



City of Denton:

Climate Action Adaptation Plan

GHG Inventory and Business-as-Planned Results
SFAC Workshop

January 27th, 2023

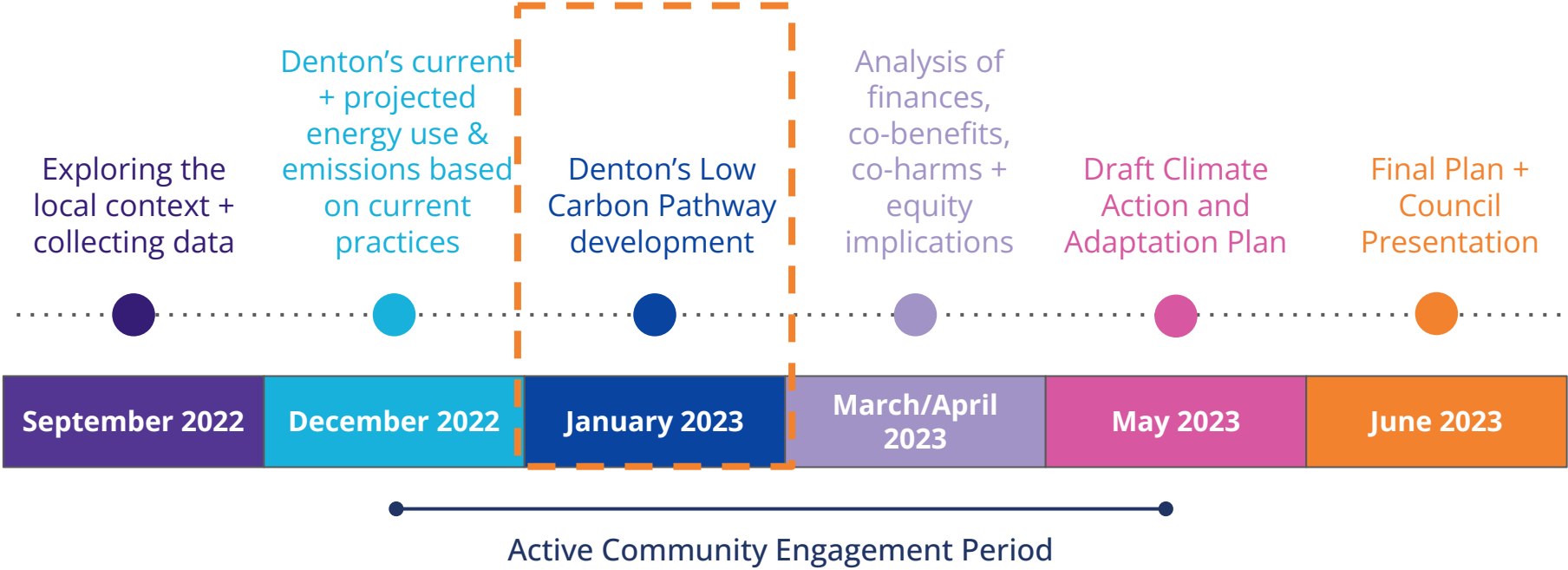
Agenda

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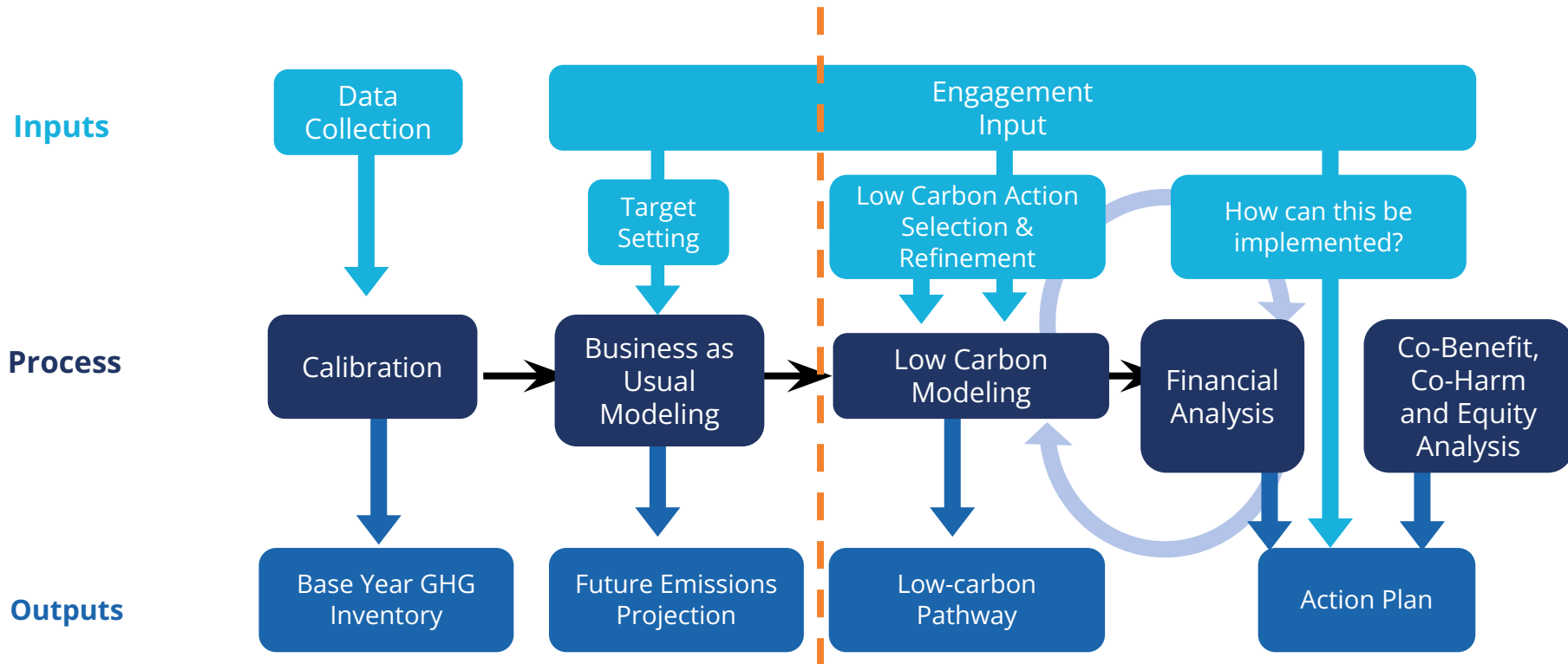
- Project Overview
- 2019 Updated Inventory Report
- Business-as-Planned Projections
- Significant Results
- Initial Low-Carbon Ideas
- Discussion
- Next Steps

Project Overview

Denton's CAAP Project Timeline



Approach: Iterative Feedback + Analysis



SFAC Input

January:

Inventory and Business-as-Usual Workshop



Identify key opportunities and challenges

March:

Targets and Actions Workshop



Review and recommend targets and actions

April:

Actions Prioritization Workshop



Prioritize recommended low-carbon actions

May:

Draft Plan Review



Provide feedback prior to finalization

Project Outputs

- ✓ Baseline greenhouse gas inventory for Denton
- ✓ Denton's forecast of energy use and emissions up to 2050 under business-as-usual scenario
- Recommended low-carbon pathway to a net-zero Denton by 2050
 - Catalog of actions and policies
 - Financial and economic analysis
 - Co-benefits, co-harms and equity analysis
 - Implementation and progress monitoring framework



Inventory Report

- This greenhouse gas inventory measures emissions generated by key activities within City of Denton's territorial boundaries.
- Provides a snapshot of baseline emissions and identifies opportunities to efficiently use energy, reduce emissions and manage waste.

