



Nashville Climate Opportunities Executive Summary

Prepared by CEA Consulting for
the Metro Government of Nashville and Davidson County

June 2019

Summary of findings

Metro Government



- Emissions are projected to drop by **36%** under a Business as Usual scenario between 2014-2050.
- As much as **86%** emissions reductions are possible by 2050 with additional measures

KEY INTERVENTIONS:

1. Purchase 100% renewable energy for Metro
2. Deeply retrofit existing Metro buildings
3. Build net-zero for new Metro buildings
4. Convert buses to electric

Summary of findings

Community



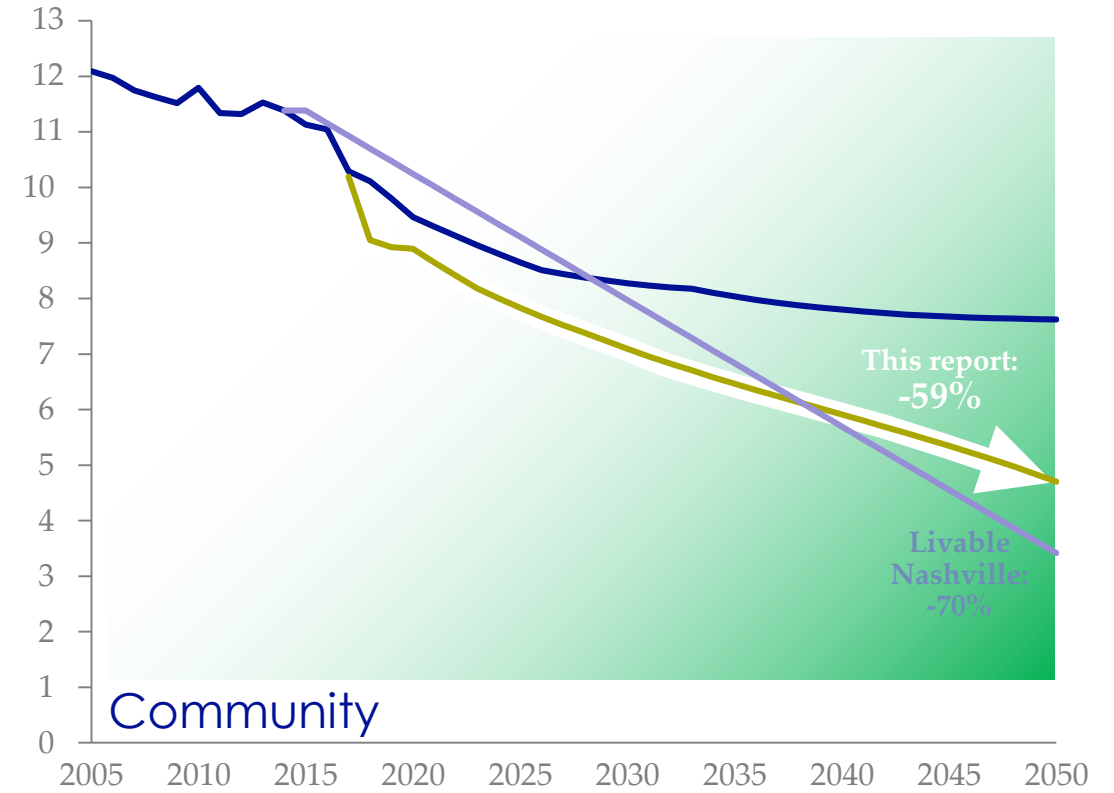
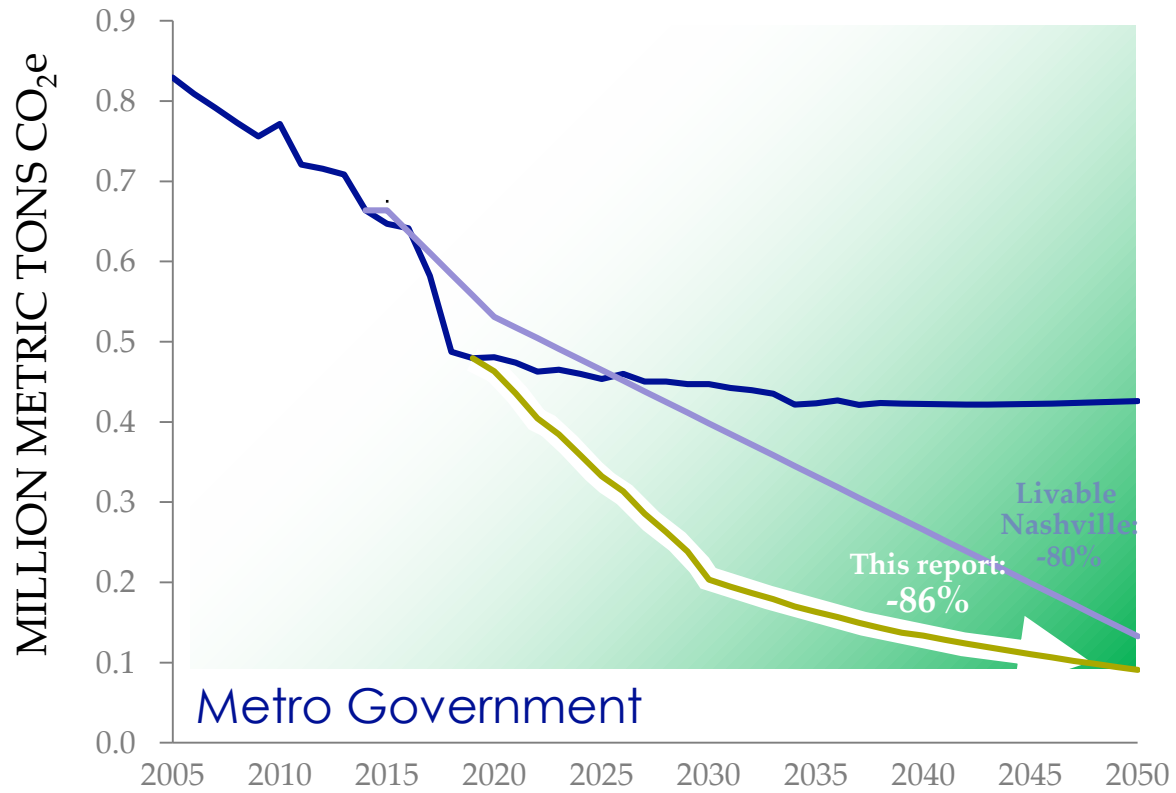
- Emissions are projected to drop by **32%** under a Business as Usual scenario between 2014-2050.
- As much as **59%** emissions reductions are possible by 2050 with additional measures

