Proposed Structure/Suggestions: A Case Study on Brookline's Climate Action Plan

POWER-D.CITY
DATA DRIVEN DECARBONIZATION

BU Earth & Environment

Dena Ciampa, Joey Ferrucci, Caleigh Ingram, Sarah Kaul, Makayla Neese

Introductions

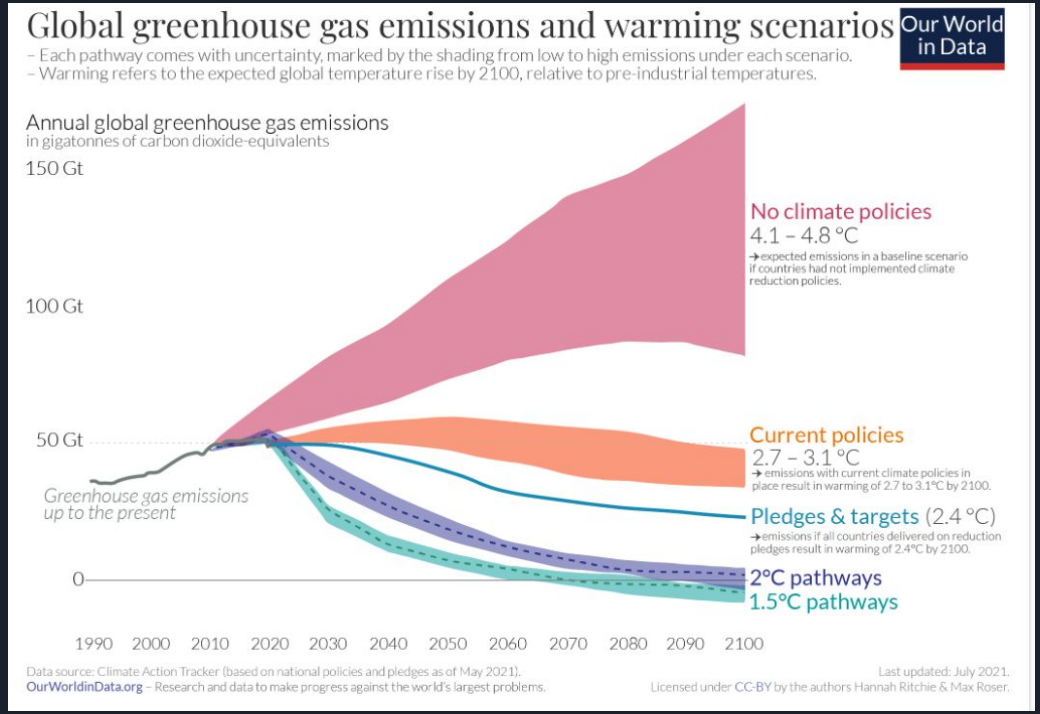
- Meet the team
- BU Earth & Environmental Department
  - Studying Environmental Analysis and Policy
  - Energy Fellows with POWER-D.city
  - Research for Environmental Agencies
  - & Organizations
- What interested us about the project

Outline

- Framing the Issue
- Climate Action Plan Overview - Other Towns
- Missing links: Data & Structure
- Proposed Structure
- Proposed Structure for GHG Inventory
- Emission Factors
- Example Calculation
- Closing Remarks

