Climate Leaders Municipal Decarbonization Roadmap

Prepared for: The Town of Arlington, MA

November 2024

PowerOptions

Green Communities
Massachusetts Department of Energy Resources

DOER
Massachusetts Department of Energy Resources

Massachusetts Clean Energy Center

Introduction

In 2021, the Commonwealth of Massachusetts amended the state's signature climate law by *An Act Creating a Next Generation Roadmap for Massachusetts Climate Policy*, also known as the 2021 Climate Law.[1,2] The 2021 Climate Law requires the Secretary of the Executive Office of Energy and the Environment (Secretary) to set statewide greenhouse gas (GHG) emissions limits and set sector-specific emissions sublimits that are to be met every five years. These limits require GHG emissions to be at least thirty-three percent below 1990 levels in 2025, and fifty percent below 1990 levels in 2030.

The Climate Leader Community certification was established to provide a framework for municipalities to meet these goals, in partnership with the Commonwealth of Massachusetts.[3] To become a certified Climate Leader, a municipality must 1) commit to eliminating on-site fossil fuel use by the municipality by 2050; and 2) develop a roadmap for decarbonizing municipal operations. In addition to accomplishing reductions in GHG emissions, a Climate Leader Community will gain access to further support and funding for decarbonization activities. The roadmap must focus on eliminating the use of fossil fuels by municipal buildings and vehicles and use a "Zero Over Time" approach (Table 1).[4] This Climate Leaders Municipal Decarbonization Roadmap was developed for the Town of Arlington as the second of five total requirements for certification.

Table 1. Minimum Emission Reduction Timeline, suggested and established by the MA Department of Energy Resources (DOER).

Targets	**2027**	**2030**	**2040**	**2050**
Emissions reductions from onsite fossil fuels	-20%	-35%	-60%	-100%
Zero emission vehicles (ZEVs) in light-duty fleet adoption	5%	20%	75%	100%
Zero emission vehicles (ZEVs) in heavy-duty fleet adoption	0%	20%	50%	100%
Energy Use Intensity reduction	-20%	-25%	-25%	-30%
Total Emissions Reduction Goals (% of 2022 emissions)	>15%	>35%	>65%	>95%

[1] Global Warming Solutions Act, 2008, https://malegislature.gov/Laws/SessionLaws/Acts/2008/Chapter298
[2] 2021 Climate Law, https://malegislature.gov/Laws/SessionLaws/Acts/2021/Chapter8
[3] An Act Relative to Green Communities, 2008, https://malegislature.gov/laws/sessionlaws/acts/2008/chapter169
[4] Green Communities 2.0

Baseline Emissions

The Town of Arlington, Massachusetts (Arlington, or the Town) has been a designated Green Community since 2010. Throughout Arlington's years as a Green Community, the Town has been granted more than $2 million to complete projects focused on energy efficiency, building upgrades, and fleet electrification infrastructure. In Fiscal Year 2022, Arlington's municipal operations (municipal and school buildings, lighting, and the Town's municipal and school fleets), emitted 7,822 metric tons of carbon dioxide equivalent (MT CO_2e) (Table 2). To become a certified Climate Leader, Arlington will need to advance projects that reduce energy consumption and GHG emissions and strive to implement the following decarbonization roadmap.

This roadmap evaluates the following strategies to decarbonize Arlington's facilities: energy efficiency, electrification (fuel-switching away from fossil fuel equipment to electric alternatives), and on-site solar photovoltaics. The roadmap also analyzes 151 internal combustion engine vehicles in Arlington's fleet to match them with the best candidates for battery electric vehicles (BEV). A combination of in-house economic models, a virtual energy audit, and Helioscope solar software were used to produce this roadmap. Because this roadmap focuses on reducing on-site fossil fuel usage, the results of the solar assessment are provided only in the Appendix.

By 2050, the measures highlighted in this roadmap are estimated to reduce Arlington's GHG emissions by over 100,000 cumulative MT CO_2e and lower building Energy Use Intensity (EUI), in thousand British thermal units (kBtu) over building square footage (ft^2), by 54 percent, meeting the emissions reductions goals defined by the Secretary.

KEY FACTS

BUILDINGS

- 36 buildings included in analysis
  - Total 1,322,121 ft^2
- FY2022 Usage:
  - 9,434 MWh
  - 76,448 MCF natural gas
  - 15,754 gallons fuel oil
  - 6,595 MT CO2e

VEHICLES

- Included in analysis
  - 91 light-duty vehicles (LDV)
  - 21 mid-duty vehicles (MDV)
  - 39 heavy-duty vehicles (HDV)
- Excluded from analysis
  - 52 NRE/Trailer
  - 6 EVs
  - 1 PHEV
  - 4 Motorcycles
- FY2022 Fleet Usage:
  - 71,794 gallons gasoline
  - 42,035 gallons diesel
  - 1,071 MT CO2e

Table 2. Town of Arlington's municipal GHG Emissions, Fiscal Year 2022, grouped by Town buildings, school buildings, vehicles, and streetlighting. Based on energy consumption and vehicle data provided by the Town.

Department and Facility Name	Fiscal Year 2022 Emissions (MT CO_2e)[5]			
	Electricity	Fossil Fuels	Total	Percent of Total
School	**1,596**	**3,203**	**4,799**	**63.1%**
Arlington High School	618	1,259	1,877	24.7%
Ottoson Middle School	208	501	709	9.3%
Hardy Elementary School	120	312	432	5.7%
Gibbs School (6th Grade)	159	139	298	3.9%
Dallin Elementary School	86	186	272	3.6%
Stratton Elementary School	71	199	271	3.6%
Bishop Elementary School	71	187	258	3.4%
Peirce Elementary School	74	170	244	3.2%
Brackett Elementary School	90	139	229	3.0%
Thompson Elementary School	98	111	209	2.7%
Vehicles (all departments)	**5**	**1,066**	**1,071**	**14.1%**
Vehicles	5	1,066	1,071	14.1%
Recreation	**144**	**289**	**433**	**5.7%**
Ed Burns Arena	118	146	265	3.5%
Parmenter School	25	143	168	2.2%
North Union Spray Pool	0	-	0	0.0%
Administration	**93**	**310**	**403**	**5.3%**
Town Hall & Annex	32	189	221	2.9%
Central School/Community Center	43	81	124	1.6%
Whittemore Robbins House	12	20	32	0.4%
Jefferson Cutter House	5	9	13	0.2%
Jarvis House	1	11	12	0.2%
Robbins Cottage	0	0	0	0.0%
Carriage House[6]	-	-	-	-
Public Safety	**163**	**186**	**349**	**4.6%**
Community Safety Building/Police	96	111	207	2.7%
Central Fire Station	38	39	77	1.0%
Highland Fire Station	18	23	41	0.5%
Park Circle Fire Station	11	13	23	0.3%
Public Works	**61**	**261**	**322**	**4.2%**
DPW Bldg D - Snow Fighting Garage	25	114	139	1.8%
DPW Bldg A - Admin/Engineering/Inspections	10	48	58	0.8%
DPW Bldg C - Maintenance Garage	8	36	44	0.6%
DPW Bldg B - Admin Offices/Assembly Hall	7	31	37	0.5%
Ryder Street Garage	10	19	28	0.4%
Cemetery Building - Chapel & Office	1	14	15	0.2%
Cemetery Garage	1	-	1	0.0%
DPW Building E & G - NEW[6]	-	-	-	-

[5] Emissions factors used to calculate MT CO_2e can be found in *Table 5. MT CO2e projections, provided by the Executive Office of Energy and Environmental Affairs (EEA) in the Massachusetts Clean Energy and Climate Plan (CECP) for 2050.*

[6] The Carriage House was unoccupied in FY22, and DPW Buildings E & G are new buildings with no data for FY22, which are nevertheless included in emissions projections.

Department and Facility Name	Fiscal Year 2022 Emissions (MT CO_2e)[5]			
	Electricity	Fossil Fuels	Total	Percent of Total
Library	**119**	**108**	**227**	**3.0%**
Robbins Library	99	87	186	2.4%
Fox Library	20	21	41	0.5%
Recreation	**144**	**289**	**433**	**5.7%**
Ed Burns Arena	118	146	265	3.5%
Parmenter School	25	143	168	2.2%
North Union Spray Pool	0	-	0	0.0%
Street/Traffic Lighting	**134**	**-**	**134**	**1.8%**
Streetlights	106	-	106	1.4%
Traffic	24	-	24	0.3%
Playground/Field Lights	4	-	4	0.0%
Rentals	**28**	**22**	**50**	**0.7%**
Dallin Library Building/ACMi	16	10	26	0.3%
23 Maple Street	12	12	24	0.3%
Water/Sewer	**34**	**-**	**34**	**0.5%**
Pump Stations	22	-	22	0.3%
Reservoir	13	-	13	0.2%
Total	**2,378**	**5,444**	**7,822**	**100%**

Table 3. Town of Arlington's GHG Emissions from buildings included in analysis, Fiscal Year 2022. Based on energy consumption data provided by the Town.

Facility Name	Fiscal Year 2022 Emissions (MT CO_2e)[7]			
	Electricity	Fossil Fuels	Total	Percent of Total
Arlington High School	618	1,259	1,877	28.5%
Ottoson Middle School	208	501	709	10.8%
Hardy Elementary School	120	312	432	6.6%
Gibbs School (6th Grade)	159	139	298	4.5%
Dallin Elementary School	86	186	272	4.1%
Stratton Elementary School	71	199	271	4.1%
Ed Burns Arena	118	146	265	4.0%
Bishop Elementary School	71	187	258	3.9%
Peirce Elementary School	74	170	244	3.7%
Brackett Elementary School	90	139	229	3.5%
Town Hall & Annex	32	189	221	3.3%
Thompson Elementary School	98	111	209	3.2%
Community Safety Building/Police	96	111	207	3.1%
Robbins Library	99	87	186	2.8%
Parmenter School	25	143	168	2.6%
DPW Bldg D - Snow Fighting Garage	25	114	139	2.1%
Central School/Community Center	43	81	124	1.9%
Central Fire Station	38	39	77	1.2%
DPW Bldg A - Admin/Engineering/Inspections	10	48	58	0.9%
DPW Bldg C - Maintenance Garage	8	36	44	0.7%
Fox Library	20	21	41	0.6%
Highland Fire Station	18	23	41	0.6%
DPW Bldg B - Admin Offices/Assembly Hall	7	31	37	0.6%
Whittemore Robbins House	12	20	32	0.5%
Ryder Street Garage	10	19	28	0.4%
Dallin Library Building/ACMi	16	10	26	0.4%
23 Maple Street	12	12	24	0.4%
Park Circle Fire Station	11	13	23	0.4%
Cemetery Building - Chapel & Office	1	14	15	0.2%
Jefferson Cutter House	5	9	13	0.2%
Bath & Pump Houses - Reservoir	13	-	13	0.2%
Jarvis House	1	11	12	0.2%
Cemetery Garage	1	-	1	0.0%
Robbins Cottage	0	0	0	0.0%
Spy Pond Field House	0	-	0	0.0%
Carriage House	-	-	-	-
DPW Building E - NEW (Facilities)	-	-	-	-
DPW Building G - NEW Salt Shed[8]	-	-	-	-
Total	**2,217**	**4,378**	**6,595**	**100%**

[7] Emissions factors used to calculate MT CO_2e can be found in *Table 5. MT CO2e projections, provided by the Executive Office of Energy and Environmental Affairs (EEA) in the Massachusetts Clean Energy and Climate Plan (CECP) for 2050.*

[8] The Carriage House was unoccupied in FY22, and DPW Buildings E & G are new buildings with no data for FY22, which are nevertheless included in emissions projections.

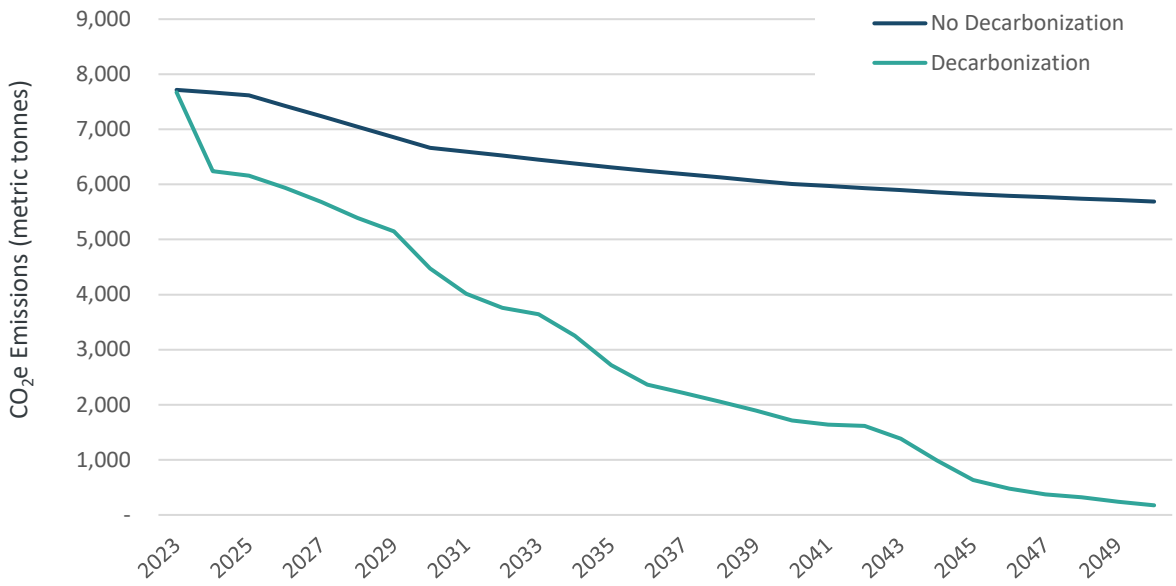
Summary of Findings

The projected reductions associated with decarbonizing the 36 buildings and 151 vehicles analyzed in this roadmap are summarized in Table 4 and Figure 1 below. Overall, the Town could expect to see a 98 percent reduction in GHG emissions by 2050, compared to Fiscal Year 2022 baseline emissions levels.

