

# Climate Pollution Reduction Plan: Public Workshop Series

Worcester Metro Area (MA-CT) -  
Community Engagement Workshop

Montachusett Region

February 16<sup>th</sup>, 2024

Leominster, MA

Montachusett Regional Planning Commission (MRPC) &  
Central Massachusetts Regional Planning Commission (CMRPC)



# Agenda

- ▶ Climate Pollution Reduction Plan Project Overview
- ▶ Project Team
- ▶ Definition of the Worcester, MA-CT Metro Area, & MRPG Region
- ▶ Climate Pollution vs. Air Pollution Overview
- ▶ Impact of Greenhouse Gases (GHGs) on Our Communities
- ▶ Overview of Air Pollution Emissions by 6 Major Sectors
- ▶ Next Steps for Tonight's Hybrid Workshop

# Climate Pollution Reduction Plan Project Overview

**CLIMATE  
POLLUTION  
REDUCTION  
GRANT**  
CMRPC-CPRG

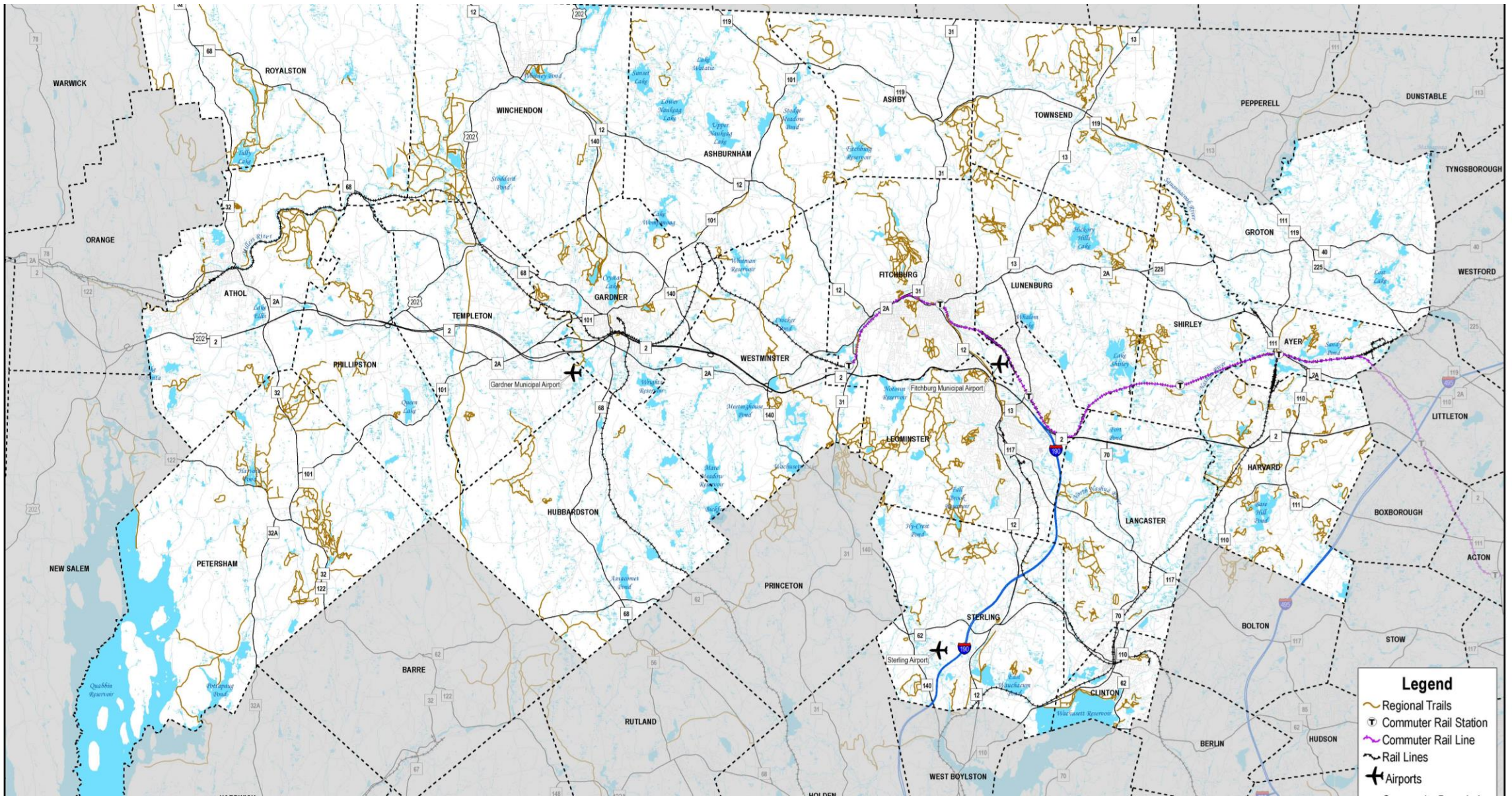
- ▶ Funded through the Inflation Reduction Act (IRA) & administered through the US Environmental Protection Agency (EPA)
  - ▶ *No local match requirement!*
- ▶ **Goal:** Develop short & long-term plans to reduce climate pollution across the Worcester, MA - Eastern CT region



