

2019 Greenhouse Gas Emissions Inventory, Emissions Forecasts and Mitigation Scenarios

City of Concord, New Hampshire

City Council Meeting

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Report by:

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- UNH Sustainability Fellow 2022
- Colorado State University, PSM Ecosystem Science and Sustainability '22G
- Goucher College, B.A. Environmental Studies '18



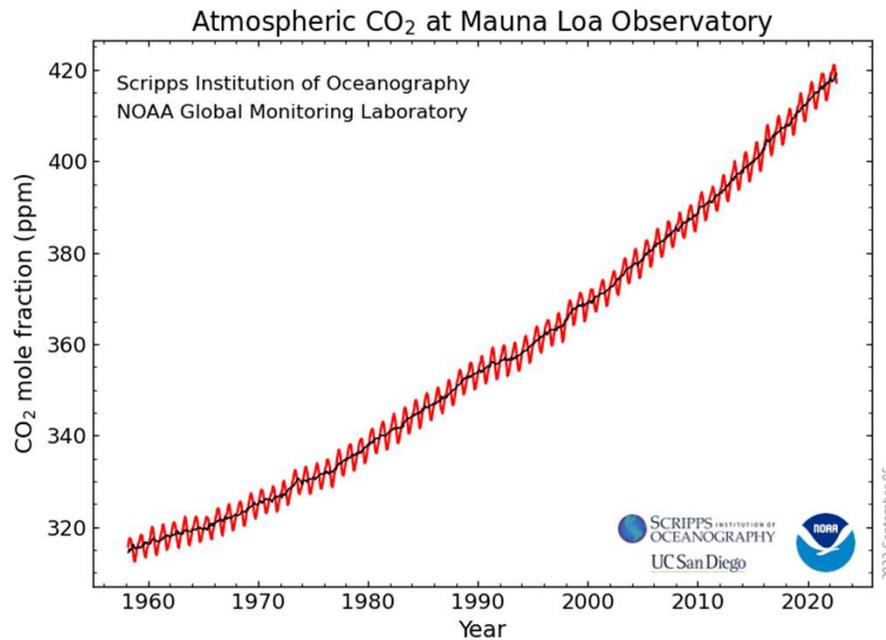
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Project Objectives

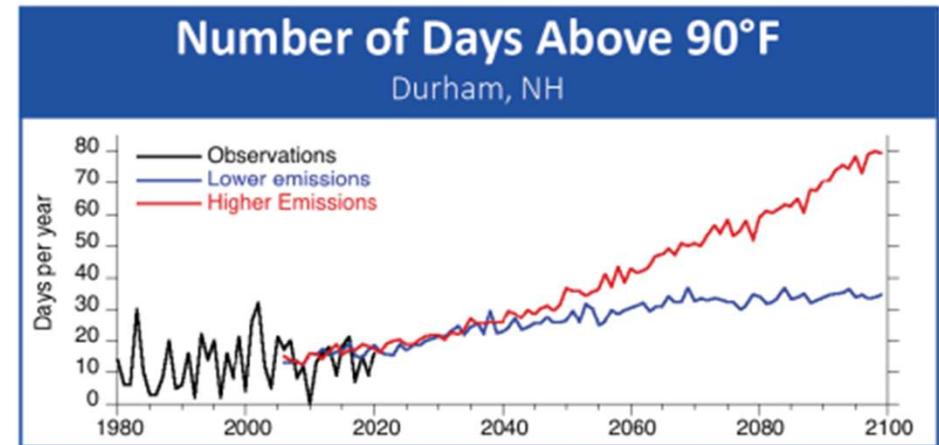
1. Facilitate GHG emissions tracking, analysis, and scenario modeling by integrating Concord's 2019 GHG Inventory into the user-friendly ClearPath Tool
2. Augment Concord's GHG inventory with the City's nature-based carbon stocks, beginning with forests & urban tree canopy
3. Evaluate the emissions impacts of proposed city policies, development and conservation proposals
4. Determine what path forward will be necessary for the City to reach its emissions reduction goals



Understanding Climate Change



Greenhouse gases (GHG) are increasing in the atmosphere due to human activities such as burning fossil fuels, deforestation, and agriculture.