Table 4. Projected emissions reductions as a result of decarbonizing the Town of Arlington's 36 buildings and 151 vehicles analyzed in this roadmap, compared to FY22 emissions baseline.

Decarbonization Roadmap Projections	**2027**	**2030**	**2040**	**2050**
Emissions reductions from onsite fossil fuels	-34%	-48%	-85%	-100%
Zero emission vehicles (ZEVs) in light-duty fleet adoption	8%	24%	78%	100%
Zero emission vehicles (ZEVs) in heavy-duty fleet adoption	0%	0%	39%	100%
Energy Use Intensity reduction	-19%	-27%	-47%	-54%
Total Emissions Reduction Goals (% of 2022 emissions)	26%	42%	78%	98%

Figure 1. CO_2e emissions by scenario, showing percent reduction as compared to FY2022 emissions (2022-2050) for facilities (36 buildings) and fleet (151 vehicles).



Decarbonization Plans for High Impact Buildings

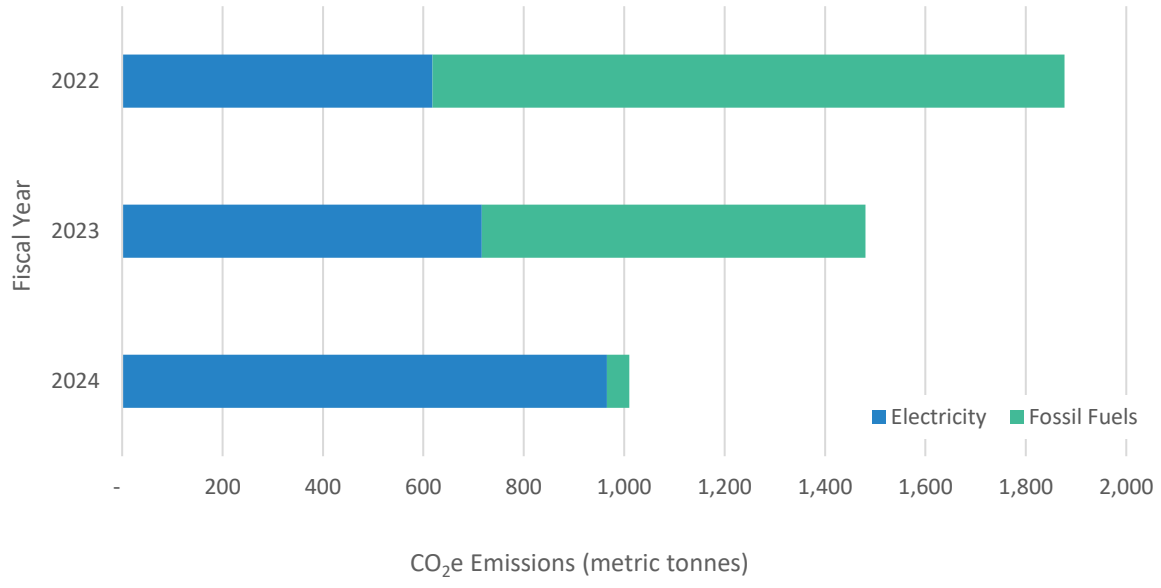
Buildings Background

Thirty-six municipal buildings (Table 3), which accounted for over 86 percent (6,595 MT CO_2e) of total Town emissions in Fiscal Year 2022, were included in the analysis. Eleven of those thirty-six buildings contributed 77 percent of building emissions and 67 percent of the Town's total Fiscal Year 2022 emissions (Table 2): the Arlington High School (29%); Ottoson Middle School (11%); Hardy Elementary School (6.6%); Gibbs School (4.5%); Dallin Elementary School (4.1%); Stratton Elementary School (4.1%); Ed Burns Arena (4%); Bishop Elementary School (3.9%); Peirce Elementary School (3.7%); Brackett Elementary School (3.5%); and Town Hall and Annex (3.3%). Focusing efforts on these high impact facilities will reduce overall emissions and contribute significantly to the Town's overall projected emissions reductions.

Since Fiscal Year 2022, decarbonization measures have already been implemented at the Arlington High School and two of the Department of Public Works (DPW) buildings, and additional energy-saving and clean energy projects are being considered at the Bishop, Brackett, Dallin, Hardy, and Thompson Elementary Schools.

As of November 2024, the construction of the new, fully electric Arlington High School is nearing completion. The electrification of this school significantly contributes to the Town's projected on-site fossil fuel emissions reductions between Fiscal Year 2022 and Fiscal Year 2024 (Table 4). Since 2022, the school's emissions have decreased by 46 percent (Figure 2). This building is therefore excluded from near-term decarbonization planning for the listed high impact buildings.

Figure 2. Arlington High School's GHG emissions from Fiscal Year 2022-Fiscal Year 2024, as reported in MassEnergyInsight (MEI).



Ottoson Middle School

In Fiscal Year 2022, the Ottoson Middle School emitted 709 MT CO_2e, the second highest building-related emissions at the time. Though the Town has replaced some of the heating equipment at the school with newer, high-efficiency boilers, natural gas emissions were responsible for over 70 percent of the building's total emissions.

The Town plans to replace this middle school within the next five to ten years and will explore options for the construction of an all-electric building. Given the school's proximity to a baseball field and parking lots, the use of ground-source heat pumps (GSHP) may be considered during construction of the new building. Though the size of the new school and heating load is not yet confirmed, it is estimated that somewhere between 50 and 60 wells would be required for a GSHP system.

Building Characteristics

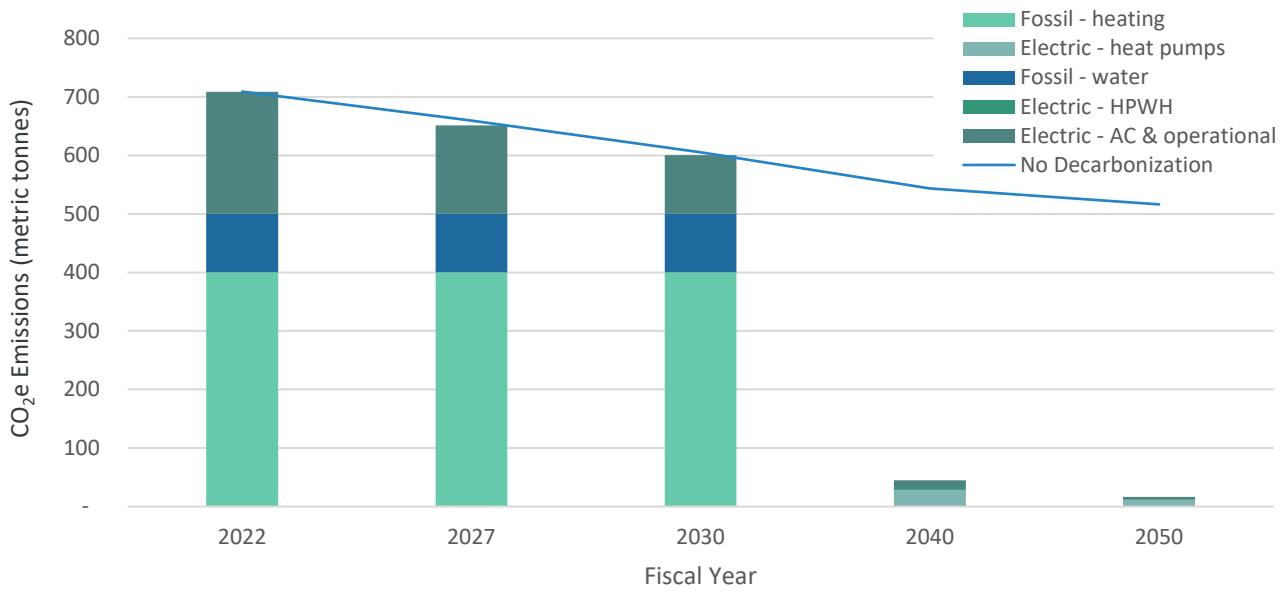
Square Footage: *154,380*
FY2022 Emissions: *709 MT CO_2e*
FY2022 EUI: *81 kBtu/ft²*
Existing Solar: *Yes, 94.2 kW and 3.4 kW*
Heating: *1998/2014/2021, natural gas*
Water Heating: *2014, natural gas*
Kitchen: *natural gas*

Proposed Strategy

HVAC: *2035, GSHP**
Water Heating: *2035, GSHP**
Kitchen: *2035, induction range**
**with fully rebuilt school*

Several energy conservation projects have been funded by Green Communities over the past decade, and though emissions have improved in this time, new construction would allow the Town to achieve net zero emissions at the middle school.

Figure 3. Estimated future building emissions based on proposed building efficiency and electrification plans at Ottoson Middle School.



Hardy Elementary School

Though GHG emissions the Hardy Elementary School were lower than those of the Ottoson Middle School, its EUI was nearly double, at 138 kBtu/ft^2. This is likely related to the inefficiencies associated with the dated natural gas boilers and envelope leakage. Within the next year, a roof replacement, weatherization and other energy efficiency measures are planned, which are likely to reduce the school's EUI in the near-term.

Building Characteristics

Square Footage: *55,107*
FY2022 Emissions: *432 MT CO_2e*
FY2022 EUI: *138 kBtu/ft^2*
Existing Solar: *No*
Heating: *2002, natural gas*
Water Heating: *2018, natural gas*
Kitchen: *natural gas*

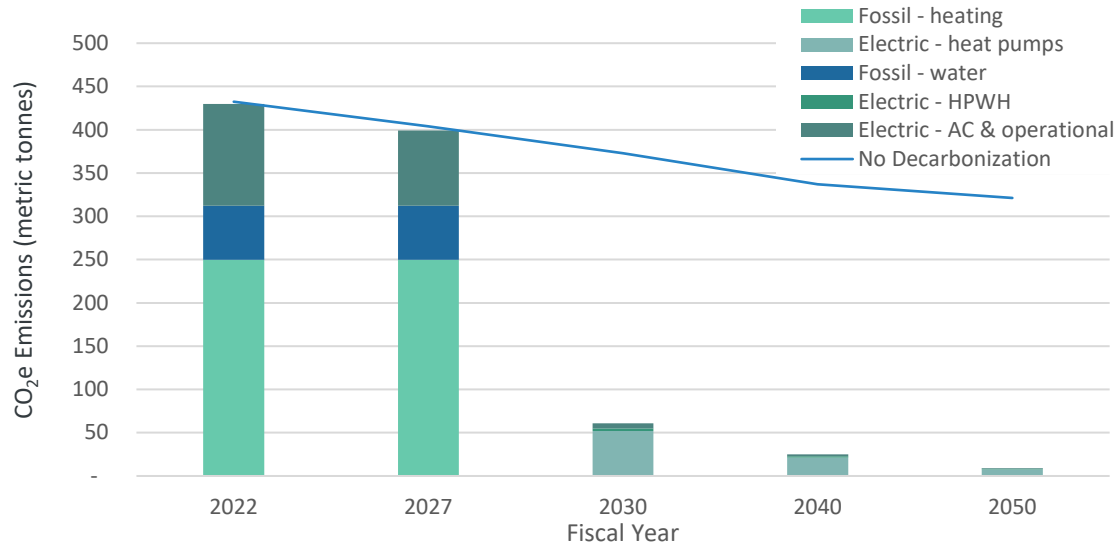
Proposed Strategy

HVAC: *2030, VRF*
Water Heating: *2030, HPWH*
Kitchen: *2032, induction or electric range*
Solar: *100 kW planned*

The heating and cooling equipment at this building have reached the end of their projected useful life, so electrification upgrades to the existing equipment could begin immediately. Using American Rescue Plan Act (ARPA) funding, the Town has solicited recommendations and a cost estimate for electrification of the school's heating and cooling equipment. Funding has not been secured, but electrification should be prioritized. The Town is exploring alternative financing and grant options, as the cost is too high to be accommodated in the capital plan.

Variable Refrigerant Flow (VRF) heat pumps could replace the current natural gas boilers, given the size of the building and existing equipment. Around 2030, the existing natural gas water heater could be upgraded to a heat pump water heater (HPWH), and the natural gas cooking range converted to electric or induction around 2032.

Figure 4. Estimated future building emissions based on proposed building electrification plans at the Hardy Elementary School.



Gibbs School

The Gibbs School was the third-highest emitter of the Town buildings in Fiscal Year 2022. Fossil fuel emissions accounted for less than half of the school's total emissions but still contributed significantly to the Town's overall emissions.