# Project Team

- ▶ Central Massachusetts Regional Planning Commission (CMRPC) is leading the planning process
- ▶ Project Team
  - ▶ Montachusett Regional Planning Commission (MRPC) & the Northeastern Connecticut Council of Governments (NECCOG)
  - ▶ Steering Committee
  - ▶ Technical Advisory Committee
  - ▶ Modelling and GHG Emissions Analysis Consultant





# Air Pollution vs. Climate Pollution



# Climate Pollution vs. Air Pollution

## *Air pollution:*

- ▶ Contamination of the indoor or outdoor environment by **any chemical, physical or biological agent** that modifies the natural characteristics of the atmosphere (World Health Organization)



Pictured: Smog in Shanghai, China  
(National Geographic)



# Environmental Justice Issue

## Example Case Study: Joe's Junkyard Fire, Spencer, MA

- Tire fire in Spencer in 1986 at an old junkyard
  - Toxic smoke, fumes, ash
  - Contaminated soil and groundwater, threatening drinking water
- Located near a 55 years+ community
- Health effects:
  - High blood pressure
  - Brain, kidney and reproductive health issues

### Firemen Battling Spencer Fire

#### Piles of Tires Still Burning

By Mark E. Ellis  
Of the Regional Staff

SPENCER — Weary firefighters continued to pour water on some nagging tire fires late last night in late stages of what was a massive fire involving several hundred thousand tires at Joe's Junkyard off Northwest Road.

Fire Chief Robert W. Gagne said he expects some parts of the pile of tires to continue burning for another two days.

Much of the area that was burning earlier in the day was out by 11 p.m. But the northern edge of the tire dump, which has piles 10 feet deep, continued to burn, sending yellow flames and billows of smoke into the night.

Fresh fire crews were brought in throughout the evening.

#### Arson Suspected

Earlier in the day, a thick, black cloud stretched in a line across Central and Southeastern Massachusetts as an estimated three-quarters of a million burning tires spewed billows of pungent, acrid smoke into the air.

As many as 85 firefighters from a dozen communities, as well as numerous state and local environmental officials, were on the scene throughout the day.

According to Gagne, the blaze was reported about 3:30 a.m. at the junkyard. He said the preliminary determination was that the fire had probably been set.

The sprawling dump is north of Route 9 and off Route 31 near St. Joseph's Abbey land and the North Brookfield line and two miles from the center of town.

#### Air Quality Monitored

Efforts to battle the blaze included the use of two bulldozers and a payload to separate the tires into small piles, according to another Fire Department spokesman. By 4 p.m. yesterday, the fires were small and isolated and smoke had been reduced substantially, he said.

Edmond Benoit, deputy regional engineer for the state Department of Environmental Quality Engineering's Central Region, said monitoring was done throughout the day to determine whether the fire posed any threat to the health of area residents or to the environment. He said preliminary determinations were that there was no immediate danger.

Turn to ... BATTLING Page 19A



Acrid, black smoke billows from burning tires in Spencer junkyard.

Telegram Photo by ROB WEISMAN

### '... Nobody Wants Them'

SPENCER — The state Department of Environmental Quality Engineering was unable to enforce an order two years ago to remove old tires from Joe's Junkyard on Northwest Road, scene of yesterday's fire.

According to state and local officials, however, there was no way to enforce the order because there was nowhere to take the tires.

"There is really no industry with regard to potential reuse, and nobody wants them in their landfills," said Edmond Benoit of the DEQE yesterday. Benoit is the deputy regional engineer in the central district of DEQE's Air Quality and Hazardous Waste Materials Division.

The fire at the junkyard was reported at about 3:30 a.m. yesterday and was battled throughout the day by as many as 85 firefighters from 12 communities. A number of DEQE officials were at the scene monitoring smoke content and runoff water for contaminants.

Officials feared, Benoit said, that the large oil content of the tires could endanger the health of area residents or the local environment. He said each car tire contains about three quarts of oil while truck tires

contain at least five quarts of oil, he said.

As it turned out, early reports from the DEQE offered assurances that the potential health and environmental problems were not materializing. However, there was still a chance last night that they could yet become a reality.

