



**GREEN
WORCESTER**

Community | Resilience | Sustainability

REDUCING GREENHOUSE

GAS EMISSIONS IN WORCESTER:

WHERE WE STAND, NEXT STEPS & HOW YOU CAN HELP

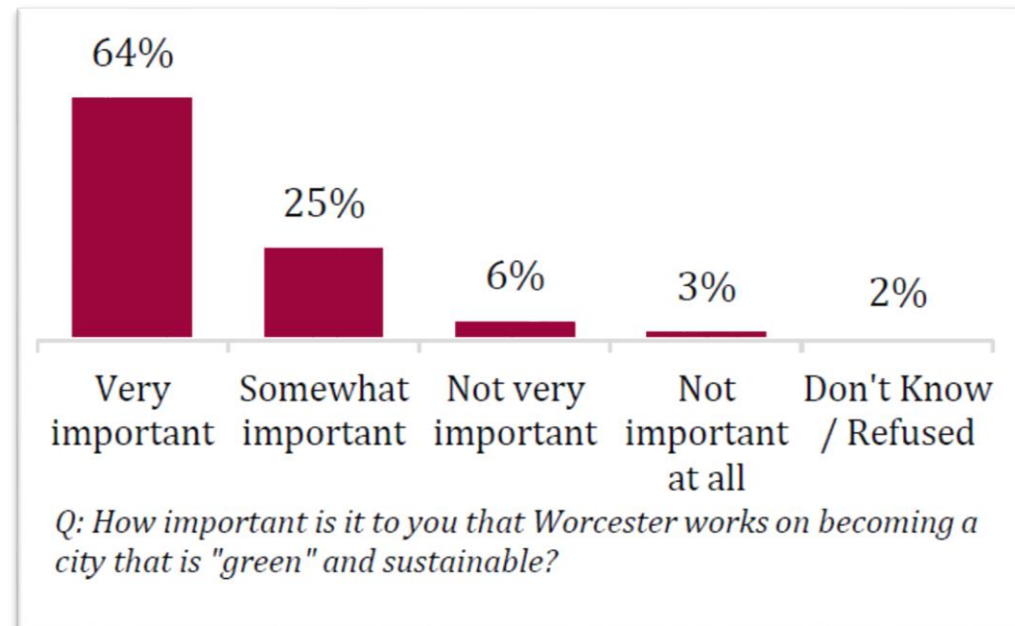
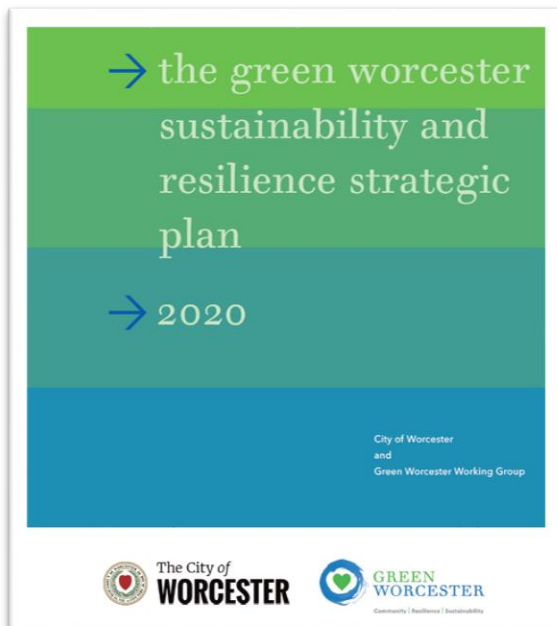


TONIGHT'S EVENT

- Green Worcester Plan
- Greenhouse Gas Emissions Inventory Results
- What You Can Do To Help
- Questions