Framing the Issue

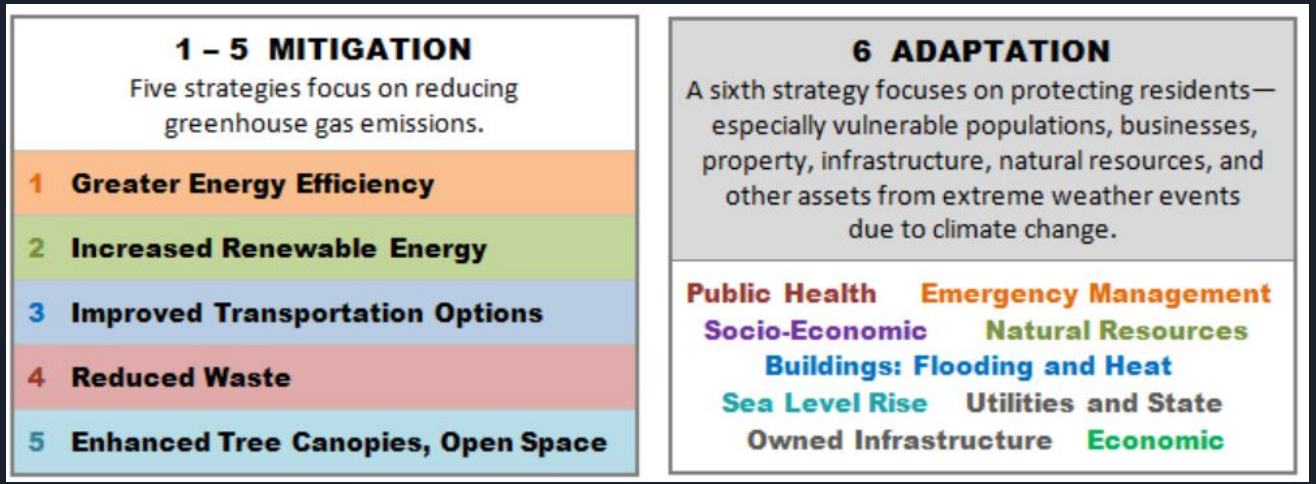
- Structure carbon emissions and inventory data
- Last semester:
  - 1. Energy usage data accessible
  - 2. Data analysis on energy use
  - 3. Modernize the grid



Hannah Ritchie and Max Roser, "CO_2 and Greenhouse Gas Emissions," *OurWorldInData.org*, last modified 2020, https://ourworldindata.org/future-emissions

Framing the Issue - Background

- Brookline's 2018 Climate Action Plan (CAP)
