



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

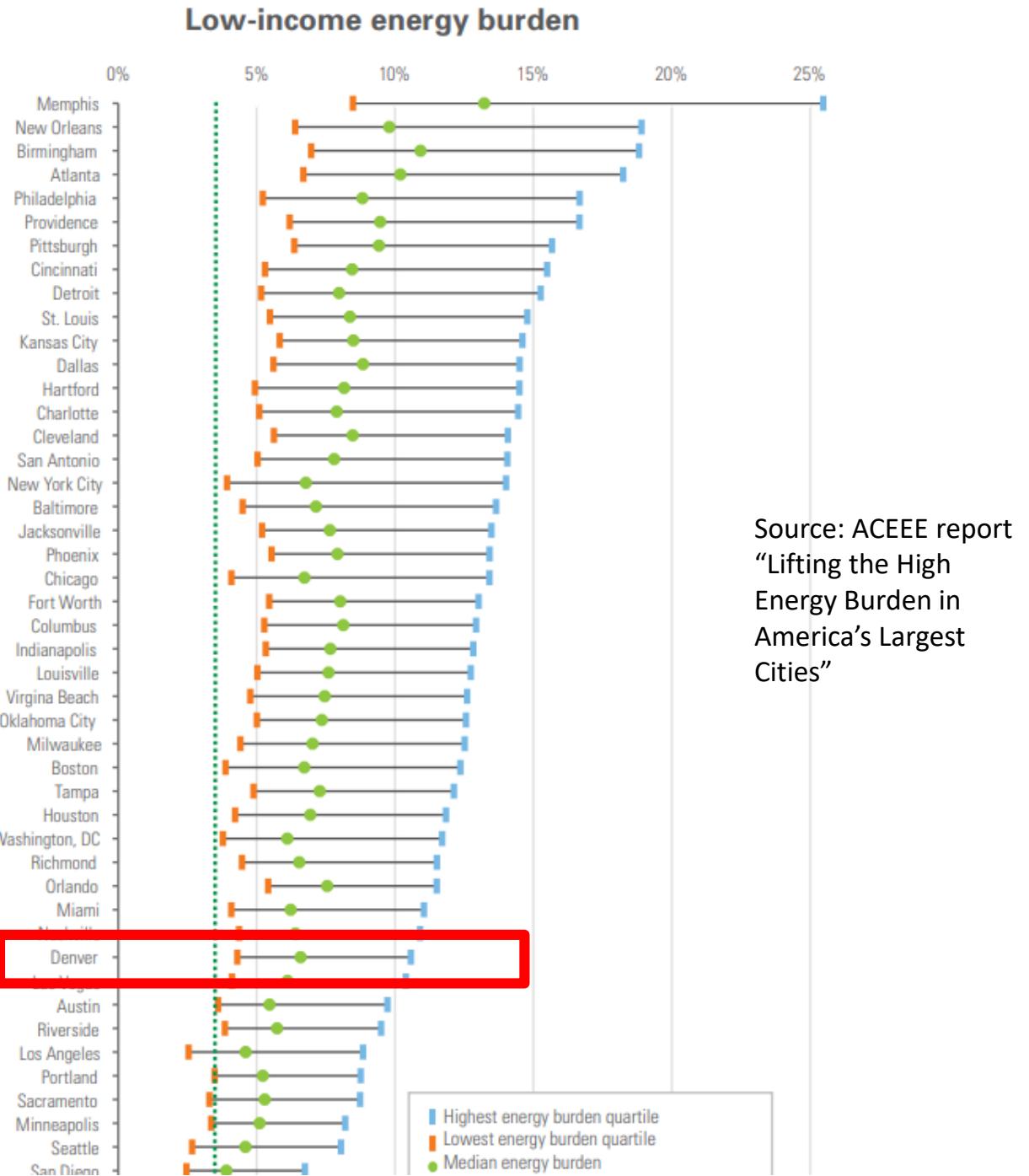
Energy Outreach of Colorado CARE program

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

LEAP

DOSP Efficiency program

Low-income energy burden by city



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/WZXBX_P7NH



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 \leq \$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	144
Single-Family	974	1083	776	1007	762	640	434*	709	5676

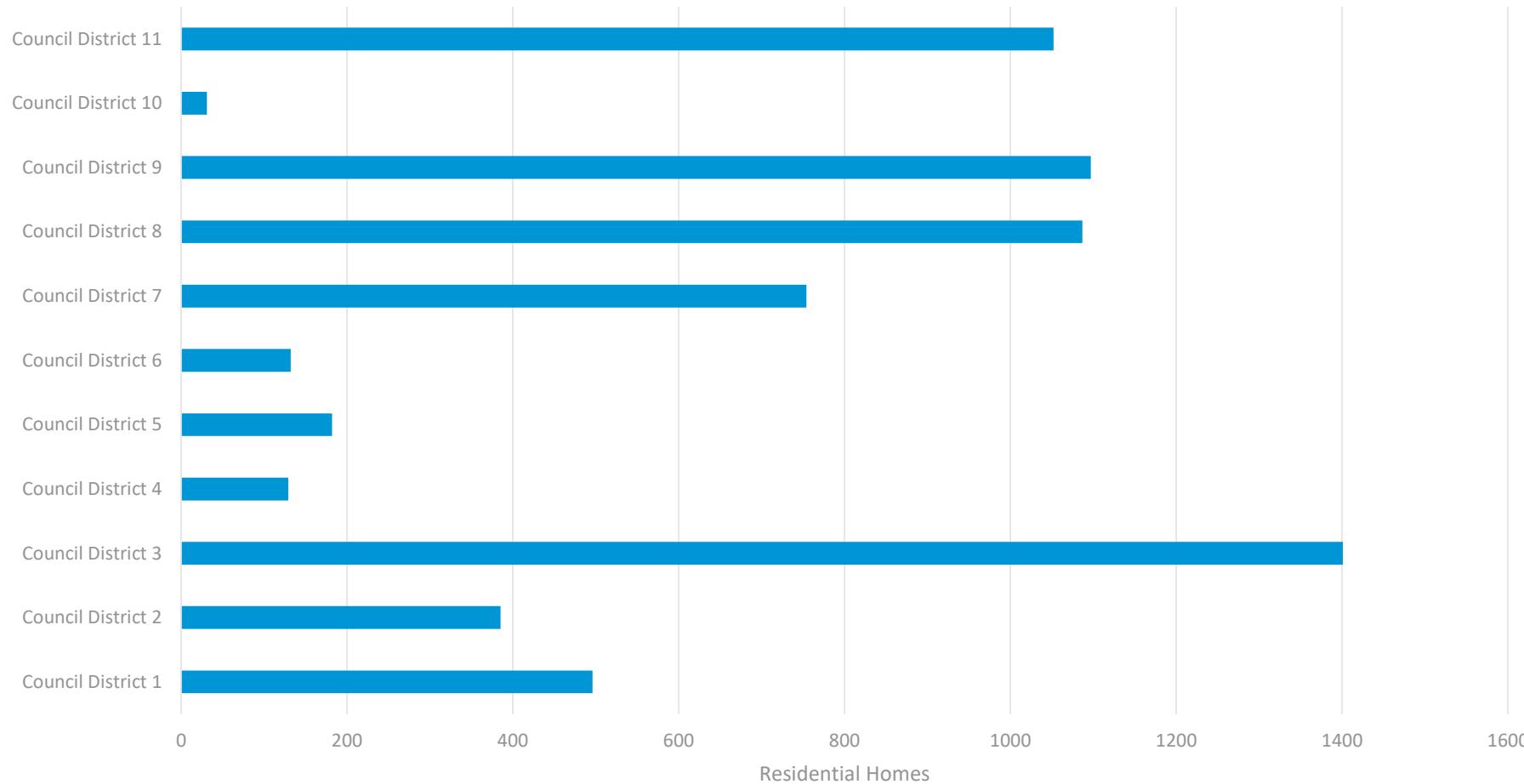
*Q1 and Q2 data only

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

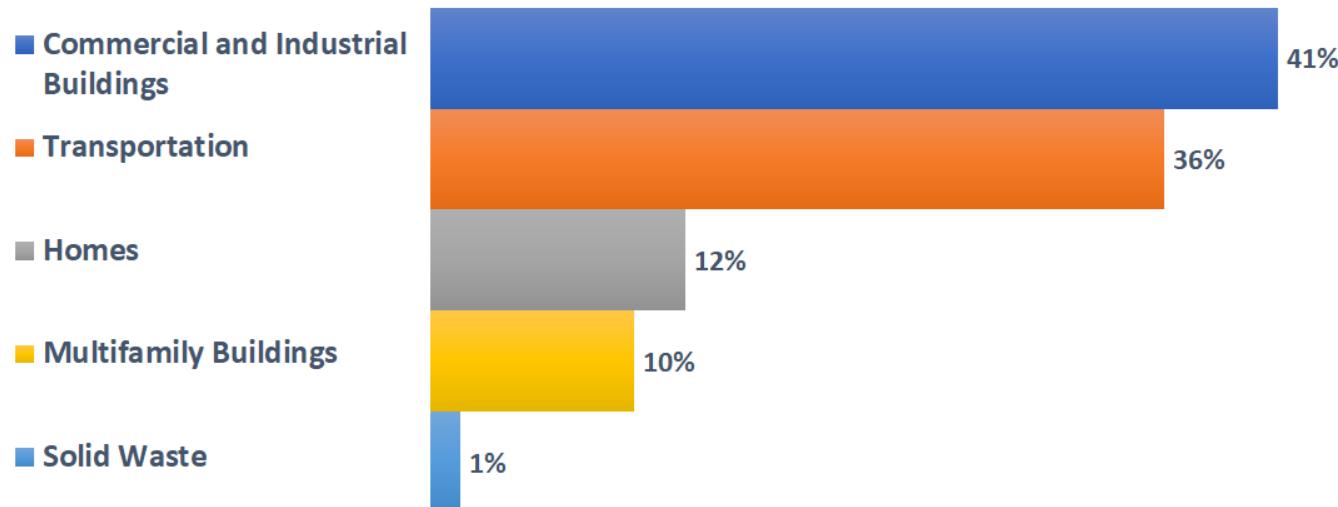
Denver Moves

Multimodal Transportation

Climate and Transportation

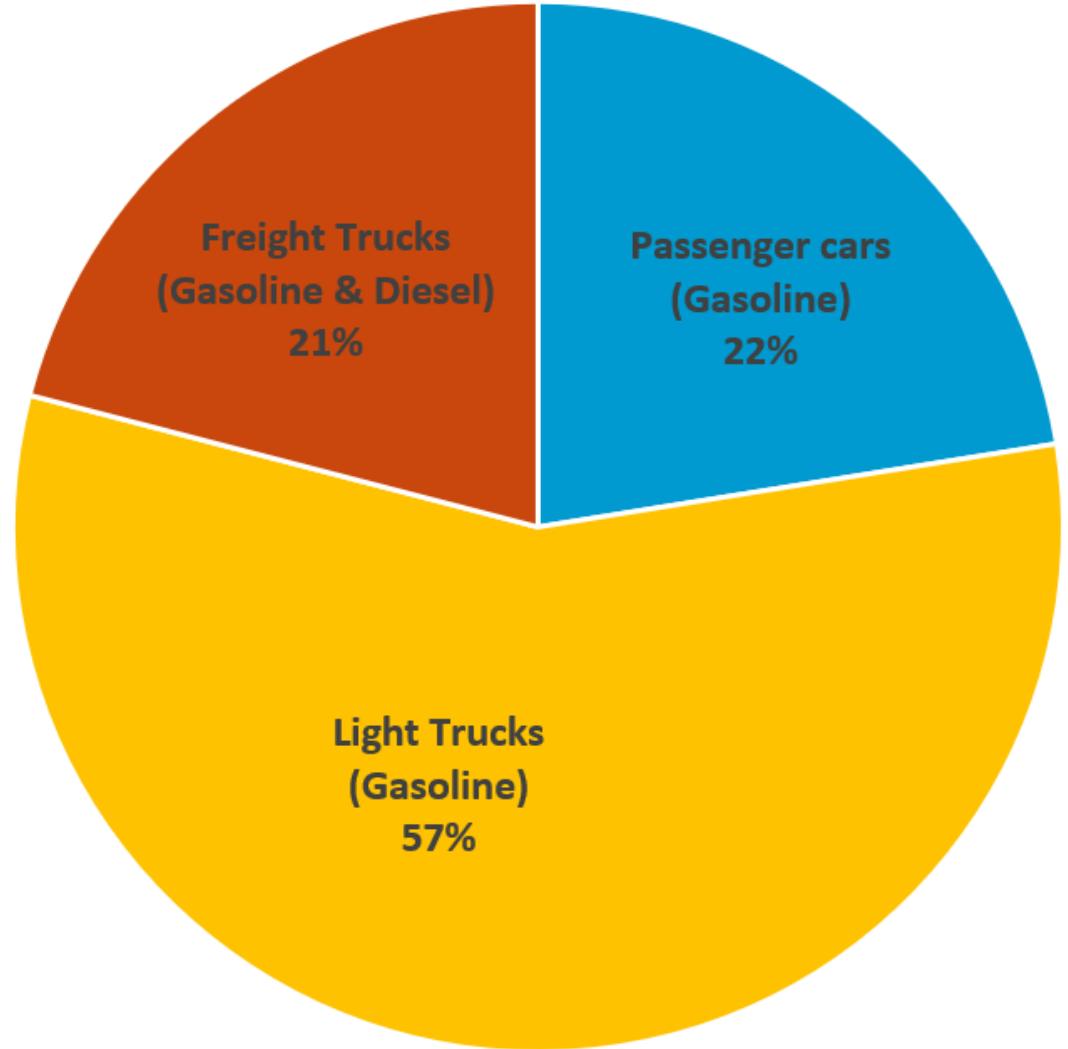
- Meeting Denver's climate goals means reducing driving
- Transportation is largest source of air pollution and the second largest source of greenhouse gas emissions