Building Characteristics

Square Footage: *53,769*
FY2022 Emissions: *298 MT CO_2e*
FY2022 EUI: *92 kBtu/ft^2*
Existing Solar: *No*
Heating: *2000/2017, natural gas*
Water Heating: *2017, natural gas*
Kitchen: *natural gas*

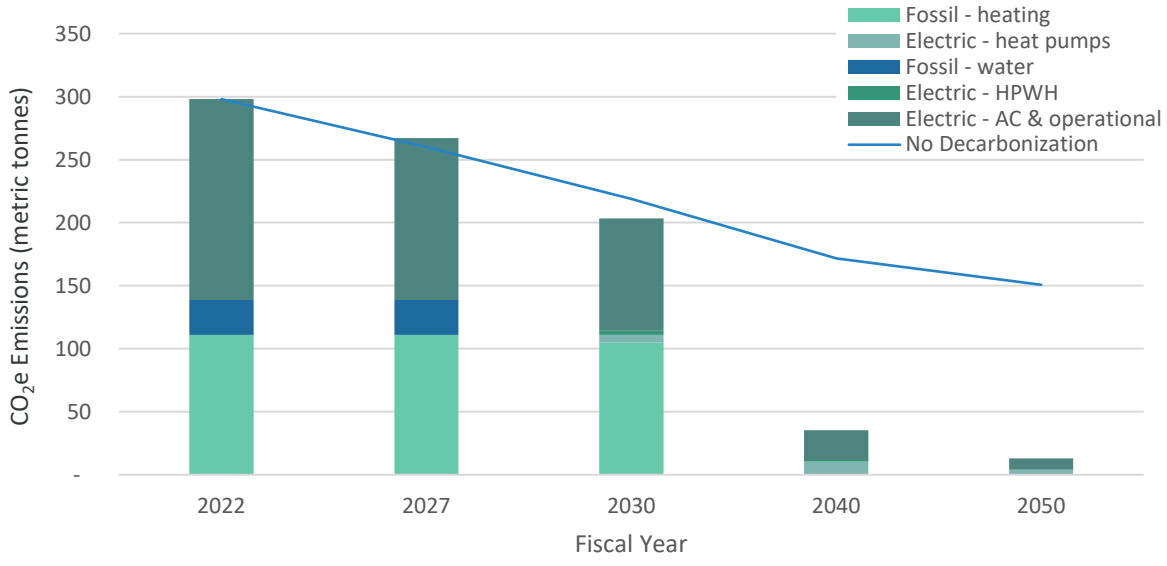
Proposed Strategy

Energy Efficiency: *2025-2029*
HVAC: *2032, VRF and HP RTUs*
Water Heating: *2029, HPWH*
On-Site Solar Potential: *120 kW*
Kitchen: *2030, induction or electric range*

In 2017, two of the school's three boilers were replaced with high-efficiency boilers and will not reach the end of their projected useful life in the near-term. These boilers, in combination with the two newer rooftop units (RTUs), are likely the reason for the lower fossil fuel consumption. Electrification of the existing boiler installed in 2000, which is currently used for backup, could be considered in the near-term. Both VRF and heat pump packaged units would be viable options for electrification of the natural gas heating equipment. Heat pump water heaters could replace the existing natural gas heaters at or near their end of useful life around 2029, and an electric or induction cooking range could replace the natural gas range around the same time.

Energy efficiency measures such as ensuring building management system (BMS) and ventilation efficiencies, and upgrading lighting controls and fixtures, could also reduce energy consumption in the near-term and should be explored prior to electrification.

Figure 5. Estimated future building emissions based on proposed building efficiency and electrification plans at the Gibbs School.



Dallin Elementary School

The Dallin Elementary School was the next-highest emitter of GHG emissions in Fiscal Year 2022 and had an EUI of 69 kBtu/ft^2. At the start of Fiscal Year 2023, the school received funding for energy conservation measures including insulation and LED lighting. The implementation of these energy conservation measures is expected to reduce the school's GHG emissions in the near-term.

Building Characteristics

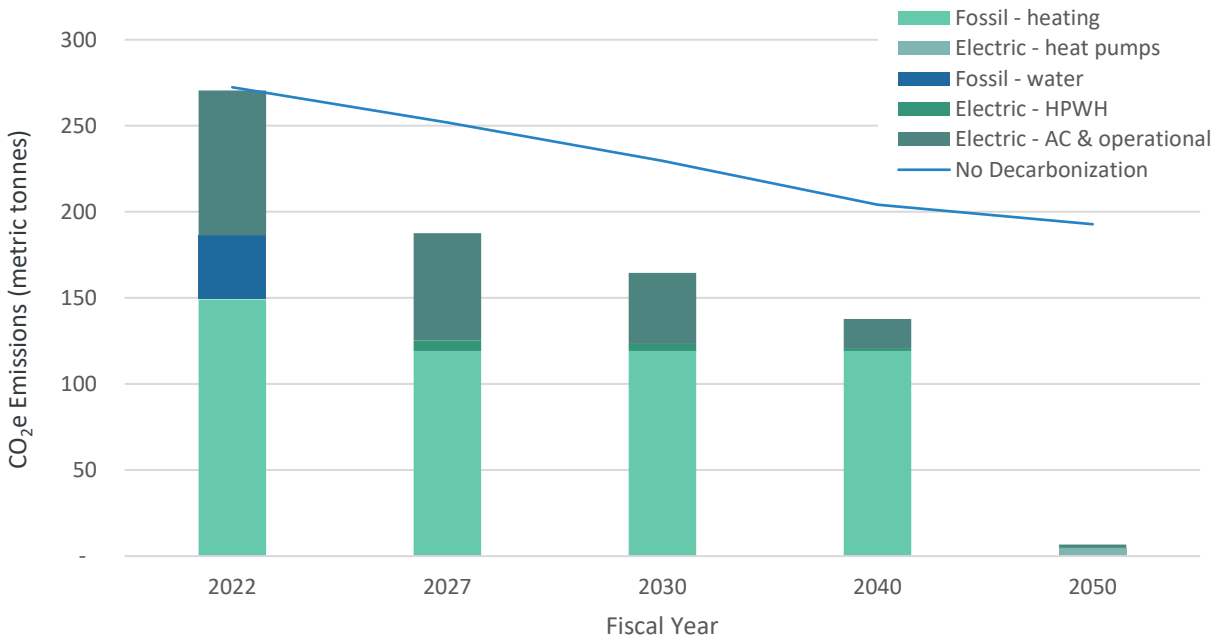
Square Footage: *68,578*
FY2022 Emissions: *272 MT CO_2e*
FY2022 EUI: *69 kBtu/ft^2*
Existing Solar: *Yes, 117 kW*
Heating: *2005, natural gas*
Water Heating: *2005, natural gas*
Kitchen: *natural gas*

Proposed Strategy

Energy Efficiency: *continued through 2025-2029*
HVAC: *2045, VRF*
Water Heating: *2025, HPWH*
Kitchen: *2027, induction or electric range*

The existing boilers installed in 2005 will need to be replaced with high efficiency gas boilers in Fiscal Year 2025. Though still powered by fossil fuels, these new boilers will reduce emissions at the elementary school. Although the new boilers are assumed not to be replaced until 2045, options for electrification could be explored in the interim. The natural gas water heater has reached the end of its projected useful life and could be replaced with a heat pump water heater as soon as 2025, or as funding permits. The existing natural gas cooking range could be electrified around the same time.

Figure 6. Estimated future building emissions based on proposed building electrification plans at the Dallin Elementary School.



Stratton Elementary School

The Stratton Elementary School contributed 271 MT CO_2e to the Town's emissions in Fiscal Year 2022. This building does not emit as large a quantity of GHGs as some of Arlington's other school buildings, but it is still a top contributor to the Town's overall emissions (3.6 percent). Direct fossil fuel use contributed nearly 75 percent of building emissions.

Upgrades to existing heating and cooling equipment likely will not be needed in the near-term. When the two remaining boilers from 2016 reach the end of their useful lives around 2031, VRF heat pumps could be an appropriate solution. A VRF heat pump system could also supplement the existing VRF technology that exists at the school. The current VRF system will likely need updating at around the same time as the boiler replacement.

Building Characteristics

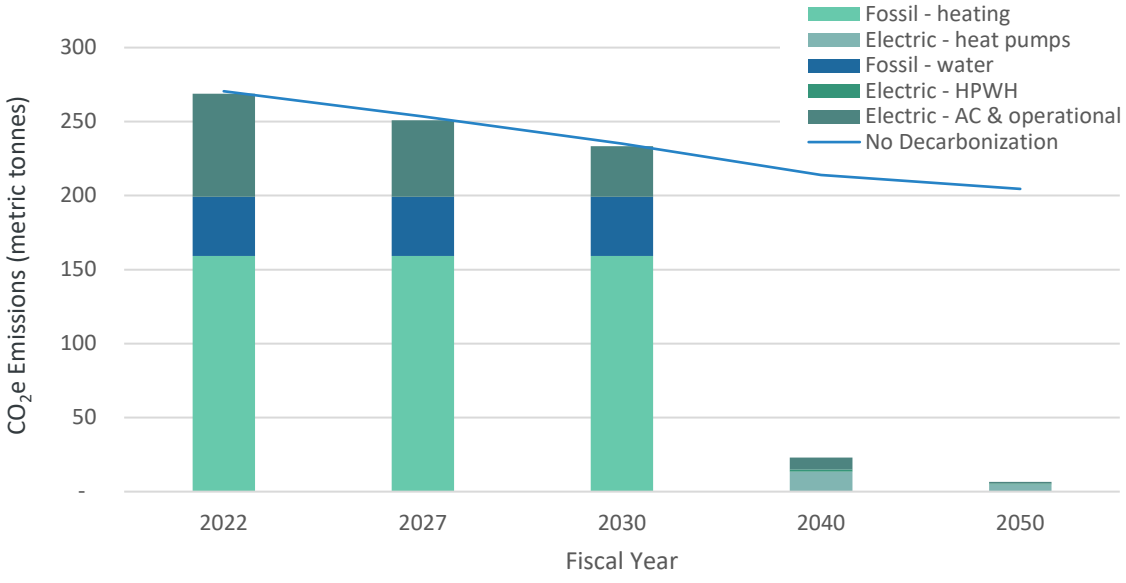
Square Footage: *63,300*
FY2022 Emissions: *271 MT CO_2e*
FY2022 EUI: *76 kBtu/ft^2*
Existing Solar: *Yes, 117 kW*
Heating: *2016, natural gas & electric*
Water Heating: *2016, natural gas*
Kitchen: *natural gas*

Proposed Strategy

Energy Efficiency: *2025-2029*
HVAC: *2031 (boiler), VRF*
Water Heating: *2031, HPWH*
Kitchen: *2035, induction or electric range*

Heat pump water heaters could replace the existing water heaters also installed in 2016. Induction or electric range stovetops will be the final measure required to achieve net zero emissions by 2050. Energy efficiency measures, such as ensuring BMS and ventilation efficiencies and upgrading lighting controls and fixtures, could further reduce energy consumption near-term and should be studied prior to electrification.

Figure 7. Estimated future building emissions based on proposed building efficiency and electrification plans at the Stratton Elementary School.



Ed Burns Arena

The Ed Burns Arena & Ice Skating Rink contributed 265 MT CO_2e in Fiscal Year 2022. Due to the recreational use type of this facility, its EUI was the highest of all Town buldings. The heating and cooling equipment at the arena are newer, but fossil fuels still accounted for over 50 percent of the building's emissions.

Due to the size of the arena, and the building's energy demands, GSHPs could be an appropriate replacement for the four existing boilers installed in 2016. The geothermal system could also integrate with both domestic and building hot water. The large field and/or parking lot next to the area could be utilized for the installation of the 10 to 20 wells that are estimated to be required.

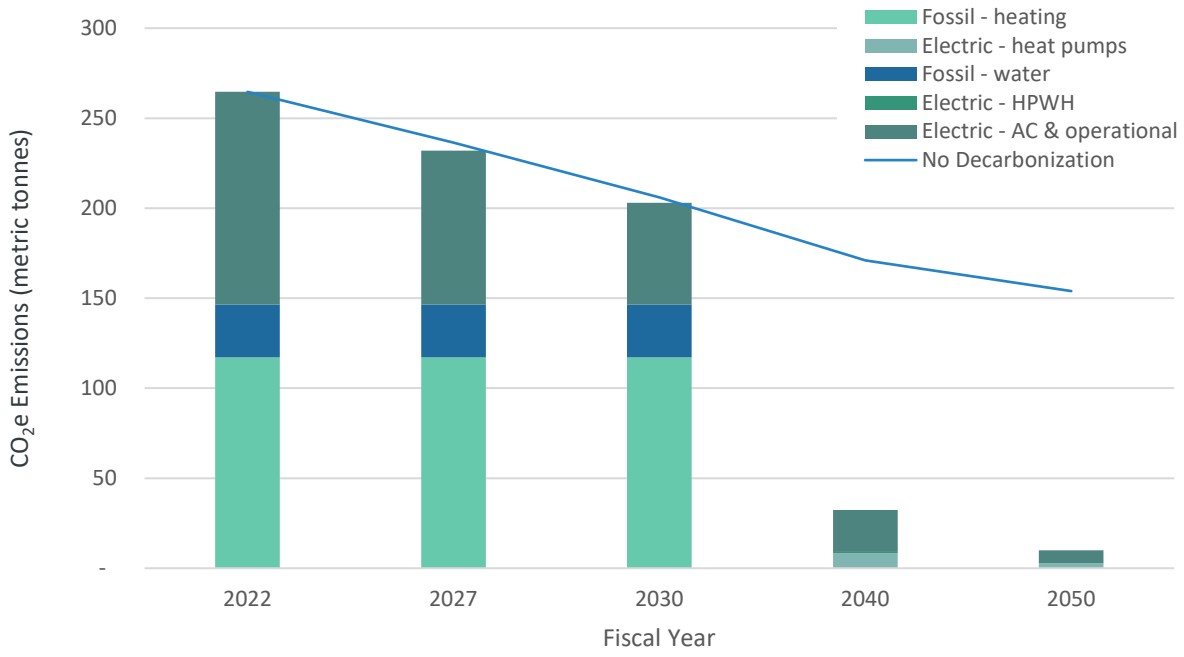
Building Characteristics

Square Footage: *25,680*
FY2022 Emissions: *265 MT CO_2e*
FY2022 EUI: *174 kBtu/ft²*
Existing Solar: *No*
Heating: *2016, natural gas*
Water Heating: *2016, natural gas*

Proposed Strategy

Energy Efficiency: *2025-2029*
HVAC: *2031, GSHP*
Water Heating: *2031, GSHP*
Solar Potential: *2027, 216 kW*

Figure 8. Estimated future building emissions based on proposed building efficiency and electrification plans at the Ed Burns Arena.



Bishop Elementary School

The Bishop Elementary School contribued close to 4 percent of the Town's building emissions in Fiscal Year 2022. Though similar in size to the Hardy Elementary School, emissions and EUI were 40 percent lower.

The school's current heating equipment was installed in 2005 and is expected to be replaced with new, efficient gas boilers in the near-term. In 2044, when the new gas boilers reach the end of their useful lives, GSHPs could be utilized to electrify the building. Around 2032, the natural gas water heater installed in 2019 could be replaced with a heat pump water heater, which would further reduce emissions. Finally, in approximately 2035, an induction or electric cooking range could be installed to electrify the natural gas range at the school.

