



### Office of Innovative Mobility ITE Luncheon Keynote Tuesday, September 21st

Ashley Nylen, Assistant Director of Mobility Technology Mike King, Assistant Director of Electrification and Energy Lisa Streisfeld, Assistant Director of Mobility Services



### Office of Innovative Mobility

Reduce pollution in our air and congestion on our roads by expanding multimodal transportation options, utilizing traditional and emerging mobility technologies.



Each of the Assistant Directors will provide an overview of their programs to the group today.



## Mobility Technology Program Overview

The Mobility Technology program focuses on guiding Colorado's strategy and policy on connected, automated, and emerging transportation technologies.



- Develop strategy for piloting connected and autonomous vehicles in Colorado, including data collection and usage, as well as future policy recommendations
- Lead Autonomous Mobility Task Force, with support from CSP and DOR
- Explore ways to enhance existing mobility options through new technologies, such as ADAS for Bustang, autonomous attenuator, etc.





Today's presentation will provide a highlight of efforts in the Automated Vehicle and Connected Vehicle programs within the Mobility Technology Pillar.



### Automated Vehicle Program Overview and Roadmap in Colorado

### Policy and Recommendations

- Coordination of Colorado's Autonomous Mobility Task Force
- National engagement and collaboration for provide informed decision making to Colorado around CAV policies and opportunities

### Technology Piloting

- Pursuing CAV supported technology in pilots, demonstrations and applications that accelerate safety and mobility in Colorado
- Leveraging pilots to inform and enable a transportation system that technology can thrive as its available

### Data

- Focus on how CAV supported technology data is operationalized for CDOT
- Publicly accessible data





## Colorado Autonomous Mobility Task Force -Collaboration between three state agencies





## CDOT Autonomous Truck Mounted Attenuator (ATMA) Program



CDOT ATMAs approved for operations on Blue, Purple, and Grey roadways.

- 27 state highways
- 41 roadway segments





## CDOT Connected Vehicle (CV) Program (revised in 2019)

Collaboration

Program Vision: Leverage connected vehicle technology and data to increase and support transportation, safety, mobility and efficiency within the State of Colorado.

Practical

innovation

Data

CDOT's CV program is led by the Office of Innovative Mobility and features close coordination with the Division of Maintenance and Operations, ITS, and the Chief Data Office



## **CDOT CV Program Principles Guiding Expansion**



V. Open source digital assets

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#### VI. Enabling interoperability



## **CDOT CV Program Approach**

#### Phase 1: 2017 - 2019 - Pilot Phase

- Pilot deployment on I-70
- Evaluation of a 3rd party connected vehicle ecosystem
- Lessons learned by CDOT for CV
  requirements deployment

#### Phase 2: Nov 2019 - Oct 2021 -Program Revision and Internal Build (Digital Infrastructure Focus)

- Program revision and discovery
- Task based approach for internal development
- Systems engineering analysis based on alignment with CDOT broader modernization
- Base development of a CDOT driven and developed ecosystem in CDOT's digital assets with full security requirements
- Base data querying internal to CDOT CV data users

#### Phase 3: Nov 2021 - Oct 2022 -Program Revision and Internal Build (Physical Infrastructure Focus)

- Ecosystem enhancements and scalability
- Refined visualization and data integration with ATMS
- In-vehicle interface prototype
- Infrastructure enhancements via BUILD grant and some OBU expansion
- Data sharing build out
- Regional pilots (R1 Snow Plow, R5 -Freight and Wolf Creek Pass)
- Interoperability with other jurisdictions
- Piloting of third party data sources

Future Roadmap Backlog: greater access to BSM data, leveraging connected cloud data (ingestion in CV system), connected freight data pilot, onboard unit human machine interface (HMI) refinements, and others

Other program activities: lead the work zone data exchange program and development at CDOT, involvement in CDOT broader data management efforts, involvement in national standard workgroups and NCHRP panels



## Upcoming Mobility Technology Efforts and Initiatives

**Connected Vehicles** 

- Phase 3 expansion and refined integration in CDOT systems
- Continued collaboration with USDOT/Turner Fairbanks on ODE enhancements
- Internal integration and evaluation of OEM CAN data (beyond BSM Part I data)
- CV RSU/OBU RFP coming soon to support infrastructure expansion
- Exploration and pilot integration of cloud connected datafeeds
- Evaluation of CV data and CV2X deployment

