
MT2030
CLIMATE
SUMMIT
SUN VALLEY 26
PRESENTED BY TORUS

DENVER
CLIMATE ACTION, SUSTAINABILITY & RESILIENCY

The Clock is Ticking: How Denver uses data to focus our efforts

MT2030 Summit
October 14, 2026

Jonathan Rogers
Deputy Executive Director
City and County of Denver
Jonathan.Rogers@denvergov.org

Nick Russell
Senior Associate II
Lotus Engineering and Sustainability
Nick@lotussustainability.com

Climate Action Update

1. Denver's Office of Climate Action, Sustainability and Resiliency (CASR)
   Achieve zero emissions as quickly and equitably as possible.
2. Developing Denver's GHG Inventory Dashboard and Forecast Model
3. Data in Action: Denver's Use of Data in Decision-Making
4. Summary
5. Q & A

But first, nice to meet you!



My friends call me “Jonny”





The Office of Climate Action, Sustainability, and Resilience is responsible for rapidly and equitably decarbonizing Denver

DENVER CLIMATE ACTION, SUSTAINABILITY & RESILIENCY | CLIMATE PROTECTION FUND

Reduce GHG emissions

65% by 2030 from 2019 baseline

100% by 2040 (without carbon offsets)

Make Strategic Investments

0.25% sales tax with equity exemptions

$50 million annual budget

One of eight LEED Platinum certified cities in the world

Ranked #2 in the ACEEE City Clean Energy Scorecard

Climate Action Division Overview

Overarching Goal

Achieve zero emissions as equitably as possible

Emitting Sectors

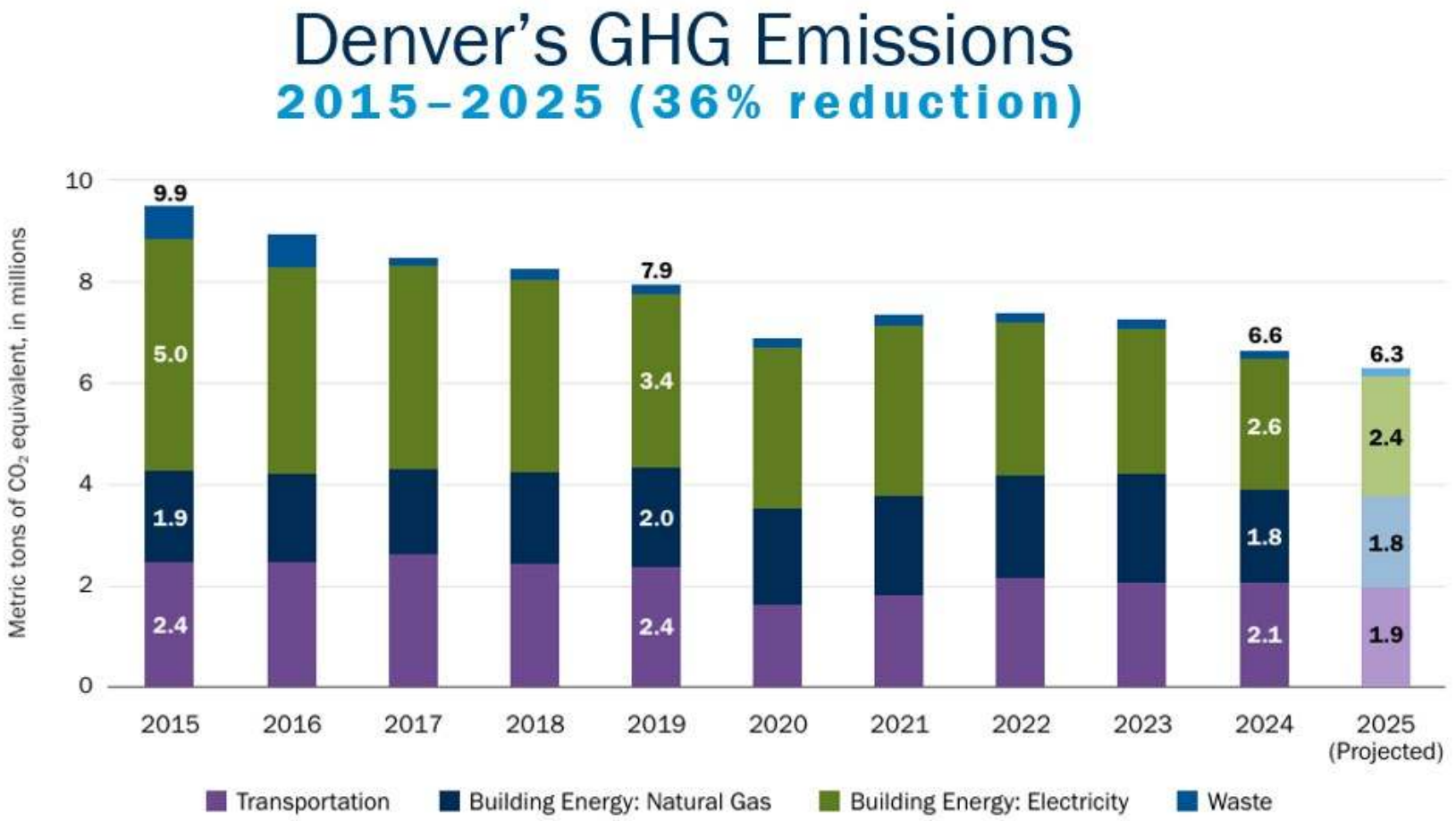
Electric; Thermal; Mobility

Strategic Pillars (complementary)

1. Influence policy to shift the status quo
2. Invest in the community to show what's possible
3. Lead by example in electrifying the city fleet, facilities, and operations
4. Use data to report on progress and enable iterative improvement

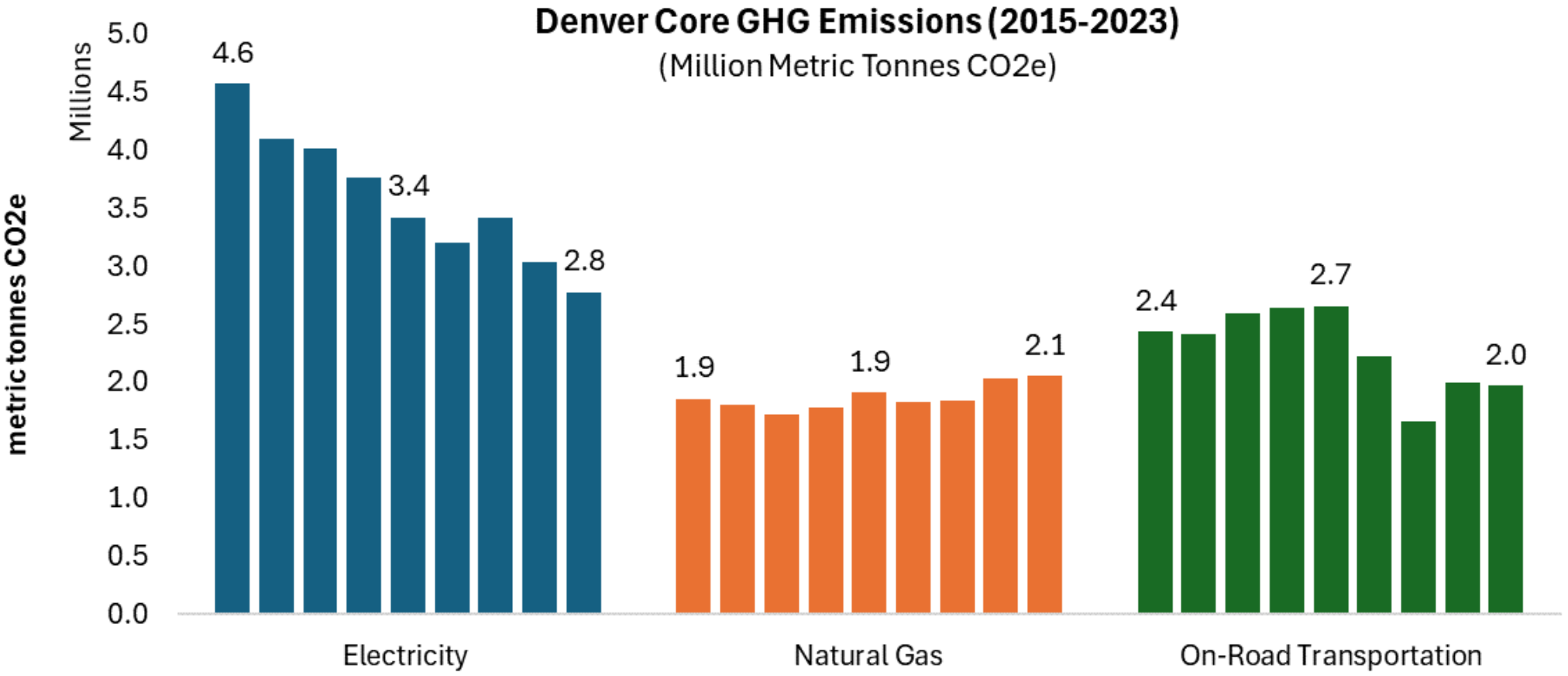
GHG Emissions Reductions are a Lagging Outcome

Yes, emissions are declining. But why, and where are we stuck?



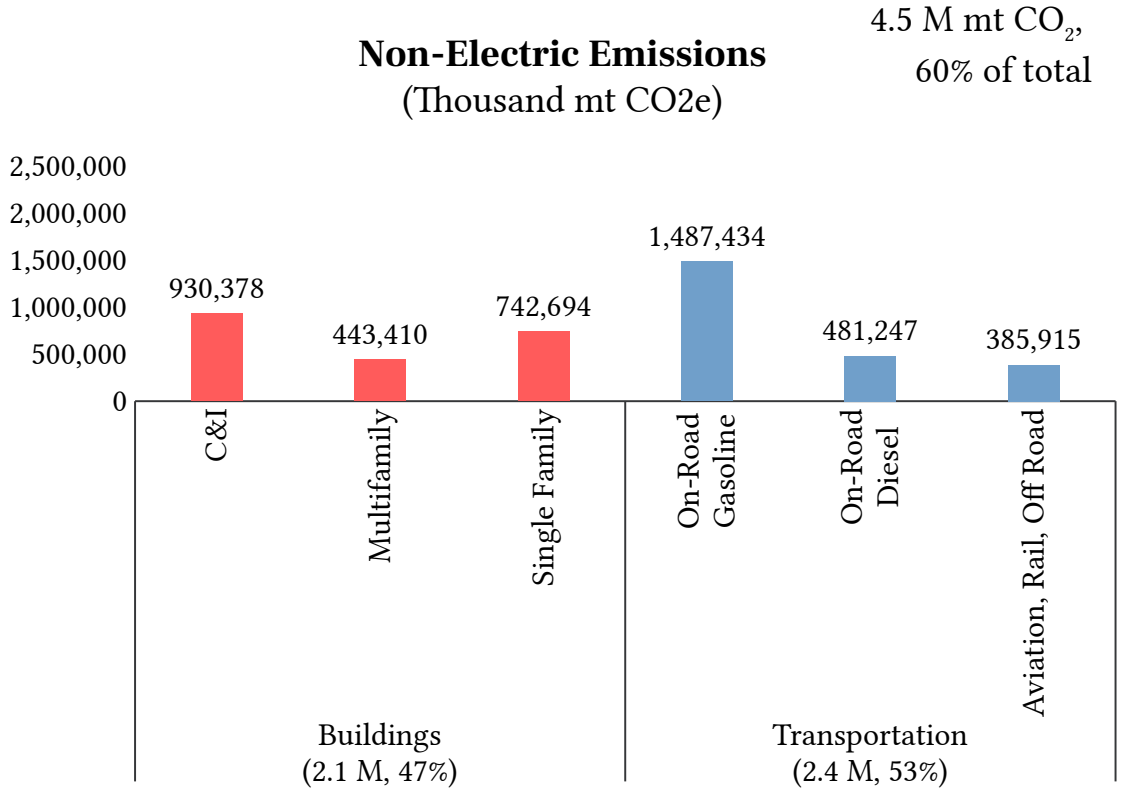
Goal: Achieve zero GHG emissions as quickly as possible.

How data helps: Observe trends and prioritize actions by sector.

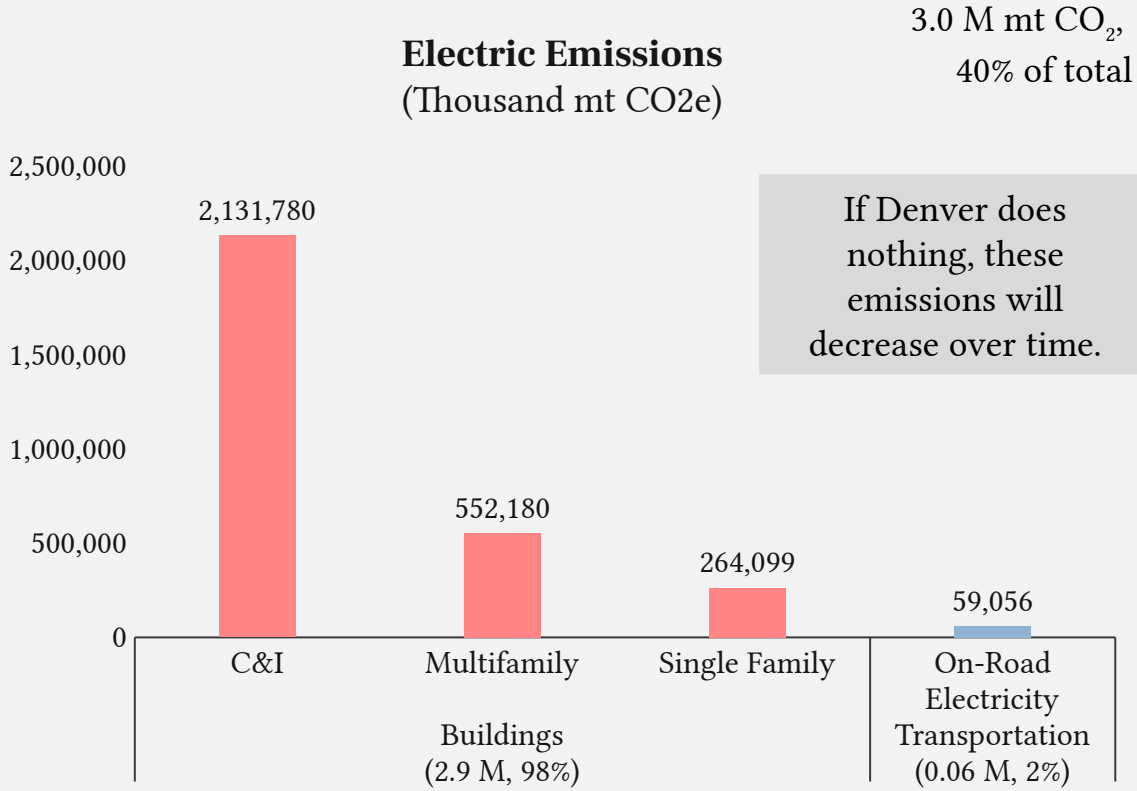


Non-Electric emissions represent 60% of Denver's carbon emissions

"Active" decarbonization requires owner investment in new assets and supportive infrastructures that can result in unintended individual and systemic costs & consequences.



"Active" decarbonization required



"Passive" decarbonization possible

Stop burning fossil fuels.

Identify leading indicators for non-electric emissions and model their impact.

Stop burning things for heat

- 225,000 fossil-gas customers to electrify
- 100 steam customers
- 7,000 heating permits per year
- +160 municipal facilities to electrify
- +6,000 miles of gas pipeline to abandon (neighborhood-scale solutions)

Stop burning things to move

- 482,000 ICE vehicles to electrify
- +3,000 CCD fleet vehicles
- +1,000 public DCFC charging plugs to deploy
- ~5,000 miles of road in Denver to make safer and more sustainable.
- 4.6 billion vehicle miles traveled annually

Denver's GHG Inventory Dashboard and Forecast Model

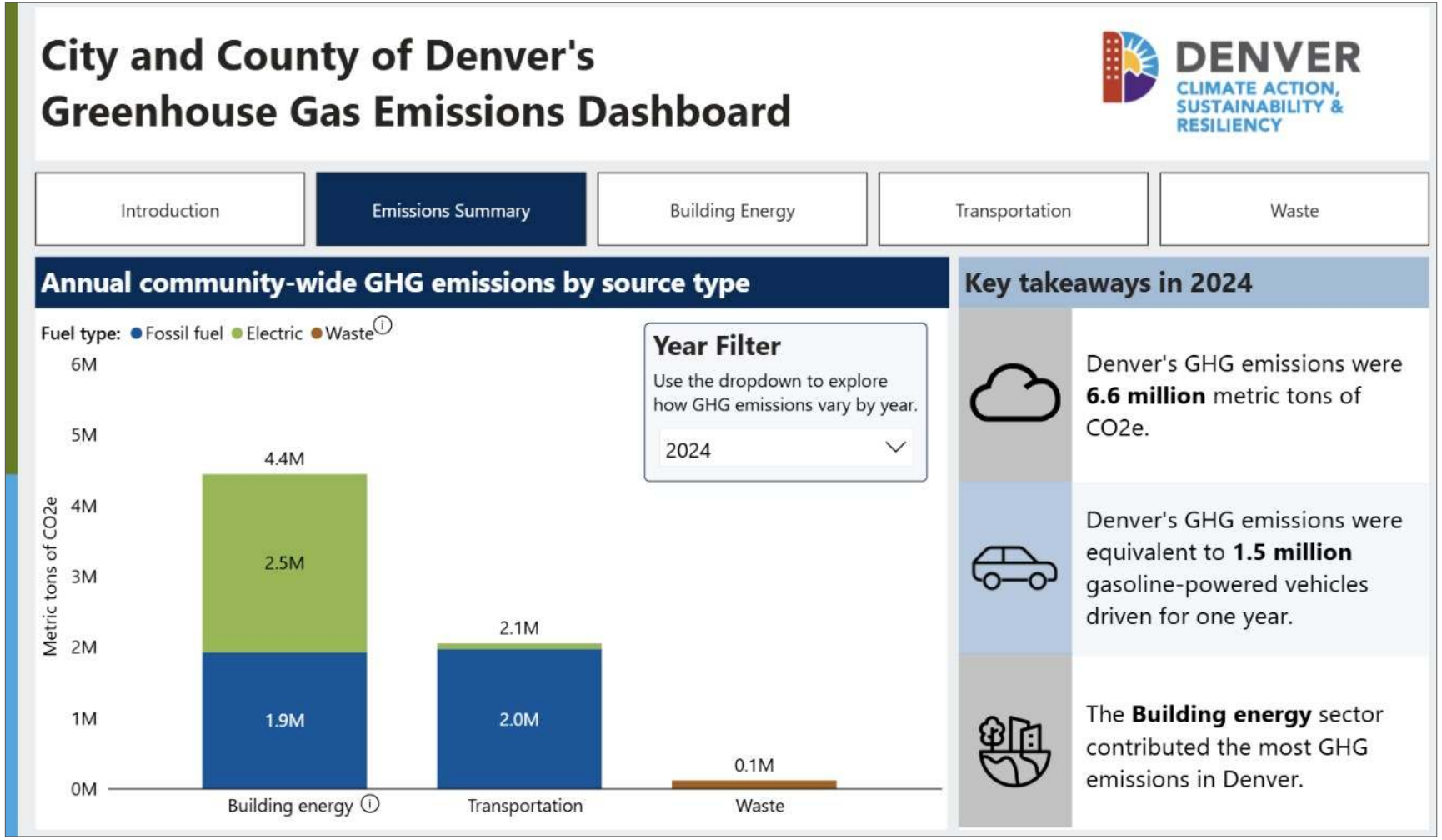
Foundational data resources

GHG Inventory Dashboard
(Retrospective)