Building Characteristics

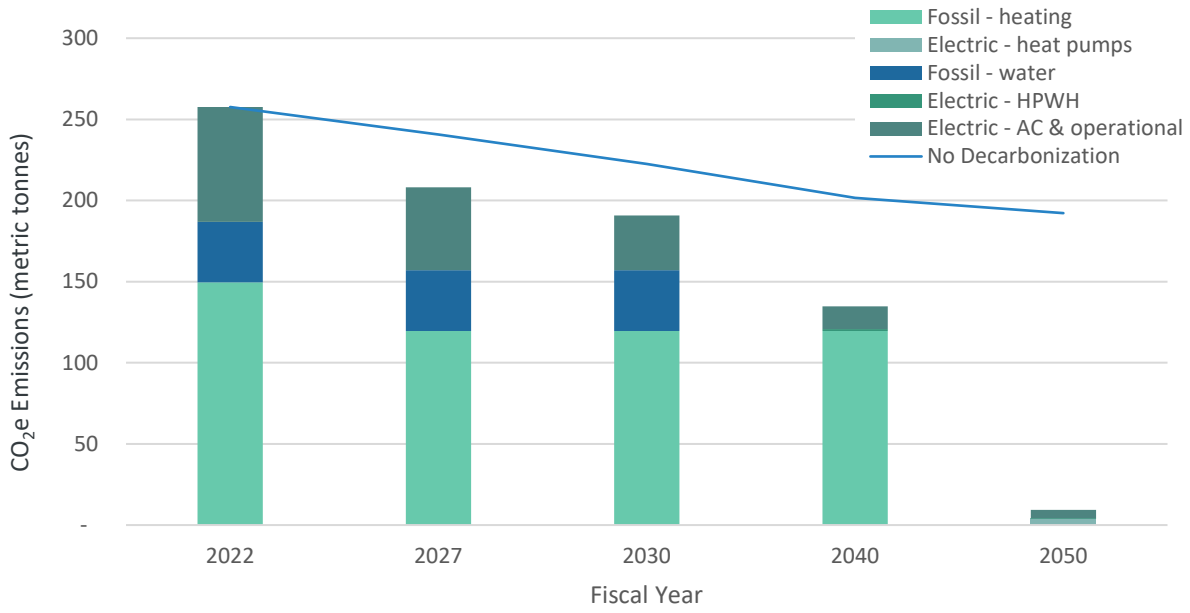
Square Footage: *51,367*
FY2022 Emissions: *258 MT CO_2e*
FY2022 EUI: *88 kBtu/ft^2*
Existing Solar: *No*
Heating: *2005, natural gas*
Water Heating: *2019, natural gas*
Kitchen*: natural gas*

Proposed Strategy

Energy Efficiency: *2025-2029*
HVAC: *2044, GSHP*
Water Heating: *2032, HPWH*
Solar Potential: *100 kW, planned*
Kitchen: *2035, induction or electric range*

Though full building electrification is not expected to occur until 2044, the combination of new boilers and energy conservation measures, such as ensuring efficient BMS runtimes, improving insulation, and upgrading lighting fixtures, could help reduce emissions in the near-term.

Figure 9. Estimated future building emissions based on proposed building efficiency and electrification plans at the Bishop Elementary School.



Peirce Elementary School

The Peirce Elementary School has an emssions profile and path to decarbonization similar to that of the Bishop Elementary School. The two natural gas boilers have reached the projected end of their useful lives but are not expected to be electrified in the near-term due to cost limitations. They will instead be replaced with new, efficient gas boilers, which will reduce fossil fuel-related emissions.

In the long-term, options for electrification should be considered. VRF heat pumps could replace the new boilers around 2045, and a heat pump water heater could be used to electrify the existing natural gas water heater, which has reached the end of its useful life, as soon as financially feasible.

Building Characteristics

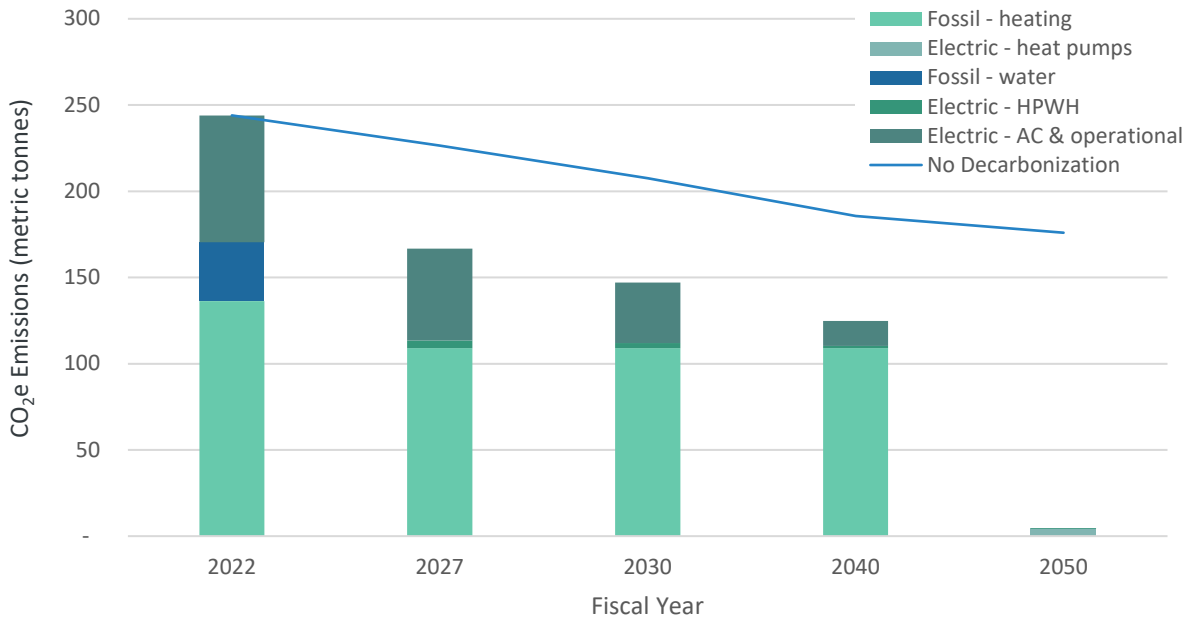
Square Footage: *48,500*
FY2022 Emissions: *244 MT CO_2e*
FY2022 EUI: *88 kBtu/ft^2*
Existing Solar: *Yes*
Heating: *2003, natural gas*
Water Heating: *2002, natural gas*
Kitchen*: natural gas*

Proposed Strategy

Energy Efficiency: *2025-2029*
HVAC: *2045, VRF*
Water Heating: *2026, HPWH*
Kitchen: *2030, induction or electric range*

Lighting upgrades were made to the building in Fiscal Year 2022, and additional energy conservation measures should be explored in the near-term. As recommended for the other school buildings, ensuring that temperature setpoints and schedules are running as intended could reduce energy consumption and emissions.

Figure 10. Estimated future building emissions based on proposed building efficiency and electrification plans at the Peirce Elementary School.



Brackett Elementary School

The Brackett Elementary School is the final school building on the high impact building list. In Fiscal Year 2022, it produced 229 MT CO_2e, or 3.5 percent, of the Town's total building emissions.

Electrification of the existing heating equipment at Brackett is not feasible in the near-term due to cost constraints. The school's two boilers, which have reached the end of their projected useful lives, are expected to be replaced with new, efficient gas boilers. Electrification will therefore be considered in the long-term.

In approximately 2032, a heat pump water heater could replace the existing gas water heater and an induction or electric stove could replace the gas cooking range. Energy efficiency measures could also be studied and implemented in the near-term, to further reduce energy consumption at the school.

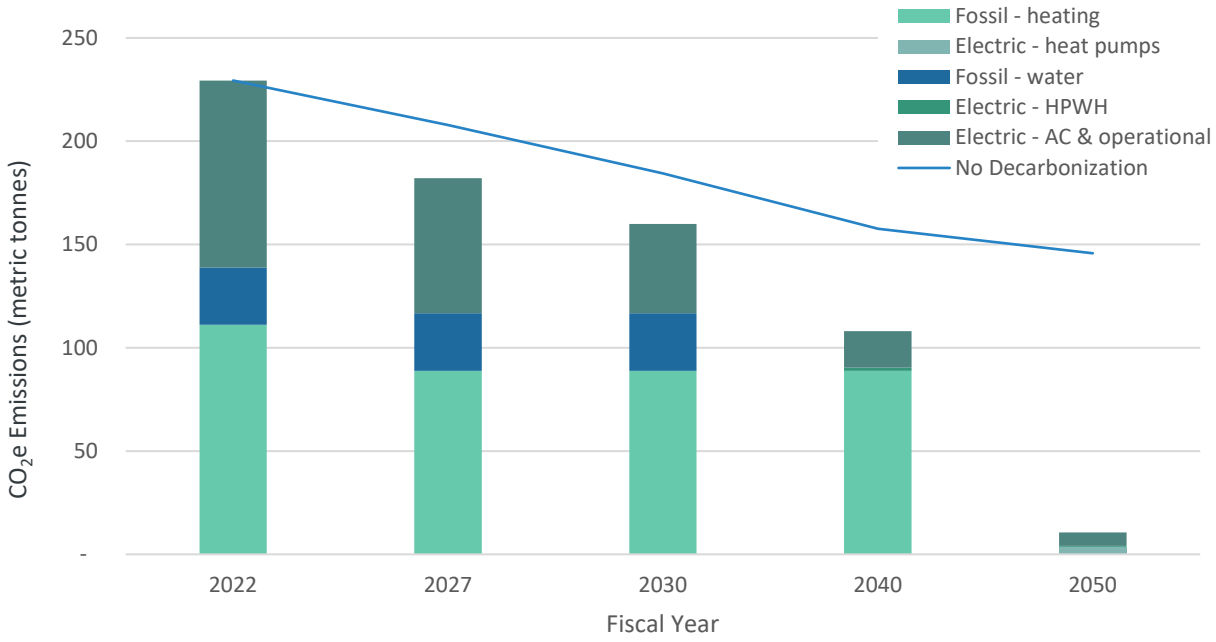
Building Characteristics

Square Footage: *57,670*
FY2022 Emissions: *229 MT CO_2e*
FY2022 EUI: *68 kBtu/ft^2*
Existing Solar: *No*
Heating: *2000, natural gas*
Water Heating: *2017, natural gas*
Kitchen*: natural gas*

Proposed Strategy

Energy Efficiency: *2025-2029*
HVAC: *2044, VRF*
Water Heating: *2032, HPWH*
Solar Potential: *2026, 72.2 kW*
Kitchen: *2030, induction or electric range*

Figure 11. Estimated future building emissions based on proposed building efficiency and electrification plans at the Brackett Elementary School.



Town Hall and Annex

The Town Hall and Annex contributed 221 MT CO_2e in Fiscal Year 2022. The Town Hall complex is the final high impact building analyzed in the roadmap.

The Town Hall and Annex's proximity to lawn space makes this complex a good candidate for ground-source heat pumps (GSHP). If installed, the GSHPs could also be used for water heating in the building and may also generate enough energy to serve the nearby Robbins Library. Though further studies would be necessary, preliminary estimates suggest that about 20 wells would be required.

Building Characteristics

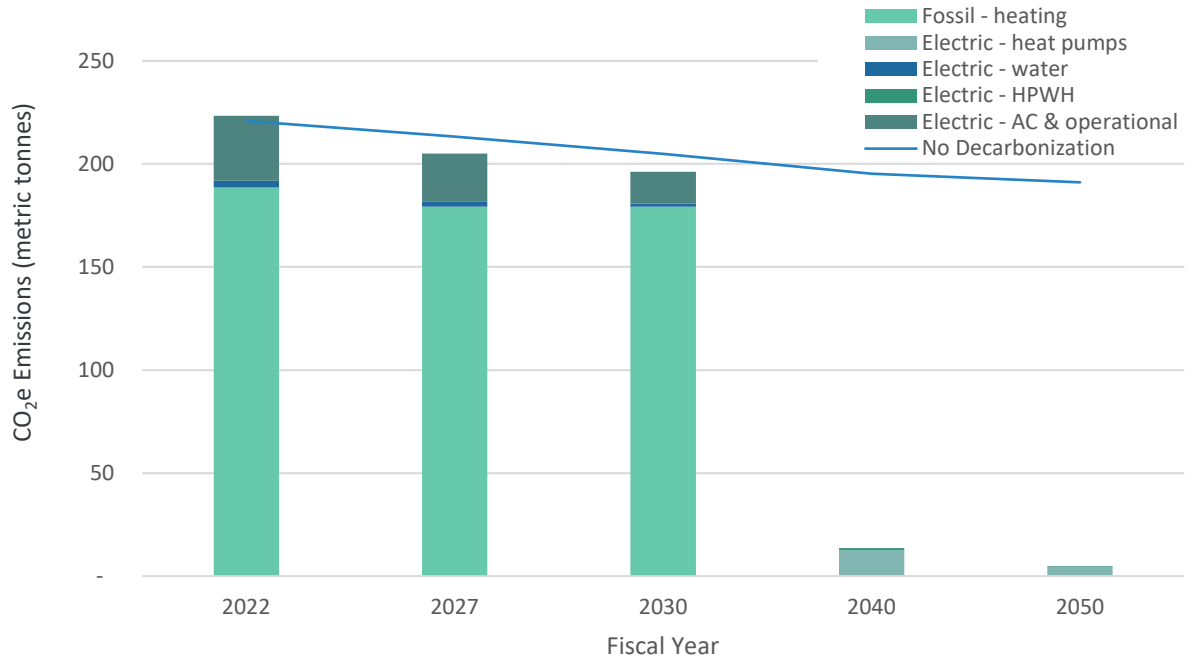
Square Footage: *45,612*
FY2022 Emissions: *221 MT CO_2e*
FY2022 EUI: *88 kBtu/ft²*
Existing Solar: *No*
Heating: *2004/2019, natural gas*
Water Heating: *2016, electric*
Kitchen*: electric*