### **Automated Vehicles**

- Continual participation in national workgroups (PAVE, NCHRP, AASHTO AV COP)
- Updates to strategy for AV development
- Autonomous truck mounted attenuator technical support for further deployment
- Piloting of advanced driver assistance systems (ADAS) in CDOT transit vehicles
- ADAS driver education module development with fellow state DOTs
- Work Zone Data Exchange Demonstration





## Mobility Services Program Overview

The Mobility Services program focus

- 1. Guiding Legislation
- 1. Following the 2019 State TDM Plan Publication: What's new with Transportation Demand Management (TDM)
- 1. Ongoing Projects and Future Efforts



### Colorado HB 19-1261: Climate Action Plan to Reduce Pollution

### Sets bold goals for Colorado to Reduce Greenhouse Gas Emission from 2005 levels

- 26% by 2025
- 50% by 2030
- 90% by 2050





#### HOUSE BILL 19-1261

BY REPRESENTATIVE(Š) Becker and Jackson, Jaquez Lewis, Bird, Cutter, Duran, Froelich, Galindo, Hooton, Kennedy, Kipp, Melton, Roberts, Singer, Sirota, Snyder, Sullivan, Tipper, Titone, Valdez A., Weissman, Arndt, Benavidez, Buckner, Buentello, Caraveo, Exum, Gonzales-Gutierrez, Gray, Hansen, Lontine, McCluskie, Michaelson Jenet, Mullica, Esgar, Herod, McLachlan;

also SENATOR(S) Winter and Williams A., Moreno, Bridges, Court, Danielson, Donovan, Fenberg, Fields, Foote, Ginal, Gonzales, Lee, Pettersen, Story, Todd, Zenzinger.

CONCERNING THE REDUCTION OF GREENHOUSE GAS POLLUTION, AND, IN CONNECTION THEREWITH, ESTABLISHING STATEWIDE GREENHOUSE GAS POLLUTION REDUCTION GOALS AND MAKING AN APPROPRIATION.

Be it enacted by the General Assembly of the State of Colorado:

SECTION 1. In Colorado Revised Statutes, amend 25-7-102 as follows:

**25-7-102.** Legislative declaration. (1) In order to foster the health, welfare, convenience, and comfort of the inhabitants of the state of Colorado and to facilitate the enjoyment and use of the scenic and natural



### Colorado SB 19-239: 2019 Emerging Mobility Impact Study

Examine the impacts of technological and business changes related to motor vehicles used for commercial purposes

Identify means to mitigate negative or promote positive impacts

Assess emissions, trips, and vehicle miles traveled (VMT) contributed by emerging mobility providers

- Inventoried existing fees on emerging mobility providers in other cities, states, and airports
- Colorado State University conducted a literature review
- Modelled emerging mobility providers contribution to VMT and emissions
- Forecasted demand elasticities in response to fees
- Forecasted congestion and emissions
- Coordinated with a Stakeholder Working Group

#### 2019 EMERGING MOBILITY IMPACT STUDY

Report on Colorado Senate Bill 19-239





## Colorado HB 21-1076: Carpooling Internet Applications

- Separates carpool apps from the definition on Transportation Network Companies like Uber or Lyft
- <u>Website contains:</u> Copy of the bill & Question/Answer document
- Companies required to <u>Register</u> with CDOT starting Oct. 1, 2021
- Carpool rides must at least 23 miles
  - Rides to ski resort are exempt from minimum.
- Carpool trips are limited to one round-trip per day
- Vehicles are allowed one driver and up to 6 passengers
- Drivers are reimbursed through these apps for wear/tear on the vehicle and fuel only
- CDOT supports carpooling as a low-cost & high-value solution to reducing vehicle miles traveled and greenhouse gas emissions

National data from American Community Survey 2019 (from US Census)

8.6 % of people carpool to work.



#### HOUSE BILL 21-1076

BY REPRESENTATIVE(S) McCluskie and Will, Bird, Exum, Froelich, Gray, Hooton, Lontine, McCormick, Michaelson Jenet, Ortiz, Roberts, Titone, Valdez A., Valdez D.;

also SENATOR(S) Donovan and Hisey, Hansen, Jaquez Lewis, Priola, Rankin, Winter.

CONCERNING CARPOOLING SERVICE INTERNET APPLICATIONS, AND, IN CONNECTION THEREWITH, REQUIRING THAT APPLICATION OWNERS OR OPERATORS REGISTER WITH THE DEPARTMENT OF TRANSPORTATION.