- Formulate a structure to track emissions



Brookline, "Climate Action Plan," *Brooklinema.gov*, last modified 2022, https://www.brooklinema.gov/702/Climate-Action-Plan.

CAP Overview — Other Towns

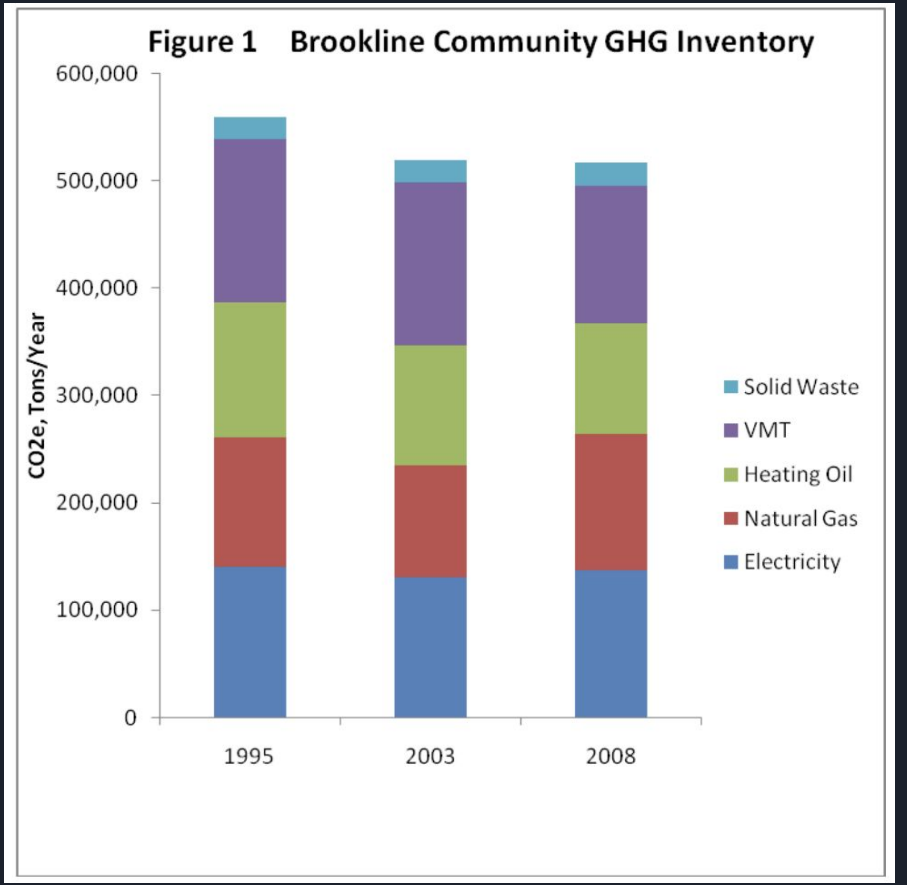
- Categories to consider when rewriting Brookline's CAP:
  - Population Size, Utility Type, Target Year, Baseline Comparison Year, Emissions Measurement Units, Ranking of Emitting Sectors, External Organizations