Proposed Strategy

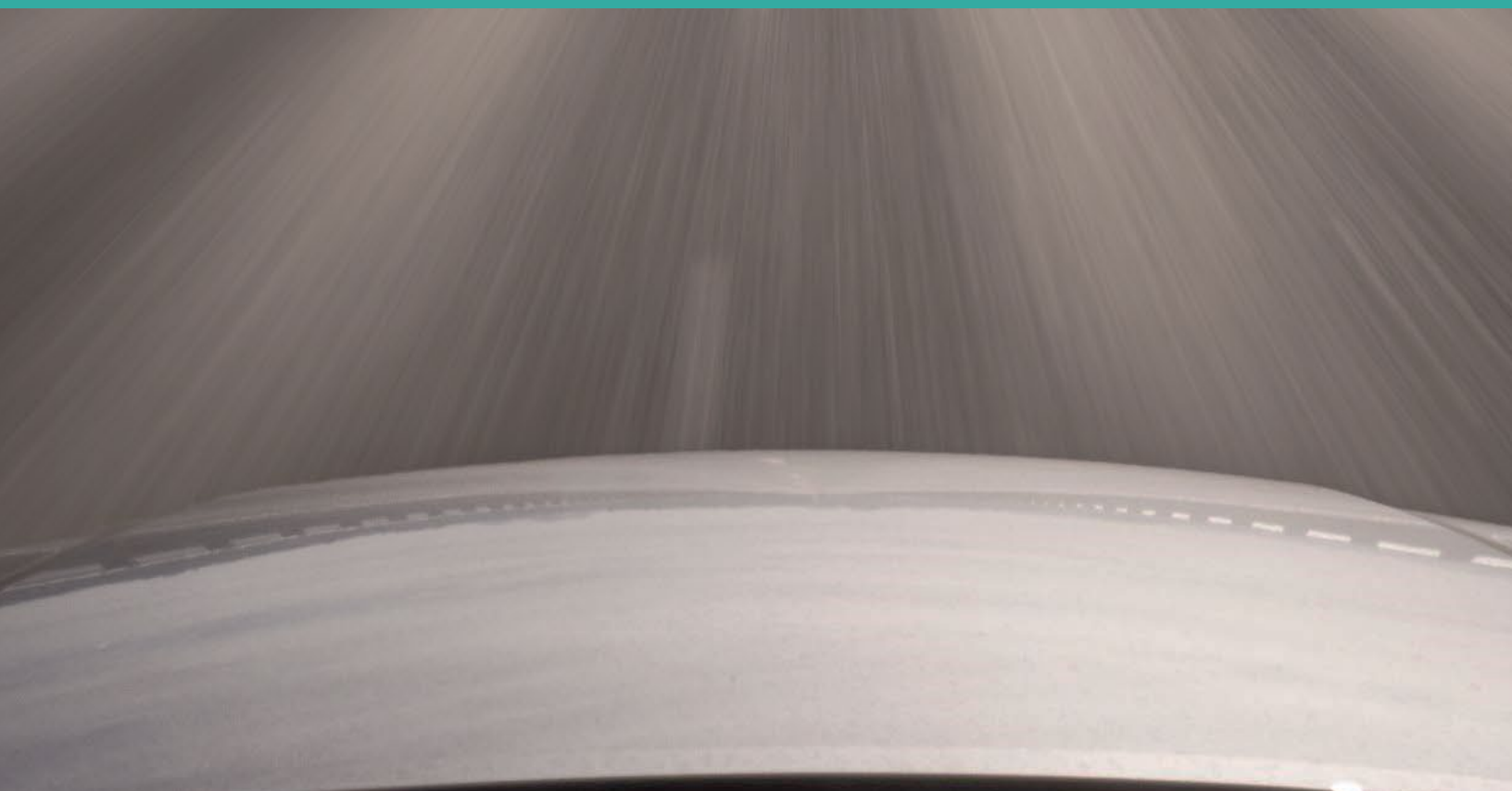
Energy Efficiency: *2025-2029*
HVAC: *2034, GSHP*
Water Heating: *2034, GSHP*
Solar Potential: *2034, 24.1 kW*

Though electricity is used for water heating and cooking already, the high fossil fuel-related emissions suggest that there are opportunities for energy efficiency. Measures such as updating the BMS and replacing the single pane windows could reduce emissions in the near-term.

Figure 12. Estimated future building emissions based on proposed building efficiency and electrification plans at the Town Hall & Annex.



Vehicles



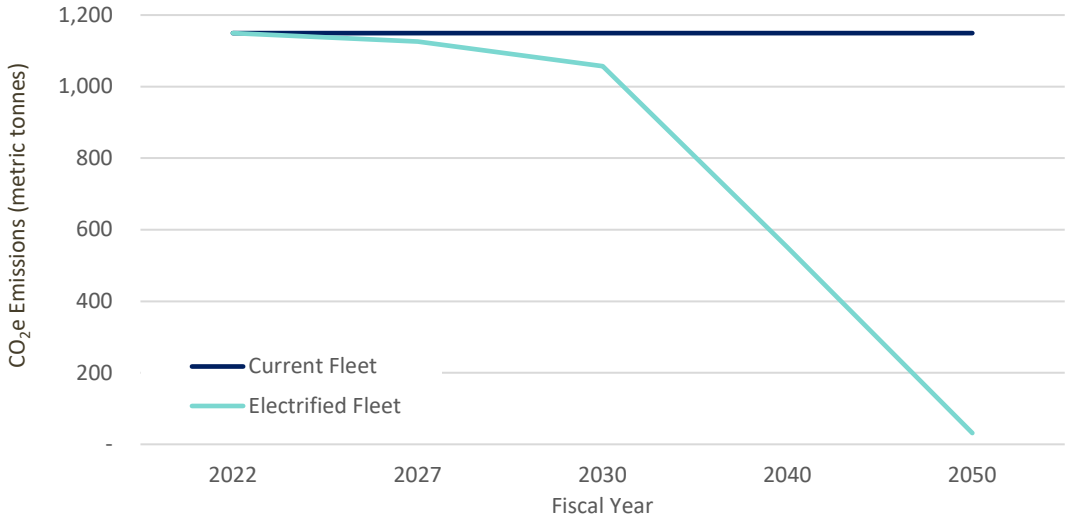
Fleet Vehicles

As of Fiscal Year 2023, the Town of Arlington has utilized grant funding to convert four of the Town's internal combustion engine (ICE) vehicles to battery electric vehicles (BEV) and plug-in hybrid electric vehicles (PHEVs). The Town has also adopted a Zero-Emission Vehicle (ZEV) First policy, which is required for Climate Leader designation.[9] This policy requires that municipal departments and divisions prioritize the purchase of ZEVs. While there are certain vehicle exemptions and exceptions permitted under specific circumstances, the policy is intended to eliminate the combustion of fossil fuels in fleets and support broader emissions reductions in the municipality. A procurement timeline that replaces vehicles at the end of their projected useful lives or when electric alternatives become available can be followed to comply with the policy.

Arlington's fleet consists of 151 vehicles: 91 light-duty vehicles (LDV), 21 medium-duty vehicles (MDV), and 39 heavy-duty vehicles (HDV).[10] As of Fiscal Year 2023, Arlington had 6 electric vehicles (EVs) — 2 school buses and 4 Chevrolet Bolts; and 1 PHEV (a Toyota Prius), which were excluded from this analysis. Arlington's existing EVs were excluded from this analysis because the roadmap is specifically focused on transitioning the remaining ICE vehicles to zero-emission vehicles.

Municipal and school vehicles accounted for fourteen percent (14%) of the Town's emissions in Fiscal Year 2022. Converting the current fleet of ICE vehicles to BEV platforms could result in avoiding 12,000 MT CO_2e emissions cumulatively through 2050.

Figure 13. CO_2e emissions by scenario, Fiscal Year 2022-2050.



[9] Climate Leaders Zero-Emission-First Vehicle Policy, https://www.mass.gov/doc/climate-leader-communities-zev-first-policy/download

[10] Alternative Fuels Data Center. "Vehicle Weight Classes & Categories." U.S. Department of Energy, https://afdc.energy.gov/data/10380.

Procurement Timeline

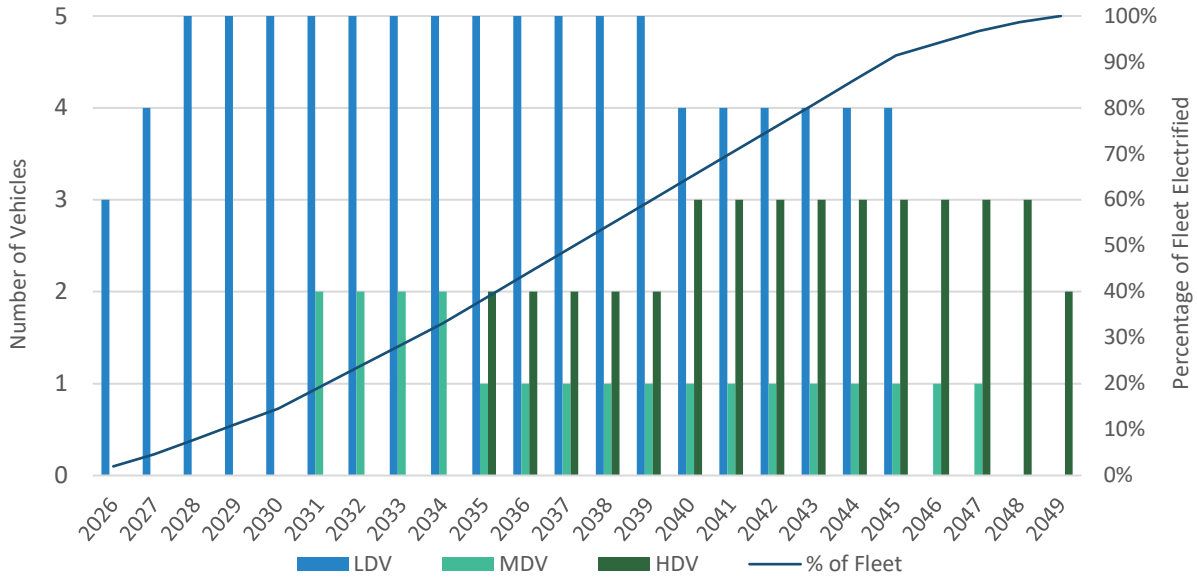
The procurement timeline is based on cost-effectiveness, annual budget considerations, and the remaining useful life of each vehicle in Arlington's existing fleet (Figure 14). The appendix contains a detailed table with specific replacement years and EV model replacements for each vehicle. Please note that these assumptions are subject to change based on evolving factors such as vehicle availability.

From 2025-2030, 22 light-duty vehicles can be converted to electric. These are primarily sedans, SUVs, and pickup trucks—all of which have mature EV market options that are cheaper and cleaner to operate than their gas/diesel alternatives. Strong state incentives make near-term purchase possible and recommended.

Between 2031-2040, another 49 light-, 14 medium and 13 heavy-duty vehicles can be replaced. These 27 heavier vehicles comprise of transit vans, pickup trucks, heavy-duty trucks fire trucks and school buses. The medium- and heavy-duty market is in the early stages of development, and advancements are expected to lead to increased cost-effectiveness in the future.

In 2041-2050, the remaining 20 light-, 7 medium-, and 26 heavy-duty vehicles will be cost-competitive candidates for EV replacement. Currently, electric alternatives for these vehicle types, particularly those with specialty features like mounted cranes and snowplows, are limited or non-existent. Options for fire and dump trucks are anticipated to expand, however, making them more cost competitive in the future. Therefore, it is recommended that the Town wait until the heavy-duty EV market matures and more options are available, before electrifying these vehicles.

Figure 14. Vehicle replacement schedule by vehicle class (light-duty [LDV], medium-duty [MDV] and heavy-duty [HDV]).



Assumptions & Conclusion

Assumptions

Emissions Factors

- Emissions factors for fossil fuels are held constant throughout the roadmap and were derived from the EPA published factors.[11] Electricity emissions factors are sourced from the Massachusetts Clean Energy and Climate Plan for 2050, and represent estimates based off the New England grid (Table 5).

Buildings

- *Energy Efficiency Recommendations and Savings:* The measures and associated savings outlined for buildings were derived through completion of a virtual energy audit of all buildings.[12]
- *Electrification Recommendations:* Existing equipment replacement year is determined by the current age of the system(s) and any planning currently underway. The type of heat pump equipment used for electrification is determined using the following data points provided by the community:
    - System age and capacity (Btu)
    - Fuel type(s) used
    - Building square footage
    - Existing equipment type (i.e., boiler, furnace, RTU, etc.)

Fleet

- *Mileage Consideration:* Analysis incorporates average miles traveled to align recommendations with real-world usage patterns, unless otherwise provided by the Town.
- *Vehicle Replacement:* The year is determined by factors including:
    - *Expected Lifetime*: Vehicles typically have a lifespan of around 10 years. This expected lifetime helps to establish a baseline for when replacement becomes necessary.
    - *Market Availability*: Based on the availability of electric alternatives in the market, the recommendation is to wait until a specific model becomes available.

Table 5. MT CO_2e projections for various fuel types, provided by the Executive Office of Energy and Environmental Affairs (EEA) in the Massachusetts Clean Energy and Climate Plan (CECP) for 2050.

CO2 Emissions per Unit (metric tons, MTe)	2022	2025 (projected)	2030 (projected)	2040 (projected)	2050 (projected)
Electricity (kWh)	0.0002345	0.0002195	0.0001184	0.0000485	0.0000150
Natural Gas (therms)	0.00531	0.00531	0.00531	0.00531	0.00531
Oil Savings (gallons)	0.01015	0.01015	0.01015	0.01015	0.01015
Gasoline (gallons)	0.00886	0.00886	0.00886	0.00886	0.00886
Diesel (gallons)	0.01015	0.01015	0.01015	0.01015	0.01015
Propane (gallons)	0.00576	0.00576	0.00576	0.00576	0.00576

Source: MA EEA

[11] Greenhouse Gas Emissions Technical Reference

[12] This was a "desktop" audit. In-person, technical audits will be required to validate efficiency measures to implement.