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



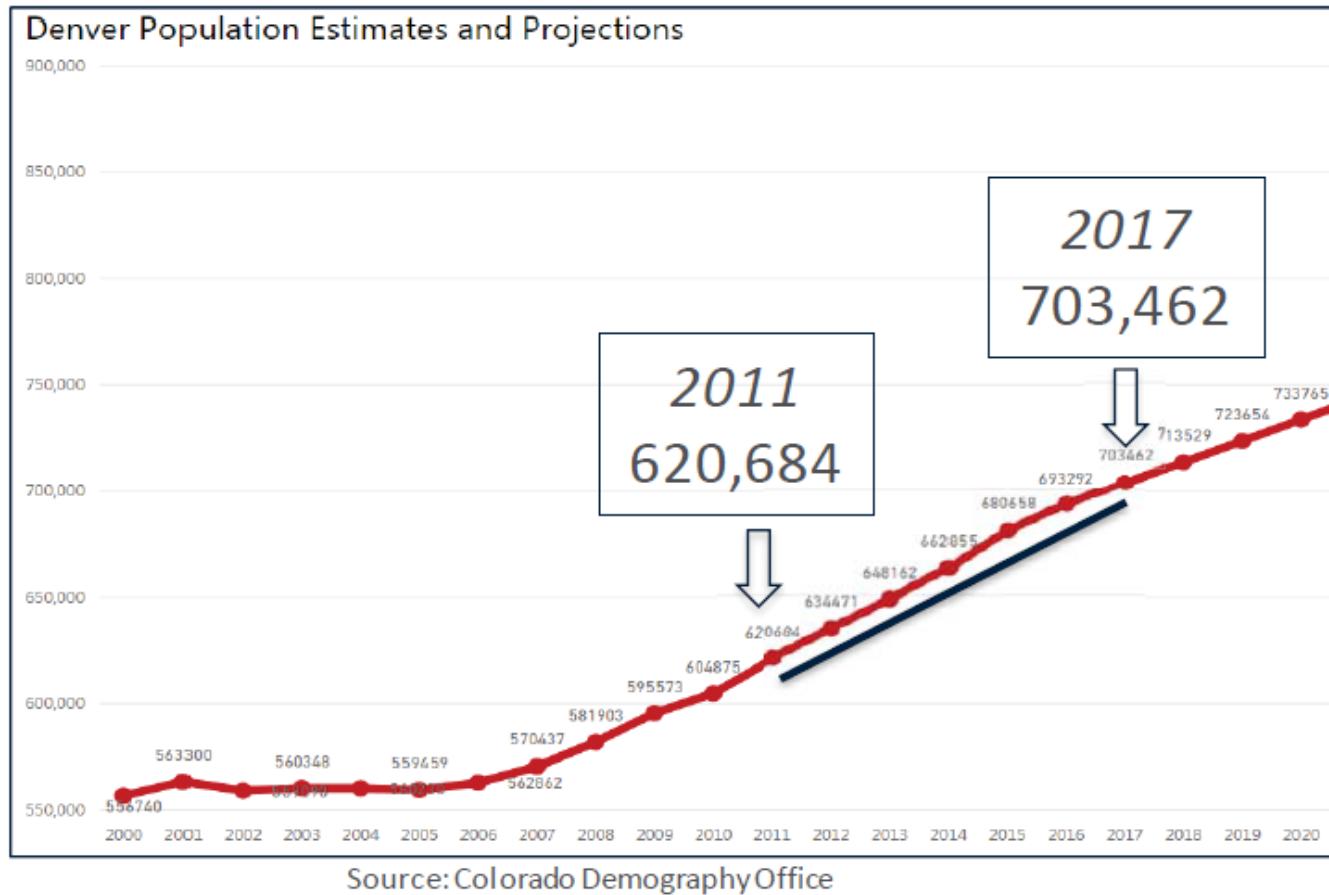
ACCESSIBILITY

Increasing technology
to make your trip
easier and faster

Denveright

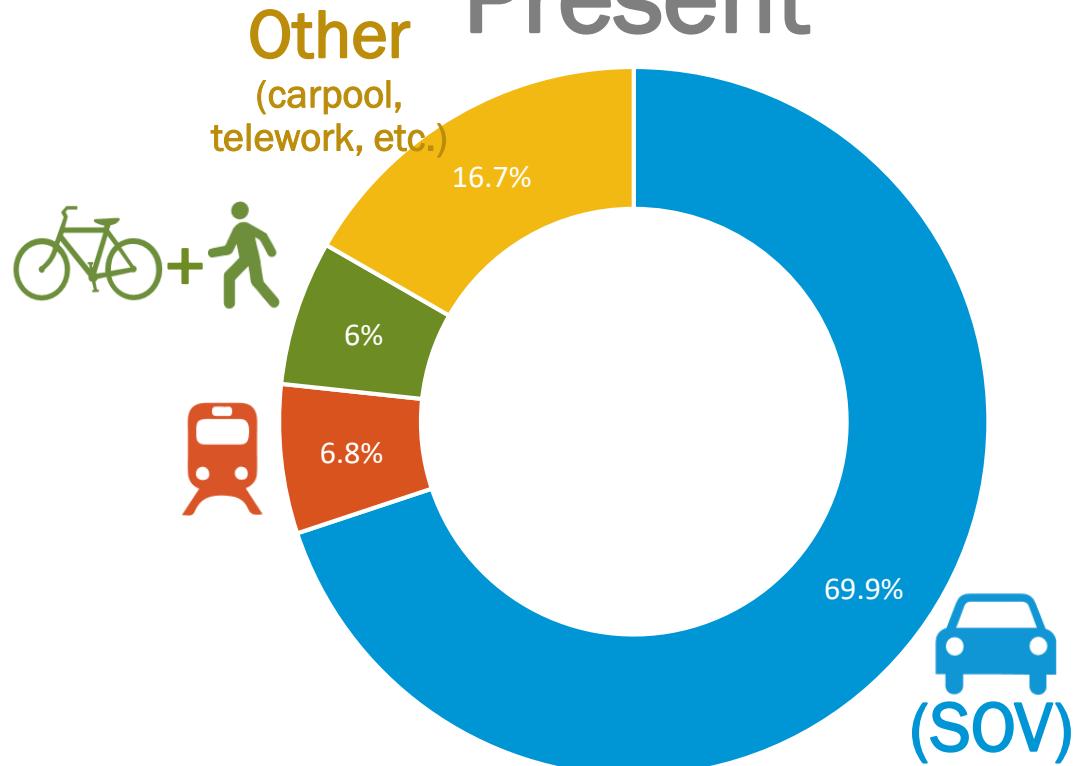


Growth in Denver



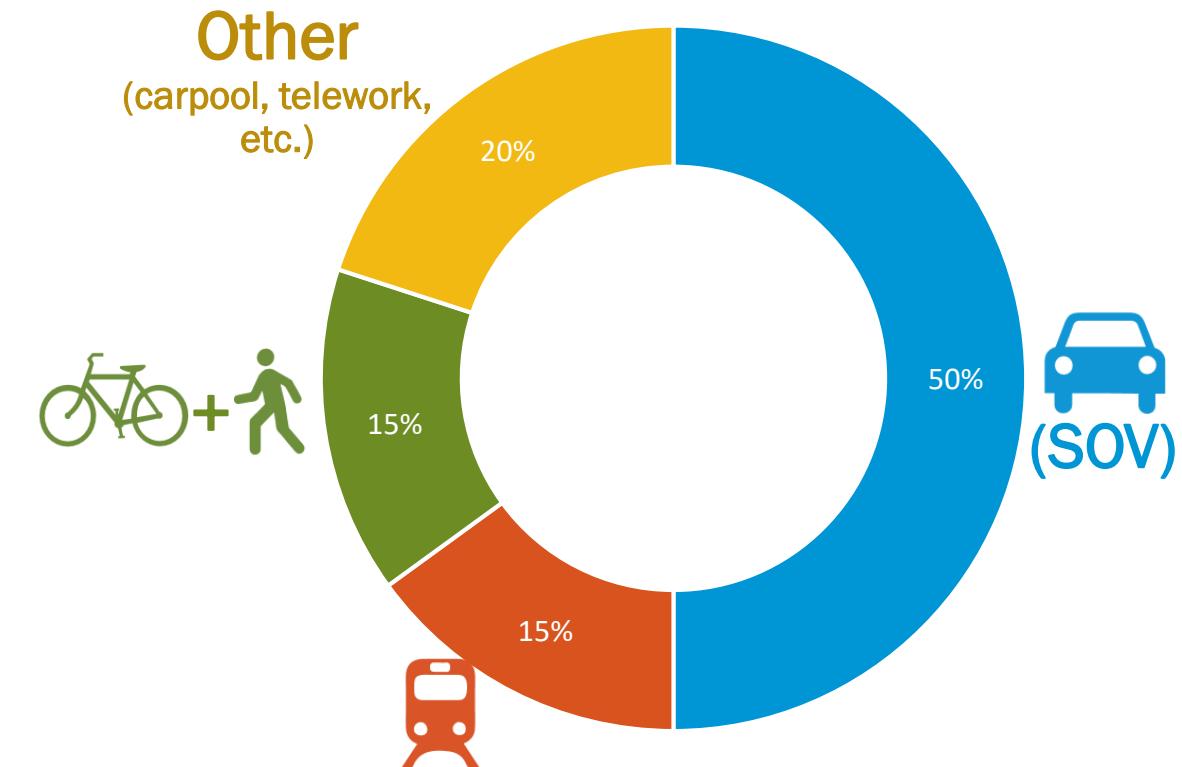
Commute Mode-Share

Present



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

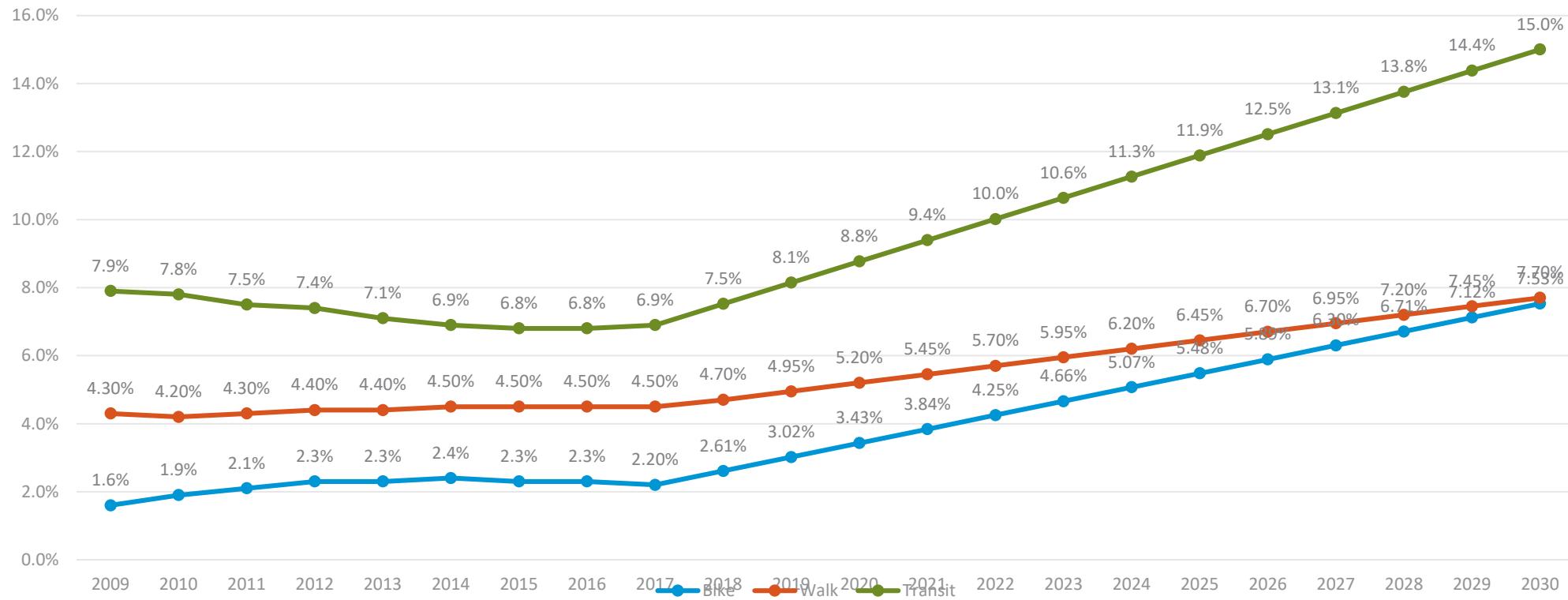
2030 Goal



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

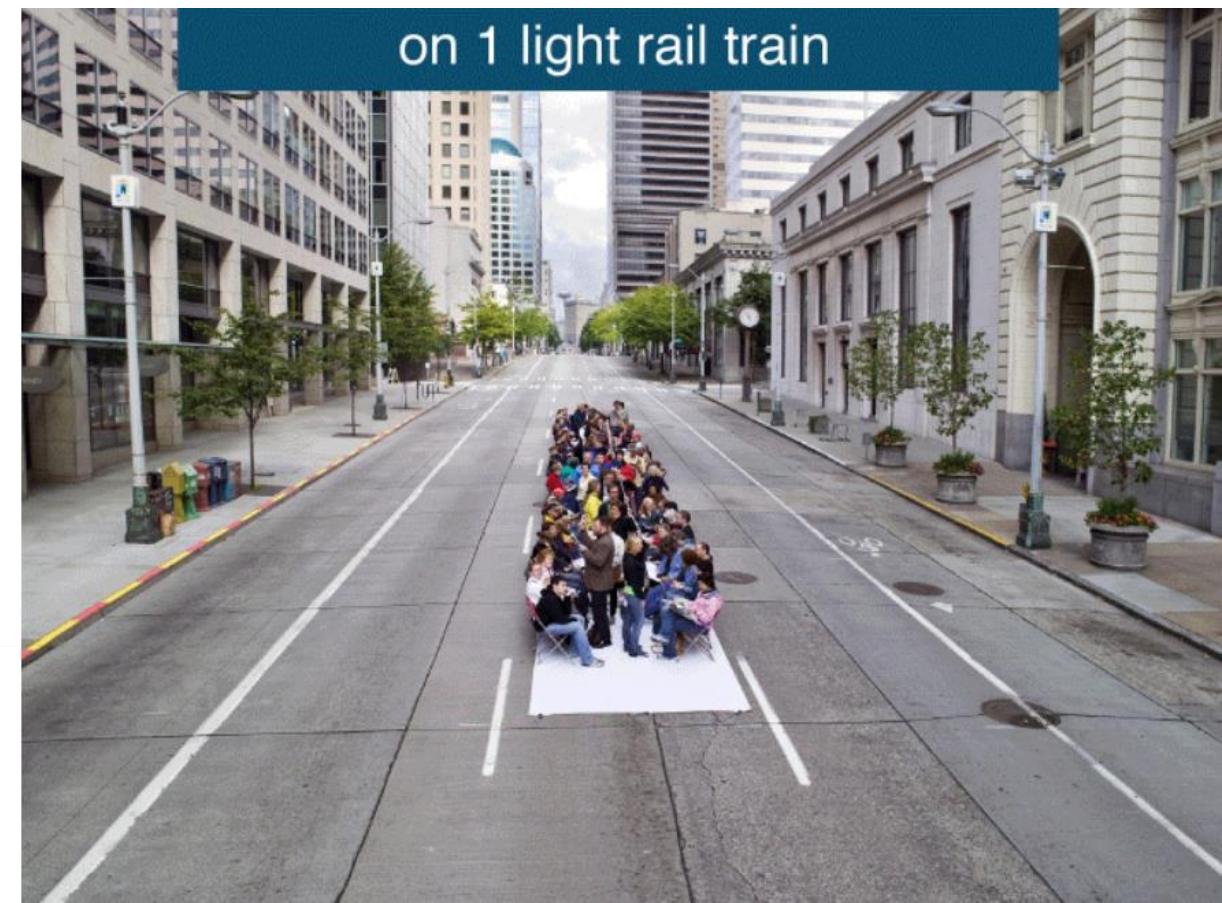
Transit as a climate strategy

- 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

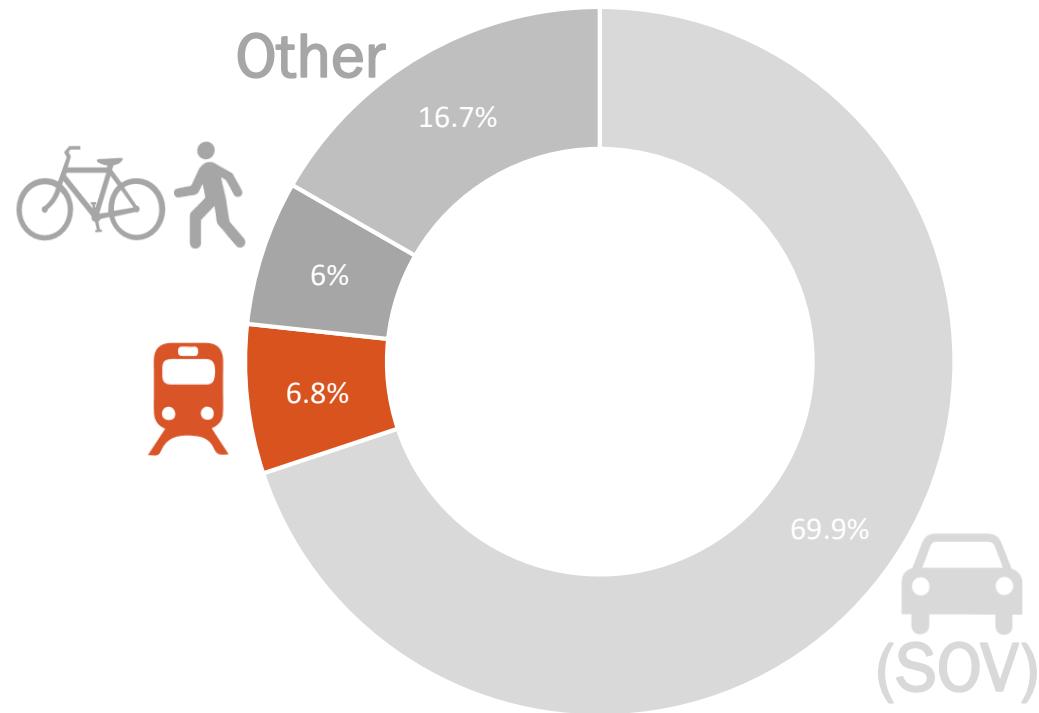


on 1 light rail train



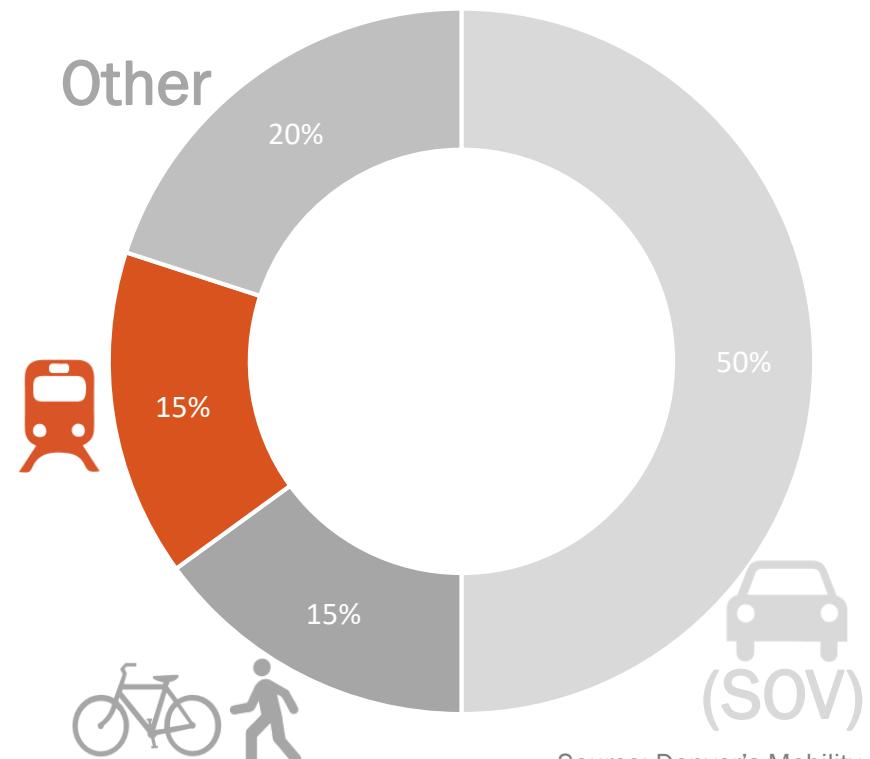
