Transportation

CLIMATE ACTION FACT SHEET

Electrify municipal fleets

ACCELERATE ELECTRIFICATION OF MUNICIPAL VEHICLES

Description and purpose of strategy: Cape towns can lead by example by electrifying municipal fleets, which account for 25% of CO_2 emissions from local government operations. Feasibility considerations include typical use patterns in relation to vehicle range. Charging infrastructure requirements will depend on usage and parking locations. Procurement policies may be modified to reflect consideration and prioritization of electric and/or hybrid vehicles.

Content of fact sheet: Overview of the costs and benefits of municipal electric vehicle (EV) adoption. Includes expected economic and environmental costs, equity considerations, a New Bedford, Massachusetts case study, and the steps to EV adoption for municipalities.

Implementation support: This fact sheet expands upon strategies and actions from the Climate Actions Database, which can be found at: capecodcommission.org/climate.

BENEFITS

- ☑ Greenhouse gas (GHG) emissions reductions or sequestration
- ☑ Health improvement from reduced pollutants
- ☐ Increased recreation
- ☑ Lower maintenance/operational costs
- ☐ Environmental enhancement/protection
- ☐ Less damage to infrastructure
- ☐ Higher property values
- ☐ Increased resilience
- ☐ Job and economic growth

COSTS

- ☑ Higher capital costs
- ☐ Higher maintenance costs
- ☐ Higher operational costs
- ☐ Additional time for municipal staff to implement

KEY FINDINGS

Equity: Those closest to the sources of tailpipe emissions will see the greatest benefits from municipal vehicle electrification. In many cases, these are environmental justice and vulnerable communities living in higher-traffic areas.

Financial benefits: While following this strategy typically raises up-front costs, the strategy will often save money over time, and incentives can reduce those high initial costs.

Non-market benefits: Improvements in health from reduced pollutants and reduced maintenance will reduce inoperable time compared to internal combustion engine vehicles (ICEVs).

GHG reductions: EVs produce fewer emissions, so GHG reductions depend on the number of internal combustion engine vehicles (ICEVs) that are replaced by EVs. This strategy could be impactful for municipal GHG reduction.

Ease of implementation: This strategy is scalable. Municipalities can start replacing vehicles as older ones are retired and could be factored into a 5-year capital plan where vehicle replacements are anticipated.

BENEFIT COST ANALYSIS

The following example shows the costs and benefits of replacing a gasoline-powered passenger transport (PT), light-duty truck, police vehicle, and school bus with a comparable electric model. The analysis accounts for the vehicle costs and annual operational costs, such as those for maintenance and fuel. Fuel prices are particularly susceptible to variation; to show how they might change the overall cost of the vehicle, the example below incorporates a sensitivity analysis using fuel prices, as of February 2023, adjusted by 25% to get a range of fuel costs. The sensitivity analysis results are shown in parentheses.

This analysis illustrates the potential financial, health, and environmental benefits of electrifying different types of municipal vehicles. Note that many incentives are available to offset the EV costs shown, including $7,500 incentives for purchasing new vehicles from the Massachusetts Vehicle Incentive Program (MassEVIP). These are discussed below in the "Implementation" section.

TOTAL COST OF OWNERSHIP ANALYSIS

VEHICLE	VEHICLE TYPE	ENGINE TYPE	MSRP	ANNUAL FUEL COST	ANNUAL MAINTENANCE COSTS	TOTAL COST OVER VEHICLE LIFESPAN*
Ford Mustang Mach-E	Police	EV	$45,995	$645 ($484–$806)	$406	$56,509 ($54,896–$58,121)
Ford Explorer	Police	ICEV	$36,760	$1.663 ($1,248–$2,079)	$800	$61,390 ($57,232–$65,549)
Chevrolet Bolt	PT	EV	$26,500	$547 ($410–$684)	$406	$36,037 ($34,668–$37,405)
Toyota Camry	PT	ICEV	$26,220	$1,403 ($1,053–$1,754)	$800	$48,251 ($44,743–$51,760)
Ford F150 Lightning	Light-duty truck	EV	$55,974	$958 ($718–$1,197)	$406	$69,615 ($67,221–$72,009)
Ford F150	Light-duty truck	ICEV	$34,445	$2,041 ($1,531–$2,552)	$800	$62,856 ($57,752–$67,959)
School bus, Type C	School bus	EV	$319,041	$986 ($739–$1,232)	$5,444	$447,638 ($442,710–$452,567)
School bus, Type C	School bus	ICEV	$134,979	$4,775 ($3,581–$5,969)	$11,136	$453,191 ($429,317–$477,065)

* All vehicles were assumed to have a lifespan of 10 years, except school buses, which have a lifespan of 20 years.
**All values are in 2022 USD.

While the total costs suggest that EVs can compete with ICEVs, incentives will help make EVs more affordable. Switching to EVs has many additional benefits: for example, EVs do not emit criteria pollutants from burning fuel. The table below shows the avoided emissions of pollutants for each vehicle type. It displays the avoided pollution, in pounds and social benefit, from switching a single vehicle from an ICEV to an EV for the vehicle's lifespan.