Increasing GHG causes increased global surface temperature, extreme precipitation events, floods, droughts, and sea level rise. Snowpack is decreasing overtime with high temperatures.

Citation: 2022 New Hampshire Climate Assessment Executive Summary; 2021 IPCC Summary for Policy Makers



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Concord's Energy and GHG Emissions Reduction Goals

- **New Hampshire Climate Action Plan (2009)**
 - Reduce GHG emissions by 80% by 2050
- **Climate Mayor's Agreement (2017)**
 - Uphold Paris Climate Agreement Targets
~ 45% reduction by 2030 and 100% by 2050
- **100% Renewable Energy Goal (2018)**
 - By 2030: 100% renewable electricity
 - By 2050: 100% renewable thermal and clean transportation
- **Race to Zero (2021)**
 - 50% reduction by 2030 and 100% by 2050



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ICLEI ClearPath Tool



Community Track

- Residential Energy
- Commercial energy
- Industrial Energy
- Transportation & Mobile Sources
- Agriculture, Forestry, and Other Land Use (AFOLU)
- Solid Waste

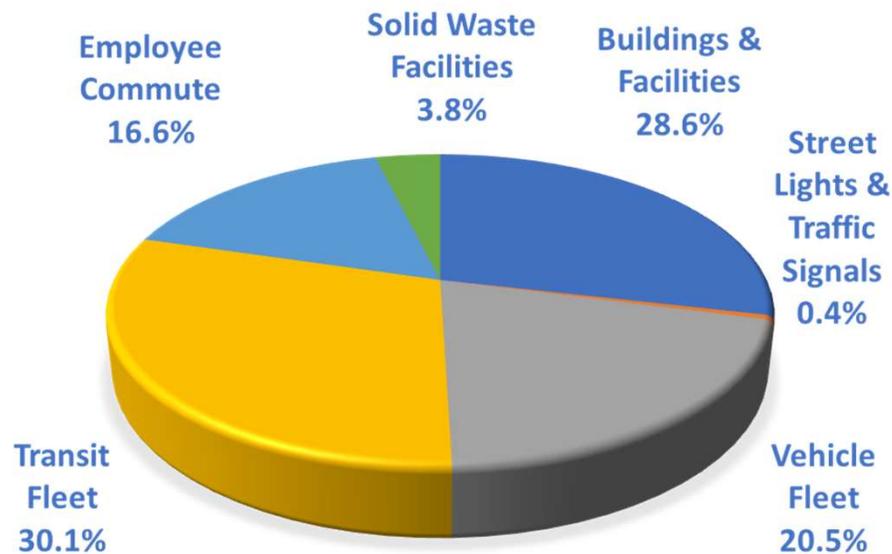
Government Track

- Buildings & Facilities
- Streetlights & Traffic Signals
- Vehicle Fleet
- Transit Fleet
- Employee Commute
- Solid Waste Facilities



Concord Government 2019 GHG Inventory

Concord's Government emissions in 2019:
7,573 metric tonnes (MT) CO₂e



If no action is taken to mitigate climate change, Concord will emit **slightly fewer emissions** in the future:
7,394 MT CO₂e by 2030
7,261 MT by 2050