Goal: Double # of People Taking Transit

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

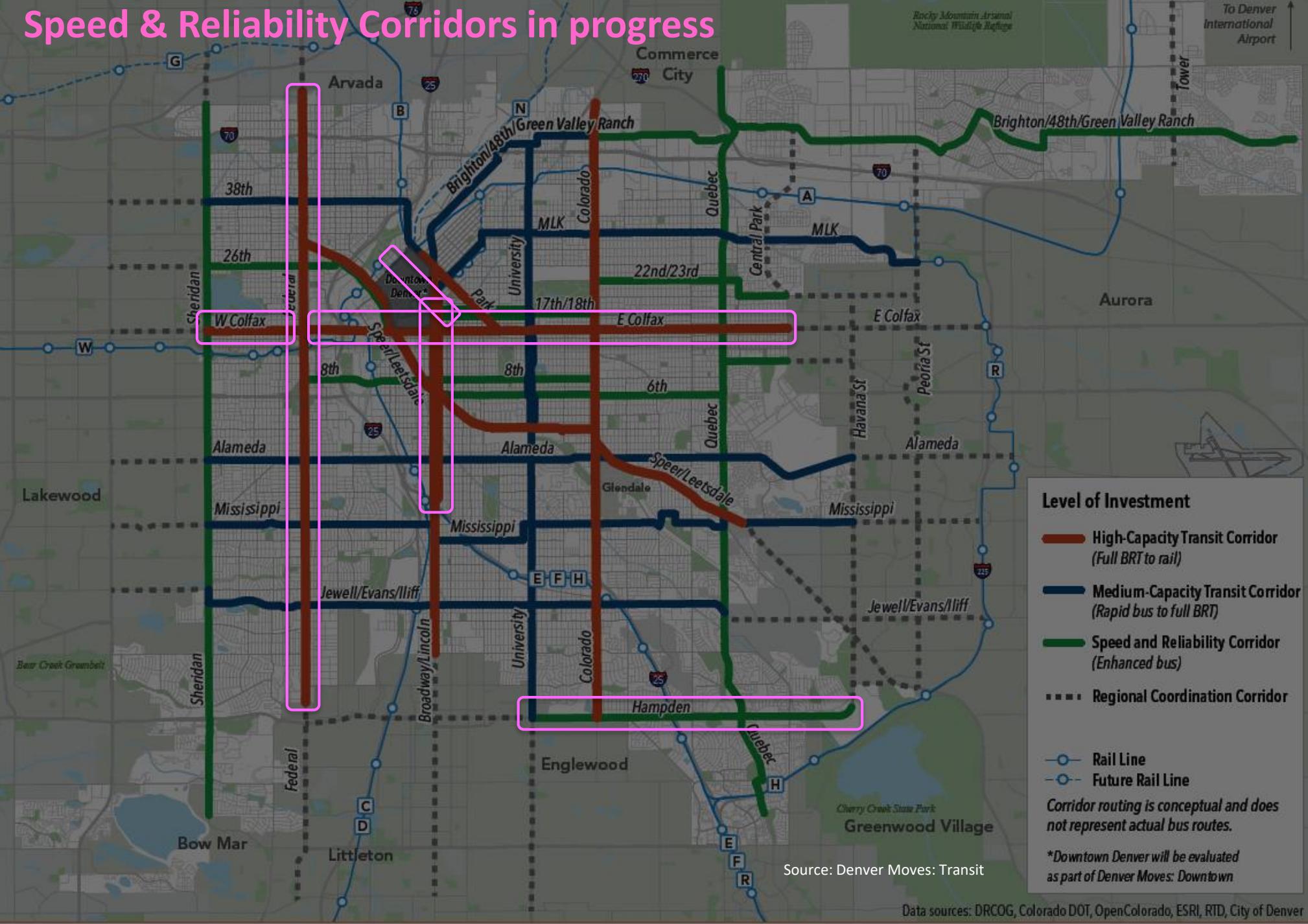
1. Improve Speed and Reliability of Buses

- 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
18th/19th 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

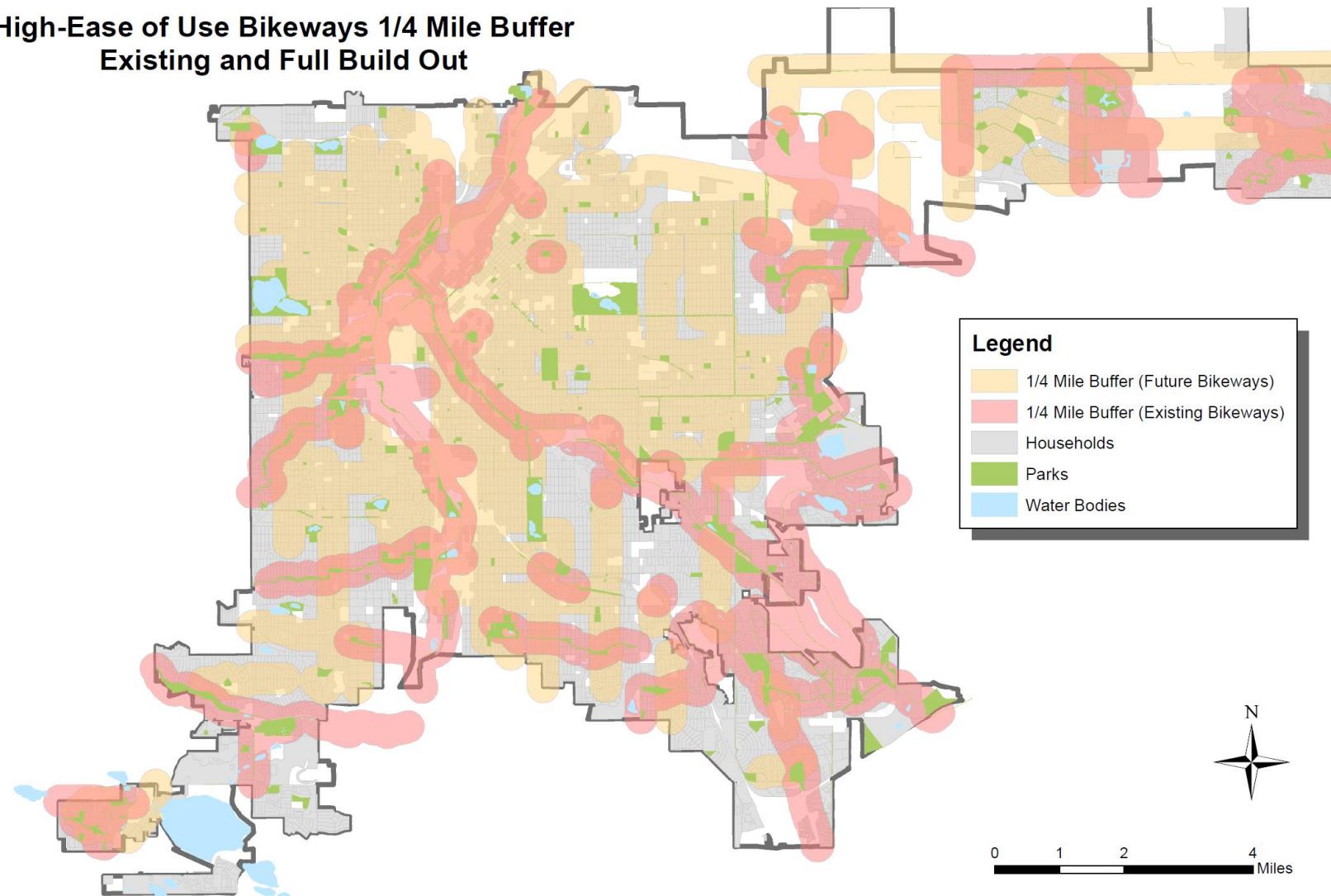
- ½ of all trips in U.S. are less than 3 miles = 20 minute bike ride
- Zero emission mode to substitute car travel
- Study: commitment to bicycle infrastructure in cities globally could reduce urban transportation emissions 11%

Bike Goals

- 7.5% Bike Mode Share
- All of Denver within $\frac{1}{4}$ 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