Benoit admitted that all of the fear and the hours of work spent by hundreds of people at the fire could have been avoided if the tires had been moved earlier. Because they could not be moved, all other possi-

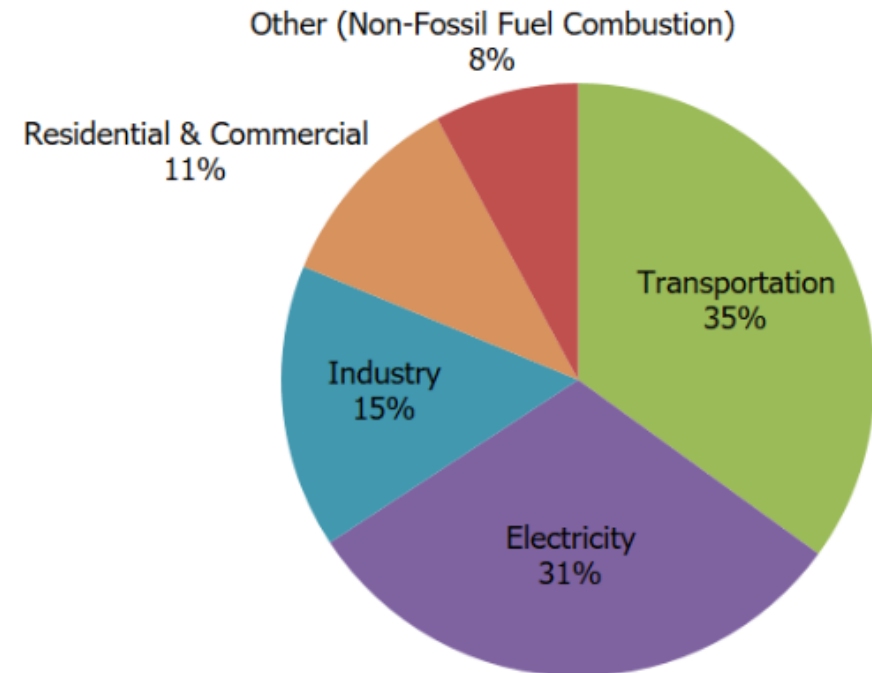
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# Climate Pollution vs. Air Pollution

