

# WORKBOOK

# LOW EMISSION

# SMART AREAS



## Introduction

This workbook outlines presentations, discussions, lessons learned, and best practices from low emission smart area (LESA) workgroup meetings. The LESA project aims to address key challenges within curb management and clean mobility including increasing deliveries and curb use; limited and static curb space; congestion, safety and air pollution; equity and environmental justice; clean mobility access; electric vehicle charging gaps; and education and awareness.

This workgroup has served as a forum of collaboration to create a blueprint for launching pilot projects in Colorado municipalities while addressing the challenges above.

Important conclusions include the need for strong and robust pilot projects, support of communities and local organizations, and thorough data collection and analysis.



# Table of Contents

**Executive Summary..... 3**

## **Overview**

Blueprint..... 4

Key Findings..... 5

## **Case Studies**

CALSTART Going Beyond the Curb..... 6

City of Omaha Curb Management..... 9

Los Angeles Clean Tech Incubator (LACI)..... 12

Los Angeles Department of Transportation Zero Emission Zones..... 15

## **Important Partners**

Lightning eMotors..... 17

Automotus..... 19

Zeem Solutions..... 20

Workgroup Participants..... 22





# Executive Summary

The aim of the LESA Workgroup is to provide information and peer learning opportunities for communities in Colorado that wish to reduce local air pollution, GHG emissions, and congestion in high emission areas and disproportionately impacted communities. This will be achieved while increasing safety, parking and delivery efficiency, public health, and equitable clean mobility access for underserved communities. The LESA workgroup aimed to learn from existing programs in European and U.S. cities including the Santa Monica Zero-Emissions Delivery Zone, Smart Zones in Aspen, Nashville, Omaha, and West Palm Beach, and 2020 Transportation for America Smart Cities Collaborative projects in Bellevue, Minneapolis, and Boston. The LESA workgroup analyzed pilot projects across the nation incorporating technologies and concepts such as green-only loading zones, curb management, zero-emission commercial EV truck-share, EV car and ride-share, micro-mobility hubs, and last-mile innovative delivery solutions.

An emphasis on local community engagement, public-private partnerships, and collaboration will help to spur business expansion, investments, and green job creation, while incentivizing fleets to more quickly transition to zero and low-emission vehicles in the area. Increased eMobility access will facilitate ZEV education and awareness opportunities through vehicle showcase events and ride & drives held

for local residents. The area will further serve as an incubator and innovation hub, providing companies with the opportunity to pilot demonstrations of zero and low-emission technologies and initiatives. Through focus on these goals, a blueprint consisting of comprehensive data analytics and best practices, to be utilized for future low and zero-emission Smart Areas that can be deployed throughout the state of Colorado and targeted specifically towards overburdened / underserved communities and high emission areas has been established.