GHG Impact Forecast Model
(Forward Looking)

Denver's GHG Emissions Dashboard

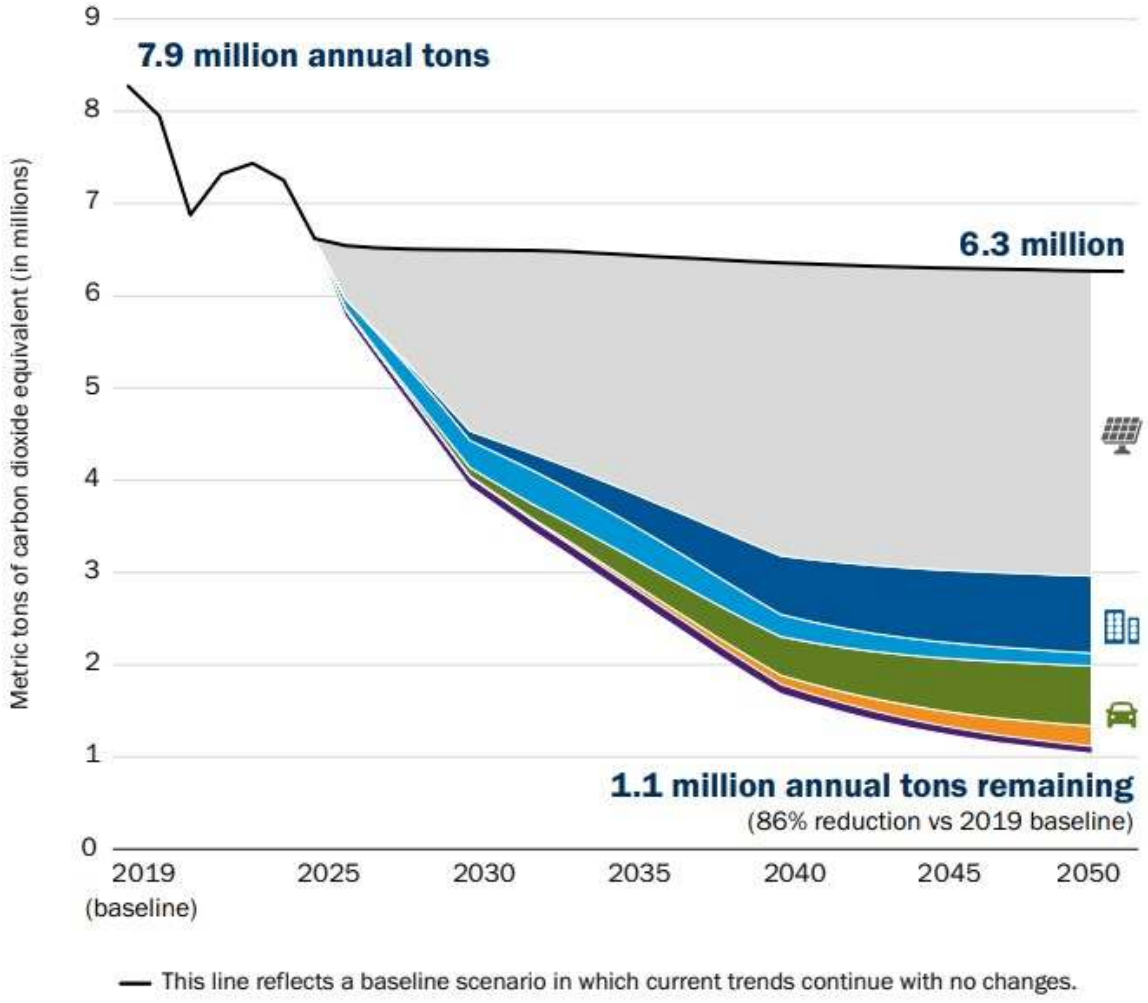
Explore core emissions sectors, emissions sources, and trends



www.denvergov.org/Government/Agencies-Departments-Offices/Agencies-Departments-Offices-Directory/Climate-Action-Sustainability-and-Resiliency/About-Us#section-3

GHG Emissions Impact Forecast Model

A cleaner grid + electrification achieve 92% of reduction potential by 2050



Cumulative Metric Tons Avoided (2025 - 2050)	Targets by Core Emissions Sector
65.2 million	**Electric Grid Decarbonization** ■ 85% by 2030 (PUC approved) ☐ 98% by 2040
11.7 million	**Electrification of Building Systems** ☐ 60% of space/water heating equipment permits by 2030 ☐ 90% by 2040
6.2 million	**Building Energy Efficiency** ■ 30% reduction in commercial use by 2032 (Building Performance Policy Aligned) ☐ 10% reduction in residential use by 2032 ☐ 35% reduction in total by 2040
8.6 million	**Light Duty Vehicle Electrification** ■ 82% of new registrations are EV by 2032 (CO Advanced Clean Cars) ☐ 95% new registrations by 2040
2.2 million	**Heavy Duty Vehicle Electrification** ■ 46% of new registrations are EV by 2032 (CO Advanced Clean Trucks) ☐ 95% new registrations by 2050
0.9 million	**Vehicle Miles Traveled per Capita** ☐ 10% reduction by 2040 ☐ 20% reduction by 2050 (Denver Moves Everyone aligned)

■ Required ☐ Projected

Developing Denver's GHG Inventory Dashboard and Forecast Model

Nick Russell
Lotus Engineering and Sustainability

A bit about me...



LOTUS Engineering & Sustainability

Denver

NATIONAL PARK SERVICE

Center for Sustainable Energy®

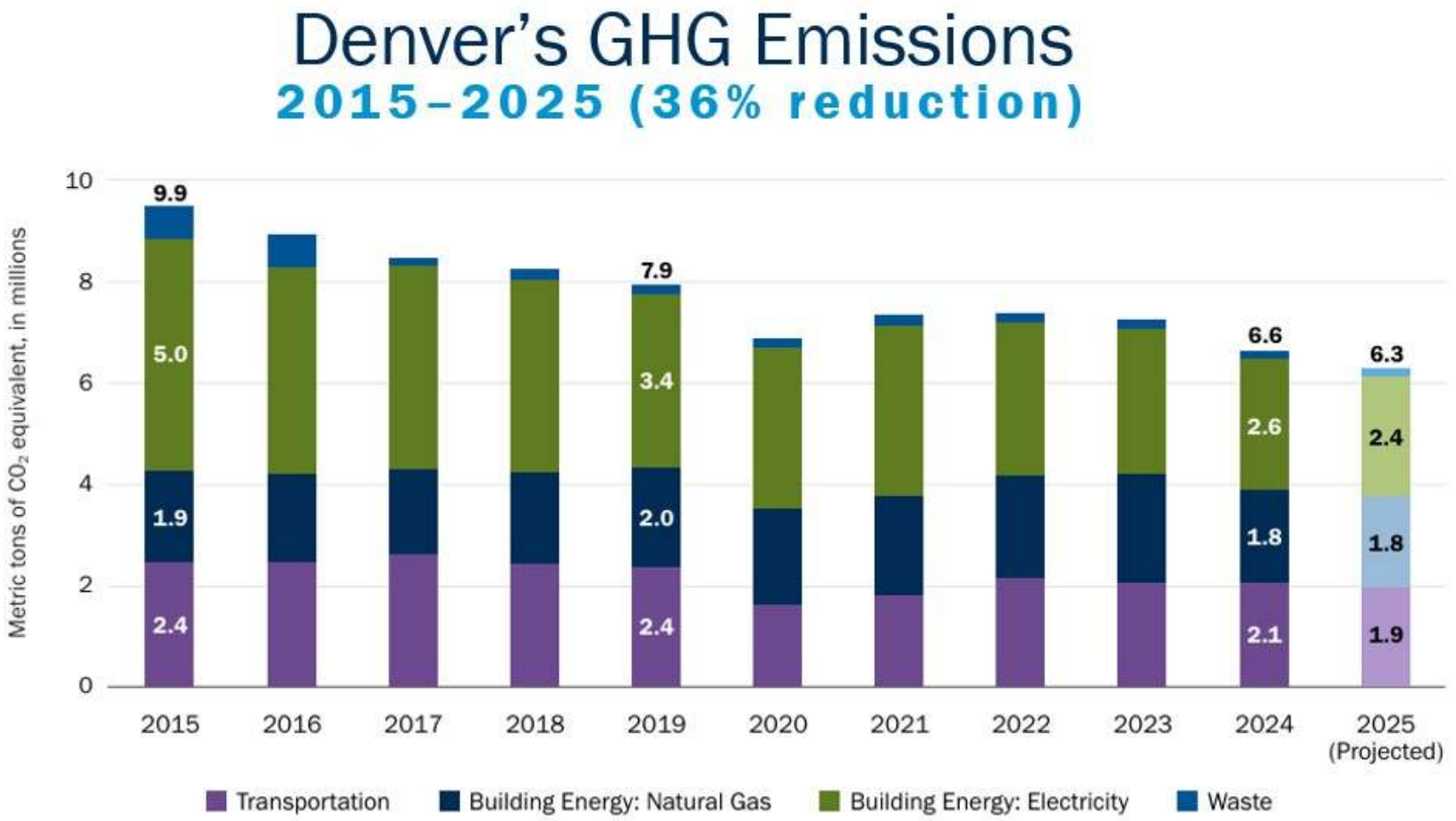




Denver's GHG Inventory Dashboard

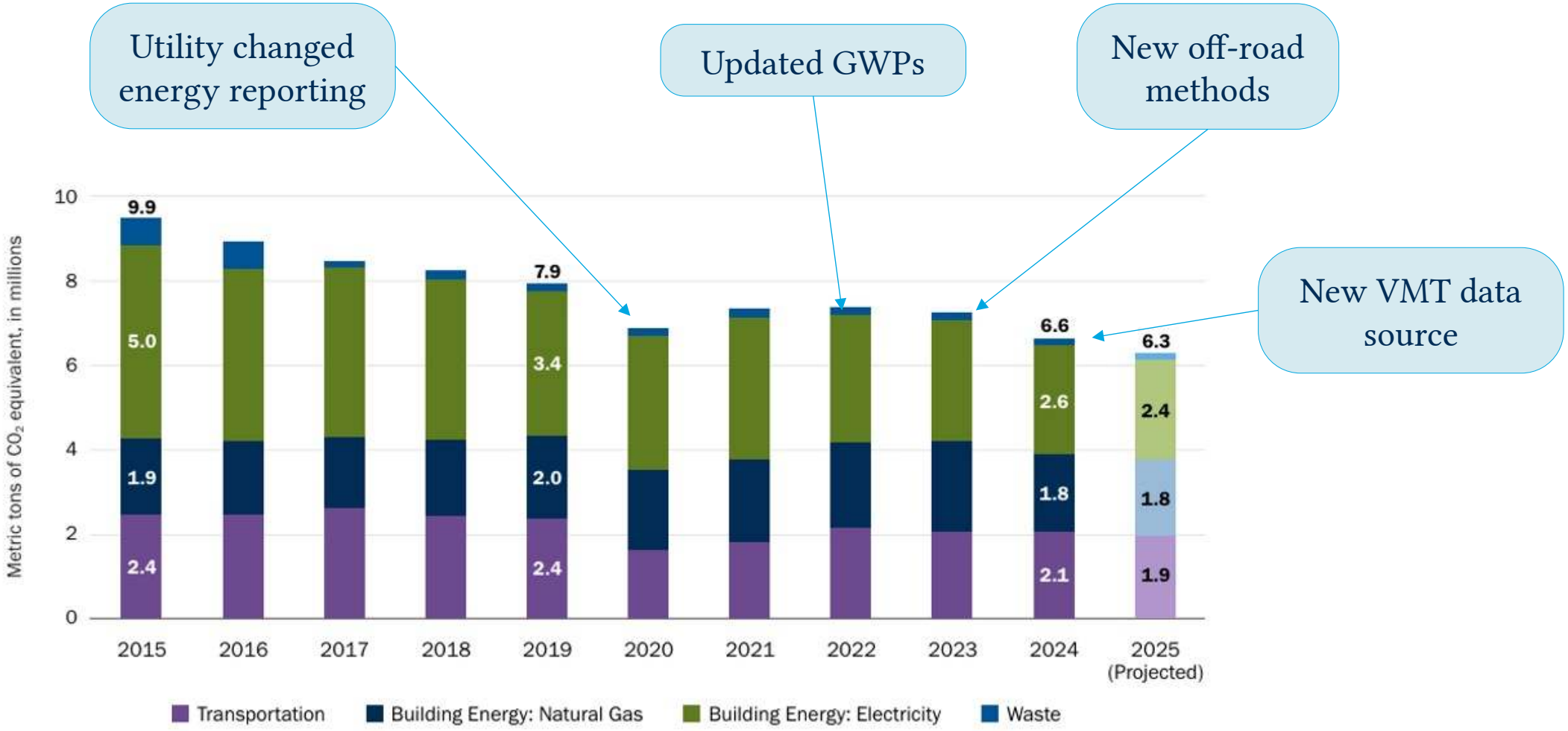
Denver's GHG Emissions Dashboard

Look Back: Multiple years of inventory data illuminate key trends

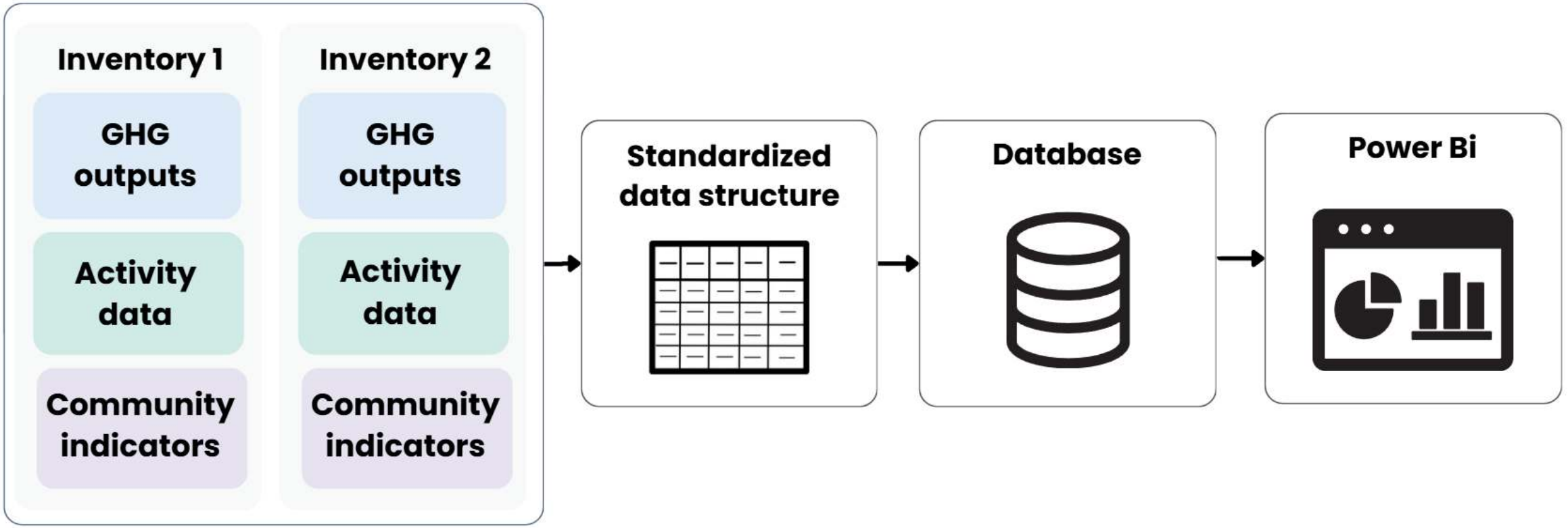


Denver's GHG Emissions Dashboard

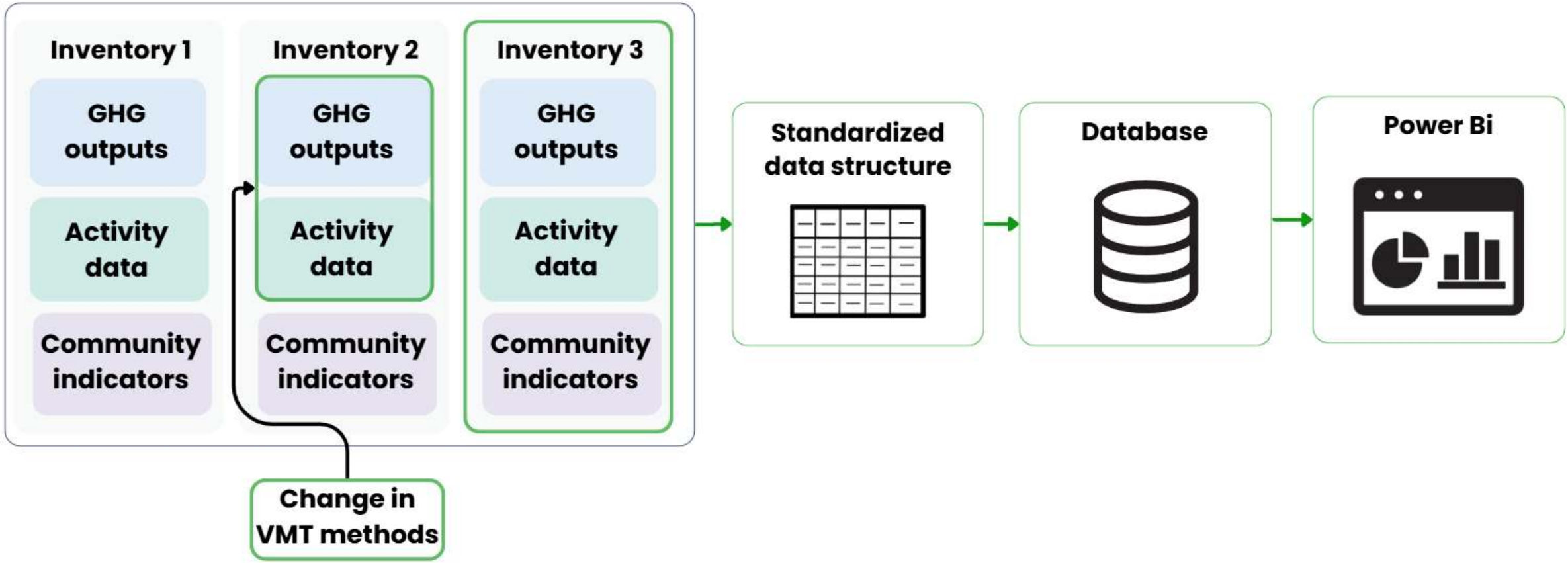
GHG inventory data sources, methodologies, and protocols change over time.



