

---

# Climate Change

## August 21, 2019

# Outline

- Energy burden in low-income households and supportive services
- Transportation, mobility and electric vehicles
- Land use planning
- Climate adaptation



---

# Energy burden in low-income households and supportive services

Temporary Rental & Utility Assistance

Energy Outreach of Colorado CARE program

DURA- Single Family Rehab (SFR) and Emergency Home Repair (EHR)

LEAP

DOSP Efficiency program

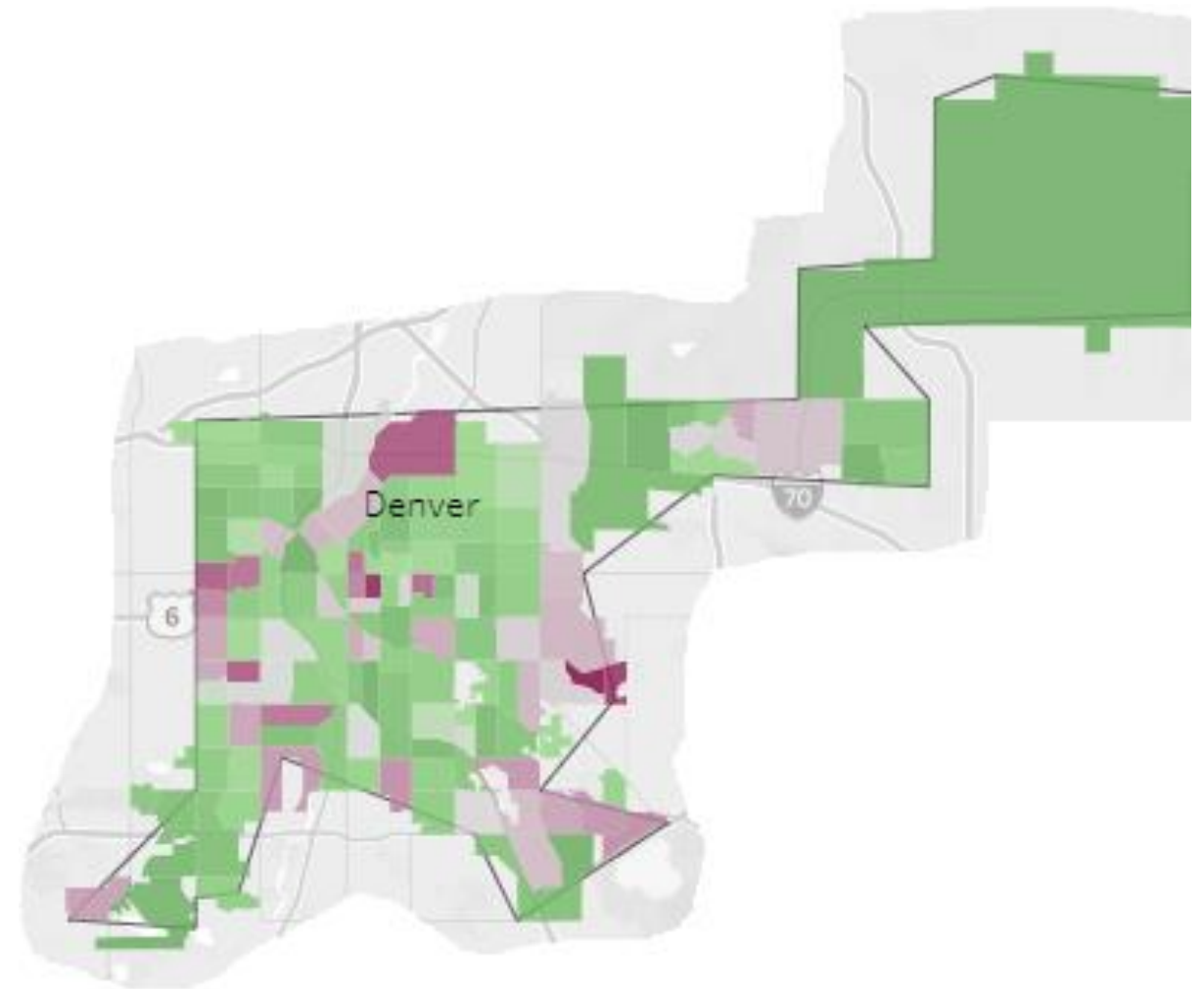
# Low-income energy burden by city



Source: ACEEE report  
 "Lifting the High  
 Energy Burden in  
 America's Largest  
 Cities"

# Energy burden

- Energy burden is the percentage of gross household income spent on energy bills.
- A household is typically considered energy burdened if they spend more than 10% of gross household income on their energy bill.
- The map shows the areas with households with an energy burden above 10%
- Source:  
<https://public.tableau.com/profile/the.greenlink.group#!/vizhome/shared/WZXBXP7NH>



# Spectrum of services



# DHS LEAP Program

LEAP is a Federal (LIHEAP) energy assistance program that provides:  
Cash assistance for home heating;  
Crisis furnace repair/replacement; and  
Weatherization.

Eligible applicants must at or below 165% of Federal Poverty Level.

# Who We Serve

## Denver's Application Data

Program Year	Approvals	Total	Average Benefit
2018/2019	7,160	10,672	426.29
2017/2018	7,432	10,119	547.97



# DEDO PROGRAMS TO ADDRESS ENERGY BURDEN

## DURA programs

- Emergency Home Repair
  - No-interest loans and grants (if assistance ≤ \$1,000)
  - Plumbing, electrical, heating, roof, sewer and other systems that may pose immediate danger to health & safety
  - HHs up to 50% AMI
- Single Family Rehabilitation
  - Loans to address code compliance and lead-based paint abatement, including building systems (plumbing, electrical, heating), structural issues, windows and roofing
  - HHs up to 80% AMI

## Energy Outreach Colorado- CARE

- CARE- Concentrated Neighborhood Approach
- Stabilize existing residential affordable housing in Elyria Swansea
- Home improvement upgrades including LEDs, insulation, proper insulation, appliance replacement etc. and home assessments
- Marketing the LEAP program, energy education

## Temporary Rental/Utility Assistance

- NDHC and Brothers Redevelopment Inc.
- Rental assistance to eligible HHs for up to 6 months
- Utility assistance to eligible HHs for a period of up to 2 occurrences. Water, electric, gas assistance to renters and homeowners
- Assist low-moderate income residents in a housing crisis maintain stability

Program	DEDO Grant	Services goal: HHs served	HHs served as of June 2019	HHs receiving energy related assistance
EOC-CARE	\$450,000	288	28	28
TRUA (administered by Northeast Denver Housing Center and Brothers Redevelopment Inc.)	\$2,000,000	>700	478	70
DURA- EHR	\$250,000	≥50	35	-
DURA- SFR	\$850,000	≥20	8	-

Source: OED program contracts and monthly program reports (2018-2019)

# Office of Strategic Partnerships Efficiency Programs

- Reduce the impact of energy bills by providing energy audits, upgrades, and education for low-income energy efficiency programs for individuals and non-profit agencies.
- Disburses approximately \$1.8M annually to serve low-income individuals, families and nonprofit organizations

DOSP Residential  
Energy Efficiency  
Program

## Residences Served

Resident Type	2011	2012	2013	2014	2015	2016	2017	2018	TOTAL
Multi-family	17	11	5	4	40	44	23*	44	<b>144</b>
Single-Family	974	1083	776	1007	762	640	434*	709	<b>5676</b>

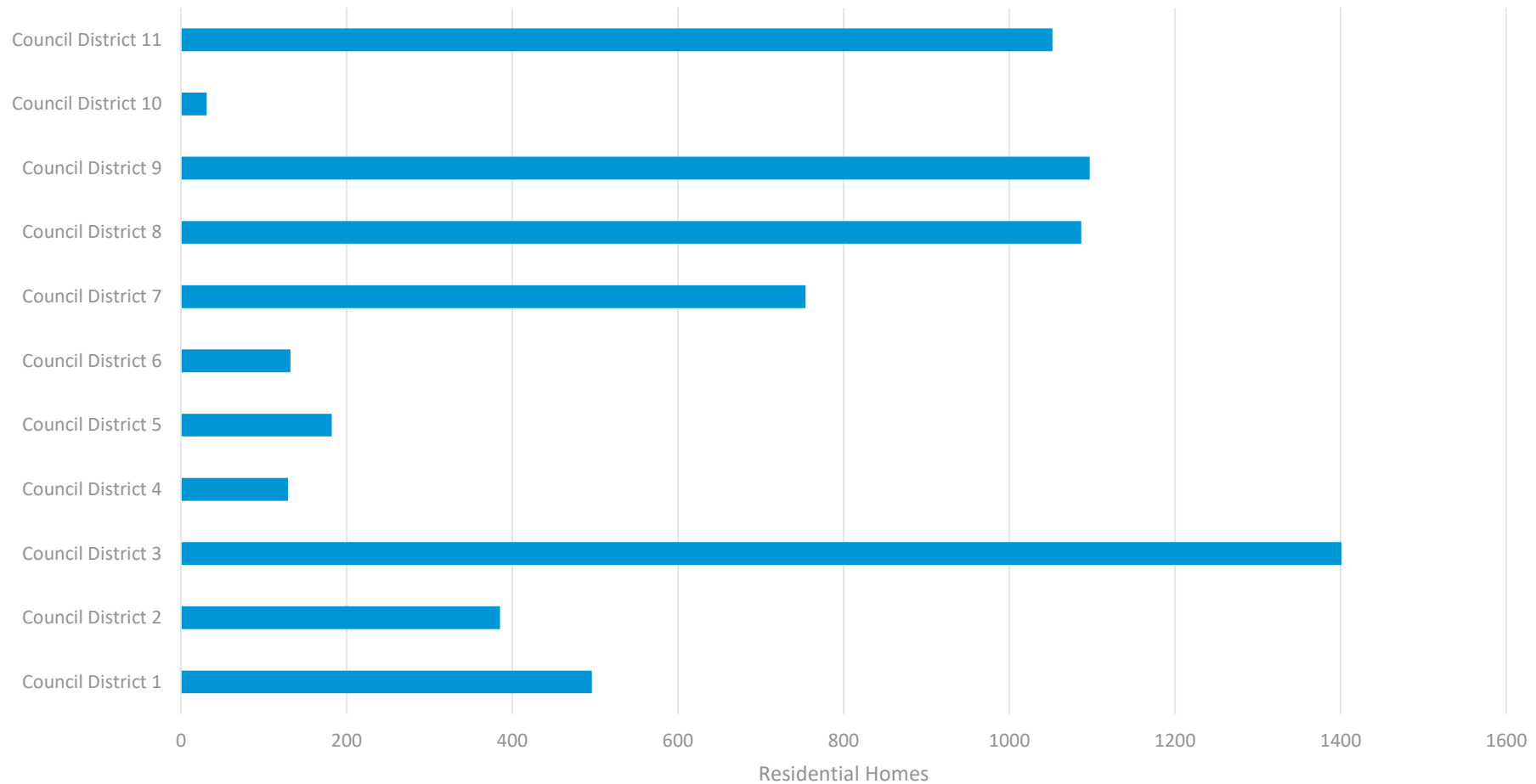
\*Q1 and Q2 data only

## Average Annual Percent Savings (per Home)

kWh	Therms	Total
13.8%	9.1%	15.3%

Average Annual Program Savings  
\$136,000

## DOSP Residential Energy Efficiency By Council District (2011-2017)



## DOSP Non-profit Energy Efficiency Program

234 Non-profit Organizations Served  
(2009-2018)

Average Annual Program Energy Savings:  
\$123,000

### Non-Profits Served in 2018:

Annunciation - Mission House

Annunciation School- pipe insulation

Catholic Charities- Samaritan House 1&2nd floor

Catholic Charities- Samaritan House main building

Catholic Charities- Samaritan House Warehouse Building

CHFA

CO Episcopal Service Corps

Denver Inner City Parish

Empowerment Program - Baldame Apts.

First Unitarian Society of Denver

Mile High Ministries- Joshua Station

PCs for People - store

PCs for People - warehouse

People House

PPRM

Project Angel Heart

Providence Network- Champa House

Providence Network- Silver Lining House

Purple Door Coffee Shop

Step Denver- Recovery Center

Su Teatro - lighting

The Salvation Army - Denver Red Shield

Third Way Center - Phase II

# Benefits of weatherization

## Improve safety and comfort

- Reduce exposure to carbon monoxide and improve indoor air quality
- Reduce noise inside the home

## Save more money than invested

- Reduce utility bills annually

## Create local jobs



---

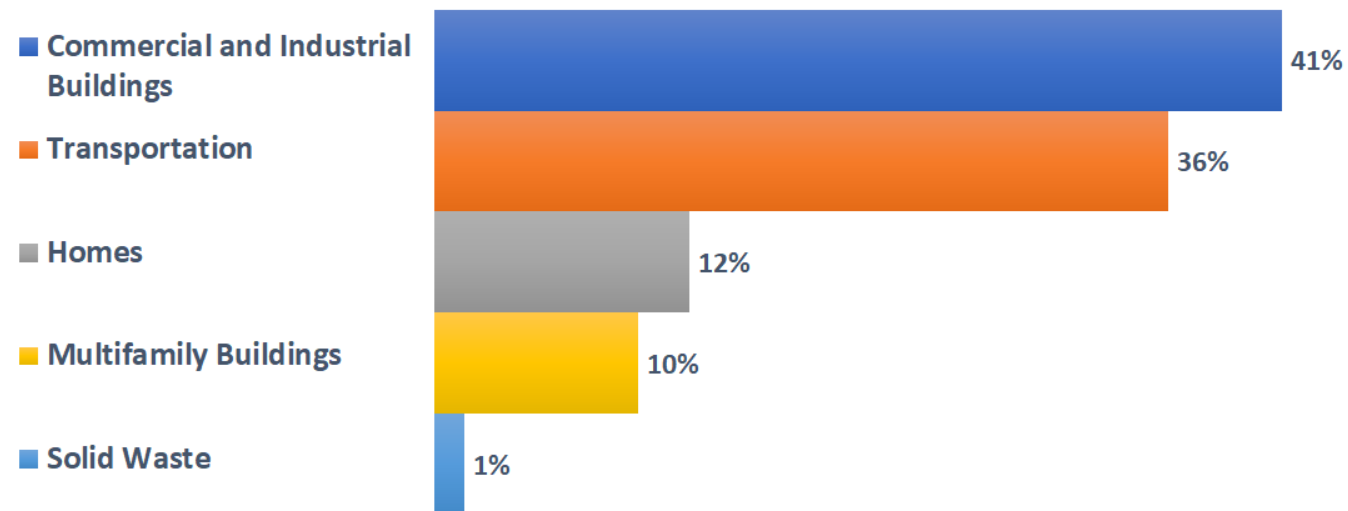
# Denver Moves Multimodal Transportation