2019 Modelled Greenhouse Gas Inventory

Sector		Total by Scope (tCO2e)				Total	Total by city-induced reporting level (tCO2e)	
		Scope 1	Scope 2	Scope 3	Other Scope 3		BASIC	BASIC+
Stationary Energy	Energy use (all I emissions except I.4.4)	213,918	284,006	26,754		524,678	497,924	524,678
	Energy generation supplied to the grid (I.4.4) *	0						
Transportation (all II emissions)		466,217	145	210,519		678,881	466,362	676,881
Waste	Generated in the city (all III.X.1 and III.X.2)	95,182		0		95,182	95,182	95,182
	Generated outside city (all III.X.3)							
IPPU (all IV emissions)								
AFOLU (all V emissions)								
Total		775,317	284,151	237,273	0	1,296,741	1,059,468	1,296,741

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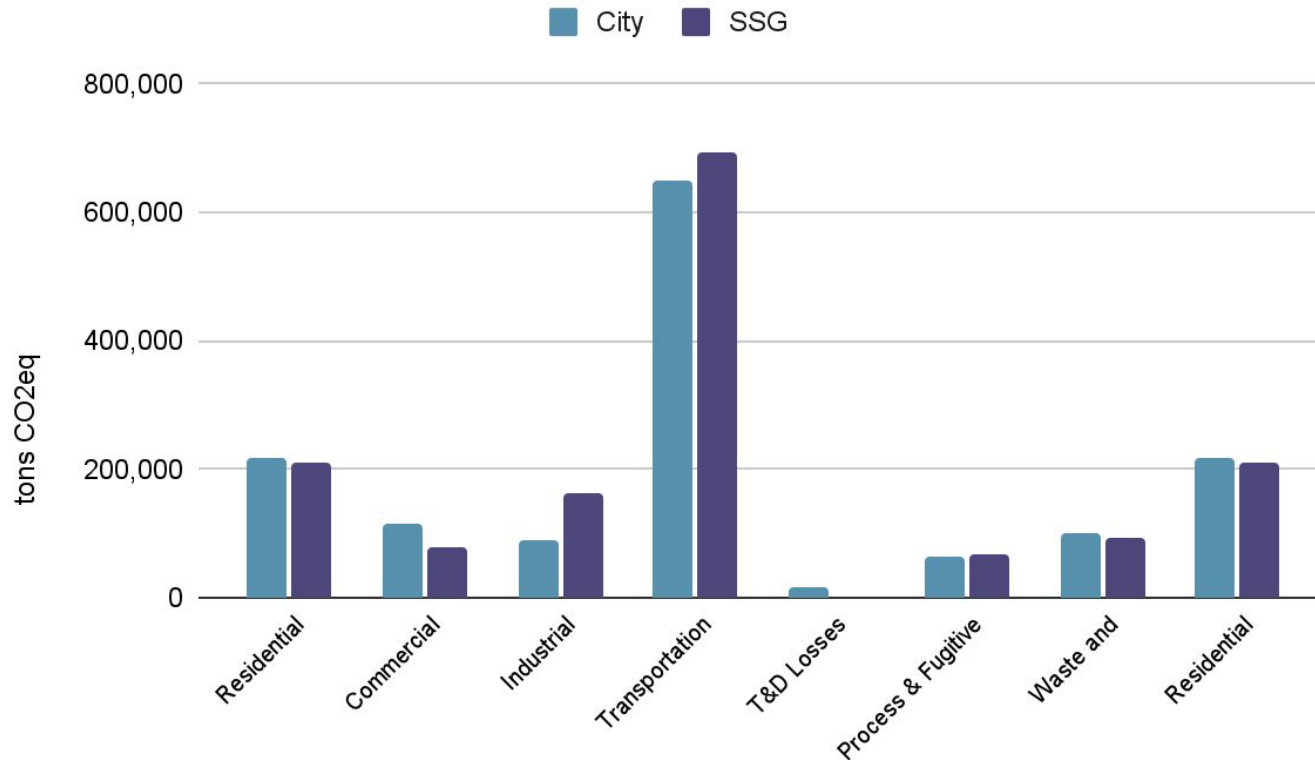
(All territorial emissions)

(All BASIC emissions)

(All BASIC & BASIC+ emissions)

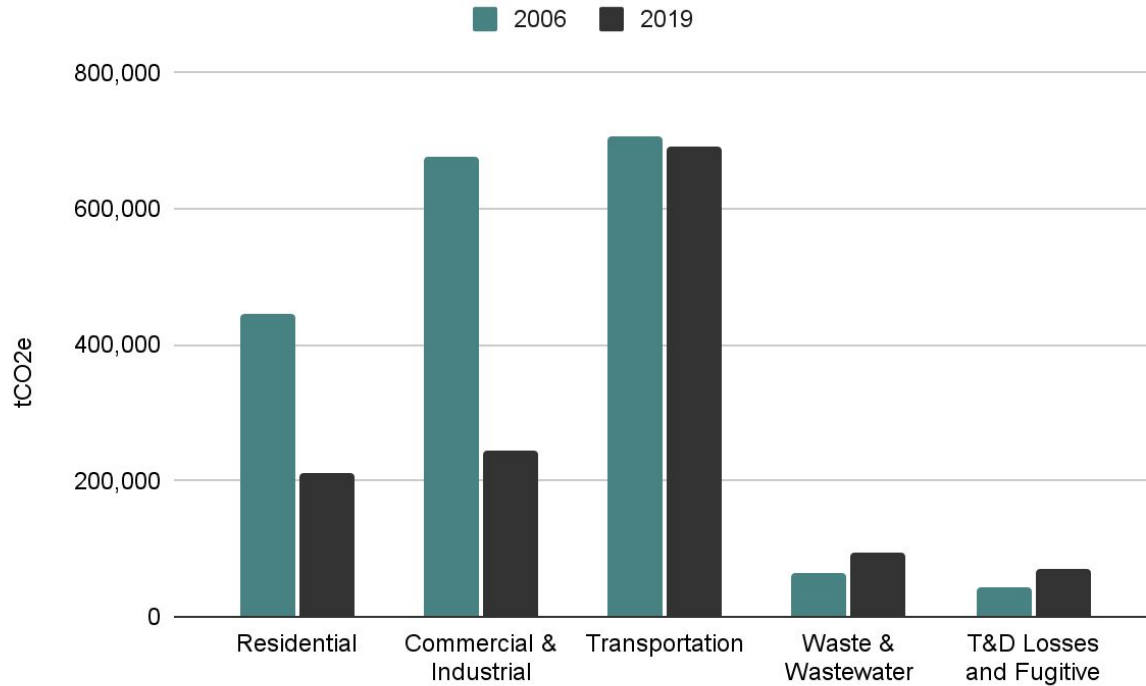
Inventory Comparison:

2019 **City** Inventory to 2019 **Modelled** Emissions Inventory



Inventory Comparison:

2006 City Inventory to 2019 Modelled Emissions Inventory



2006

Population (2008): 115,022
Emissions per capita: 16.8 tCO₂eq
Total emissions: 1,938,057 tCO₂eq

2019

Population: 136,195 + student population
Emissions per capita: 6.8 tCO₂eq
Total emissions: 1,311,636 tCO₂eq

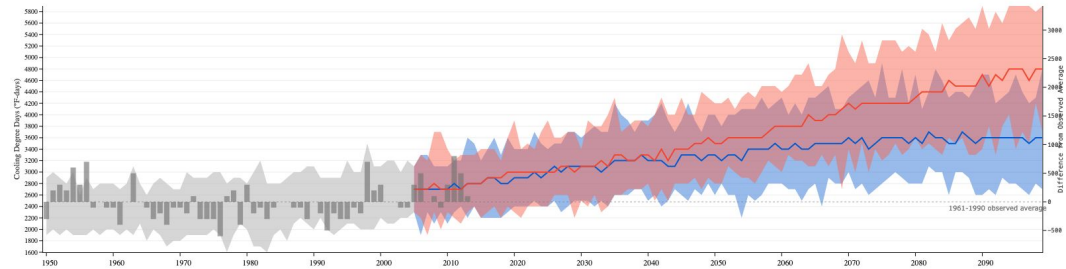
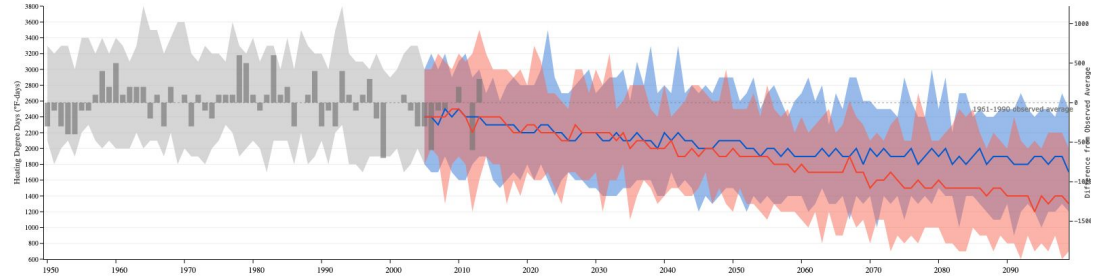
Business-As-Planned Projections

- A business-as-planned scenario incorporates demographic trends with approved and funded plans, policies, and programs to project annual energy use and emissions in the long-term.

