

WINDHAM ENERGY PLAN



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GPCOG
GREATER PORTLAND
COUNCIL OF GOVERNMENTS

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ACRONYMS

ACS	American Community Survey
ARPA	American Rescue Plan Act
BIL	Bipartisan Infrastructure Law
CACP	Clean Air and Climate Protection
DEP	Department of Environmental Protection
DOE	Department of Energy
EPA	Environmental Protection Agency
EV	Electric Vehicle
EVSE	Electric Vehicle Service Equipment
GHG	Greenhouse Gas Emissions
GPCOG	Greater Portland Council of Governments
HVAC	Heating Ventilation and Air Conditioning
HEV	Hybrid Electric Vehicle
IRA	Inflation Reduction Act
kW	Kilowatt
LED	Light-emitting Diode
MMBtu	Million British Thermal Units
MT CO ₂ e	Metric tons of CO ₂ equivalent
O&M	Operations and Maintenance
PHEV	Plug-in Hybrid Electric Vehicle
PPA	Power Purchase Agreement
RSU	Regional School Unit
SMPDC	Southern Maine Planning and Development Commission
T&D Loss	Transmission and Distribution Loss
VMT	Vehicle Miles Traveled

Introduction and Overview

INTRODUCTION

In 2022, the Town of Windham participated in the pilot program that created the State of Maine's Community Resilience Partnership and became eligible for Community Action Grants to fund projects that reduce energy costs, carbon emissions, and support transitioning to clean energy. Through this partnership Windham received funding to update the 2011 Town Energy Plan and 2009 Greenhouse Gas Emissions Inventory. The previous Town Energy Plan measured Windham's municipal energy use, established Windham Energy Committee's future energy use goals, and delivered recommendations and actions to achieve those goals.

The Town of Windham, Maine is committed to reducing its energy consumption and improving its energy efficiency to reduce operating costs and minimize harmful emissions. Implementing the 2011 Energy Plan Windham conducted building audits, converted heating systems to natural gas, installed solar arrays to offset municipal electricity, switched street and building lighting to LED, and incorporated additional fuel-efficient vehicles into the fleet.

Using the Community Action Grant Windham updated and expanded the 2011 Energy Plan to measure progress on action items, revisit the sources and uses of energy in operations, and identify additional cost savings projects. This effort also supports development of new capital projects, there is significant federal funding available through the Bipartisan Infrastructure Law (BIL) and the Inflation Reduction Act (IRA) for the next five years, and additional State funding opportunities to support actions that reduce energy use, improve efficiency and convert systems to renewable energy. By updating the Town Energy Plan Windham hopes to create an organized pipeline of potential projects to pursue federal and state funding.

Windham recognizes that energy efficiency improvements can yield significant benefits for both the local economy and the environment. By decreasing energy demand and improving efficiency, the Town can save money on energy expenses, lower greenhouse gas emissions, and decrease dependence on fossil fuels. To that end, this updated energy plan outlines a range of strategies and initiatives to improve energy efficiency across municipal operations, including buildings, transportation, and equipment. It establishes clear goals and objectives for reducing energy use and greenhouse gas emissions and identifies specific actions and projects that will help the Town achieve these targets.

Updating the Town Energy Plan represents a critical step towards a more sustainable and resilient future for Windham. By prioritizing strategies that drive energy efficiency, Windham can reduce long-term operational costs, while still reducing Town emissions.

ENERGY PLAN PROGRESS

The Windham Town Council adopted its first town energy plan in 2011. Since then, the Town has been working on achieving the goals, strategies and priorities outlined in that document. This section includes a summary of the operations, policies, and improvements that Windham has accomplished since 2011 from the list of identified priorities and recommendations.

Table 1 highlights the priorities from Windham's 2011 Energy Plan that are currently in-progress or partially completed. The actions outlined in the previous energy plan were identified and

prioritized by the Windham Energy Advisory Committee and implemented by the Town. Additional investments have been made by the Town to reduce energy costs, improve efficiency, and reduce overall emissions that were not directly called out by the energy plan.