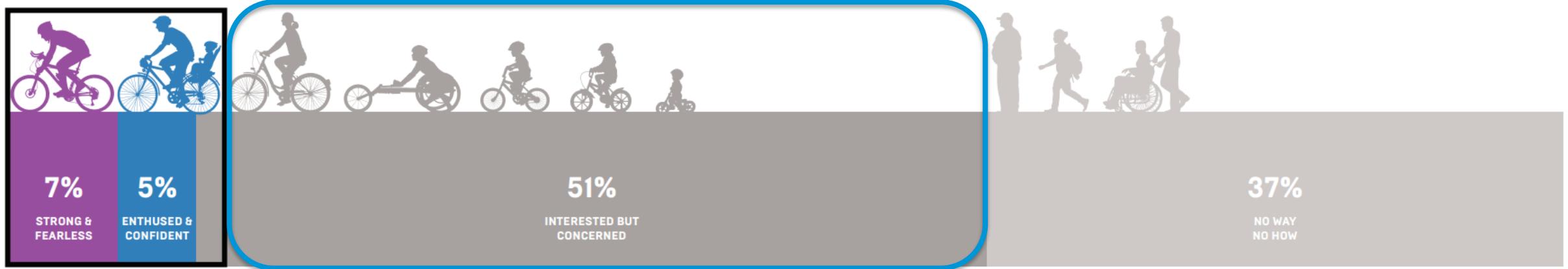


Bikeways to Move People

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

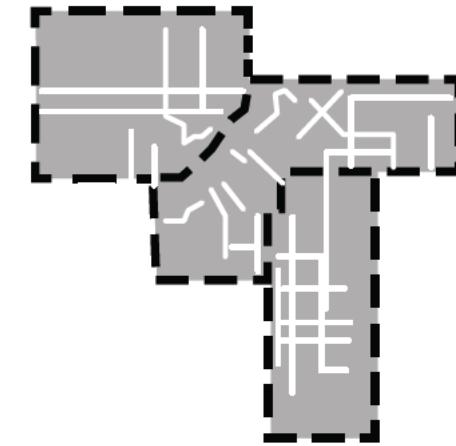
\$18mil
Total Miles:
54.2 mi



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

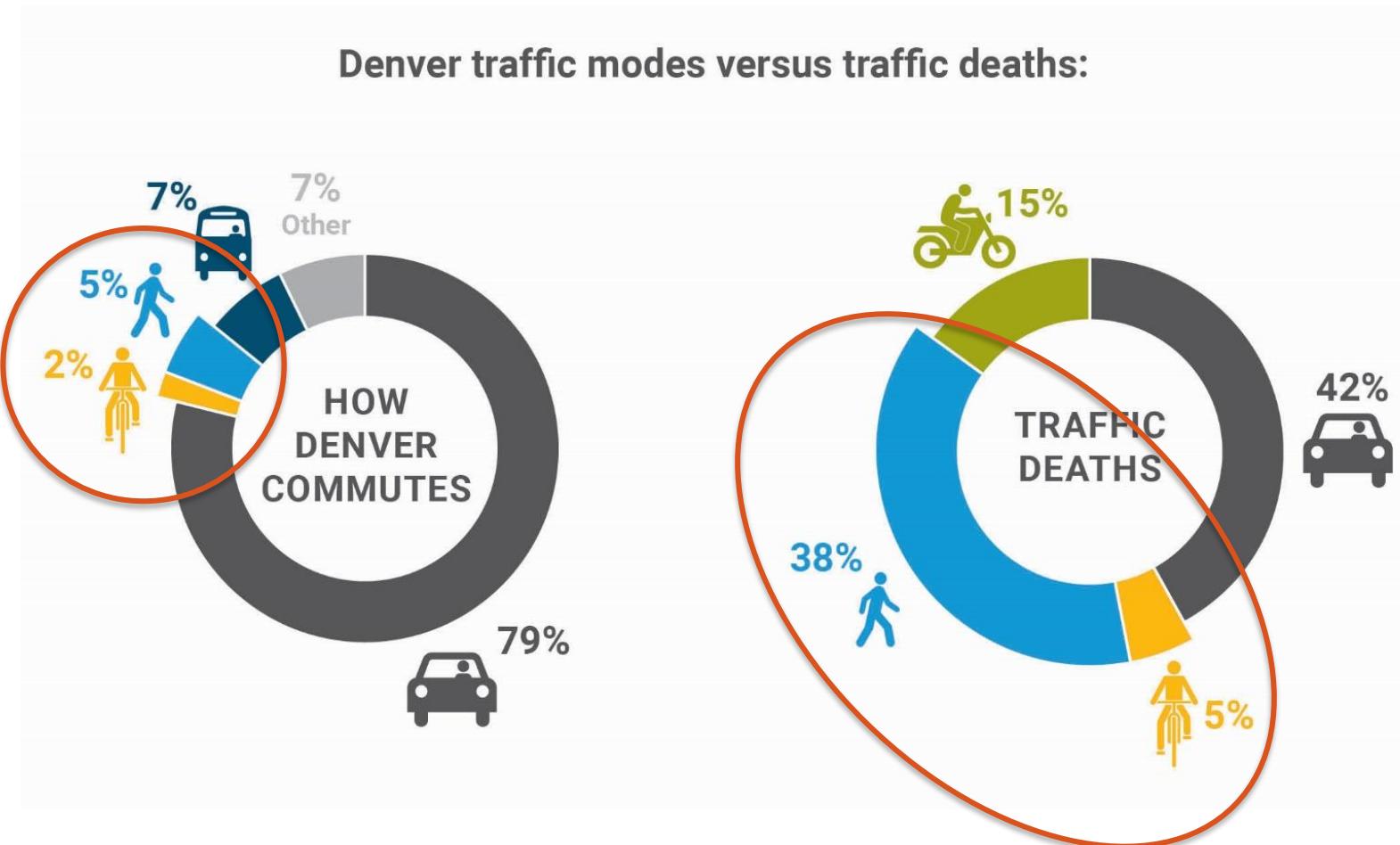
- 4 of all trips in U.S. are less than 1 mile = 20 minute walk
- Zero emission mode to substitute car travel
- Walking facilitates connections to transit

Pedestrian Goals

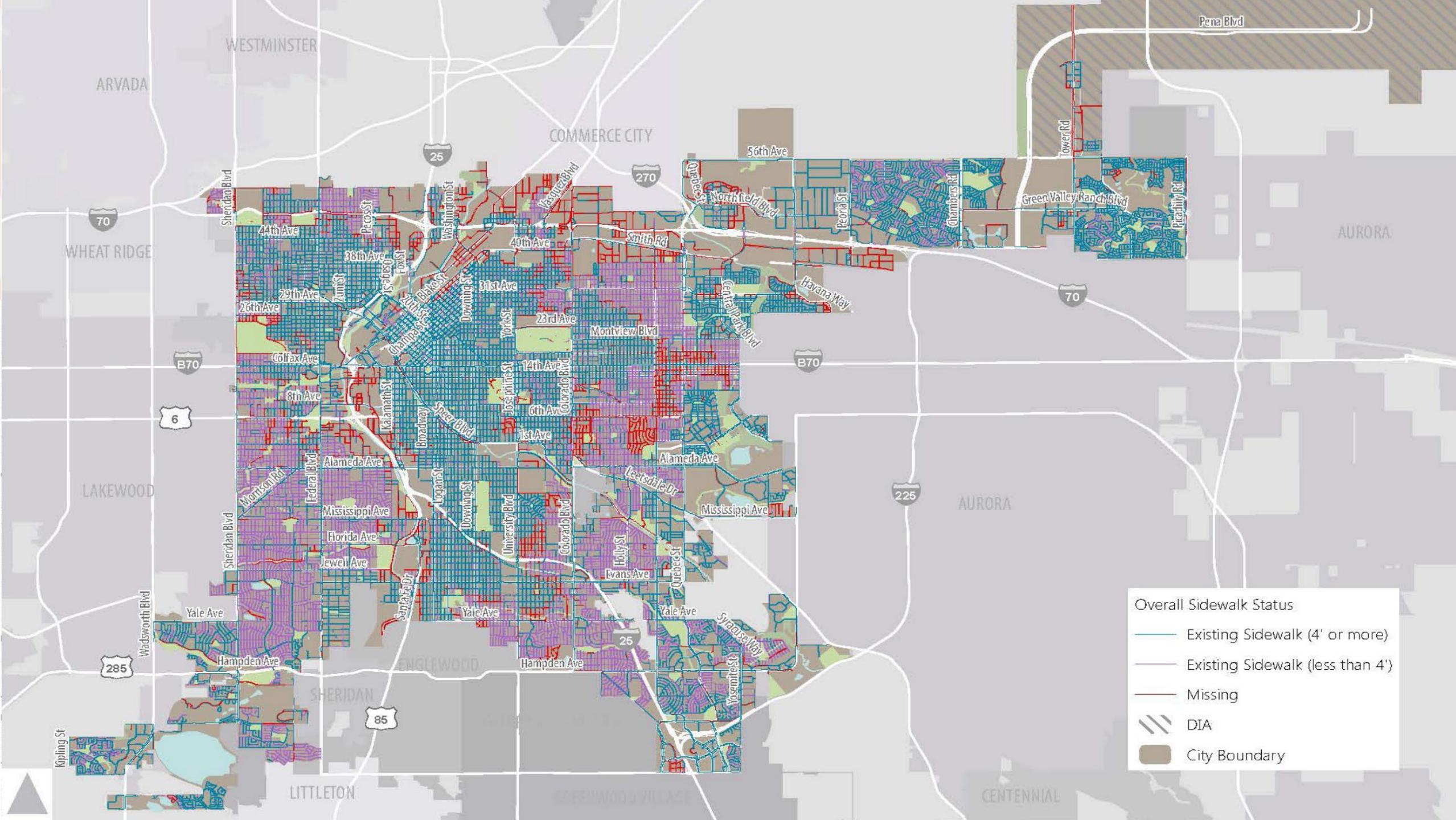
- 7.5% Walk Mode Share
- 14+ miles of sidewalks built/year
- 10 Intersection Improvements/year