Business-as-Planned Key Assumptions

Changes in climate by 2050:

- Heating degree days decrease by 13%, from 2333 to 2033
- Cooling degree days increase by 14%, from 2983 to 3400



Business-as-Planned Key Assumptions

Demographic growth by 2050:

- 67% population growth
- 200+% employment growth



Business-as-Planned Key Assumptions

Energy switch:

- DME's 100% renewable electricity = 91% of electricity used by Denton residents
- Natural gas growth use offset by 9.4% increase in heat pumps by 2030
- Rooftop solar increases 2% annually.



Business-as-Planned Key Assumptions

Buildings:

- Total residences increase to ~90,000,
- Avg home size remains 2000 ft²
- 2.6 million ft² additional, non-residential, building space
- Space and water heating = 45% natural gas and 55% electricity for heat
- 87% of households have air conditioning units, rest have heat pumps



Business-as-Planned Key Assumptions

Transportation:

- Minor mode shift
- National fuel efficiency improvements
- Municipal vehicles produce 25% less emissions by 2025
- Personal vehicles gradually electrify

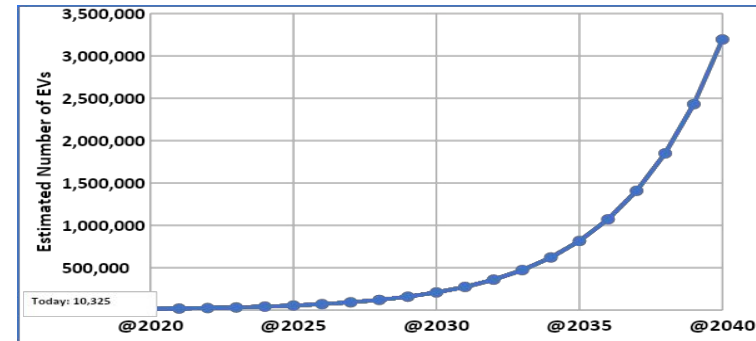
Waste:

- 24% diversion remains constant
- Total waste increases with population

Water and Wastewater:

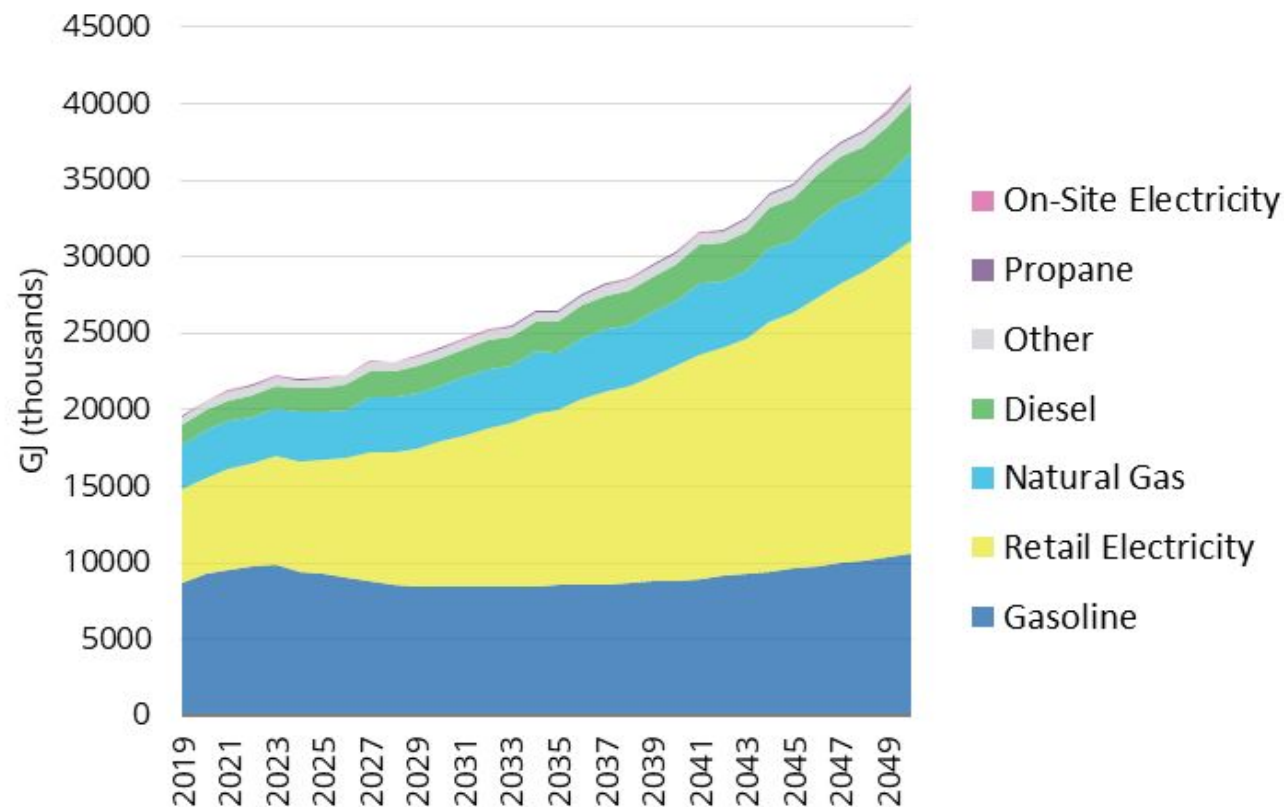
- Water use decreases by 5% per person by 2024
- Wastewater emissions grow with population