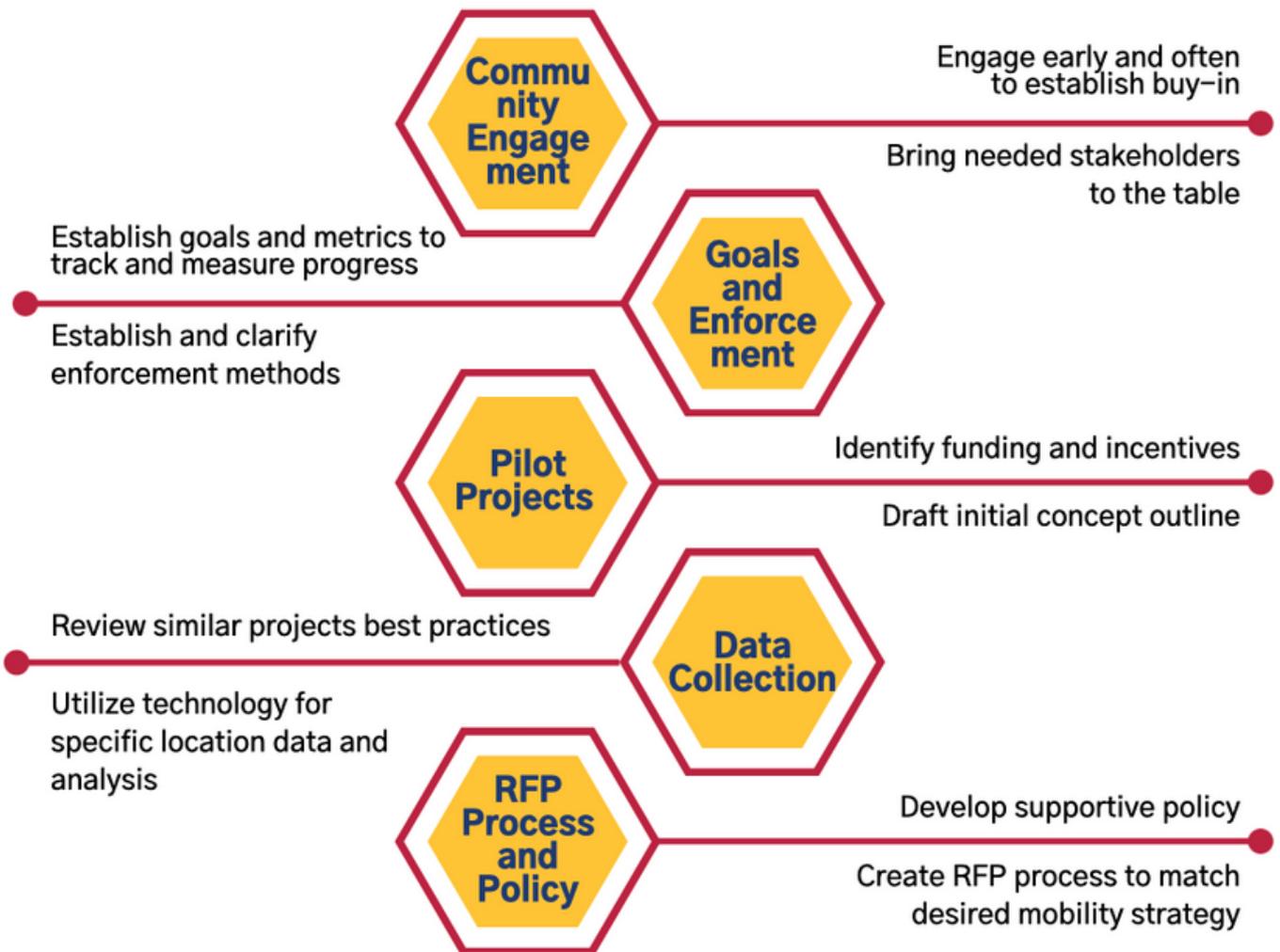
The state of Colorado currently has initiatives in place including HB 19-1261 requiring municipalities to attain and maintain the national ambient air quality standards; the GHG Pollution Reduction Roadmap outlining an achievable pathway to the state's climate targets of pollution reduction of 50% by 2030 as laid out in 19-1261 mentioned above; and the prioritization of sustainable transportation infrastructure as enacted in SB 21-260.

In line with these initiatives the LESA workgroup aims to support these goals. Key takeaways from these workgroup sessions in the scope of LESA include robust pilot projects, strong community support, adequate funding, comprehensive data collection, thorough site selection, and policy and enforcement. The blueprint and key findings below outline a model proven successful in other pilot projects for municipalities across Colorado to adopt into action.





# Blueprint - Low Emission Smart Area Implementation Process





# Key Findings

**Engage the community** early and often to establish buy-in and to conduct helpful needs assessments

- Provide the communities with research and background on existing initiatives through means such as the LESA workgroups and blueprint

**Bring the needed stakeholders** to the table including community members, decision makers at the municipality, utilities, fleets, and other partners as appropriate

- Establish an advisory board early on in projects

**Establish goals, objectives, and metrics** to track and measure progress

**Establish a means of enforcement** and **clarify existing policies** that may represent barriers

**Identify supportive funding** and incentives

**Draft an initial concept outline** for a pilot deployment

**Communicate with other municipalities**, organizations, etc. that have piloted similar projects to establish best practices and lessons learned