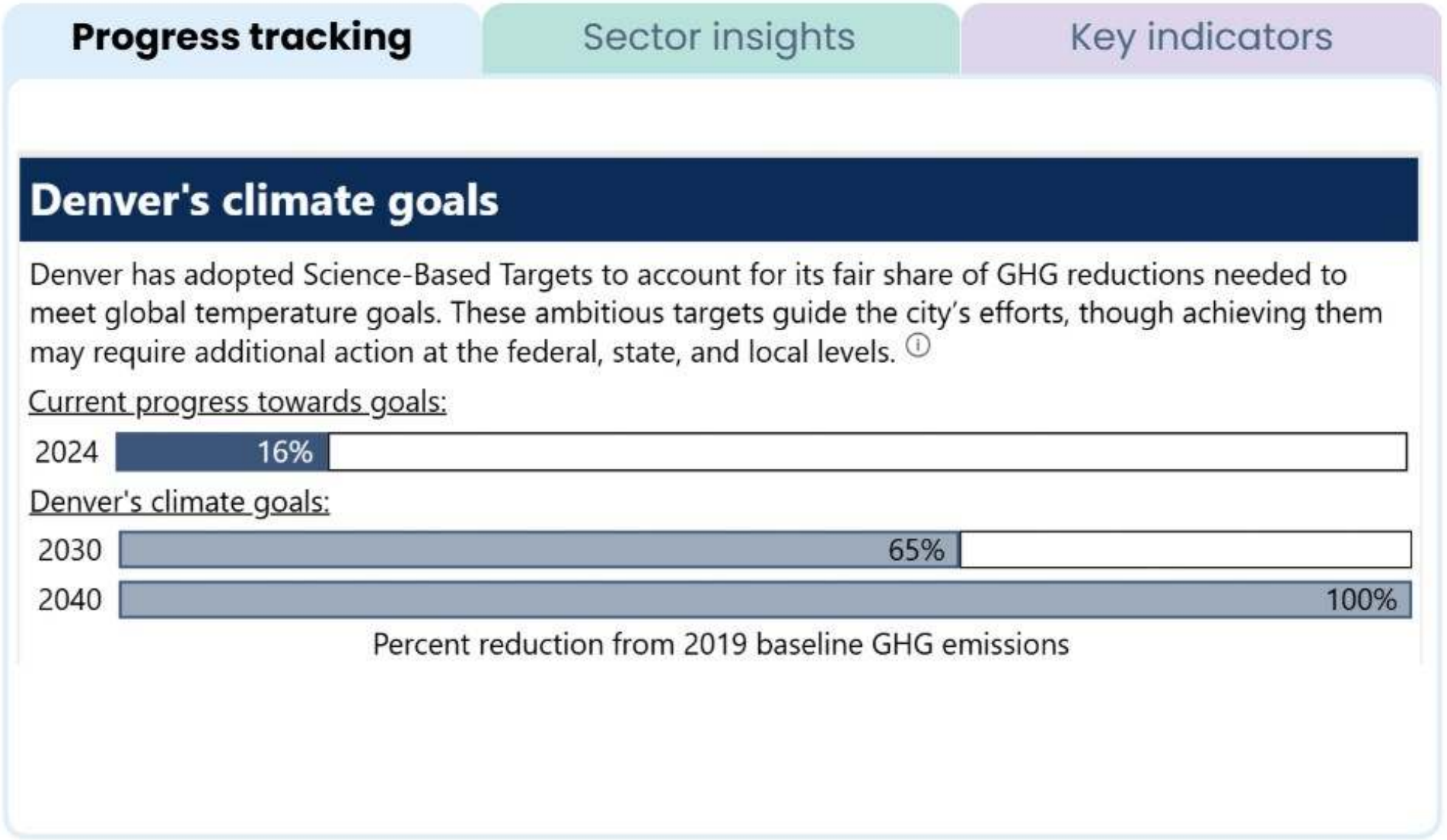
Denver's GHG Emissions Dashboard Streamlines Data Management



Denver's GHG Emissions Dashboard Enables Easy Updates



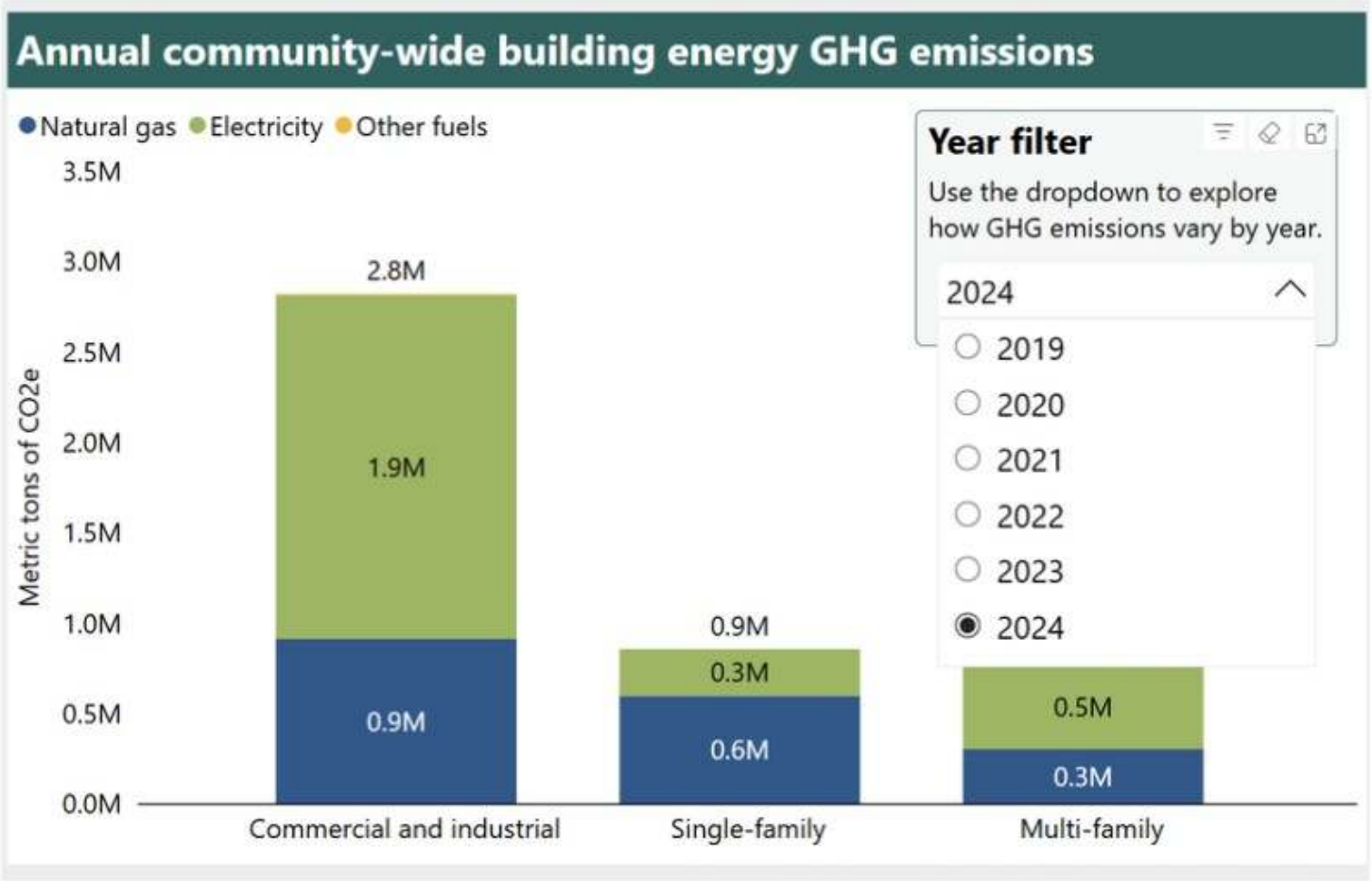
Denver's GHG Emissions Dashboard Brings Key Insights to the Top



Denver's GHG Emissions Dashboard Brings Key Insights to the Top

DENVER
CLIMATE ACTION, SUSTAINABILITY & RESILIENCY

Progress tracking | **Sector insights** | Key indicators



Denver's GHG Emissions Dashboard Brings Key Insights to the Top

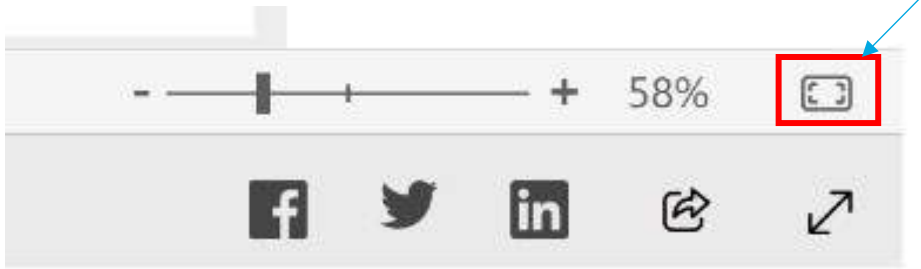
DENVER
CLIMATE ACTION, SUSTAINABILITY & RESILIENCY



Dashboard Walkthrough

Denver GHG Emissions Dashboard

Select “Fit to page” on mobile.



Dashboards are efficiency tools



IMPROVE DATA MANAGEMENT

- Standardize data formats.
- Better manage data source and methodology changes.
- Enable continuous comparison.



STREAMLINE ANALYSIS

- Automate trends analysis.
- Use activity data and community indicators to their full potential.



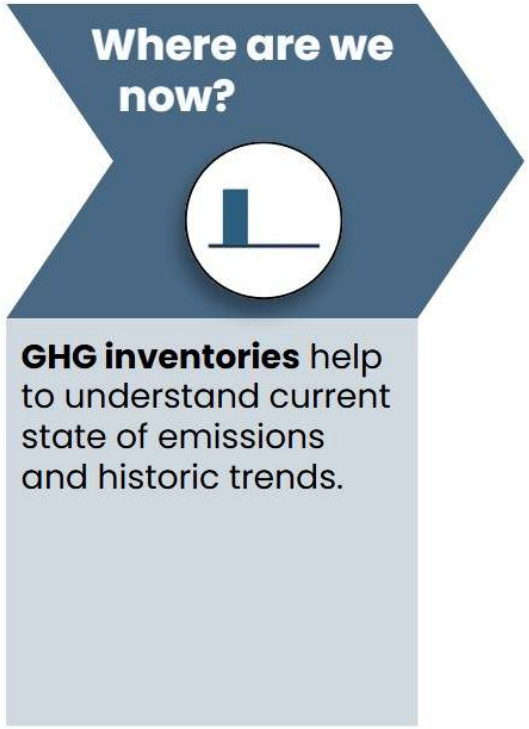
KEY FINDINGS AT YOUR FINGERTIPS

- Single source of truth for all emissions data.
- Quickly pull cross-sector findings.
- Reduce reporting delays.