Conclusion & Next Steps

This roadmap illustrates that the Town of Arlington can meet the emissions reductions targets set by the Secretary and required for the Climate Leader Community certification. By 2050, the electrification measures outlined in this roadmap are estimated to reduce Arlington's GHG emissions by over 100,000 cumulative MT CO_2e and lower building Energy Use Intensity (EUI) by 54 percent.

To become a certified Climate Leader, Arlington will, in combination with ongoing GHG reduction efforts, strive to implement this Municipal Decarbonization Roadmap. To comply with Climate Leader guidelines, Arlington also commits to updating the proposed plan of action every three years.

Appendix

Table 6. Possible decarbonization measures, by building.

Building	Fiscal Year 2022 Emissions (MT CO_2e)	Energy Efficiency (EE) Measures	Space Heating		Domestic Water Heating		Solar PV Potential (kW)	
			Existing (installation year, fuel type)	**Replacement** (installation year, heat pump type)	**Existing** (installation year, fuel type)	**Replacement** (installation year, heat pump type)	**Existing** (roof year)	**Solar** (installation year, size)
Arlington High School	1,876.7	*New building*	2022-2024 Pump(s)	N/A (existing), ducted ASHP	Existing	Existing electric water heating	2022-2024	Existing & 2025, 223.81 existing & 354.2 planned
Ottoson Middle School **replaced in next 5-10 years*	709.0	*- Monitor temperature setpoints and/or add additional control points*	2014, Natural Gas	2035, GSHP	2014, Natural Gas	2035, GSHP	1998	Existing, 94.24 & 3.36 kW
Hardy Elementary School	432.4	*- Monitor temperature setpoints and/or add additional control points* *- Upgrade lighting controls and fixtures as needed*	2002, Natural Gas	2030, VRF	2018, Natural Gas	2030, HPWH	2001	2025 (planned), 100 kW
Gibbs School (6th Grade)	298.0	*- Monitor temperature setpoints and/or add additional control points*	2017, Natural Gas	2032, VRF/HP RTUs	2017, Natural Gas	2029, HPWH	2008	2033, 120.3 kW

Building	Fiscal Year 2022 Emissions (MT CO_2e)	Energy Efficiency (EE) Measures	Space Heating		Domestic Water Heating		Solar PV Potential (kW)	
			Existing (installation year, fuel type)	**Replacement** (installation year, heat pump type)	**Existing** (installation year, fuel type)	**Replacement** (installation year, heat pump type)	**Existing** (roof year)	**Solar** (installation year, size)
Dallin Elementary School	272.4	*- Monitor temperature setpoints and/or add additional control points* *- Upgrade lighting controls and fixtures as needed*	2005, Natural Gas (to be replaced with gas boilers in near-term)	2045, VRF	2005, Natural Gas	2025, HPWH	2005	Existing, 117.8 kW
Stratton Elementary School	270.5	*- Monitor temperature setpoints and/or add additional control points* *- Ensure efficient ventilation rates*	2016, Natural Gas	2031, VRF	2016, Natural Gas	2031, HPWH	2010	Existing, 117.8 kW
Ed Burns Arena	264.6	*- Monitor temperature setpoints and/or add additional control points* *- Ensure adequate ventilation*	2016, Natural Gas	2031, GSHP	2016, Natural Gas	2031, GSHP	1969	2027, 216.5 kW
Bishop Elementary School	257.6	*- Monitor temperature setpoints and/or add additional control points* *- Upgrade lighting controls and fixtures as needed* *- Improve insulation*	2005, Natural Gas (to be replaced with gas boilers in near-term)	2044, GSHP	2019, Natural Gas	2032, GSHP	2001	2025 (planned), 100 kW

Building	Fiscal Year 2022 Emissions (MT CO_2e)	Energy Efficiency (EE) Measures	Space Heating		Domestic Water Heating		Solar PV Potential (kW)	
			Existing (installation year, fuel type)	**Replacement** (installation year, heat pump type)	**Existing** (installation year, fuel type)	**Replacement** (installation year, heat pump type)	**Existing** (roof year)	**Solar** (installation year, size)
Peirce Elementary School	244.0	*- Monitor temperature setpoints and/or add additional control points - Improve insulation*	2003, Natural Gas (to be replaced with gas boilers in near-term)	2045, VRF	2002, Natural Gas	2026, HPWH	2002	Existing, 70.7 kW
Brackett Elementary School	229.4	*- Monitor temperature setpoints and/or add additional control points* *- Upgrade lighting controls and fixtures as needed*	2000, Natural Gas (to be replaced with gas boilers in near-term)	2044, VRF	2017, Natural Gas	2032, HPWH	2000	2025, 72.2 kW
Town Hall & Annex	220.9	*- Ensure efficient BMS run times and temperature settings* *- Upgrade lighting controls and fixtures as needed*	2019, Natural Gas	2034, GSHP (shared with Robbins Library)	2016, Electricity (resistance coils)	2034, GSHP	2009 (main); 2008 (annex)	2034, 24.1 kW
Thompson Elementary School	209.1	*- Ensure efficient ventilation rates*	2015, Natural Gas	2030, GSHP	2015, Natural Gas	2030, GSHP	2013	Existing, 94.24 kW

Building	Fiscal Year 2022 Emissions (MT CO_2e)	Energy Efficiency (EE) Measures	Space Heating		Domestic Water Heating		Solar PV Potential (kW)	
			Existing (installation year, fuel type)	**Replacement** (installation year, heat pump type)	**Existing** (installation year, fuel type)	**Replacement** (installation year, heat pump type)	**Existing** (roof year)	**Solar** (installation year, size)
Community Safety Building/ Police	207.4	*- Monitor temperature setpoints and/or add additional control points* *- Upgrade lighting controls and fixtures as needed*	2023, Natural Gas	2038, VRF	2022, Natural Gas	2037, HPWH	2001	2030, 48.1 kW
Robbins Library	186.0	*- Monitor temperature setpoints and/or add additional control points* *- Upgrade lighting controls and fixtures as needed*	2013, Natural Gas	2034, GSHP (shared with Town Hall)	2013, Natural Gas	2034, GSHP	2013	2035, 24.1 kW
Parmenter School	168.3	*Ensure efficient BMS run times and temperature settings*	2021, Oil	2036, VRF	2021, Oil	2036, HPWH	N/A	N/A
DPW Bldg D - Snow Fighting Garage	138.8	*Recent renovations, no EE measures in near-term*	2024, Natural Gas	2043, VRF	N/A	N/A	1977	2002, 21.7 kW
Central School/ Community Center	124.3	*- Ensure efficient BMS run times and temperature settings* *- Upgrade lighting controls and fixtures as needed*	2021, Natural Gas	2036, VRF	2022, Natural Gas	2037, HPWH	1982	N/A
Central Fire Station	76.9	*Ensure efficient ventilation rates*	2015, Natural Gas	2030, VRF	2015, Natural Gas	2030, HPWH	2015	2040, 24.1 kW
DPW Bldg A - Admin/Engineering/Inspections	57.9	*Recent renovations, no EE measures in near-term*	Existing Heat Pump(s)	2023, Ducted ASHP	2022, Electricity (Heat Pump)	2035, HPWH	2022	2047, 9 kW
DPW Bldg C - Maintenance Garage	44.1	*Recent renovations, no EE measures in near-term*	2023, Natural Gas	2044, VRF	N/A	N/A	1977	2002, 6.9 kW

Building	Fiscal Year 2022 Emissions (MT CO_2e)	Energy Efficiency (EE) Measures	Space Heating		Domestic Water Heating		Solar PV Potential (kW)	
			Existing (installation year, fuel type)	**Replacement** (installation year, heat pump type)	**Existing** (installation year, fuel type)	**Replacement** (installation year, heat pump type)	**Existing** (roof year)	**Solar** (installation year, size)
Fox Library	41.4	*- Will be demolished and replaced in the near-term*	2008, Natural Gas	2028, VRF	2023, Natural Gas	2028, HPWH	2005	2030, 24.1 kW
Highland Fire Station	40.8	*Ensure efficient ventilation rates*	2011, Natural Gas	2028, VRF	2011, Natural Gas	2026, HPWH	2011	N/A
DPW Bldg B - Admin Offices/Assembly Hall	37.2	*Recent renovations, no EE measures in near-term*	Existing Heat Pump(s)	2023, Ducted ASHP	2023, Natural Gas	2034, HPWH	2024	2049, 5.8 kW
Whittemore Robbins House	31.9	*- Ensure efficient BMS run times and temperature settings*	2015, Natural Gas	2030, Ducted ASHP	2009, Natural Gas	2027, HPWH	N/A	N/A
Ryder Street Garage * *Likely to be torn down or renovated*	28.2	*N/A*	2002, Natural Gas	2027, Ducted ASHP	2023, Natural Gas	2038, HPWH	1950	2028, 24.1 kW
Dallin Library Building / ACMi	26.1	*Recent renovations, no EE measures in near-term*	Existing Heat Pump(s)	2024, Ductless ASHP	2016, Natural Gas	2031, HPWH	N/A	2029, 24.1 kW
23 Maple Street	23.8	*- Planned weatherization*	2010, Oil	2025, Ducted ASHP	2025, Oil	2027, HPWH	N/A	N/A
Park Circle Fire Station	23.4	*- Ensure efficient BMS run times and temperature settings* *- Ensure efficient ventilation rates*	2007, Natural Gas	2024, Ducted ASHP	2007, Natural Gas	2027, HPWH	2007	N/A

Building	Fiscal Year 2022 Emissions (MT CO_2e)	Energy Efficiency (EE) Measures	Space Heating		Domestic Water Heating		Solar PV Potential (kW)	
			Existing (installation year, fuel type)	**Replacement** (installation year, heat pump type)	**Existing** (installation year, fuel type)	**Replacement** (installation year, heat pump type)	**Existing** (roof year)	**Solar** (installation year, size)
Cemetery Building - Chapel & Office	14.8	*- Ensure efficient BMS run times and temperature settings* *- Upgrade lighting controls and fixtures as needed*	2016, Oil	2031, Ductless ASHP	2015, Electricity (resistance coils)	2030, HPWH	2015	N/A
Jefferson Cutter House	13.5	*- Monitor temperature setpoints and/or add additional control points*	2018, Natural Gas	2033, Ducted ASHP	2018, Natural Gas	2033, HPWH	2014	N/A
Bath & Pump Houses - Reservoir	12.5	*No EE measures in near-term*	N/A	N/A	2021, Electricity (resistance coils)	2036, HPWH	2021	N/A
Jarvis House	12.4	*No EE measures in near-term*	Existing Heat Pump(s)	2024, Ductless ASHP	2018, Natural Gas	2033, HPWH	1815	N/A
Cemetery Garage	0.5	*- Ensure efficient ventilation rates*	2016, Oil	2031, Ductless ASHP	N/A	N/A	2015	N/A
Robbins Cottage	0.1	*No EE measures in near-term*	Existing Heat Pump(s)	2025, Ductless ASHP	2024, Natural Gas	203, HPWH	N/A	N/A
Spy Pond Field House	0.1	*Recent renovations, no EE measures in near-term*	2002, Natural Gas	2033, Ductless ASHP	2002, Natural Gas	2027, HPWH	N/A	N/A
Carriage House	Unoccupied							

Building	Fiscal Year 2022 Emissions (MT CO_2e)	Energy Efficiency (EE) Measures	Space Heating		Domestic Water Heating		Solar PV Potential (kW)	
			Existing (installation year, fuel type)	**Replacement** (installation year, heat pump type)	**Existing** (installation year, fuel type)	**Replacement** (installation year, heat pump type)	**Existing** (roof year)	**Solar** (installation year, size)
DPW Bldg E - NEW (Facilities)	New Building		2023, Natural Gas	2044, HP Packaged Unit (RTU)	2023, Natural Gas	2033, HPWH	DPW Bldg E - NEW (Facilities)	New Building
DPW Bldg G - NEW Salt Shed	New Building						2023	2048, 6.5 kW

Table 7. Vehicle by vehicle replacement schedule and savings estimates.