STATIONARY ENERGY

The Town of Windham currently utilizes electricity generated from two solar arrays. The first is a 39.78 kW array that was installed in 2013 on the East Windham Fire Station. The Town purchased the array in 2021 and since this purchase, the

TABLE 1. Progress of 2011 Energy Plan

PRIORITIES FROM 2011 ENERGY PLAN	CURRENT STATUS / PROGRESS
Create a standing Energy Committee, with appointed members, tasked with identifying and implementing energy efficiency and conservation measures for municipal operations and the residents of Windham.	The Energy Advisory Committee was established in 2011 and currently has 3 members but does not actively convene. This committee can serve as a vital resource for the Town in accomplishing the outlined priorities in this plan.
Utilization of existing computer power management settings in town computers.	Power saving feature currently implemented: Computer screens shut off after 60 minutes of non-use.
Upgrade lighting in all municipal buildings.	Most building's interior and exterior lights have been changed over to LED except for the social services building and the library.
Make audit-recommended efficiency improvements to the library.	The town is actively discussing future plans to relocate the library to the existing middle school building if a new middle school is built.
Examine streetlight policy and streetlight inventory, with a goal of reducing the number of streetlights.	The Town adopted a streetlight policy in 2013. The Energy Advisory Committee attempted to reduce the number of streetlights but faced resistance. Many streetlights have been converted to more energy efficient bulbs.
Commit to and support The Energy Committee's community outreach and education efforts for residents and businesses.	The Energy Advisory Committee can take the lead on this initiative, but it will need to be managed by municipal staff.
Evaluation of ventilation system at garage and salt storage buildings.	Public works garage operates on two exhaust fans that bring outside air in and the salt shed has a large exhaust fan on the north wall. A new Public Works facility was built in 2019 to better meet the needs of the department and RSU 14.

energy has more than offset the electricity generation at both the East and North Windham Fire Stations. The savings for both stations in the fiscal year 2022 were approximately \$3,245. The second system is a 504-kW solar array on top of the Town's capped landfill which helps offset over 617,000 pounds of carbon pollution every year. The Town has a Power Purchase Agreement (PPA) for this array that allows the Town to pay for electricity generated from the array each month at a fixed rate by purchasing renewable energy credits. The credit value for this array has increased by 50% each of the last two consecutive years. In 2022, the cumulative savings for this array were approximately \$50,244.

A new Public Works facility was built in 2019 and included a 1,200-gallon waste oil tank which helped increase oil capacity for the building. Additionally, the waste oil for this facility is re-used in the winter months by the waste oil furnace. The Town completed energy assessments in 2011 for the Library, Town Office, Public Safety building, and the North Fire Station in 2012. Between late 2019-2021, the Town purchased its existing streetlights from CMP and converted them all to LED lights. Furthermore, the Town connected the North Windham Fire Station to natural gas.

As a result of the previously adopted 2011 Windham Energy Plan, the Town has conducted four building energy audits. These "decision grade" energy audits allowed Windham to make the best-informed decisions on energy efficiency upgrades and improvements that provide the Town with the greatest return on investment. Decisions were also made based on their impact on electricity and fuel usage. A full list of the municipal energy audits, and their findings can be found on the [Town website](#).

TRANSPORTATION

The Town has tracked individual vehicle consumption for town vehicles using the town's fuel master system which records each time personnel vehicles fuel up. Reports on any given Town vehicle for any given date can be generated upon request. Mileage and services for all Town vehicles and equipment are accounted for in the Public Works Mitchell system.

As a commitment to supporting municipal EV adoption, the Town has installed three EV charging stations at the Town Hall and one at the Public Works facility. As of 2023, Windham currently operates five battery electric light-duty vehicles, with the Police department operating new hybrid electric cruisers.

MUNICIPAL ENERGY USAGE COMPARISON

This section compares the energy usage from the 2009 data used for the previous energy plan with the 2019 data used for the plan update. Energy data was collected in partnership by the Town and various utilities servicing the town, and then analyzed by GPCOG. Analyzing the updated data and understanding the array of actions the Town has taken since 2019 helped to identify the outlined strategies within this plan.