Once a specific need and buy-in have been established, **create an RFP process** to match cities with the desired mobility / transportation strategy and organizations to carry out those objectives (see LACI approach)

**Develop supportive policy** together with programs & projects

Start small in order to **demonstrate feasibility** with a focus on the ability to scale projects, with reduced public investment if proven successful



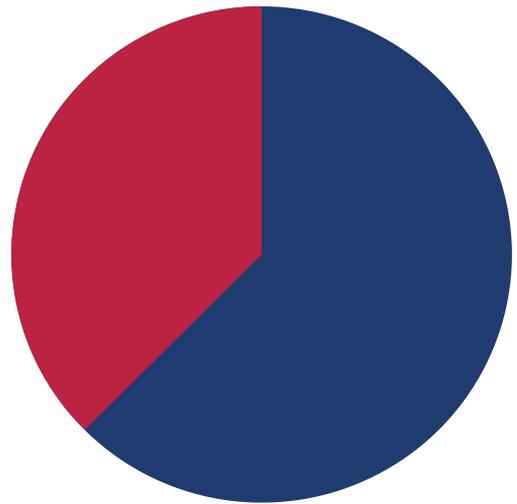


# CALSTART Case Study

This workgroup session analyzed CALSTART, a national non-profit, that aims to accelerate clean transportation nationwide. They focus on:

- Lowering transportation emissions by 40% by 2030
  - Working towards this goal through technology development and demonstration and assessment
- Market acceleration
- Advancing and shaping public policy
- Providing services to members

Transportation  
emission  
reduction goal



## Strategy & Implementation

Emphasis on bus and innovative mobility which focuses on building multimodal systems that reduce VMT from passenger and goods movement:

- Emerging focus on
  - Access to mobility
  - Educational partnerships
  - Last-mile delivery

Going Beyond the Curb, in collaboration with FedEx, dynamic curb management policies and practices that enhanced efficiency, access, and safety was researched, and aims to identify new technologies and strategies to unlock potential. Recommendations for city agencies and industry to facilitate adoption of similar strategies was provided. Important considerations include:

- Establishing early and ongoing communication across municipal departments
- Earning support of local organizations
- Phasing in new technology and practices



Beyond the Curb New York City applied this process in a pilot project. Key steps made were:

- Developing a guiding document for companies seeking last-mile delivery initiatives in NYC that align with supporting advancements in policy and tech
- Assessing approaches to implementing innovative delivery solutions that:
  - Optimize curb space utilization through more efficient and effective deliveries
  - Support the use case for rightsizing delivery modes by incorporating lightweight, human-powered electric vehicles (EVS) and EVs with smaller footprints
  - Relieve roadway congestion
  - Improve air quality in NYC communities
  - Meet growing demand for deliveries in NYC
- Identifying challenges to launching pilots in NYC and recommending practices to overcome them





## Pilot Structure



- Introduction
  - Understanding the scope of the study
- Current NYC delivery landscape
  - Analyzing the current state of NYC deliveries
- Policy context
  - Analyze the policies, programs, and regulations that are shaping this delivery landscape
- Stakeholder engagement
  - Understanding needed engagement for a successful demonstration project
- Pilot location
  - Understanding important factors in choosing a pilot program location
- Conclusion
  - Analyzing what is needed from a company to set a pilot up for success

## Conclusions

Implementation of dynamic curb areas requires clear communication across municipal departments to support strategic development and use of technology, policy, and stakeholder engagement. Support of local organizations and businesses is vital for quick adoption of zero-emission curb side strategies as well as future growth of projects in further reaching municipalities. Guiding and straightforward documents allow for policies to be implemented with collective regulations more efficiently and effectively.