Mode Goals Necessitate Safe Streets



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



Tier	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

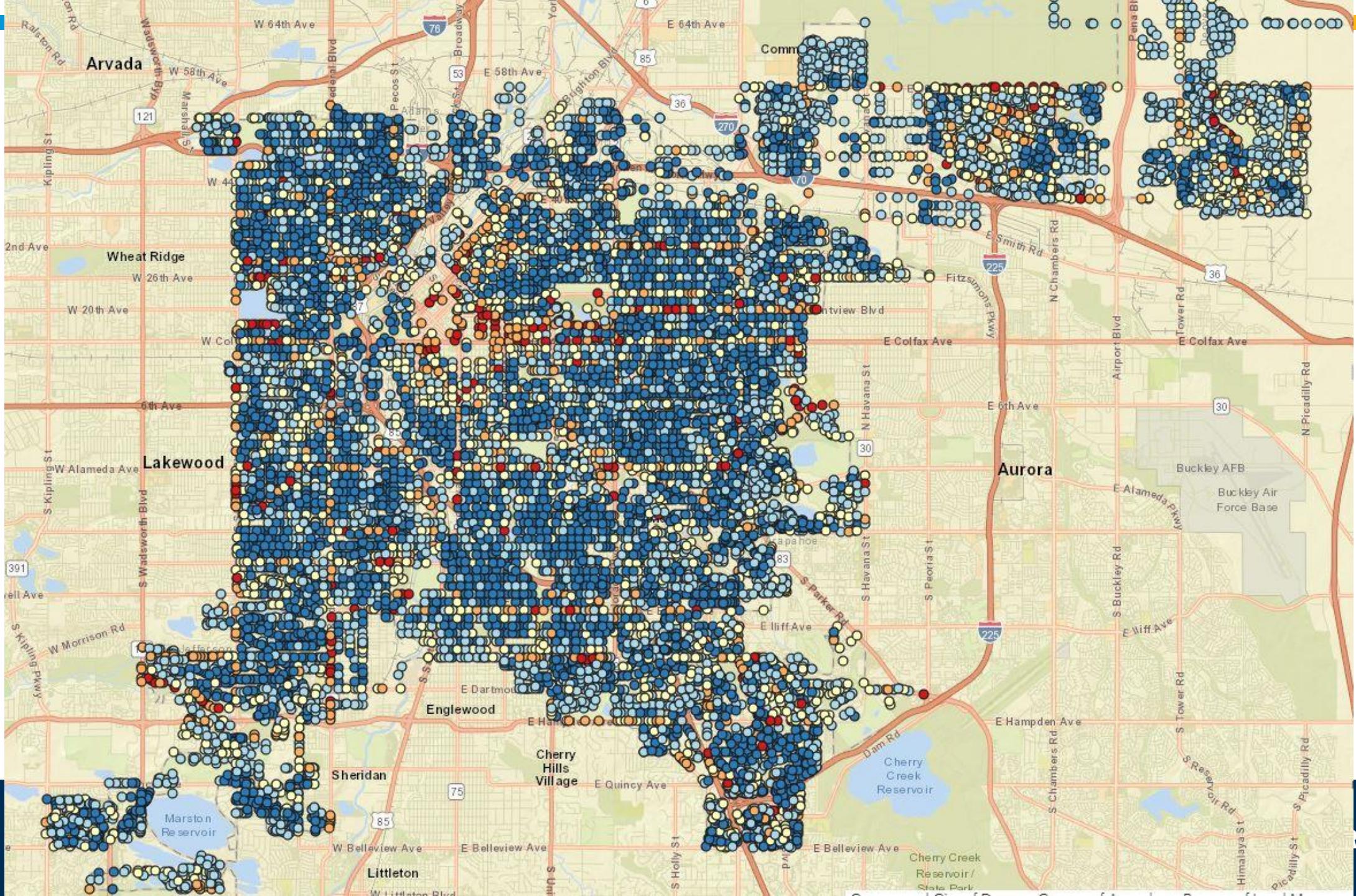
\$0

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

Carshare



2018 Trips = 764,150

Dockless Mobility Pilot



2018 Trips = 1,500,000+

Bike Share

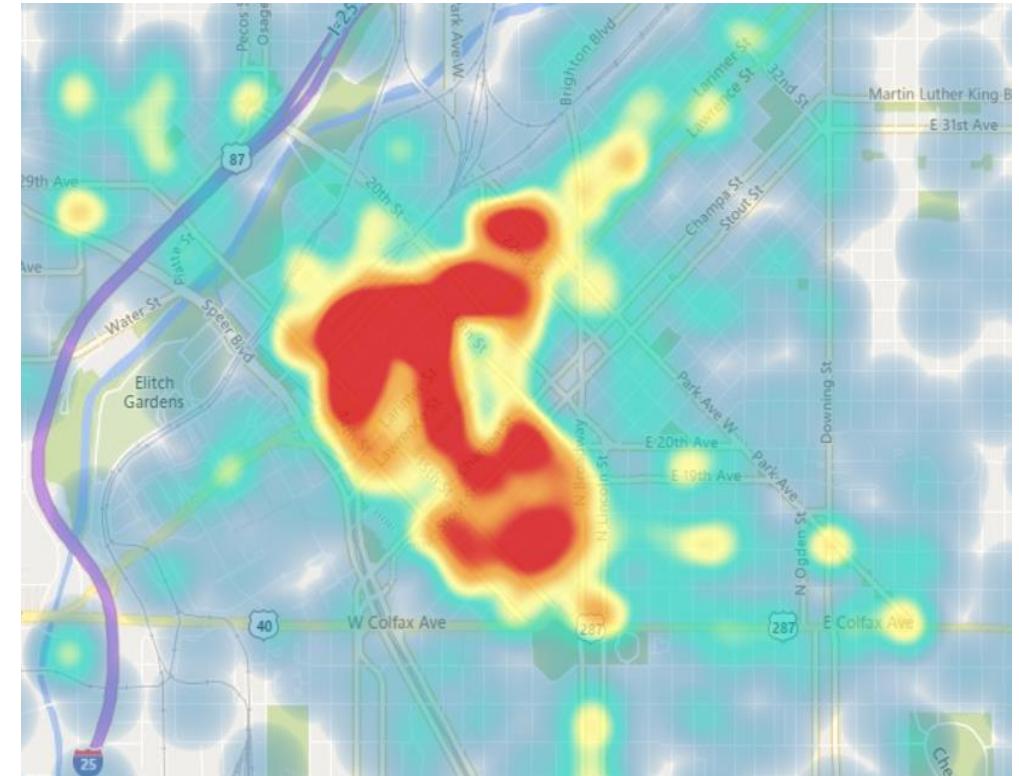


2018 Trips = 305,440

Dockless Mobility Pilot Program

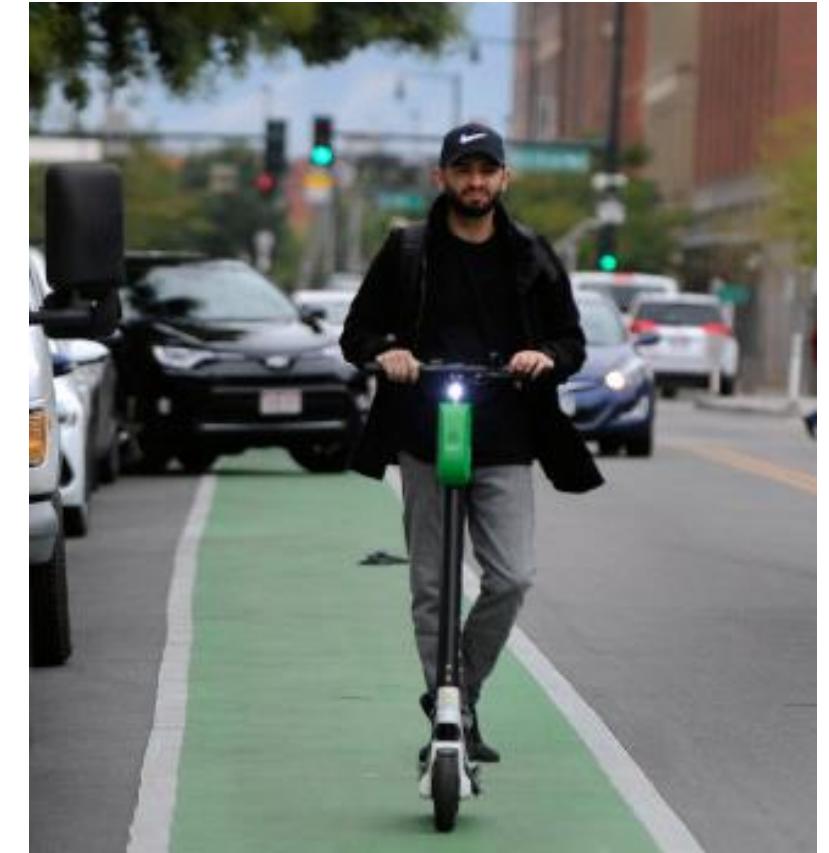
- Pilot launched July 2018
- Over 1,500,000 rides to-date
 - 20% of users ride a scooter to/from a transit stop at least once per week
 - 30% of trips replaced automobile trips for a reduction of 570,000 miles travelled

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

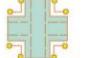
- Tool to help achieve mode split goals: 15% biking/walking; 15% transit
- Integrates more sustainable transportation choices into development, land use, homes and businesses

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	Infrastructure	Parking Management	Subsidies	Education
 Transit (RTD)	 Curb Management	 Paid Parking	 Transit Pass Discounts	 New Resident/Employee Welcome Kits
 Microtransit (RTD FlexRide)	 Bicycle Parking	 Unbundled Parking	 Car-share Membership Discounts	 Information Kiosks
 Car Share (ZipCar, car2go)	 Transit Stop Enhancements	 Preferential Parking	 Bike-share Membership Discounts	 General Marketing
 Shuttles	 Bicycle Repair Stations	 Discounted Car-Pool Parking	 TNC Discounts	 Bicycle Workshops
 TNCs (Uber + Lyft)	 Wayfinding	 Car-share Parking	 Micromobility Credits	 Websites/Apps
 Micromobility (scooters/bikes)	 Showers/Changing Facilities		 Direct Payment to Service Providers	 Trip Planning Assistance

Mode shift as a climate strategy

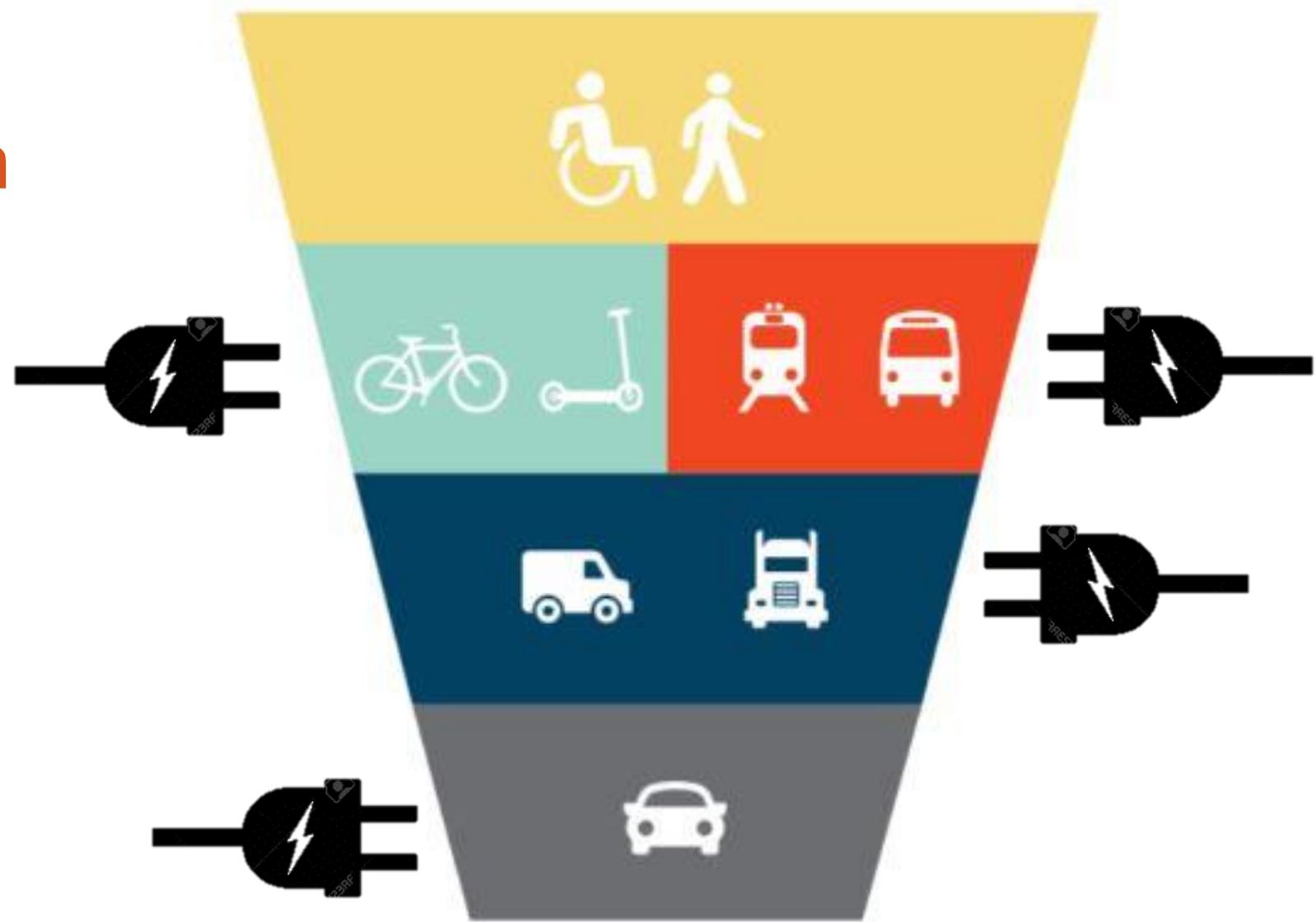
- Denver's Climate Action Plan depends on mode shift goals
- The cleanest mile driven is the one that isn't