Projected growth of EVs in North Texas

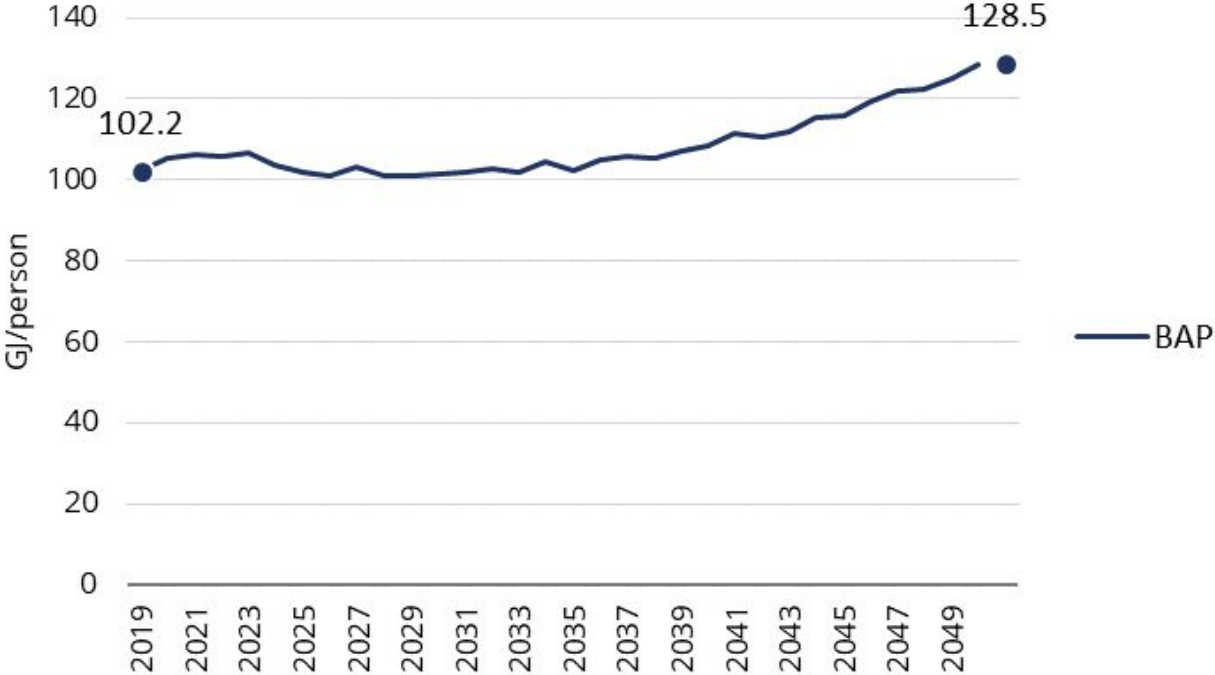


Source: North Central Texas COG

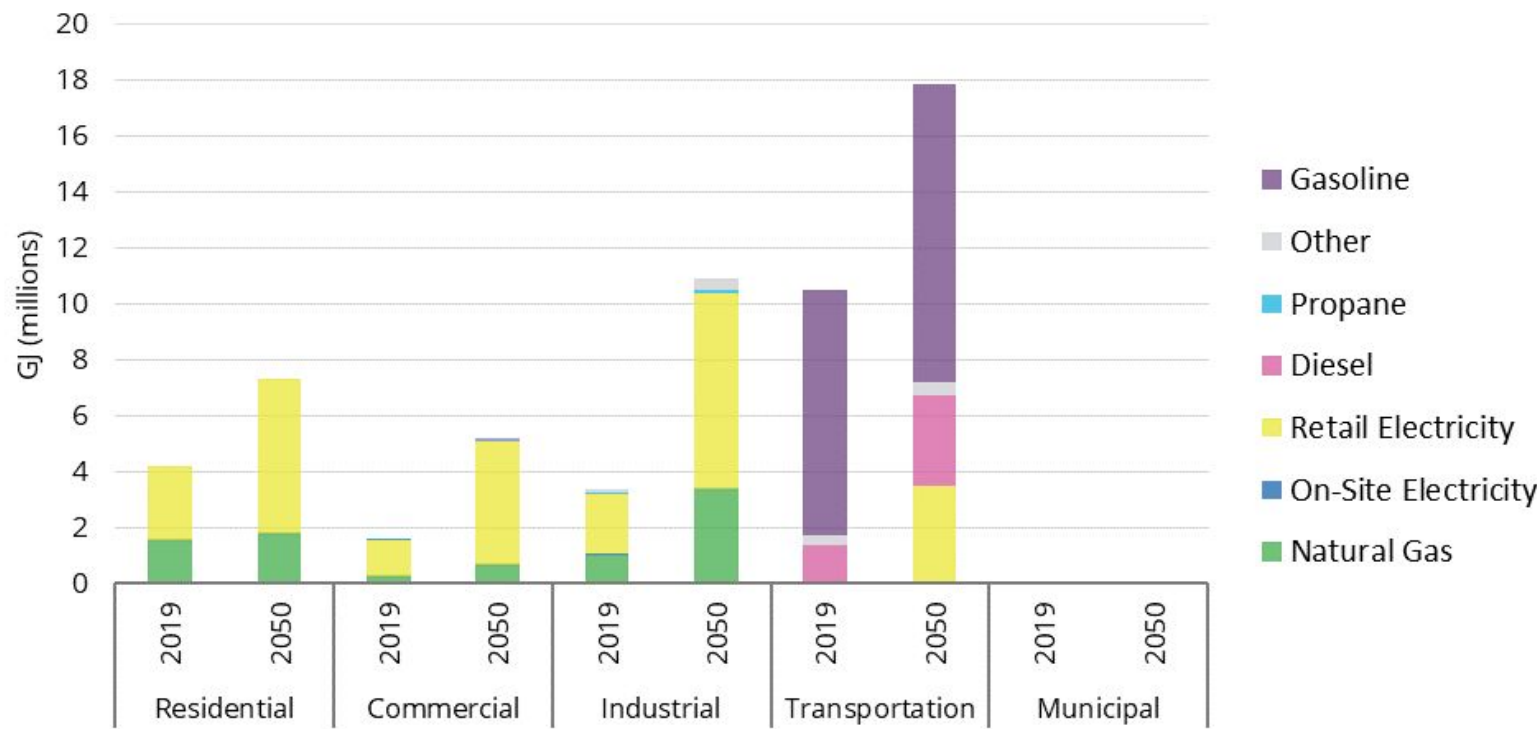
Business-as-Planned: Total Energy Use by Fuel



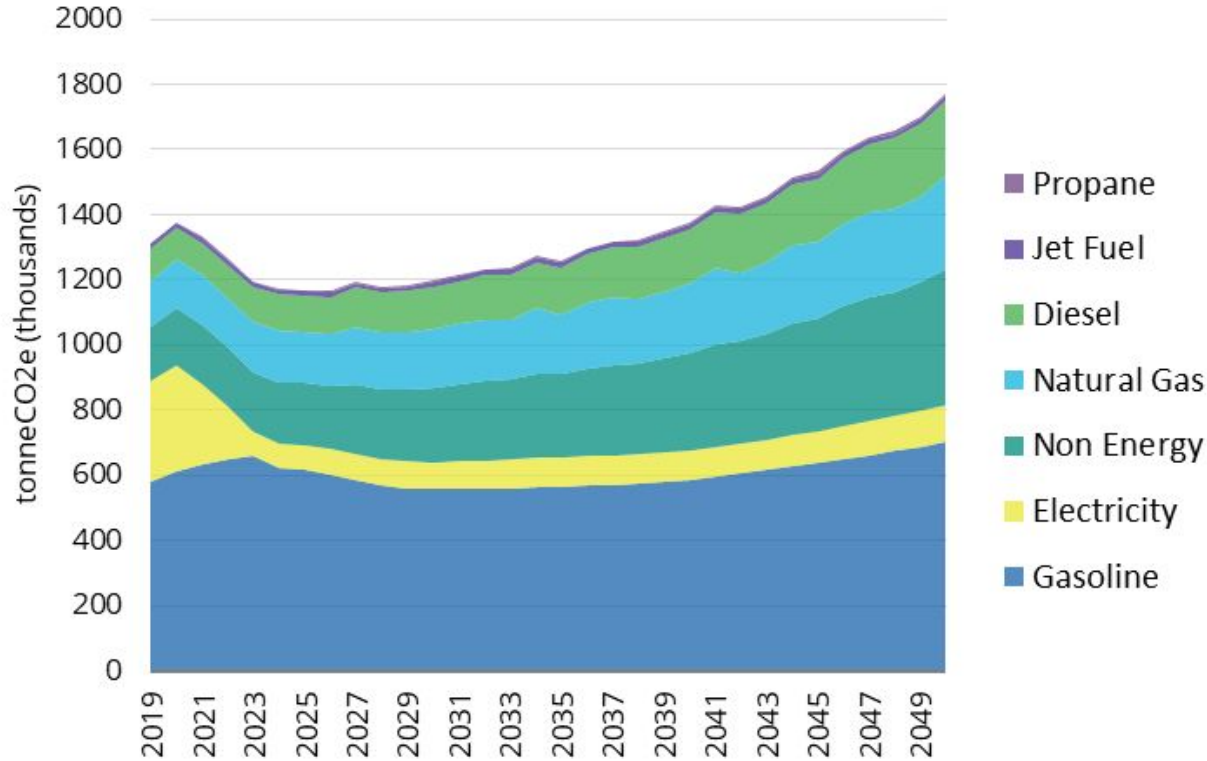
Business-as-Planned: Per Capita Energy Use



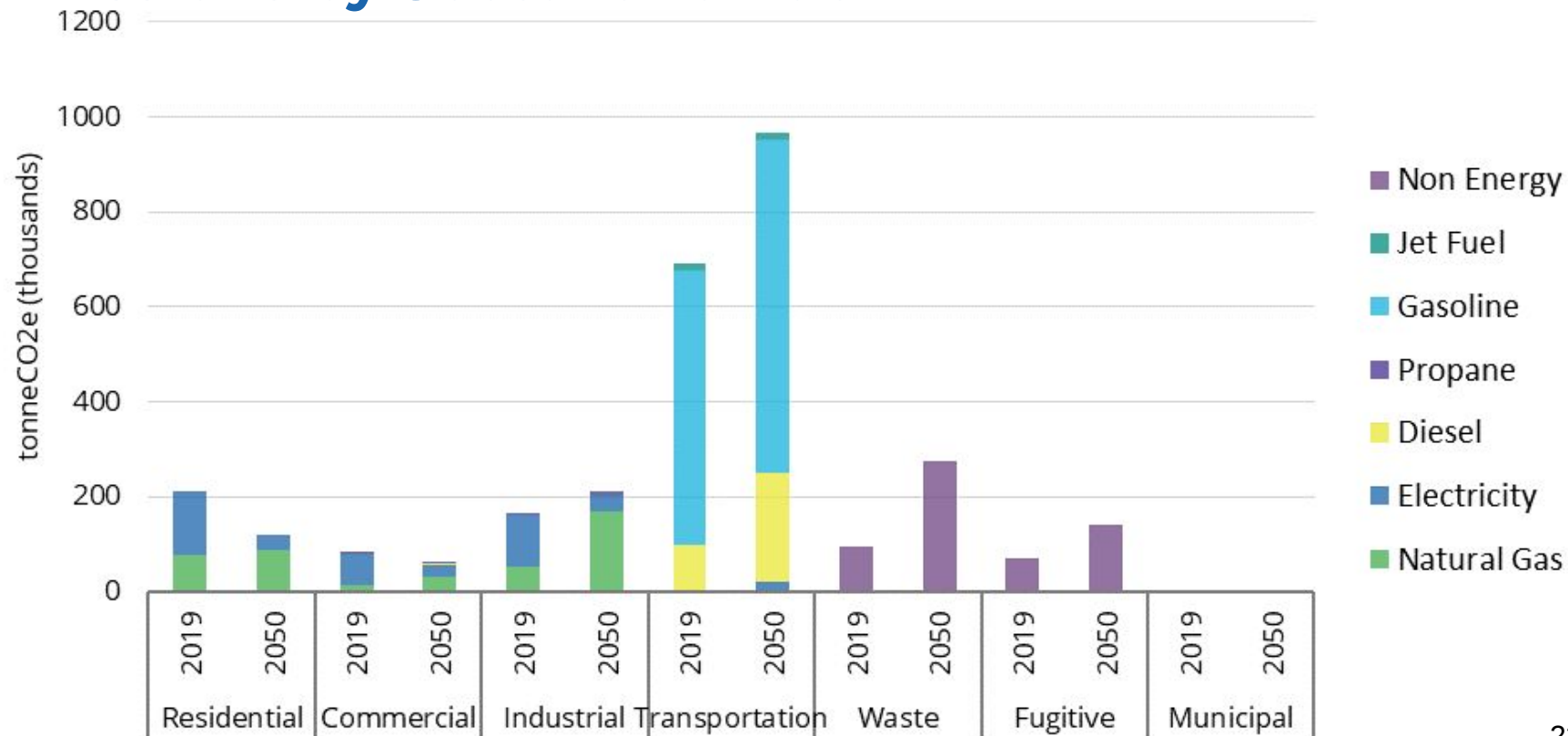
Business-as-Planned: Energy Use by Sector and Fuel