KEY INTERVENTIONS:

1. Increase TVA share of renewables
2. Decrease vehicle miles traveled
3. Increase share of electric vehicles on the road
4. Waste reduction

Reaching targets will require additional action

— Business as Usual
 — Potential With Strategies Identified in this Report
 — Livable Nashville Target



Developing a wedge analysis for Nashville

Identifying and modeling strategies

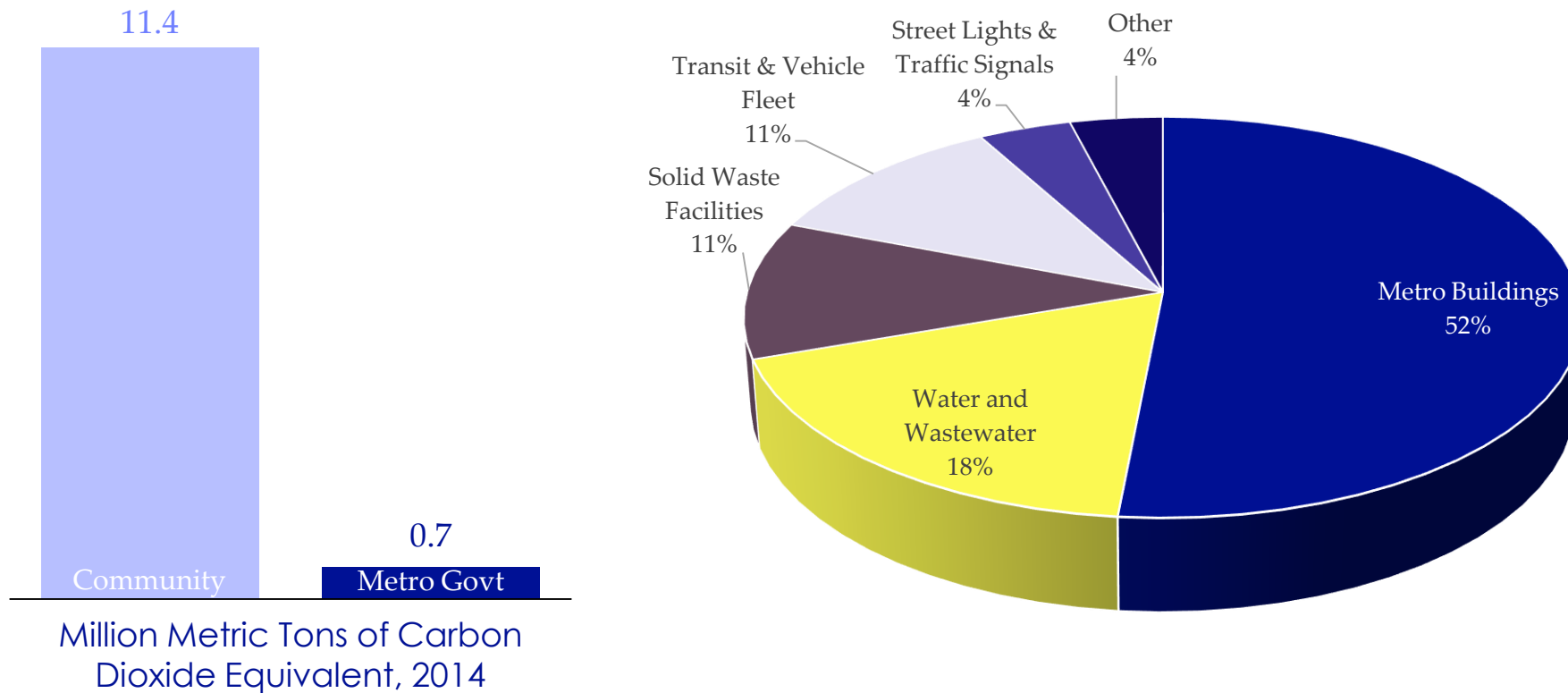
Method



1. Identify emissions reductions strategies from Nashville planning documents (e.g., Livable Nashville)
2. Develop a “Business As Usual” scenario using Nashville 2014 GHG Inventory out to 2050
3. Model emissions reductions potential of Livable Nashville emissions reductions strategies out to 2050
4. Provide recommendations on areas for largest emissions reduction potential