Be it enacted by the General Assembly of the State of Colorado:

SECTION 1. In Colorado Revised Statutes, add 43-1-127 as follows:

43-1-127. Registration of carpooling service internet applications - limitations - disclosure - definitions. (1) ON AND AFTER OCTOBER I, 2021, AN OWNER OF A CARPOOLING SERVICE INTERNET APPLICATION OR AN OPERATOR OF THE APPLICATION ON THE OWNER'S BEHALF SHALL REGISTER WITH THE DEPARTMENT ON AN ANNUAL BASIS IN A FORM AND MANNER DETERMINED BY THE DEPARTMENT. THE DEPARTMENT SHALL PUBLISH THE FORM AND MANNER OF REGISTERING ON THE

Capital letters or bold & italic numbers indicate new material added to existing law; dashes through words or numbers indicate deletions from existing law and such material is not part of the act.



## Transportation Demand Management (TDM)

Reduce or manage vehicular travel to maintain operational capacity on highway infrastructure.

- Change day of travel
- Change time of day
- Change the route of the trip
- Change the mode of the trip: walk, bike, bus, rail, scooter
- Transit for special events
- Combine trips
- Combine persons taking the trips:
  - Carpool 0
  - Vanpool
  - School pool Ο
  - Ski-pool Ο
  - Shared rides using TNCs\* Ο

\*TNC: Transportation Network Company: such as Uber, Lyft, Hop-Skip-Jump

### **BENEFITS:**

- Reduce vehicle miles traveled
- Reduce congestion and delay .
- Reduce greenhouse gas emissions
- Enhance operational lifespan of infrastructure
- Reduces wear and tear on transportation network
- Reduce parking needs downtown •
- Help promote economic development •
- Increase accessibility to opportunities
- **Reduce noise impacts**
- Diversify mobility choice

management is influencing



people's behavior



to use the existing infrastructure

in more efficient ways.

Mobility Lab



### Colorado FY 2022 TDM Grants

Encourages actions identified in the 2021 GHG Pollution Reduction Roadmap to meet Colorado's climate targets

### **Opportunity 1: TMO Support Grant**

- Released this summer
- Provides funding to Transportation Management Organizations (TMOs)
  - To deploy new trip-reduction projects and programs
  - To support employer-driven TDM planning and interventions
- Over \$450,000 awarded to date

Opportunity 2: TDM Programs, TDM Projects, and Telework Support

- Fall release expected
- Approximately \$400,000 in funding available
- Program has broad scope for TDM
  - To capture innovative approaches for trip reduction
  - To promote teleworking practices
  - $\circ$  To support new programs
- Open to local governments and other transit or governmental entities statewide
  - Private, for-profit companies, nonprofits and transportation management organizations (TMOs) may partner with jurisdictions or be a sub-recipient of a governmental agency



## **Other TDM Efforts**

Incorporate TDM Strategies into Mobility Hubs

CDOT Policy Directive 1601 for Interchange Approval Amended to Require TDM

How to Create A TDM Plan

### **Employee TDM Programs**

- Employee surveys
- Webinars
- E-bikes deployment
- EV training videos
- Transit rides reimbursement program
- Statewide access to vanpool program
- Installed EV charging on CDOT campuses: fleet vehicle and staff use
- Monthly reimbursement for staff biking to work





### Transportation Demand Management (TDM) Conference

- Co-hosted by the Association of Commuter Transportation (ACT) and CDOT
- Purpose: Showcase transportation options geared toward private employers, transportation professionals, municipalities and other organizations that have a role in transportation demand management (TDM)
- November 5, 2021 (7:30 am-1:30 pm)
- Free <u>Registration</u> on CDOT OIM/Mobility Services Website
- Sample Session Themes Under Economic Development and TDM
  - $\circ$   $\;$  Best Practices in Data Collection and Reporting  $\;$
  - TDM at Schools, Colleges and Universities
  - Local Project Highlights
  - Employer Based TDM Programs
- 18 presentations committed to date



## **Mobility Services Projects**

### Ongoing:

### Transit Emissions Dashboard

- Transit fleet conversion to zero emission vehicles (ZEVs)
- Transit ridership
- Transit vehicle miles traveled
- Statewide emissions for CDOT's Bustang/Outrider trips
- Avoided emissions per passenger vehicle mile traveled
- Trend data for transit emission reduction over time

#### **Connected Colorado**

 Develop an easy-to-use mobile application (app) and web platform that allows the public to plan their entire trip and pay online, while supporting better coordination and data sharing between local transit providers

#### **Micromobility Support**

- Inventory of Deployment Throughout the State
- Data Coordination with Denver Regional Council of Governments

### Future:

Phase 2 of Transit Emissions Dashboard

Mobility for Human Services and Non Emergency Medical Transportation

Best Practices for Freight Transportation Demand Management



## Electrification and Energy Program Overview



The Electrification and Energy Program focuses on supporting the growing market for zero-emission vehicles through state policy, infrastructure build-out, vehicle replacement, and public education and awareness.