THE GREEN WORCESTER PLAN

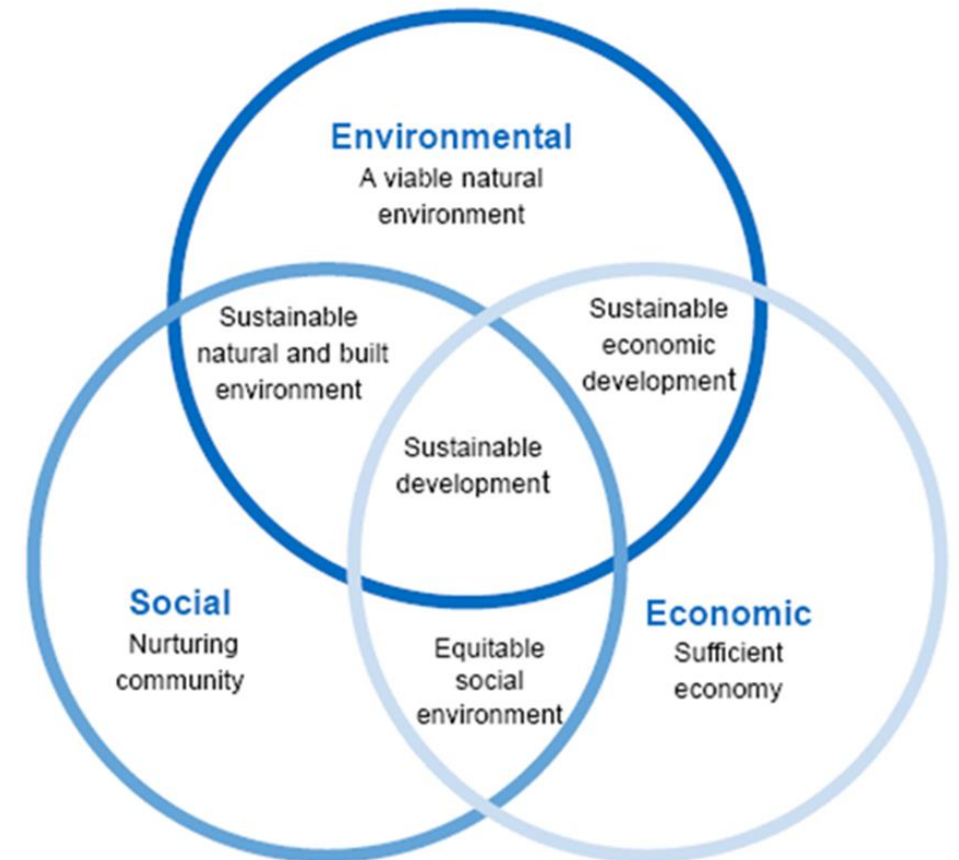
- The Green Worcester Plan is short for The Green Worcester Sustainability and Resilience Strategic Plan
 - Its vision is for Worcester to become the greenest mid-sized city in the country!
 - Our commitment to sustainability and resilience will benefit everyone who lives, works, and studies in Worcester.
- Survey Results: Worcester residents value making the city more sustainable



- Telephone survey of representative sample of Worcester residents (606 respondents – English and Spanish)
- People of Color: 74% “very important”
- Whites: 59% “very important”

WHAT WE MEAN BY SUSTAINABILITY AND RESILIENCE

- **Sustainability:** meet the needs of today's generation, without compromising the ability of future generations to meet their own needs.
- **Resilience:** capacity to withstand and adapt to climate change.
- **The Sustainability Triple Bottom Line:** Integration of environmental, social, and economic values for sustainable outcomes.

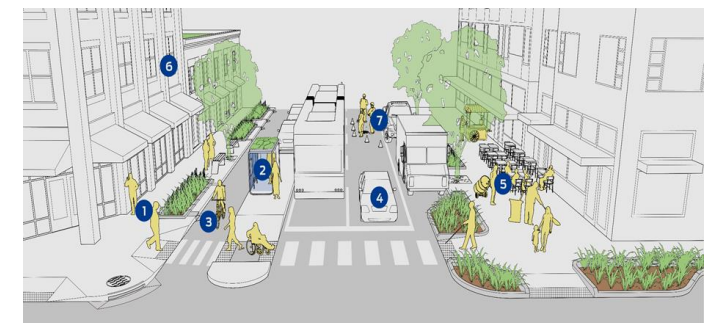
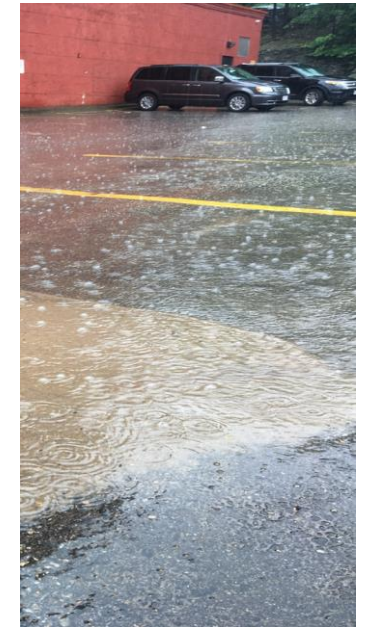


THE GREEN WORCESTER PLAN IS GUIDED BY THREE LENSES

- **Equity:** All people have the same rights to live, work, and play in healthy environments and make decisions about their environments.
- **Health:** Ensure that policies and actions promote healthy outcomes and avoid harmful health impacts.
- **Prosperity:** Jobs and economic benefits for all from sustainable policies and initiatives.

MAIN GOALS OF THE GREEN WORCESTER PLAN

1. 100% Clean and Affordable Energy
2. Net-Zero and Climate Resilient Buildings
3. Climate Change Resilience
4. Sustainable Transportation Choices
5. Zero Waste
6. Integrated Water Management
7. Sustainable Local Food Systems
8. Pollution Prevention
9. Connected Green & Blue Spaces with Healthy Natural Systems
10. Sustainability, Resilience & Green Education in All Policies