Baseline: 2014 Greenhouse Gas Inventory

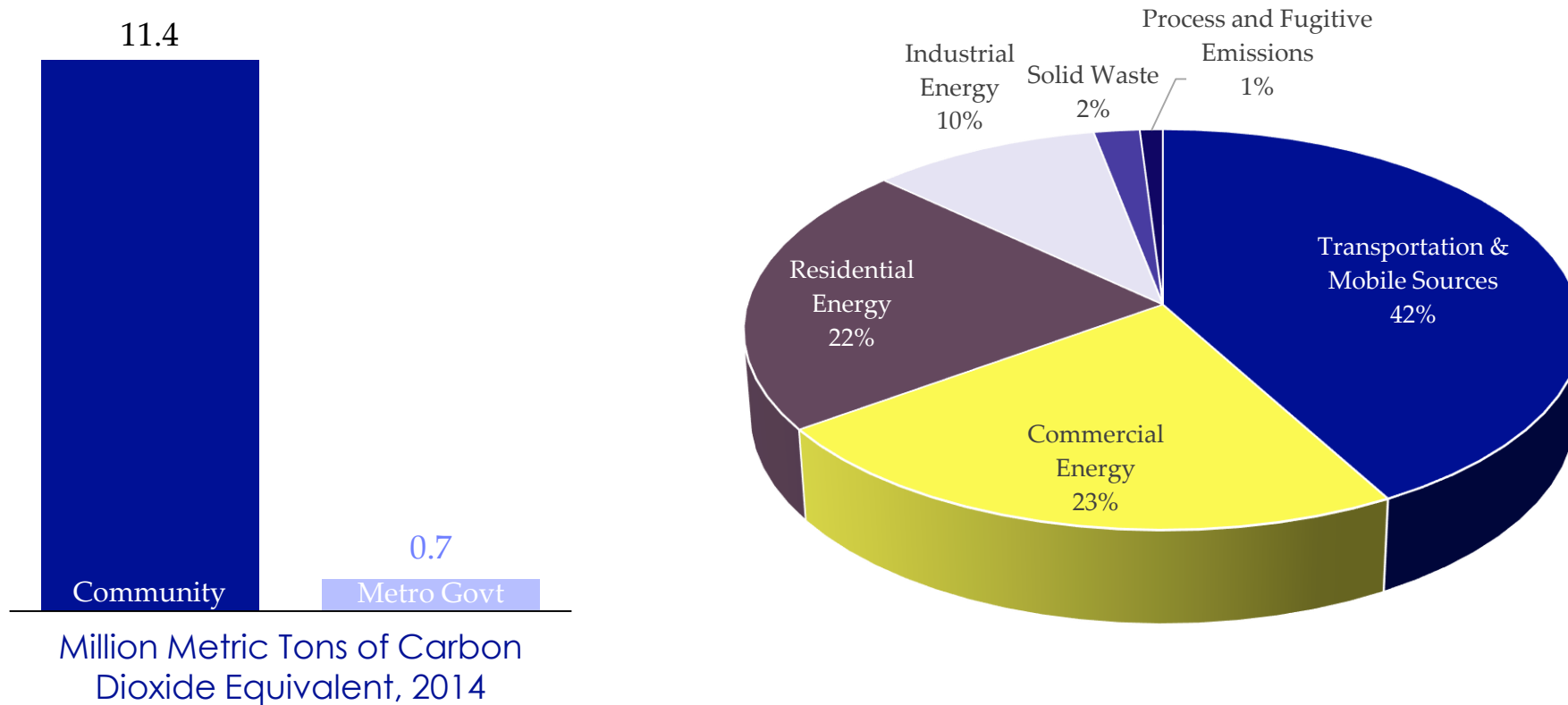
Metro Government



1. Results from Nashville's GHG inventory have been adjusted due to a variety of corrections including, emissions factor for electricity, methane destruction rate at landfills, updated electricity consumption data, etc.

Baseline: 2014 Greenhouse Gas Inventory

Community



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Livable Nashville Targets



Climate & Energy

- 80% reduction in annual Metro Government's GHG emissions by 2050
- 70% reduction in annual Nashville-Davidson County's GHG emissions by 2050
- 30% renewable energy in annual fuel mix by 2030