Business-as-Planned: Total Emissions by Fuel

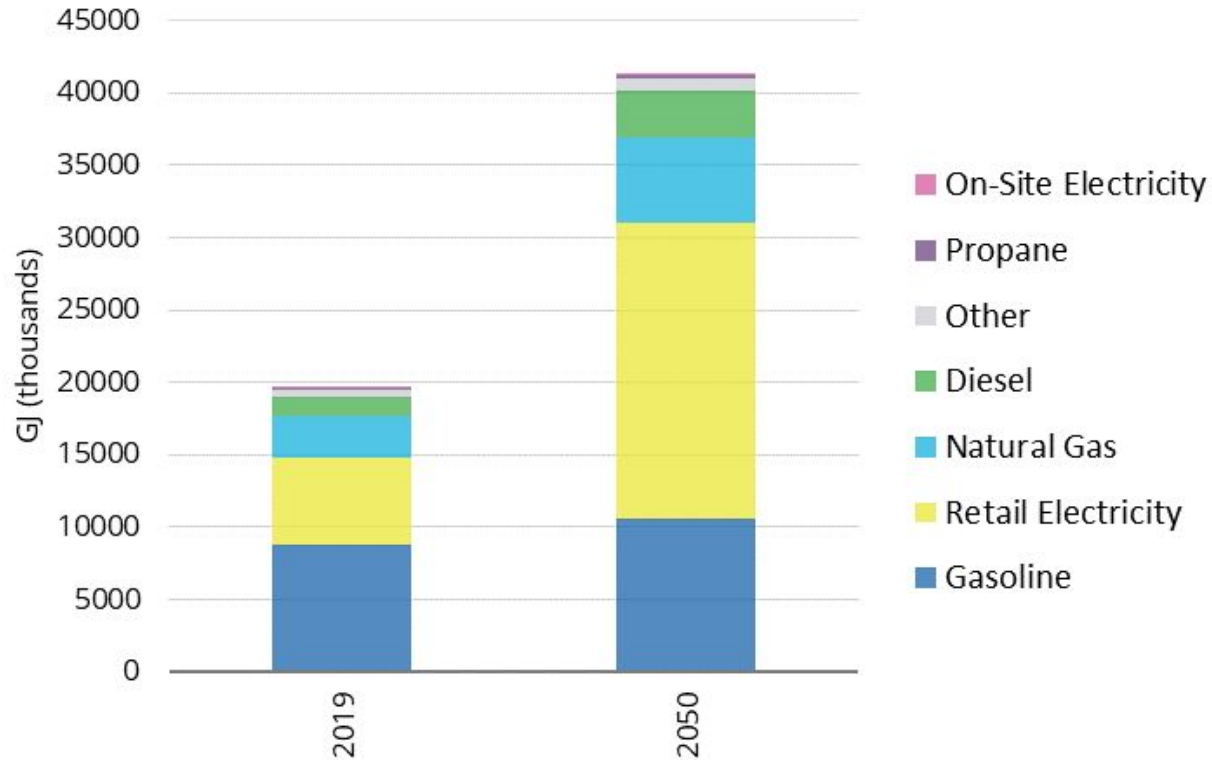


Business-as-Planned: Emissions by Sector and Fuel

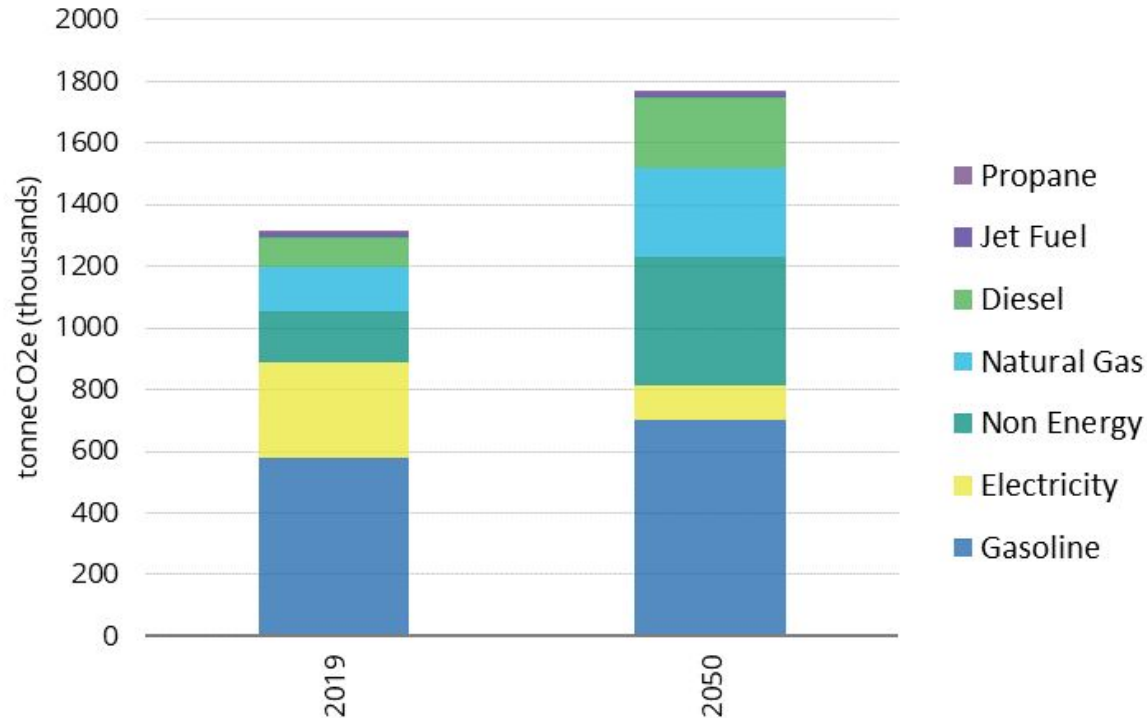


Significant Results

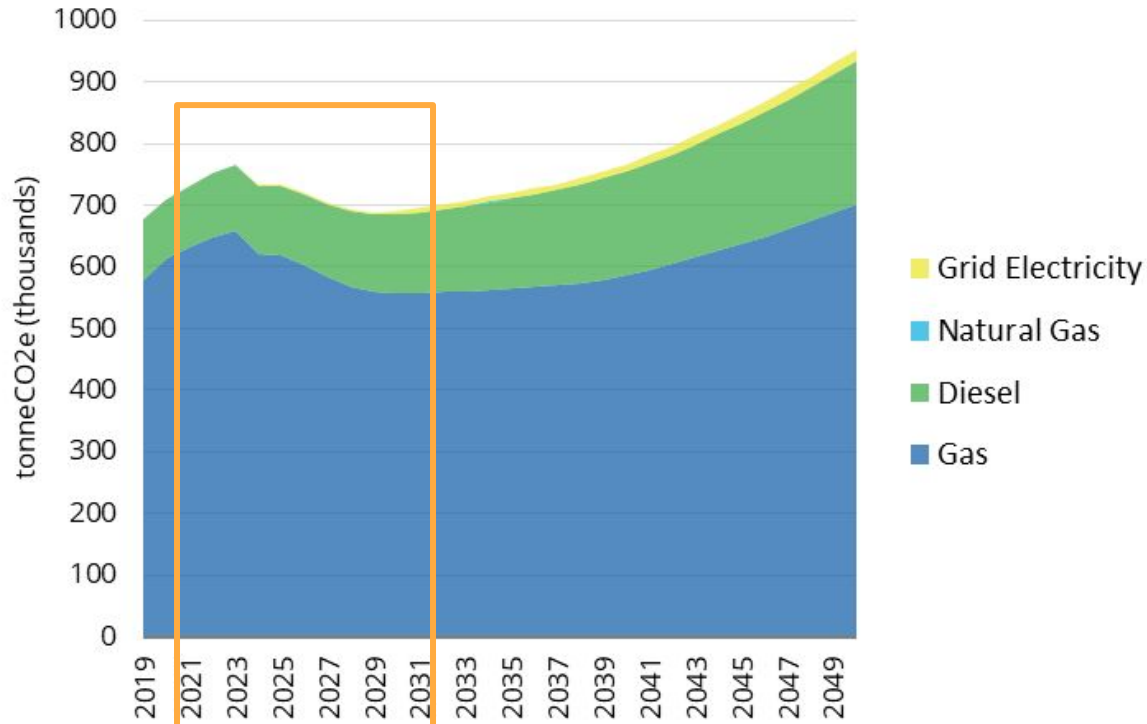
1. Electricity: From 31% to 50% of all energy used