AVOIDED EMISSIONS FROM EV ADOPTION

VEHICLE TYPE	POLLUTANT	AVOIDED EMISSIONS (POUNDS)	SOCIAL BENEFIT (2022 USD)	TOTAL VALUE OVER VEHICLE LIFETIME
Police	CO_2e	91,692.26	$2,371	$3,276
	NO_x	11.76	$103	
	PM	2.77	$780	
	SO_2	0.61	$22	
PT	CO_2e	77,365.35	$2,001	$2,764
	NO_x	9.93	$87	
	PM	2.34	$658	
	SO_2	0.51	$19	
Light-duty truck	CO_2e	112,531.41	$2,910	$4,020
	NO_x	14.44	$126	
	PM	3.40	$957	
	SO_2	0.74	$27	
School bus	CO_2e	627,437.75	$16,225	$31,459
	NO_x	1,384.01	$12,063	
	PM	10.99	$3,095	
	SO_2	2.09	$77	

In addition to the quantifiable benefits, electrification of vehicle fleets can have positive impacts on jobs and the economy from the construction of charging infrastructure and municipal budget savings. Meanwhile, the future will see increasing availability of relevant new technologies such as vehicle-to-grid (V2G) power. V2G allows electricity to flow in either direction between the vehicle and the grid. This means vehicles can be used for demand response and frequency regulation: EVs can be used to stabilize the grid, further reduce power grid reliance on fossil fuels, and reduce air pollution (Noel and McCormack, 2014). V2G is not commonly available now but that is expected to change into the future.

EQUITY

Transportation is responsible for a substantial proportion of emissions on Cape Cod. Switching gasoline-powered vehicles to EVs would result in reduced emissions and air pollution throughout the county. Potential equity benefits include:

- **Reduced emissions in environmental justice communities.** Those living closest to the source of emissions will see the largest benefits as the municipal fleet switches to EVs. The use of municipal EVs may benefit environmental justice communities who have historically been disproportionately burdened by vehicle emissions and air pollution by reducing community-wide emissions.
- **Increase access to charging stations.** Municipalities will need to update and improve charging stations. Making this infrastructure more widely available across the region is essential for equitable access to personal EV utilization.

Optimizing Equity During Implementation

Those closest to the sources of tailpipe emissions will benefit the most from municipal vehicle electrification. These might be low-income families living in higher-traffic areas. Research has found that air pollution burdens often disproportionately affect low-income communities and communities of color (Demetillo et al., 2021).

Beyond reduced emissions, municipal vehicle electrification may not have many other direct equity benefits, but there are potential secondary benefits that could accrue over time. For instance, transitioning to municipal EVs could force towns to consider and make improvements to their EV charging infrastructure. Low-income populations often have less access to EV charging stations (American Cities Climate Challenge, 2021) and could benefit from installation of new EV charging stations, particularly if they are near multi-unit residences. Further, municipalities could make their municipal charging stations available to the public when they are not in use, increasing availability.

Along with potential benefits, a municipal electric fleet program poses very few risks. However, given the potential economic costs of transitioning the municipal fleet to EVs, municipalities need to ensure that they are not investing in this action at the expense of other transportation-related social services that many communities rely on, such as a more robust public transportation network.

STATE OF PRACTICE

General State of Practice

EVs are rapidly increasing their market share. In 2021 there were nearly 1.5 million EVs registered nationally and over 30,000 EVs registered in Massachusetts, up from 3,600 in 2016 (Alternative Fuels Data Center, n.d.). There are now over 50,000 EV-charging locations, with over 140,000 chargers, nationally (Alternative Fuels Data Center, 2023).

Many municipalities are electrifying their fleets throughout the country. New York City operates 2,260 EVs and plug-in hybrid vehicles and plans to have 100% non-emergency EVs by 2035. The city also plans to reduce vehicle emissions by 50% by 2025.

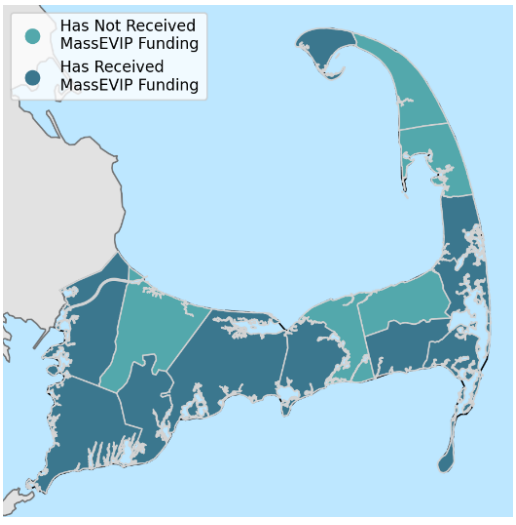
President Biden's Executive Order 14057, signed in December 2021, sets goals of carbon-free electricity generation and use in the federal government. These include 100% carbon-free electricity on a net annual basis by 2035, 100% zero-emission vehicle acquisitions by 2035, and 100% zero-emission light-duty vehicle acquisitions by 2027, among other goals.