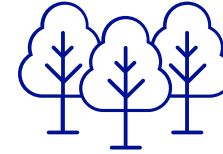
Mobility

- Increase percentage of Metro light duty vehicles that are electric to 25% by 2030



Green Buildings

- 80% reduction in annual energy consumption for existing Metro buildings by 2050
- 75% reduction in annual energy consumption for existing Nashville buildings by 2050
- 60% decrease in commercial building sector's annual energy consumption by 2050



Natural Resources

- Increase tree canopy cover to 50% coverage (500,000 trees) by 2050



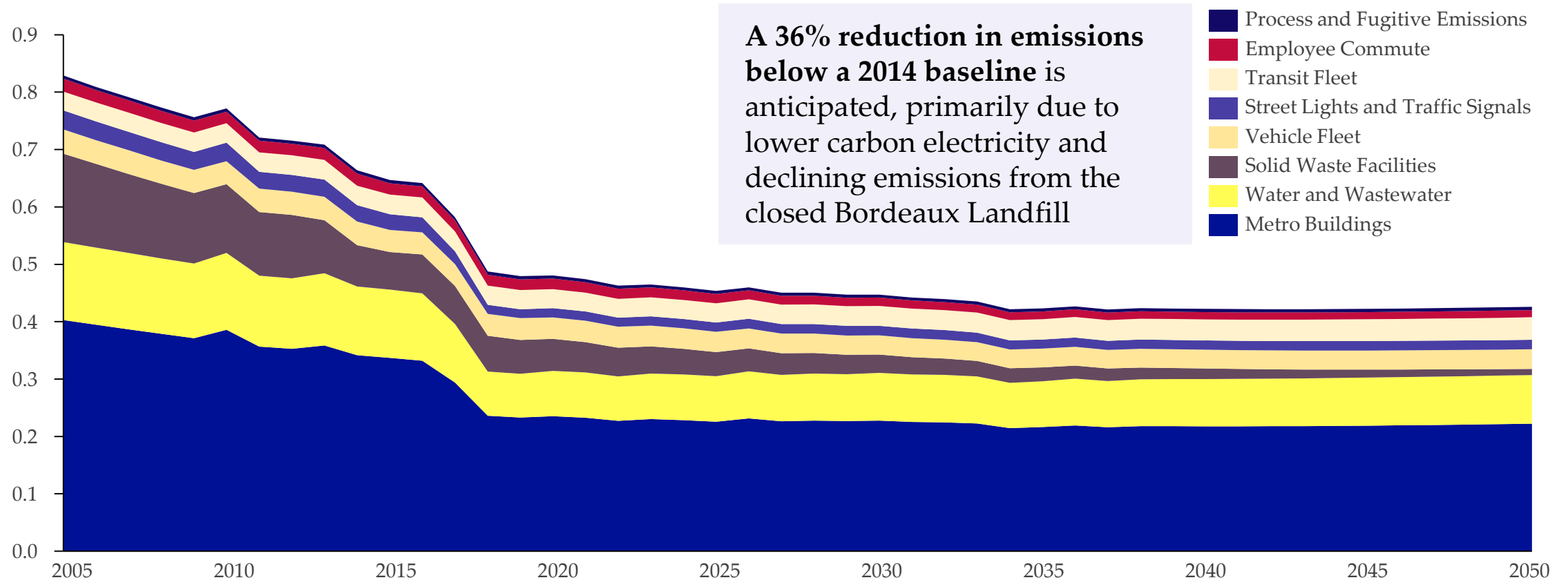
Waste

- 100% waste diversion from landfills by 2050
- Decrease annual food waste sent to landfills by 50% by 2030