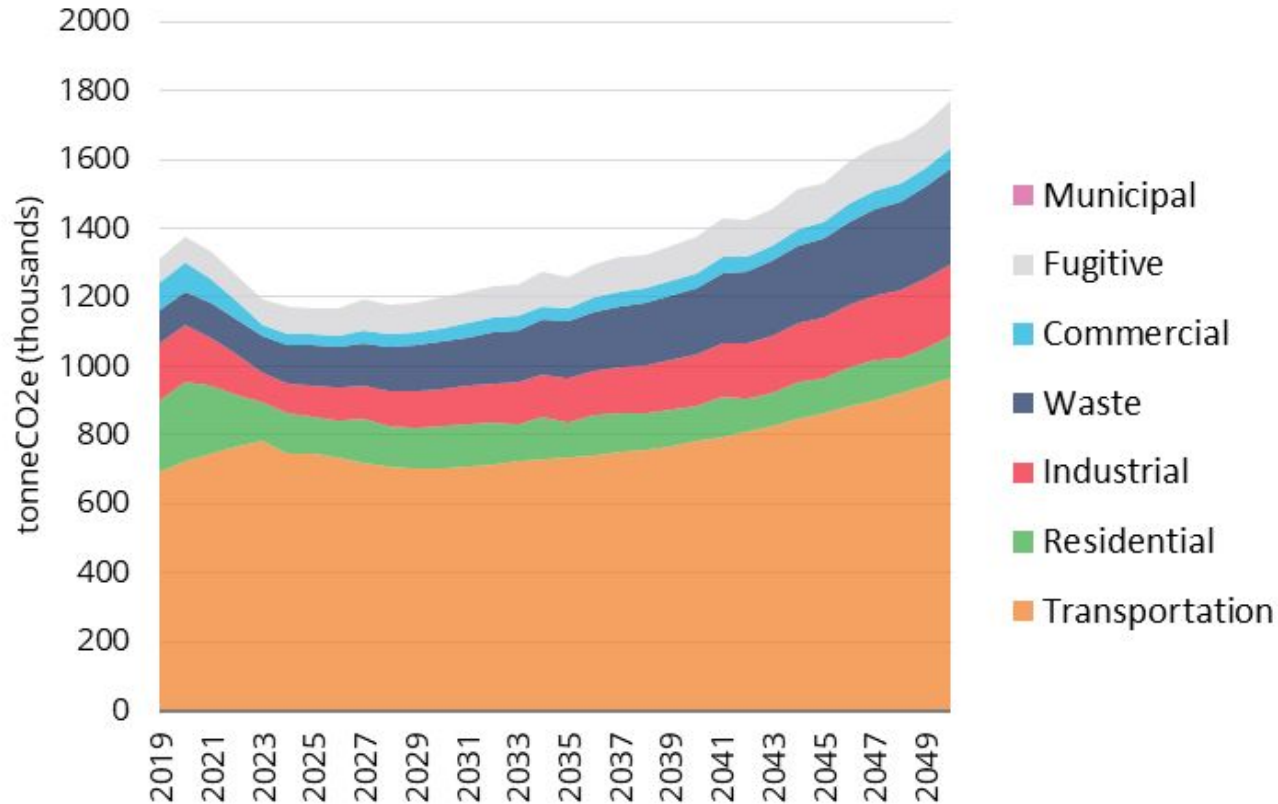
1. Electricity: from 24% to 6% of all emissions



2. Vehicles: Fuel efficiency improvements

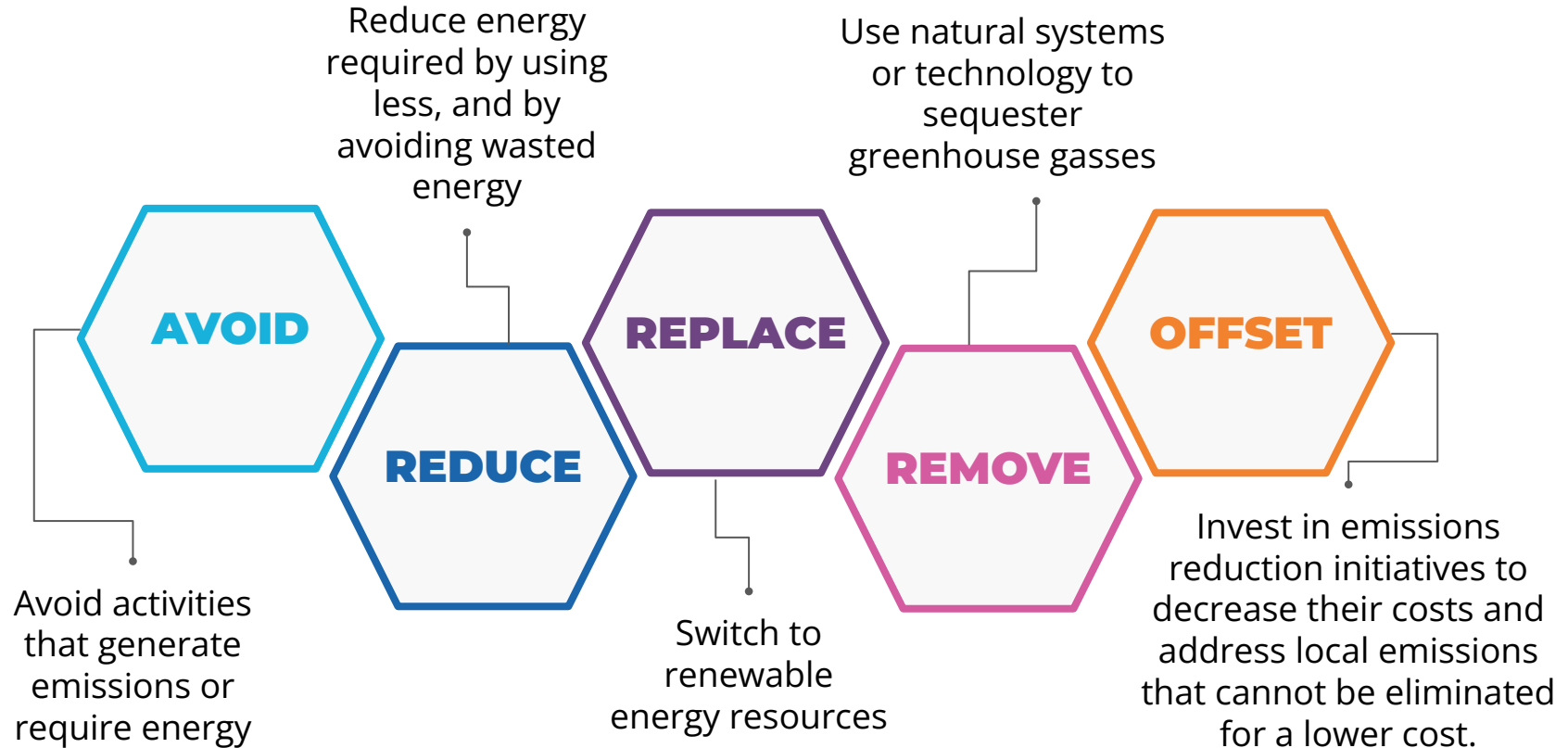


3. Transportation: Emissions continue to rise



Initial Low-Carbon Action Ideas

The Planning Philosophy



15-minute neighborhoods

- Increase opportunities for residents to meet their daily needs within a 20-minute roundtrip walk
- Co-benefits: physical and mental health, support local businesses, reduce air pollution



Low-carbon and healthy streets

- Low- or no-emissions zones
 - Ex., University campuses, Downtown, Master Planned Communities



- Slow / Healthy Streets

Low-carbon transportation

- Leverage Denton's location and existing economy to become a low-carbon transportation hub
 - Ex., EV and e-bike manufacturing
 - Low-carbon shipping and distribution
- Create a Bikes for Business program for in-town deliveries

Sources: Peterbilt, Bunch Bikes, Team London Bridge

ELECTRIC VEHICLES



Pickup & Delivery

Designed for driver comfort and productivity, the Model 220EV is ideal for pickup & delivery, regional haul and food & beverage applications. The 220EV provides customers with a clean, efficient operation and a range of up to 200 miles.