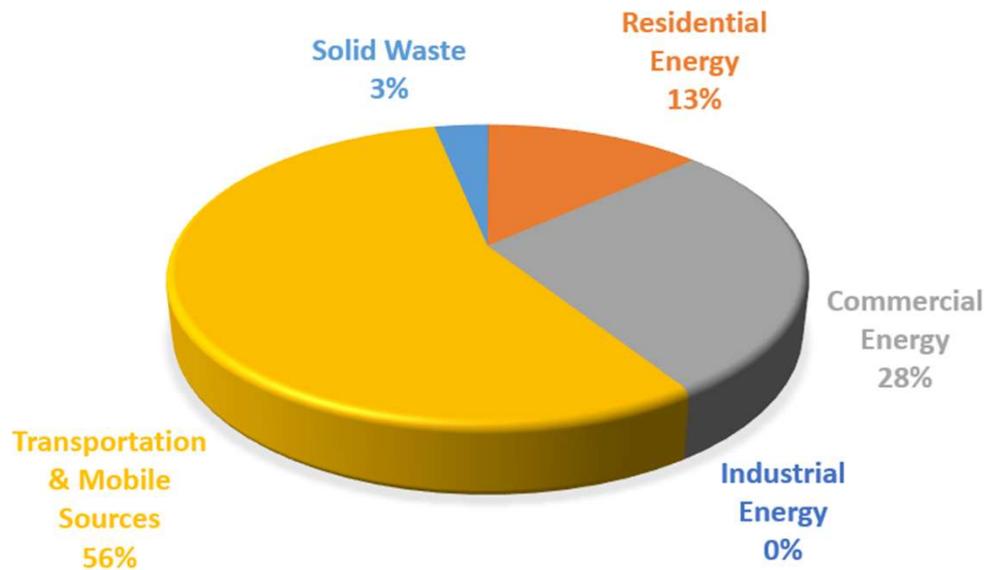
Citation: ICLEI ClearPath



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Concord Community 2019 GHG Inventory

Concord's Community-wide emissions in 2019:
486,510 metric tonnes (MT) CO₂e



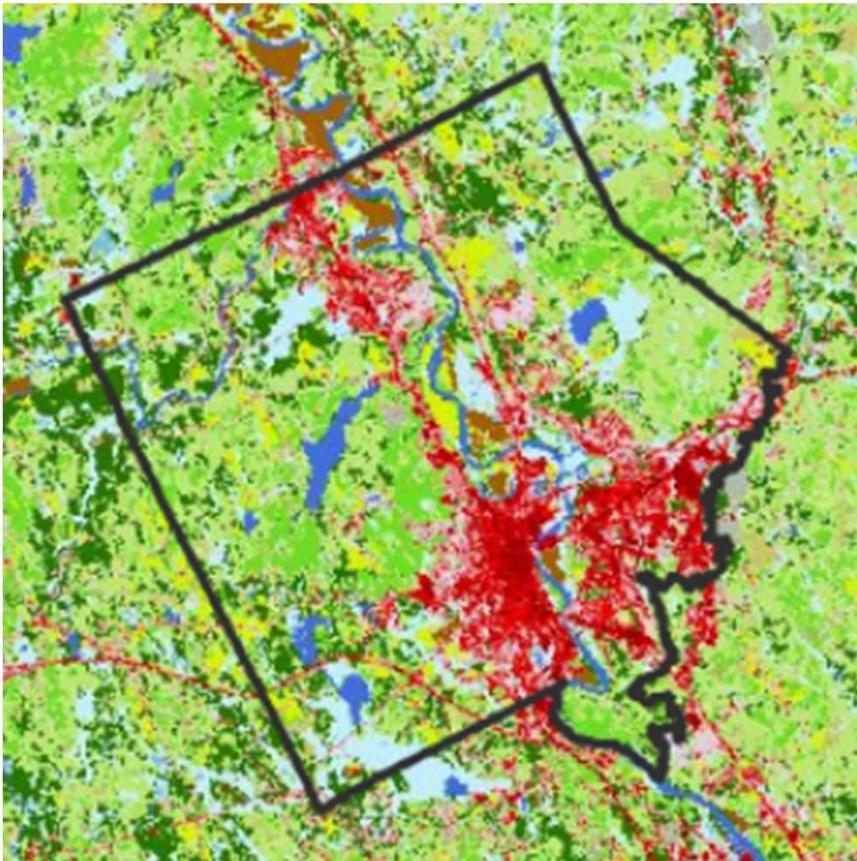
If no action is taken to mitigate climate change, Concord will continue to emit **roughly the same emissions** in the future:
484,272 MT CO₂e by 2030
489,354 MT by 2050