The National Electric Vehicle Infrastructure (NEVI) Formula Program from the U.S. Department of Transportation will fund up to 80% of eligible project costs for obtaining and installing EV charging stations, operating and maintaining them, and sharing data from them.

Cape Cod Context

Municipalities in Barnstable County have taken advantage of the MassEVIP program, acquiring incentives for 17 EVs, three plug-in hybrid vehicles, and eight charging stations, totaling over $165,000. The MassEVIP program has provided incentives for 350 EVs, and 98 charging stations, totaling over $3.6 million for Massachusetts.

Massachusetts was recently awarded nearly $30 million in clean school bus funding from the federal Clean School Bus Program. The state will use the funds to purchase 76 full electric school buses (EPA, n.d.), one of which was purchased by Upper Cape Cod Regional Technical School.



CASE STUDY: NEW BEDFORD, MA

New Bedford has a population of 95,032 (as of 2016) and an area of 20 square miles. The town began working with MassEVIP in 2015 to start replacing older fleet vehicles. The town leased 23 Nissan Leafs to replace about 30% of its passenger vehicle fleet and installed 25 additional vehicle charging stations to add to the eight it already had. (Six of the 25 chargers are available to the public.) To date, the town has received $229,000 in incentives from the MassEVIP program. It has saved an estimated $17,329 in gasoline costs and avoided 149,567 pounds of emissions over three years from 176,329 miles traveled. Going forward, the town plans to acquire additional charging stations and EVs.

Photo: MassDEP

IMPLEMENTATION

Below are actions a municipality can take to convert its fleet to EVs. Each action can help a municipality move toward an all-electric fleet, though no single one can achieve that goal on its own.

REQUIRED EXPERTISE

Internal: Selectboards; Department of Public Works (DPW) staff, police, and fire staff; Purchasing and finance staff

- **Take part in a statewide contract for vehicle technology.** The Massachusetts Department of Energy Resources (DOER) has partnered with the Metropolitan Area Planning Council and the Operational Services Division to create a statewide contract for vehicle technology. This is a program that highlights advanced vehicle technology that is best for certain fleets.
- **Buy fuel-efficient vehicles to meet Green Communities criteria.** DOER is working with municipalities to promote vehicle energy use. Municipalities designated as Green Communities must adhere to Criterion 4—which includes rules for buying fuel-efficient vehicles—among other criteria.
- **Join a purchasing cooperative.** State contracts could simplify EV purchasing for smaller municipalities, or municipalities could use Sourcewell, a purchasing cooperative led by Minnesota.
- **Pursue grants for EV purchasing.** MassEVIP is a grant program that supports purchase of EVs by municipalities. Towns can apply online and read case studies of other towns that have completed projects.
- **Join a workplace charging infrastructure program.** MassEVIP also has a workplace and fleet charging infrastructure program that provides incentives to fleet operators to procure and install level 1 and 2 EV charging stations.
- **Follow additional requirements.** Some municipalities have adopted policies to promote fleet electrification. For example, Cambridge, Massachusetts, requires its new vehicles to meet the standards set forth by a local Green Fleet Policy. Under this policy, a municipal department seeking to buy a new vehicle must first compare three options by fuel efficiency and emissions using the Environmental Protection Agency (EPA) Green Vehicle Guide.

The following resources may assist with electrifying municipal fleets.

FINANCIAL AND TECHNICAL SUPPORT	
MassEVIP Fleets Incentives	Provides incentives for public entities to buy or lease EVs with a maximum gross vehicle weight rating up to 10,000 pounds. Maximum funding amounts depend on vehicle type and means of acquisition.
Massachusetts Offers Rebates for Eletric Vehicles (MOR-EV)	Supplies rebates for purchased or leased passenger vehicles that are battery electric or use fuel cells and cost less than $55,000.
MOR-EV Trucks	Offers rebates for public and private purchases or leasing of qualified new vehicles whose gross weight exceeds 8,500 pounds.
U.S. EPA Clean School Bus Program	Offers rebates to replace existing school buses with zero-emission and low-emission models.
MassCEC ACTBUS	Provides deployment technical assistance and advisory services intended to complement the EPA Clean School Bus Program.
MassEVIP Charging Incentives	Provides incentives for fleet operators and employers for Level 1 and Level 2 charging stations.
ADDITIONAL INFORMATION	
Electrifying Transportation in Municipalities	Policy toolkit on EV deployment and adoption at the local level, published by the Electrification Coalition in 2021.
U.S. EPA Green Vehicle Guide	Guide to vehicle technology and its relation to fuel efficiency and emissions.

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Additional climate change information and resources can be found at capecodcommission.org/climate.