Renewable energy

- Add significantly more renewable energy and battery storage.
- Increases resilience to blackouts and extreme weather
- Projected large increase in energy consumption creates opportunities for local economic development around renewable energy.



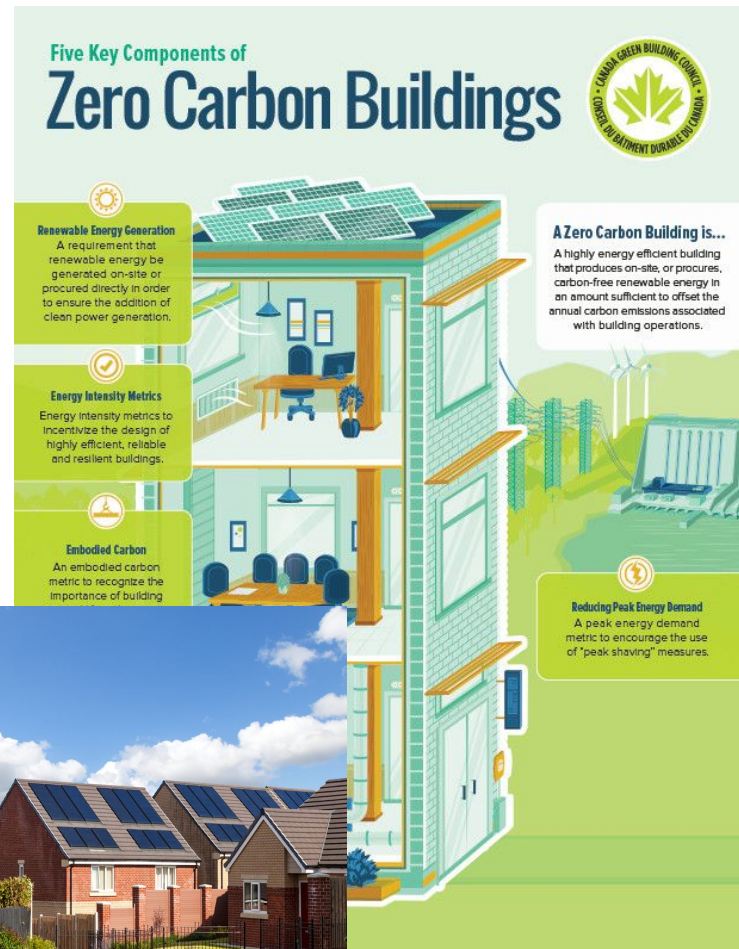
Sources: Blue Green Tomorrow,
Sunverge energy



Low-carbon buildings

- Green Building Standards for new construction
- Expand low income weatherization programs
- Increase incentives for heat pumps and efficient appliances
- Energy benchmarking programs for large commercial and multifamily buildings

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Reducing waste and wastewater emissions

- Educational campaigns to reduce food waste
- Residential and commercial compost collection
- Expand landfill gas to electricity production program
- Energy efficiency improvements at WWTP



