Holliston Community Decarbonization Report

Report Status and Background

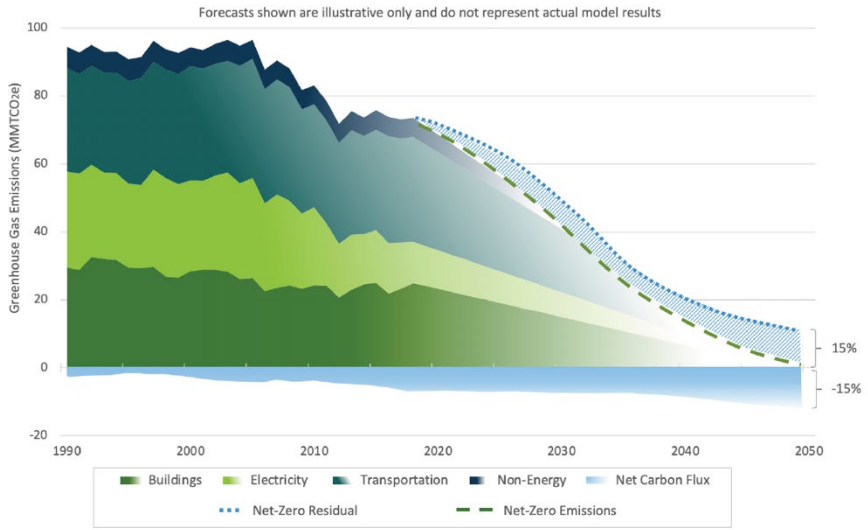
- A working draft
- Data driven with spreadsheet support

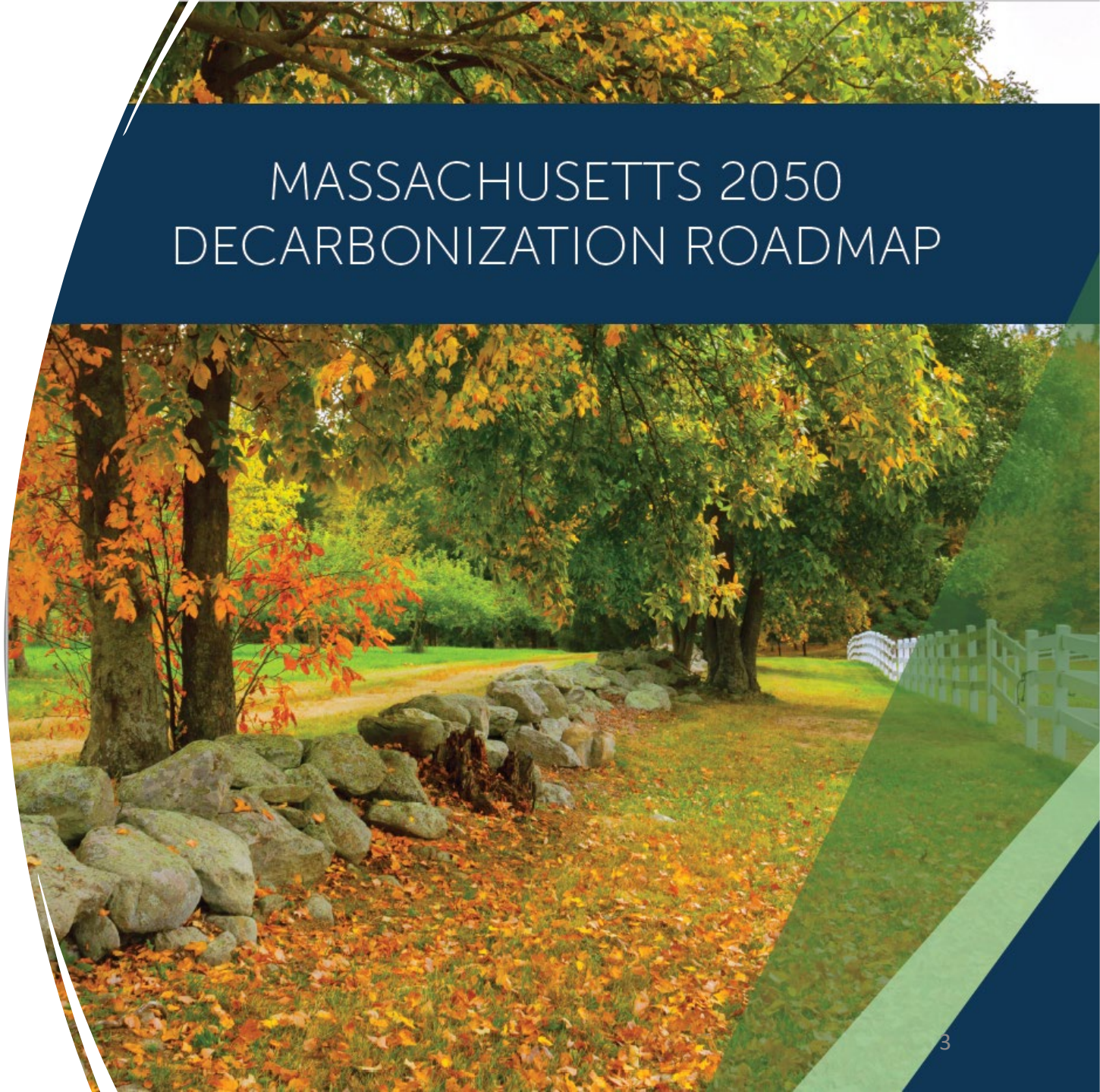
Metropolitan Area Planning Commission and John Snell LLC