Table 2 compares energy usage from 2009 to 2019 and highlights that municipal buildings & facilities accounted for 34% of the town's energy consumption in 2009, but increased to 44.6% in 2019, an increase of 10.6%.

Streetlights and traffic signals saw a slight rise from 4.6% to 4.8% (+0.2%). Transportation, however, experienced a decrease from 61.3% to 50.6% of the Town's energy usage, representing a decline of 10.7%. The composition of energy by sector has shifted and the overall town energy usage has increased by 28.9%. The data demonstrates this is due in part to the addition of the new Public Works building that opened in 2019. Additionally, Windham has seen a steady

growth in population (+22%) since conducting the previous municipal inventory, increasing municipal services demand from 15,727 residents up to 19,128.

BUILDINGS & FACILITIES

By 2019, several municipal buildings were able to phase out the need for oil and connect to natural gas lines for heating, with the public works facility being the highest consumer. It's important to note that the public works facility is a shared space with RSU 14, and these calculations include overall energy from both parties. Isolating the energy footprint of only the public works department would require a more in-depth analysis. In 2009, municipal buildings & facilities accounted for 5,291 MMBtu, and by 2019 energy usage increased to 8,916 MMBtu. This drastic increase in overall energy usage for buildings & facilities is due to the construction of the new Public Works facility that opened its doors in 2019, and more than tripled its previous square footage from almost 9,000 sq. ft. to 30,000 sq. ft.

Due to the size and work conducted at the Public Works facility, this building has the highest energy

TABLE 2. Municipal Energy Usage Summary

ENERGY USAGE	BASELINE (2009) ENERGY USAGE (MMBtu EQUIVALENT)	COMPOSITION OF TOWN ENERGY USE	CURRENT (2019) ENERGY USAGE (MMBtu EQUIVALENT)	COMPOSITION OF TOWN ENERGY USE	PERCENTAGE ENERGY INCREASE 2009-2019
Buildings & Facilities	5,291	34%	8,916	44.6%	+ 67%
Streetlights/Traffic Signals	717	4.6%	963	4.8%	+ 34%
Transportation	9,538	61.3%	10,132	50.6%	+ 6%
Totals	15,546	100%	20,011	100%	+28.9%

usage of all municipal buildings and facilities accounting for approximately 3,588 MMBtu, or 40% of municipal building energy, primarily from natural gas usage. Due to the usage of the building and shared space between the public works department and RSU 14, this building is naturally a higher energy consuming facility. It had the highest consumption and cost for both electricity and natural gas using 190,129 kW and 29,060 therms respectively totaling \$83,746 in energy costs alone.

MUNICIPAL FLEET

The municipal fleet's energy usage increased from 9,538 MMBtu to approximately 10,132 MMBtu. This is due to the growth of the municipal fleet size from 75 vehicles in 2009 to 84 in 2019.

STREET & AREA LIGHTING

The energy usage from streetlights and traffic signals decreased slightly from 4.6% of town energy usage in 2009 to 4.8% in 2019.



Windham Town Hall EV Charging Station (Photo by PlugShare)

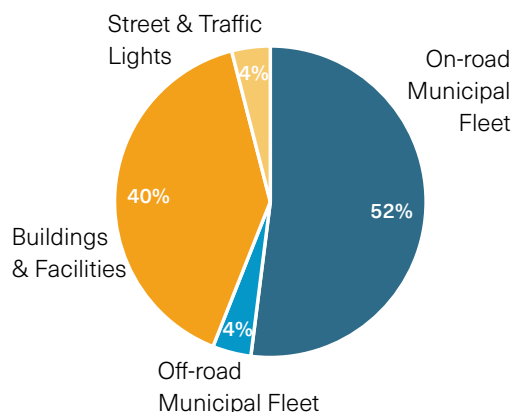
MUNICIPAL GREENHOUSE GAS EMISSIONS OVERVIEW

The Town conducted an updated municipal greenhouse gas (GHG) emissions inventory, measuring the emissions footprint of municipal operations. This inventory utilizes the most readily available data from 2019 sources, reflecting pre-pandemic activity. It is important to note that since 2019, Windham has taken significant action to reduce municipal operating costs and decrease overall emissions. Reduction strategies implemented after 2019 are not reflected in this inventory.