Denver's GHG Forecast Model

Looking Back Sets You Up to Look Ahead

The GHG analysis roadmap: 5 simple questions



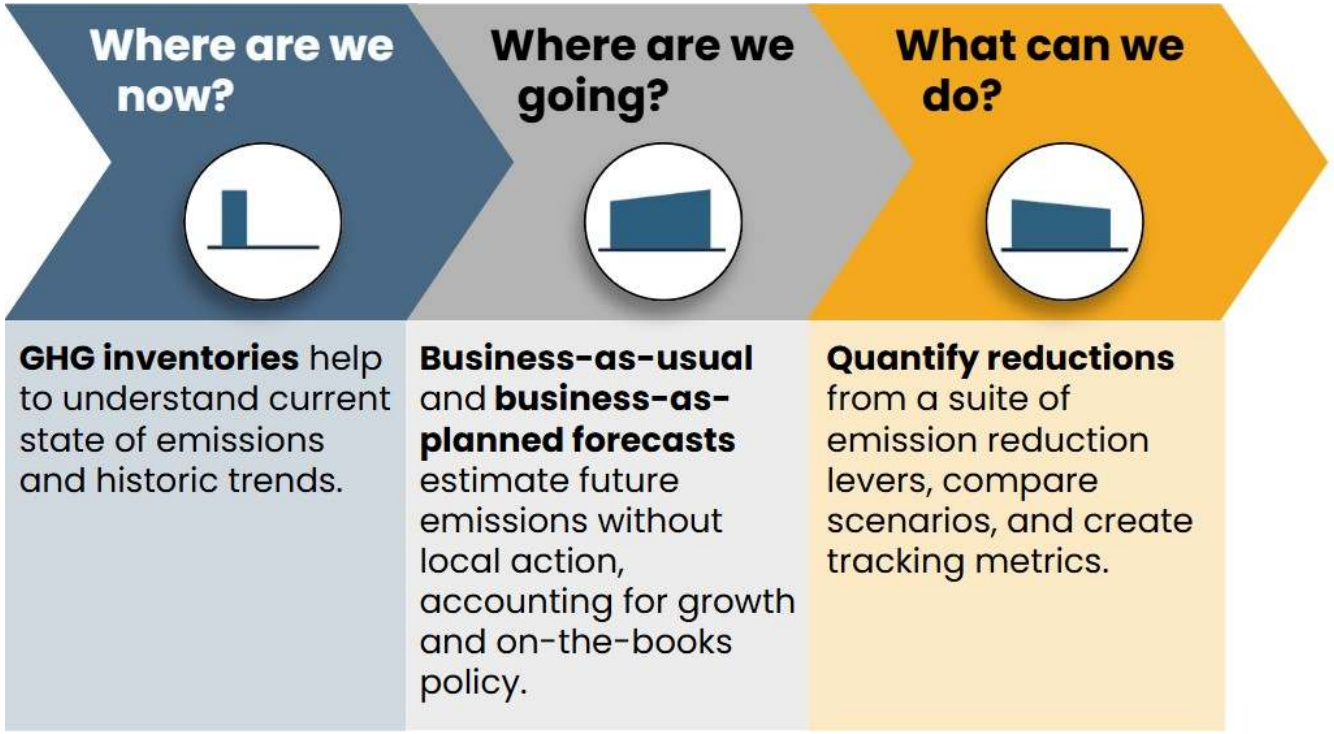
Looking Back Sets You Up to Look Ahead

The GHG analysis roadmap: 5 simple questions



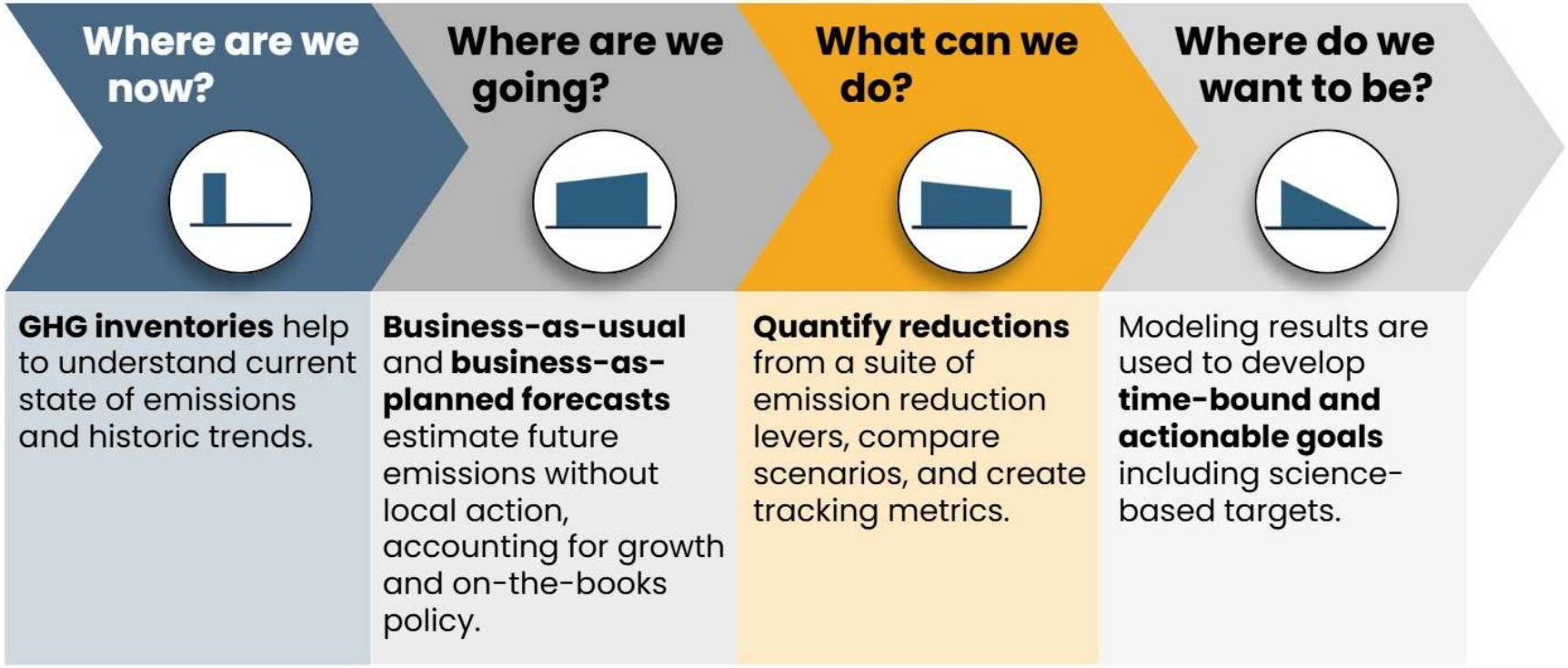
Looking Back Sets You Up to Look Ahead

The GHG analysis roadmap: 5 simple questions



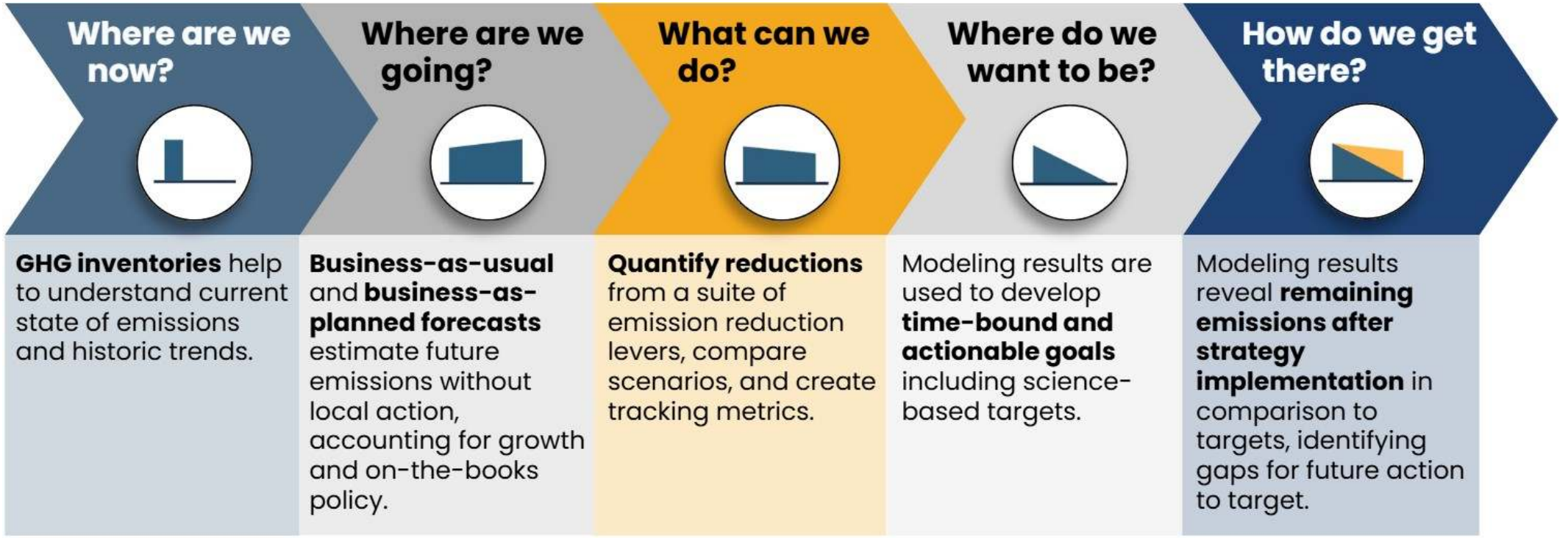
Looking Back Sets You Up to Look Ahead

The GHG analysis roadmap: 5 simple questions



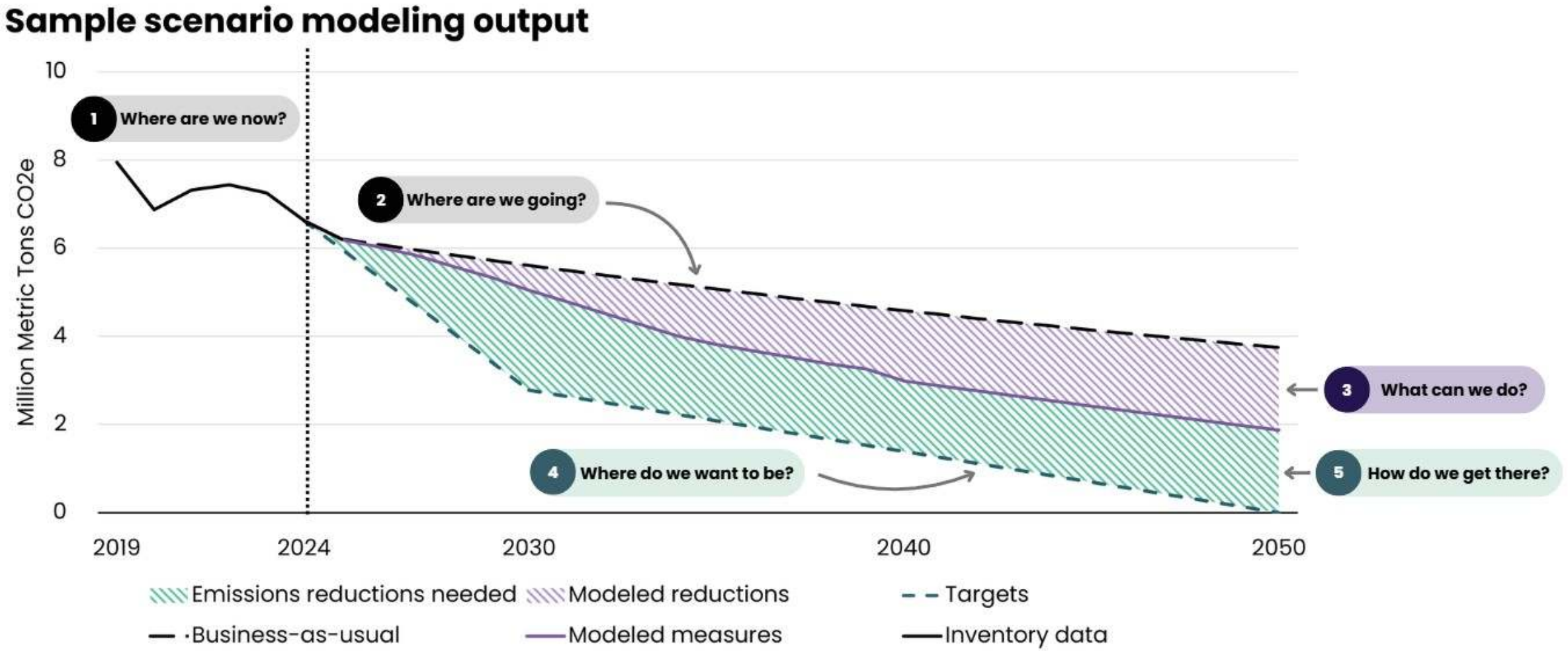
Looking Back Sets You Up to Look Ahead

The GHG analysis roadmap: 5 simple questions



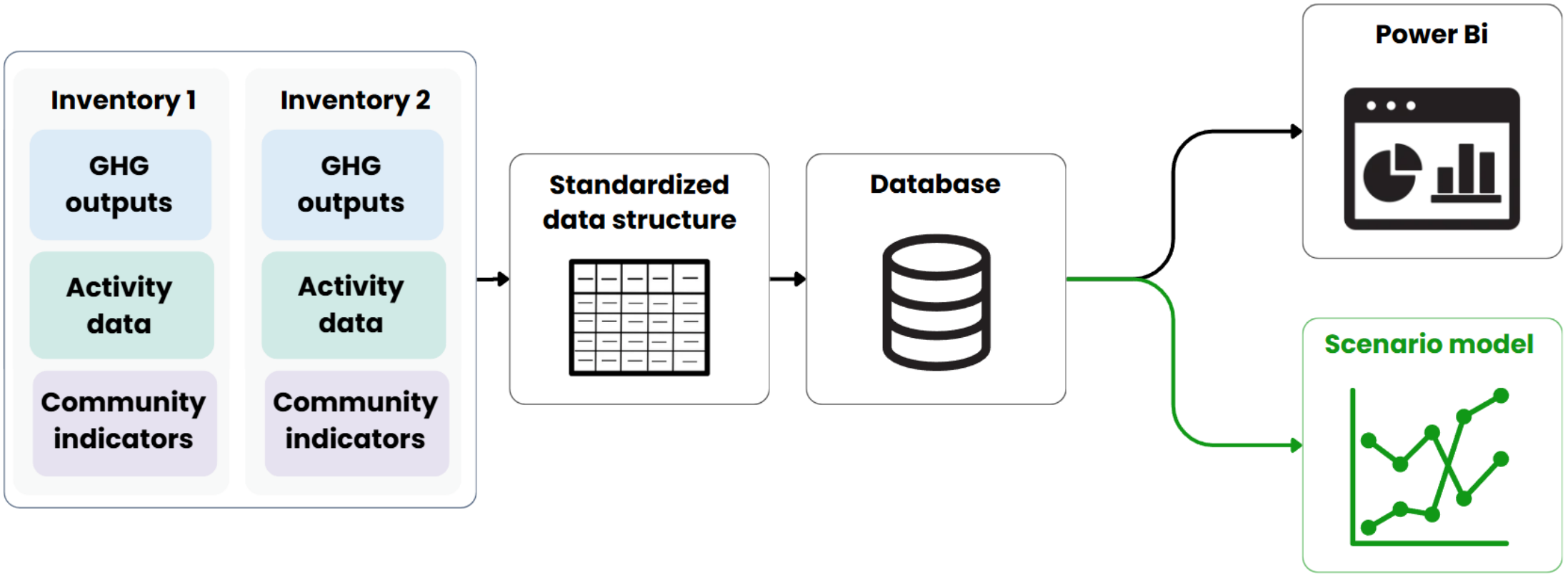
Tracking Does Not Keep Up With Reality

The GHG analysis roadmap: 5 simple questions



Flexible Models Enable Continuous Analysis

Connection to the same dashboard data structure ensures latest data is always included.



Flexible Models Enable Continuous Analysis

User inputs keeps enables flexible scenario modeling

Select which levers to include.

Adjust implementation levels and timelines.

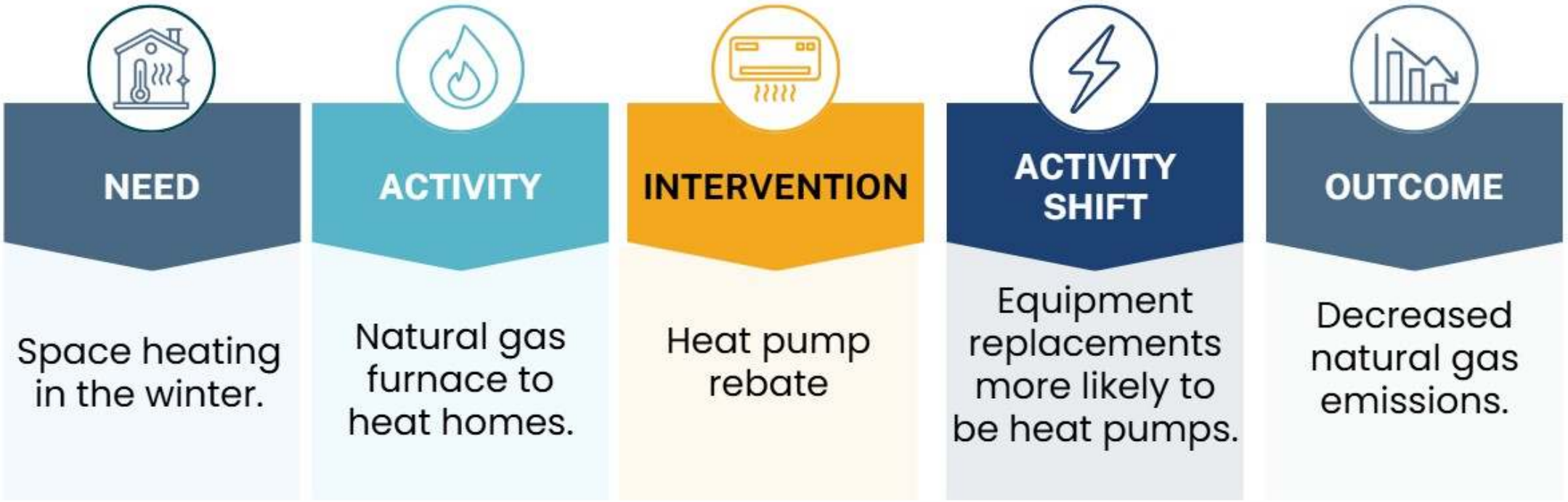
User inputs						
Description	**Emission factor**		**Notes**			
Electricity emission factor selector	Xcel Planned Emission Factor		Impacts user-input and BAU scenarios.			
Energy and Buildings	**User inputs**					
EB 1: Greening of the grid						
Shift description	**Include**	**Target #1**	**Target #1 Year**	**Target #2**	**Target #2 Year**	**Baseline value**
Target 1: Percent reduction of Xcel's electricity emission factor from 2005 baseline levels.	☑	90%	2030	100%	2040	Xcel Planned Emission Factor: 2030: 87% 2040: 94%
EB 2: Electrification of existing buildings						
Shift description	**Include**	**Target #1**	**Target #1 Year**	**Target #2**	**Target #2 Year**	**Baseline value**
Residential buildings						
Space heating: share of new equipment purchases that are high-efficiency electric equipment.	☑	70%	2030	100%	2045	2030: 20% 2045: 22%
Water heating: share of new equipment purchases that are high-efficiency electric equipment.	☑	50%	2030	100%	2050	2030: 5% 2050: 6%
Residential equipment lifespan (years)	17					

Customize key parameters.

Compare inputs to the BAU

Modeling Assumptions Based in Reality

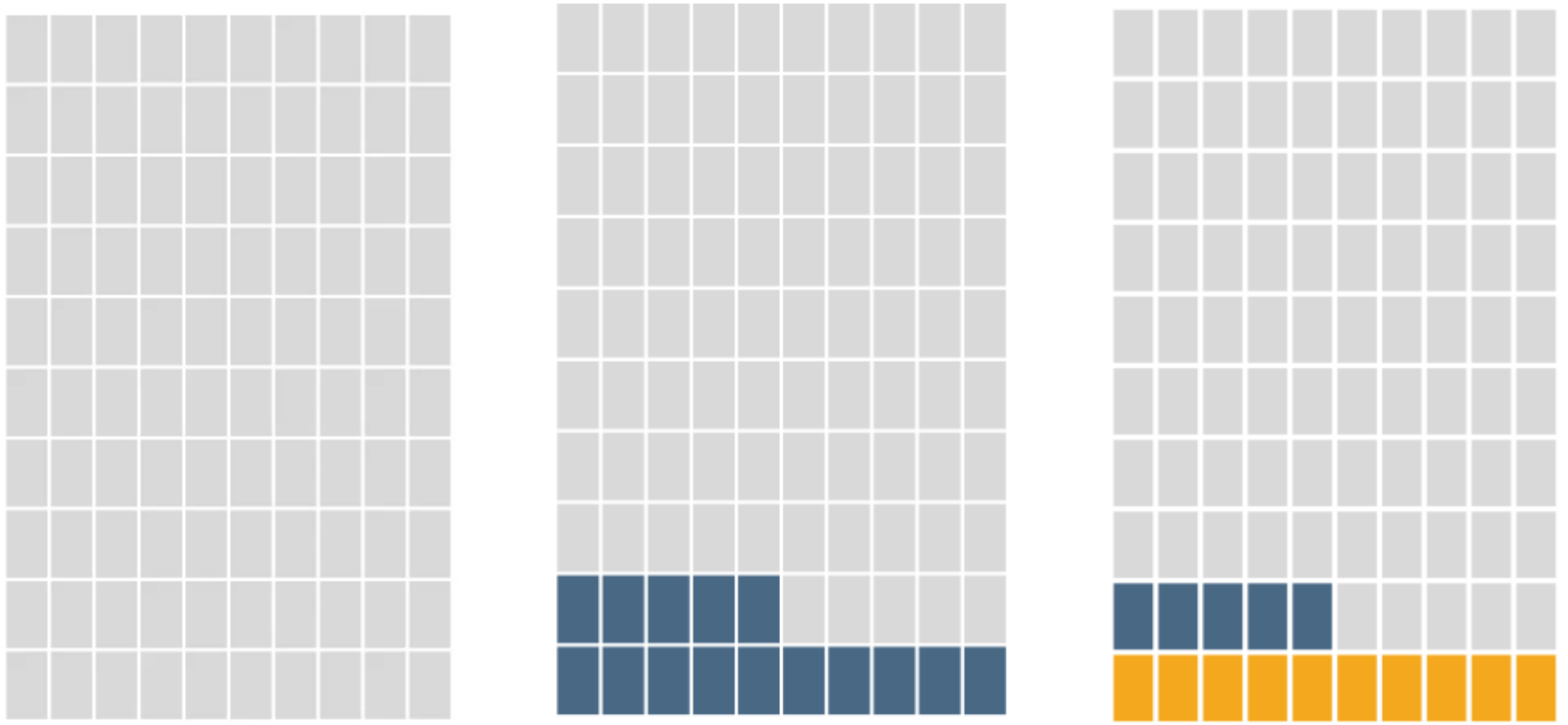
Impacts of levers needs and activities tell us how levers can impact emissions.



Modeling Assumptions Based in Reality

A stock and flow approach allows realistic adoption assumptions.