# City of Omaha Case Study

This workgroup discussed the City of Omaha's use of curb management and smart zones to promote efficient use of the curb with technology. Partners include Coord, Vade and Automotus, with a focus on:

- Curb management history
- Curb management in practice and lessons learned
- Curb Management Future



## Strategy & Implementation

### Curb Management History

- The city collected curb data with a GIS layer showing 92 miles of curb usage mapped, including no parking zones, emergency vehicle parking, restricted parking, and open parking
- Flex zone conversations
  - Created “flex zones” which have mixed uses throughout the day based on the need at that time. Examples include loading zones, parking, or ride-share.
- Reasons for smart zones
  - Decrease amount of double parking and create safe loading areas
  - Ability to track usage at the curb to find the best use possible for each area
  - Transition from current fees for zones being paid by the adjacent property owner to fees based on usage at different times of the day
  - Using a software to capture plate data to monetize curb space
    - Ability to adjust fee throughout the day as a way to manage curb use



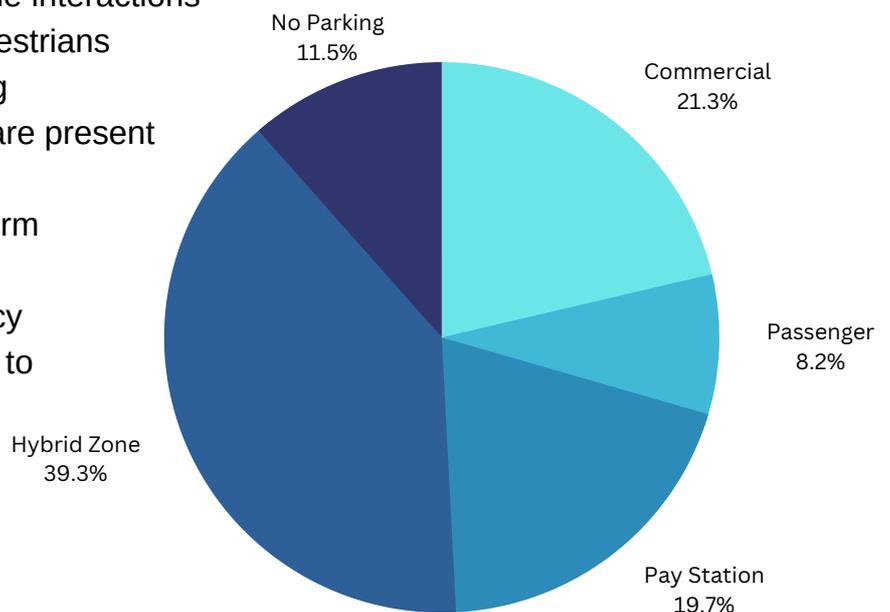
GIS map of Omaha curb space





## Curb Management in Practice

- **Coord Pilot** is a six-month pilot launched in November 2020
  - Technical Smart Zone pilot
    - Created five new Smart Zones in areas previously used for parking
    - Space is booked through an app
    - Areas large enough for freight trucks to load safely
  - Newly created areas decreased the frequency of non-permitted loading and double parking and dwell time was reduced\*
- Lessons learned include:
  - Smart Zones will be used if available
  - However, large companies tend to be unadaptable and prefer not having additional steps their drivers must take
  - Examples include needing to download an app or reserve a parking space in advance
  - Community engagement is vital to communicate the pros and cons
    - Examples include communication with restaurants and local businesses explaining added bike lanes, reasons for less parking, advantages of new loading zones
- **Vade Pilot** launched in 2022 installed cameras to capture usage at or near curbs and in drive lanes.
  - Data collected will be used for changes to the municipal code for loading zones
    - Fee changes based on curb use time
  - Shows the usage along specific roads and capture the vehicle interactions with bicycles and pedestrians
  - Capture double parking
  - Capture where trucks are present and for how long
  - Use this data in long term evaluation of sites
  - This data is key in policy changes and adoption to show use and need of smart zones



Example of Vade curb use data



- Automotus Commercial Curb Challenge is currently happening in 2022-2023.
  - Added smart loading zone areas
    - Used existing loading zones and created new zones that can accommodate larger freight vehicles
    - Ability to use the space and be charged only for time used
    - Camera based fee charging – no need to install software or app
  - Created maps of current and future zones overlaid with existing infrastructure
  - Currently awaiting municipal code change and contracting (2023)

## **Curb Management Future**

- Data collected from Vade and Automotus used to inform policy on parking and loading processes
  - New Smart Loading Zones will be created with fees paid by users
  - “Flex Zones” will be created and implemented in commercial districts
- Continued data collection and analysis with technological tools

## **Conclusions**

Utilizing multiple pilot projects allows for analysis of best practices and takeaways. Proper curb management ensures not only reduced emissions but also public safety and parking, delivery, and loading efficiency. Monitoring of curb areas and data collection of vehicle behavior creates the ability for implementation of most effective technology for zero-emission or general curb side regulation enforcement and fee tracking. Data analysis also allows for informed policy modeling in pilot projects and beyond.