Community Decarbonization Documentation
for
The Town of Holliston
April 27, 2023
Working Draft

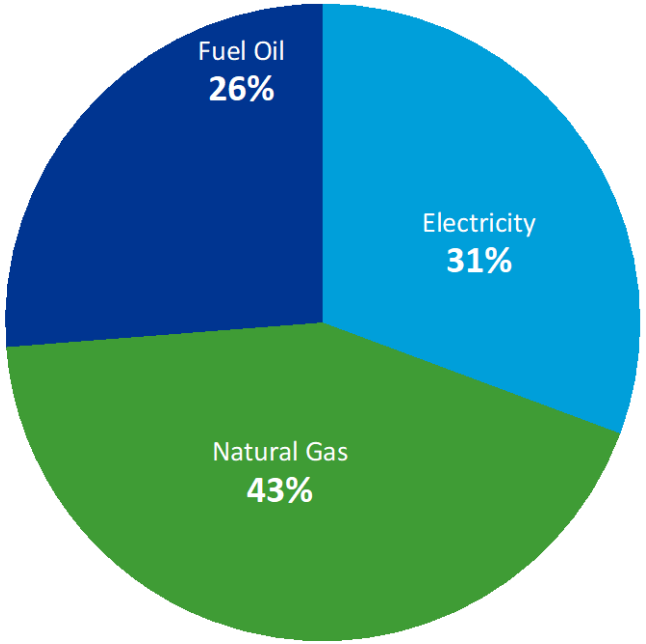
Massachusetts Decarbonization Roadmap

- 50% reduction by 2030
- 85% reduction by 2050



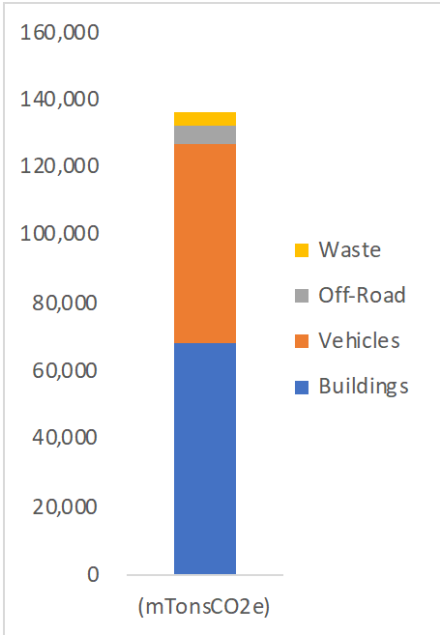


Holliston's Greenhouse Gas Emissions



Building carbon emissions by source energy

Community Sector	Total Carbon Emissions (mTonsCO2e)	Emissions (%)
Buildings		
Residential	47,886	35%
Commercial	20,450	15%
Vehicles		
Gasoline	56,848	42%
Diesel	1,689	1%
Off-Road	5,697	4%
Waste	3,434	3%
Total	136,004	100%



Residential and Commercial Buildings

- Heat pumps are the most cost-effective decarbonization strategy for buildings
- HVAC systems turn over once every 15 to 30 years
- At least two-thirds should receive deep energy efficiency improvements
- Best to install new equipment during routine home improvements or when older HVAC system is replaced
- Every building should receive energy efficiency improvements
- New and expanded financing strategies will be needed to defray upfront costs

Residential Buildings

Building Type	Households (#)	Total Area (SF)	Total Electricity (kWh)	Total Gas (therms)	Total Oil (gallons)
Single-Family- Detached	4,361	12,982,697	46,376,922	3,064,547	1,348,743
Single-Family- Attached	189	385,182	1,375,951	90,922	40,016
Multi-Family, 2-4 Units	256	304,896	1,089,153	71,970	31,675
Multi-Family, 5+ Units	365	309,885	1,106,974	73,148	32,193
Mobile Homes	0				
Total	5,171	13,982,660	49,949,000	3,300,587	1,452,627

Commercial Buildings

Facility type	Number of Employees	Total Electricity (kWh)	Total Gas (therms)	Total Oil (gallons)
Commercial				
Food Service	157	2,860,580	401,904	5,625
Service	167	3,042,782	316,422	5,983
Health Care Outpatient	120	2,186,430	234,515	4,299
Warehouse And Storage	513	9,346,990	225,328	18,379
Mercantile Retail (other than mall)	65	1,184,317	197,604	2,329
Mercantile Enclosed and Strip Malls	34	619,489	195,506	1,218
Food Sales	45	819,911	108,475	1,612
Religious Worship	34	619,489	69,692	1,218
Public Assembly	133	2,423,294	57,273	4,765
Office	598	10,895,712	56,653	21,424
Lodging	75	1,366,519	32,297	2,687
Industrial				
Fabricated Metal Products	322	5,866,922	59,694	11,536
Machinery	53	965,673	33,745	1,899
Computer and Electronic Products	73	1,330,079	10,675	2,615
Miscellaneous	208	3,789,813	0	7,452
Total	2,597	47,318,000	1,999,781	93,040