ZEV technology is rapidly advancing and major OEMs are making bold commitments to convert their entire product lines to full ZEV.





Meanwhile, state and federal policymakers are investing in decarbonization more than ever before while passing a suite of supportive policies.

CDOT views ZEVs as a means of achieving major GHG reductions and increasing consumer transportation choice.



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## 2020 Colorado EV Plan

- Colorado's 2020 Electric Vehicle Plan established a state target of <u>940,000 registered ZEVs by 2030</u>
- CDOT and its partner agencies are currently developing a <u>Clean Trucking Strategy</u> to reduce emissions from medium- and heavy-duty vehicles across the state
- Colorado also has a goal of converting all transit vehicles in-state to ZEVs, with an interim target of <u>1,000 transit ZEVs by 2030</u>
- The plan also includes strategies to explore related issues like the <u>hydrogen</u> fuel market, supporting EV <u>equity</u>, and working with dealers and technical schools to develop a supportive <u>ZEV workforce</u> over the longer-term



https://energyoffice.colorado.gov/zero-emission-vehicles/colorado-ev-plan-2020



## **Market Background**



### 40,895 EVs in Colorado

- 28,585 BEVs
- 12,310 PHEVs



## **Increasing Vehicle Availability**

- In 2019, Colorado adopted the Zero-Emission Vehicle standard that will require automakers to make a greater number and variety of ZEVs for sale in Colorado, increasing consumer choice.
- Colorado is currently assessing the Advanced Clean Truck regulation passed by California, which takes a similar approach but would apply to medium- and heavy-duty trucks.
- Both of the regulations are or would be applied to manufacturers, <u>not</u> consumers.



Source: The New York Times



## **EV Growth Projections in Colorado**



Source: Navigant (2019)



## **Statewide EV Fast Charging Corridors**



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## **Statewide EV Fast Charging Corridors**

Colorado Existing EV Fast Charging Stations (133) (with 30 Miles Travel Buffers) Updated 06/2021





## **VW Settlement Program**

- Colorado's portion of the \$2.7 billion environmental mitigation fund is anticipated to be approximately **\$68.7 million**.
- The designated lead agency is CDPHE, working in partnership with CDOT, CEO, and RAQC.





# **Settlement Program - Transit**

## Past Grant Rounds

- Year 1 Awards:
  - •\$13,828,037
  - •6 agencies
  - 23 electric buses (with 20 EVSEs)
  - •1 CNG buses
  - 3 LPG buses

- Year 2 Awards:
  - •\$2,903,940
  - 3 agencies
  - •6 electric buses (with 5 EVSEs)

- Year 3 Awards:
  - •\$5,624,676
  - •4 agencies
  - 10 electric buses (with 9 EVSEs)





# **Clean Trucking Strategy - ZEV Phase-In**

ZEVs are likely to be adopted in multiple "waves", but we need to prepare our policies and investments now in order to maximize the benefits in future years.





# **SB21-260 Electrification Investments**

\$733 million of new fee revenue supports 3 new electrification and charging infrastructure Enterprises:

Charging Infrastructure & Electric Vehicle Equity

- New 'Community Access' Enterprise in Colorado Energy Office (CEO).
- Build charging infrastructure in communities across the State, and support electric vehicle and eBike adoption in low and moderate income communities.
- \$310 million investment
- Paired with existing CO EV Infrastructure Fund - \$115 million and potential federal funding

**Fleet Electrification Incentives** 

- New 'Clean Fleet' Enterprise in CO Department of Public Health and Environment (CDPHE)
- Support fleet replacement (delivery trucks, TNCs, school buses, and other light/medium/heavy duty vehicles) with incentives to meet climate and air quality goals
- Support CDPHE's Mobile Source Program to complement vehicle investment.
- \$289 million investment

**Public Transit Electrification** 

- New enterprise in Colorado Department of Transportation (CDOT).
- Support electrification of public transit through electrification planning efforts, facility upgrades, fleet vehicle replacements and associated charging infrastructure.
- **\$134 million** investment



Thank you!

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