# Los Angeles Cleantech Incubator (LACI) Case Study

This workgroup discussed LACI's goals to build an inclusive green economy focusing on transportation, clean energy, and smart and sustainable cities. Strategies include unlocking innovation, market transformation, and community enhancement, with environmental, social, and economic impact goals.

## Mission and Strategies



### Priorities

- **Transportation**
  - Transit and freight systems that are connected, shared, and electric
- **Clean energy**
  - Integrated energy generation and storage systems
- **Smart, sustainable cities**
  - Including circular economy, resilient food, water, and waste systems

### Strategies

- **Unlocking innovation** - Incubating and accelerating clean tech startups and helping commercialize technologies
  - Coaching and advice
  - Investment preparation and assistance
  - Shared services
  - Customer engagement and impact
  - Access to high-value resources
- **Market transformation** - Accelerating clean tech adoption and system change by engaging key stakeholders and decision makers
  - Transportation electrification partnerships
  - Energy innovation programs
  - Pilots and demonstrations
  - Strategic partnerships



- **Enhancing community** - Working in collaboration with local communities, identifying sustainability challenges, creating opportunities and building workforce pipelines
  - Diversity and inclusion program
  - Workforce development
  - Women in cleantech
  - Middle school girls program
  - Advanced prototyping center (APC)

## Impact

- Environmental impacts include:
  - Green house gas reduction, renewable energy generation, water saving and waste diversion
- Social impacts include:
  - Employment for minorities and increased female employment
- Economic impacts include:
  - Engagement with disadvantaged communities, job creation, direct hiring from workforce program

## Zero Emission Mobility Pilots Overview

### Pacoima EV Car Share

- Revenue shared model with CBO partner; established program sustainability
- Engaged community outreach and program partner (Pacoima Beautiful)
- Nissan Leaf S+ model provided long range trip accessibility
- Proved off grid EV charger viability for EV car shares

### San Pedro Car Share

- Funding model for EV car shares in subsidized housing communities
- Lead to drafting national legislation
- Exposed need for larger EVs to accommodate households with more than four members





### **Leimert Park Free Neighborhood Electric Shuttle**

- Increased local business and personal economic growth through first and last mile transportation access
- Addressed traffic congestion and parking constraints
- Most frequently used by 65+ age group
- Often used for first and last mile connection to public transit
- CBO lead community outreach and education
- Sponsorship offset the operations cost allowing for extended service

### **Santa Monica Zero-Emissions Delivery Zone**

- Aims to develop a blueprint for cities to adopt zero emissions delivery zones for last mile delivery and best practices
- Immediate benefits to the local community including reduced pollution, noise and congestion, and safety
- Provided economic opportunity to small businesses through access zone benefits
- Partners include local municipality, CBOs, delivery operators, and tech startups





# Los Angeles Department of Transportation Case Study

This workgroup session discussed Los Angeles Department of Transportation's zero-emission delivery zone with the goals of:

- Advancing mobility element and green new deal policy objectives
- Improving air quality
- Testing a new curbside management strategy
- Demonstrating, evaluating, learning, and expanding
- Incentivizing investments in ZE delivery vehicles



Zero-emission zones will incentivize companies to begin, or continue, investing in ZE fleet delivery vehicles and send a market signal to urban freight delivery operators to transition fleets to ZE vehicles and reduce emissions and improve air quality in urban areas.