# Climate and Transportation

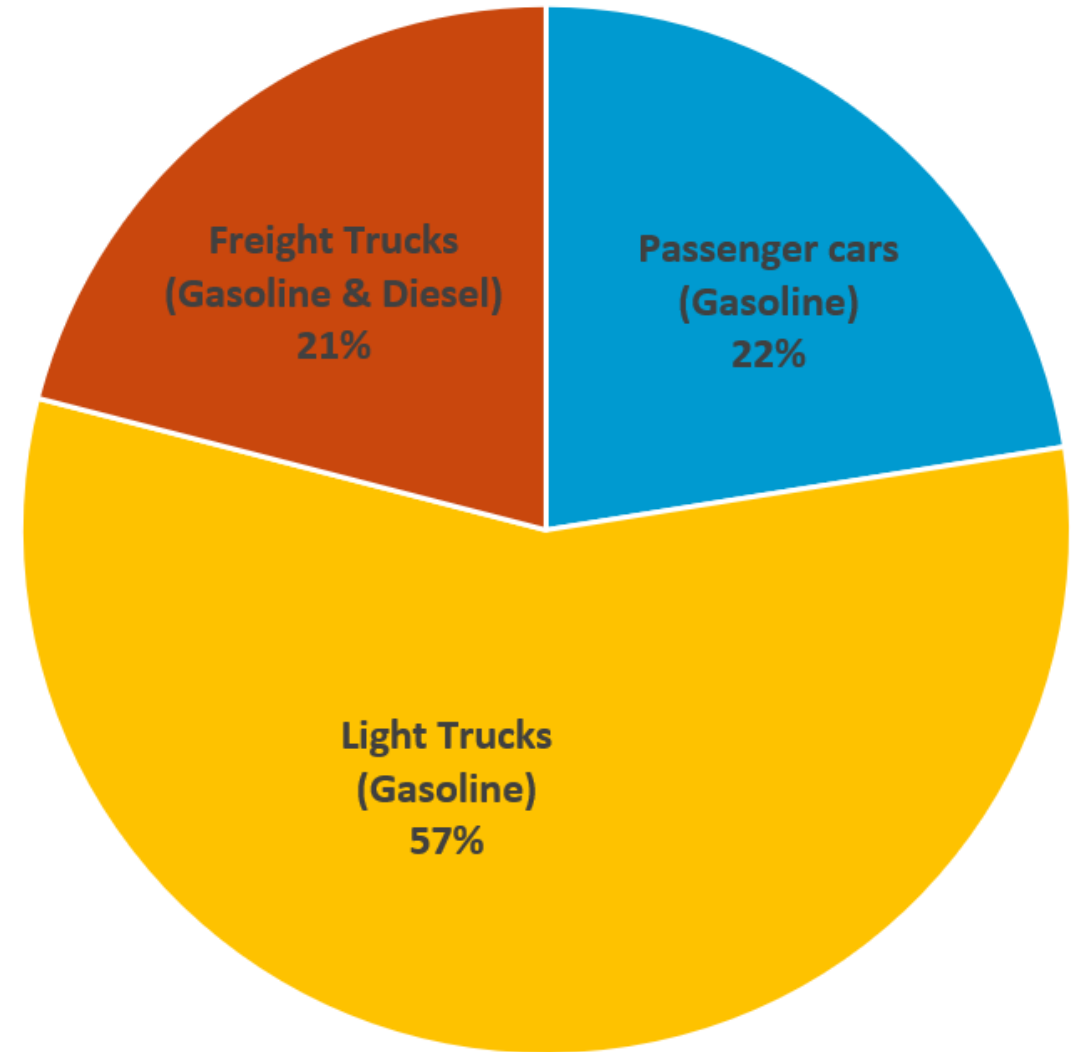
- Meeting Denver's climate goals means reducing driving
- Transportation is largest source of air pollution and the second largest source of greenhouse gas emissions

Denver's Greenhouse Gas Emissions



# Transportation Emissions in Denver

- Mostly from passenger cars and light trucks



# Climate and Transportation

Transportation emission reductions strategies include:

- Transit, like light-rail and buses
- Active transportation, i.e biking and walking (zero emissions!)
- Shared mobility, including e-scooters and bikes

Not only climate strategies, but improve safety & quality of life

# Mayor's Mobility Action Plan

\$2+ billion over the next 12 years to make it safer and easier to get where we need to go.

## Denver's Mobility Action Plan

Denver is ready to transform its transportation system.

30%

Commuters biking, walking or taking transit by 2030

80%

Reduction of emissions by 2050

Zero

Traffic Deaths by 2030

## Strategic Goals



### CHOICE

Providing more choices: Walk, Bike, Drive, Transit or Share



### SAFETY

Improving safety through Vision Zero



### CLIMATE & HEALTH

Expanding use of electric vehicles and charging stations



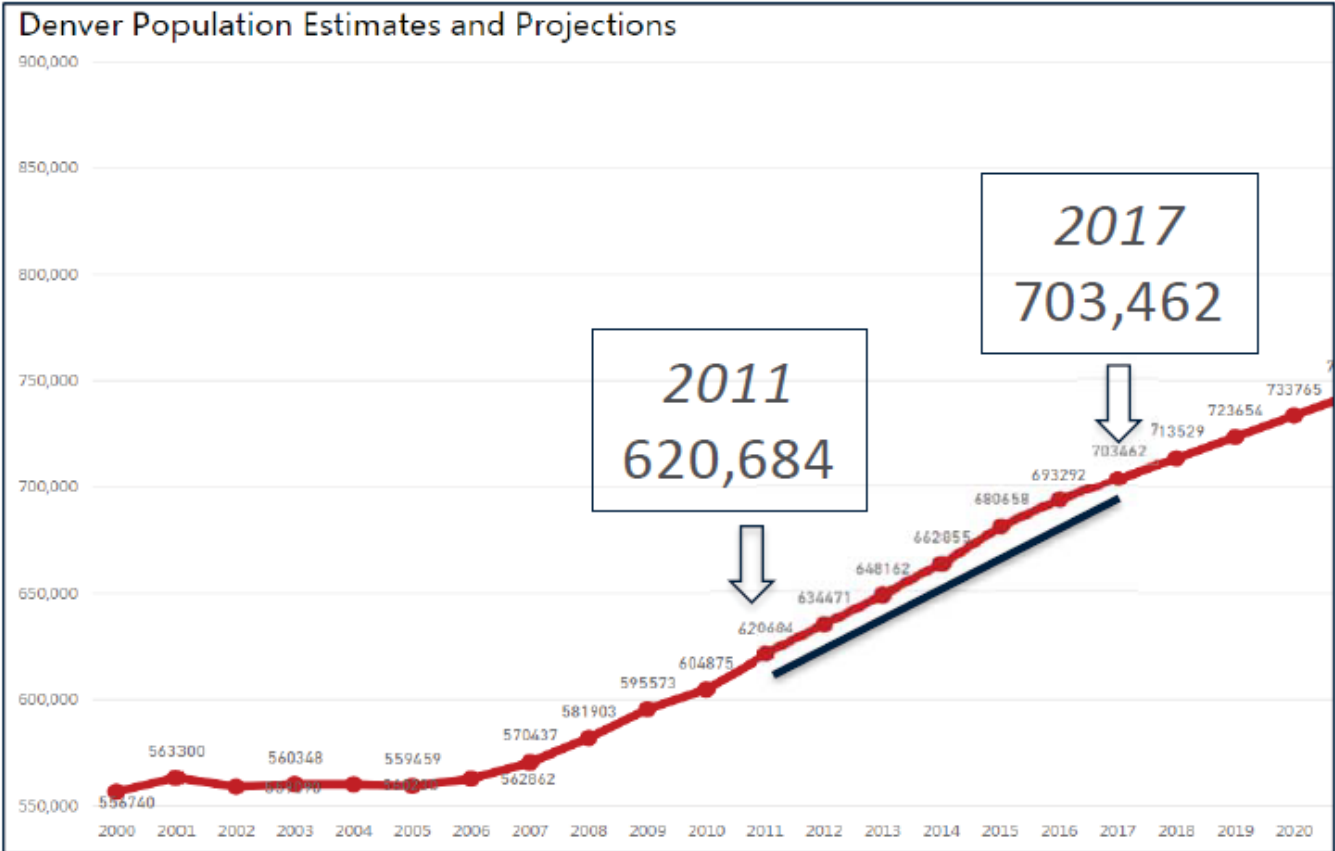
### ACCESSIBILITY

Increasing technology to make your trip easier and faster

# Denverright

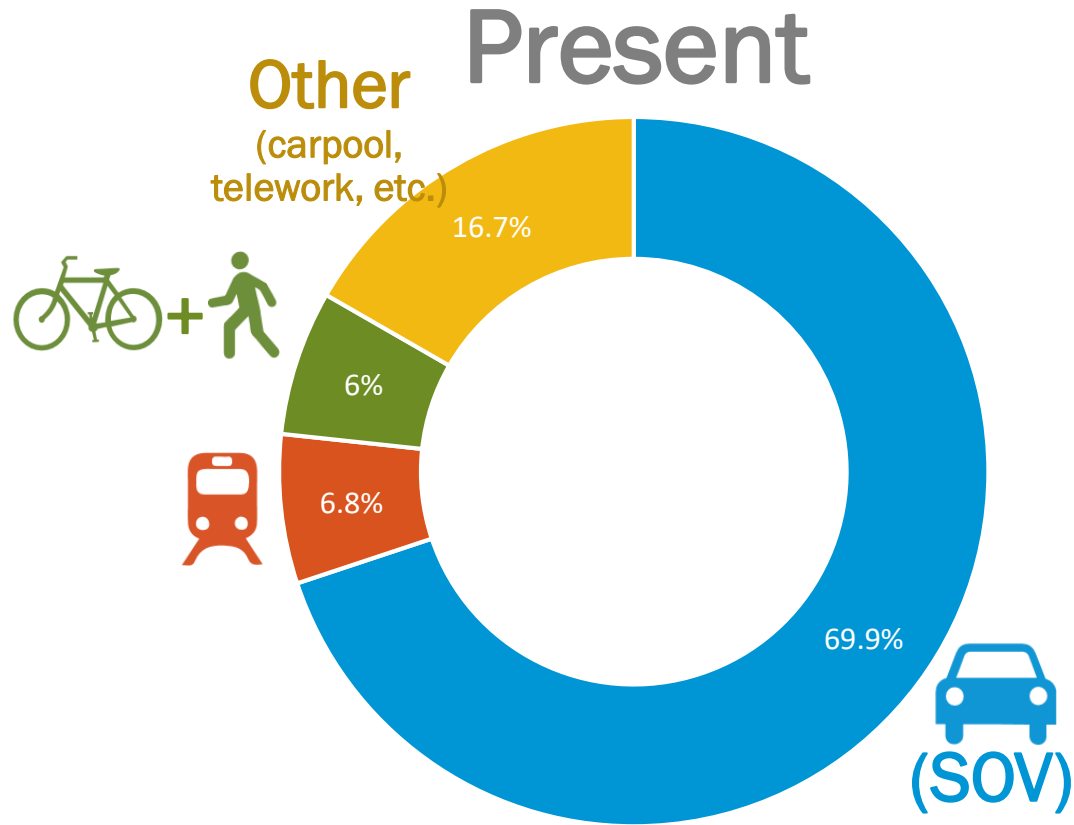


# Growth in Denver

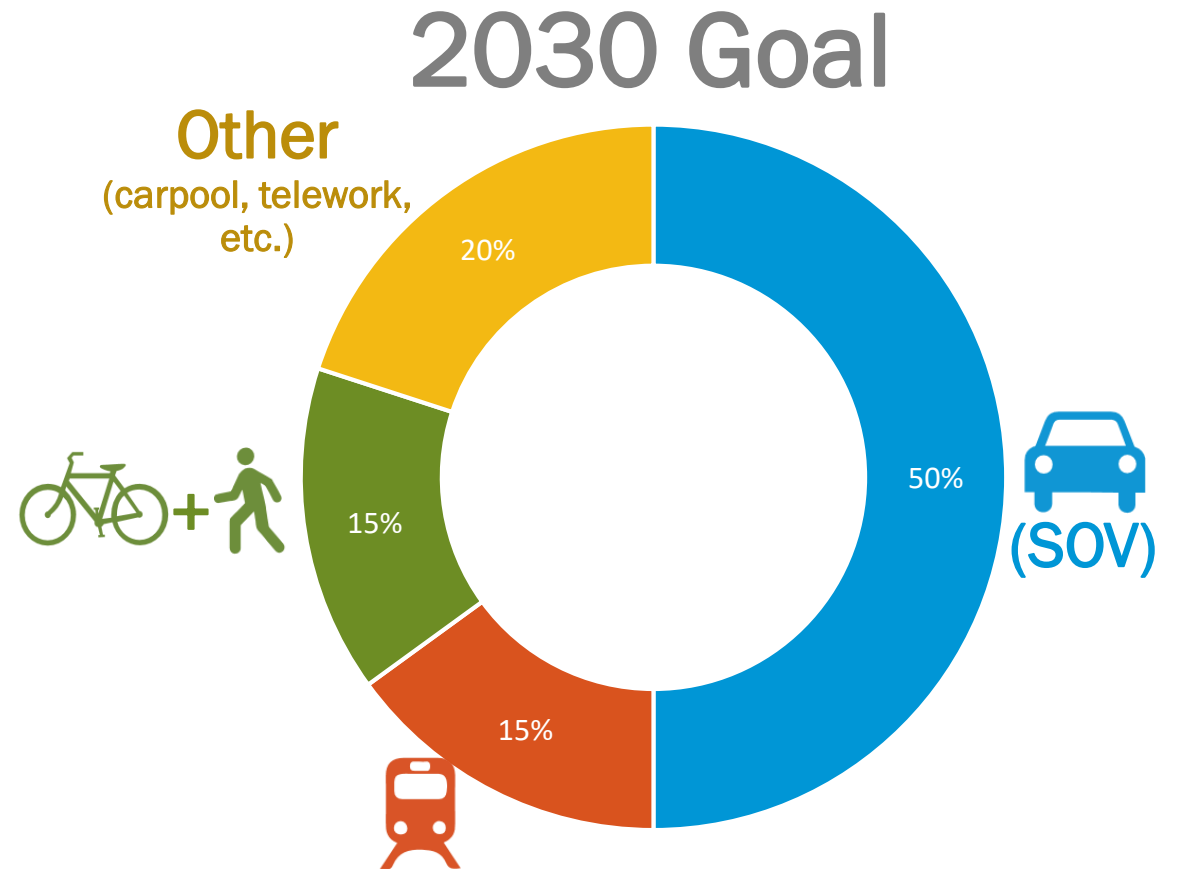


Source: Colorado Demography Office

# Commute Mode-Share



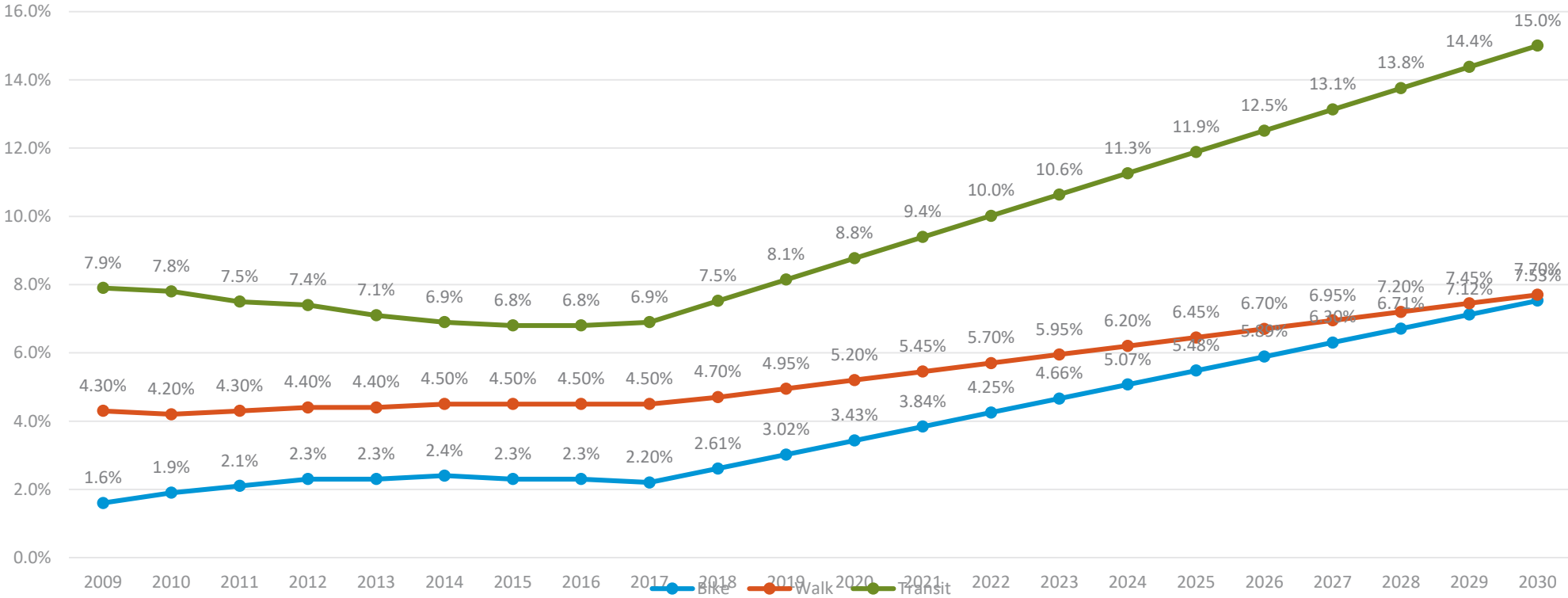
Source: American Community Survey 7-Year Estimates, U.S. Census Bureau, 2017