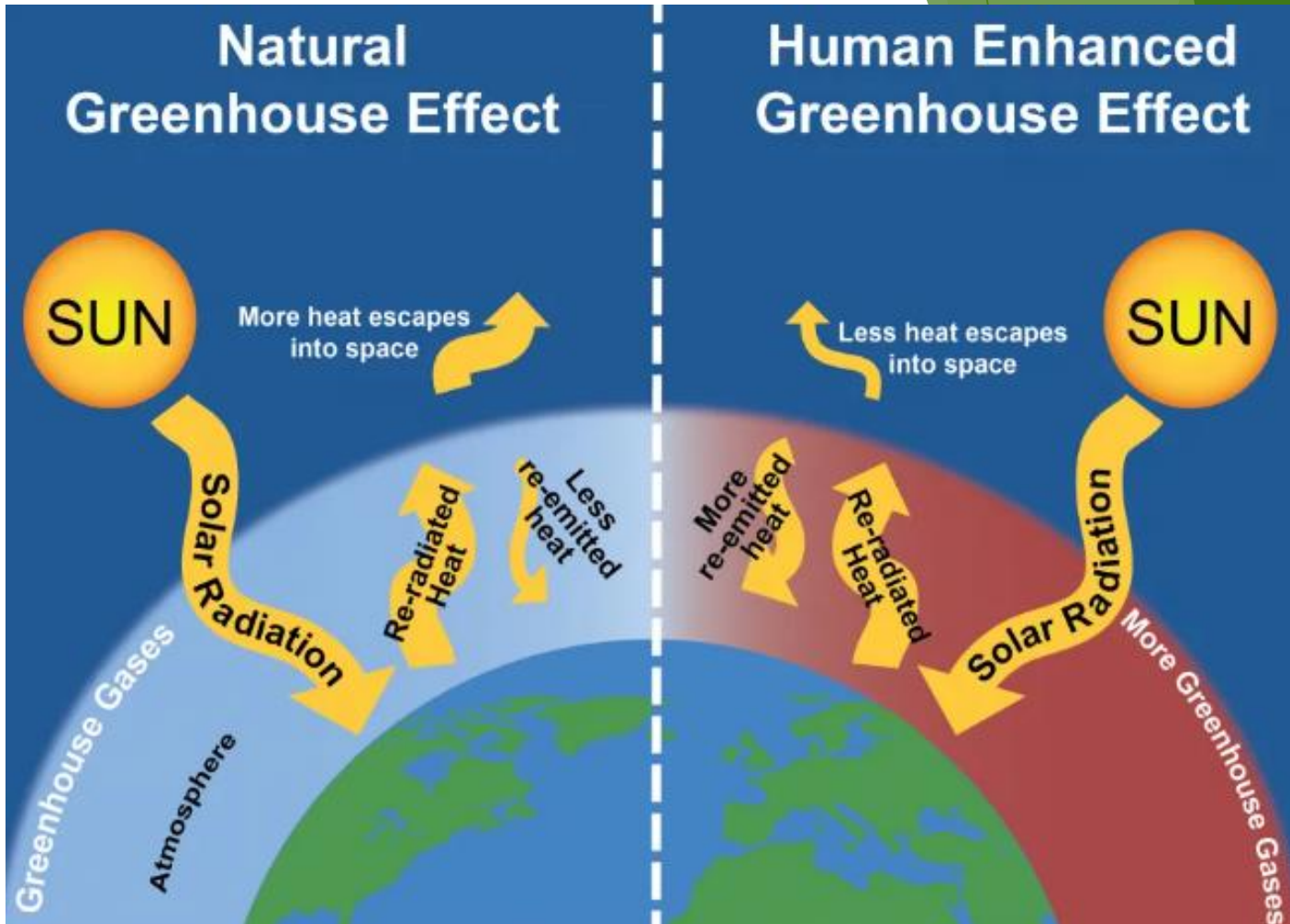
*Climate pollution:*

- ▶ Adding large amounts of **greenhouse gases (GHGs)** into the Earth's atmosphere, resulting in direct impacts to earth's climate (i.e. warming)
- ▶ Not all air pollutants have a warming effect like GHGs do

## U.S. Carbon Dioxide Emissions, by Economic Sector



Source: EPA



# What are Greenhouse Gases?

- ▶ GHGs: gases that trap heat in earth's atmosphere
  - ▶ Carbon dioxide (CO<sub>2</sub>) (most abundant)
  - ▶ Methane (CH<sub>4</sub>) (most potent)
  - ▶ Nitrous oxide (N<sub>2</sub>O) (longest lasting)
- ▶ Humans are emitting GHGs into the atmosphere through combustion of fossil fuels

# How does this Impact us?



A collage of typical climate and weather-related events: floods, heatwaves, drought, hurricanes, wildfires and loss of glacial ice. (Image credit: NOAA)