Passenger and Commercial Vehicles

Switch light-duty vehicles to electric

Maintain and support existing public transit systems

Most vehicles will be replaced only twice between now and 2050

Most EV charging will happen at home (if off-road parking)

Medium-duty and heavy-duty vehicles will require retrofits to depots and fueling stations

Support active transportation with bike lanes and sidewalks

Passenger Vehicles

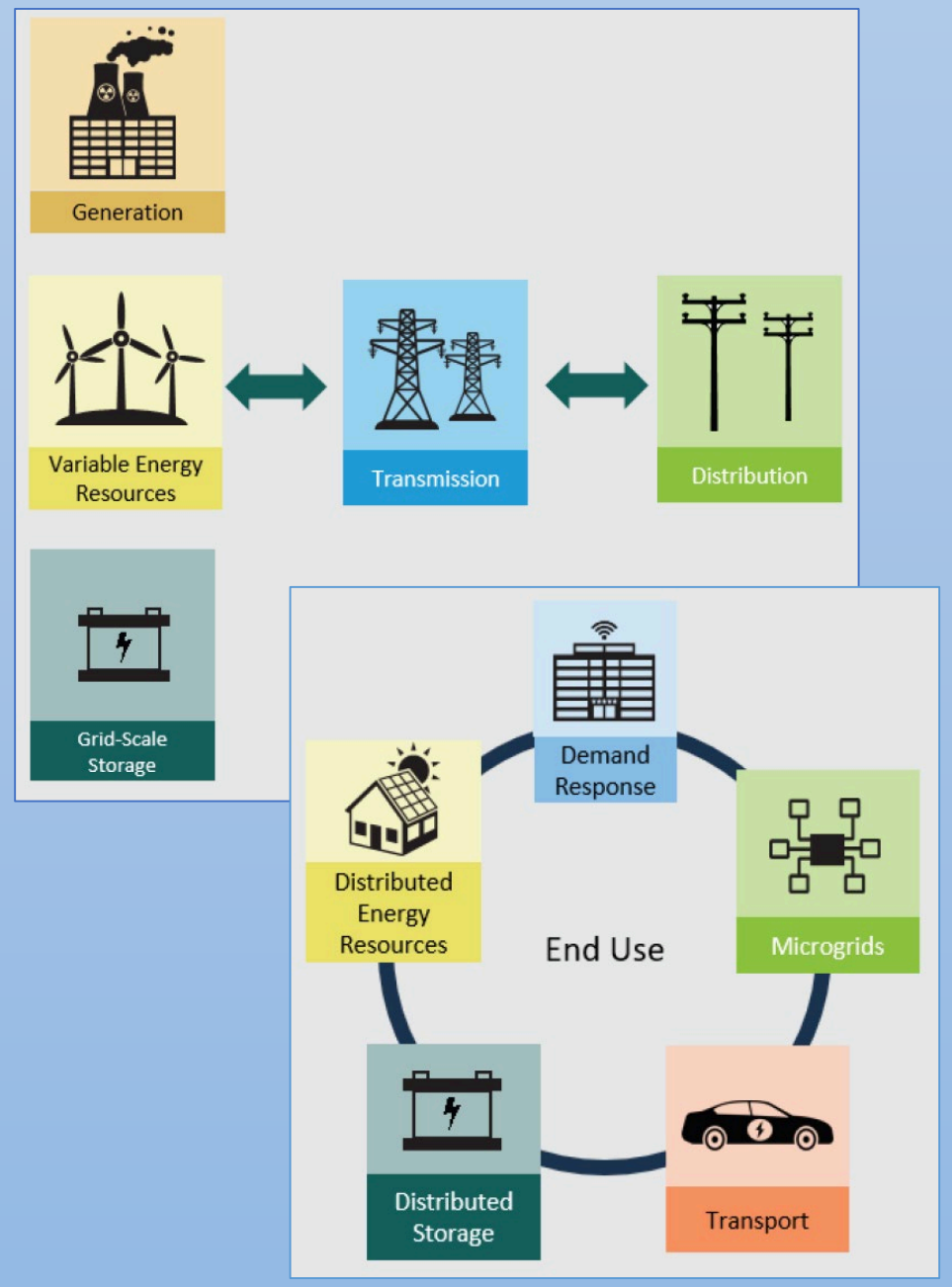
Vehicle type	Quantity (vehicles)	Average Daily Vehicle Miles	Average Fuel Economy (MPG):	Annual Vehicle Miles Travelled (VMT)	Annual Diesel/ Gasoline (Gallons)
Gasoline	9,945	31.5	20.3	114,208,693	5,629,788
Diesel	109	34.5	20.6	1,374,019	66,759
FlexFuel	406	32.7	18.4	4,841,782	263,285
Hybrid	264	38.0	39.7	3,658,384	92,193
Electric	3				
Total	10,727			124,082,879	6,052,025