Source: Denver's Mobility Action Plan, 2017

# Increase in Mode Shift - 2030

Needed Transit, Walk, Bike Mode Share Increase by Year to Reach 15% Goal







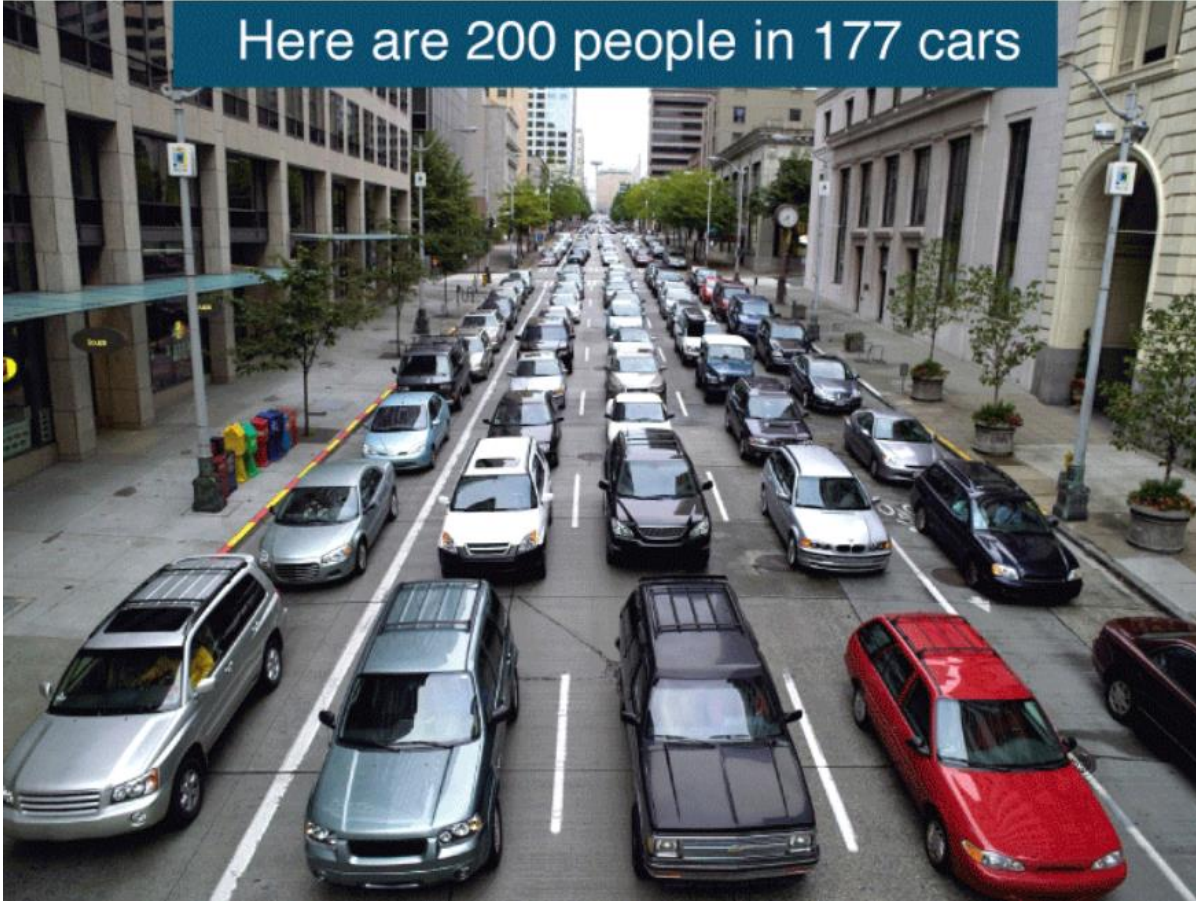
---

# Transit Program

# Transit as a climate strategy

- Current transit reduces vehicle travel 10% in U.S. cities
- Public transportation = shared trips among many people = efficient system
- Light rail in Denver uses 37% less energy per passenger mile than a car does

Here are 200 people in 177 cars

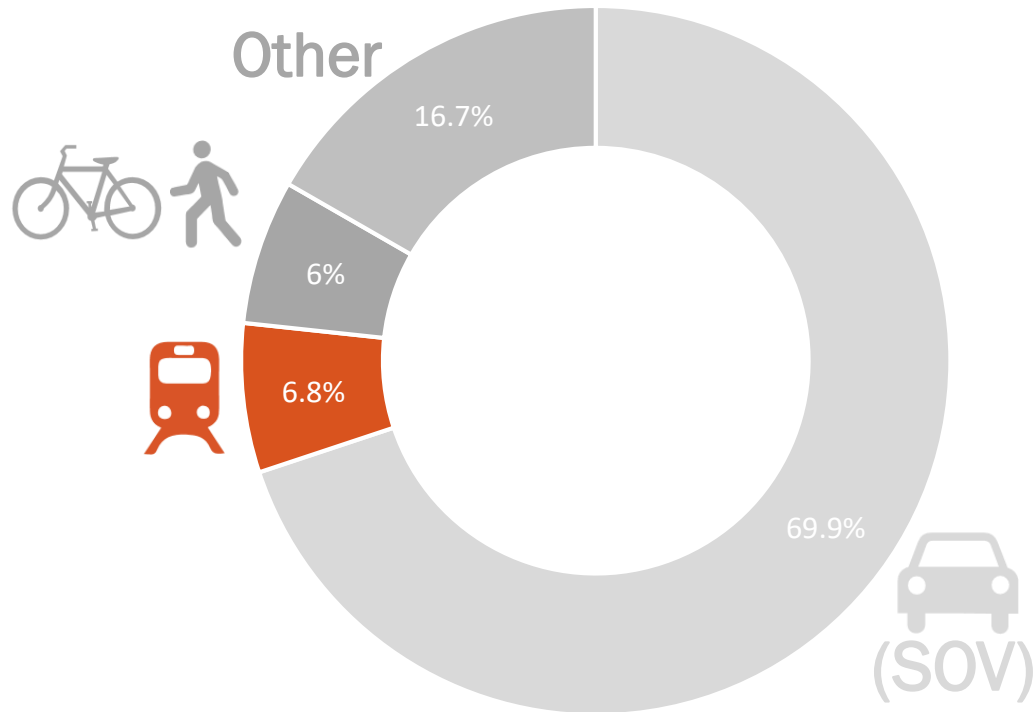


on 1 light rail train



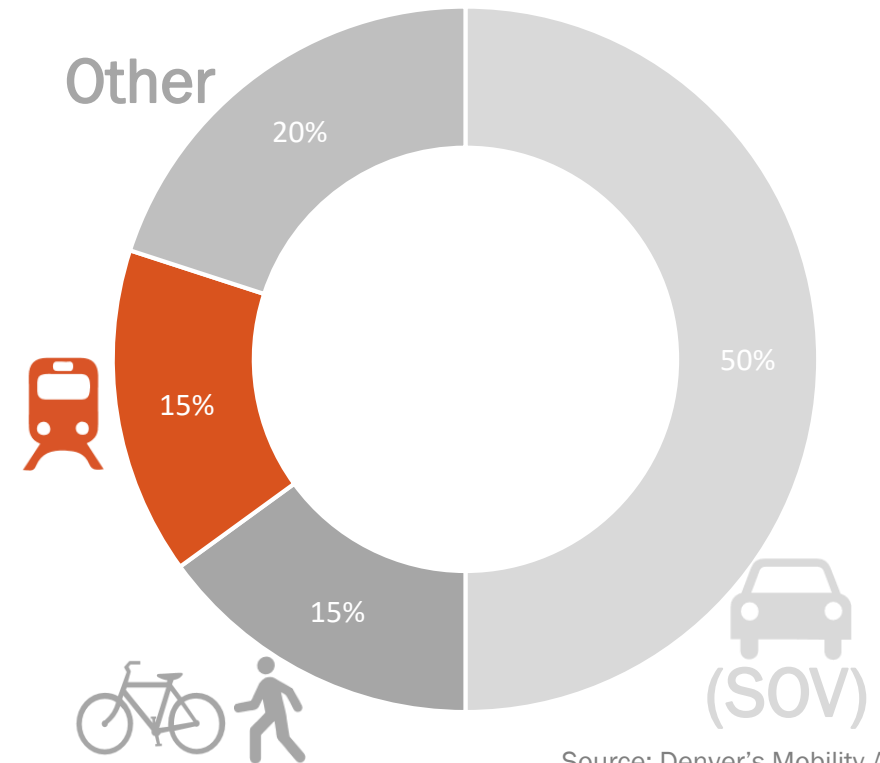
# Goal: Double # of People Taking Transit

## Present



Source: American Community Survey 7-Year Estimates, U.S. Census Bureau, 2017

## 2030



Source: Denver's Mobility Action Plan, 2017

# 15% Transit Mode Share by 2030



Per year over the next 13 years



Overall, transit commuter increase (2017-2030)

Source: 2009-2016 ACS 5-year Commute to Work  
Source: 2017 ACS 1-year Commute to Work

# Transit Strategies

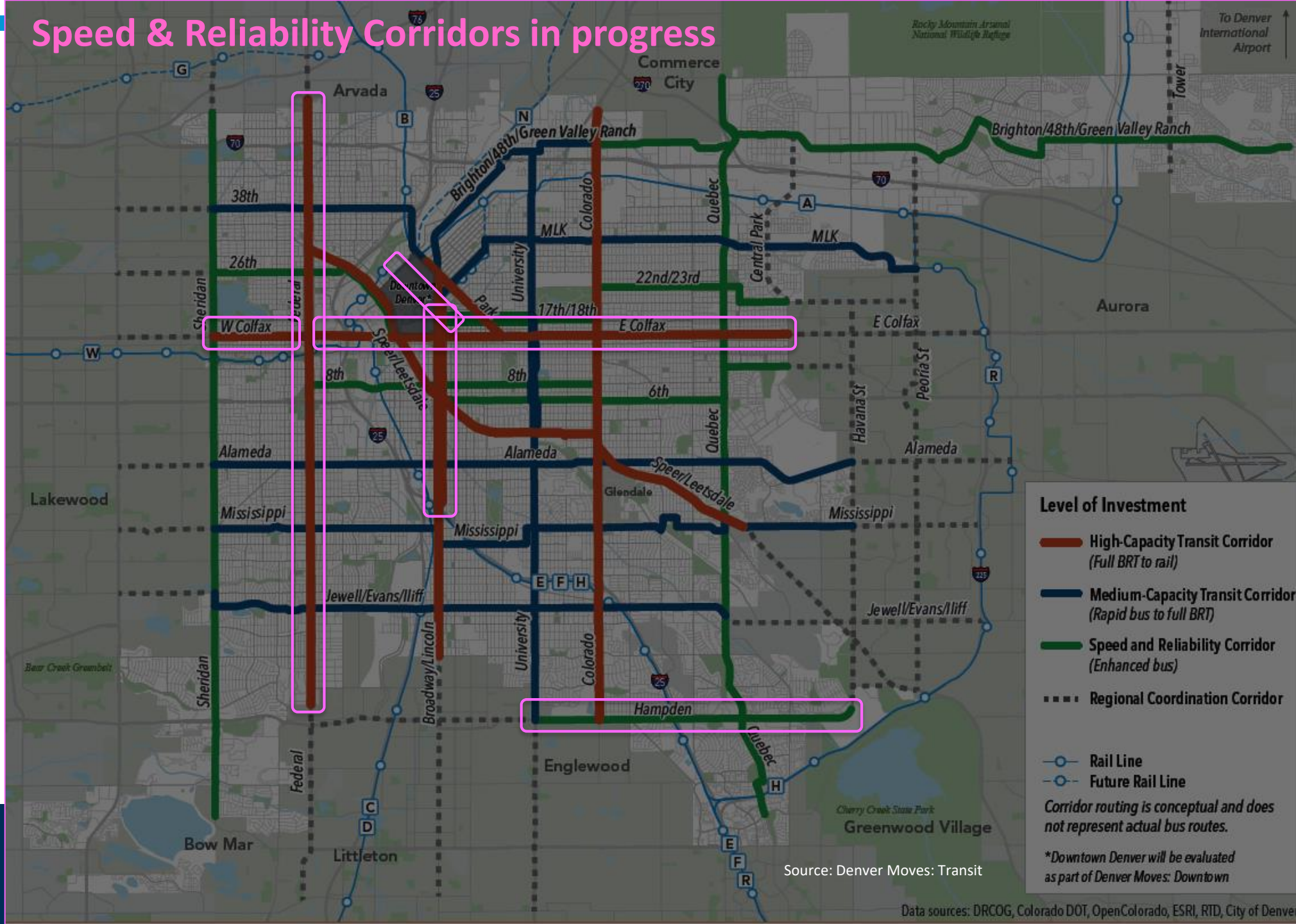
## 1. Improve Speed and Reliability of Buses

- Get buses out of traffic, moving more quickly and on schedule
- 1-2 Speed and Reliability Corridors implemented each year for next 5 years
  - Federal Blvd.
  - Broadway/Lincoln
  - 15th/17th St.
  - 18th/19th St.
  - West Colfax
  - East Colfax (15L – RTD)



# Speed & Reliability Corridors in progress

Federal  
E. Colfax  
W. Colfax  
18<sup>th</sup>/19<sup>th</sup> St.  
Bway/Lincoln  
Hampden