CAP Critiques:

Positives	Negatives
• Effective balance of visuals and information. • Well organized and easy to follow. • Includes an initial overview of the plan that is pleasing to read and gives a general view of the plan's goals. • Written with the public in mind. • Proposes attainable goals.	• Information dense and difficult to read. • Lack of background information. • Relying on outdated information to make predictions. • Written for individuals with environmental backgrounds and not geared for public consumption.

Missing Links: Data

- Frequently published, public data
- GHG Inventory
  - Last update was 2010
  - Division by source and sector
  - Understand changes to emissions in the town over time
- Completed actions
  - What CAP actions have been completed?
  - Qualitative and quantitative



https://www.brooklinema.gov/ArchiveCenter/ViewFile/Item/628

Missing Links: Structure

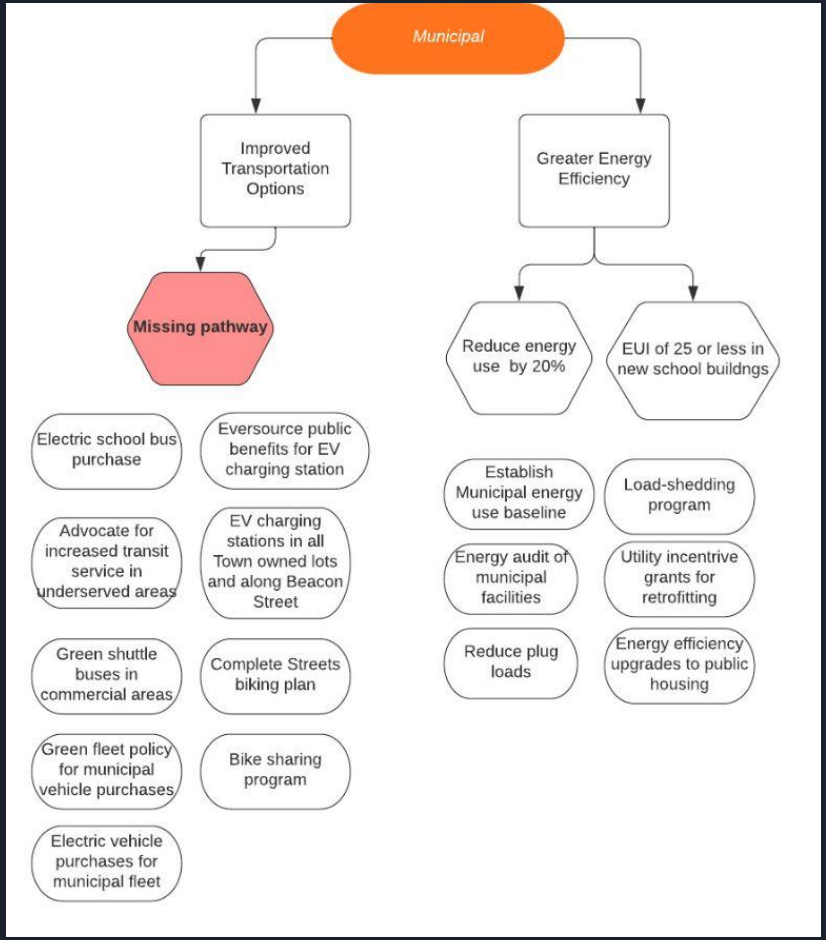
STRATEGY 2
INCREASED RENEWABLE ENERGY

GREENHOUSE GAS REDUCTIONS
X MMT CO_2e
Y % of Total Brookline GHG Reductions

STRATEGY 3
IMPROVED TRANSPORTATION OPTIONS

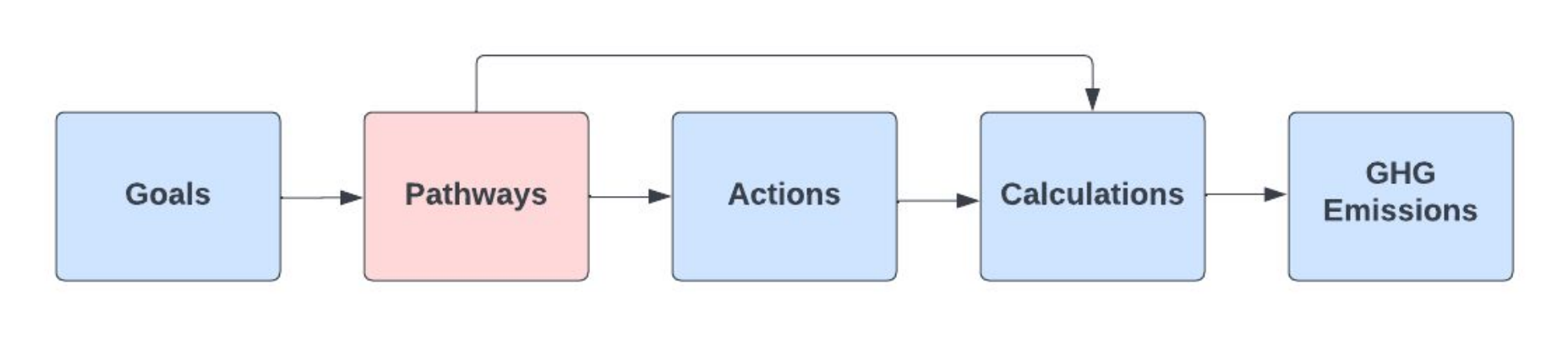
GREENHOUSE GAS REDUCTIONS
X MMT CO_2e
Y % of Total Brookline GHG Reductions