Citation: ICLEI ClearPath



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Concord's Land-based Carbon Storage



Citation: ICLEI LEARN
Tool

	Removals(t CO ₂ e/yr)	Emissions(t CO ₂ e/yr)
Undisturbed Forest	-64,070	
Forest Disturbances		5,555
Non-Forest to Forest	-1,642	
Forest to Settlement		5,696
Forest to Grassland		2,898
Forest to other non-forest lands		648
Trees outside of forests	-9,399	186
Harvested Wood Products	0	
TOTAL	-75,111	14,983
Net GHG balance	-60,128	

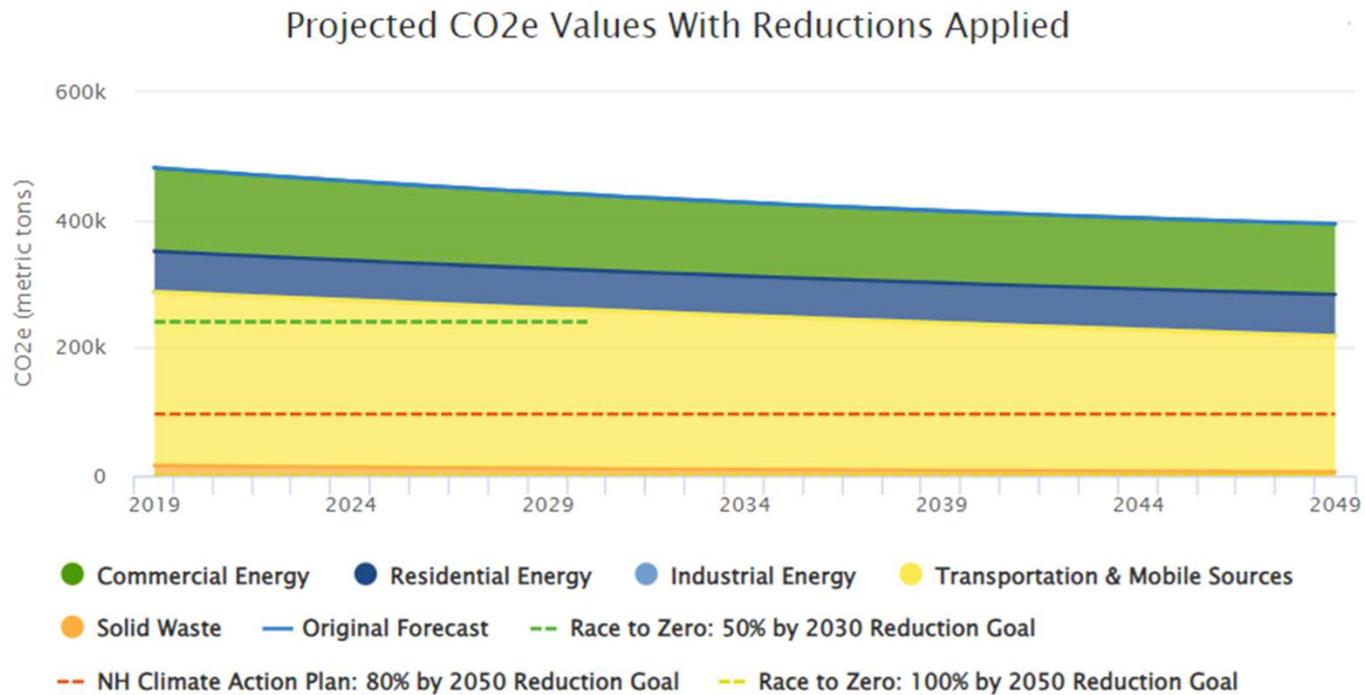
59% of Concord is forested (green). Settlements (red) cover 27% of land. Concord's forests act as a very important sink, removing approximately 60,128 MT CO₂e every year through photosynthesis.