# Transit Strategies

## 2. Increase frequency

- Goal: 75% of residents within  $\frac{1}{4}$  mile of frequent transit

## 3. Improve experience

- Goal: Improve up to 100 bus stops by 2024





---

# Bike Program



# Bikes as a climate strategy

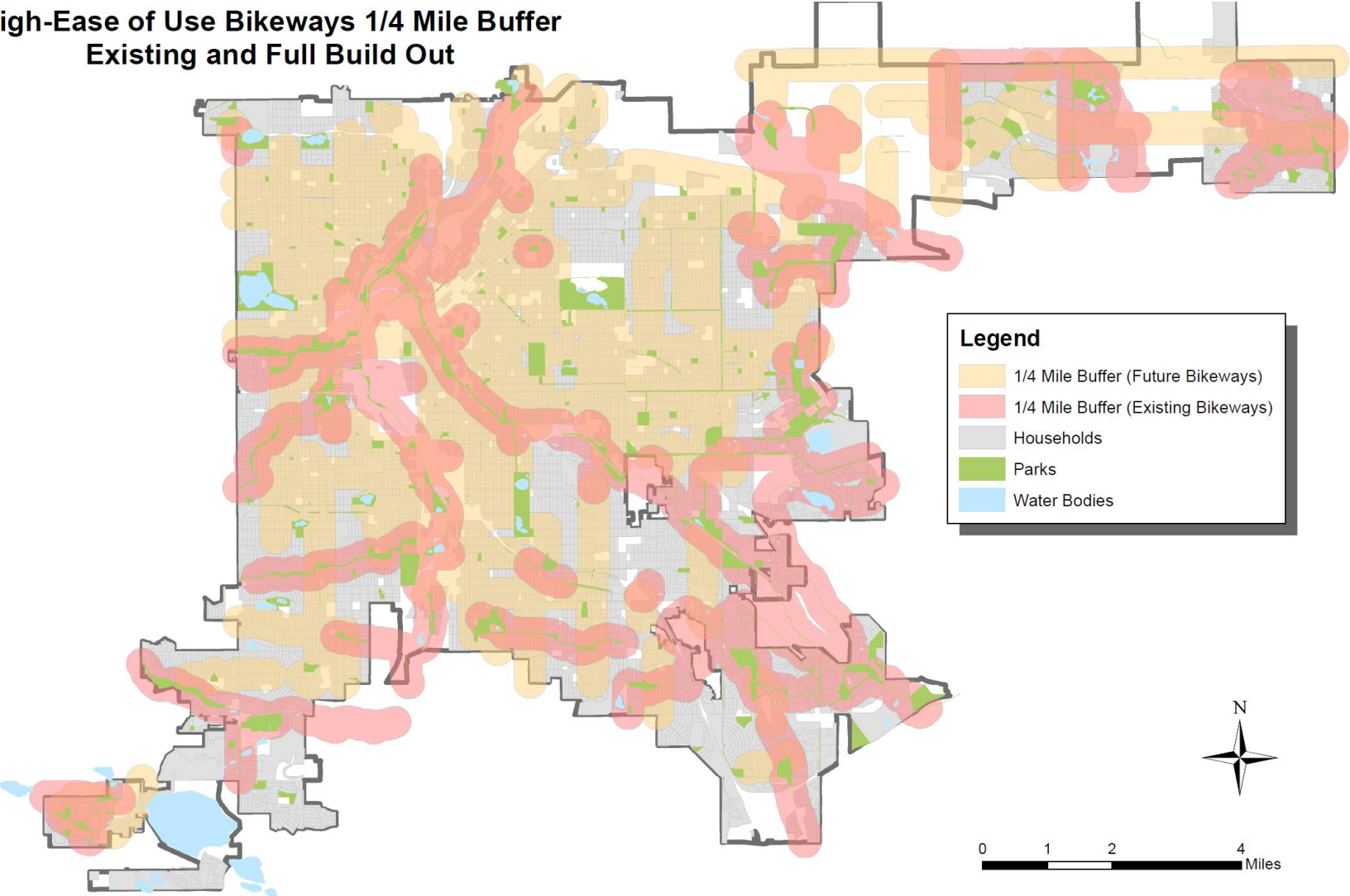
- 1/2 of all trips in U.S. are less than 3 miles = 20 minute bike ride
- Zero emission mode to substitute car travel
- Study: commitment to bicycle infrastructure in cities globally could reduce urban transportation emissions 11%

# Bike Goals

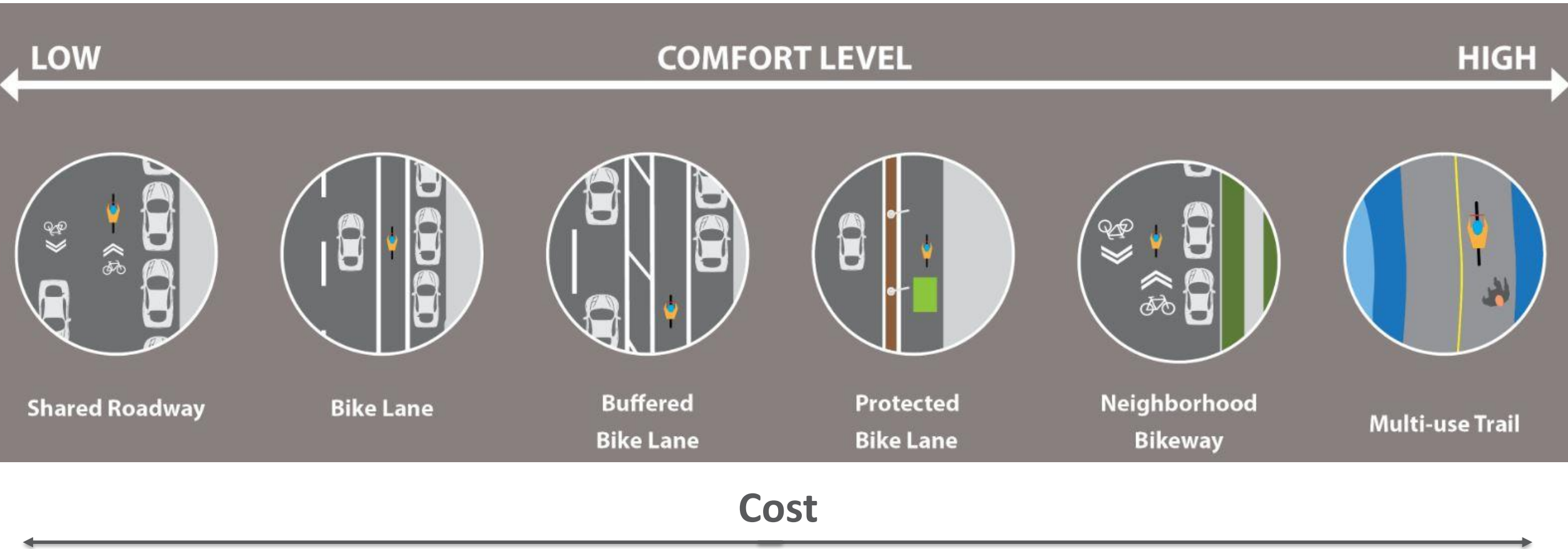
- 7.5% Bike Mode Share
- All of Denver within ¼ Mile High Comfort Facility
- 125 Miles of bikeways in 5 years



# High-Ease of Use Bikeways 1/4 Mile Buffer Existing and Full Build Out



# Building the Right Bikeways



# Bikeways to Move People

Strong/Fearless – will ride with no bikeways

Enthused/Confident – will ride with some bikeways

Interested/Concerned – want high quality bikeways



# Funding Bikeways:

## GENERAL OBLIGATION BOND 2017

\$18mil

Total Miles:

54.2 mi



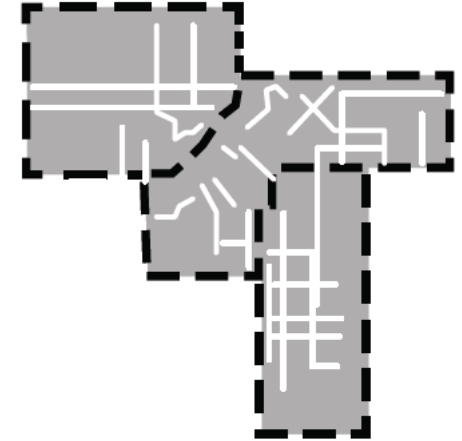
## CIP BIKEWAY PROGRAM

\$15.4mil (total 2019-2021)

Total Miles:

~75

COMMUNITY NETWORKS (100 mi.)



+ PAVING PROJECTS (~10 mi/year)





---

# Pedestrian Program

# Walking as a climate strategy

- 4 of all trips in U.S. are less than 1 mile = 20 minute walk
- Zero emission mode to substitute car travel
- Walking facilitates connections to transit

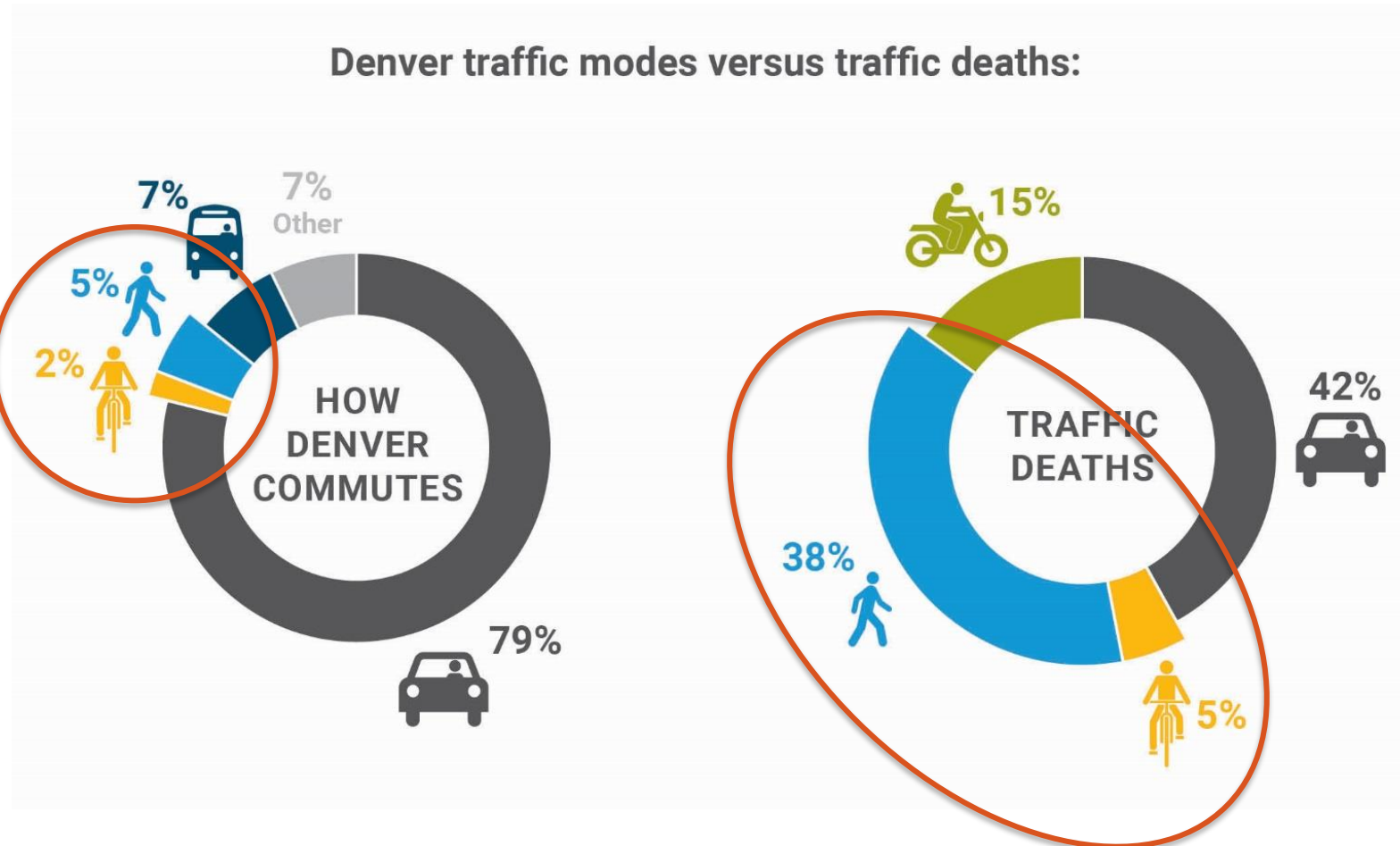


# Pedestrian Goals

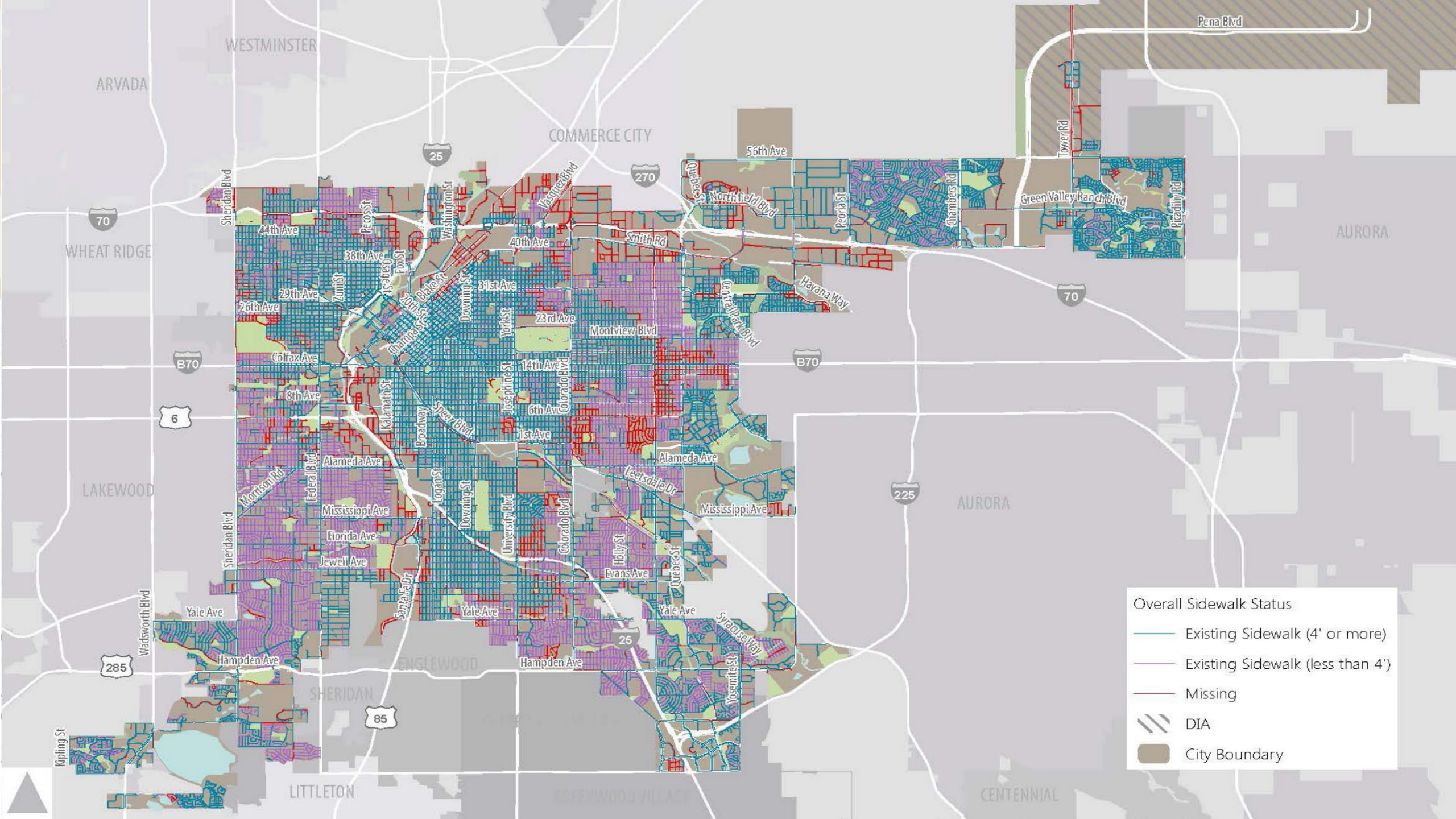
- 7.5% Walk Mode Share
- 14+ miles of sidewalks built/year
- 10 Intersection Improvements/year



# Mode Goals Necessitate Safe Streets



Source: [Denver Vision Zero Action Plan](#)



Tie r	Criteria
1	Vision Zero High Injury Network
2	High Frequency Transit Connectivity and Priority Destination
3	High Frequency Transit Access
4	Transit Access
5	High Priority Destination Access



# Building Sidewalks in Denver:

## GENERAL OBLIGATION BOND 2017

\$47mil (10-year term)

Miles Per Year\*:

4.7 mi



## CAPITAL IMPROVEMENT PROGRAM

\$2.3mil (avg. of 2017-2019)