Commercial Vehicles

Vehicle type	Quantity (vehicles)	Average Daily Vehicle Miles	Average Fuel Economy (MPG):	Annual Vehicle Miles Travelled (VMT)	Annual Diesel/ Gasoline (Gallons)
Gasoline	438	37.0	17.8	5,919,427	369,222
Diesel	57	29.4	12.6	611,263	96,989
FlexFuel	58	37.7	15.0	798,765	53,387
Hybrid	4	26.6	26.4	38,887	1,475
Electric	2				
Total	559			7,368,342	521,072

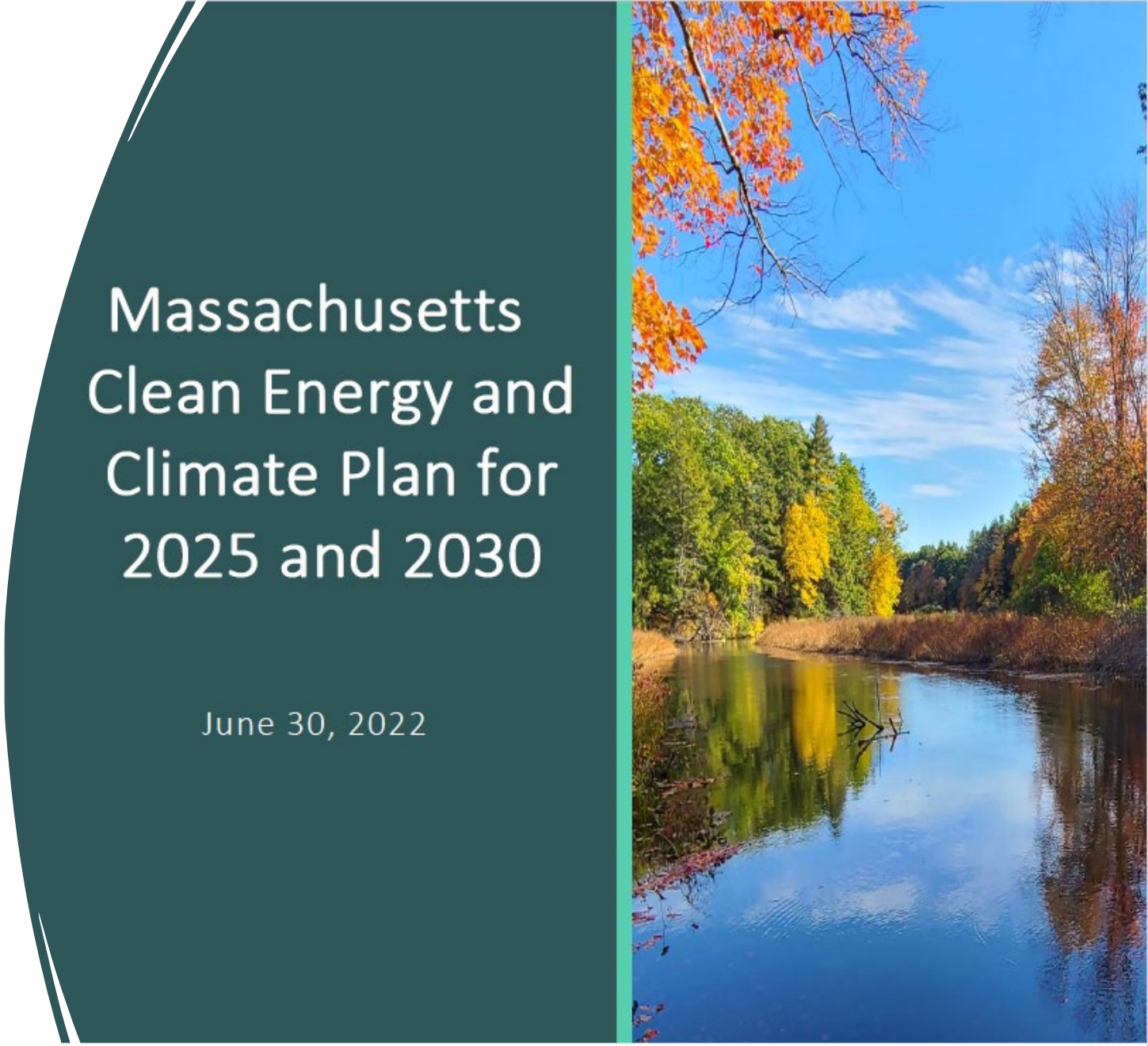
Electricity

- Electricity generation will need to more than double
- Carbon emissions from the electricity system will need to approach zero
- Strategically placed solar installed locally will have distribution system benefits
- Restricting regional transmission buildout or retiring thermal generation plants may increase costs significantly
- Offshore wind and solar must be deployed at scale (15-20 GW of each)
- Reliability resources (load management & bulk storage) will be needed