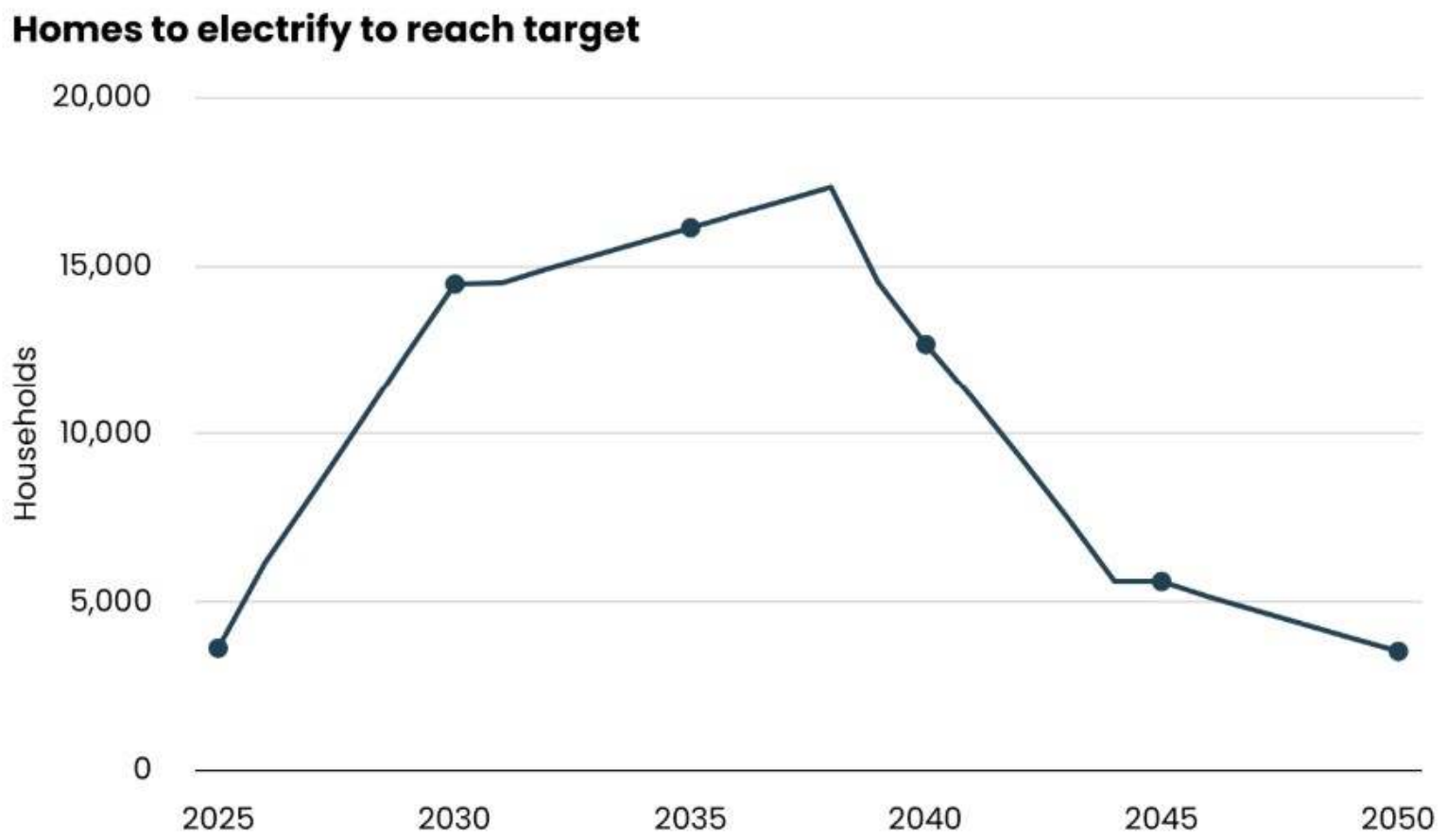
Baseline Stock	Replacement Rate	Target Stock Replacement
Baseline heating equipment stock	Number of homes replacing equipment in target year	Number of homes replacing equipment that upgrade to a heat pump



Answer Key Implementation Questions

How much electrification needs to happen and when?

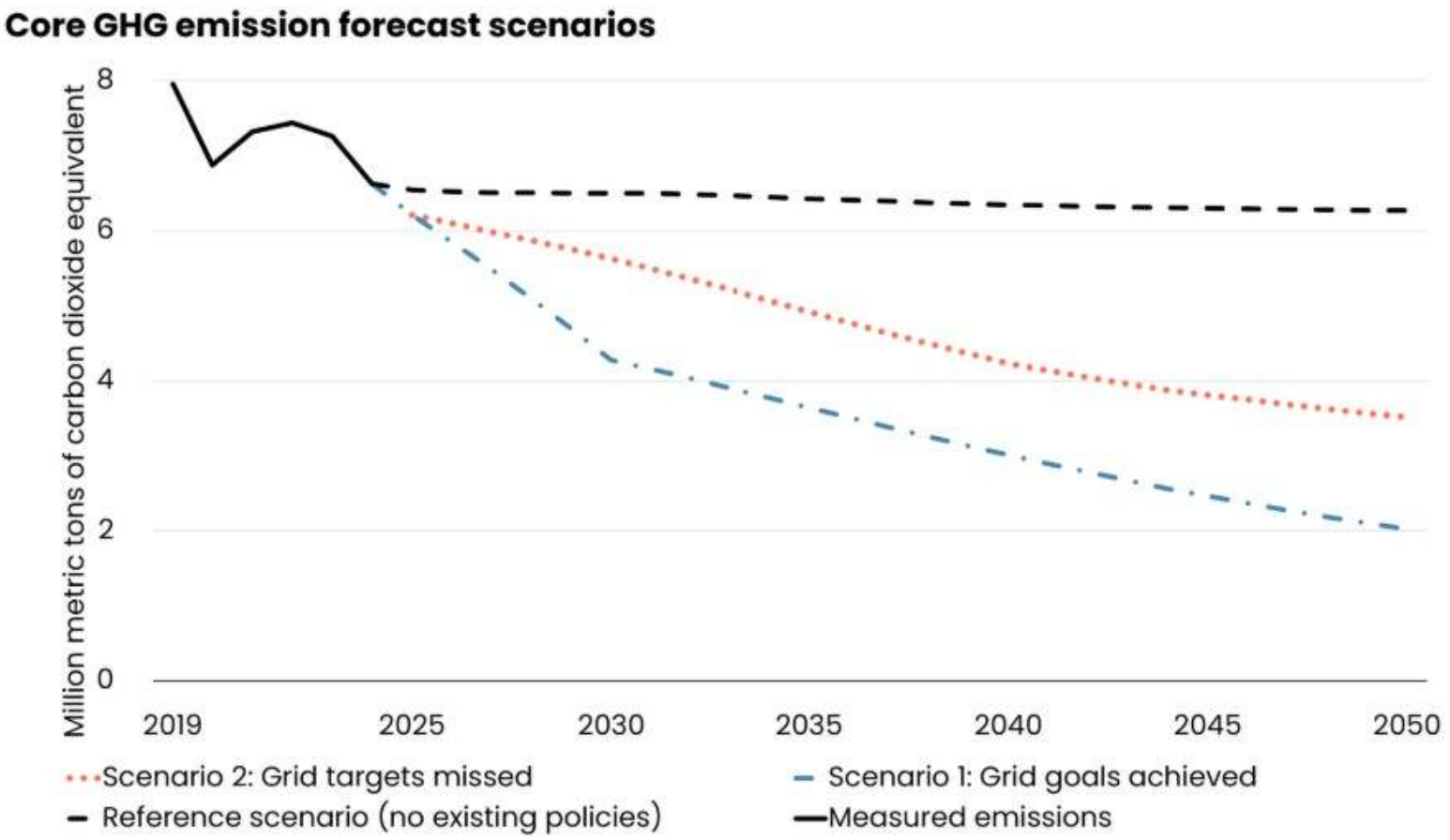
Tempo Analysis | What if scenarios | Remaining Emissions



Answer Key Implementation Questions

What happens if our electric utility does not achieve renewable energy goals?

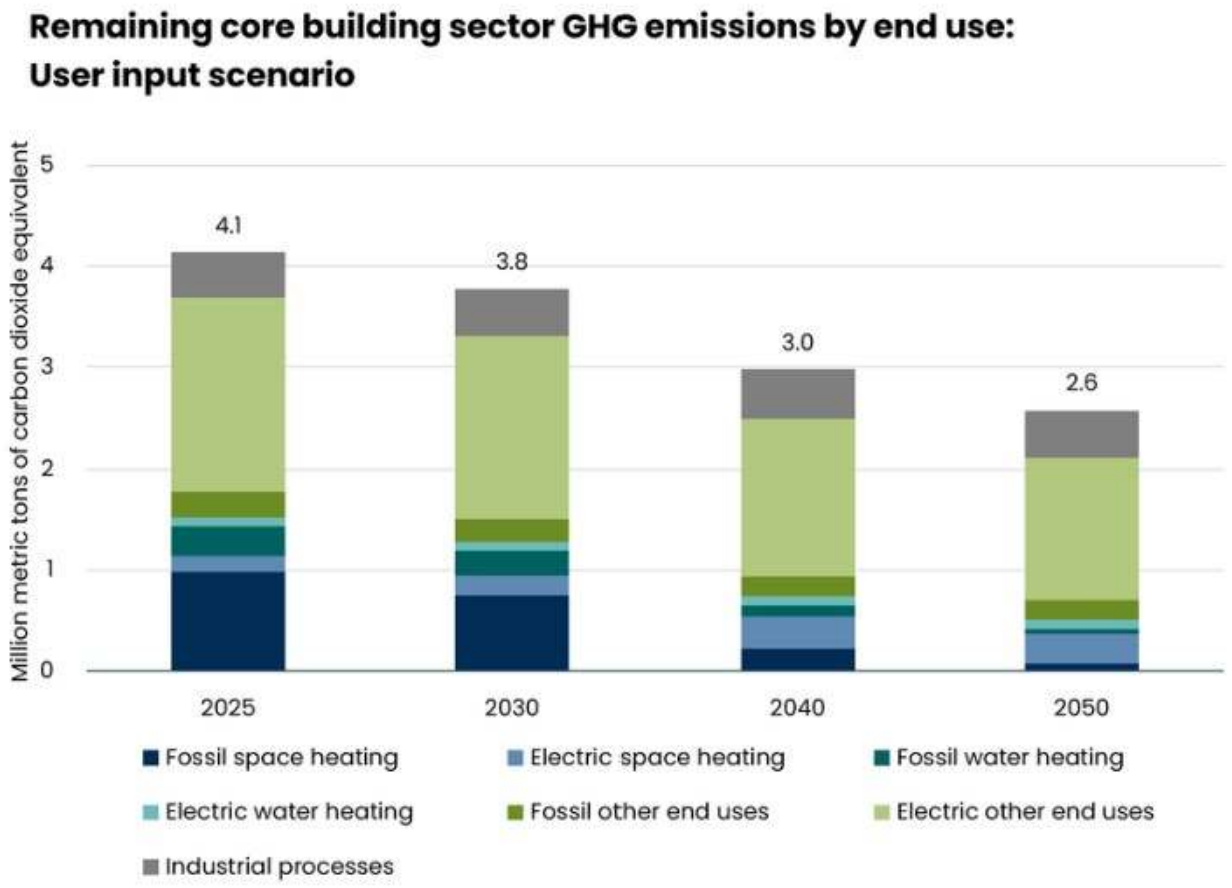
Tempo Analysis | **What if scenarios** | Remaining Emissions



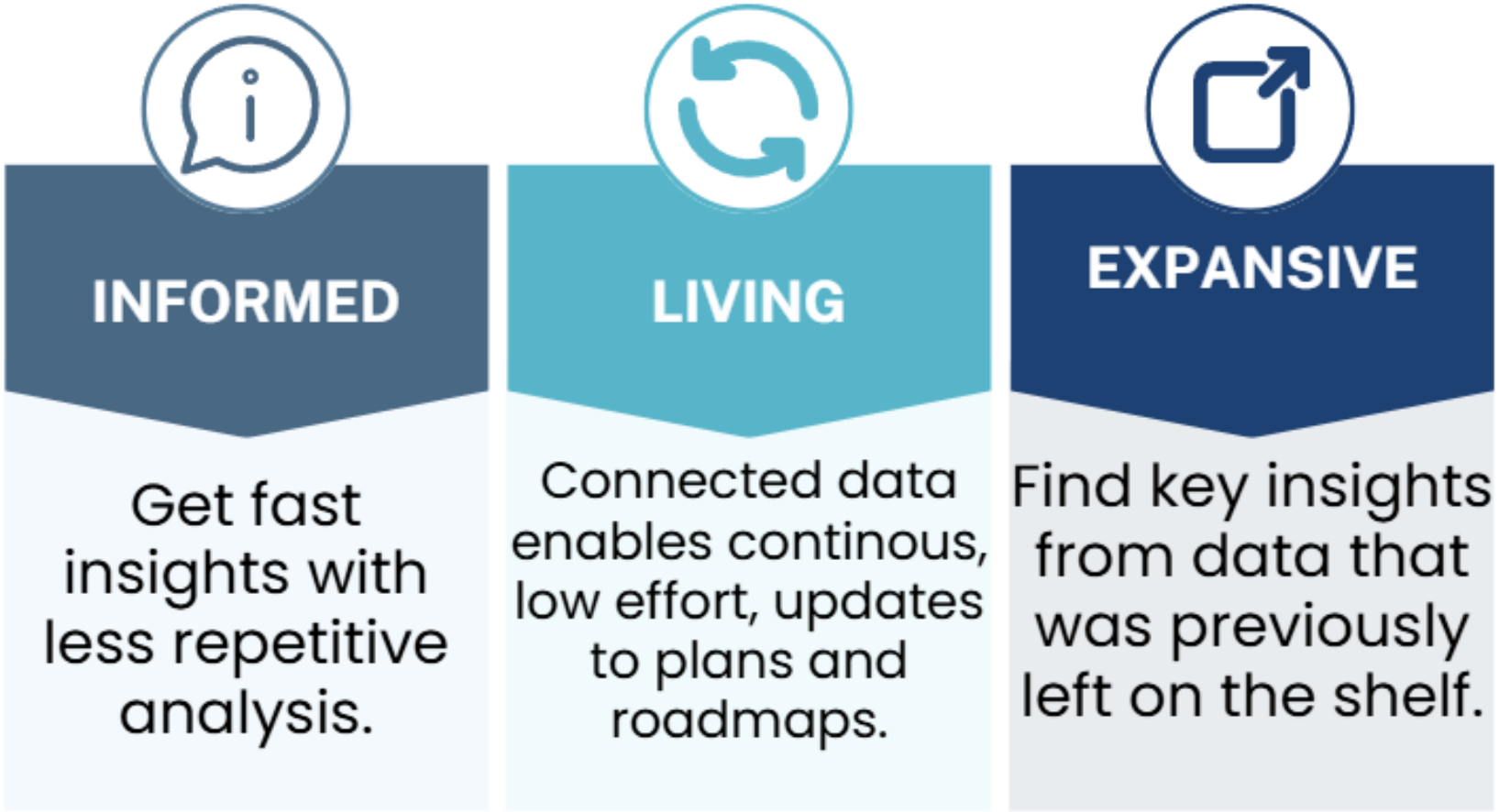
Answer Key Implementation Questions

What sources contribute to remaining emissions after implementation?

Tempo Analysis | What if scenarios | **Remaining Emissions**



Effective Data Tools Let You Focus on the Work that Really Matters



Data in Action

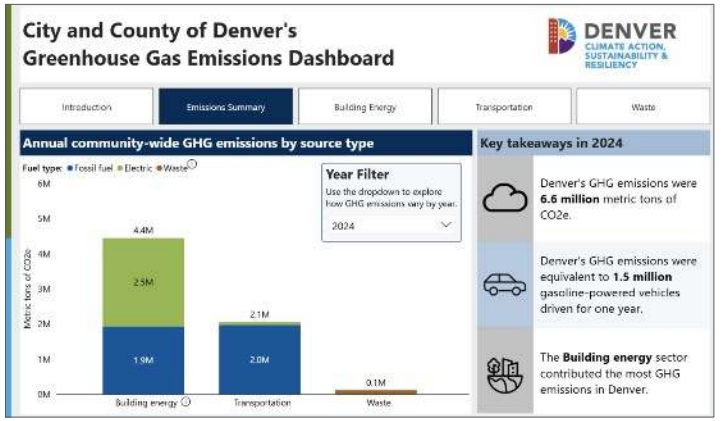
Denver's Use of Data in Decision-Making

Denver's Use of Data in Decision-Making

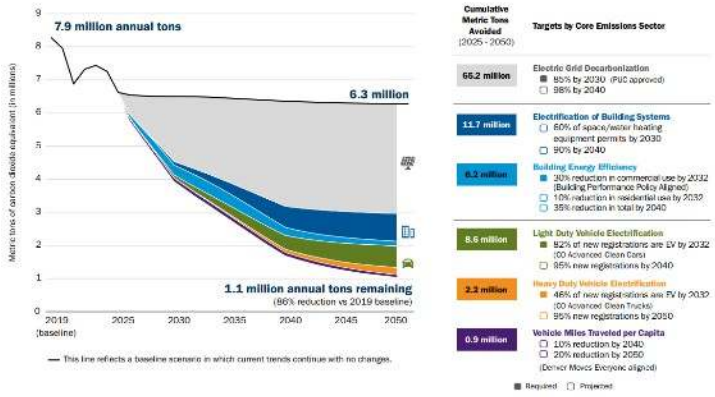
You can't manage what you can't measure.