Next Steps

Public Engagement Opportunities

Public Workshops

Crowdsourcing
Actions Survey

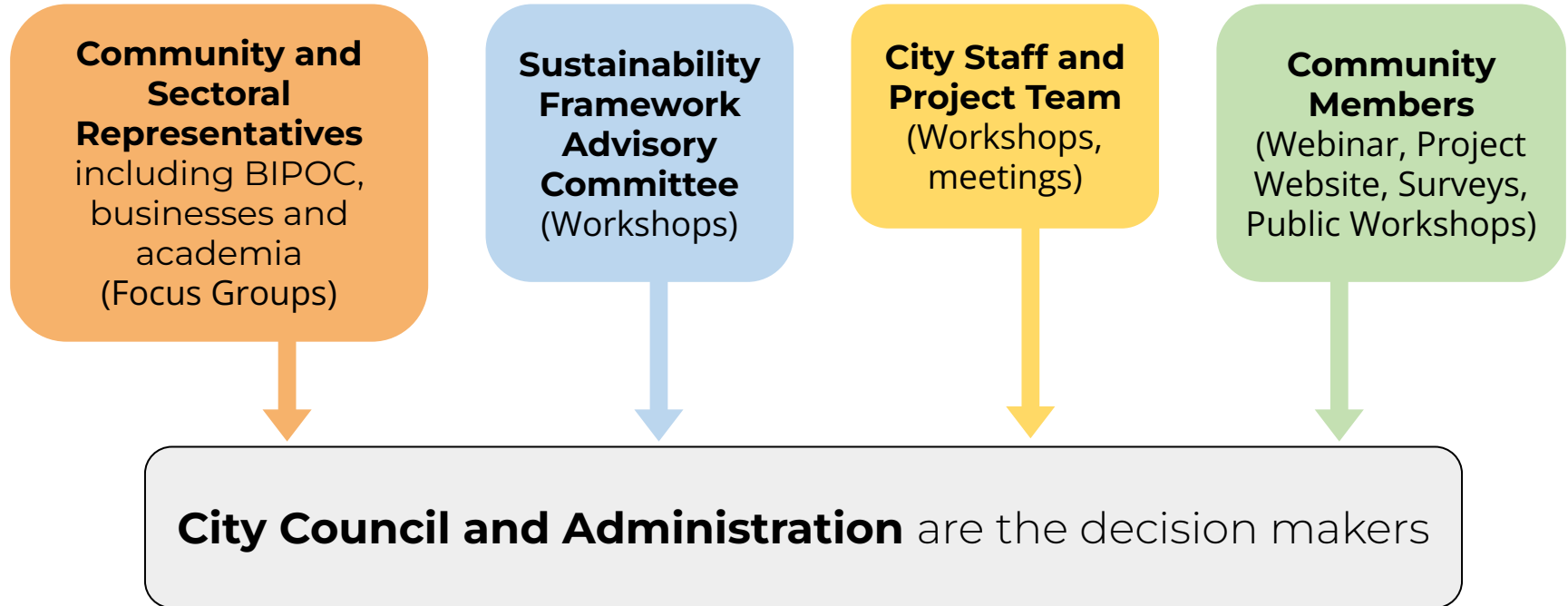


Meeting in a box/
Pop-up kiosks

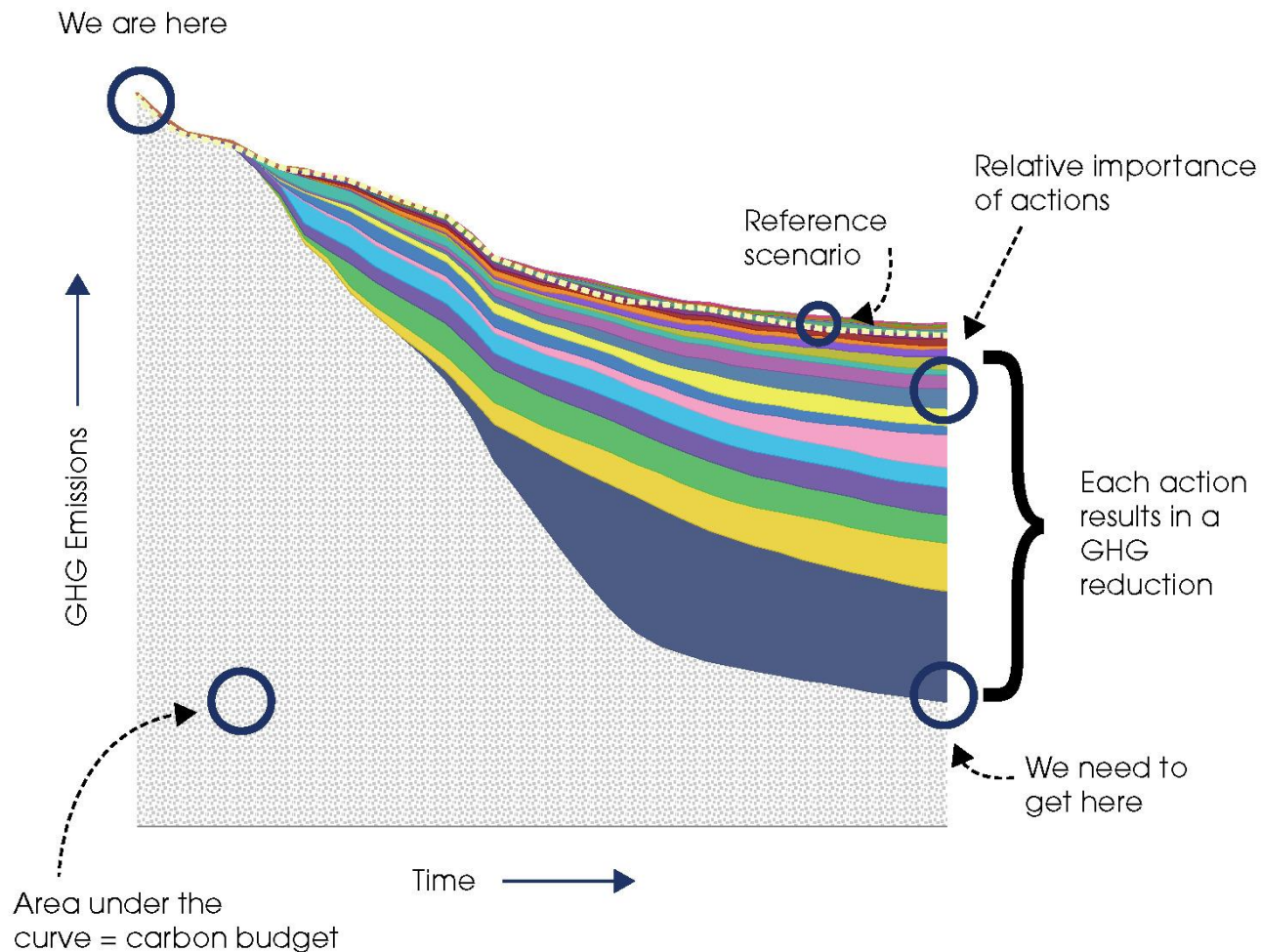
Focus Groups

sustainabledenton.com

Interested and Affected Parties

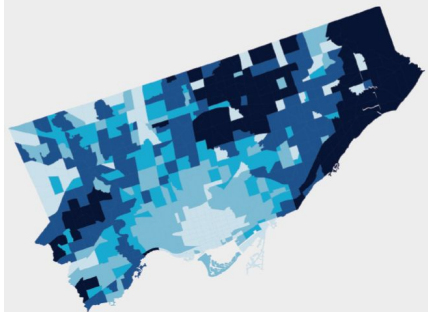


Anatomy of a Roadmap

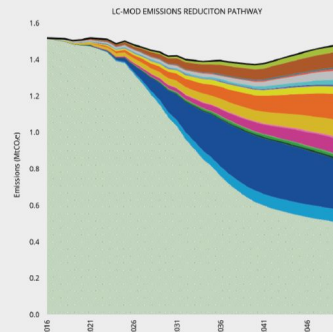


Outputs from the model

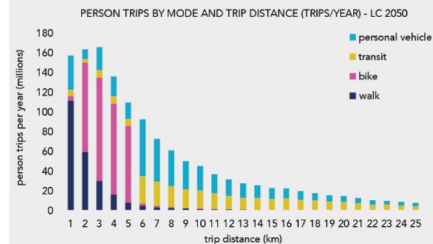
MAPS



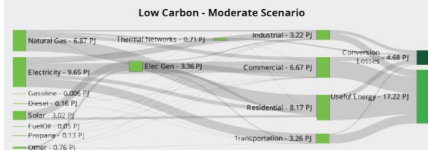
WEDGES



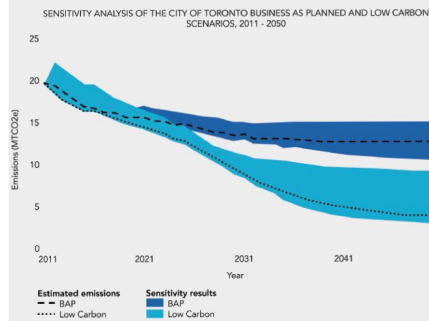
MODE SHARE



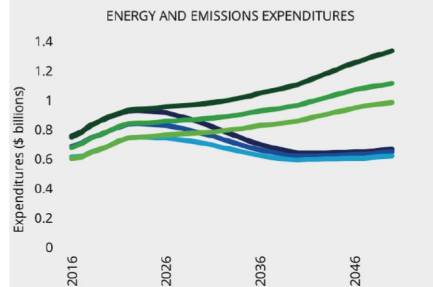
SANKEY



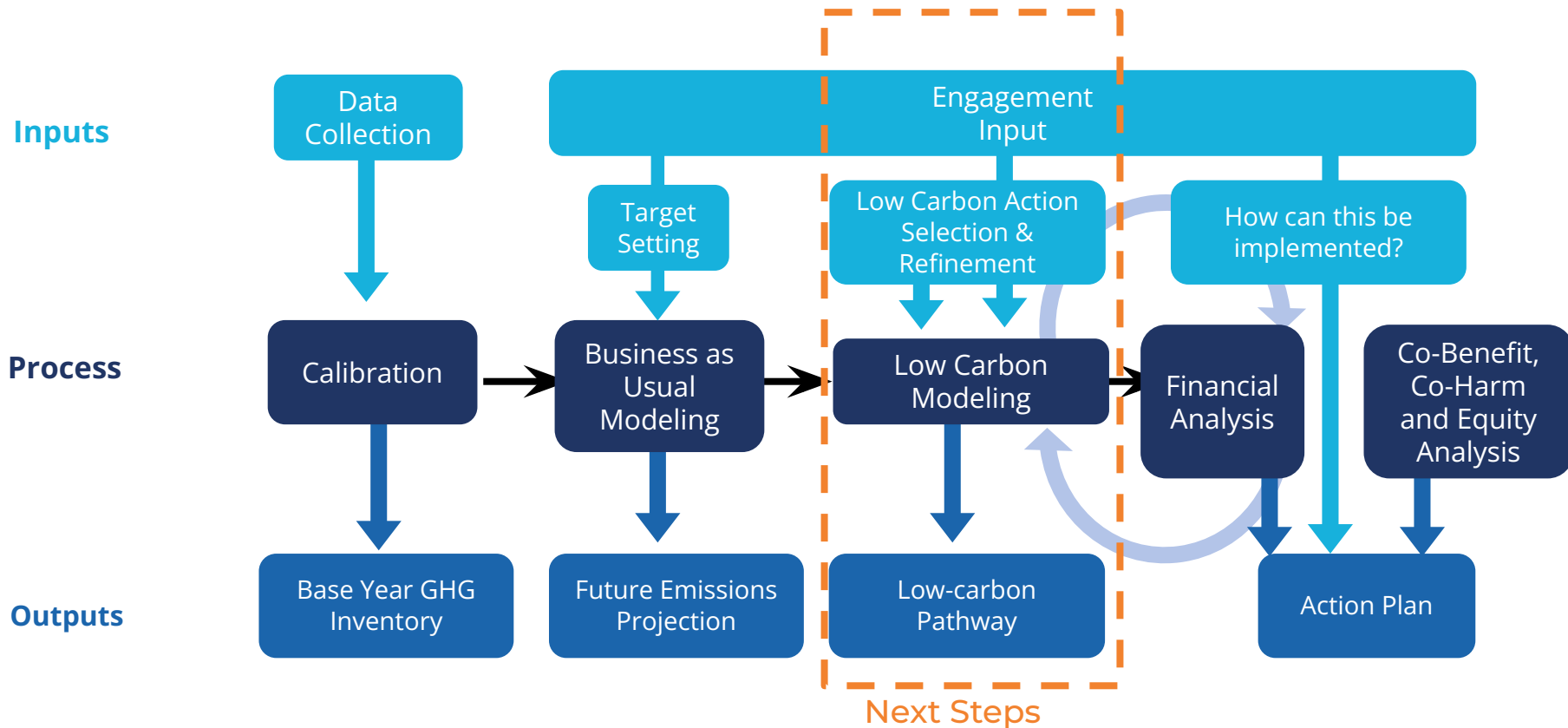
SENSITIVITY



FINANCE



Approach: Iterative Feedback + Analysis



Discussion



Thank you
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