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Greener Grid Scenario: ISO predictions for 72.5% renewable grid by 2050

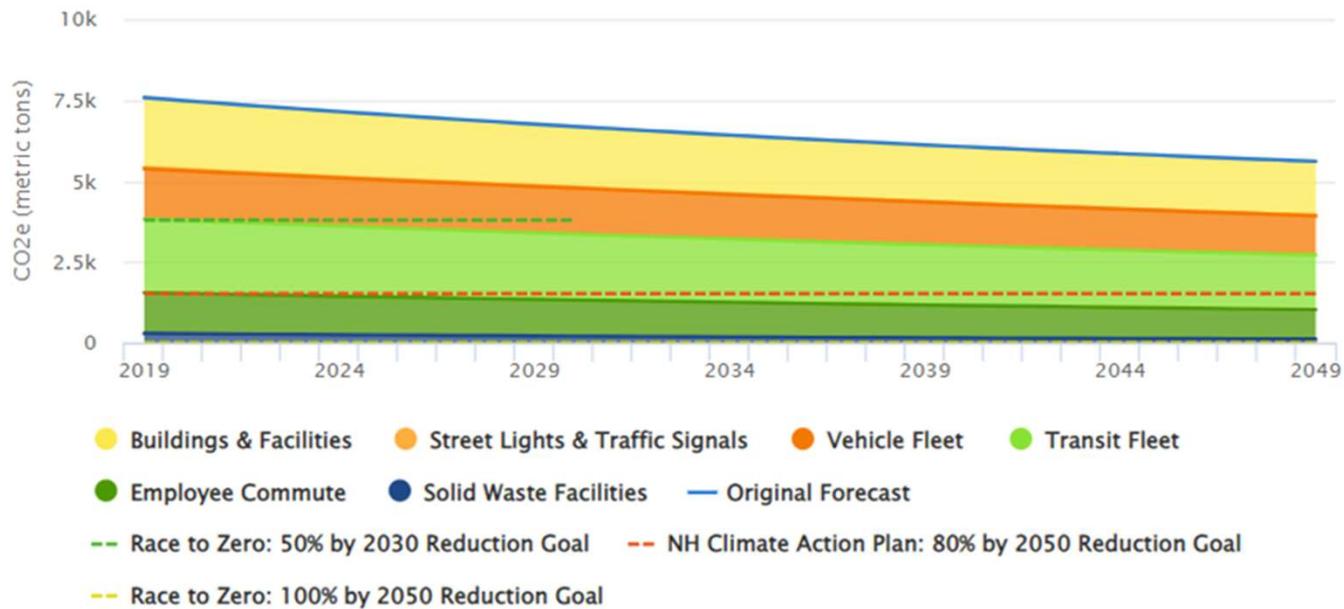
Community-Wide



Greener Grid Scenario: ISO predictions for 72.5% renewable grid by 2050

Government

Projected CO2e Values With Reductions Applied

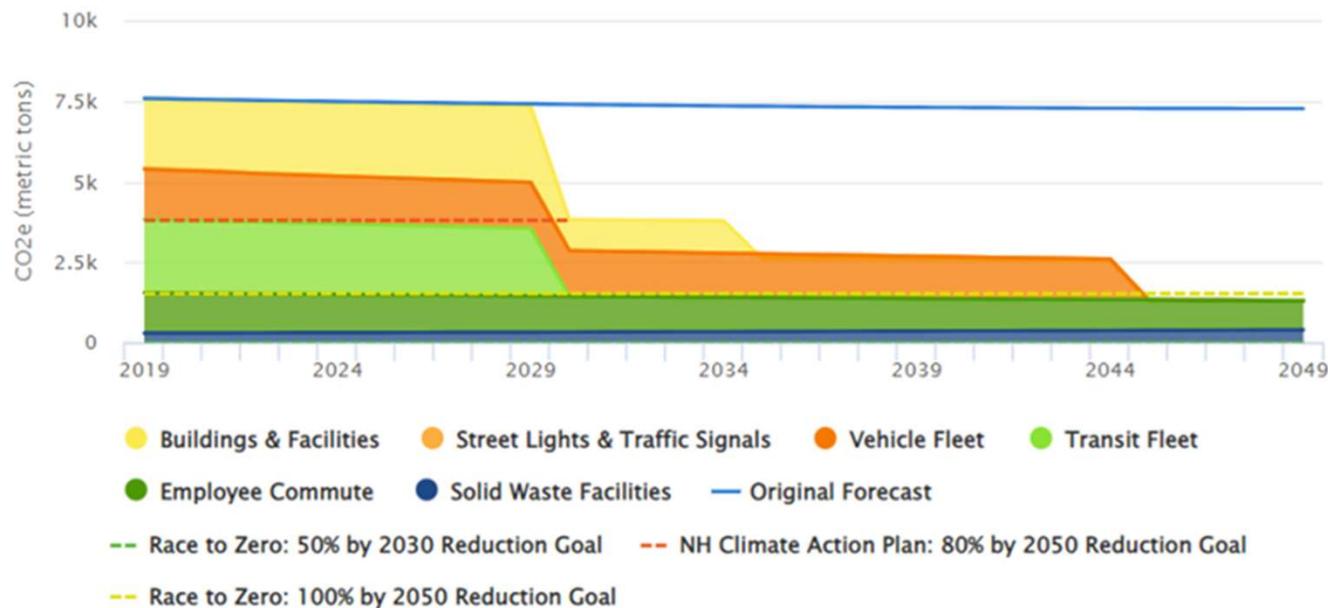


Government Mitigation Scenario - Heat Pumps & Fuel Switching

To reduce Government emissions by **80% by 2050**, Concord would need to:

1. Power municipal buildings & facilities with 100% renewable electricity by 2030.
2. Install heat pumps in to 100% of the municipal buildings & facilities by 2035.
3. Replace 100% of gas- and diesel-powered vehicles in the municipal vehicle and transit fleets with electric vehicles.