Current structure of pathways to goals

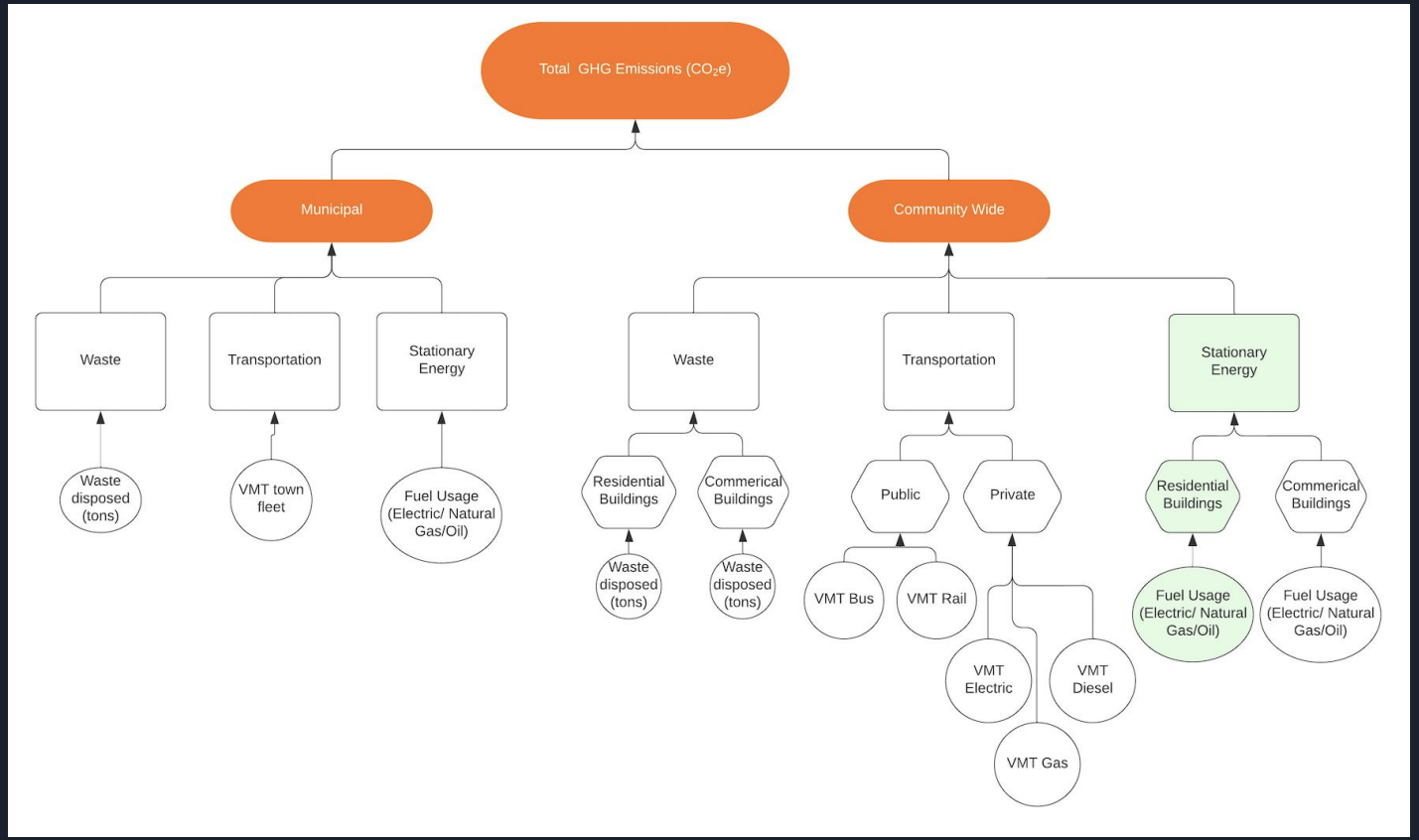


Current structure in relation to actions

Proposed Structure



Proposed Structure for GHG Inventory



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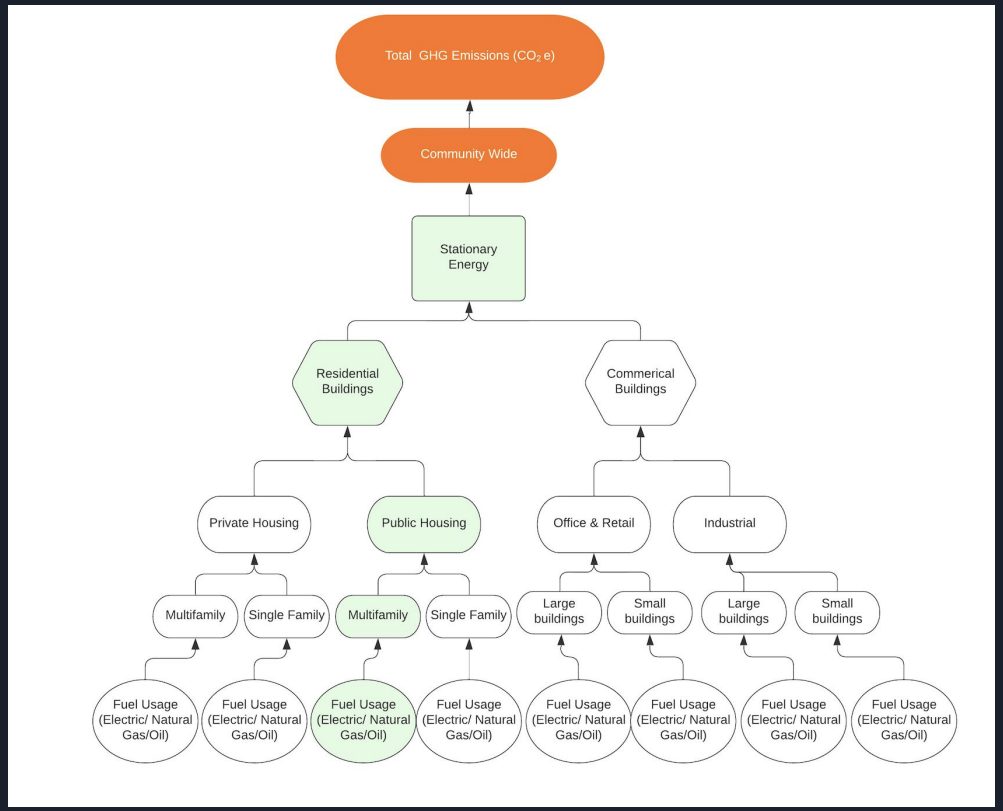

A closer look at stationary energy

Emission Factors

- Values that can be used to convert data collected from various activities into representative GHG emissions

- Allow GHG inventories to be measured in a singular representative GHG emissions unit (CO_2)
  - More easily quantifiable, digestible, and trackable

- Allow POWER-D.city to do calculations and allow towns/cities to more easily organize/analyze their data

ELECTRICITY	total output emission factors		non baseload emission factors
	co2 factor (lbs CO2/MWh)		co2 factor (lbs CO2/MWh)
eGRID Subregion	ICLEI (2005)	EPA (2019, 2021)	
AKGD	1232.36	1114.4	1333
AKMS	498.86	549.3	1520.2
AZNM	1311.05	952.3	1225.3
CAMX	948.28	453.2	964
ERCT	1324.35	868.6	1277.2
FRCC	1318.57	861	1029.5
HIMS	1514.92	1185.6	1549.5
HIOA	1811.98	1694.5	1704.1
MROE	1834.72	1502.6	1577.7