DENVER CLIMATE ACTION, SUSTAINABILITY & RESILIENCY

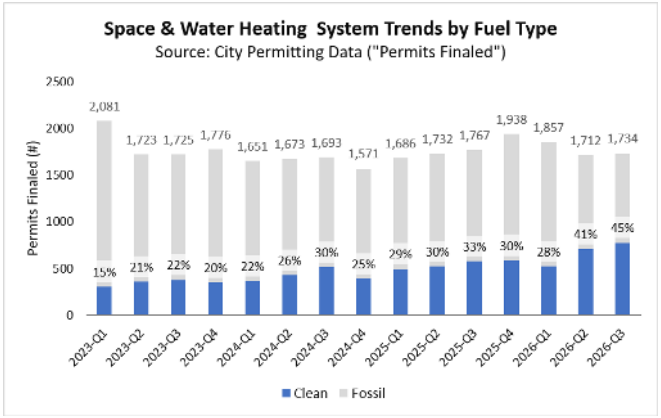
Look back: GHG Inventory



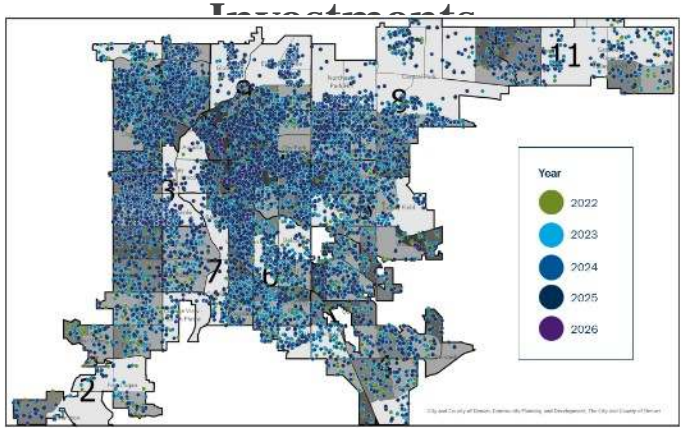
Look forward: Impact Model



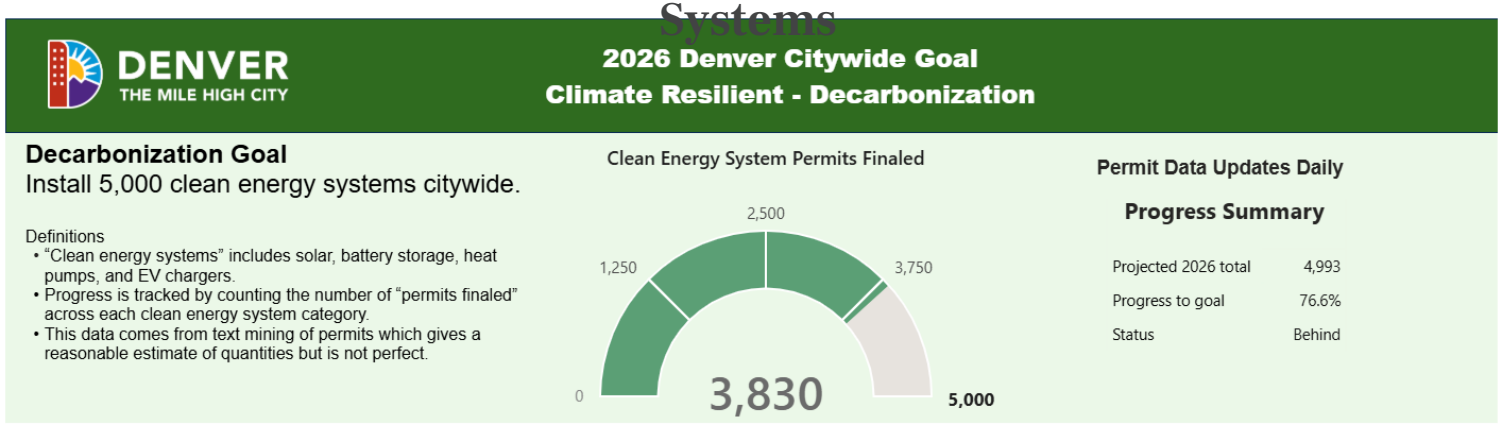
Prioritize: Leading Indicators



Track: Community Investments

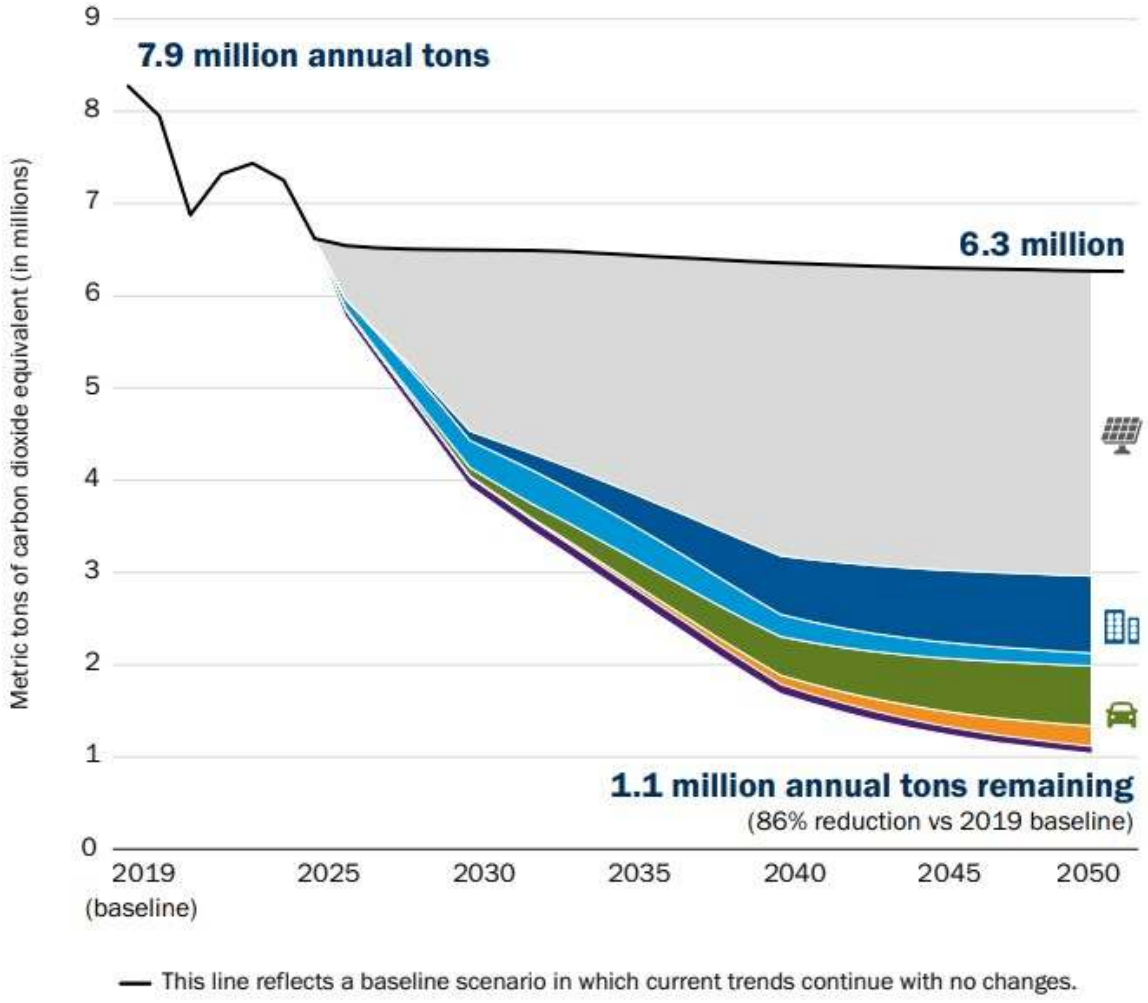


Report Up/Out: Mayor's Dashboard – Citywide Clean Energy Systems



GHG Emissions Impact Forecast Model

A cleaner grid + electrification achieve 92% of reduction potential by 2050

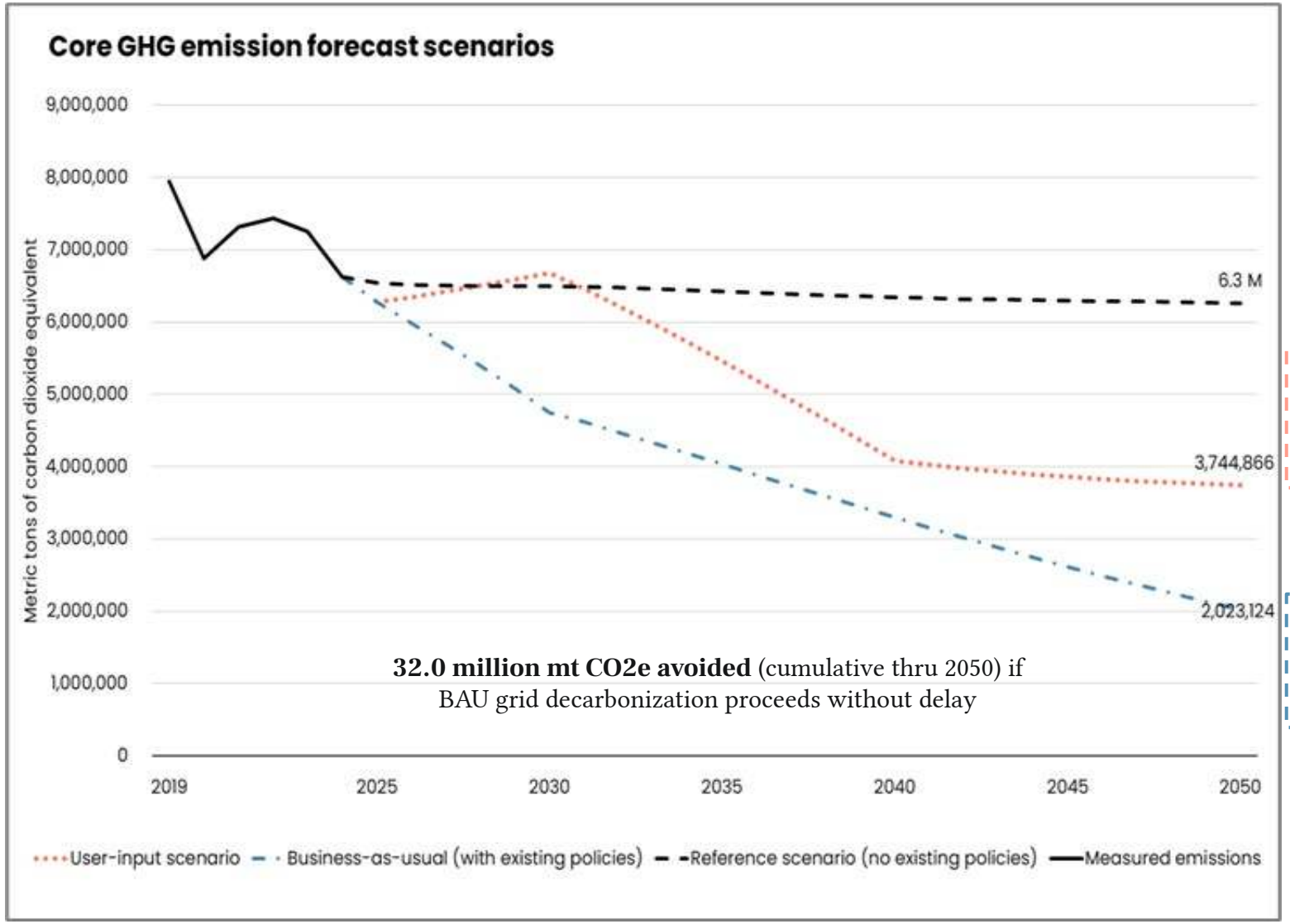


Cumulative Metric Tons Avoided (2025 - 2050)	Targets by Core Emissions Sector
65.2 million	**Electric Grid Decarbonization** ■ 85% by 2030 (PUC approved) ☐ 98% by 2040
11.7 million	**Electrification of Building Systems** ☐ 60% of space/water heating equipment permits by 2030 ☐ 90% by 2040
6.2 million	**Building Energy Efficiency** ■ 30% reduction in commercial use by 2032 (Building Performance Policy Aligned) ☐ 10% reduction in residential use by 2032 ☐ 35% reduction in total by 2040
8.6 million	**Light Duty Vehicle Electrification** ■ 82% of new registrations are EV by 2032 (CO Advanced Clean Cars) ☐ 95% new registrations by 2040
2.2 million	**Heavy Duty Vehicle Electrification** ■ 46% of new registrations are EV by 2032 (CO Advanced Clean Trucks) ☐ 95% new registrations by 2050
0.9 million	**Vehicle Miles Traveled per Capita** ☐ 10% reduction by 2040 ☐ 20% reduction by 2050 (Denver Moves Everyone aligned)

■ Required ☐ Projected

Forecast: Impact of Greening of the Grid

Staying on track avoids +30 million tons of GHG thru 2050

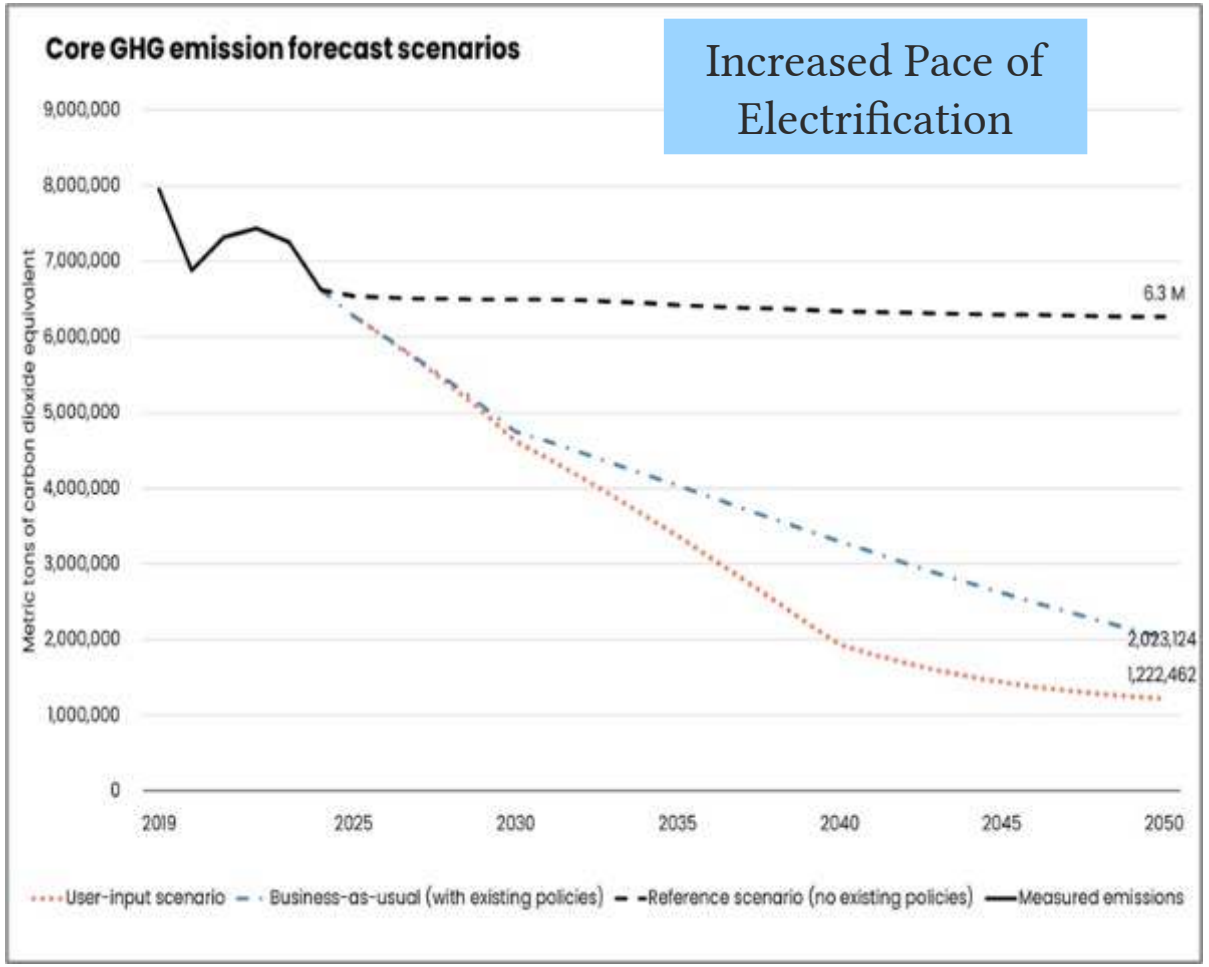


Slower Grid
50% by 2030
80% by 2040

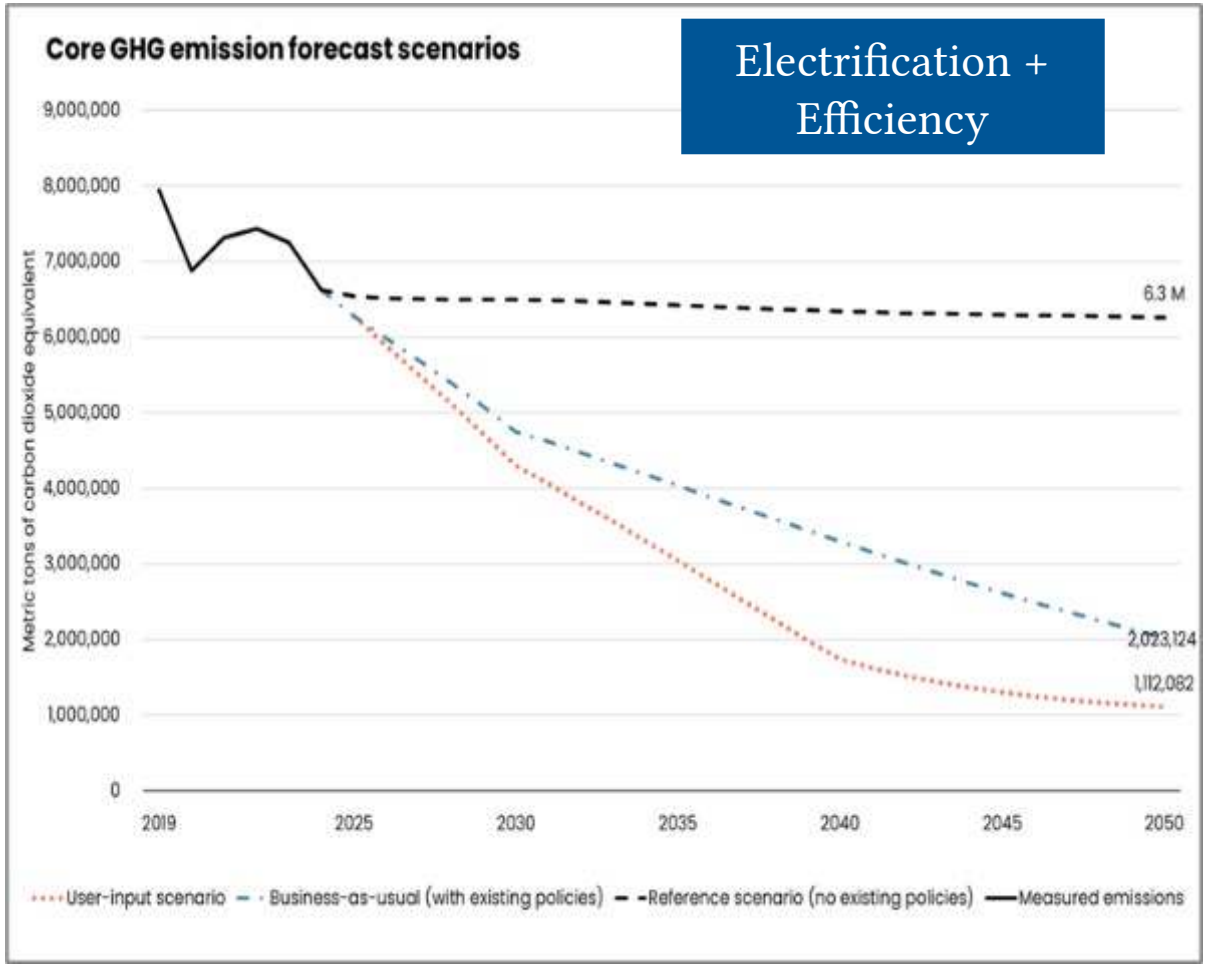
BAU (Existing Policies)
80% by 2030
90% by 2040