Suggested replacement schedule for each of the fleet's vehicles with the replacement year and the type of EV replacement. The table provides annual estimates for fuel and maintenance savings as well as an estimate for avoided greenhouse gas emissions. Total Cost of Ownership (TCO) includes vehicle costs, fuel, maintenance, and charging. The amounts vary depending on the replacement year and assume that, on average, electric vehicles (EVs) are 40% less cost-intensive than internal combustion engine (ICE) vehicles.[13]

Replace Year	Vehicle Name	Department	Make	Model	Electric Vehicle Description	EV Price (after incentives)	eMPG	TCO	Avoided GHG (MT CO_2e, annual)
2026	CHEVROLET - BLAZER A-6	ENGINEERING	CHEVROLET	Blazer	SUV-Chevrolet-Blazer 2LT-Class 1-3	$30,596	97	$35,831	0.2
2026	CHEVROLET - EXPRESS VAN A-15	FACILITIES	CHEVROLET	Express	Transit_Van-Ford-E-Transit -Class 3	$39,600	62	$183,486	24.3
2026	CHEVROLET - SILVERADO	WAT/SEW	CHEVROLET	Silverado	Pickup2-Chevrolet-Silverado EV-Class 1-3	$22,410	67	$28,706	0.4
2027	CHEVROLET - COLORADO PICKUP A-7	ENGINEERING	CHEVROLET	Colorado	Pickup2-Chevrolet-Silverado EV-Class 1-3	$22,410	67	$36,436	2.8
2027	CHEVROLET - EQUINOX A-8	ENGINEERING	CHEVROLET	Equinox	SUV-Chevrolet-Blazer 2LT-Class 1-3	$30,596	97	$37,225	0.8
2027	TOYOTA - PRIUS	INSPECTIONS	TOYOTA	Prius	Sedan-Chevrolet-Bolt-Class 1	$18,900	134	$32,346	1.4
2027	CHEVROLET- SILVERADO 62	PARKS	CHEVROLET	Silverado	Pickup2-Chevrolet-Silverado EV-Class 1-3	$22,410	67	$27,699	0.1
2028	FORD- EDGE	BOH	FORD	Edge	SUV-Chevrolet-Blazer 2LT-Class 1-3	$27,536	97	$34,158	0.6
2028	CHEVROLET - CHASSIS TRUCK	DPW	CHEVROLET	Silverado	Pickup2-Chevrolet-Silverado EV-Class 1-3	$20,169	67	$34,289	2.8
2028	CHEVROLET - EQUINOX	DPW	CHEVROLET	Equinox	SUV-Chevrolet-Blazer 2LT-Class 1-3	$27,536	97	$32,649	0.1
2028	TOYOTA- PRIUS	INSPECTIONS	TOYOTA	Prius	Sedan-Chevrolet-Bolt-Class 1	$17,010	134	$165,704	24.3
2028	FORD -TAURUS	POLICE	FORD	Taurus	Sedan-Chevrolet-Bolt-Class 1	$17,010	134	$37,086	5.0
2029	TOYOTA - PRIUS	BOH	TOYOTA	Prius	Sedan-Chevrolet-Bolt-Class 1	$17,010	134	$29,031	1.2
2029	FORD - ESCAPE	FIRE	FORD	Escape	SUV-Chevrolet-Blazer 2LT-Class 1-3	$27,536	97	$37,066	0.8
2029	CHEVROLET CK3500	PARKS	CHEVROLET	Silverado	Pickup2-Chevrolet-Silverado EV-Class 1-3	$20,169	67	$29,858	1.5
2029	TOYOTA - PRIUS	SCHOOL	TOYOTA	Prius	Sedan-Chevrolet-Bolt-Class 1	$17,010	134	$30,636	1.5
2029	CHEVROLET - SILVERADO PICKUP	WAT/SEW	CHEVROLET	Silverado	Pickup2-Chevrolet-Silverado EV-Class 1-3	$20,169	67	$34,394	2.8
2030	CHEVROLET - SILVERADO	DPW	CHEVROLET	Silverado	Pickup2-Chevrolet-Silverado EV-Class 1-3	$20,169	67	$50,049	7.6
2030	CHEVROLET- EQUINOX	DPW	CHEVROLET	Equinox	SUV-Chevrolet-Blazer 2LT-Class 1-3	$27,536	97	$32,618	0.1

[13] Forbes. "What it costs to maintain an electric vehicle." *Forbes*, accessed July24, 2024. https://www.forbes.com/sites/jimgorzelany/2022/10/06/by-the-numbers-what-it-costs-to-maintain-an-electric-vehicle/

Replace Year	Vehicle Name	Department	Make	Model	Electric Vehicle Description	EV Price (after incentives)	eMPG	TCO	Avoided GHG (MT CO_2e, annual)
2030	CHEVROLET - EXPRESS CARGO VAN	FACILITIES	CHEVROLET	Express	Transit_Van-Ford-E-Transit -Class 3	$35,640	62	$179,526	24.3
2030	FORD - FUSION	POLICE	FORD	Fusion	Sedan-Chevrolet-Bolt-Class 1	$17,010	134	$22,763	0.3
2030	FORD - FUSION	POLICE	FORD	Fusion	Sedan-Chevrolet-Bolt-Class 1	$17,010	134	$28,023	2.0
2031	CHEVROLET - EQUINOX	DPW	CHEVROLET	Equinox	SUV-Chevrolet-Blazer 2LT-Class 1-3	$27,536	97	$33,988	0.7
2031	FORD-TRUCK	FIRE	FORD	F-450	Pickup5-Ford-F-450-Class 3-5	$54,675	67	$60,401	0.2
2031	FORD - W211 SEDAN	FIRE	FORD	F-250	Pickup3-Ford-F-250-Class 1-3	$40,095	67	$45,284	0.1
2031	FORD - EXPLORER	FIRE	FORD	Explorer	Police_Vehicle-Ford-Mustang Mach-E-Class 1	$19,182	93	$32,630	2.7
2031	FORD - EXPLORER	FIRE	FORD	Explorer	Police_Vehicle-Ford-Mustang Mach-E-Class 1	$19,182	93	$27,047	1.0
2031	CHEVROLET - SILVERADO	PARKS	CHEVROLET	Silverado	Pickup2-Chevrolet-Silverado EV-Class 1-3	$20,169	67	$25,507	0.1
2031	FORD - EXPLORER	SCHOOL	FORD	Explorer	Police_Vehicle-Ford-Mustang Mach-E-Class 1	$19,182	93	$42,492	5.9
2032	CHEVROLET - SILVERADO	DPW	CHEVROLET	Silverado	Pickup2-Chevrolet-Silverado EV-Class 1-3	$20,169	67	$52,175	8.3
2032	FORD - F250 PICKUP	FACILITIES	FORD	F-250	Pickup3-Ford-F-250-Class 1-3	$40,095	67	$58,260	3.7
2032	TOYOTA - PRIUS	INSPECTIONS	TOYOTA	Prius	Sedan-Chevrolet-Bolt-Class 1	$17,010	134	$27,004	0.9
2032	FORD - TRANSIT VAN	LIBRARY	FORD	Transit Connect	Transit_Van-Ford-E-Transit -Class 3	$35,640	62	$62,110	3.8
2032	FORD - F350 PICKUP	POLICE	FORD	F-350	Pickup4-Ford-F-350-Class 3-4	$51,030	67	$144,367	24.4
2032	FORD - EXPLORER	POLICE	FORD	Explorer	Police_Vehicle-Ford-Mustang Mach-E-Class 1	$19,182	93	$24,415	0.1
2032	FORD - EXPLORER	SCHOOL	FORD	Explorer	Police_Vehicle-Ford-Mustang Mach-E-Class 1	$19,182	93	$24,116	0.0
2033	CHEVROLET- SILVERADO	DPW	CHEVROLET	Silverado	Pickup2-Chevrolet-Silverado EV-Class 1-3	$20,169	67	$38,044	4.0
2033	FORD - F550 TRUCK	DPW	FORD	F-550	Pickup6-Ford-F-550-Class 5-6	$47,385	67	$67,315	4.8
2033	CHEVROLET - EXPRESS VAN	FACILITIES	CHEVROLET	Express	Transit_Van-Ford-E-Transit -Class 3	$35,640	62	$179,526	24.3
2033	CHEVROLET- SILVERADO	FACILITIES	CHEVROLET	Silverado	Pickup2-Chevrolet-Silverado EV-Class 1-3	$20,169	67	$26,776	0.5
2033	FORD - F250 PICKUP	FIRE	FORD	F-250	Pickup3-Ford-F-250-Class 1-3	$40,095	67	$45,637	0.2
2033	FORD - FUSION	POLICE	FORD	Fusion	Sedan-Chevrolet-Bolt-Class 1	$17,010	134	$96,562	24.6
2033	FORD- TRANSIT VAN	WAT/SEW	FORD	Transit Connect	Transit_Van-Ford-E-Transit -Class 3	$35,640	62	$48,808	1.4
2034	CHEVROLET - SILVERADO	DPW	CHEVROLET	Silverado	Pickup2-Chevrolet-Silverado EV-Class 1-3	$20,169	67	$39,696	4.5
2034	FORD - F550 TRUCK	DPW	FORD	F-550	Pickup6-Ford-F-550-Class 5-6	$47,385	67	$67,990	5.0
2034	TOYOTA - RAV4	INSPECTIONS	TOYOTA	RAV4	SUV-Chevrolet-Blazer 2LT-Class 1-3	$27,536	97	$32,450	0.0
2034	CHEVROLET - SILVERADO	PARK/TREE	CHEVROLET	Silverado	Pickup2-Chevrolet-Silverado EV-Class 1-3	$20,169	67	$46,486	6.5
2034	CHEVROLET - SILVERADO	PARKS	CHEVROLET	Silverado	Pickup2-Chevrolet-Silverado EV-Class 1-3	$20,169	67	$26,811	0.5
2034	CHEVROLET- SILVERADO	PARKS	CHEVROLET	Silverado	Pickup2-Chevrolet-Silverado EV-Class 1-3	$20,169	67	$38,910	4.2

Replace Year	Vehicle Name	Department	Make	Model	Electric Vehicle Description	EV Price (after incentives)	eMPG	TCO	Avoided GHG (MT CO_2e, annual)
2034	FORD - F250 PICKUP	RECREATION	FORD	F-250	Pickup3-Ford-F-250-Class 1-3	$40,095	67	$55,388	2.9
2035	FREIGHTLINER - TRUCK 58	DPW	FREIGHTLINER	M2	Heavy_Duty_Truck_8-Volvo-VNR Electric-Class 8	$178,200	16	$192,681	1.8
2035	Fire Truck	FIRE	PIERCE MANUFACTURING	Tilt Cab	Fire_Truck-Pierce-Volterra-Class 8	$704,700	9	$945,770	26.9
2035	FORD - F550 AMBULANCE	FIRE	FORD	F-550	Pickup6-Ford-F-550-Class 5-6	$47,385	67	$149,914	31.0
2035	FORD - FUSION	FIRE	FORD	Fusion	Sedan-Chevrolet-Bolt-Class 1	$17,010	134	$24,275	0.8
2035	FORD - FUSION	POLICE	FORD	Fusion	Sedan-Chevrolet-Bolt-Class 1	$17,010	134	$23,747	0.6
2035	FORD - FUSION	POLICE	FORD	Fusion	Sedan-Chevrolet-Bolt-Class 1	$17,010	134	$31,741	3.2
2035	CHEVROLET - EXPRESS VAN	RECREATION	CHEVROLET	Express	Transit_Van-Ford-E-Transit -Class 3	$35,640	62	$56,378	2.9
2035	CHEVROLET - SILVERADO	WATER	CHEVROLET	Silverado	Pickup2-Chevrolet-Silverado EV-Class 1-3	$20,169	67	$52,020	8.2
2036	FORD - TRANSIT VAN	DPW	FORD	Transit Connect	Transit_Van-Ford-E-Transit -Class 3	$35,640	62	$46,507	1.0
2036	FORD- F550	DPW	FORD	F-550	Pickup6-Ford-F-550-Class 5-6	$47,385	67	$61,904	3.1
2036	FREIGHTLINER - M2106V 53	DPW	FREIGHTLINER	M2	Heavy_Duty_Truck_7-Freightliner -EM2-Class 7	$109,350	12	$126,427	2.6
2036	SEAGRAVE - FIRE TRUCK	FIRE	SEAGRAVE	Pumper	Fire_Truck-Pierce-Volterra-Class 8	$704,700	9	$811,714	11.4
2036	FORD - EXPLORER	FIRE	FORD	Explorer	Police_Vehicle-Ford-Mustang Mach-E-Class 1	$19,182	93	$36,051	3.8
2036	CHEVROLET - TAHOE	POLICE	CHEVROLET	Tahoe	SUV-Chevrolet-Blazer 2LT-Class 1-3	$27,536	97	$33,981	0.7
2036	FORD - EXPLORER	POLICE	FORD	Explorer	Police_Vehicle-Ford-Mustang Mach-E-Class 1	$19,182	93	$100,775	24.5
2036	CHEVROLET- SILVERADO	WATER	CHEVROLET	Silverado	Pickup2-Chevrolet-Silverado EV-Class 1-3	$20,169	67	$49,966	7.6
2037	FORD - TRANSIT VAN	DPW	FORD	Transit	Transit_Van-Ford-E-Transit -Class 3	$35,640	62	$53,401	2.3
2037	SILVERADO - CHEVROLET	DPW	CHEVROLET	Silverado	Pickup2-Chevrolet-Silverado EV-Class 1-3	$20,169	67	$40,085	4.6
2037	FORD- F550	DPW	FORD	F-550	Pickup6-Ford-F-550-Class 5-6	$47,385	67	$74,005	6.9
2037	INTERNATIONAL- 7400 TRUCK (SPREADER) 55	DPW	INTERNATIONAL	SR525	Heavy_Duty_Truck_8-Volvo-VNR Electric-Class 8	$178,200	16	$200,288	2.6
2037	CHEVROLET- CITY EXPRESS VAN	FACILITIES	CHEVROLET	City Express	Transit_Van-Ford-E-Transit -Class 3	$35,640	62	$75,486	6.1
2037	CHEVROLET- SILVERADO	FACILITIES	CHEVROLET	Silverado	Pickup2-Chevrolet-Silverado EV-Class 1-3	$20,169	67	$43,635	5.7
2037	CHEVROLET-COLORADO	HIGHWAY	CHEVROLET	Colorado	Pickup2-Chevrolet-Silverado EV-Class 1-3	$20,169	67	$47,172	6.7
2037	INTERNATIONAL - DUMP	PARK/TREE	INTERNATIONAL	SA515	Dump_Truck-Lion Electric-Dump Truck -Class 8	$214,650	16	$311,617	19.3
2038	FORD- F-550	DPW	FORD	F-550	Pickup6-Ford-F-550-Class 5-6	$47,385	67	$77,188	7.9
2038	SEAGRAVE - AERIAL FIRE TRUCK	FIRE	SEAGRAVE	Ladder	Fire_Truck-Pierce-Volterra-Class 8	$704,700	9	$716,981	0.5
2038	FORD - EXPLORER	FIRE	FORD	Explorer	Police_Vehicle-Ford-Mustang Mach-E-Class 1	$19,182	93	$47,051	7.4
2038	CHEVROLET- SILVERADO	HIGHWAY	CHEVROLET	Silverado	Pickup2-Chevrolet-Silverado EV-Class 1-3	$20,169	67	$48,033	7.0