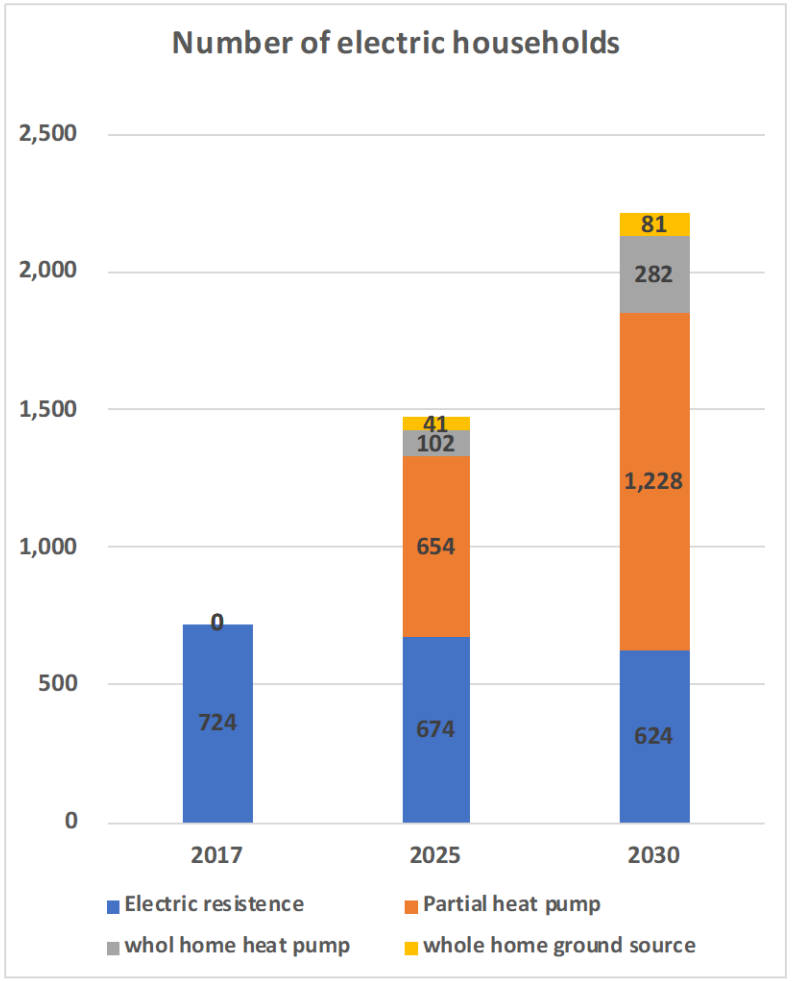


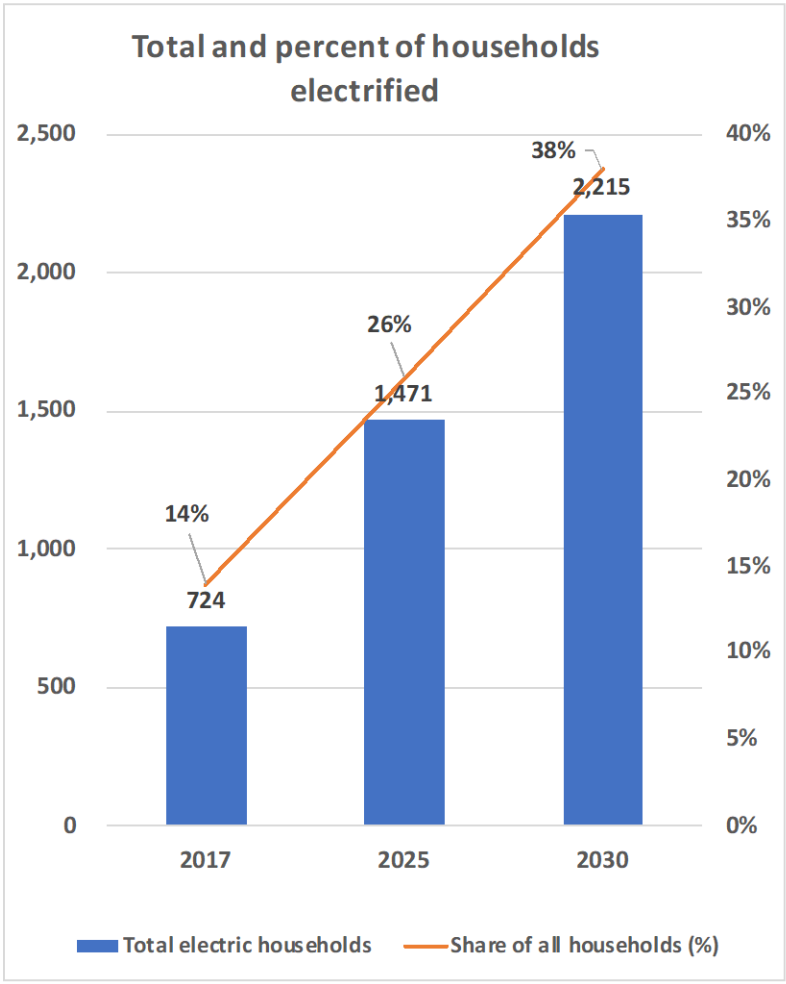
Massachusetts Clean Energy and Climate Plan for 2025 and 2030