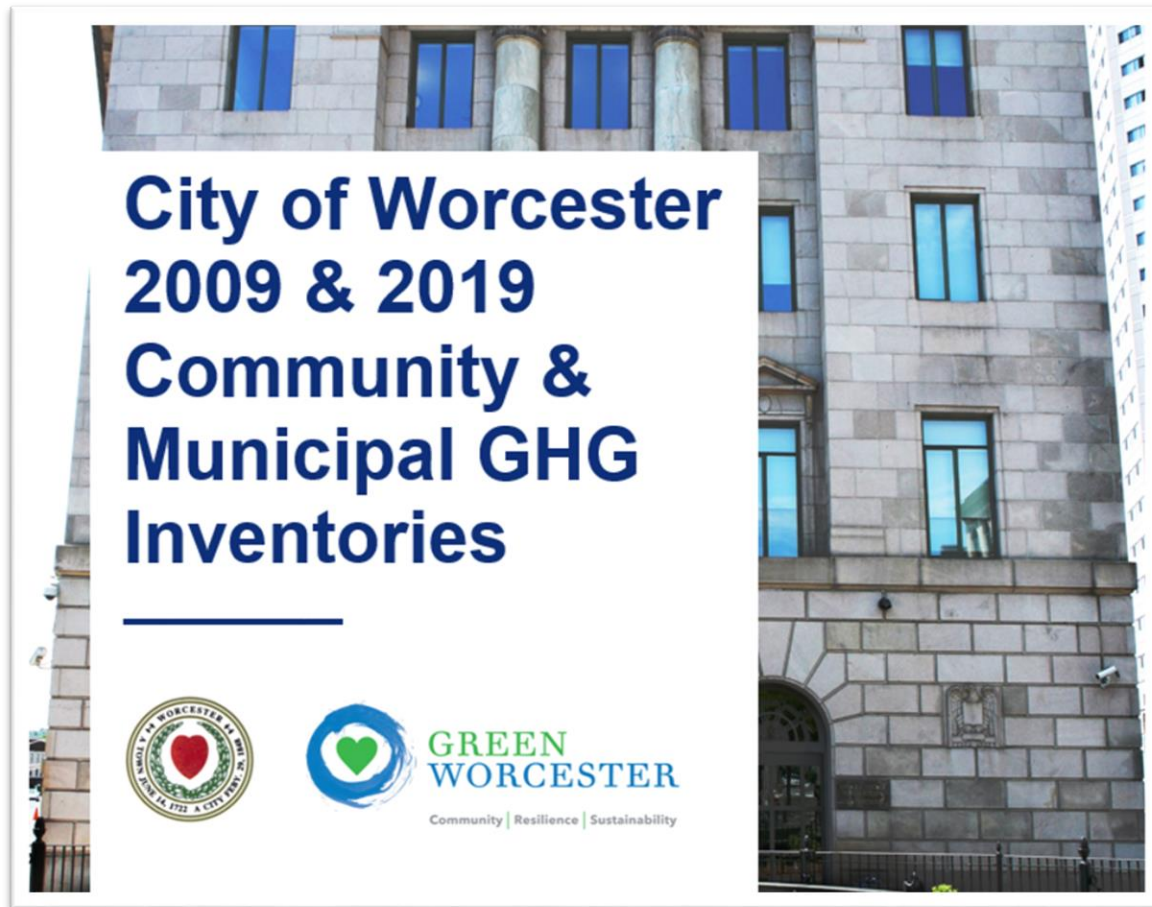
GOAL: 100% CLEAN AND AFFORDABLE ENERGY

- By 2030: 100% renewable energy for municipal facilities.
- By 2035: 100% renewable electricity citywide.
- By 2045: 100% renewable energy that includes heating and transportation.
 - Strategies:
 - ☑ **Greenhouse Gas Emissions Inventory Update in First Year of Plan Implementation**
 - Net Zero City municipal facilities and operations by 2030
 - Community Choice Electricity Aggregation Plan – 100% renewable community-wide by 2035
 - Set a “climate budget” for city government
 - Citywide policies and regulations on building performance, flexible commutes, EV charging stations
 - Collaborate with State government

GHG INVENTORY PROJECT SUMMARY

- KLA was hired by Worcester's Department of Sustainability & Resilience in Nov 2021 to **conduct a Greenhouse Gas Emissions Inventory** in a format compliant with the Local Government Operation Protocol, CDP and Global Covenant of Mayors.
- **Project's purpose:** To advance toward the Green Worcester Plan's goal (III-1) of eliminating 100% of greenhouse gas emissions citywide, by developing and publishing the citywide greenhouse gas emissions inventory.
- **2009** data baseline, compared to **2019**; **Scopes 1, 2 and partial 3** (more below)

THE INVENTORY RESULTS



Presented by:

Mike Steinhoff

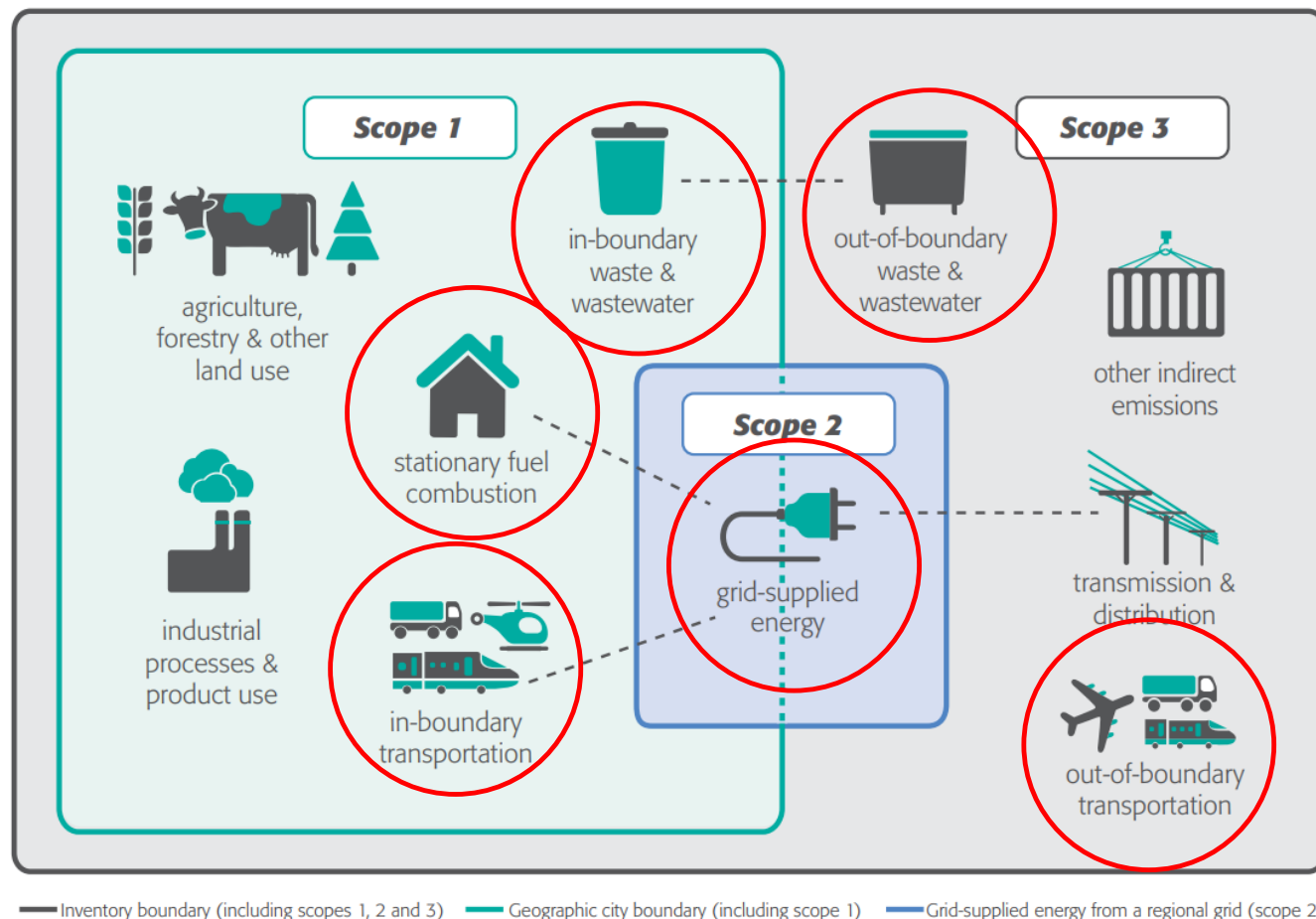
Director of Technical Services

Kim Lundgren Associates



INVENTORY SCOPES – EMISSIONS THAT ARE COUNTED

- **Global Protocol for Community Inventories: Scopes Framework**
 - Illustrates what kinds of things can be counted.
 - Categories (1, 2, 3) prevent double counting across communities.
- **US Community Protocol – 5 Basic Emissions Generating Activities**
 - Consistent core of activities that exist in all communities.



MAJOR INVENTORY FINDINGS (2009-2019)

- **Vast majority (92%) of community-wide emissions are from buildings and transportation!**
- **Electricity:**
 - Electricity use has **declined** – building energy efficiency improvements in the past decade
 - Electricity use is expected to **increase** - everyone is working on buildings' and vehicles' electrification
 - Worcester Electricity **Aggregation** Program helps with decreasing emissions faster through renewable electricity purchases.
- **Natural gas** use has **grown**, likely from increase in number of buildings and from fuel oil switching
- **Transportation demand is rising in Worcester** (similar trends in MA and nationally).