Replace Year	Vehicle Name	Department	Make	Model	Electric Vehicle Description	EV Price (after incentives)	eMPG	TCO	Avoided GHG (MT CO_2e, annual)
2038	CHEVROLET- SILVERADO	HIGHWAY	CHEVROLET	Silverado	Pickup2-Chevrolet-Silverado EV-Class 1-3	$20,169	67	$29,776	1.4
2038	INTERNATIONAL - SANDER 51	HIGHWAY	INTERNATIONAL	SR525	Heavy_Duty_Truck_8-Volvo-VNR Electric-Class 8	$178,200	16	$185,369	0.4
2038	FORD - EXPLORER	POLICE	FORD	Explorer	Police_Vehicle-Ford-Mustang Mach-E-Class 1	$19,182	93	$62,420	12.3
2038	FORD - EXPLORER	POLICE	FORD	Explorer	Police_Vehicle-Ford-Mustang Mach-E-Class 1	$19,182	93	$66,248	13.5
2039	CHEVROLET - 2500 CREW TRUCK	CEMETERY	CHEVROLET	Silverado HD	Pickup2-Chevrolet-Silverado EV-Class 1-3	$20,169	67	$25,567	0.2
2039	CHEVROLET- EXPRESS VAN	DPW	CHEVROLET	City Express	Transit_Van-Ford-E-Transit -Class 3	$35,640	62	$58,963	3.2
2039	INTERNATIONAL - DUMP TRUCK	DPW	INTERNATIONAL	SR525	Dump_Truck-Lion Electric-Dump Truck -Class 8	$214,650	16	$236,189	2.8
2039	FORD- F550	PARKS	FORD	F-550	Pickup6-Ford-F-550-Class 5-6	$47,385	67	$106,214	17.1
2039	FORD F150	POLICE	FORD	F-150	Pickup-Ford-F150 Lightning-Class 1-3	$20,229	67	$109,545	24.4
2039	CHEVROLET - TRAVERSE	POLICE	CHEVROLET	Traverse	SUV-Chevrolet-Blazer 2LT-Class 1-3	$27,536	97	$87,756	24.6
2039	FORD - EXPLORER	POLICE	FORD	Explorer	Police_Vehicle-Ford-Mustang Mach-E-Class 1	$19,182	93	$95,848	23.0
2039	BLUEBIRD - SCHOOL BUS	SCHOOL	BLUE BIRD	BB Conventional	School_Bus-Bluebird-Vision-Class 7	$230,850	26	$286,295	7.5
2040	FORD-ECONOLINE	COA	FORD	E-350	Transit_Van-Ford-E-Transit -Class 3	$35,640	62	$89,299	10.1
2040	CHEVROLET - SILVERADO	DPW	CHEVROLET	Silverado	Pickup2-Chevrolet-Silverado EV-Class 1-3	$20,169	67	$29,441	1.3
2040	E ONE - TYPHOON	FIRE	E-ONE	Truck	Fire_Truck-Pierce-Volterra-Class 8	$704,700	9	$862,799	17.3
2040	FORD - FUSION	POLICE	FORD	Fusion	Sedan-Chevrolet-Bolt-Class 1	$17,010	134	$23,226	0.4
2040	FORD - EXPLORER	POLICE	FORD	Explorer	Police_Vehicle-Ford-Mustang Mach-E-Class 1	$19,182	93	$24,690	0.2
2040	BLUEBIRD - SCHOOL BUS	SCHOOL	BLUE BIRD	All American / All Canada	School_Bus-Bluebird-Vision-Class 7	$230,850	26	$286,295	7.5
2040	THOMAS-SCHOOL BUS	SCHOOL	FREIGHTLINER	B2 Bus Chassis	School_Bus-Bluebird-Vision-Class 7	$230,850	26	$296,277	8.9
2040	FORD-TRANSIT VAN	SCHOOL	FORD	Transit	Transit_Van-Ford-E-Transit -Class 3	$35,640	62	$47,540	1.3
2041	CHEVROLET- SILVERADO	DPW	CHEVROLET	Silverado	Pickup2-Chevrolet-Silverado EV-Class 1-3	$20,169	67	$43,940	5.7
2041	FORD - ESCAPE SE	DPW	FORD	Escape	SUV-Chevrolet-Blazer 2LT-Class 1-3	$27,536	97	$33,418	0.2
2041	FORD -F250	FIRE	FORD	F-250	Pickup3-Ford-F-250-Class 1-3	$40,095	67	$45,028	0.0
2041	FREIGHTLINER - SD	HIGHWAY	FREIGHTLINER	108SD	Heavy_Duty_Truck_8-Volvo-VNR Electric-Class 8	$178,200	16	$205,935	4.3
2041	FREIGHTLINER - TRUCK	HIGHWAY	FREIGHTLINER	108SD	Heavy_Duty_Truck_8-Volvo-VNR Electric-Class 8	$178,200	16	$202,005	3.5
2041	CHEVROLET - SILVERADO	TREE	CHEVROLET	Silverado	Pickup2-Chevrolet-Silverado EV-Class 1-3	$20,169	67	$25,735	0.2
2041	FREIGHTLINER - DUMP TRUCK	WAT/SEW	FREIGHTLINER	114SD	Dump_Truck-Lion Electric-Dump Truck -Class 8	$214,650	16	$263,584	9.2
2041	CHEVROLET- SILVERADO	WATER	CHEVROLET	Silverado	Pickup2-Chevrolet-Silverado EV-Class 1-3	$20,169	67	$26,737	0.5

Replace Year	Vehicle Name	Department	Make	Model	Electric Vehicle Description	EV Price (after incentives)	eMPG	TCO	Avoided GHG (MT CO_2e, annual)
2042	FREIGHTLINER - 108SD	DPW	FREIGHTLINER	108SD	Heavy_Duty_Truck_8-Volvo-VNR Electric-Class 8	$178,200	16	$195,791	1.9
2042	FORD- F550	FACILITIES	FORD	F-550	Pickup6-Ford-F-550-Class 5-6	$47,385	67	$64,638	3.8
2042	FORD - EXPLORER	POLICE	FORD	Explorer	Police_Vehicle-Ford-Mustang Mach-E-Class 1	$19,182	93	$28,196	0.2
2042	THOMAS-SCHOOL BUS	SCHOOL	THOMAS BUILT	MVP-EF (Engine Front)	School_Bus-Bluebird-Vision-Class 7	$230,850	26	$273,153	6.1
2042	THOMAS-BUS	SCHOOL	FREIGHTLINER	B2 Bus Chassis	School_Bus-Bluebird-Vision-Class 7	$230,850	26	$381,314	23.9
2042	FORD - TRANSIT	SCHOOL	FORD	Transit	Transit_Van-Ford-E-Transit -Class 3	$35,640	62	$160,813	24.3
2042	CHEVROLET- SILVERADO	WATER	CHEVROLET	Silverado	Pickup2-Chevrolet-Silverado EV-Class 1-3	$20,169	67	$40,242	5.1
2042	CHEVROLET - COLORADO 4WD	WATER	CHEVROLET	Colorado	Pickup2-Chevrolet-Silverado EV-Class 1-3	$20,169	67	$48,767	8.0
2043	FORD- F250	BLDG. MAINT.	FORD	F-250	Pickup3-Ford-F-250-Class 1-3	$40,095	67	$59,339	5.0
2043	CHEVROLET- SILVERADO	DPW	CHEVROLET	Silverado	Pickup2-Chevrolet-Silverado EV-Class 1-3	$20,169	67	$55,461	11.6
2043	CHEVROLET-SILVERADO	DPW	CHEVROLET	Silverado	Pickup2-Chevrolet-Silverado EV-Class 1-3	$20,169	67	$45,557	7.8
2043	FREIGHTLINER - 108SD	DPW	FREIGHTLINER	108SD	Heavy_Duty_Truck_8-Volvo-VNR Electric-Class 8	$178,200	16	$200,101	4.0
2043	FREIGHTLINER - M2	DPW	FREIGHTLINER	M2	Heavy_Duty_Truck_7-Freightliner -EM2-Class 7	$109,350	12	$114,915	0.2
2043	E-ONE - FIRE TRUCK	FIRE	E-ONE	Truck	Fire_Truck-Pierce-Volterra-Class 8	$704,700	9	$823,286	15.9
2043	FORD - EXPLORER HYBRID	POLICE	FORD	Explorer	Police_Vehicle-Ford-Mustang Mach-E-Class 1	$19,182	93	$39,864	4.9
2043	FORD - EXPLORER	POLICE	FORD	Explorer	Police_Vehicle-Ford-Mustang Mach-E-Class 1	$19,182	93	$43,629	6.4
2044	CHEVROLET - SILVERADO	DPW	CHEVROLET	Silverado HD	Pickup2-Chevrolet-Silverado EV-Class 1-3	$20,169	67	$30,663	2.4
2044	PIERCE - LADDER TRUCK	FIRE	PIERCE MANUFACTURING	Aerial	Fire_Truck-Pierce-Volterra-Class 8	$704,700	9	$792,287	13.1
2044	FORD- F550	FIRE	FORD	F-550	Pickup6-Ford-F-550-Class 5-6	$47,385	67	$62,611	4.7
2044	FREIGHT - M2 AERIAL	PARK/TREE	FREIGHTLINER	M2	Heavy_Duty_Truck_7-Freightliner -EM2-Class 7	$109,350	12	$134,418	6.2
2044	FORD - EXPLORER	POLICE	FORD	Explorer	Police_Vehicle-Ford-Mustang Mach-E-Class 1	$19,182	93	$27,691	0.1
2044	FORD - EXPLORER	POLICE	FORD	Explorer	Police_Vehicle-Ford-Mustang Mach-E-Class 1	$19,182	93	$25,096	0.5
2044	FORD - EXPLORER	POLICE	FORD	Explorer	Police_Vehicle-Ford-Mustang Mach-E-Class 1	$19,182	93	$77,761	24.5
2044	THOMAS - SCHOOL BUS	SCHOOL	FREIGHTLINER	B2 Bus Chassis	School_Bus-Bluebird-Vision-Class 7	$230,850	26	$286,163	10.6
2045	FORD - TRANSIT	BLDG. MAINT.	FORD	Transit	Transit_Van-Ford-E-Transit -Class 3	$35,640	62	$123,923	24.3
2045	FREIGHTLINER - 108SD	DPW	FREIGHTLINER	108SD	Heavy_Duty_Truck_8-Volvo-VNR Electric-Class 8	$178,200	16	$202,946	6.2
2045	FREIGHTLINER - 108SD	DPW	FREIGHTLINER	108SD	Heavy_Duty_Truck_8-Volvo-VNR Electric-Class 8	$178,200	16	$192,262	2.9

Replace Year	Vehicle Name	Department	Make	Model	Electric Vehicle Description	EV Price (after incentives)	eMPG	TCO	Avoided GHG (MT CO_2e, annual)
2045	FORD - F250 PICKUP	FACILITIES	FORD	F-250	Pickup3-Ford-F-250-Class 1-3	$40,095	67	$45,061	0.0
2045	FTL - 108SD	HIGHWAY	FREIGHTLINER	108SD	Heavy_Duty_Truck_8-Volvo-VNR Electric-Class 8	$178,200	16	$195,803	4.0
2045	CHEVROLET 3500 DUMP	PARKS	CHEVROLET	Silverado HD	Pickup2-Chevrolet-Silverado EV-Class 1-3	$20,169	67	$73,298	24.5
2045	FORD-TRANSIT VAN	POLICE	FORD	Transit	Transit_Van-Ford-E-Transit -Class 3	$35,640	62	$123,923	24.3
2045	FORD - EXPLORER	POLICE	FORD	Explorer	Police_Vehicle-Ford-Mustang Mach-E-Class 1	$19,182	93	$70,090	24.5
2046	FREIGHTLINER - 108SD	DPW	FREIGHTLINER	108SD	Heavy_Duty_Truck_8-Volvo-VNR Electric-Class 8	$178,200	16	$194,817	4.4
2046	FORD - F350 DUMP	HIGHWAY	FORD	F-350	Pickup4-Ford-F-350-Class 3-4	$51,030	67	$56,102	0.1
2046	THOMAS- SCHOOL BUS	SCHOOL	THOMAS BUILT	MVP-EF (Engine Front)	School_Bus-Bluebird-Vision-Class 7	$230,850	26	$330,761	28.1
2046	INTERNATIONAL - MV607LP PICK UP	SCHOOL	INTERNATIONAL	MV607	Heavy_Duty_Truck_7-Freightliner -EM2-Class 7	$109,350	12	$178,300	27.4
2047	FORD - E350 TRANSIT VAN	COA	FORD	E-350	Transit_Van-Ford-E-Transit -Class 3	$35,640	62	$39,768	0.1
2047	THOMAS - SCHOOL BUS	SCHOOL	THOMAS BUILT	MVP-EF (Engine Front)	School_Bus-Bluebird-Vision-Class 7	$230,850	26	$310,829	28.1
2047	FRHT- M2106	TREE	FREIGHTLINER	M2	Heavy_Duty_Truck_7-Freightliner -EM2-Class 7	$109,350	12	$120,514	3.9
2047	FRHT - 114SD	WATER	FREIGHTLINER	114SD	Heavy_Duty_Truck_8-Volvo-VNR Electric-Class 8	$178,200	16	$198,549	7.7
2048	FREIGHTLINER- 108SD	DPW	FREIGHTLINER	108SD	Heavy_Duty_Truck_8-Volvo-VNR Electric-Class 8	$178,200	16	$184,525	2.1
2048	FREIGHTLINER - 108SD Plow	HIGHWAY	FREIGHTLINER	108SD	Heavy_Duty_Truck_8-Volvo-VNR Electric-Class 8	$178,200	16	$225,750	27.7
2048	THOMAS- BUS	SCHOOL	FREIGHTLINER	B2 Bus Chassis	School_Bus-Bluebird-Vision-Class 7	$230,850	26	$290,897	28.1
2049	FREIGHTLINER - 108SD	DPW	FREIGHTLINER	108SD	Heavy_Duty_Truck_8-Volvo-VNR Electric-Class 8	$178,200	16	$183,374	2.9
2049	FREIGHTLINER - 108SD Dump	HIGHWAY	FREIGHTLINER	108SD	Dump_Truck-Lion Electric-Dump Truck -Class 8	$214,650	16	$243,212	27.7