption and associated charging infrastructure in LA County. For example, we narrowed the range from 60,000-100,000 chargers to support people movement, as published in the 1.0 version of the Roadmap, to a more specific target of 84,000 chargers by 2028. See pages 12-13 for updated targets for all sectors.

Finally, we also extrapolated bold policy commitments required to make these goals a reality. We strove to ground these commitments in deep data, modeling and stakeholder engagement—to ensure they are the most critical approaches.



Building on Existing Commitments to Meet the Partnership Goal and Targets

In the coming year, the Partnership will explore and recommend policies, programs and incentives needed to meet the goal and targets. However, these actions will build on existing commitments and goals by many of our partners. Below are select commitments—drawn from Mayor Garcetti’s Green New Deal Sustainability pLAn, LA County’s OurCounty Sustainability Plan and the LA Metro Vision 2028 Plan, among others—that are already leading the way towards our region’s transportation goals.



Light-duty Electric Vehicle Commitments

Charging Infrastructure

- **Create a zero emission transportation system**
 - Streamline permitting and construction of zero emission vehicle infrastructure
 - Install EV chargers at County facilities and properties prioritizing DACs
 - Update County’s fleet policy to require zero emission vehicles or better whenever feasible
 - Convert Sheriff’s Department fleet to zero emission
 - Pilot a zero emission fire engine
- **Install 10,000 publicly available EV chargers by 2022; and 28,000 by 2028**
 - Streamline the permitting and interconnection processes for EV charger installation
 - Update the building code to expand EV charging
 - Build 20 Fast Charging Plazas in the city
 - Expand curbside charger program to include the private sector
 - Distribute 11,500 L2 EV charger rebates, and 75 DCFC rebates by 2021
- **Pursue the development of infrastructure for over 50,000 EV charging ports in SCE’s service territory by 2025. This includes:**
 - Over 48,000 charging ports for light-duty EVs at workplaces

EV Sales

- **Distribute 1,000 used EV rebates by 2021**
 - Enhance EV outreach efforts, including dealership engagement
 - Support vehicle trade-in events and programs like Cash for Clunkers
 - Increase used EV rebate to \$1,500 per eligible vehicle (LADWP)

TNCs and Shared Cars

- **Electrify 10% of taxi fleet by 2022 and 100% by 2028**
 - Install network of dedicated chargers for electric taxis around the city
 - Launch an incentive for EV taxis
 - Expand electric cars sharing options in top 10% DACs

- **Ensure all AVs used for sharing services are electric by 2021**

Mode Shift Commitments

Public/Active Transit

- **Policy/Advocacy:**
 - Adopt policies to prioritize transit/mobility
 - Adopt a transportation demand management (TDM) ordinance
 - Study/implement congestion pricing in accordance with LA Metro’s upcoming congestion pricing study

Building on Existing Commitments to Meet the Partnership Goal and Targets

Public/Active Transit: continued

- **Active transportation that is inclusive of and accessible to all**
- **Advocacy to encourage shared, sustainable mobility options by 2021**
- **Conduct NextGen Bus Study to design a new bus network that is more relevant, reflective of and attractive to the residents of LA County**

Infrastructure, and tools

- **Improve travel time via Bus-only lanes & signal prioritization**
- **Free transit passes for targeted groups**
- **Curbside designation mapping app**
- **New mobility options are equitably available across the City**
- **Increase Walk Score**
- **Complete for Measure M 28 by '28 projects**
- **Expand Bike Share and bike infrastructure**
- **Ensure all City residents have access to high-quality-mobility options**
- **First/Last Mile plans for the new and future transit lines**
- **100% zero emission bus fleet by 2030**
- **Partnered with Via—an on-demand ride-hailing service that takes multiple passengers heading in the same direction and books them into a shared vehicle—to provide rides to or from select Metro stations**

Parking

- **Comprehensive parking reform strategy**
- **Demand-based priced parking where appropriate**

Zero Emissions Microtransit

- **Help tech-enabled mobility options support public transit**
- **Expand LADOT MicroTransit operations**
- **Issuing a request to the private sector in fall 2019 to team with Metro to plan, design, implement and evaluate a brand new MicroTransit pilot project to take advantage of new and emerging technology and connect more people to the investments we’re making in our region’s transit and road system.**

Safety

- **Implement Vision Zero safety improvements by 2025**

Zero Emissions Zones

- **Develop roadmap for Fossil Fuel Free Zone**

Goods Movement Commitments

Charging Infrastructure

- **SCE is pursuing the development of medium- and heavy-duty EV charging ports to support nearly 8,500 vehicles under its approved Charge Ready Transport program**

Medium-duty vehicles

- **100% of urban delivery vehicles are zero emission by 2035**
 - Create a suite of innovative street and curb usage regulations to encourage electrification of urban goods movement
 - Develop an electric freight and commercial vehicle billing rate