**GREEN
WORCESTER**

Community | Resilience | Sustainability

2019 COMMUNITY GHG EMISSIONS INVENTORY

By Sector



Commercial Buildings
704,799 MTCO_{2e} **39%**



On-Road Transportation
485,273 MTCO_{2e} **27%**



Residential Buildings
456,990 MTCO_{2e} **26%**



Solid Waste
137,456 MTCO_{2e} **8%**

By Source



Natural Gas
588,963 MTCO_{2e} **31%**



Gasoline
389,084 MTCO_{2e} **22%**



Purchased Electricity
360,947 MTCO_{2e} **20%**



Fugitive Natural Gas
166,513 MTCO_{2e} **9%**

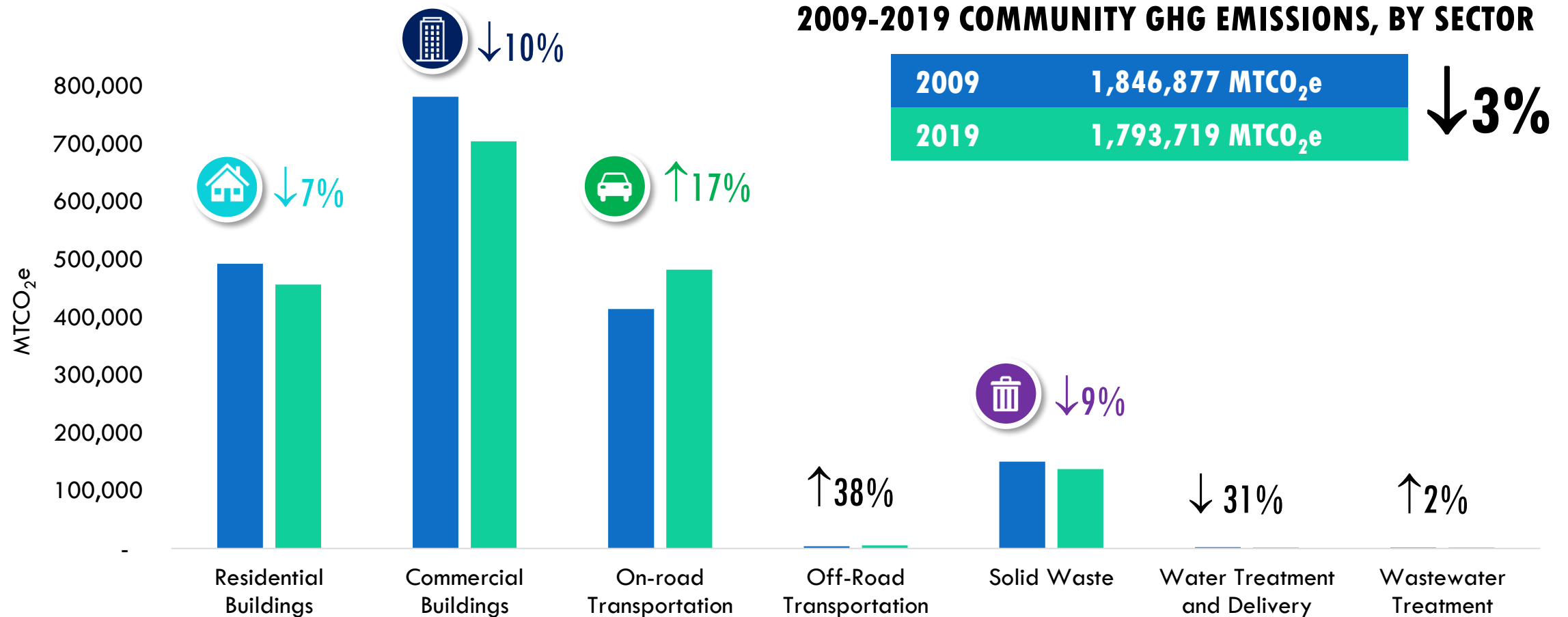


MSW Incinerated
107,049 MTCO_{2e} **6%**



Diesel
90,720 MTCO_{2e} **5%**

2009-2019 COMMUNITY GHG EMISSIONS TRENDS BY SECTOR



2009-2019 COMMUNITY GHG EMISSIONS TRENDS BY SOURCE

Natural Gas



**Commercial Use
(Therms)**

2009	56,017,923
2019	65,823,323

↑18%



**Residential Use
(Therms)**

2009	36,291,405
2019	39,414,006

↑9%

Purchased Electricity



**Commercial Use
(MWh)**

2009	1,014,230
2019	823,743

↓19%



**Residential Use
(MWh)**

2009	426,880
2019	414,245

↓3%

Transportation



**WRTA
(Passenger Miles)**

2009	9,611,835
2019	14,111,090

↑47%

Electric (VMT)

2009	0
2019	4,329,082

**Passenger
Vehicles (VMT)**

2009	847,621,170
2019	1,001,586,270

↑18%

**MBTA (Passenger
Miles)**

2009	10,963,368
2019	14,916,616

↑36%

2009-2019 COMMUNITY GHG EMISSIONS METRICS



Population

Source: U.S. Census Bureau

2009	181,045
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2019	185,428
------	---------

↑2%

Residential Energy Use (MMBTU) per Home



2009	91
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2019	87
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↓4%

Light-Duty Vehicle Miles Traveled per Capita



2009	4,429
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2019	5,181
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↑17%

Commercial Energy Use (Million MMBTU)