Image: J. Legros



Image: J. Legros



Image: J. Legros



Image: J. Legros

# Leominster, MA 9/11/24: Catastrophic Flood Event



Image: Chris Christo, Boston Herald



Image: J. Legros



Image: Gary Fournier

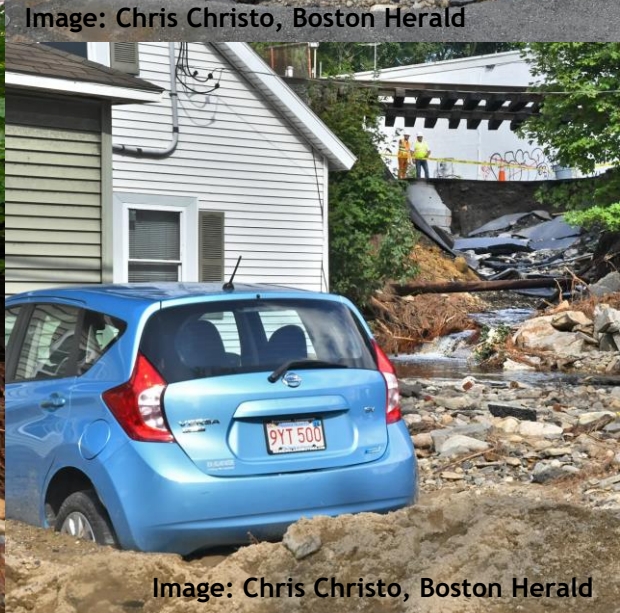


Image: Chris Christo, Boston Herald

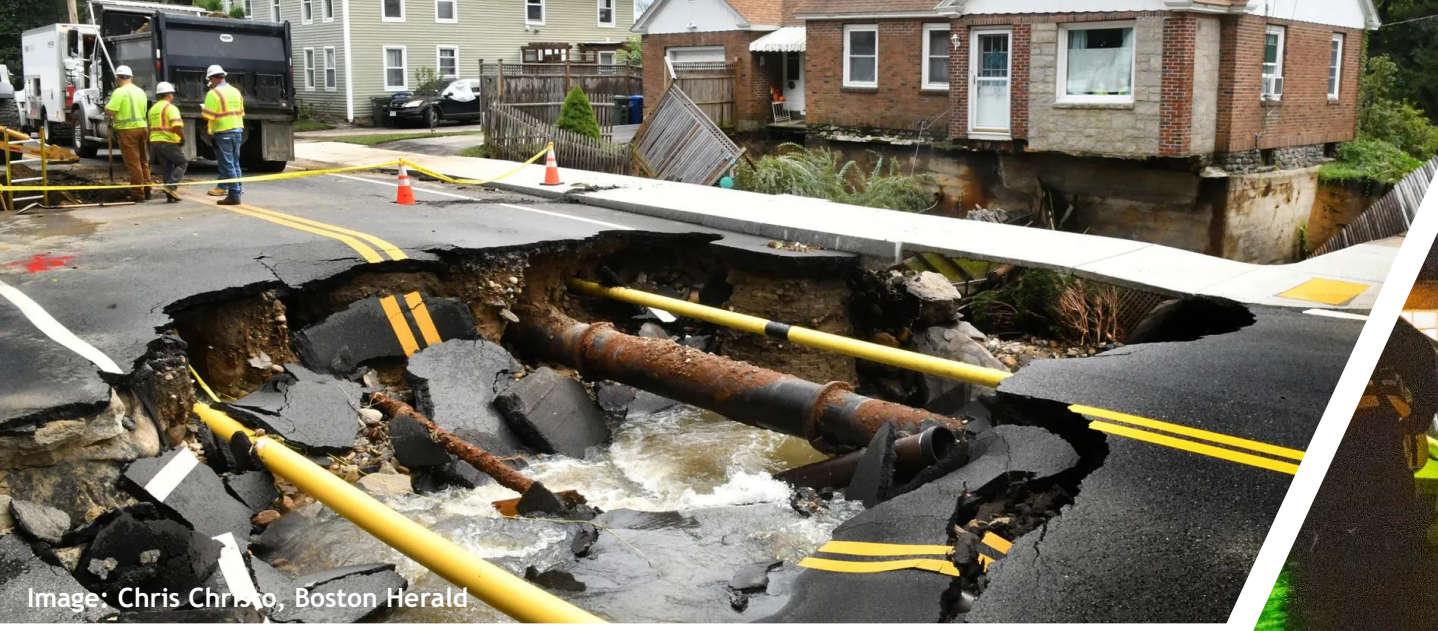


Image: Chris Christo, Boston Herald



Image: Rick Cinclair, Worcester Telegram & Gazette via AP



Image: Chris Christo, Boston Herald



Image: Chris Christo, Boston Herald

# Reducing Greenhouse Gas Pollution by Sector



# Six Main Air Polluting Sectors

1) *Transportation*



4) *Commercial and Residential Buildings*



2) *Electricity*



5) *Waste Management*



3) *Industry*



6) *Agriculture / Natural and Working Lands*





# Group Discussion!

- ▶ Tell us your priorities for each major climate polluting sector
  - ▶ Please feel free to be imaginative!
  - ▶ Municipalities will be eligible to apply for funds from a federal pool of \$4.6 billion



# ELECTRICITY AND CLIMATE POLLUTION



## WHAT IS THE PROBLEM?

- Electricity sector produced 25% of total United States GHG emissions (2021)
  - Second largest contributor
- Only ~20% of U.S. electricity generation comes from renewable sources (i.e. wind, solar, biomass)
- Inefficiencies of transmission & distribution of electricity can cause excess air pollution



**20%** Of all Massachusetts GHG emissions come from the electricity sector.

(MA Clean Energy and Climate Plan 2020)



## WHAT ARE COMMON IMPACTS?

### IMPACTS ON LAND AND NATURAL RESOURCES



- Toxic waste brought onto land from drilling operations can pollute land & drinking water
- Land erosion impacts
- Hazardous waste byproducts (i.e. heavy metals) can contaminate soil & groundwater

### HEALTH IMPACTS



- Air pollution coming from the burning of natural gas to power electricity can cause:
  - Asthma
  - Cardiovascular disease
  - Premature death

### Electricity Emissions in MRPC Region

Town	MT CO2 Emitted from Residential Electricity Transport & Delivery
Ashburnham	103.19
Ashby	25.25
Athol	393.07
Ayer	1,030.91
Clinton	890.70
Fitchburg	1,675.95
Gardner	881.40
Groton	289.03
Harvard	71.15
Hubbardston	30.50
Lancaster	218.85
Leominster	3,643.47
Lunenburg	170.79
Petersham	13.21
Phillipston	13.86
Royalston	5.70
Shirley	454.10
Sterling	215.85
Templeton	236.87
Townsend	424.50
Westminster	500.56
Winchendon	145.70
<b>Total</b>	<b>11,434.61</b>

## GENERAL GOALS AND STRATEGIES TO CONSIDER FOR THE ELECTRICITY SECTOR

1

SCALE UP FUEL-SWITCHING EFFORTS THAT RESULT IN LESS CO2 EMISSIONS

2

INCREASE THE EFFICIENCY OF AND/OR DECOMMISSION EXISTING FOSSIL FUEL-FIRED POWER PLANTS

3

REDUCE OVERALL ELECTRICITY USE AND PEAK DEMAND

4

SCALE UP ENERGY TRANSMISSION INFRASTRUCTURE/ GRID CONNECTIONS



# AGRICULTURE, NATURAL & WORKING LANDS AND CLIMATE POLLUTION

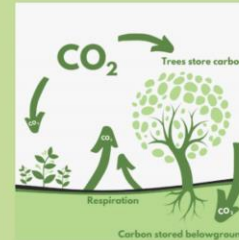


## WHAT IS THE PROBLEM?

- Agriculture industry was responsible for **10% of U.S. GHG emissions** in 2021 (EPA)
- Certain **soil management**: Applying synthetic & organic fertilizers causes nitrous oxide emissions
- **Livestock** (i.e. cattle): Release methane as part of their normal digestion process (their burps and manure!)