- Five strategy areas:
  - Transportation
  - Buildings
  - Energy supply
  - Non energy and industrial emissions
  - Natural and working lands
- Developed with:
  - Extensive modeling (updated from 2050 plan)
  - Stakeholder participation
  - Environmental justice as a priority
  - Proposed funding and legislative actions
  - Public review process

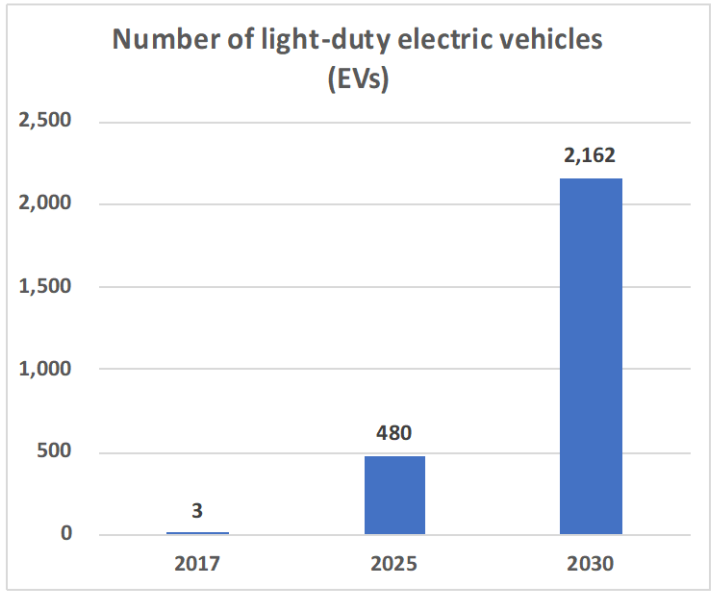


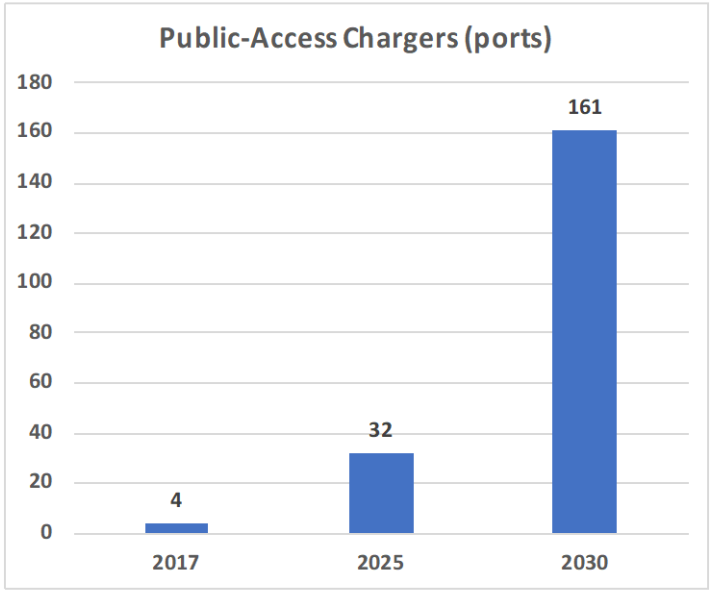
Holliston Building Targets for 2025 & 2030