## Strategy & Implementation

**Proper Site Selection Criteria** is vital to ensure a zero-emission zone is usable for the community. Important considerations include:

### High demand curbsides

- Curbsides in high density areas that experience high commercial loading demands

### Areas burdened by pollution

- Data analysis of these high demand curbsides allows for site selection that currently see the highest amount of pollution
- Allows for environmental equity in over-polluted areas

### Feasible and not disruptive

- Sites allow for installation with minimal impact to the built environment
- Have support from nearby business owners

### Administratively realistic

- Keep number of zones planned to be processed realistic based of resources available
- Colored curb markings were found to be too cost and effort intensive



**Strong enforcement** and education is required to adopt a municipal code on zero-emission zones.

Los Angeles adopted a municipal code to enforce zero-emission zones. Santa Monica had similar zero-emission pilot test; however, did not take the step to pass an ordinance and thus their program was based on honor system. Following LADOT's ordinance, important considerations include:

#### **Educate public and officers**

- LACI is assisting with a public education effort to smaller businesses and larger public on ZE zones

#### **Allow delivery companies to register ZE vehicles**

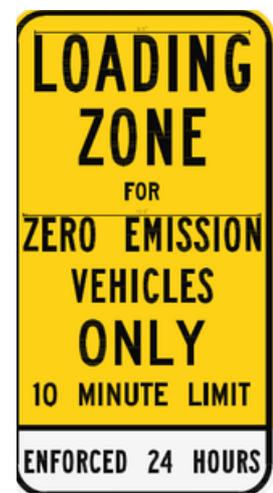
- Registration program allows officers to conduct an automatic query on a vehicle parked within a ZE zone
- If the vehicle is properly registered the officer will not notified and be unable to give a citation
- If a vehicle is cited the company will be billed directly at the end of the month reducing administration needs

#### **Two-week warning period**

- Building in an adjustment period for a new systems allows for smoother adoption

#### **Cargo bikes and other light electric freight vehicles allowed**

- Strong community understand of eligible vehicles for ZE zones



## **Conclusions**

Implementation of the zero-emission zones such as those in this case study will require evaluation and analysis of the pilot test to continue developing and maintaining such programs, understanding prime site selection, and reducing administrative burden. Continued enforcement training and education as well as adaptation of the ZE vehicle registration system will allow for smooth adoption of such zones across municipalities. Securing funding and grants from the DOE, along with other sources, will allow for ZE delivery zones to be scaled up across cities beyond a pilot test.





# Lightning eMotors - Important Partners

This workgroup discussed Lightning eMotors commercial fleet development and the path to electrifying commercial vehicles. This is vital to implementation of future pilots, including low emission delivery zones and low emission loading zones as electric fleets are a key piece of these projects.

## Mission and Strategies



### Priorities

#### Commercial zero-emission vehicles

- Class 3-7 trucks and busses
- Powertrains and EV technology for OEMs and Second Stage Vehicle Manufactures
- Develop both new and repowered EVs

#### Analytics

- Actionable fleet intelligence
  - Drive, route efficiency, HVAC usage, etc.
- Unique Bit Data on drive cycles

#### Charging and charging infrastructure

- Complete charging and infrastructure solutions, including microgrid
- Patented mobile charging solutions





## Strategies

- Vehicle class and application design
- Multiple specialty vehicles within each class
- High level of cost-effective customization enabled by modular software and hardware
- Serving all segments of urban commercial fleets with proven reliability
- Software-enabled platform and integration capabilities translate to fast time-to-market with new platforms

Funding and accessibility. There are many new stackable subsidies available for commercial electric fleets including:

- Colorado Clean Fleet Enterprise
- Colorado School Bus fund of \$65 million
- EPA for School Buses of \$1 billion
- FTA for transit vans, shuttles, buses of \$1 billion per year
- IRA offering \$40,000 per vehicle for class 4 and larger





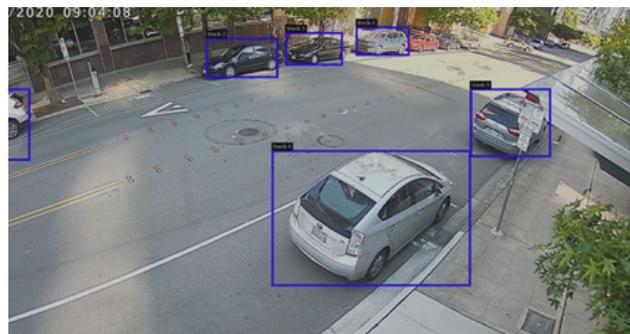
# Automotus - Important Partners

This workgroup discussed Automotus' strategies and infrastructure changes needed to develop the most effective solutions for both cities and fleets. Advantages to cities include reduced double-parking and congestion, more sustainable and equitable streets, and increased curbside revenues. Fleets benefit from reduced time spent looking for parking, access to real-time parking and congestion data, and reduced parking tickets.