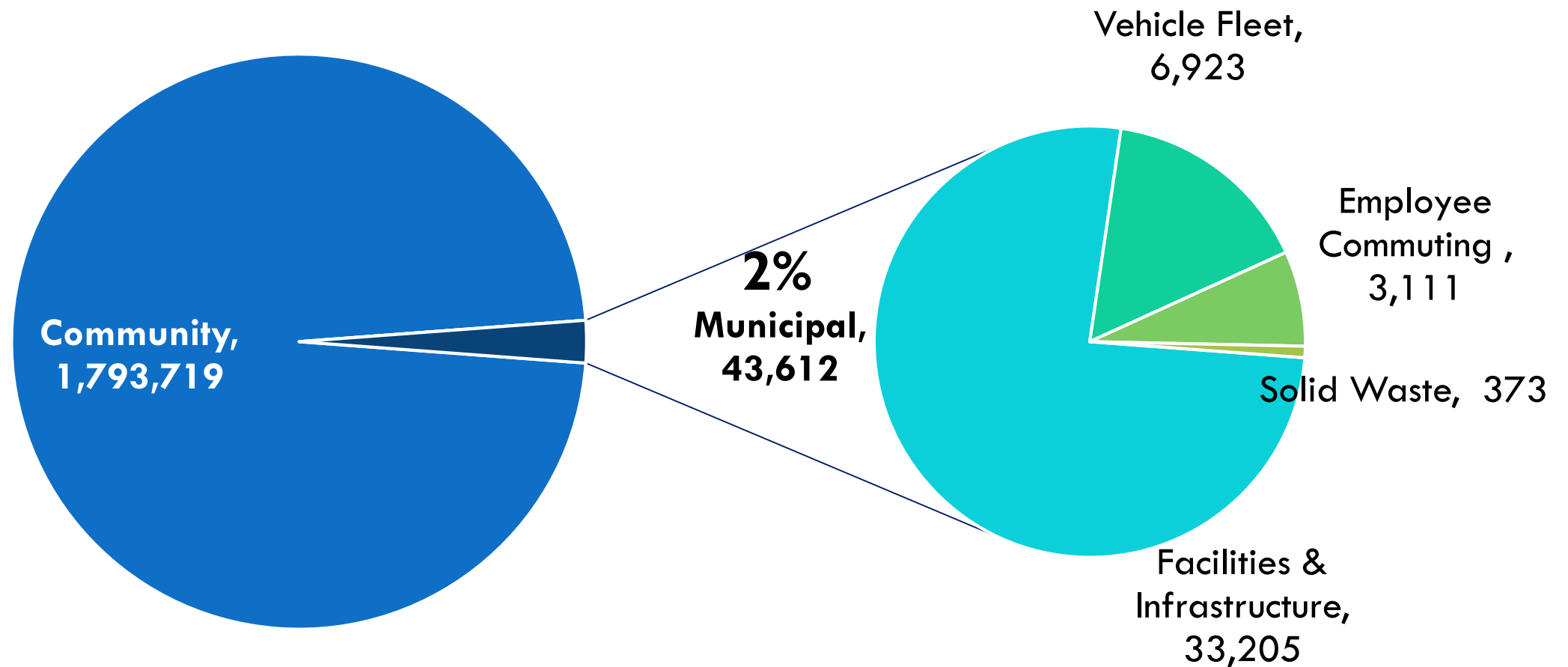


2009	9.2
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2019	9.6
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↑4%