Projected CO2e Values With Reductions Applied



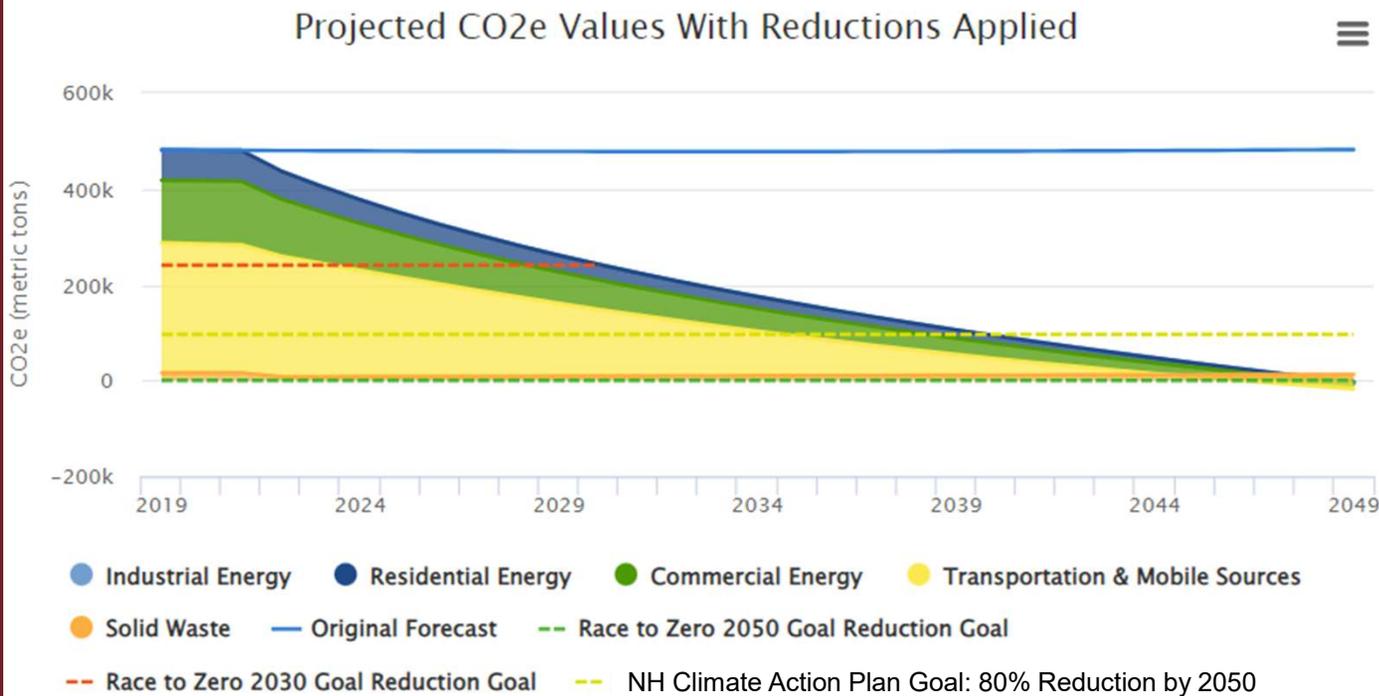
Citation: ICLEI ClearPath



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Community Mitigation Scenario – High Level Target Planning

To reduce Community emissions by **100% by 2050**, Concord would need to:



Citation: ICLEI ClearPath



1. Power residential and commercial spaces with 100% renewably sourced electricity.
2. Switch 100% of residential and commercial natural gas end uses (heating, cooling, cooking) to electric.
3. Replace 100% of gas and diesel vehicles on the road with electric vehicles.
4. Reduce total waste generation by 50% by diverting waste to recycling and increasing composting services.

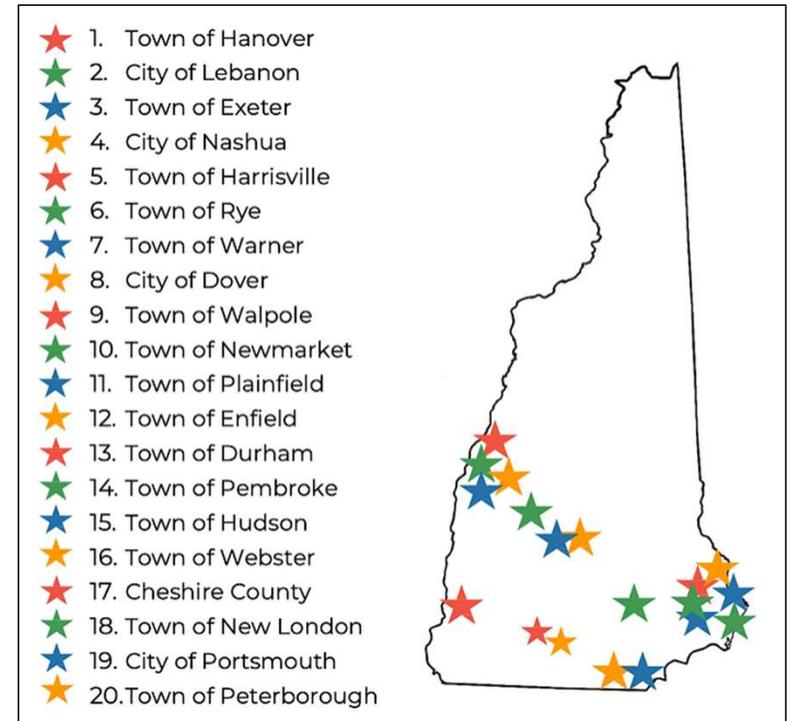
Conclusions and Recommendations

Concord needs to take action on several fronts to meet our 2030 and 2050 emissions reduction goals