## NATURAL LANDS CAN HELP SEQUESTER CARBON!

Massachusetts natural and working lands currently store at least 0.6 gigatons of carbon, **equivalent to the past 25 years of CO2 emissions!**



Graphic: NJ DEP

## WHAT ARE COMMON IMPACTS?

### ECONOMY IMPACTS



- Climate pollution can create sudden changes in rainfall and temperature
  - Risk of crop loss from extreme rain, frosts, droughts
  - Dependency on fertilizers leads to higher food costs for producers and consumers

### WATER POLLUTION & HABITAT DISRUPTION



- Polluted runoff and increased temperatures can cause **hypoxia**
  - Aquatic fish populations are increasing risk of dying off
  - **Algal blooms** can contaminate water sources and cause illness for animals & humans
  - Habitat disruption impacts

### NWL Carbon Sequestration in MRPC Region

Town	Metric Tons of Carbon Dioxide Captured
Ashburnham	36,440
Ashby	24,828
Athol	30,400
Ayer	7,666
Clinton	4,728
Fitchburg	22,051
Gardner	20,569
Groton	33,363
Harvard	23,941
Hubbardston	40,923
Lancaster	25,859
Leominster	25,024
Lunenburg	23,215
Petersham	55,861
Phillipston	25,048
Royalston	41,650
Shirley	16,261
Sterling	31,676
Templeton	29,913
Townsend	34,427
Westminster	30,912
Winchendon	40,569
<b>Total</b>	<b>625,324</b>

## GENERAL GOALS TO CONSIDER FOR THE AGRICULTURE NATURAL AND WORKING LANDS SECTOR

- 1 INCREASE CARBON SEQUESTRATION CAPACITY**
- 2 REDUCE/ DISINCENTIVIZE LAND CLEARING & PERMANENTLY PROTECT LAND AND WATER**
- 3 SCALE UP SUSTAINABLE LAND USE PRACTICES**
- 4 IMPROVE LIVESTOCK AND MANURE MANAGEMENT**



# COMMERCIAL, RESIDENTIAL BUILDINGS & CLIMATE POLLUTION



## WHAT IS THE PROBLEM?

- **Direct emissions**
  - Combustion of natural gas & petroleum for heating and cooking emits **carbon dioxide, methane & nitrous oxide**
- **Indirect emissions**
  - Includes electricity that is generated offsite to power homes and businesses
- Commercial & residential buildings were responsible for 30% of end-use electricity consumption in the U.S. (2021)

Residential units in the MRPC Region are emitting...

**393,915 Metric Tons of Carbon Dioxide Annually**

Commercial buildings in Worcester County are emitting...

**184,055 Metric Tons of Carbon Dioxide Annually**

According to the CMRPC's Priority Climate Action Plan (PCAP) GHG Inventory

## WHAT ARE COMMON EFFECTS?

### POOR AIR QUALITY



- Air pollution may cause premature death and illnesses such as asthma, lung cancer, heart disease and stroke (American Lung Association)

### HIGH ENERGY COSTS FOR CONSUMERS



- Energy costs can present financial hardships for households, creating **energy burdens** such as:
  - High-interest short-term loans to pay their energy bills
  - Sudden disconnection of utilities

### CONSTRUCTION IMPACTS ON NATURAL RESOURCES



- Construction, clearing, and excavation may cause biodiversity loss
- Artificial light and noise pollution can disrupt **natural human rhythms and systems**

About **75%** of commercial square footage in Massachusetts is heated with..



Natural Gas



Electricity



Petroleum



Direct Steam Systems

## GENERAL GOALS TO CONSIDER FOR THE BUILDINGS SECTOR

1

**POWER COMMERCIAL AND RESIDENTIAL BUILDINGS WITH RENEWABLY SOURCED ELECTRICITY**

2

**REDUCE ENERGY USE VIA ENHANCED ENERGY EFFICIENCY MEASURES**

3

**PROMOTE PASSIVE HEATING AND COOLING MEASURES THROUGH BUILDING DESIGN**

4

**IMPROVE DRINKING & WASTEWATER, AND WASTE MANAGEMENT EFFICIENCY**

<https://www.epa.gov/ghgemissions>

[www.usgbc.org](http://www.usgbc.org)



# INDUSTRY AND CLIMATE POLLUTION



## WHAT IS THE PROBLEM?

Large industrial facilities in MA emitted nearly **10.5 million metric tons of CO2** into the atmosphere (2022)

- 5% of total GHG emissions in MA
- Emissions came from power plants, waste management facilities, and petroleum & natural gas system leaks