Electrification and Energy Efficiency

Annual Emissions Comparison



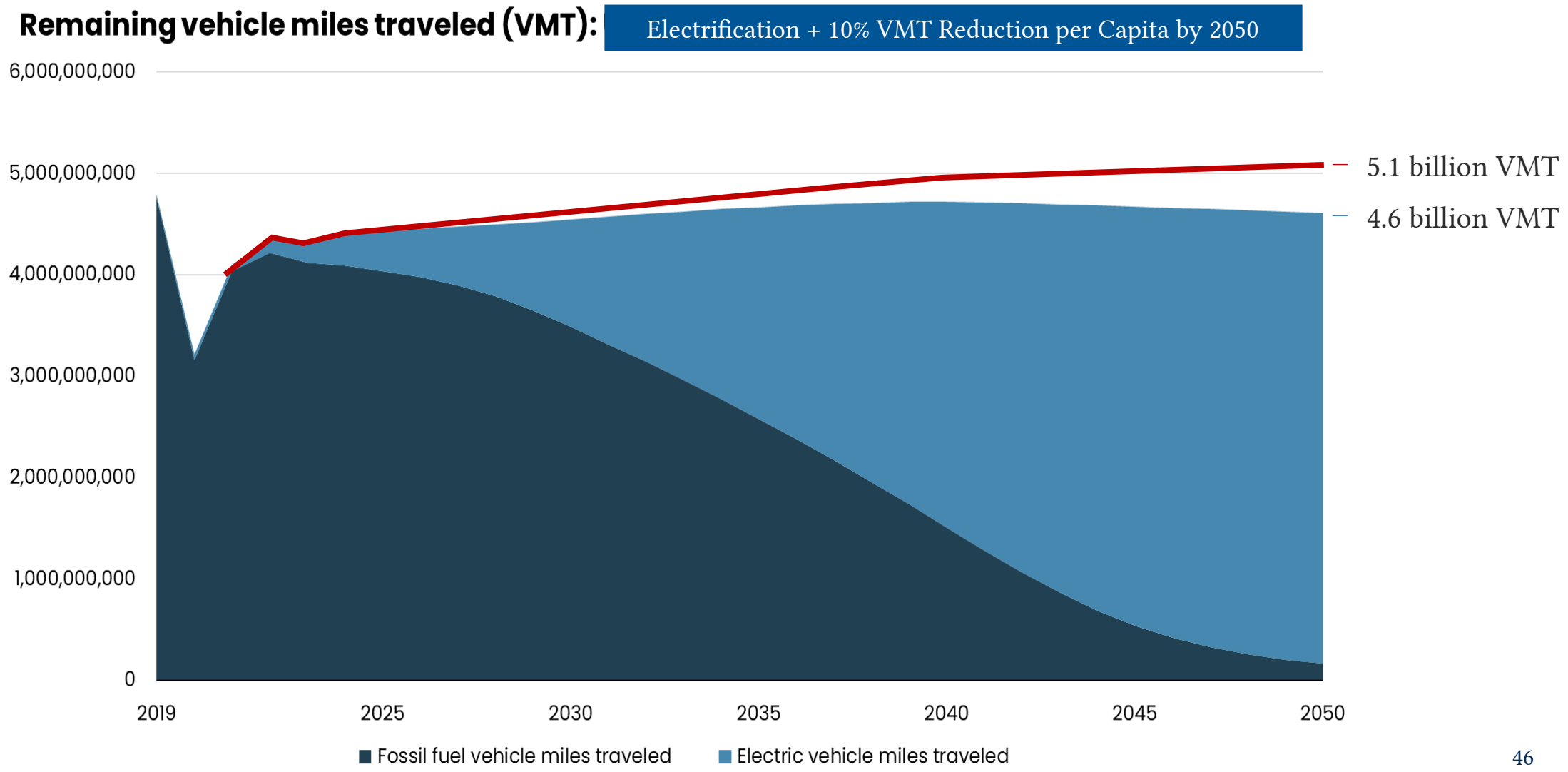
Extra 18.0 million mt CO2e avoided (cumulative thru 2050) vs BAU (electrification only)



Extra 23.4 million mt CO2e avoided (cumulative thru 2050) vs BAU (electrification + efficiency)

Deep Dive – Vehicle Miles Traveled

Even with a 10% reduction per capita, there are 4.6 billion annual VMT to decarbonize



Forecast Model: Directional Guidance

The observations are from a model based on simplifying assumptions.

1. **Denver will need to be very thoughtful in setting, and communicating, practically achievable goals that complement established science-based targets.**
   - A 65% reduction in GHG emissions by 2035 does not seem achievable in practice. (Denver SBT published in 2021)
   - A 75% reduction in GHG emissions by 2040 is achievable.

2. **Greening of the grid plus electrification is foundational to decarbonization.**
   - The pace of electrifying heating equipment installations and EV adoption are primary drivers. (how quickly 100% of heating equipment installs and new vehicle registrations are all-electric)
   - Improved efficiency of existing buildings shows the next most near-term and cumulative GHG benefits (reduced infrastructure costs is an expected additional benefit, not quantified).

Applied Data Enables Success at a Citywide Level
Systems Thinking Approach

Upstream Actions

- Regulatory, Policy, Permitting
- Community Investment & Advisory Services
- Lead-by-Example Projects
- Institutional Influence

Leading Indicators

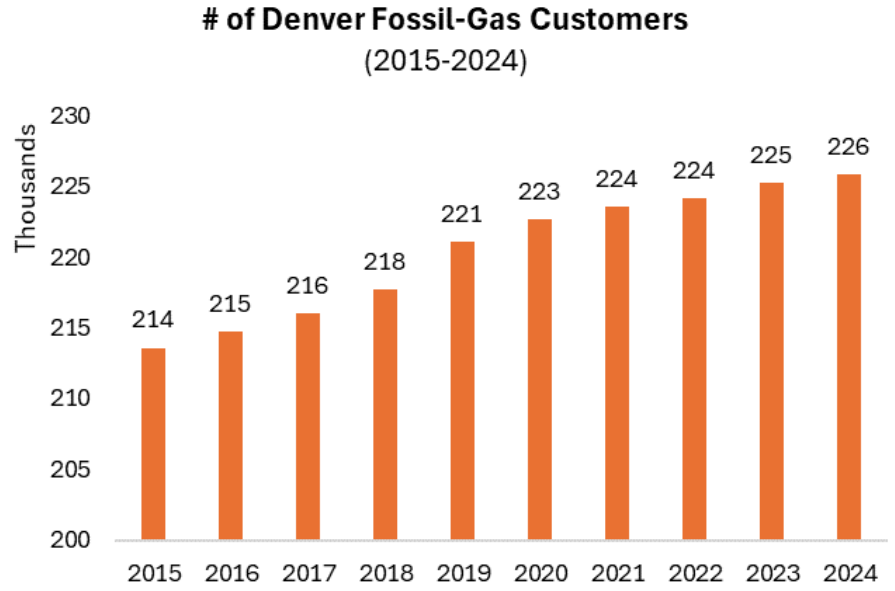
- Clean energy permits (HPs; EVSE; renewables)
- # of fossil-gas customers
- % EV registrations
- BPP compliance

Downstream Outcomes

- GHG emissions reductions
- Affordability & reliability
- Public health benefits
- Vibrant communities

Transition gas customers to non-emitting options.

Elevating Systemic Leading Indicators and Upstream Actions



Big Picture

- Xcel Energy: 226k gas customers in Denver
- ~1,000 new Denver gas customers annually
- Denver needs to stop growth of the gas system and streamline electrification of existing facilities.
- Retaining dependence on gas infrastructure, even if only for a handful of peak hours per year, creates duplicative costs for energy customers.

Upstream Actions

- Electrification in code
- Streamline permitting
- Electrification case studies (community investment & municipal leadership)
- Influence PUC/Xcel programs and system-planning

Success Indicators

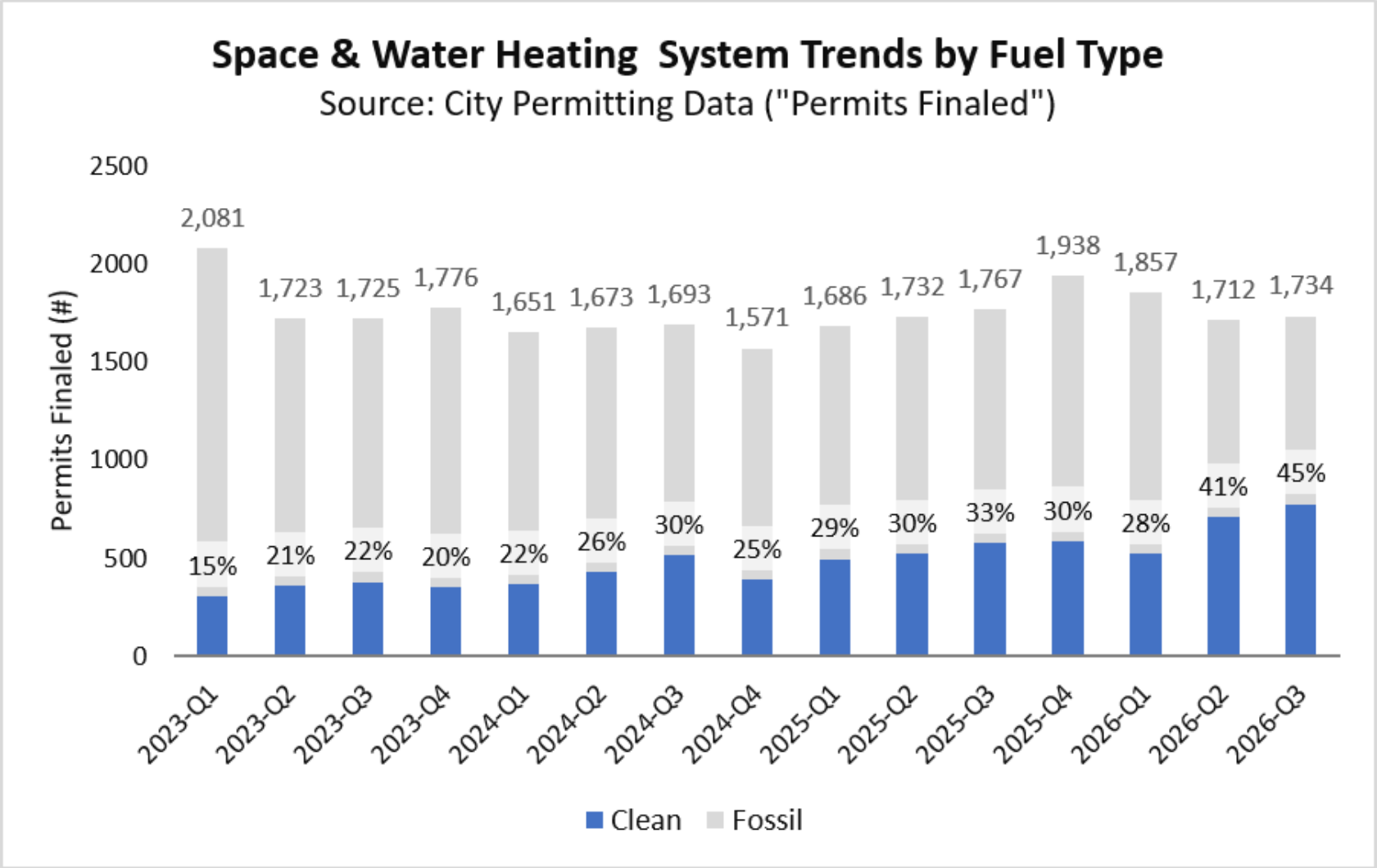
- Increase in heat permits issued
- Reduction in heat pump permit timelines
- Streamlined gas disconnection process
- % new construction all-electric
- Participation in utility, regional, and city clean energy support programs
- PUC approved funding and plans

Downstream Outcomes

- Reduction in GHG emissions
- Reduction in gas customers
- Utility bill impacts
- Customer satisfaction

Increase the “clean” share of space and water heating permits

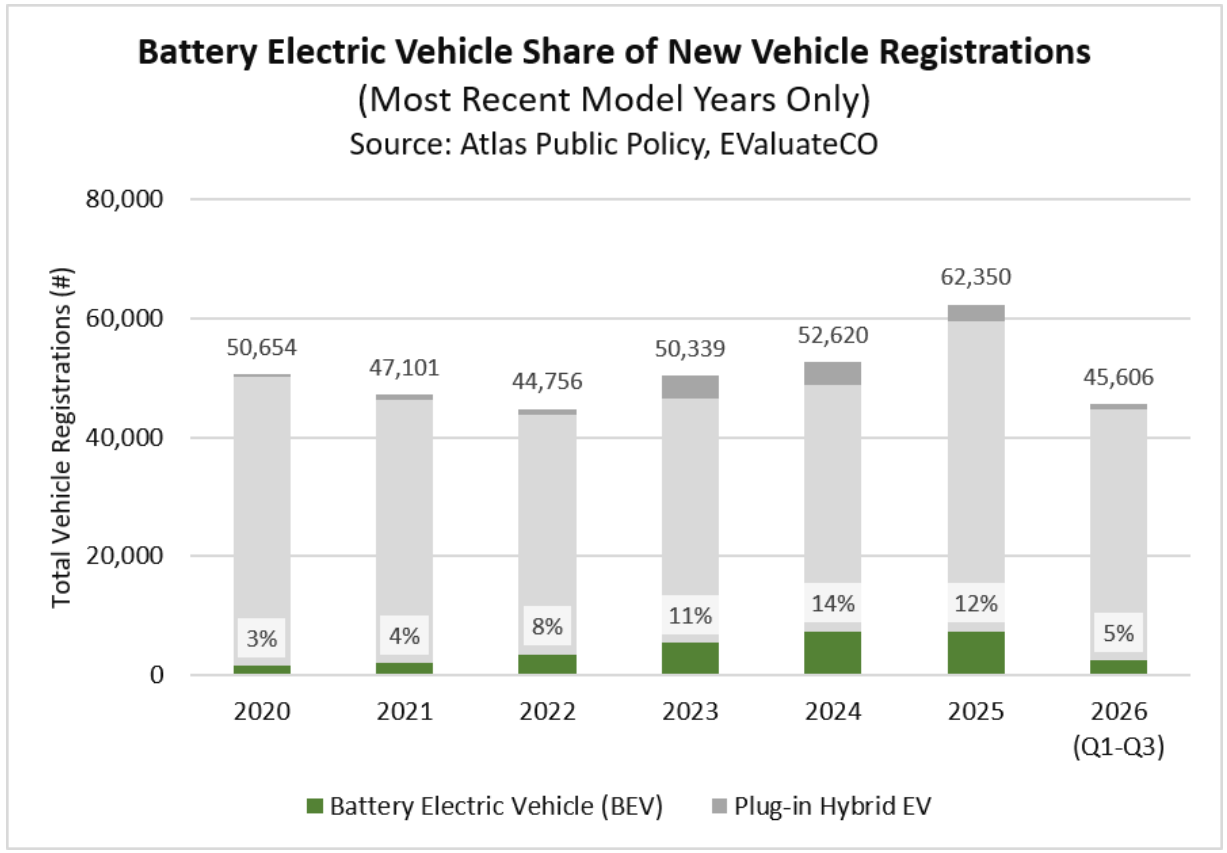
Elevating Systemic Leading Indicators and Upstream Actions