Conclusions and Recommendations

- **Acquiring renewable electricity is a necessary first step to achieving emissions reduction and renewable energy targets**
 - **Securing Community Power** from renewable sources is a key, and perhaps **necessary strategy** to achieve this goal cost-effectively
- Support the development of local renewable energy
- Support improvement of electrical transmission infrastructure



Community Power Coalition of NH, As of August 2022



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Conclusions and Recommendations

- **Transportation is the largest source of Concord's municipal and community-wide emissions**
- Concord's government should immediately begin to replace existing gas and diesel powered vehicles with alternatives
- Concord needs to develop charging infrastructure to support this transition among residents, commuters, and tourists
- Essential for local commerce
- Support the walkability and bikeability



Conclusions and Recommendations

- The energy used to heat homes and businesses is Concord's second greatest source of emissions
- **Weatherize and transition to heat pumps or other net zero sources of heat**
- The city should lead the way on city properties
- Raise awareness and improve incentives for businesses and residences to weatherize and transition to alternative heat sources

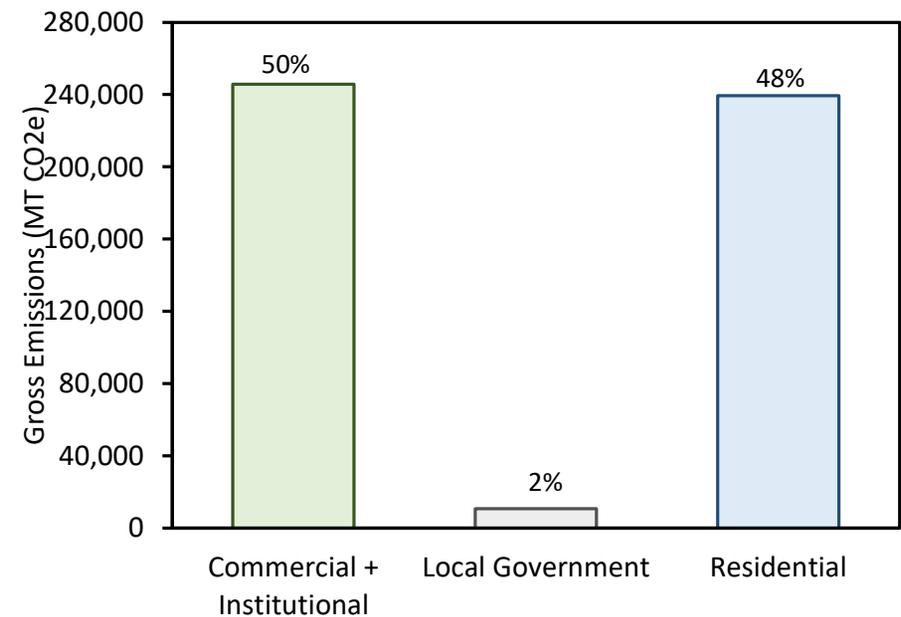


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Conclusions and Recommendations

- **The Commercial and Institutional sector is the largest sectoral source of emissions**

- Work with large businesses to raise awareness about emissions reduction actions that can be taken.



From original 2019 inventory, Grant 2020



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Conclusions and Recommendations

- Concord's open space and trees are important component of it's GHG inventory and improving net sequestration can help offset some difficult to reduce sources (e.g., solid waste, wastewater)
 - Conserve existing forests, tree cover, and open space lands
 - Encourage redevelopment over new development in natural areas
 - Scale up tree replacement and tree planting programs and consider mitigation ordinances
 - Encourage smart agriculture and wetlands management





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