MUNICIPAL SHARE OF COMMUNITY GHGS



2019 MUNICIPAL GHG EMISSIONS INVENTORY

By Sector



Facilities & Infrastructure
33,205 MTCO_{2e} **76%**



Vehicle Fleet
6,923 MTCO_{2e} **16%**



Employee Commuting
3,111 MTCO_{2e} **7%**



Solid Waste
373 MTCO_{2e} **1%**

By Source



Purchased Electricity
14,602 MTCO_{2e} **33%**



Natural Gas
13,916 MTCO_{2e} **32%**



Gasoline
7,860 MTCO_{2e} **22%**

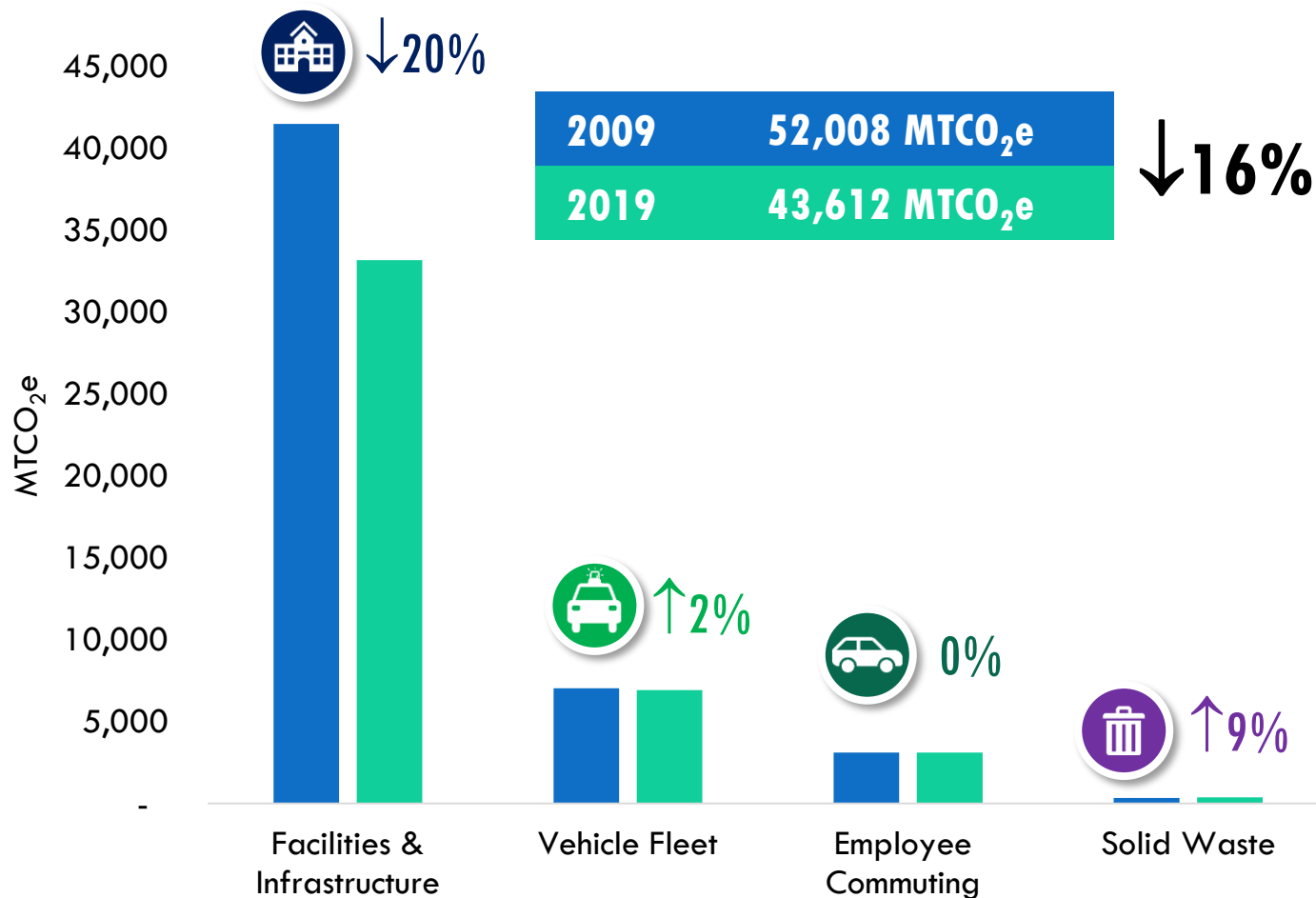


Fugitive Natural Gas
4,146 MTCO_{2e} **10%**



Diesel
2,177 MTCO_{2e} **5%**

2009-2019 MUNICIPAL GHG EMISSIONS TRENDS BY SECTOR



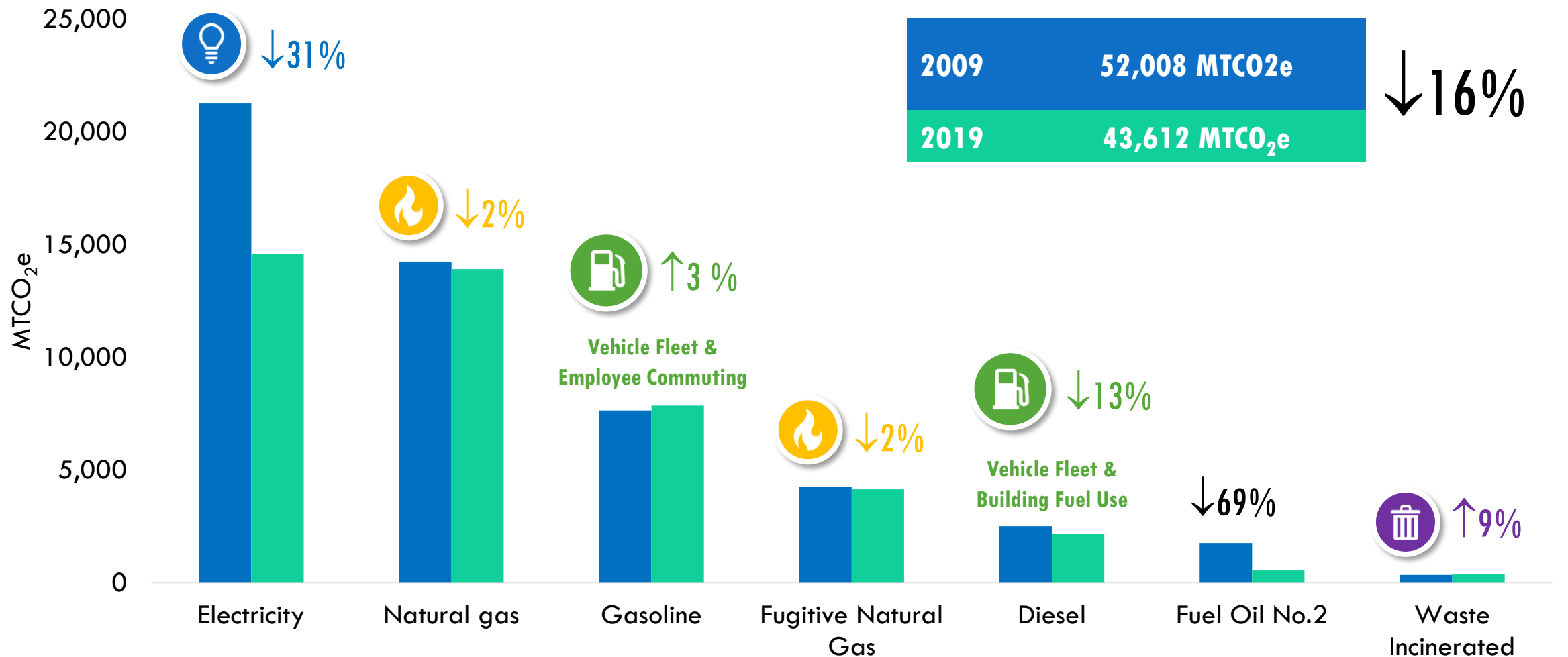
Facilities & Infrastructure



This sector can be further categorized by property type within the City's built portfolio

Sector	2009 MTCO ₂ e	2019 MTCO ₂ e	% Change
Municipal Buildings	32,444	26,668	↓18%
Water & Sewer	4,491	3,914	↓13%
Streetlights & Traffic Signals	3,441	1,362	↓60%
Parks Buildings	1,153	1,261	↑9%

2009-2019 MUNICIPAL GHG EMISSIONS TRENDS BY SOURCE



EMISSIONS REDUCTIONS – THE ROAD AHEAD

1. **Energy Efficiency:** Cutting energy demand for building and transportation energy will help make the transition to 100% renewable energy more feasible
2. **Electrification** of buildings and transportation systems
3. **Increasing renewable electricity** sources

SOME OF THE UPCOMING DSR PROJECTS

- **Reduce Carbon Emissions**
 - Triple-decker neighborhoods
 - Building energy disclosure policy
 - Energy efficiency barrier study
- **Advance Climate Change Resilience**