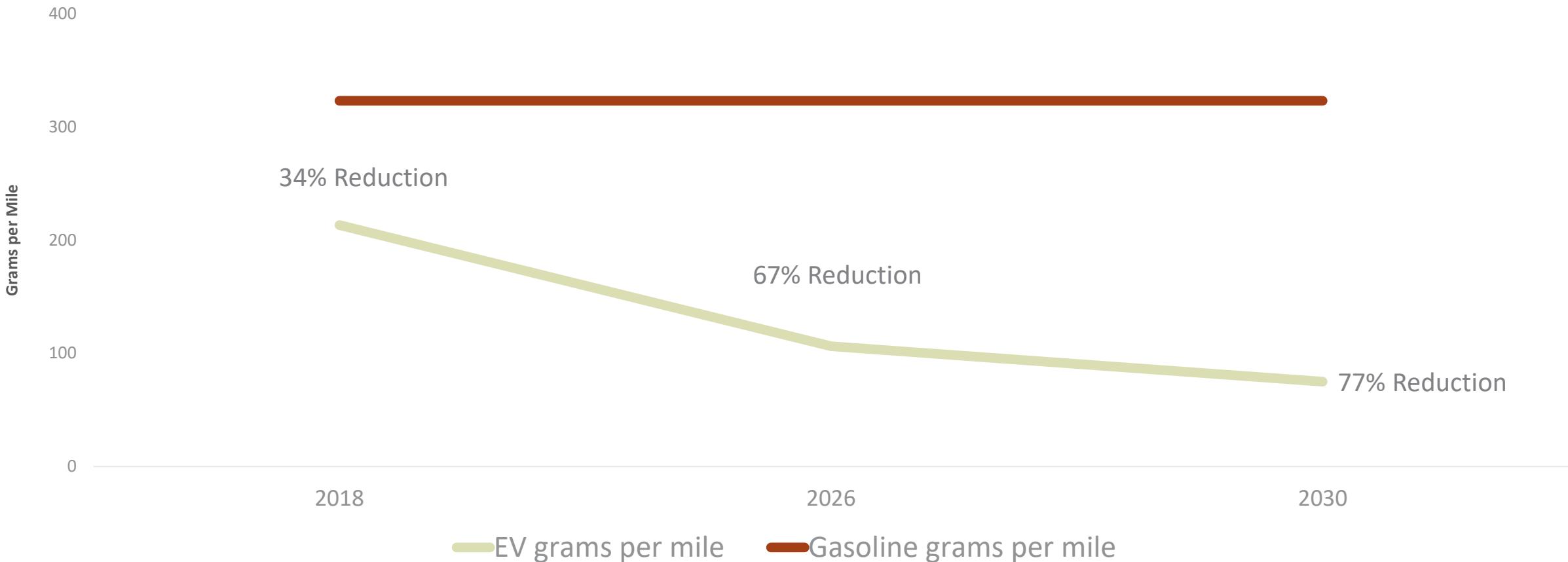
Electric Vehicles

Transportation Hierarchy



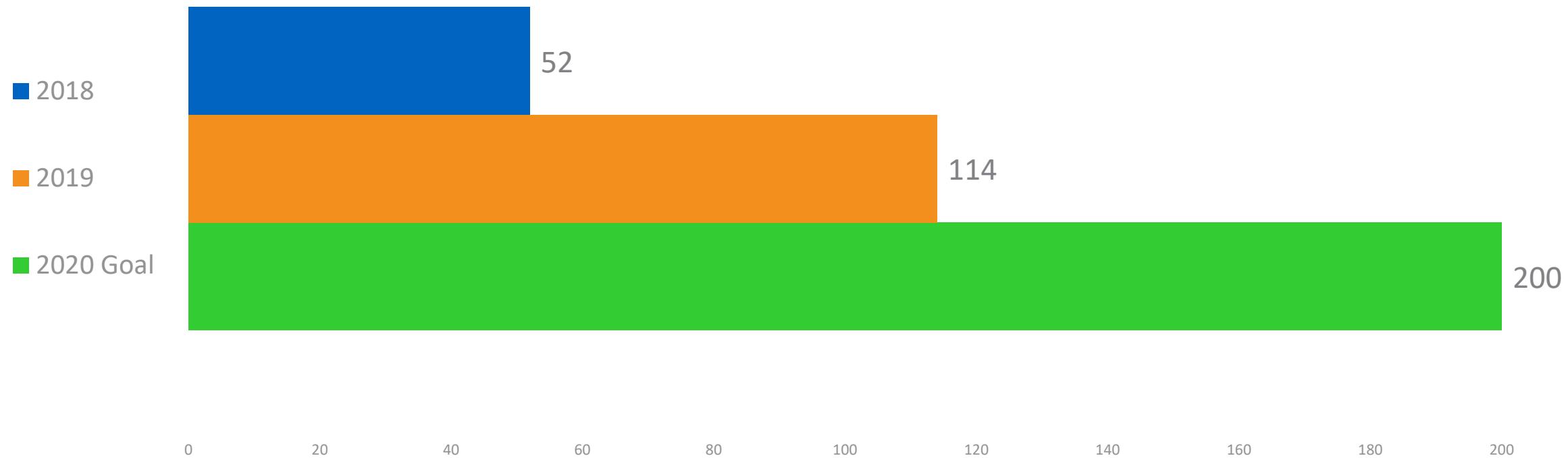
Climate Benefits of Electric Vehicles

Comparison of 2018 Gasoline and Electric Vehicle GHG Emissions over Time



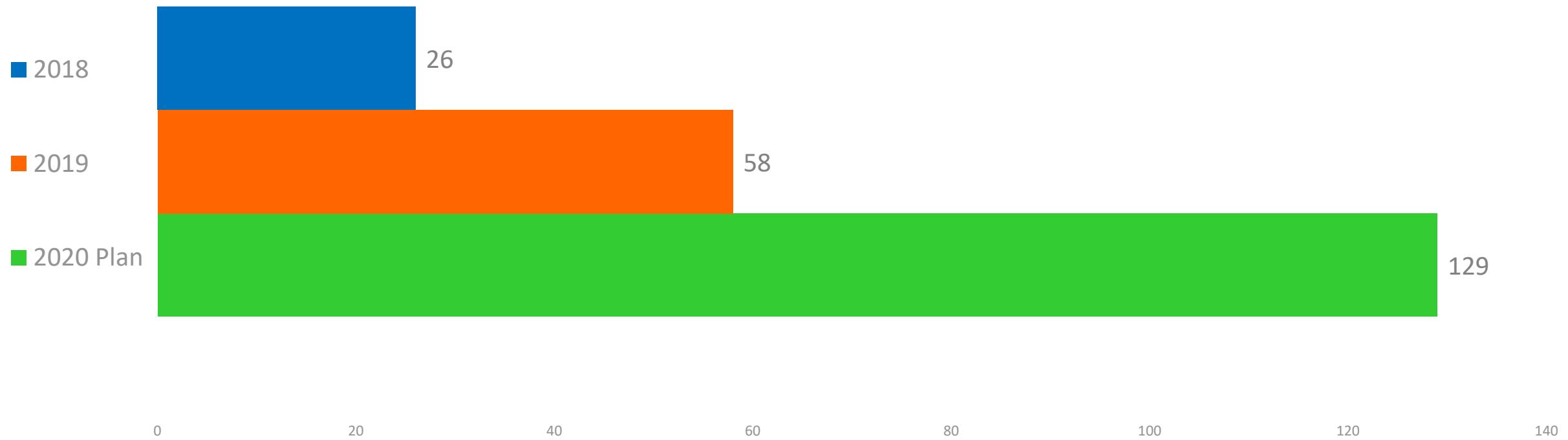
City Fleet Goal: 200 Electric Vehicles by 2020

Denver Fleet: Number of Electric Vehicles



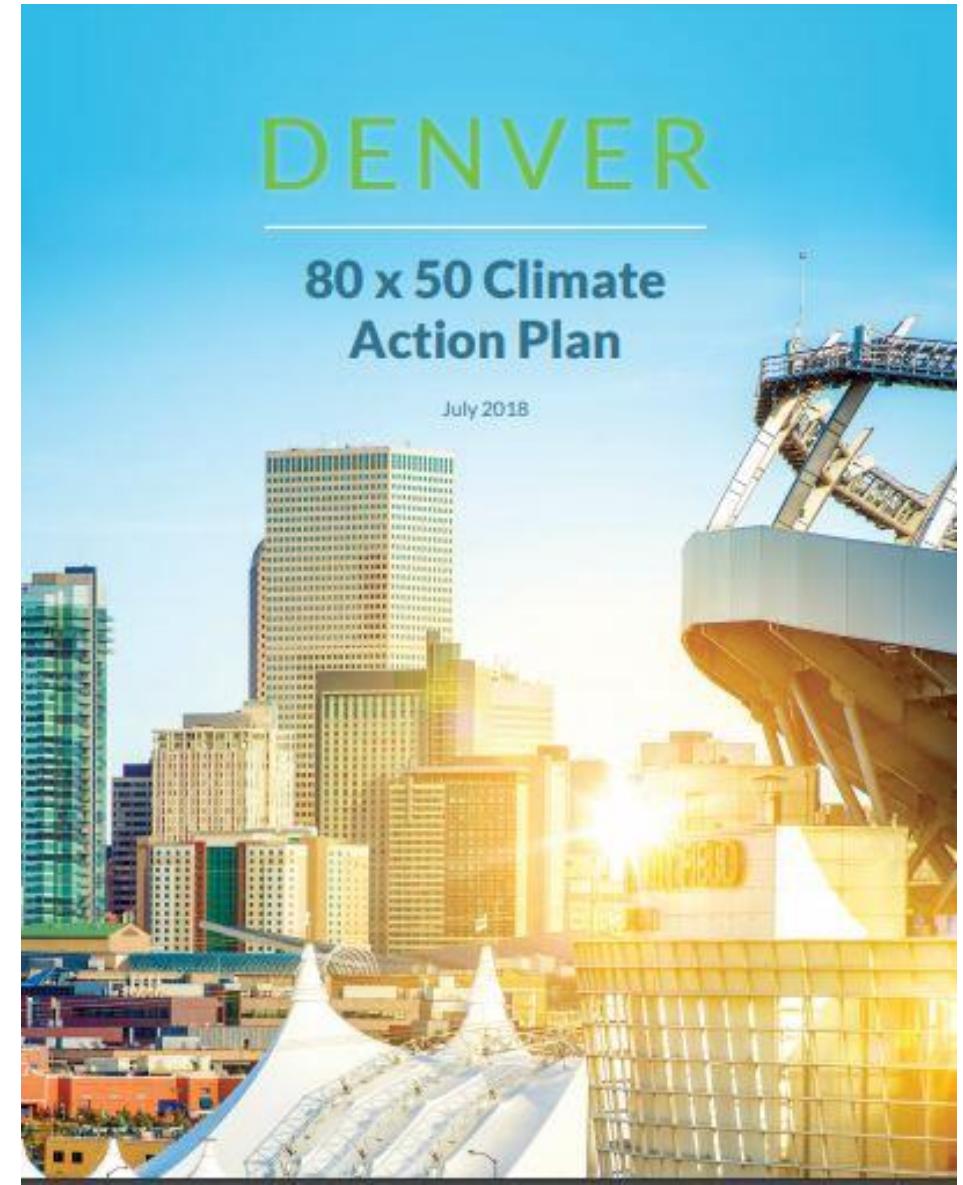
City Fleet Goal: 200 Electric Vehicles by 2020

Denver Fleet: Number of Charging Stations

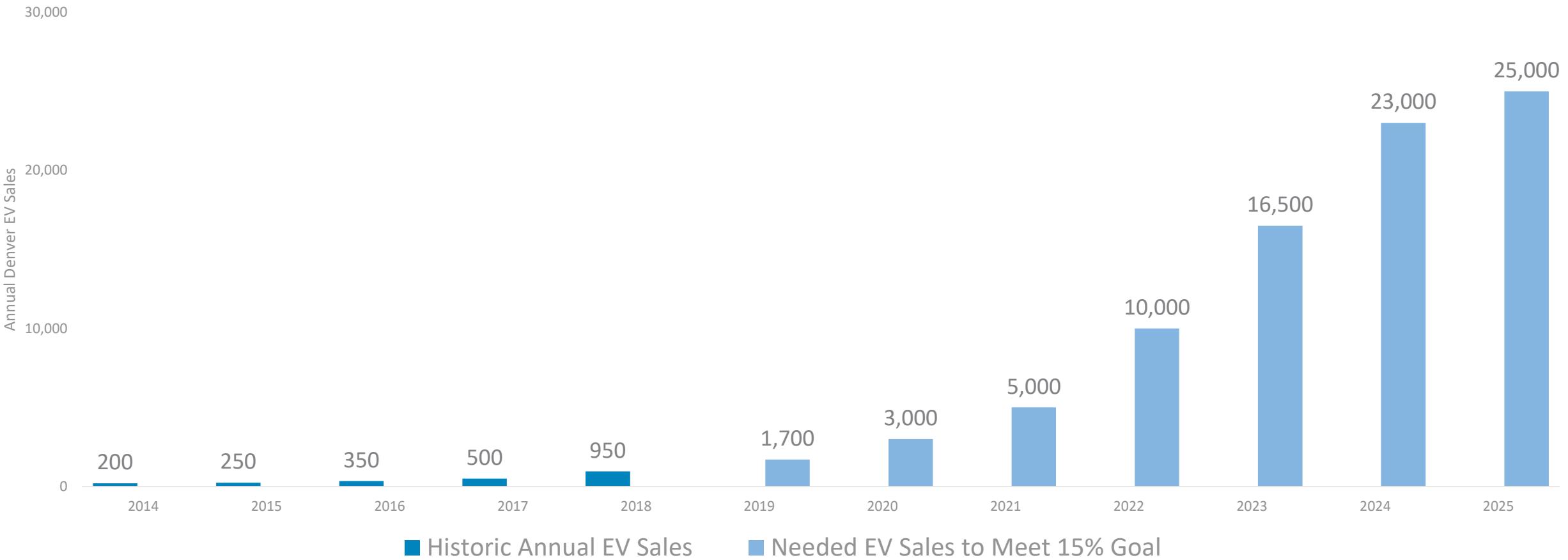


Denver's Electrification Goals

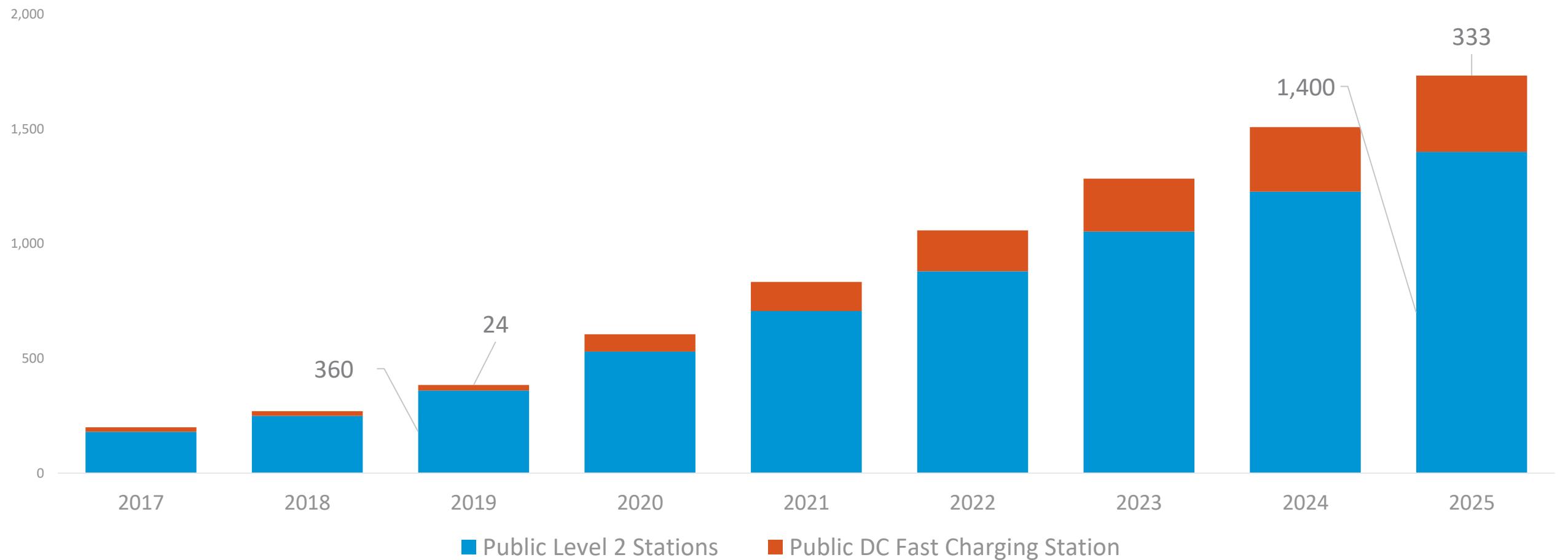
- **Light Duty Vehicles**
 - 2025: 15% of Denver vehicle registrations are electric
 - 2030: 30% of Denver vehicle registrations are electric
 - 2050: 100% of Denver vehicle registrations are electric
- **Heavy Duty Vehicles and Fleets**
 - 2050: 75% of freight trucks will use carbon neutral fuel
 - 2050: 100% of taxis and transportation network vehicles are electric
 - 2050: 100% of public transportation will be carbon free