Miles Per Year\*:

2.3 mi



## DEVELOPER CONSTRUCTED

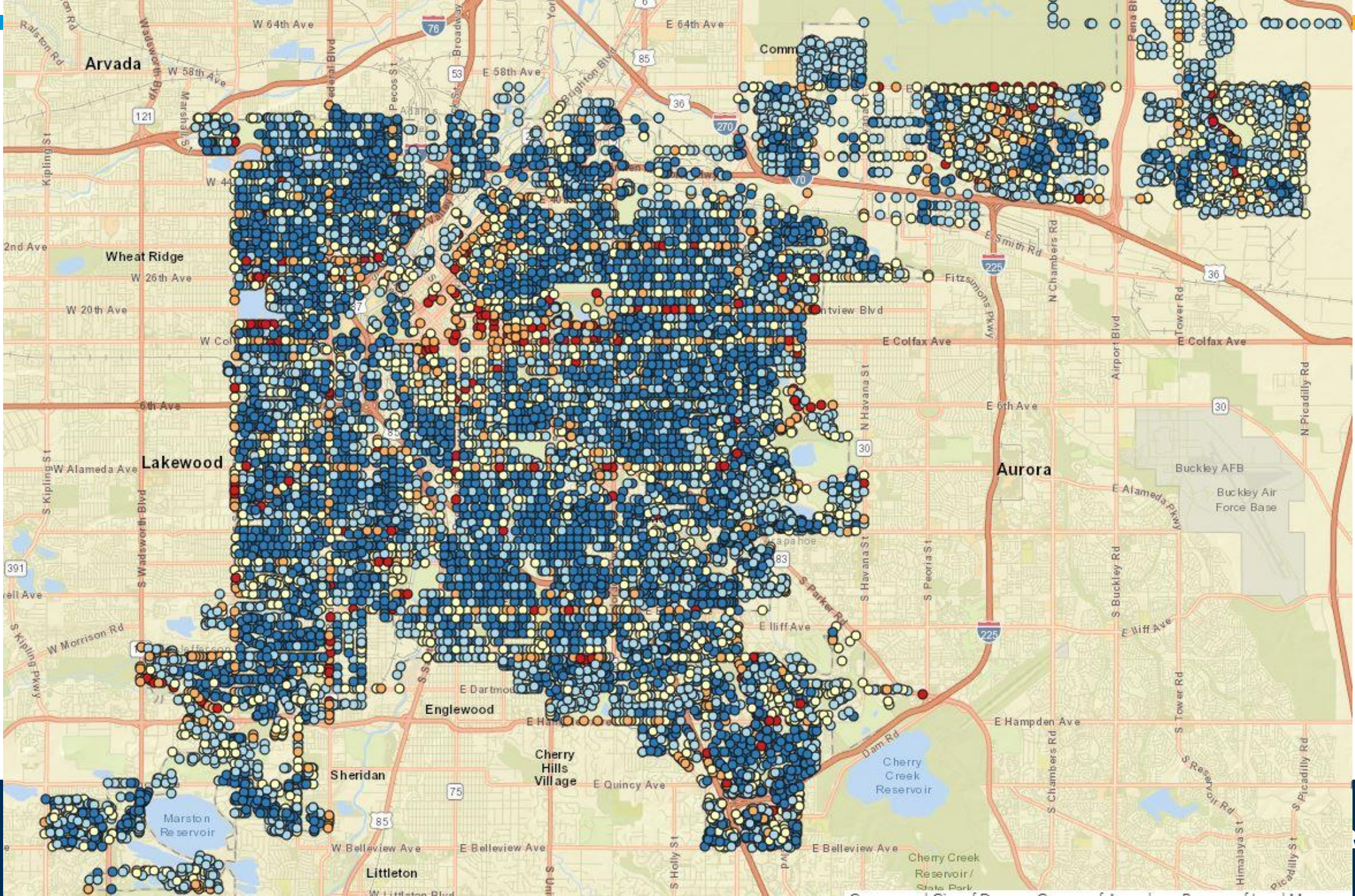
\$0

Miles Per Year\*:

~1 mi\*\*

*\*Assuming sidewalks average \$1mil per mile. Many sidewalks will exceed this conservative estimate.*

*\*\*Estimate based on sample assessment of Go Bond Funded Sidewalks that have been built since 2016*





---

# Shared Mobility Program

# Shared mobility as a climate strategy

- Gives people access to lower-emission modes for particular trips
- Can substitute for car ownership where every person needs their own car





# Shared Mobility

## Rideshare



2018 Trips = Unknown

## Dockless Mobility Pilot



2018 Trips = 1,500,000+

## Carshare



2018 Trips = 764,150

## Bike Share

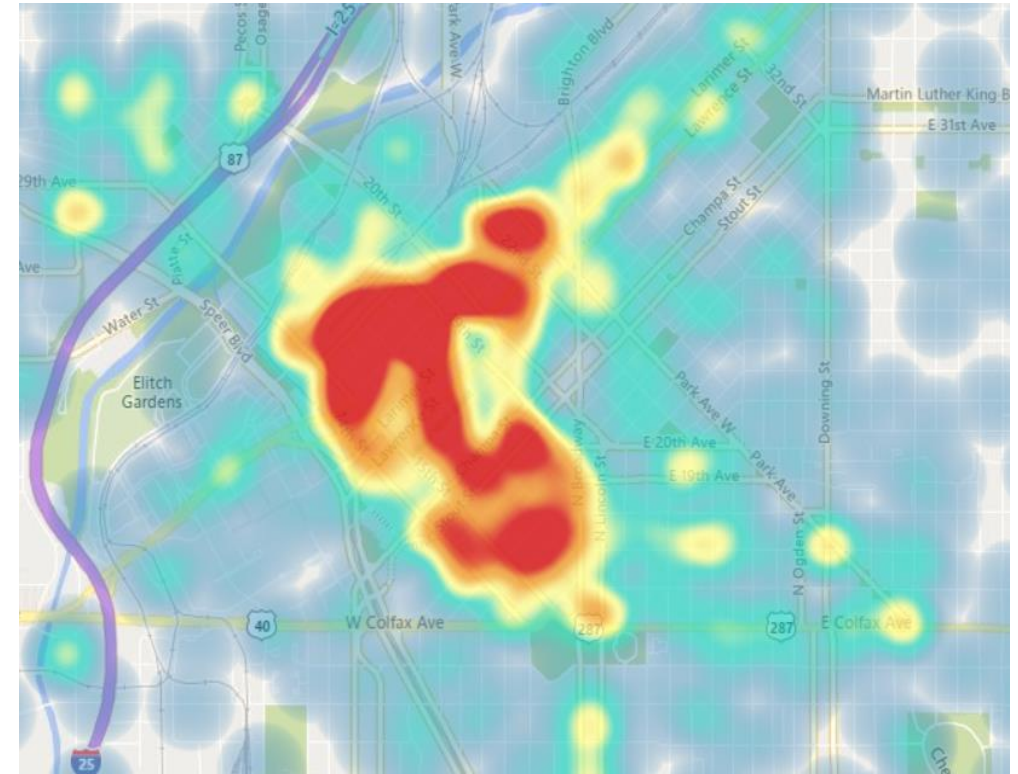


2018 Trips = 305,440

# Dockless Mobility Pilot Program

- Pilot launched July 2018
- **Over 1,500,000 rides to-date**
  - 20% of users ride a scooter to/from a transit stop at least once per week
  - **30% of trips replaced automobile trips** for a reduction of 570,000 miles travelled

## Real-Time Data Tracking



# Dockless Mobility Pilot Program

- Formal permit program launching now
- Potentially more stringent data & compliance
- Permits can be revoked
- More information needed to assess if dockless mobility services are helping fulfill goals





---

# Transportation Demand Management Program

# Transportation Demand Management as a climate strategy

Transportation Demand Management (TDM) informs and encourages people to use more efficient modes than driving

- Tool to help achieve mode split goals: 15% biking/walking; 15% transit
- Integrates more sustainable transportation choices into development, land use, homes and businesses

Also helps mitigate impacts of growth

# TDM Strategies

- **Adopt TDM Plan:** integrate TDM strategies in new development and in city projects
- **Draft concepts being vetted** through PRC and LUTI
- Will give a **menu of transportation options** to include in new buildings (multi-unit residential & commercial)
- **Strategies based on estimated vehicle trip reduction** (which reduces emissions) to meet citywide goals

Examples of types of TDM strategies



## Services



Transit (RTD)



Microtransit (RTD FlexRide)



Car Share (ZipCar, car2go)



Shuttles



TNCs (Uber + Lyft)



Micromobility (scooters/bikes)



## Infrastructure



Curb Management



Bicycle Parking



Transit Stop Enhancements



Bicycle Repair Stations



Wayfinding



Showers/Changing Facilities



## Parking Management



Paid Parking



Unbundled Parking



Preferential Parking



Discounted Car-Pool Parking



Car-share Parking



## Subsidies



Transit Pass Discounts



Car-share Membership Discounts



Bike-share Membership Discounts



TNC Discounts



Micromobility Credits



Direct Payment to Service Providers



## Education



New Resident/Employee Welcome Kits



Information Kiosks



General Marketing



Bicycle Workshops



Websites/Apps



Trip Planning Assistance

# Mode shift as a climate strategy

- Denver's Climate Action Plan depends on mode shift goals
- The cleanest mile driven is the one that isn't