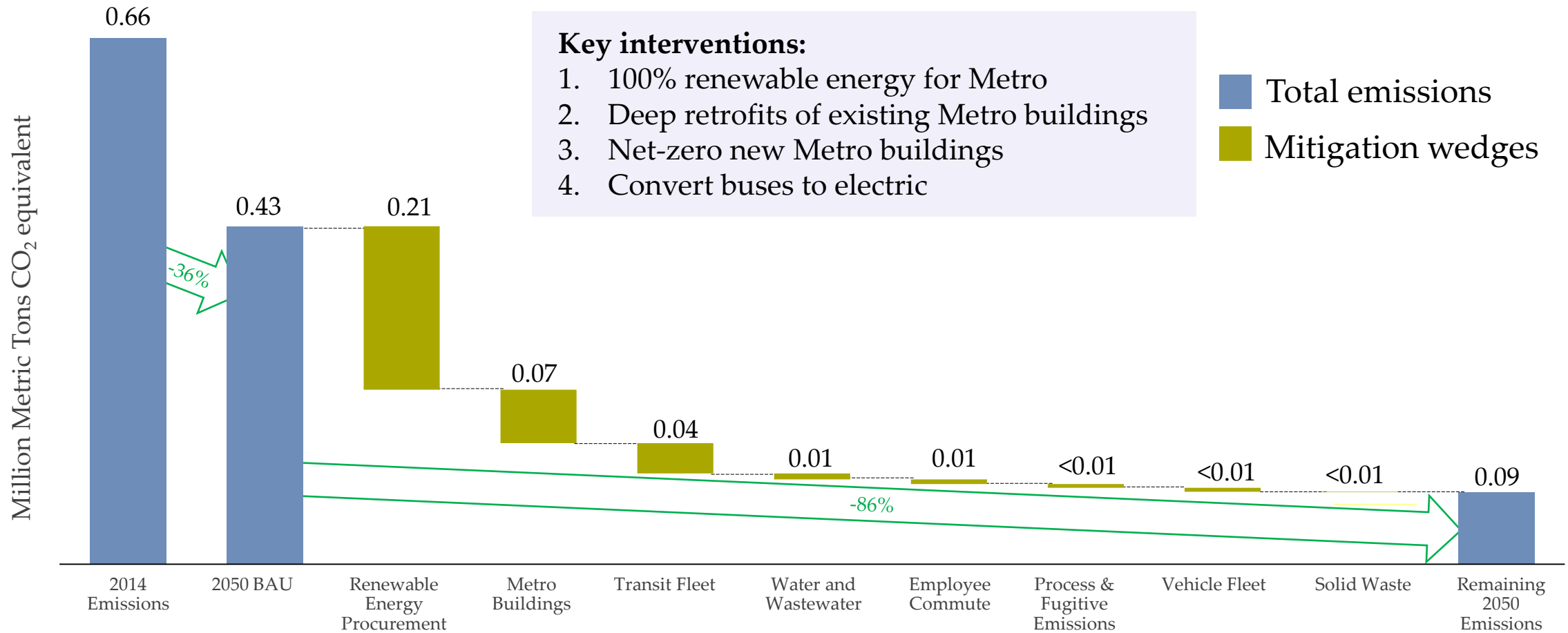
Summary of Findings: Metro Government

Business as Usual: Metro Government

Projected Metro Emissions under BAU, MMT CO₂e 2005-2050



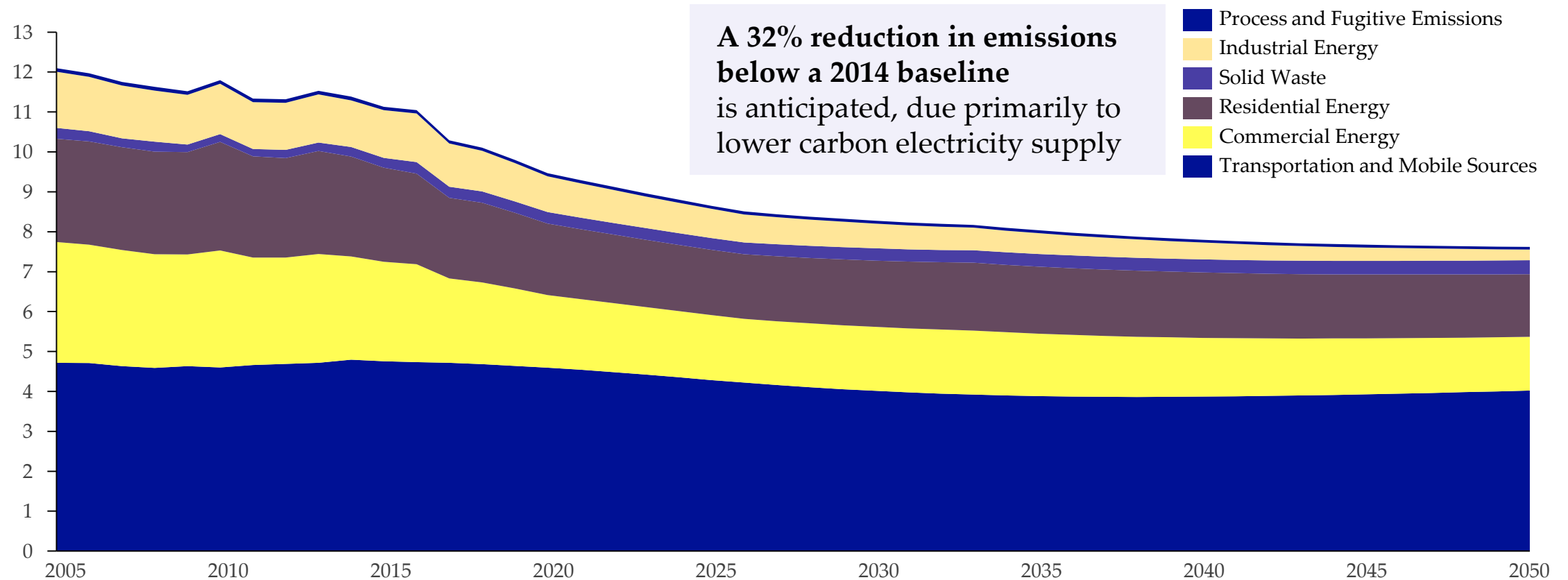
Mitigation Opportunities: Metro Government