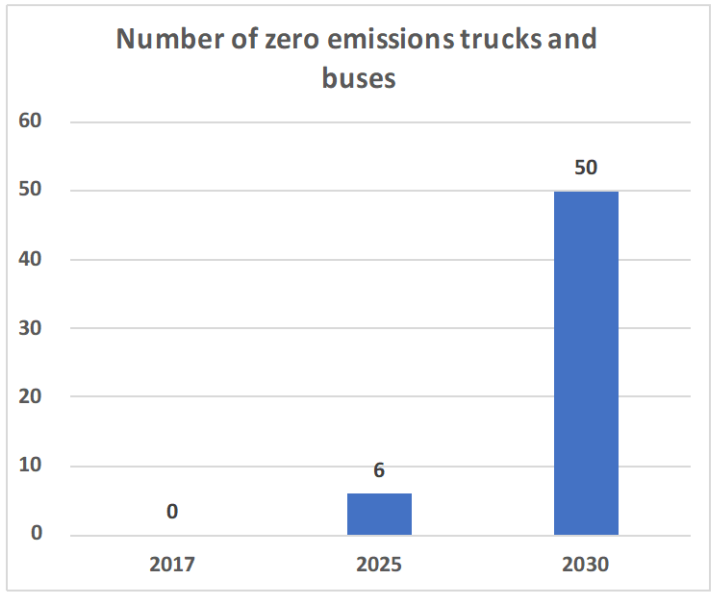


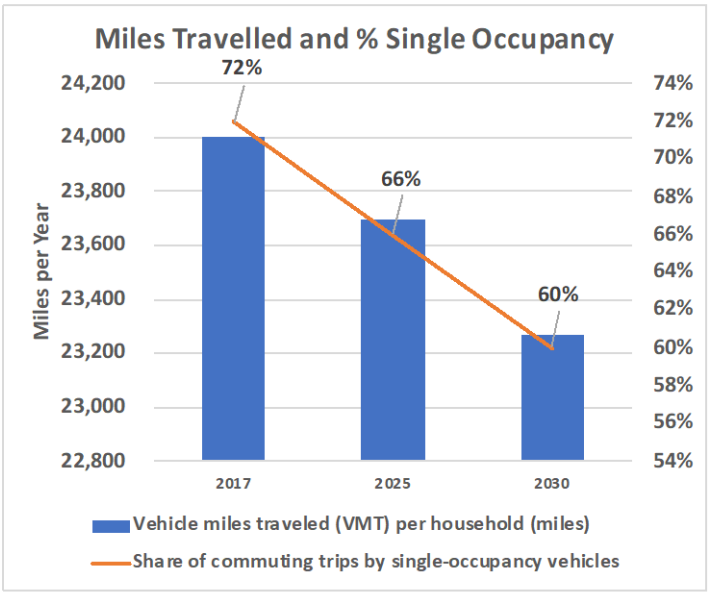


Holliston Transportation Targets for 2025 & 2030

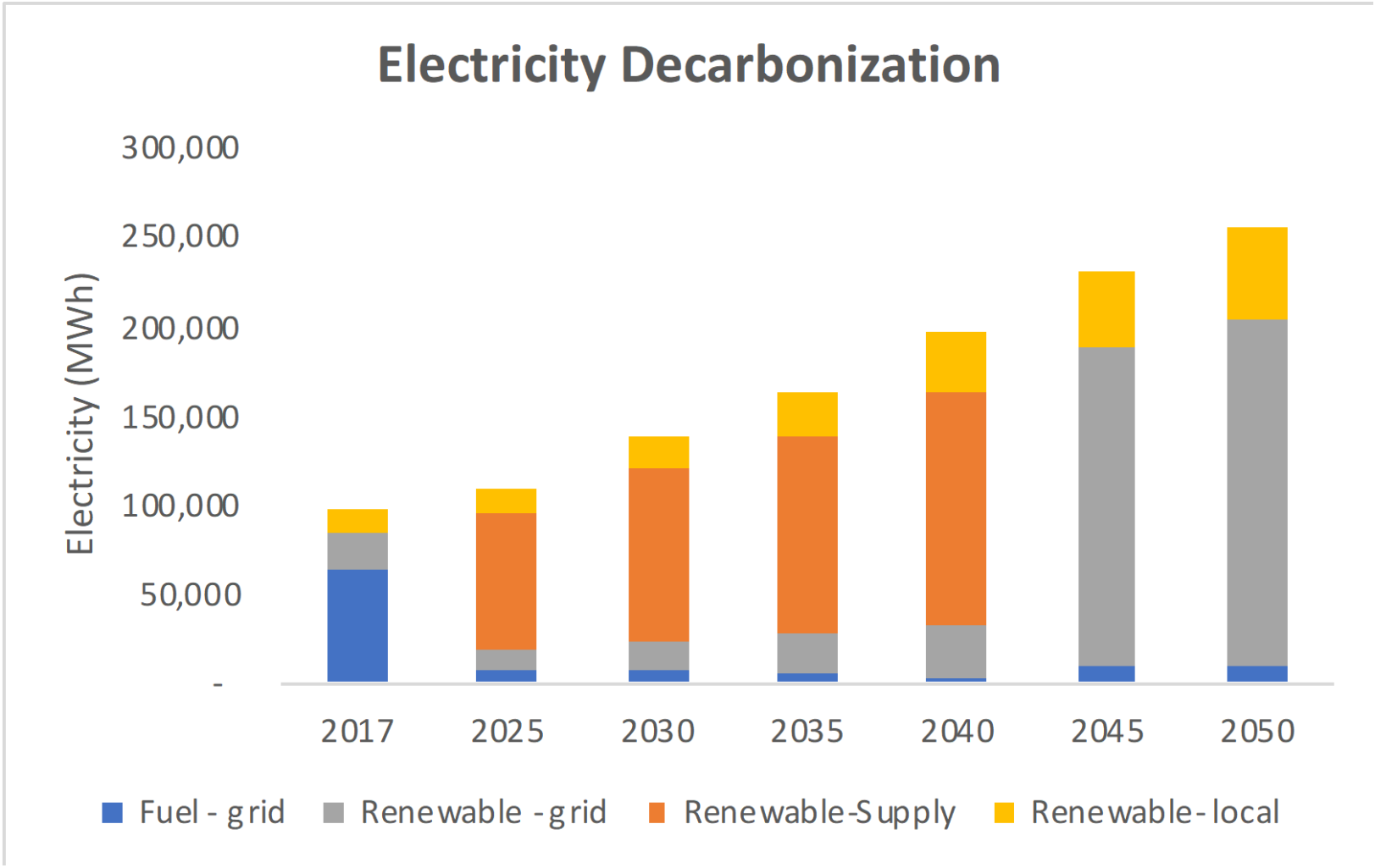




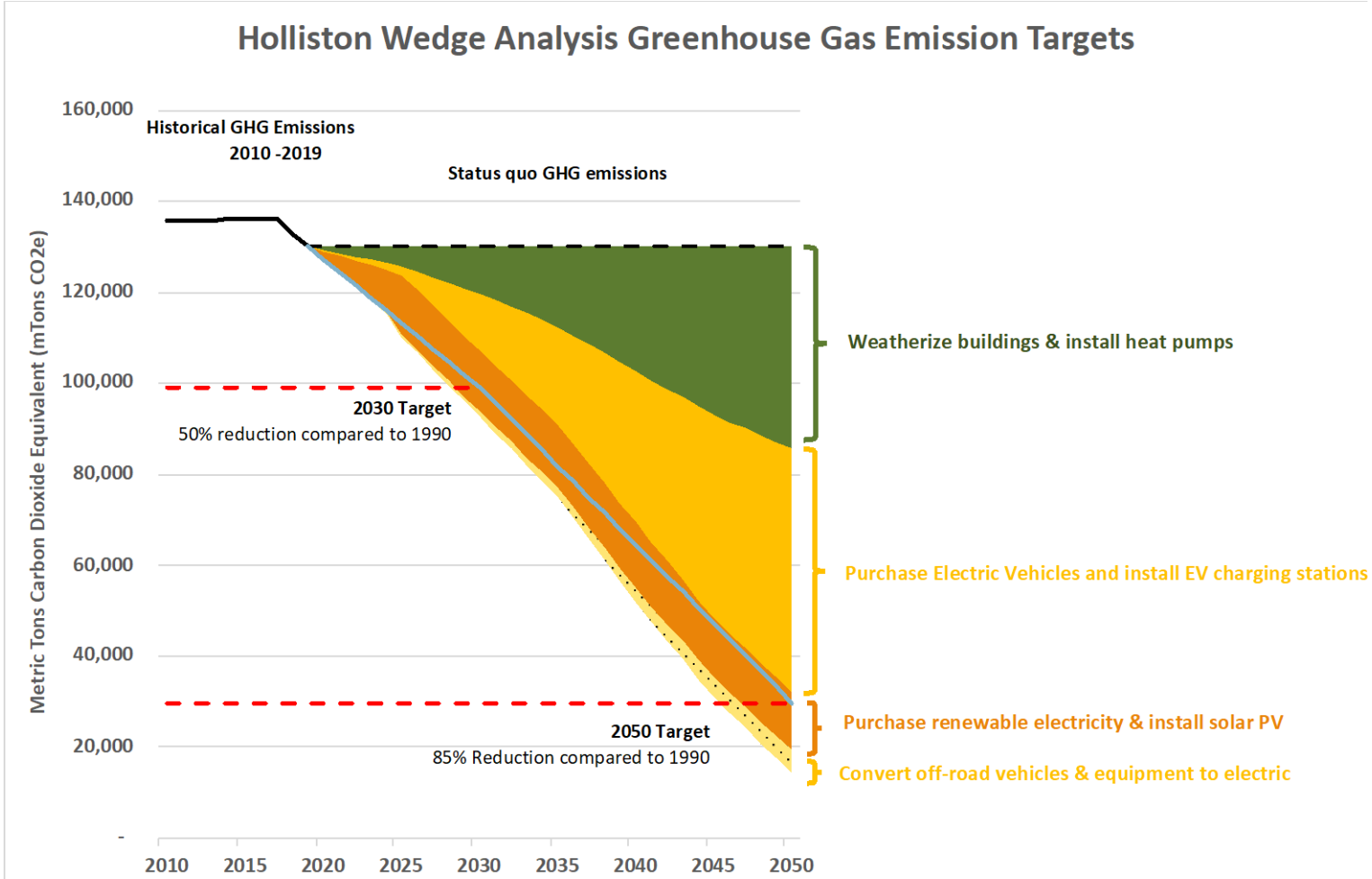




Holliston's Electricity Use and Sources Forecast



Holliston Carbon Reduction Targets for 2050



Appendices

- Appendix A: Massachusetts Clean Energy and Climate Plan for 2025 and 2030
- Appendix B: Additional Resources
- Appendix C: Renewable Portfolio Standard Explanation
- Appendix D: Data Sources and Assumptions
- Appendix E: 25% Tipping Point
- Appendix F: Electric Vehicles and Charging Stations
- Appendix G: Electrical Grid Considerations and Resources
- Appendix H: Decarbonization Monitoring Reports
- Appendix I: Carbon Emission Costs and Investment Approaches