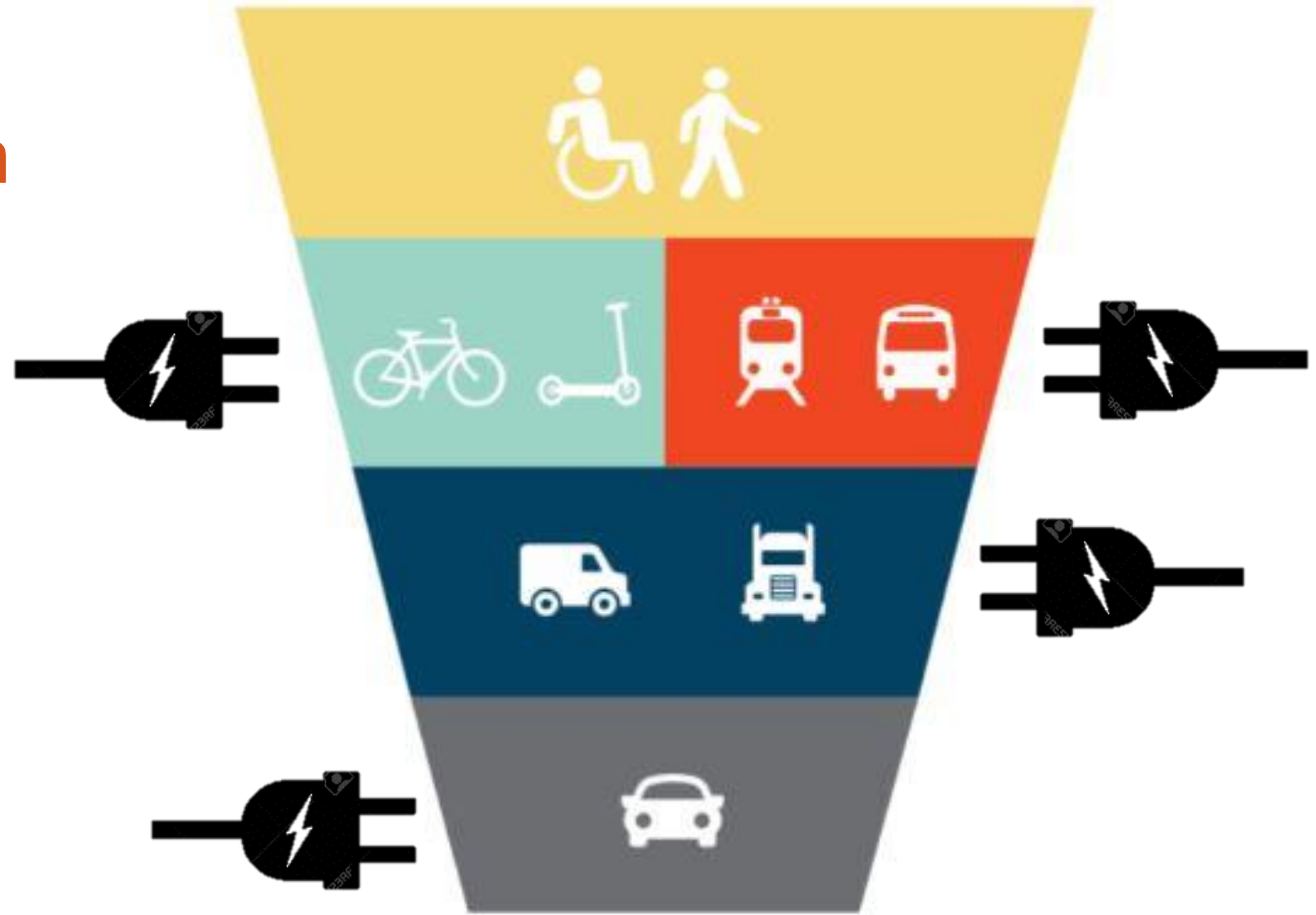




---

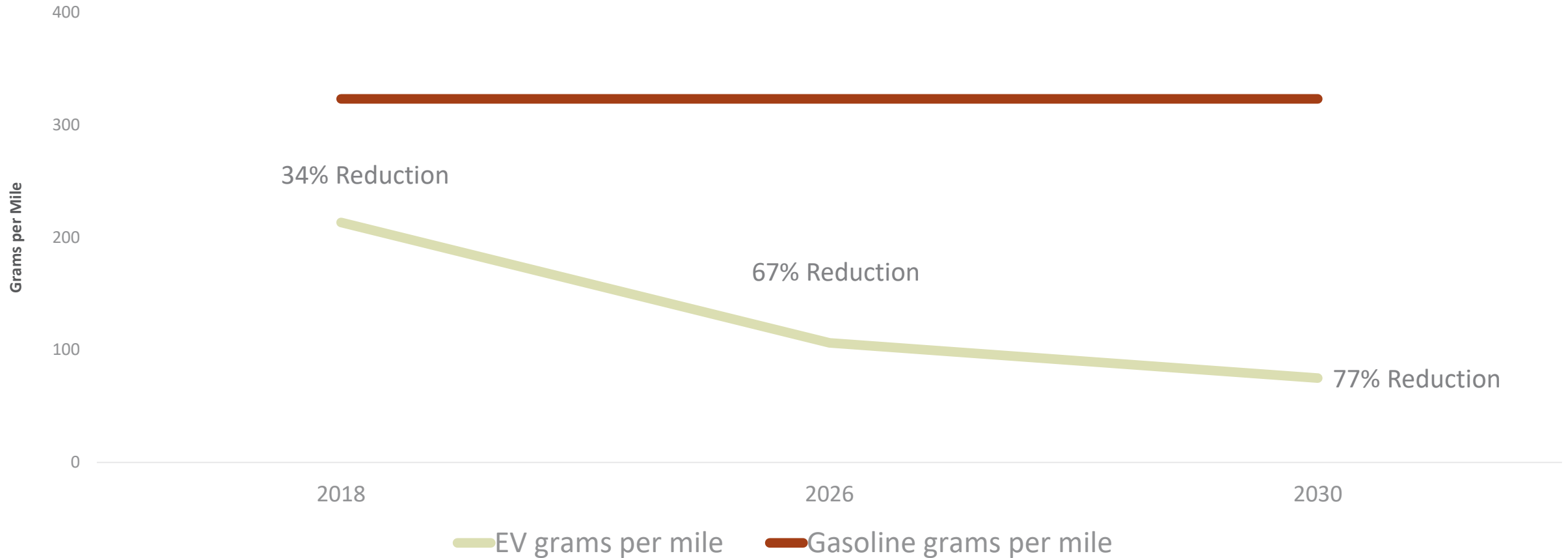
# Electric Vehicles

# Transportation Hierarchy



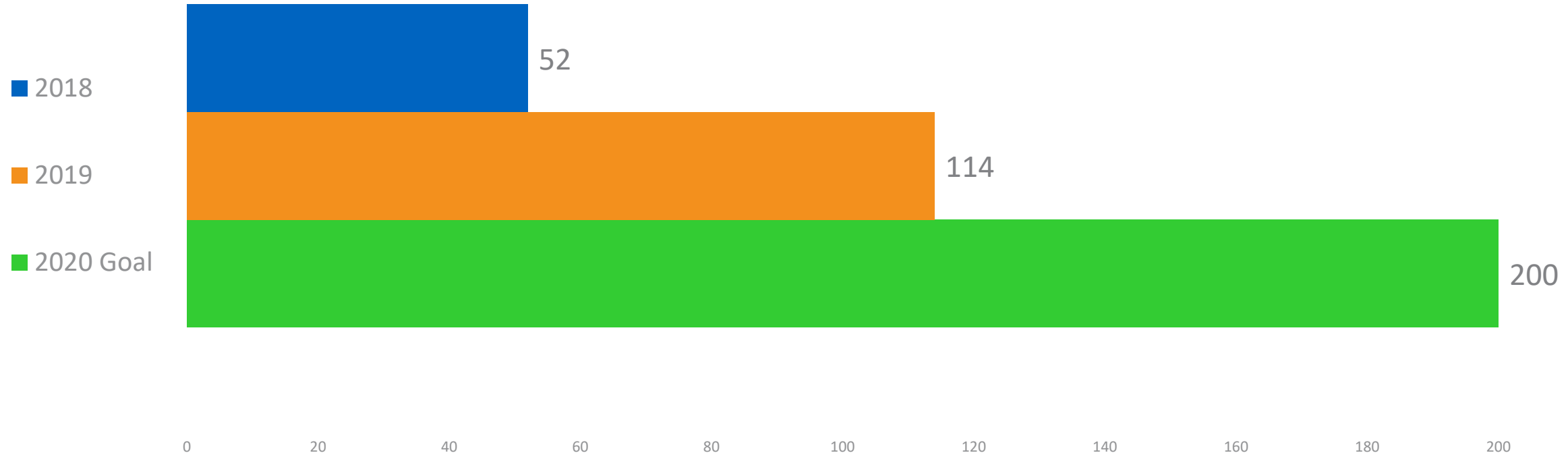
# Climate Benefits of Electric Vehicles

## Comparison of 2018 Gasoline and Electric Vehicle GHG Emissions over Time



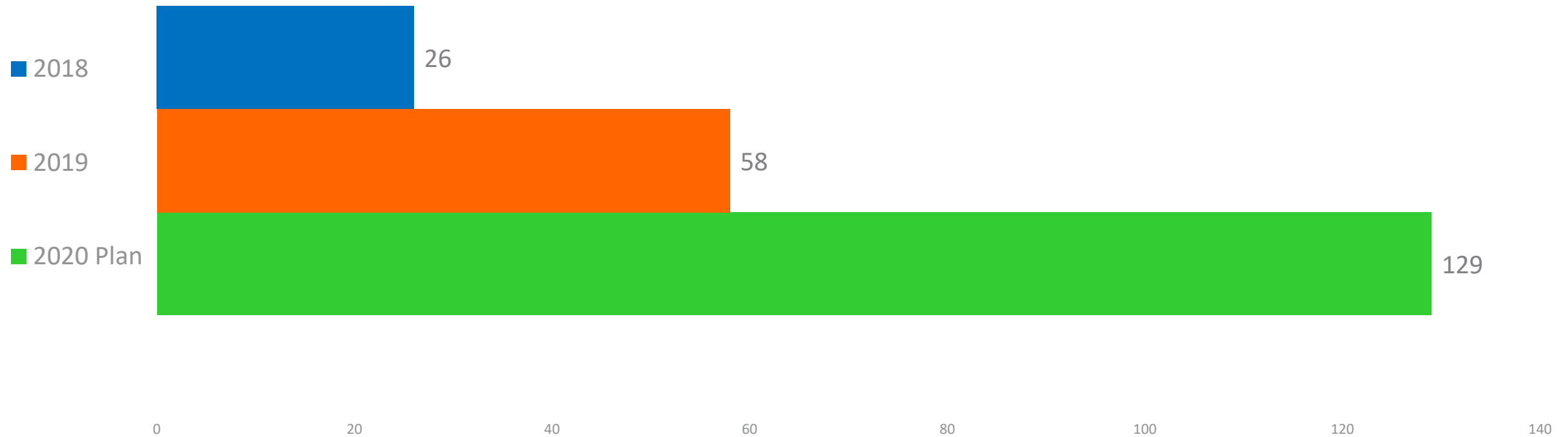
# City Fleet Goal: 200 Electric Vehicles by 2020

Denver Fleet: Number of Electric Vehicles



# City Fleet Goal: 200 Electric Vehicles by 2020

Denver Fleet: Number of Charging Stations



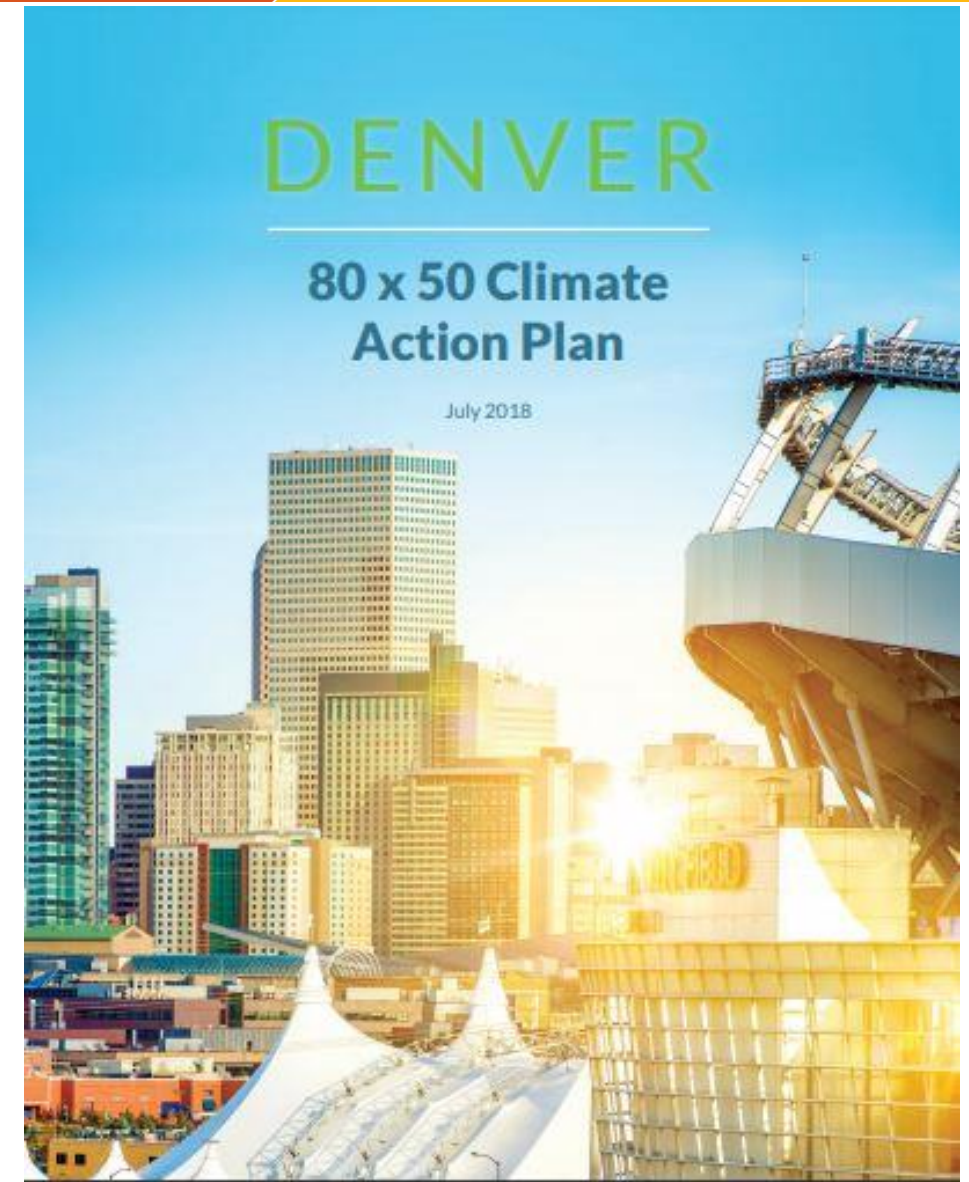
# Denver's Electrification Goals

- **Light Duty Vehicles**

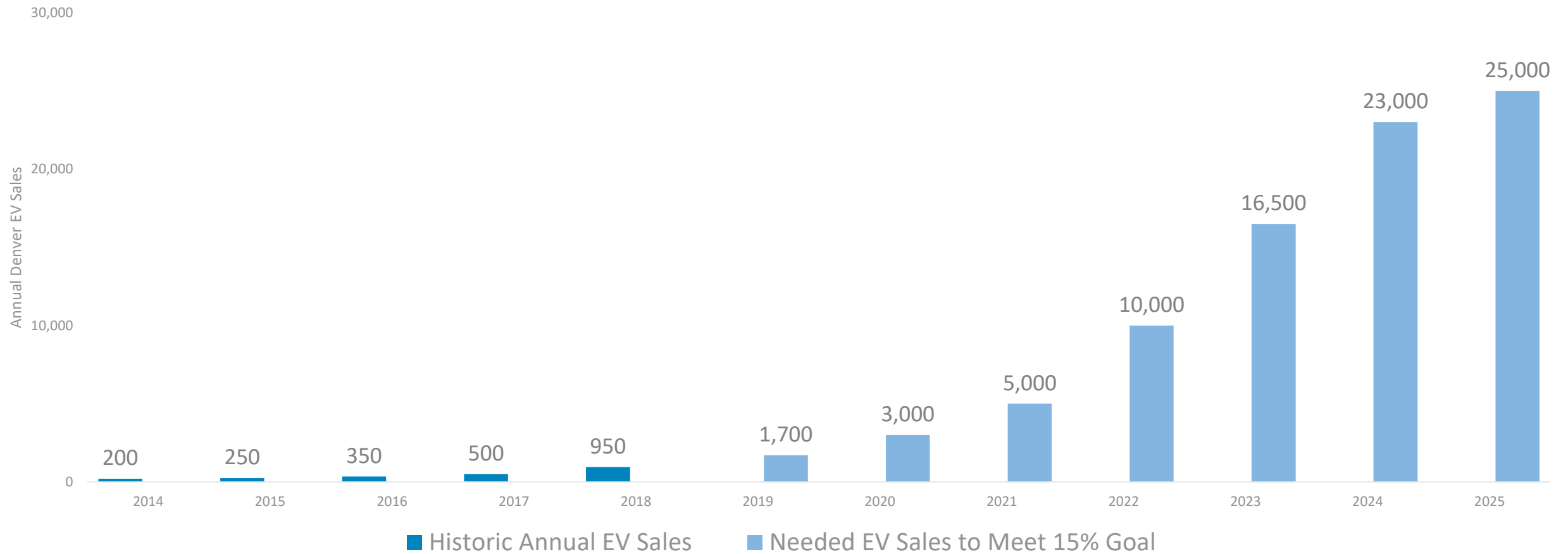
- 2025: 15% of Denver vehicle registrations are electric
- 2030: 30% of Denver vehicle registrations are electric
- 2050: 100% of Denver vehicle registrations are electric

- **Heavy Duty Vehicles and Fleets**

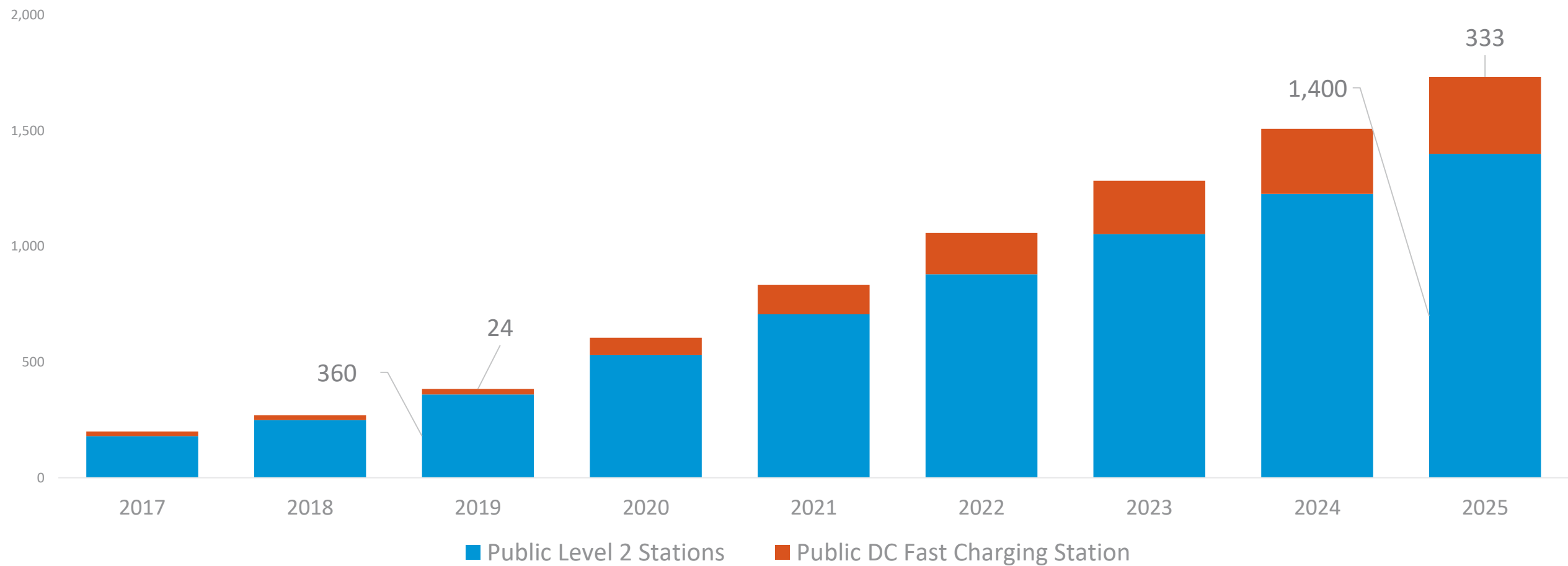
- 2050: 75% of freight trucks will use carbon neutral fuel
- 2050: 100% of taxis and transportation network vehicles are electric
- 2050: 100% of public transportation will be carbon free