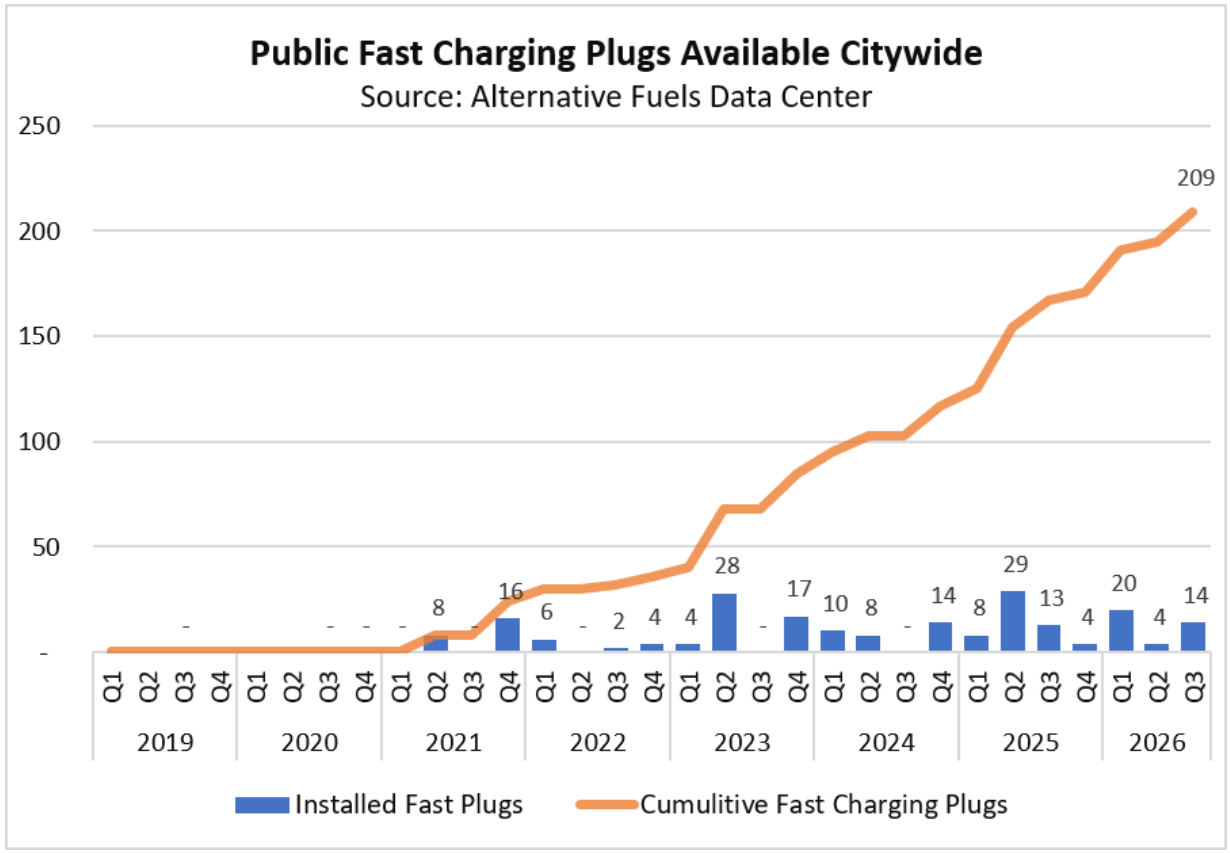




Increase support for EV adoption and charging infrastructure

Elevating Systemic Leading Indicators and Upstream Actions





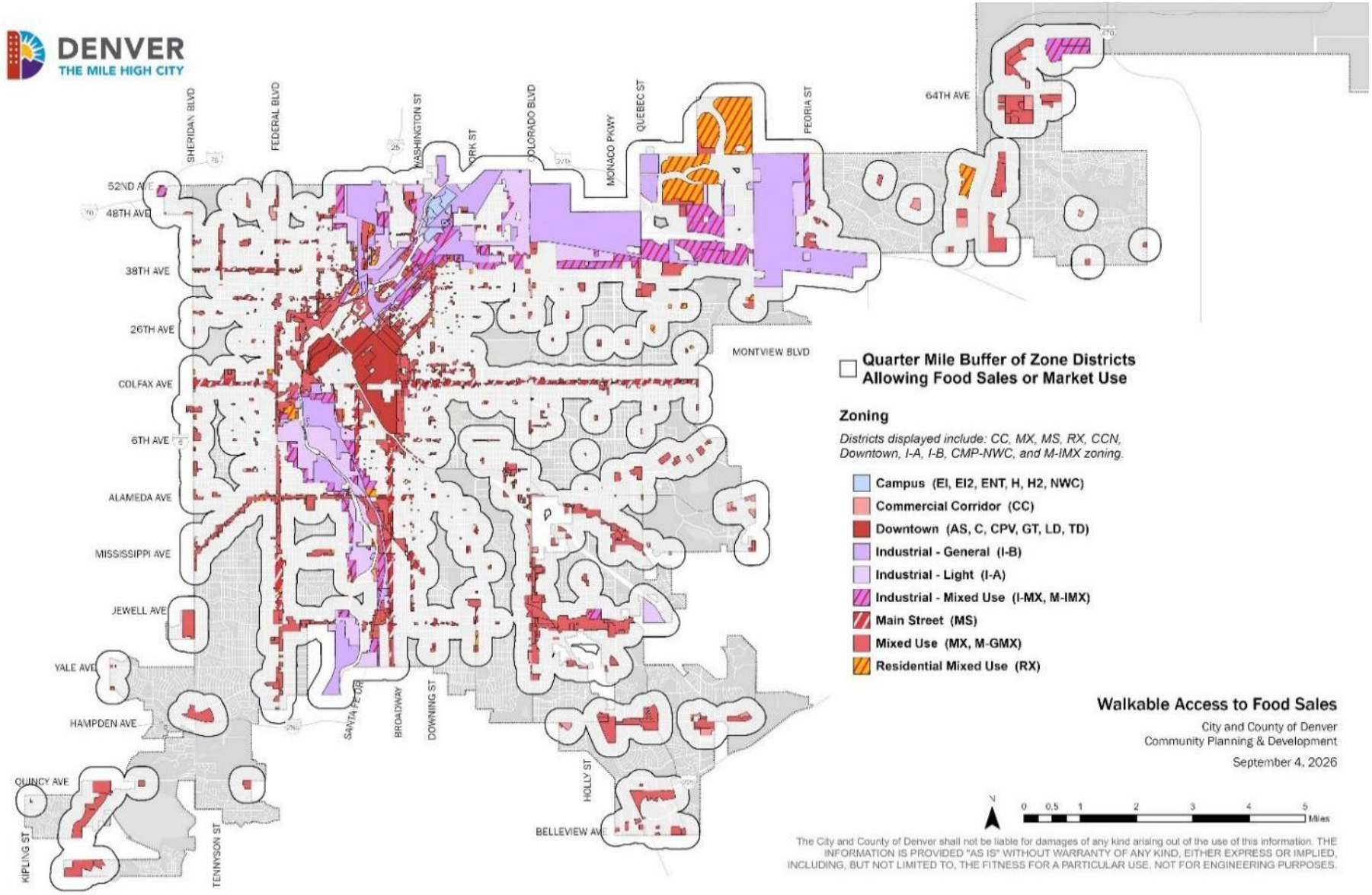
Increase access to basic necessities for Denverites

Elevating Systemic Leading Indicators and Upstream Actions

DENVER
CLIMATE ACTION, SUSTAINABILITY & RESILIENCY

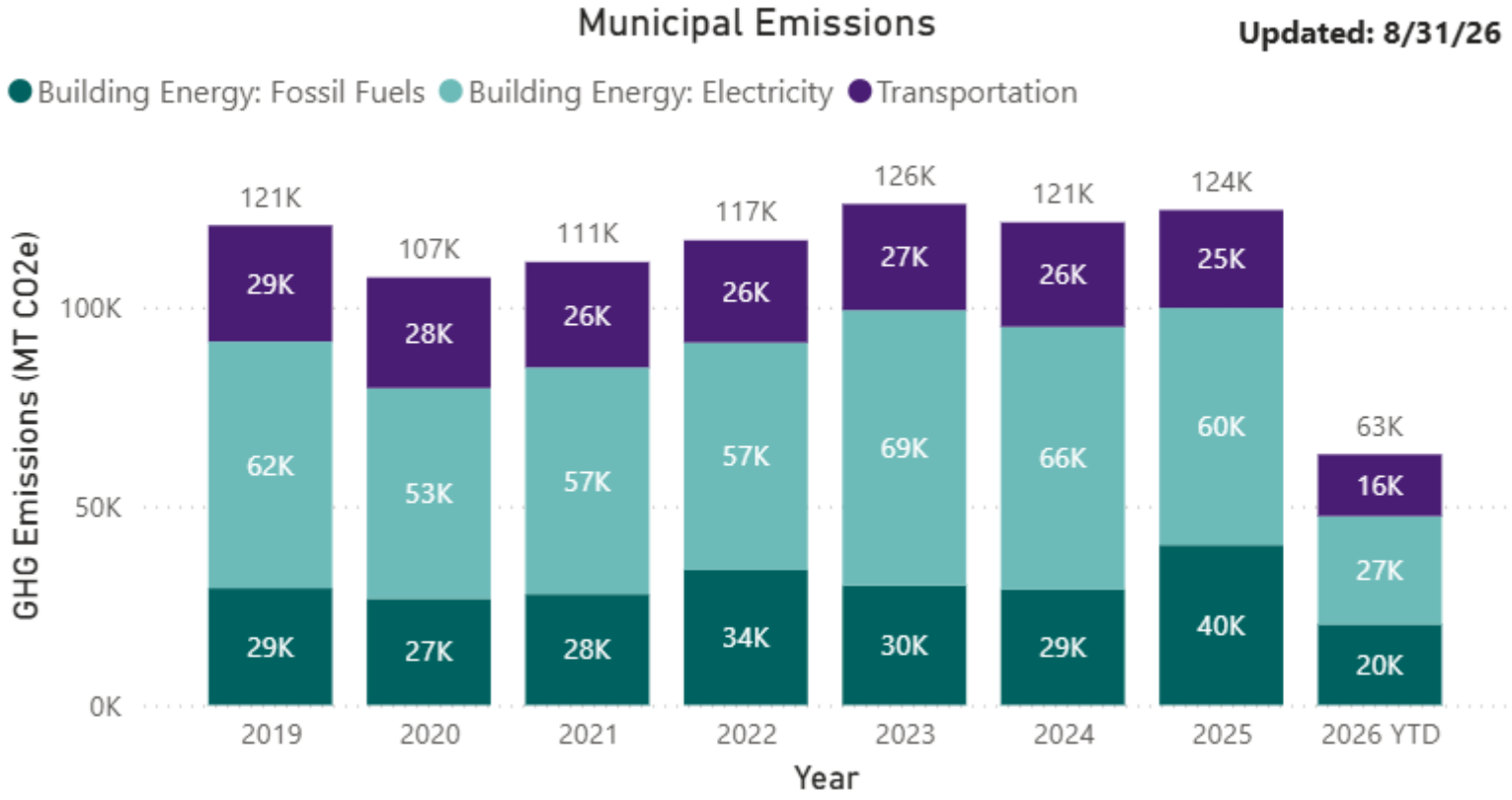
Opportunity to increase community access to necessities near home

Expand allowances for “Food Sales” and “Market Use” in more zone districts



Lead by example – Decarbonize Municipal Operations

Elevating Systemic Leading Indicators and Upstream Actions



29.8%	1.7%	3%	3%
Buildings with Efficiency Measure	All-Electric Buildings	Sites with Sufficient Charging	EV Fleet Vehicles

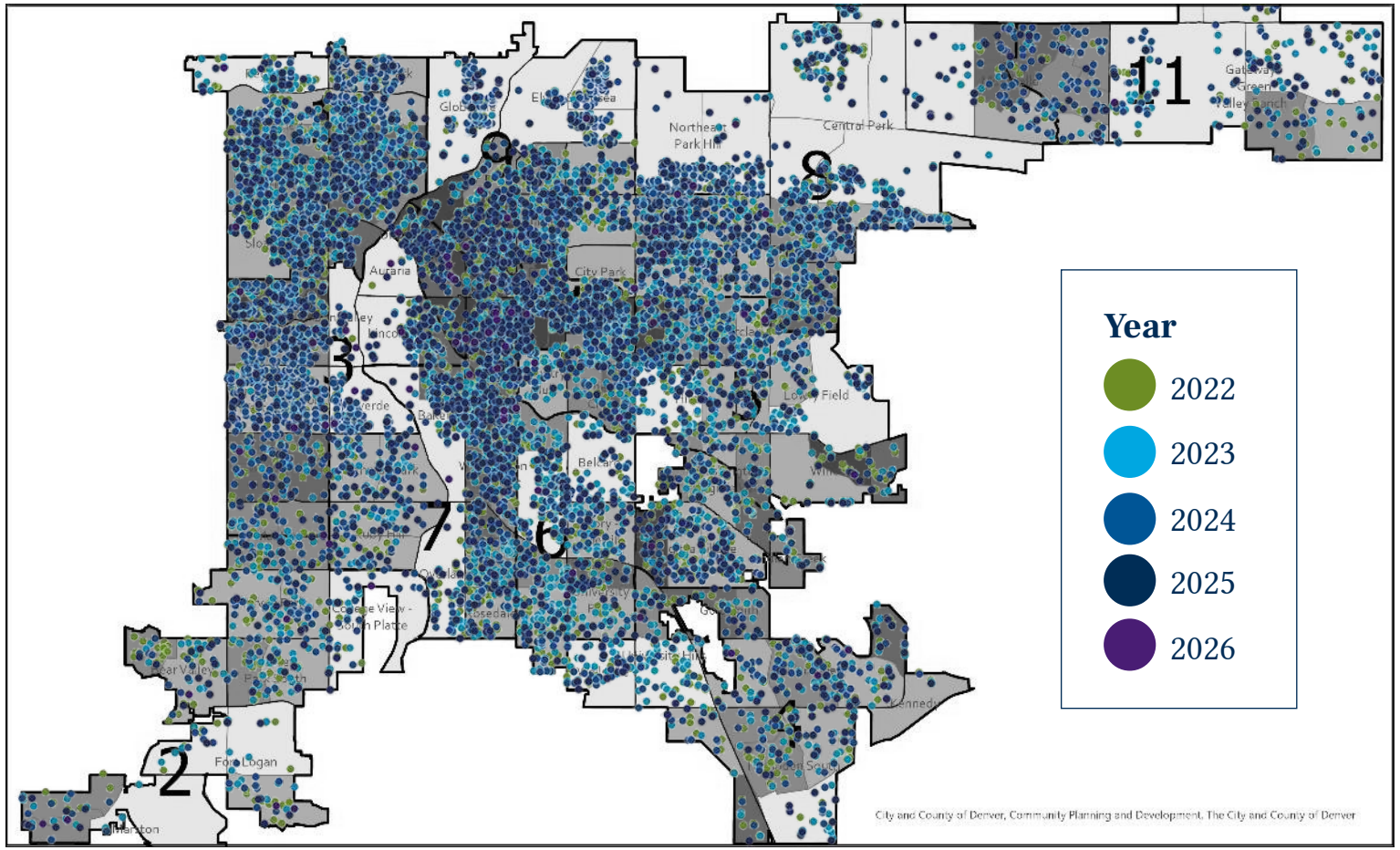
Invest in the Community

Elevating Systemic Leading Indicators and Upstream Actions

Over 15,000 community members reached via e-bikes, tree planting, solar arrays, heat pump rebates, and more.

How data helps:

- Who are we reaching?
- Where are our gaps?
- What does it cost to shift behavior?
- Can we update our program designs to support more equitable outcomes?
- Can we influence broader systems through what we learn?

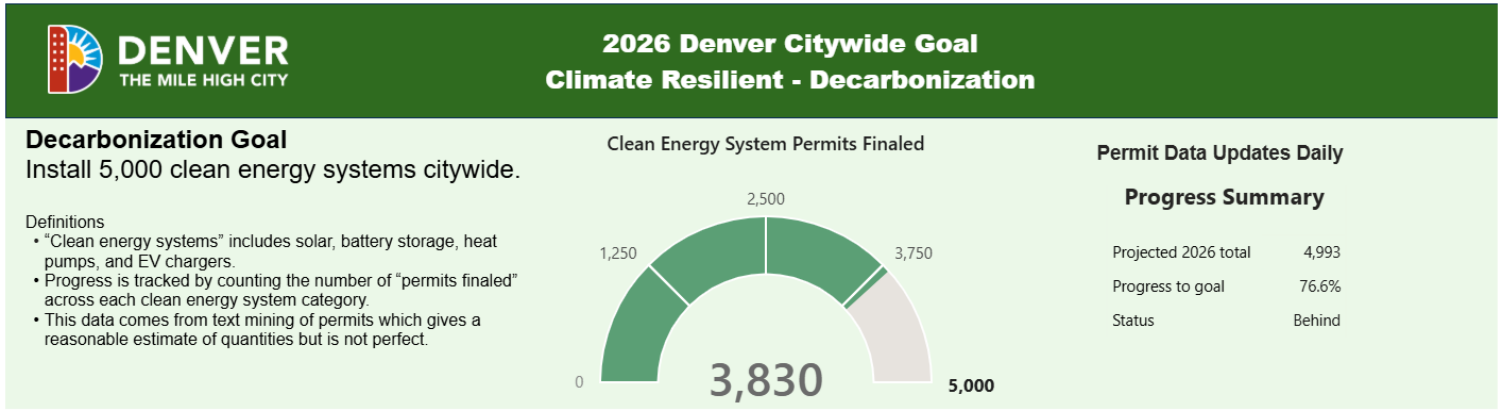


Elevate Primary Leading Indicators in Reporting Dashboards

2026 – Internal Dashboard

2027 – Update Denver's 5-Year Climate Plan and Create a Public Dashboard

Mayor's Dashboard – Citywide Clean Energy Systems



Heat Pump % of Total Space & Water Equipment Permits Issued

45% → **70%**

2026 (Q3) → 2032

All Electric % of New Construction

51% → **100%**

2026 (Q3) → 2030

Electric % of New Vehicle Registrations

5% → **60%**

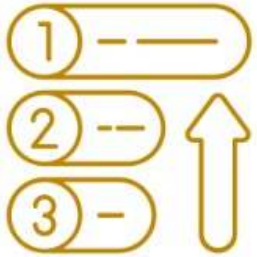
2026 (YTD) → 2032

Summary

You can't manage what you can't measure.



Be informed.
What data do you have and what do you need?



Be selective.
Evaluate and elevate a few priority leading indicators



Be impactful.
Are your actions achieving their intended results?

DENVER
CLIMATE ACTION, SUSTAINABILITY & RESILIENCY

Appendix

Reduce Emissions – Denver 5-year Climate Plan Update
DRAFT Goals & Outcomes

DENVER CLIMATE ACTION, SUSTAINABILITY & RESILIENCY

Sector	Goal	Outcome
Energy Transition 	**E1. Clean Electricity** Denver will be served by 100% clean electricity by 2040.	E1a. Denver will be served by at least 85% clean electricity by 2032.
		E1b. Denver's aggregate electric rates will remain below the national average through 2032.
	E2: Clean Heating Half of gas customers in Denver will transition to zero emission energy service by 2040.	E2a. Increase the number of Denver gas customers that transition annually to zero emission energy service to 10,000 by 2032.
		E2b. A Non-Emitting Thermal Energy Network is available in downtown Denver, reaching more than 50 customers by 2032.
Built Environment 	**B1: Zero Emission Buildings** Every residential and commercial building permit issued in Denver is zero emissions by 2040.	B1a. 100% of new buildings and homes in Denver are zero emissions by 2030.
		B1b. At least 70% of permitted heating systems in Denver are zero emissions by 2032.
	B2: Energy Efficient Buildings Denver will improve the energy efficiency of existing buildings by 30% aggregated across all property types and sizes by 2040.	B2a. At least 90% of Energize Denver Building Performance Policy covered buildings achieve compliance or have an approved compliance plan by 2032.
		B2b. More than 10,000 energy efficiency projects will be completed each year through utility, City, and partner programs by 2032.
Transportation 	**T1: Zero Emission Vehicles** All new vehicles registered in Denver will be zero emissions by 2040.	T1a. Transportation electrification is the norm and over 60% of new vehicles registered in Denver are battery electric by 2032.
		T1b. Electric infrastructure supports adoption of electric vehicles, with over 600 public fast charging plugs available citywide by 2032.
	T2: Mode Shift Vehicle miles traveled per capita will be reduced 20% by 2040.	T2a. A majority of Denver residents have access to basic necessities within a 10 minute walk or roll from their home by 2032.
		T2b. A majority of Denver residents have access to high-quality, clean transit or high-comfort bike facility within a 10 minute walk or roll from their home by 2032.
Municipal Operations 	**M1: Zero Emission Buildings** Denver's municipal building operations will be net zero emissions by 2040.	M1a. New city buildings will be all-electric by 2027.
		M1b. Municipal HVAC systems will be electrified at time of replacement by 2027.
	M2: Zero Emission Fleet Denver's municipal fleet operations will be zero emissions by 2040.	M2a. All new light-duty fleet vehicle purchases will be battery electric by 2032.
		M2b. The number of vehicles in the fleet is optimized to match service needs and vehicles are maintained and replaced according to industry standards by 2032.

Deep Dive – Electrification Plus Energy Efficiency

Cumulative emissions reductions by lever

Electrification + Efficiency

Three Priority Areas → 92% of cumulative reduction by 2050

1. **Greening of the Grid (non-emitting %)**
   - ~45% now -> 80% by 2030 -> 98% by 2040
2. **Building Heating System Electrification (% of permitted systems)**
   - ~42% (space) / 25% (water) now -> 60% by 2030 -> 90% by 2040
3. **Light-duty Vehicle Electrification (% of original vehicle registrations)**
   - ~7% now -> 82% by 2030 -> 95% by 2040

Total cumulative reductions	**2040**		**2050**		
Lever	**mt CO_2e**	**%**	**mt CO_2e**	**%**	**% thru 2050**
EB 1: Greening of the grid	30,238,059	72%	62,910,286	69%	>92%
EB 2: Electrification of building heating systems	3,873,586	9%	11,628,101	13%	
T 1: Light-duty vehicle electrification	3,418,867	8%	9,359,125	10%	
EB 3: Existing building energy efficiency	3,671,575	9%	4,854,011	5%	>7%
T 2: Medium and heavy-duty vehicle electrification	528,991	1%	1,819,536	2%	
T 3: VMT reduction	297,907	1%	414,865	0%	<1%
EB 4: New building energy efficiency	59,848	0%	146,366	0%	
Total	**42,088,833**	**= 78% reduction** (in annual mt CO2e vs 2019)	**91,132,290**	**= 86% reduction** (in annual mt CO2e vs 2019)	