Clean Energy Employment Sector Statistics: Central Massachusetts 2020-2021

Label	Employment (# of people)	Businesses (# of businesses)
2020 Report	18,344	1,111
2021 Report	16,370	1,099
2020-2021 Report Change	-10.8%	-1.1%
2021 % of MA Clean Energy Total	16.2%	15.5%
2021 % of Total Jobs/Businesses in Central MA	5.0%	4.1%

Source: MA 2022 Clean Energy & Climate Plan

## WHAT ARE COMMON EFFECTS?

### HEALTH IMPACTS



- Vulnerable neighborhoods can be disproportionately exposed to **smog**
  - Poor air quality can lead to higher rates of asthma, cancer & cardiovascular disease

### DEPLETION OF RAW MATERIALS



- Permanent impacts on ecosystems & biodiversity
  - i.e. excessive logging & clear-cutting reduces forest cover and natural carbon sequestration systems

### ECOSYSTEM IMPACTS



- Hazardous waste byproducts decrease soil and water quality
- Risk of alteration of aquatic **habitat structures** due to debris build-up in the environment

Industrial buildings in Worcester County are emitting...

13,594 Metric Tons of Carbon Dioxide Annually

According to the CMRPC's Priority Climate Action Plan (PCAP) GHG Inventory

## GENERAL GOALS TO CONSIDER FOR THE INDUSTRY SECTOR

1

UPGRADE INDUSTRIAL FACILITIES USING ENERGY EFFICIENT INDUSTRIAL TECHNOLOGIES

2

CHANGE INDUSTRY REGULATIONS & PROMOTE PROGRAMS TO PRODUCE GOODS FROM RECYCLED/RENEWABLE MATERIALS

3

RAISE AWARENESS ABOUT/ INCREASE TRAINING FOR PREVENTION OF EMISSION LEAKS FROM INDUSTRIAL EQUIPMENT

4

SCALE UP FUEL SWITCHING EFFORTS THAT RESULT IN LESS CO2 EMISSIONS

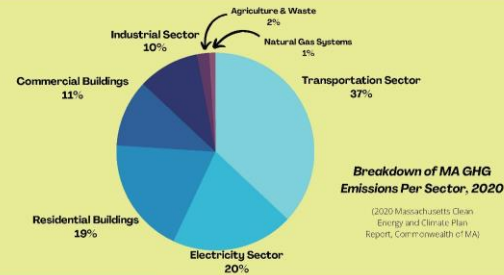


# TRANSPORTATION AND CLIMATE POLLUTION



## WHAT IS THE PROBLEM?

- **Excess carbon dioxide** from the combustion of petroleum-based products (gas, diesel) in internal combustion engines
- **Methane & nitrous oxide** are emitted during fuel combustion
- Another byproduct, **particulate matter** (i.e. smoke, soot, dirt), leads to smog when mixed with atmospheric pollutants



## WHAT ARE COMMON IMPACTS?

### DISTURBED NEIGHBORHOODS



- Transportation infrastructure projects displace and isolate low-income & minority residents
  - These groups are more likely to live near areas where air pollution from transportation is abundant

### HEALTH IMPLICATIONS



- Poor air quality can lead to higher rates of **asthma, cancer & cardiovascular disease**
- The American Lung Cancer Association estimates 90,000 premature deaths could be prevented by 2050 if gasoline powered vehicles disappeared from roads by 2035

### NATURAL HABITAT IMPACTS



- Degradation & fragmentation of natural habitats
- Animal communication, mating behavior, foraging behavior, and spatial orientation are all impacted

## Emissions from Passenger Vehicles in MRPC Region (CMRPC PCAP GHG Inventory)

Town	Gasoline Miles Traveled	Metric Tons CO2 Emitted
Ashburnham	64,081,550	26,387
Ashby	32,090,335	13,393
Athol	100,226,547	40,729
Ayer	73,422,079	29,022
Clinton	119,836,966	47,092
Fitchburg	272,086,920	108,479
Gardner	155,767,891	61,835
Groton	102,363,977	41,503
Harvard	51,007,503	21,096
Hubbardston	48,518,593	19,774
Lancaster	61,744,898	24,725
Leominster	327,497,391	128,584
Lunenburg	104,049,807	42,475
Petersham	13,822,997	5,640
Phillipston	20,731,334	8,456
Royalston	14,004,432	5,953
Shirley	55,377,588	22,291
Sterling	79,793	32,675
Templeton	81,855,416	33,037
Townsend	93,217,459	37,855
Westminster	81,514,171	33,406
Winchendon	96,197,216	39,395
<b>Total</b>	<b>2,049,154,441</b>	<b>823,802</b>