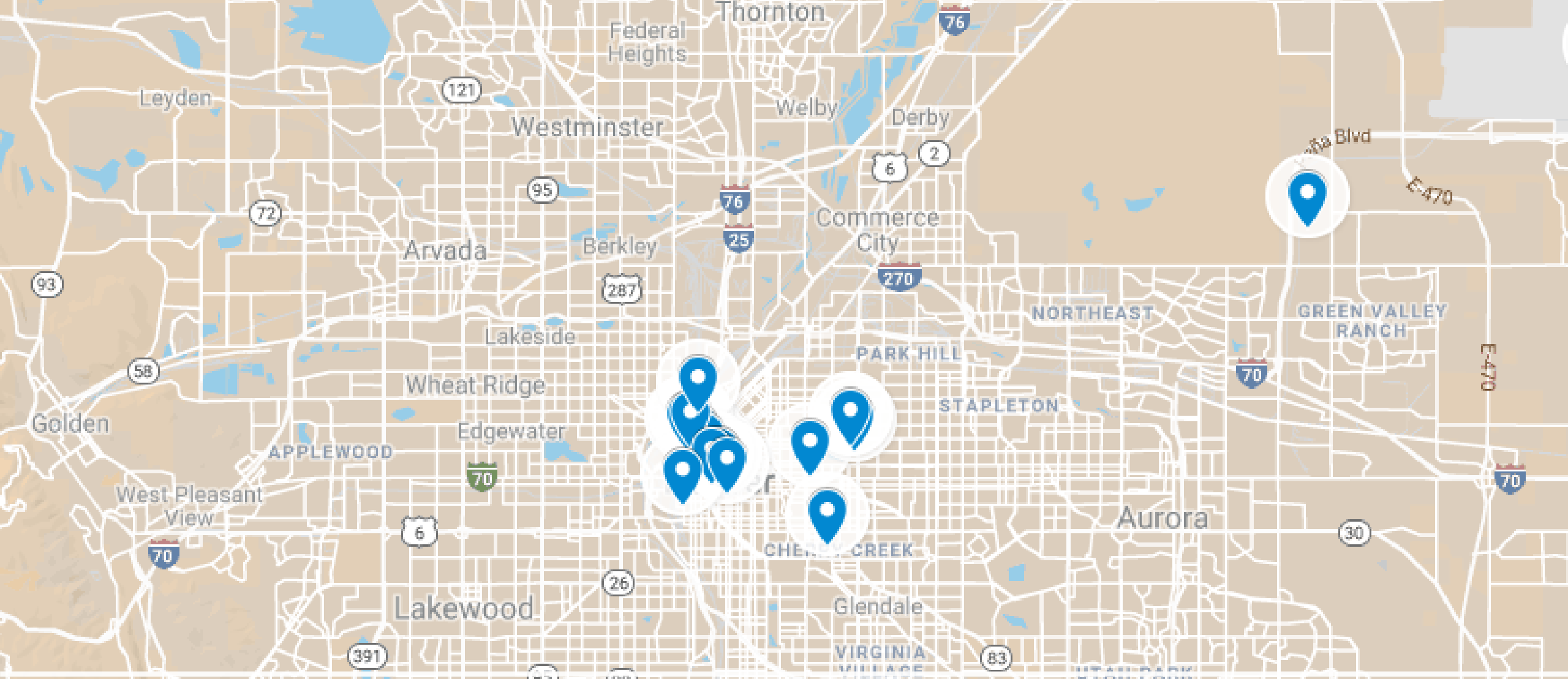
# Denver EV Sales Needed to Meet 15% Goal



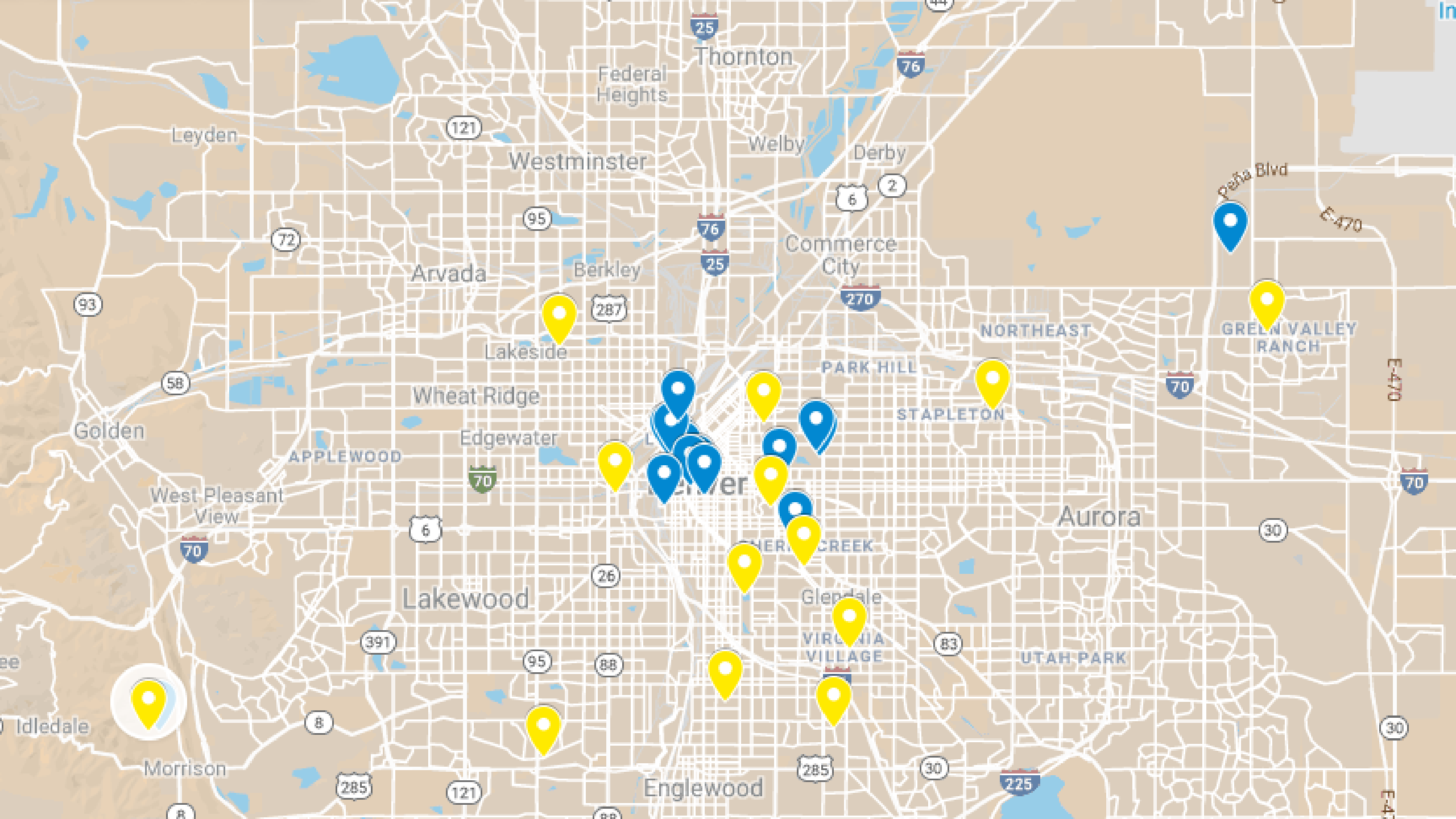
# Historic and Needed Publicly Available Charging Stations in Denver







# City Owned Public Charging Stations





# Electrifying Rideshare Vehicles



# Electrified Car Sharing in the Mariposa Neighborhood



# Proposed EV Ready Building Code Amendment

## Single Family

- Double Existing Required EV Ready Capacity

## Multi-Family

- 5% with Charging Stations
- 15% Wired
- 80% with Conduit

## Commercial

- 5% with Charging Stations
- 10% Wired
- 10% with Conduit

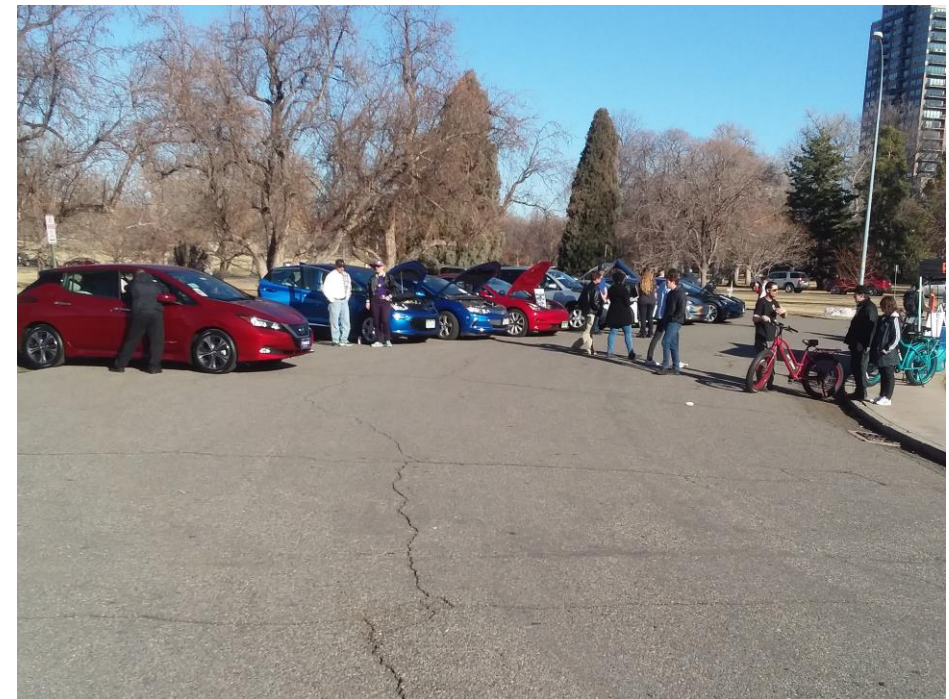
# Colorado's Zero Emission Vehicle Standard

## Denver co-led Local Government Coalition Support



# EV Education and Outreach Events

Upcoming EV Ride and Drive  
September 19<sup>th</sup>, 11-2  
On Bannock in front of City and County Building



# Gaps

- **Existing residents without home charging**
  - Neighborhood DC Fast Charging
  - Workplace Charging
  - Charging in the Right of Way
- **Access and Affordability**
  - Access to EVs in low-income neighborhoods, carshare, subsidies and new programs
  - Access to Charging
- **Lack of knowledge**
  - 85% of Coloradans don't know about state tax credit

# What Does Denver Need to Do?

- Reducing barriers (City policies) to private sector installation of charging stations
- Focused DC fast charging station deployment
- Expand Outreach and Education
- Update Building Codes
- Leverage partnership with Xcel Energy
- Targeted Incentives and Charging for Low Income Residents





---

# Land Use Planning

# Comprehensive Plan 2040





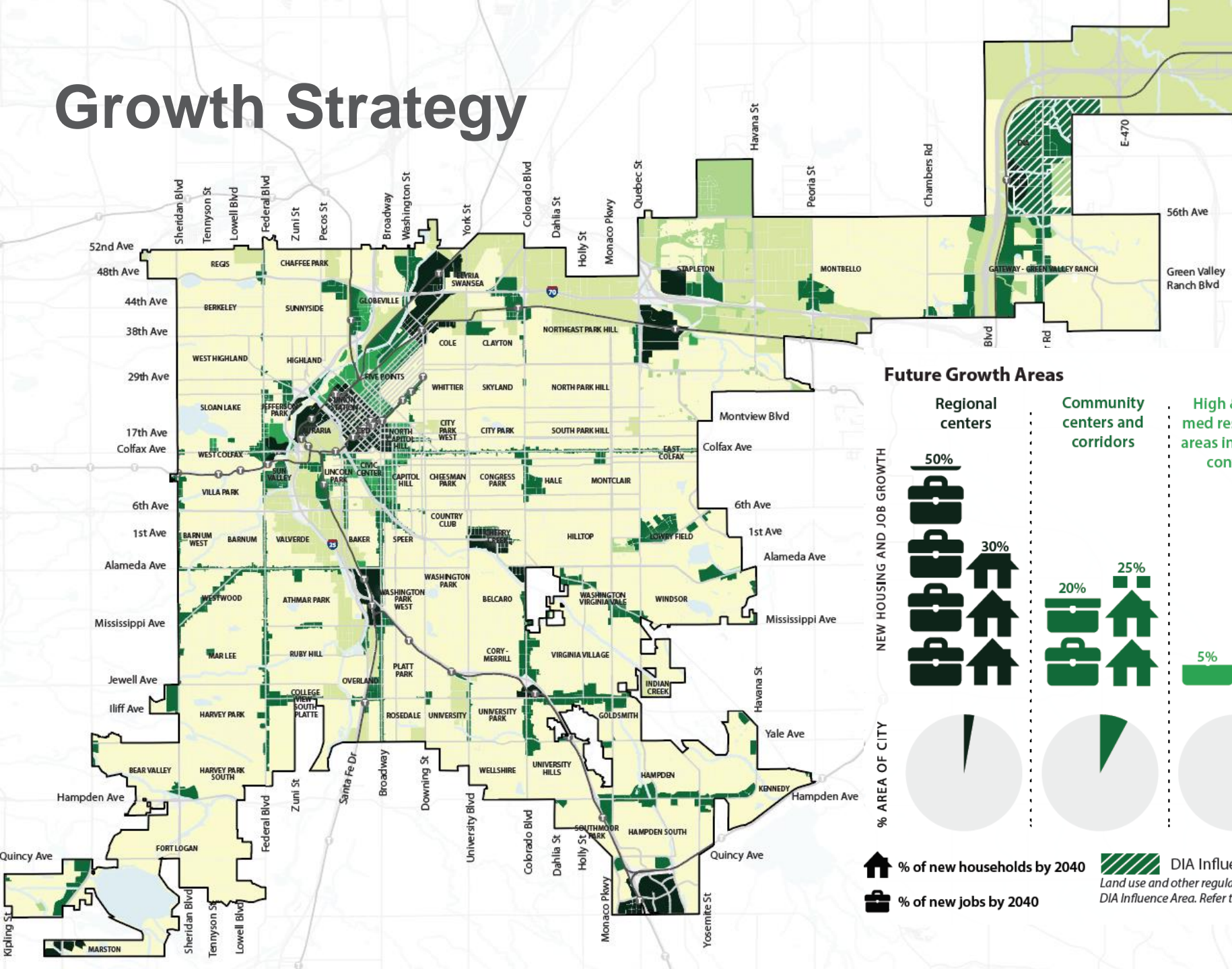
## MAJOR TOPICS COVERED

- Climate change and adaptation
- Water conservation
- Stormwater and green infrastructure
- Protecting waterways and the river
- Solid waste reduction

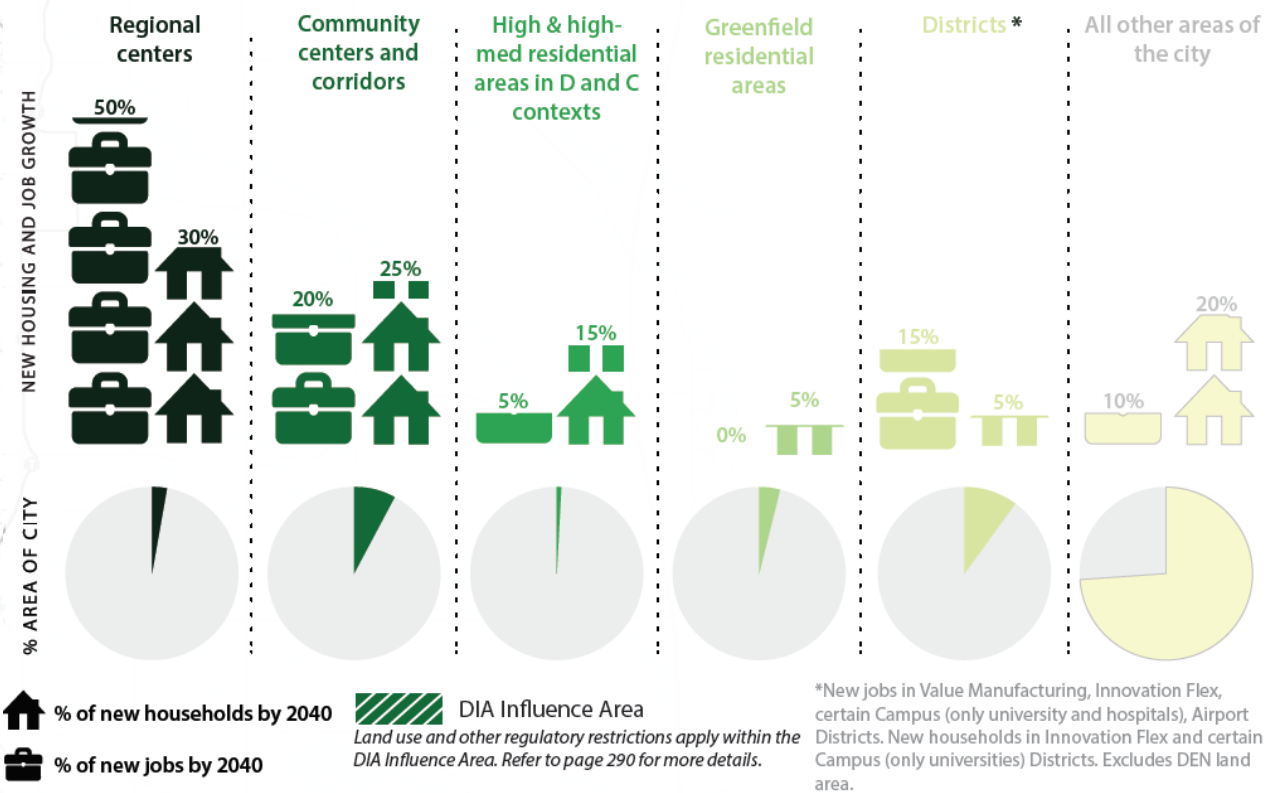
**In 2040...**

Denver is a thriving, livable city connected to nature and resilient to the forces of climate change.