## Mission and Strategies

### Key strategies include:

- Mobility insights and data sharing
- Automated curb payments
- Automated curb enforcement



License plate reading technology

Important considerations for future success ZEDZ projects include automated license plate readers to charge or enforce parking and learning and growing from models recognizing fast-paced changes in training and technology. New policies are needed for commercial loading zones and will be charged by propulsion type.

## Pilots

Automotus has been a key partner in many of the pilots described in this workbook including:

Santa Monica Zero Emission Zone as discussed on page 18

Los Angeles Department of Transportation Zero Emission Zone as discussed on page 6





# Zeem Solutions - Important Partners

This workgroup discussed Zeem Solution goals of transforming how fleets operate by providing an affordable solution for zero emission transportation, aiming to reduce emissions and improve air quality in communities. Zeem Solutions is an innovative zero emission fleet-as-a-service provider.

## Mission and Strategies



### Priorities

Zeem builds and operates zero emission vehicle (ZEV) depots with specialized charging infrastructure and services for fleet customers.

Fleet-as-a-service provides zero emission vehicles for a flat monthly fee – inclusive of vehicle lease, charging, maintenance, and insurance- at a lower cost than owning and operating a gas or diesel fleet

Barriers to electrification of small and medium fleets include:

- Existing sites cannot accommodate chargers – restrictive property leases, limited space, insufficient power, etc.
- Lack of access to competitive financing for vehicles and infrastructure
- Cannot reach economies of scale for CapEx and OpEx
- Limited public DC fast charging (DCFC), especially for MHD EVs
- No resources to navigate regulations and incentives
- Significantly larger business disruptions when an EV or charger is unavailable
- All-or-nothing proposition – uneconomical to transition one EV/charger at a time





**Key strategies include:**

Deploying depots in strategic markets to accelerate zero emission mobility, serve as centers of technological innovation, and support the growing clean energy economy.

Identify existing programs and develop new opportunities to partner on innovative solutions to transport goods, people, and services with zero emission vehicles.

Business model serves as a catalyst to launch and demonstrate viable use-cases for zero emission vehicle applications to decarbonize the supply chain

Collaborate to accomplish mutual emission reduction objectives that improve air quality in communities located near transportation hubs with high commercial vehicle activity.

Extensive experience in zero emission vehicles, transportation and trucking, distributed and renewable energy, and charging infrastructure development.





# Workgroup Participants

## Blink Mobility

### Mission

Smarter, greener transportation in Los Angeles through all-electric car shares. Blink focuses on:

- Affordability
- Convenience
- Reliability
- Electrifying

Blink Mobility provides EV car shares with 40 drop off and pick up locations around the city allowing community members flexibility, and providing accessibility to electric vehicles.

## Workgroup Members

**Boulder County**

**Camsys**

**Colorado Department of Public Health and Environment**

**City of Boulder**

**Clean Energy Economy for the Region**

**Colorado Department of Transportation**

**Colorado Energy Office**





**Colorado Smart Cities Alliance**

**Commuting Solutions**

**Colorado State University**

**Denver Department of Transportation and  
Infrastructure**

**Denver, Climate Action, Sustainability & Resiliency**

**Denver Regional Council of Governments**

**Englewood**

**Fermata Energy**

**Fluid Truck**

**Manitou Springs**

**Mobility Next**

**Motiv**

**Northern Colorado Clean Cities**

**National Energy Technology Laboratory**

**National Renewable Energy Laboratory**

**Vail**

**Xcel Energy**