Heavy-duty vehicles

- **Pursue public-private partnerships to develop heavy-duty**
- **100% zero emissions on-road drayage trucks**
- **Deploy 50-100 zero emission trucks in a clean truck pilot**
 - Implement an updated Clean Truck Program with prioritization on zero emissions trucks charging depots

Glossary

Autonomous vehicle (AV): A vehicle with at least level 4 autonomy

DAC: Disadvantaged communities are defined by CalEPA as the top 25 percent scoring areas from CalEnviroScreen 3.0, along with other areas with high amounts of pollution and low populations. CalEnviroScreen was developed by the Office of Environmental Health Hazard Assessment (OEHHA) at the request of CalEPA to identify California’s most pollution-burdened and vulnerable communities. The most recent version, CalEnviroScreen 3.0, uses a quantitative method to evaluate multiple pollution sources and stressors, and vulnerability to pollution, in California’s approximately 8,000 census tracts.

DCFC: Direct Current Fast Chargers

Emissions: Emissions in this analysis are from mobile sources of transportation only

Equity: LACI is working to ensure that everyone can benefit from the green economy, either from green jobs, clean air or accessing new zero emissions mobility or energy solutions. Our vision is for all communities in the Greater LA region to have access to and benefit from the transition to electric vehicles, charging infrastructure, first and last mile travel options, and all of the innovation solutions incorporated in the Roadmap.

EVSE: Electric Vehicle Service Equipment

GHG: Greenhouse Gases

Greater LA Region: We have used LA County data and established goals specific to LA County, but the key challenges and opportunities identified through the Partnership are applicable across the larger LA region, including Orange, Riverside, San Bernardino and Ventura Counties.

Medium- and Heavy-Duty Zero Emission Vehicles: Medium- and heavy-duty vehicles with zero tailpipe emissions, including battery electric, fuel cell electric vehicles as well as plug-in hybrid electric vehicles.

ICE: Internal Combustion Engine

LACI: Los Angeles Cleantech Incubator

LADOT: Los Angeles Department of Transportation

LEV: Light Electric Vehicle, which include motorized electric scooters, bikes, and other related vehicles

Light-Duty Private Electric Vehicles: Battery electric and plug-in hybrid electric passenger vehicles with an all-electric range of 50 miles or greater

SOV: Single Occupancy Vehicle

Partnership: Transportation Electrification Partnership, a LACI managed program

TNC: Transportation Network Company

VMT: Vehicle Miles Traveled

VTOL: Vertical Take-Off and Landing

Acknowledgements

Leadership Group Organizations

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About LACI

About LACI

The Los Angeles Cleantech Incubator (LACI), a City of Los Angeles established nonprofit organization, is creating an inclusive green economy by: unlocking innovation through working with startups to accelerate the commercialization of clean technologies, transforming markets through partnerships with policymakers, innovators and market leaders in transportation, energy and sustainable cities; and enhancing communities through workforce development, pilots and other programs. Founded as an economic development initiative by the City of Los Angeles and its Department of Water & Power (LADWP), LACI is recognized as one of the most innovative business incubators in the world by UBI. In the past eight years, LACI has helped 78 portfolio companies raise \$221M in funding, \$220M in revenue, create 1,750 jobs, and deliver more than \$393M in long term economic value. Learn more at laci.org



In Memoriam: Ron Nichols

A Tireless Champion of Equity in Air Quality

Ron was an unwavering advocate for ensuring all communities have access to clean energy technologies and their benefits. Given Ron understood that public-private partnership and collaboration was the best way to accelerate the complex policies needed to reduce air pollution and accelerate transportation electrification, Ron’s knowledge, passion, and leadership were critical to the creation of the Partnership—early in the process Ron met with Mary Nichols of CARB, the leadership at LADWP and Matt Petersen of LACI to frame the initial ideas and goals for the Partnership. It is thanks to Ron’s vision and commitment to helping disadvantaged communities that the unprecedented Partnership exists today.

Ron was so effective at making progress on multifaceted issues because he was highly respected by government and private sector colleagues, as well as environmental organizations and labor unions. His commitment to disadvantaged communities and clean air, and his leadership and humility is missed by the Partnership.

“

“Healthy air and a healthy climate go hand in hand, and in order to improve local air quality and to meet the state’s 2030 greenhouse gas targets, it is important that all Californians, regardless of neighborhood or income, have the opportunity to participate in and benefit from the clean energy revolution. This includes adoption of electric vehicles, energy efficiency, distributed renewable energy, job training for clean energy jobs and listening to communities about the best ways to bring clean energy technology to everyone.”

– Ron Nichols



TRANSPORTATION ELECTRIFICATION PARTNERSHIP