MROW	1821.84	1098.4	1806.8
NEWE	927.68	488.9	839.9
NWPP	902.24	715.2	1617.5
NYCW	815.45	553.8	1016.2
NYLI	1536.8	1209	1300.6
NYUP	720.8	232.2	890.2
PRMS	n/a	1537.3	1587.9
RFCE	1139.07	695	1237.9
RFCM	1563.28	1189.3	1766.9
RFCW	1537.82	1067.7	1831.6
RMPA	1883.08	1242.6	1578.8
SPNO	1960.94	1070	1958.6
SPSO	1658.14	1002	1543.7
SRMV	1019.74	806.8	1200.1

Example Calculation

User's end: asked to input…

- Quantifiable goal
  - Greater energy efficiency (X CO_2e, Y% by 2020)
- Quantifiable pathway
  - Reduce energy use in town buildings by 20% by 2020
- Quantifiable action (optional)
  - Reduce plug loads

- Start date and recorded pathway energy usage
- End date and recorded pathway energy usage

POWER-D.city's end:

Convert initial and current energy usage into CO_2e

↓

Calculate percentage of pathway reached

↓

Calculate pathway percentage towards goal reached

Closing Remarks

- Other communities CAPs
- Missing links
- Proposed structure
  - Emission factors
  - Calculations
- Data tracking and sharing

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Questions