 - Urban Heat Risk Assessment
 - Assist DPW-Parks with Urban Forestry Plan
- **Advance Mobility Transformation**
 - Co-lead with new Transportation and Mobility Dept. in development of a **Worcester Mobility Plan**
- **Educate, Effectively Communicate and Facilitate Action at the Community Level**

HOW YOU CAN HELP

- Personal actions to reduce your Greenhouse Gas Emissions
 - Sign up for Municipal Aggregation Electricity Program's "100% Green" option at any time at WorcesterCommunityChoice.com
 - Participate in Mass Save® programs
 - Energy Assessments and Audits – www.masssave.com or 1-866-527-7283
 - Equipment Rebates & Incentives
 - Reduce your household waste and recycle correctly – learn how at recyclesmartma.org
 - Getting started sections in Green Worcester Plan at worcesterma.gov/sustainability-resilience

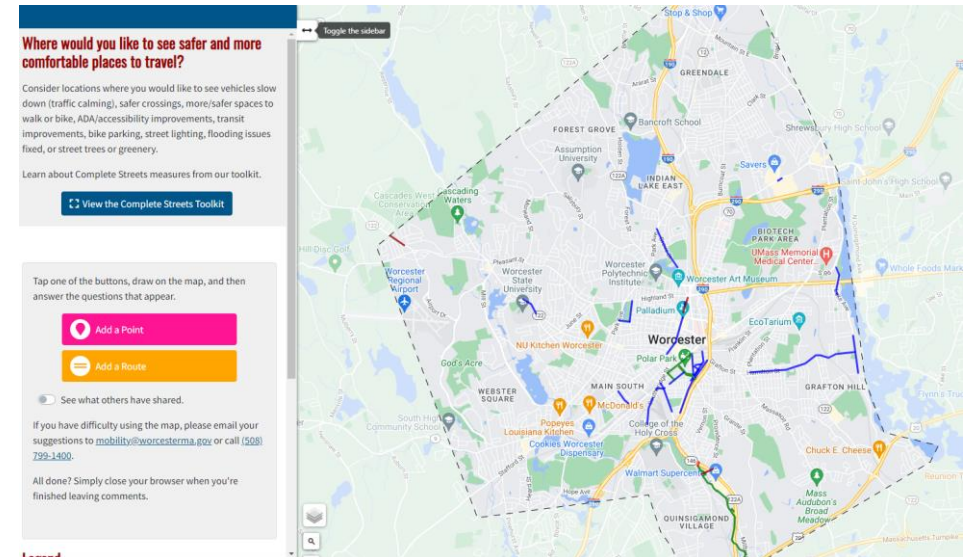


Worcester Community Choice
Electricity Aggregation Program



HOW YOU CAN GET INVOLVED

- Help with Planning for a Greener Worcester!
 - Worcester NOW | NEXT Survey & Workshops: [Worcester Now | Next](#) (by end of May)
 - Complete Streets Mapping & Survey: [Worcester Complete Streets \(tooledesign.github.io\)](#) (by end of May)
 - [Urban Forestry Plan Survey](#) and Workshops
 - Urban Mobility Plan (upcoming this summer)
 - Attend Green Worcester Advisory Committee meetings!





THANK YOU!

Q&A

To contact the Department of Sustainability & Resilience, email greenworchester@worcesterma.gov.