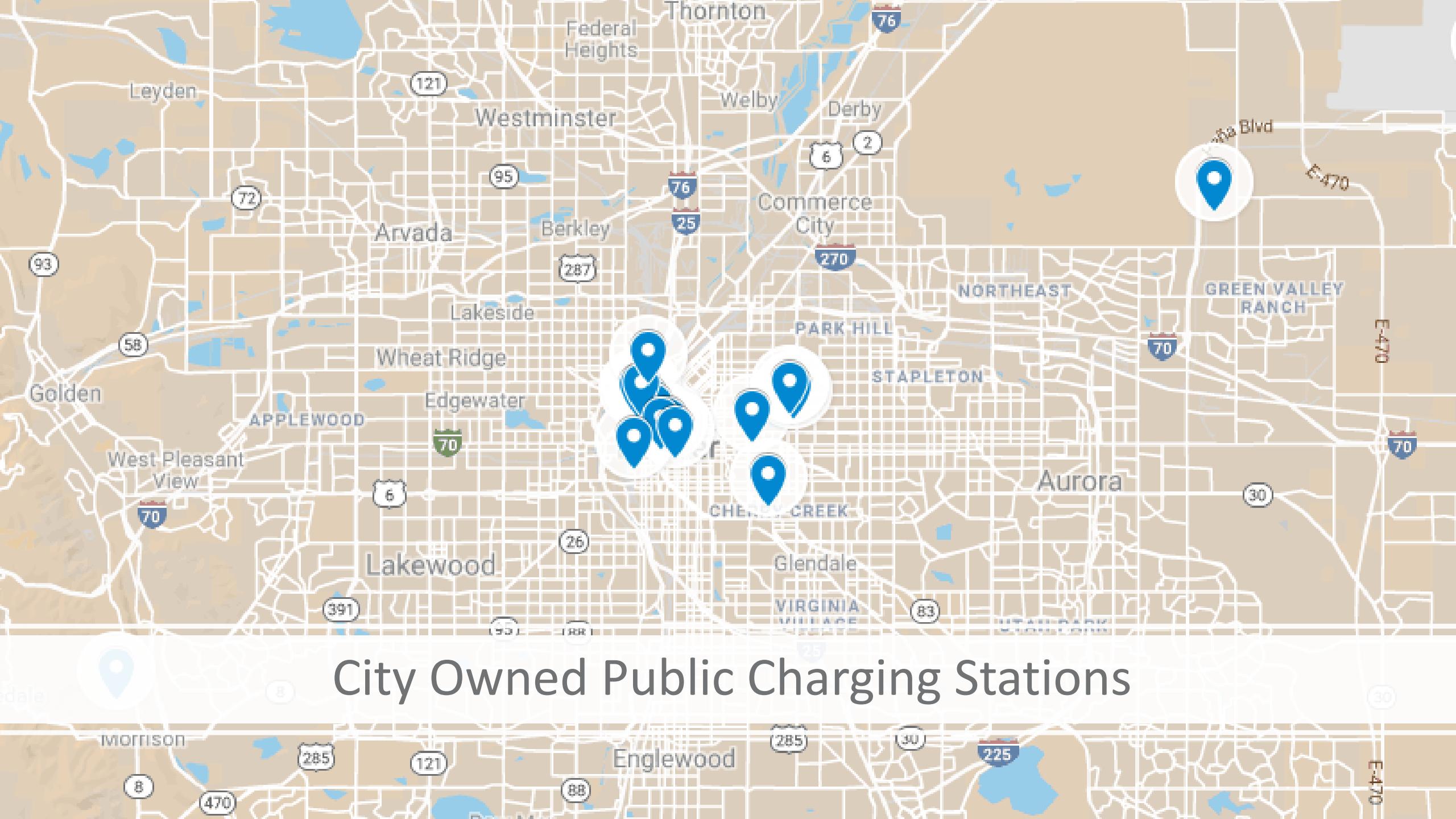


Denver EV Sales Needed to Meet 15% Goal

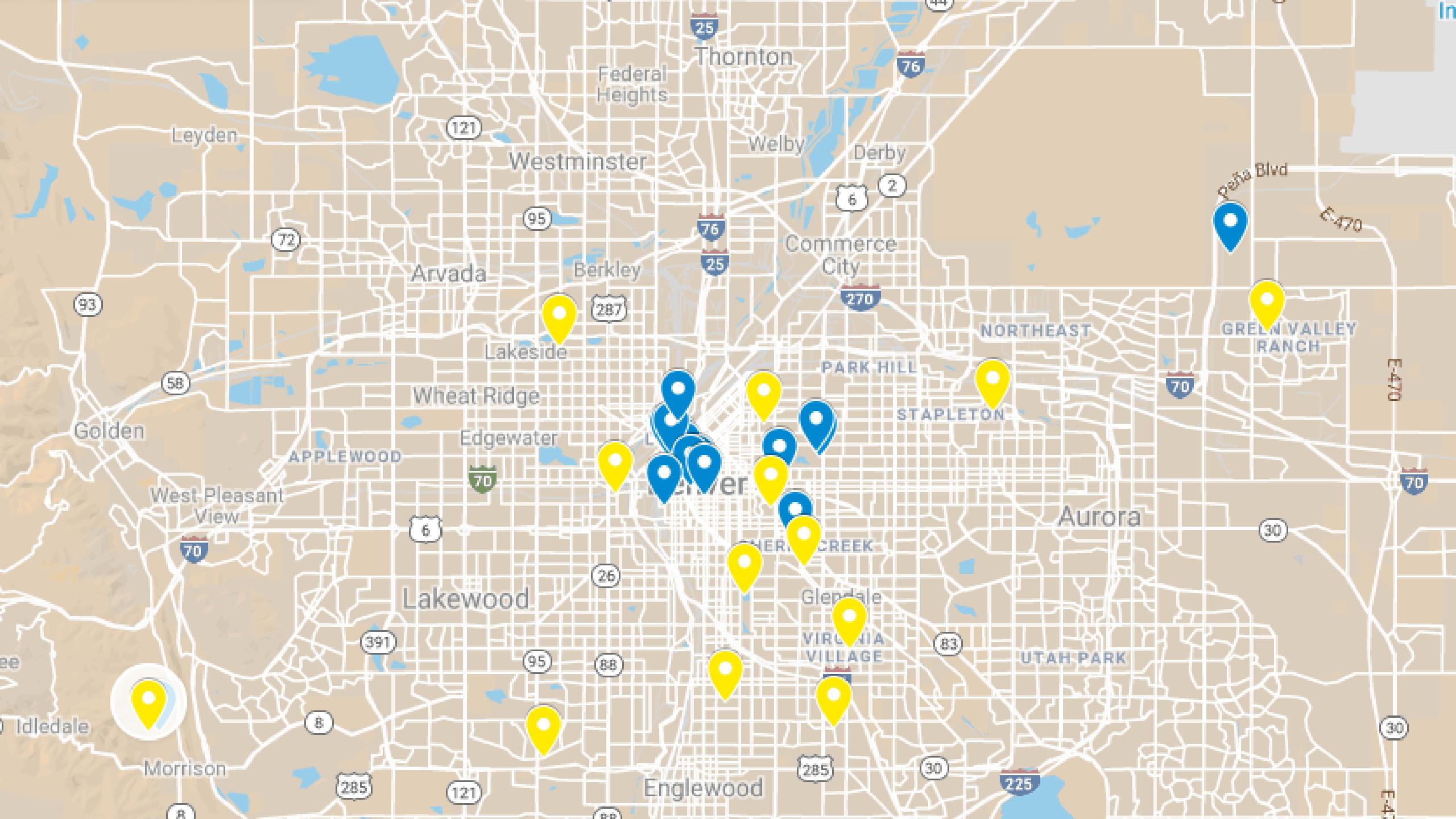


Historic and Needed Publicly Available Charging Stations in Denver





City Owned Public Charging Stations





U.S. DEPARTMENT OF
ENERGY



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

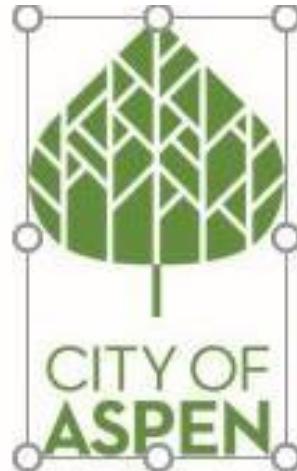
- 5% with Charging Stations
- 15% Wired
- 80% with Conduit

Commercial

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

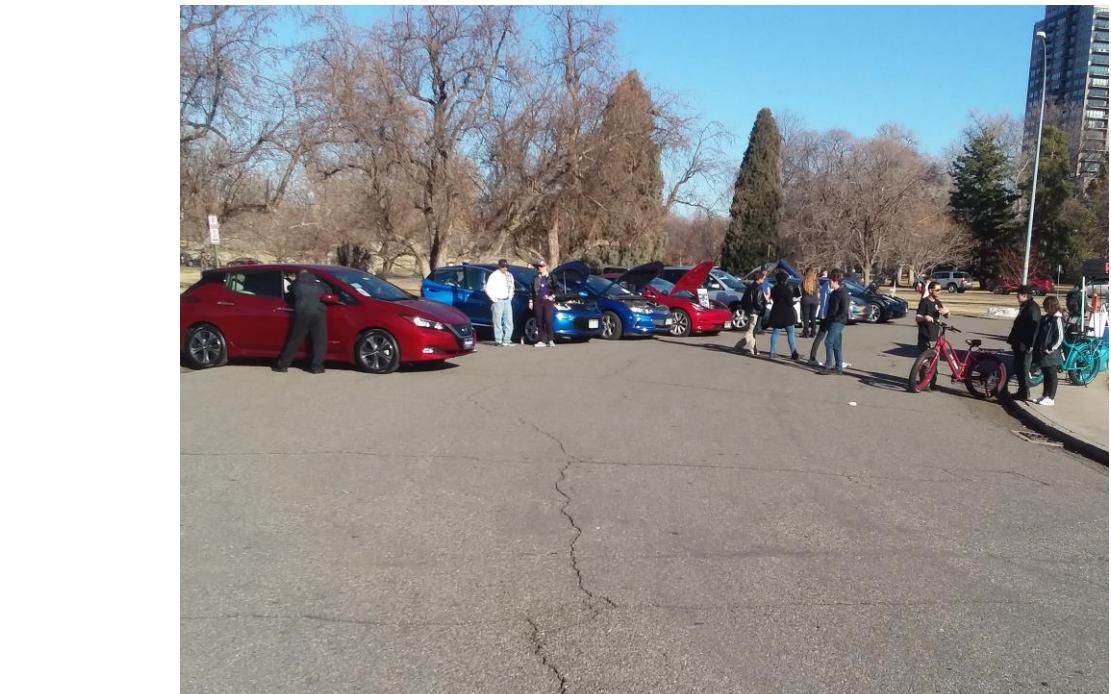
Colorado's Zero Emission Vehicle Standard

Denver co-led Local Government Coalition Support



EV Education and Outreach Events

Upcoming EV Ride and Drive
September 19th, 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



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Comprehensive Plan 2040





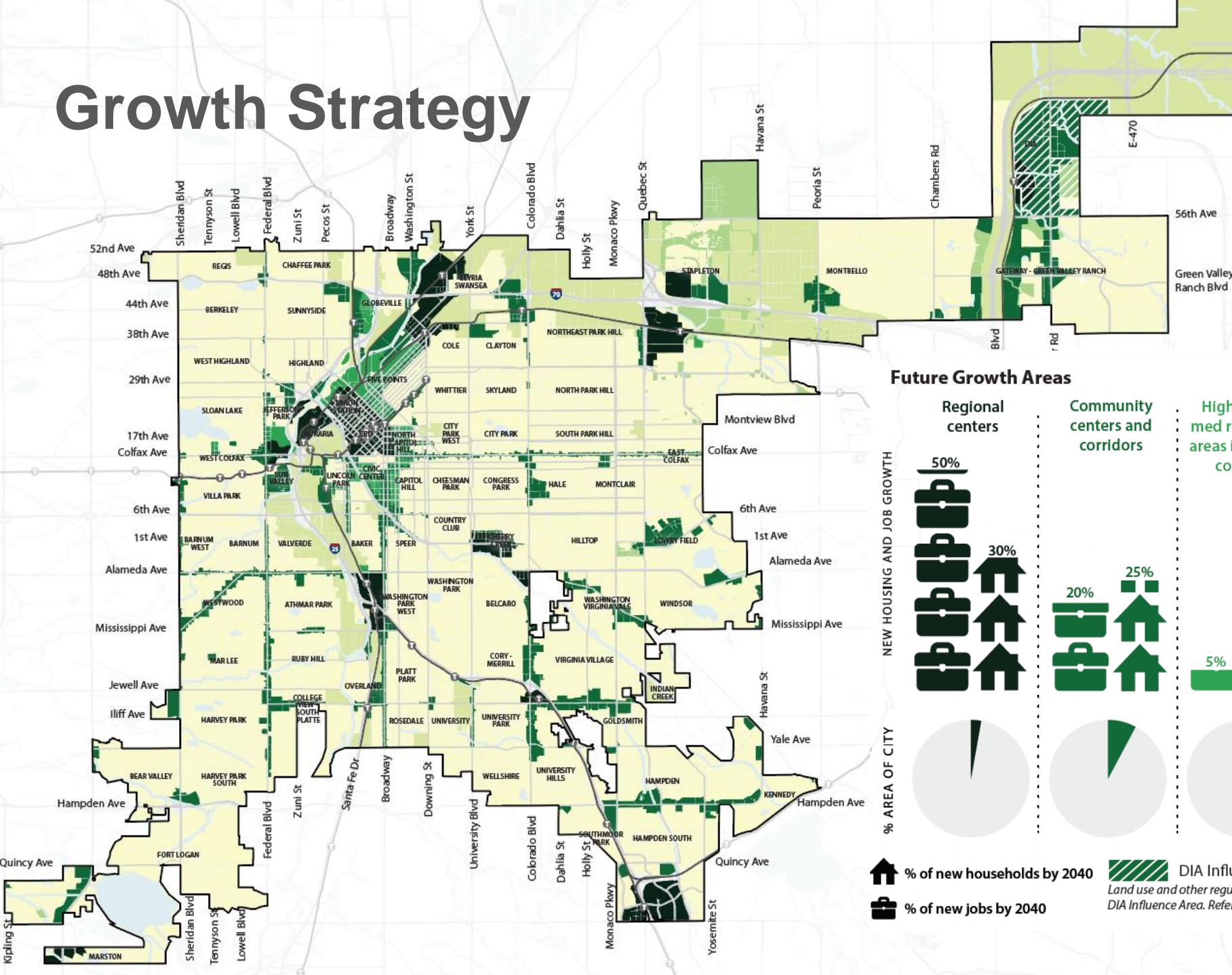
In 2040...