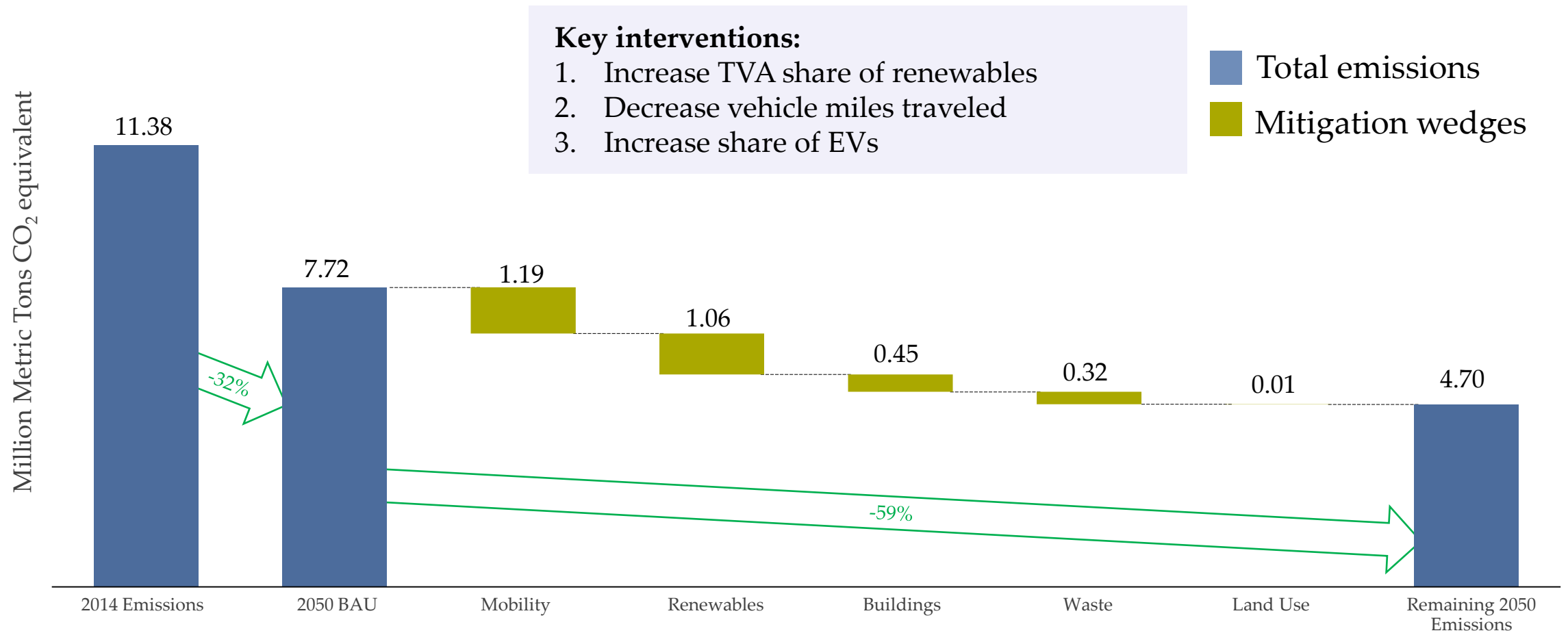
Summary of Findings: Community

Business-As-Usual: Community

Projected Community Emissions under BAU, MMT CO₂e 2005-2050

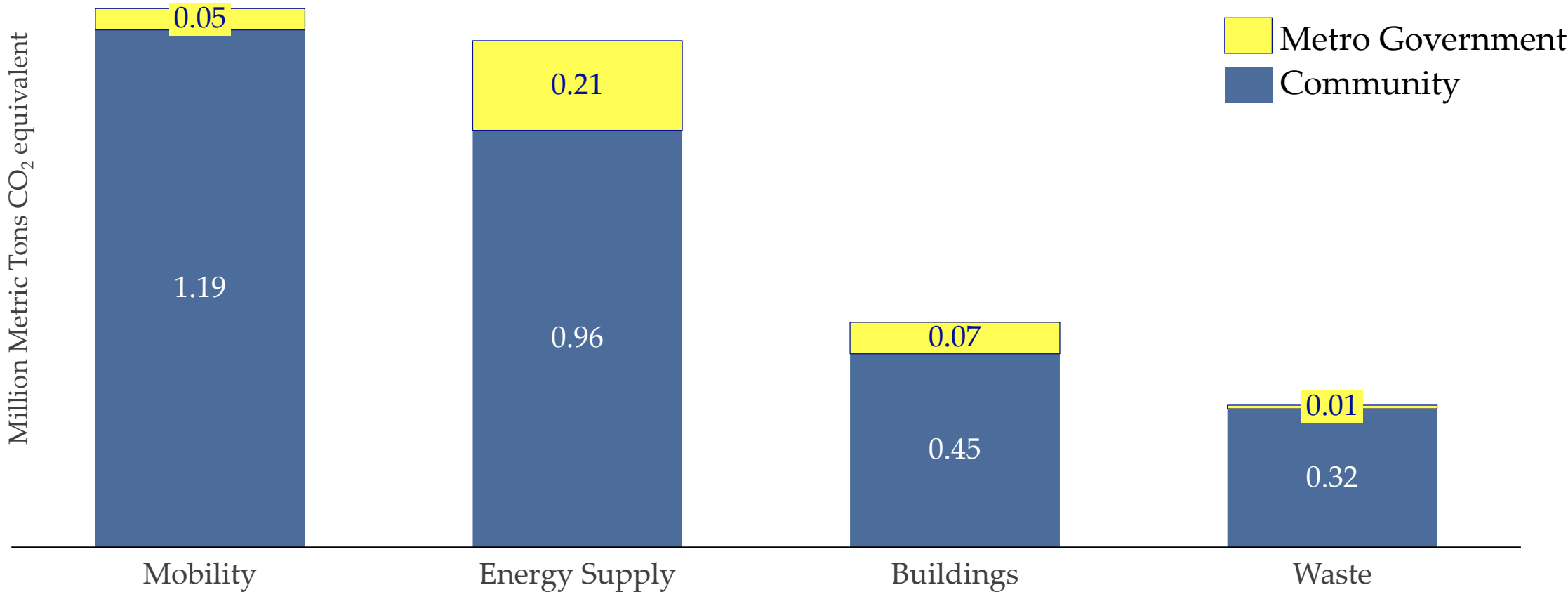


Mitigation Opportunities: Community







Potential next steps

Summary of emissions reductions potential



USDN's list of "High Impact Priorities" and efforts in other cities can inform next steps