Municipal GHG inventories account for all GHG emissions resulting from the Town operations and encompass emissions from buildings & facilities, street & traffic lights, and transportation. Conducting an updated municipal inventory allows the Town of Windham to pinpoint significant contributors to operational costs and emissions and prioritize future efforts for reduction. Updating the inventory will help the Town of Windham track the progress toward energy and emissions reduction strategies from 2009 and guide the adoption of new targets and priorities if needed.

The previous Windham GHG inventory was measured using 2009 data. Emissions were calculated using the Clean Air and Climate

FIGURE 1. Windham Municipal Emissions Inventory Summary



Protection (CACP) Software from ICLEI – Local Governments for Sustainability and the ENERGY STAR Portfolio Manager Software from the US Environmental Protection Agency (EPA) and Department of Energy (DOE). A comparison of emission levels between 2009 and 2019 can be found in table 3. The 2019 municipal GHG inventory utilizes ClearPath, an updated emissions modeling software from ICLEI and follows the methodology outlined in the [SMPDC Greenhouse Gas Inventory Protocol](#).

TABLE 3. Municipal Emissions by Sector

ENERGY USAGE	BASELINE (2009) MT CO ₂ e	PERCENTAGE OF TOWN EMISSIONS	CURRENT (2019) MT CO ₂ e	PERCENTAGE OF TOWN EMISSIONS	PERCENTAGE CHANGE OF TOWN EMISSIONS 2009-2019
Buildings & Facilities	5,291	34%	8,916	44.6%	+ 67%
Streetlights/Traffic Signals	717	4.6%	963	4.8%	+ 34%
Transportation	9,538	61.3%	10,132	50.6%	+ 6%
Totals	15,546	100%	20,011	100%	+28.9%

Cost and emissions data from stationary energy and transportation were used to inform the energy plan as that is where the municipality has the most influence for conducting energy efficiency improvements.

Total emissions from municipal operations were 1,310 MT CO₂e with stationary energy accounting for 44% and transportation the remaining 56% of municipal emissions. Figure 1 displays the emissions overview for Town buildings & facilities, street & traffic lights, and the municipal fleet.

STATIONARY ENERGY

BUILDINGS & FACILITIES

Buildings and facilities were responsible for emitting 519 metric tons of carbon dioxide equivalent (MT CO₂e), which accounts for 40% of the total GHG emissions. Calculations include GHG emissions from heating, cooling, and

electricity use in all municipal buildings. The North and South Fire Stations, Public Works facility, Public Safety building, and Town Offices were the most energy-consuming municipal buildings.

The cost breakdown for electricity and natural gas consumption in municipal buildings can be found in the tables below. The Town also used approximately 5,000 gallons of propane in 2019, but a breakdown analysis for each building's propane usage was not readily available.

STREETLIGHTS

Windham street and traffic lights accounted for approximately 4% of the Town's emissions in 2019.

TABLE 4. Electricity Consumption and Cost by Building

MUNICIPAL BUILDING	CONSUMPTION (kW)	TOTAL COST
Clothes Closet & Food Pantry (Social Services)	22,979	\$3,578
Public Safety Building - Central Station	124,560	\$15,494
Fire & Rescue - South Station	70,119	\$10,620
Medical Loan Closet	12,263	\$1,991
Public Library	43,861	\$6,986
Public Works & Storage Sheds	191,979	\$27,051
Windham Town Offices	179,321	\$24,691