## GENERAL GOALS TO CONSIDER FOR THE TRANSPORTATION SECTOR

1

REDUCE VEHICLE TRAVEL DEMAND IMPROVE TRANSPORTATION MOBILITY

2

IMPROVE OVERALL FUEL EFFICIENCY

3

ELECTRIFY PERSONAL TRANSPORTATION NETWORKS + SCALE UP FUEL SWITCHING EFFORTS

4

IMPROVE OPERATIONAL EFFICIENCY OF FREIGHT AND FLEET



# WASTE, MATERIALS MANAGEMENT & CLIMATE POLLUTION



## WHAT IS THE PROBLEM?

- Landfills are the third-largest contributor of human-related methane emissions, accounting for **14.3%** of U.S. methane emissions (2021)
- Methane is 28x more effective at trapping heat in the atmosphere than carbon dioxide
- Treatment of wastewater also emits methane & nitrous oxide

Top Materials in Massachusetts' Trash by Weight (MassDEP, 2019)



## WHAT ARE COMMON EFFECTS?

### WATER SUPPLY EFFECTS



- Overall decrease in the availability of freshwater
- Improperly disposed garbage can break down and pollute local groundwater sources

### BIODIVERSITY AND NATURAL HABITAT EFFECTS



- Landfills can breed diseases, causing biodiversity to decline
- Improper disposal of hazardous materials can lead to contamination of nearby neighborhoods & wildlife habitats
- Acid rain causes algal blooms, harming local fish populations

### HUMAN HEALTH IMPACTS



- Short-term exposure to ammonia and hydrogen sulfide in the air can cause:
  - Irritation of the eyes, nose and throat
  - Headaches and nausea
  - Breathing difficulties

## Greater Worcester Region Waste Sector Carbon Dioxide Emissions (MT CO<sub>2</sub>)

Solid Waste Disposal	339,866
Biological Treatment of Waste	788
Incineration and Open Burning	13,998
Wastewater Treatment and Discharge	101,424
<b>Total</b>	<b>456,055</b>

## GOALS TO CONSIDER FOR THE WASTE AND MATERIALS MANAGEMENT SECTOR

1

Phase out difficult to recycle materials

2

Reduce the amount of waste being disposed overall, especially food waste

3

Improve quality of / reduce contamination in residential recycling streams

4

Sustainably manage disposal facilities within the MSA

# Tell us your climate pollution reduction priorities!



<https://www.surveymonkey.com/r/QCSGB7G>

- ▶ **Sector-specific ranking activity**
  - ▶ In-person workshop attendees:
    - ▶ Fill out voting cards for each of the six major climate polluting sectors & drop voting card into sector-specific box
  - ▶ Online workshop attendees:
    - ▶ Click the link in this meeting's chat to take our survey!
    - ▶ <https://www.surveymonkey.com/r/QCSGB7G>
- ▶ **Overall sector investments activity**
  - ▶ In-person workshop attendees:
    - ▶ Use two red tickets to indicate which two major climate polluting sectors you would prioritize as the focus for future investments
  - ▶ Online workshop attendees:
    - ▶ Answer the final question of the Sector-specific ranking survey provided earlier!





<https://www.surveymonkey.com/r/F6GGWLY>

# Tell us your priority climate pollution reduction actions!

- ▶ In-person attendees:
  - ▶ Use your smartphone or internet enabled device to scan the QR code on the left or navigate to the web address to take the survey online. Or...
  - ▶ Fill out the paper copy of the survey now! Or...
  - ▶ Take a paper copy of the survey or survey flier to complete the online or print survey at home
- ▶ Online attendees:
  - ▶ Access the survey flier in the MRPC-CPRG Workshop DropBox. Or...
  - ▶ Scan the QR code with your smartphone camera or click the link in the chat!

# Thank you for attending!

- ▶ Please stay in-touch with the Greater Worcester Area's Climate Pollution Reduction Grant process through the CMRPC's CPRG project website:

<https://www.cmrpc-cprg.com/>



<https://www.cmrpc-cprg.com/>



# Supplemental Sources

- ▶ US Envi Protection Agency, CPRG  
<https://www.epa.gov/inflation-reduction-act/climate-pollution-reduction-grants>
- ▶ US Envi Protection Agency, GHG Overview  
<https://www.epa.gov/ghgemissions/overview-greenhouse-gases>
- ▶ NOAA, Climate.gov <https://www.climate.gov/news-features/climate-ga/how-will-global-warming-harm-human-health-and-well-being>
- ▶ Westborough Climate Action Plan, 2021  
[https://www.town.westborough.ma.us/sites/g/files/vyhlif5176/f/uploads/westborough\\_2021\\_climate\\_action\\_plan\\_draft\\_03-02-2021.pdf](https://www.town.westborough.ma.us/sites/g/files/vyhlif5176/f/uploads/westborough_2021_climate_action_plan_draft_03-02-2021.pdf)

Images:

<https://www.wbjournal.com/article/following-growing-demand-in-central-mass-canton-construction-company-expands-with-Worcester>

<https://www.placer.ca.gov/8071/What-is-extreme-heat>

<https://www.epa.gov/inflation-reduction-act/climate-pollution-reduction-grants>

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