<p>USDN High Impact Priorities</p>	 <ul style="list-style-type: none"> • Major public transit investments • Major bike and pedestrian investments • Community electric vehicles adoption • Autonomous vehicle planning 	 <ul style="list-style-type: none"> • Renewable energy procurement for government operations • Utility-scale renewable energy • Community installation of renewable energy • State/federal agency on energy supply and efficiency 	 <ul style="list-style-type: none"> • Electrification of building energy systems • Energy benchmarking for large buildings • Energy upgrades at trigger events for large buildings • Zero net energy in private new buildings 	 <ul style="list-style-type: none"> • Organic waste management • Construction waste management
<p>Other City's Actions</p>	<ul style="list-style-type: none"> • Chicago EV purchase subsidies • Seattle full electrification of Metro fleet • Milan low emission congestion charge 	<ul style="list-style-type: none"> • 100 cities committed to 100% renewable energy purchasing for municipal operations • Portland 100% renewable purchasing with at least 15% produced within city limits 	<ul style="list-style-type: none"> • Climate Mobilization Act • Vancouver Net Zero standards for municipal buildings • Austin point-of-sale energy audits 	<ul style="list-style-type: none"> • San Francisco mandatory recycling and composting ordinance • Iowa City yard and food waste bins and kitchen food scrap composting containers

Appendix: Full Results

Full List of Actions: Metro Government

Category	Wedge	Cost	Mitigation Potential BAU Electricity Emissions Factor	Mitigation Potential 100% Renewable Electricity*
Metro Buildings	Achieve 20% reduction in energy use intensity of existing metro buildings	\$	19,225	8,647
	Achieve 60% energy use reductions through deep retrofits of half of existing metro buildings (Additional to Above)	\$\$	41,465	18,651
	Achieve 80% reduction in energy consumption in existing metro buildings (Additional to above 2)	\$\$\$	54,899	24,694
	All new metro buildings constructed after 2030 are net-zero	\$\$-\$\$\$	37,046	15,518
Transit Fleet	Convert MTA fixed route buses to 100% battery electric	\$-\$\$	14,680	18,930
	Convert MTA paratransit buses to 100% battery electric	\$\$	4,712	6,040
	Convert all MNPS buses to electric	\$\$\$	8,612	13,052
Water and Wastewater	Improve energy efficiency of water and wastewater treatment	\$-\$\$	2,849	208
	Fully utilize biogas production at wastewater facilities	\$-\$\$	7,260	7,260
Employee Commute	Reduce employee commute VMT by 25%	\$-\$\$	3,129	3,129
	Increase employee EV adoption by an additional 30% of total vehicle share above BAU	\$\$	1,467	2,788
Process & Fugitive Emissions	Reduced leakage from lower natural gas consumption	\$-\$\$	4,845	4,845
Vehicle Fleet	Improve fuel economy of on-road vehicle fleet 20% above CAFÉ and Phase II standards	\$-\$\$	4,812	4,812
Solid Waste	Reduce employee waste sent to landfill by 90%	\$-\$\$	648	648
Street Lights & Traffic Signs	Convert all streetlights to LED technology	\$	9,147	-
Renewable Electricity Procurement	Procuring 100% renewable electricity	\$	NA	205,948

Full List of Actions: Community

Category	Wedge	Cost	Mitigation Potential BAU Electricity Emissions Factor	Mitigation Potential 100% Renewable Electricity*
Mobility	Decrease VMT of passenger vehicles 30% by 2050	\$\$	647,066	647,066
	Increase share of electric vehicles to 30% by 2050	\$\$	428,176	543,166
Renewables	30% renewable energy target for TVA by 2050	\$\$-\$	--	1,042,745
	35 MW of community solar	\$\$	13,826	13,826
Residential Energy	Residential retrofit – low potential	\$\$-\$	154,222	100,411
	Residential retrofit – high potential	\$\$\$	129,762	84,544
	Adoption of IECC code (combined with commercial)	\$	29,562	13,826
	Early adoption of IECC code (combined with commercial)	\$	2,205	1,083
Commercial Energy	Low-cost retrofit of 50% of commercial buildings by 2050	\$	83,851	54,632
	Whole building retrofit of 50% of commercial buildings by 2050	\$\$	91,122	59,324
	Deep retrofit of 50% of commercial buildings by 2050	\$\$\$	113,862	74,167
Solid Waste	Increase recycling diversion rate to 90% by 2050	\$\$	179,475	179,475
	Maximize technical methane capture efficiency	\$\$\$	89,703	89,703
	Install industrial compost facility and divert 30% of compostable material by 2050	\$\$\$	39,846	39,846
	Decrease per-capita waste generation by 30% by 2050	\$\$	9,570	9,570
Industrial Energy	Deep retrofit of 50% of industrial buildings by 2050	\$	57,074	45,527
	Whole building retrofit of 50% of industrial buildings by 2050	\$\$	12,095	9,648
	Low-cost retrofit of 50% of industrial buildings by 2050	\$\$\$	1,872	1,493
Land Use	Planting of 500,000 additional trees	\$\$	6,250	6,250



Thank you

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