# Growth Strategy



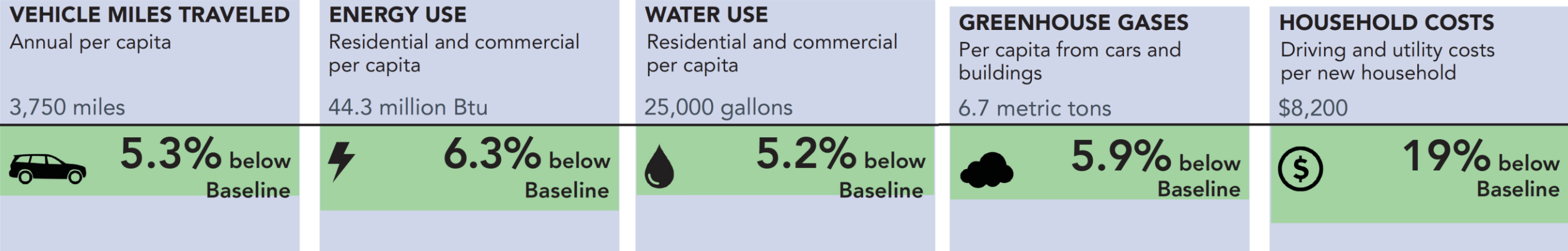
## Future Growth Areas



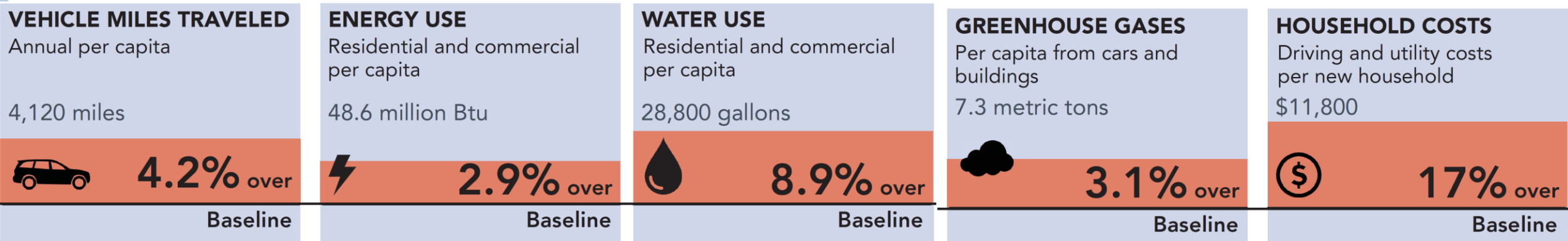
\*New jobs in Value Manufacturing, Innovation Flex, certain Campus (only university and hospitals), Airport Districts. New households in Innovation Flex and certain Campus (only universities) Districts. Excludes DEN land area.

# Growth Strategy: Informed by environmental impact

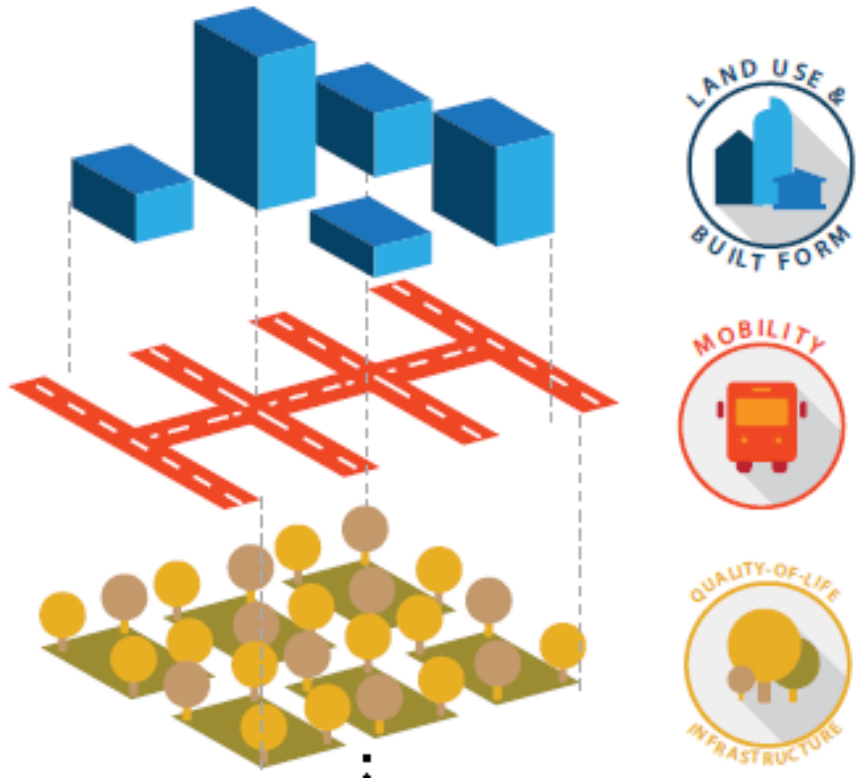
## High Growth



## Low Growth



# Growth Strategy: Complete Neighborhoods



Places vary:



# Growth Strategy: Complete Networks

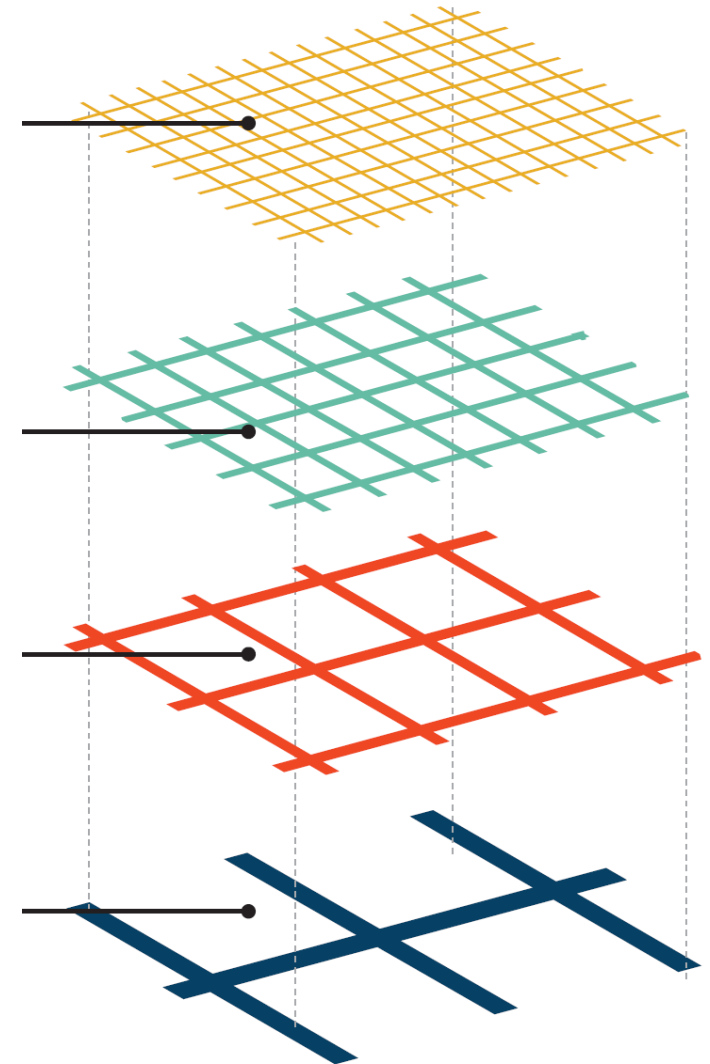
High-quality, continuous transportation networks that prioritize pedestrians, transit, bicycles or cars for seamless mobility throughout the city.

**Pedestrians**

**Bicycles**

**Transit**

**Auto and  
Goods  
Movement**



A panoramic view of the Denver skyline at sunset. The sky is filled with large, dramatic clouds illuminated by the setting sun, creating a warm orange and yellow glow. The city lights are visible in the foreground, including the Colorado State Capitol building and several tall skyscrapers. The mountains are visible in the distance under the twilight sky.

# Climate Adaptation

An overview of Denver's Adaptation Goals, Efforts, Gaps and Resource Needs

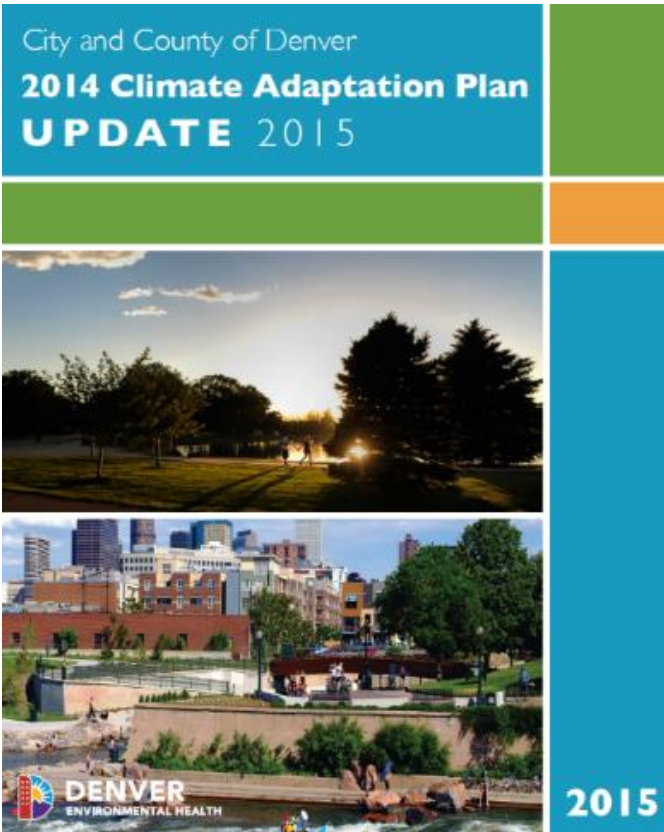


# Key Terminology

---

- **Adaptation** Adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts.
- **Hazard** The potential occurrence of a natural or human-induced physical event that may cause harm.
- **Risk** The probability that a situation will produce harm under specified conditions. It is a combination of two factors: the probability that an adverse event will occur; and the consequences of the adverse event.
- **Vulnerability** The propensity or predisposition to be adversely affected.





Denver's first inter-agency Climate Adaptation Plan released in 2014/2015. Contains vulnerability assessment identifying:

- An Increase in temperature and urban heat island effect
- An increase in extreme weather events (prolonged heat, hail, etc)
- Reduced snowpack and earlier snowmelt
- Focused solely on agency/operational impacts

## Adaptation Requirements

*While mitigation and adaptation efforts have expanded . . . they do not yet approach the scale considered necessary to avoid substantial damages to the economy, environment, and human health over the coming decades.*

4<sup>th</sup> National Climate Assessment  
2018



Provides evidence of a recent climate adaptation plan covering at least the city boundary<sup>1</sup>



Has engaged key stakeholders in adaptation planning



Has an update process for the adaptation plan



Demonstrates action being taken on at least 50% of the hazards identified, with those actions being in operation or completed

1. Denver's 2014 Plan will not be "recent" as of 2020 and was limited in scope to impacts to government operations.

# Hurdles to Adaptation

---

- Perception of problem, especially as an inland city
- Uncertainty as it relates to economic costs of climate ready efforts
- Recognizing natural environment's inherent adaptation and mitigation elements

# Adaptation work by Agencies\*

\*Not exhaustive, many agencies support adaption

	DDPHE	DPW [FOCUS ON GREEN INFRASTRUCTURE GROUP]	DP&R
<b>Roles</b>	Lead for Community-wide adaptation planning/coordination	Responsible for urban infrastructure/green infrastructure	Citywide green infrastructure
<b>Efforts</b>	Denver's first inter-agency Climate Adaptation Plan released in 2014/2015	Green Infrastructure (GI) Design Guidelines Citywide GI Implementation Strategy Impervious Cover Forecasting Model 25 miles of Green Streets' Goal	Parks Game Plan Parks Citywide Resiliency Plan (2020) Urban Forestry partnership with DDP Neighborhood Forestry Program Water conservation efforts with DW Habitat restoration efforts citywide S. Platte River restoration Open space acquisition program
<b>Gaps</b>	Community Engagement and Equity Focus for required update in 2020 Longer term vulnerability assessment	Green Infrastructure Monitoring and Co-Benefits Analysis Infrastructure Vulnerability Analysis Education & Outreach	
<b>Resource Needs</b>		Political Support Business & Community Partnerships Space for Green	
<b>Impact Areas</b>	All areas of Adaptation, centralized planning and coordination Community Health	Resilience to precipitation variability & heat Water conservation & diversified supply Creates safer and more comfortable streets for pedestrians & bicyclists Easy to Implement in Most Vulnerable Communities Community Aesthetics & Placemaking	Resilience to heat and flooding Front range forest fire reduction Water conservation Habitat restoration Community livability

# DPR PROGRAMS TO ADDRESS CLIMATE CHANGE

## Water Resources

- Water Re-Use Program
- Water Conservation: improved technology
- Landscape conversions
- Flood reduction and improved water quality (partnership with PW)

## Forestry

- Urban forestry initiative (DDP)
- Mountain park forest fire reduction program
- Neighborhood forestry initiative
- EAB preventative program
- Enhanced pruning effort citywide

## Habitat Restoration

- Waterway restoration
  - Rivers, gulches and lakes
- Promote and establish habitat:
  - Pollinators
  - Wetland and aquatic
  - Riparian and upland
- Land acquisition

# Greening Denver

## Through Green Streets

### Scales of Green Infrastructure

Ranges from site-scale approaches like rain gardens and streetside stormwater planters

Large scale regional approaches including Parks, Open Space, Trails and Floodplains.

### Makes Denver more resilient to a changing climate



Planting trees near buildings reduces both heating and cooling demands

Trees produce oxygen and sequester carbon

Native vegetation can withstand both flooding & drought conditions.

Green Infrastructure reduces ponding which creates safer conditions for bicyclists.

Vegetation near roads reduces particulate pollution and ground level ozone which provides public health benefits.

Improves local watersheds by slowly infiltrating and dirty runoff from streets.

Vegetation near roads reduces particulate pollution and ground level ozone which provides public health benefits.

Shading pavement can increase its lifespan

Streetscapes can increase property values