TABLE 5. Natural Gas Consumption & Cost by Building

MUNICIPAL BUILDING	CONSUMPTION (THERMS)	TOTAL COST
Clothes Closet & Food Pantry (Social Services)	187.2	\$239.29
Fire & Rescue - North Station	6,612.1	\$11,592.33
Fire & Rescue - South Station	10,752.6	\$21,070.15
Medical Loan Closet	2,393.2	\$5,022.11
Public Library	29,060.1	\$57,315.61
Windham Town Offices	10,004.9	\$18,917.28

TRANSPORTATION

MUNICIPAL FLEET

Transportation represents 56% of the total municipal emissions and includes emissions from on- and off-road vehicles owned and operated by the Town. Emissions were calculated based fuel consumption and miles traveled by each of the department fleets. In 2019, the Town of Windham operated a fleet of 84 vehicles across seven departments. The municipal fleet consumed a total of 46,169.6 gallons of gasoline, 26,781.7 gallons of diesel fuel, and traveled approximately 640,358 miles. The Town also has several off-road vehicles which consumed an additional 4,823 gallons of diesel fuel. As a result, the municipal fleet was responsible for approximately 728 metric tons of CO₂e, making transportation the highest emitter of municipal GHG emissions and a key sector of focus for fuel-use reduction strategies.

TABLE 6. Municipal Fleet

MUNICIPAL DEPARTMENT	REGISTERED VEHICLES
Fire & Safety	20
Assessing	3
Code Enforcement	2
Parks & Recreation	4
Police	22
Public Works	32
Town Office	1
Total	84

MUNICIPAL ENERGY SOURCE AND COST

Energy usage and cost data was provided by the utility companies who service the municipality in Windham, or directly from the Town. Gasoline and diesel fuel costs were calculated using a 12-month average fuel price. The town spent approximately \$474,000 on energy expenditure needs in 2019.

TABLE 7. Energy Costs by Fuel Type

MUNICIPAL BUILDING	CONSUMPTION (THERMS)	TOTAL COST
Electricity	1,052,802 kWh	\$166,800
Natural Gas	60,958 therms	\$118,645
Propane	5,000 gallons	\$6,935
Gasoline	46,169 gallons	\$112,652
Diesel	26,781 gallons	\$69,095

COMMUNITY EMISSIONS OVERVIEW

The community-wide inventory for Windham includes all emission sources and associated quantities of emissions for the stationary energy, transportation, and waste sectors. Differentiations are made between residential and commercial emissions. Municipal emissions are captured in the community emissions overview. The full GHG inventory report is presented in Appendix A.

STATIONARY ENERGY

Total stationary emissions were estimated at 80,558 MT CO₂e. In Windham, residential energy use is the highest emitting stationary source, producing 70% of the sector's emissions. Windham has an older housing stock, with more than a third of homes being over fifty years old and still using heating oil as their primary heating source.¹ The average annual energy cost for Cumberland County is \$2,485 and over half of Windham residents spent 30% or more of their income on rent for housing².

TABLE 8. Stationary Energy Emissions

EMISSIONS BY SECTOR	CURRENT (2019) MT CO ₂ e	% OF TOWN EMISSIONS
Residential Buildings	56,617	70%
Commercial Buildings	23,201	29%
Industrial Buildings	740	1%
Total	80,558	100%



Aerial of North Windham and Bangor Savings Bank with Solar (Photo by SKY HIGH MAINE)

TRANSPORTATION

The transportation sector consists of all on-road transportation and mobile sources in Windham and is responsible for approximately 101,717 MT CO₂e. Emissions were calculated from total community vehicle miles traveled (VMT) using proprietary data from the transportation modeling software [Streetlight](#). The VMT is based on all trips that occur because of people travelling to, from, or within a community, but does not include those which pass through without stopping.

For the community inventory, GPCOG compared Windham transportation emissions with several communities in the Greater Portland region on a per capita basis. This metric allows for a standardized comparison among different communities. Figure 2 displays the community transportation emissions per capita between several communities surrounding Windham.