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

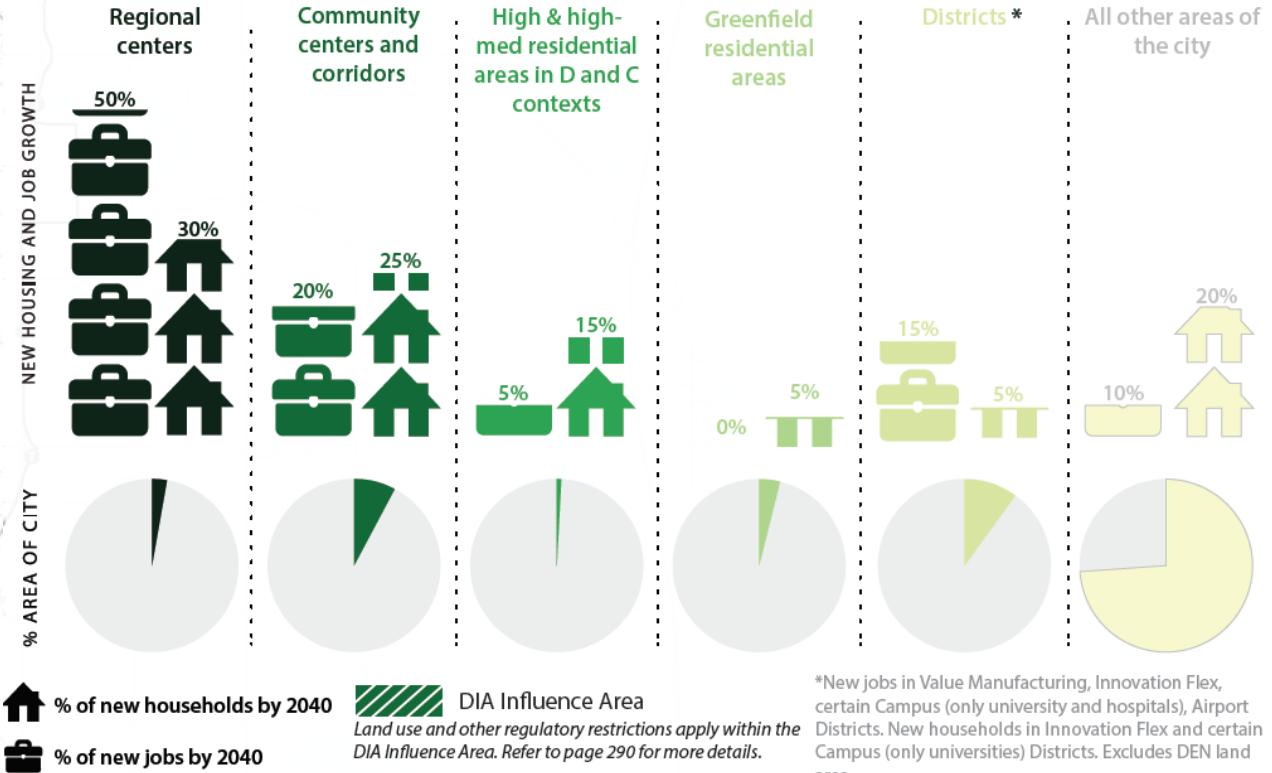
MAJOR TOPICS COVERED

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

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

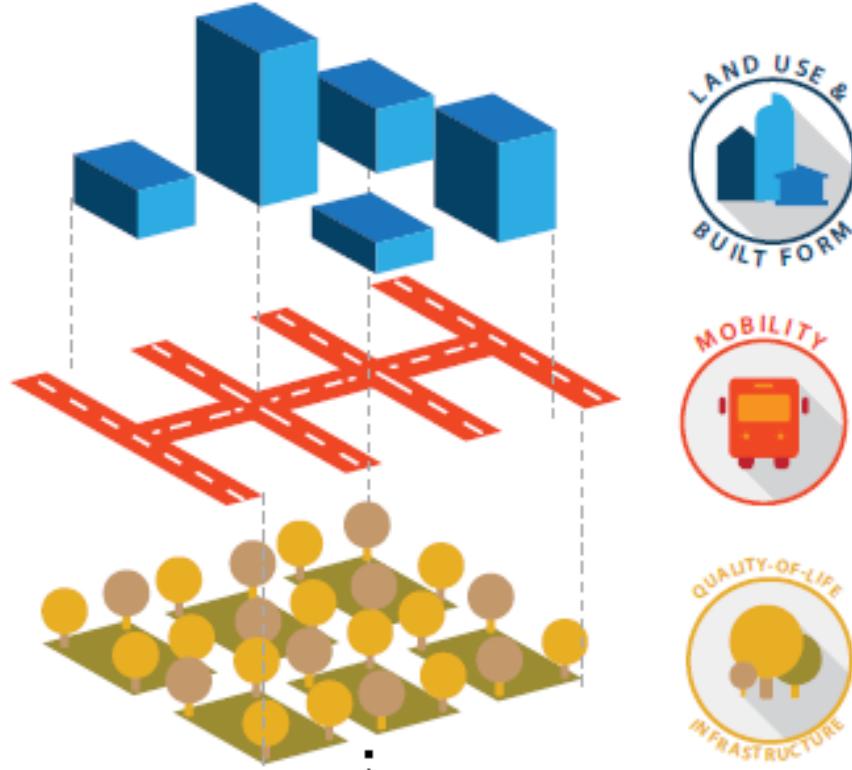
High Growth

VEHICLE MILES TRAVELED	ENERGY USE	WATER USE	GREENHOUSE GASES	HOUSEHOLD COSTS
Annual per capita 3,750 miles	Residential and commercial per capita 44.3 million Btu	Residential and commercial per capita 25,000 gallons	Per capita from cars and buildings 6.7 metric tons	Driving and utility costs per new household \$8,200
 5.3% below Baseline	 6.3% below Baseline	 5.2% below Baseline	 5.9% below Baseline	 19% below Baseline

Low Growth

VEHICLE MILES TRAVELED	ENERGY USE	WATER USE	GREENHOUSE GASES	HOUSEHOLD COSTS
Annual per capita 4,120 miles	Residential and commercial per capita 48.6 million Btu	Residential and commercial per capita 28,800 gallons	Per capita from cars and buildings 7.3 metric tons	Driving and utility costs per new household \$11,800
 4.2% over Baseline	 2.9% over Baseline	 8.9% over Baseline	 3.1% over Baseline	 17% over Baseline

Growth Strategy: Complete Neighborhoods



Places vary:



Growth Strategy: Complete Networks

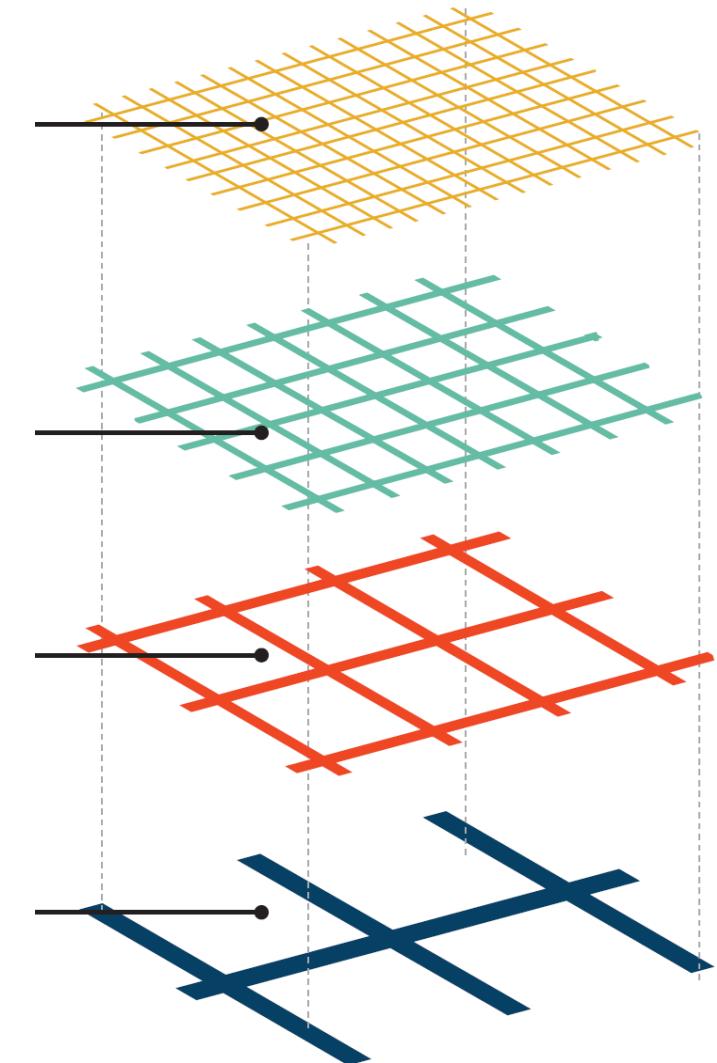
High-quality, continuous transportation networks that prioritize pedestrians, transit, bicycles or cars for seamless mobility throughout the city.

Pedestrians

Bicycles

Transit

Auto and Goods Movement



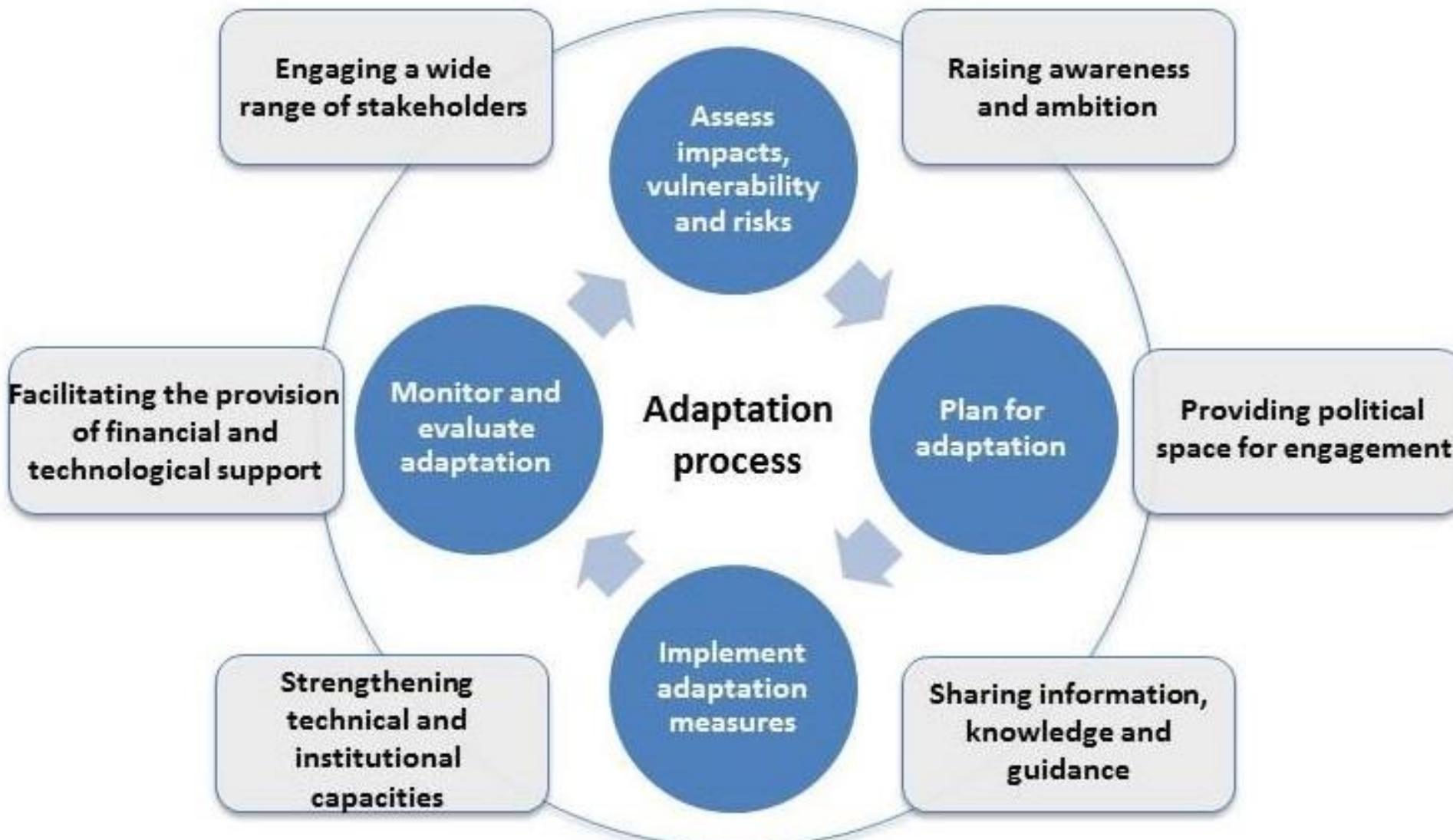
A wide-angle photograph of the Denver skyline at sunset. The sky is filled with large, billowing clouds illuminated from behind by the setting sun, transitioning from deep blue to bright orange and yellow. In the foreground, the city lights of Denver are visible, including the Colorado State Capitol building and various commercial buildings. The Rocky Mountains are visible in the background, their peaks partially obscured by the horizon.

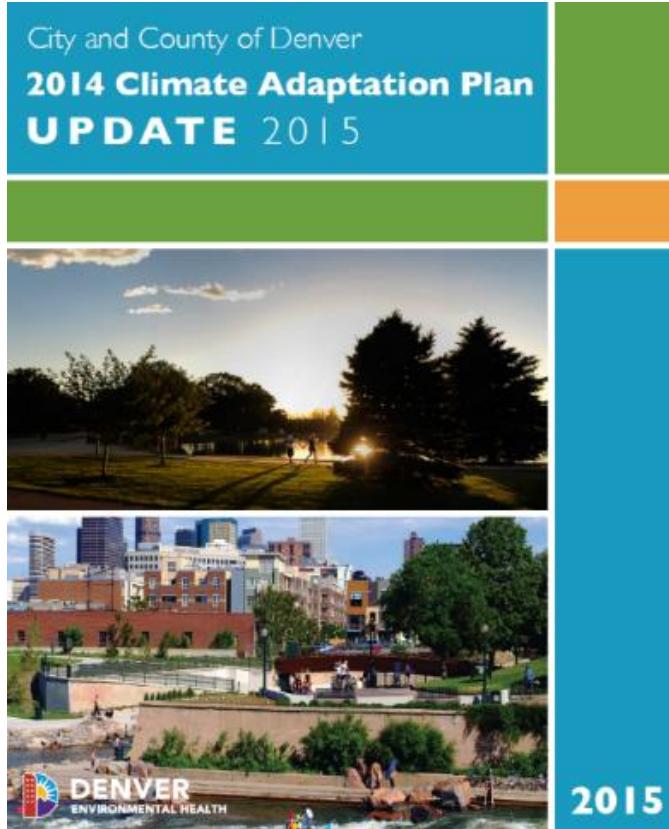
Climate Adaptation

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.

4th National Climate Assessment
2018



Provides evidence of a recent climate adaptation plan covering at least the city boundary¹



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
Roles	Lead for Community-wide adaptation planning/coordination	Responsible for urban infrastructure/green infrastructure	Citywide green infrastructure
Efforts	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
Gaps	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	
Resource Needs		Political Support Business & Community Partnerships Space for Green	
Impact Areas	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