FIGURE 2. Transportation Emissions per Capita

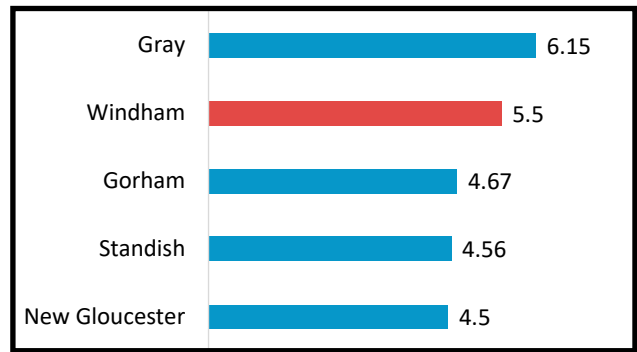


TABLE 9. Transportation Emissions

EMISSIONS BY SECTOR	CURRENT (2019) MT CO ₂ e	% OF TOWN EMISSIONS
On-road Passenger Vehicles	71,845	71%
On-road Commercial Vehicles	28,354	28%
Buses	1,518	1%
Total	101,717	100%

WASTE

The emissions from this sector are based on the processing of the waste and recycling produced by the town. This sector also addresses greenhouse gas emissions produced by sewage management and septic tanks. Municipal solid waste disposal and wastewater treatment accounts for approximately 10,091 MT CO₂e of Windham’s community emissions. Reducing overall consumption, and thereby reducing waste are important strategies for reducing overall costs of waste processing but are not included in the scope of this energy plan.

TABLE 10. Community Waste Emissions

EMISSIONS BY SECTOR	CURRENT (2019) MT CO ₂ e	% OF TOWN EMISSIONS
Solid Waste Incineration	7,703	76%
Landfill	162	2%
Septic Fugitive Emissions	2,226	22%
Wastewater Treatment	<1	<1%
Total	10,091	100%

Actions for Energy Efficiency

Improving Windham's energy efficiency and reducing energy consumption saves the town money and reduces greenhouse gas consumption. The town has conducted an updated greenhouse gas emissions inventory which includes the emissions and energy usage from municipal and community operations.

This action section outlines three key priority areas with strategies and actions for Windham to implement over the next decade. The three priority areas include buildings & facilities energy efficiency, transportation efficiency, and supporting community-wide energy efficiency initiatives.

PRIORITY AREA 1: Improve Energy Efficiency In Municipal Buildings And Facilities

- 1.1 STRATEGY:** MONITOR AND TRACK THE ENERGY USAGE FOR MUNICIPAL BUILDINGS
- 1.2 STRATEGY:** UTILIZE LED LIGHTING AND CONTROLS IN ALL MUNICIPAL BUILDINGS AND FACILITIES
- 1.3 STRATEGY:** UPDATE HEATING AND COOLING SYSTEMS IN MUNICIPAL BUILDINGS
- 1.4 STRATEGY:** EXPAND WINDHAM'S RENEWABLE ENERGY PRODUCTION AND STORAGE
- 1.5 STRATEGY:** IMPROVE THE WEATHERIZATION OF MUNICIPAL BUILDINGS AND FACILITIES

PRIORITY AREA 2: Reduce Transportation Costs And Emissions From Municipal Fleet

- 2.1 STRATEGY:** RIGHT SIZING THE MUNICIPAL FLEET
- 2.2 STRATEGY:** CONDUCT A COMPREHENSIVE FLEET ANALYSIS
- 2.3 STRATEGY:** TELEMATICS AND FLEET TRACKING
- 2.4 STRATEGY:** PRIORITIZE LOW AND ZERO EMISSION VEHICLES FOR MUNICIPAL FLEET
- 2.5 STRATEGY:** EXPLORE VIABILITY OF ADOPTING ALTERNATIVE FUELS, SPECIFICALLY BIOFUELS

PRIORITY AREA 3: Engage The Windham Community For Energy Efficiency Improvements

- 3.1 STRATEGY:** INCREASE THE ENERGY EFFICIENCY OF BUILDINGS THROUGH ENERGY CODES
- 3.2 STRATEGY:** LAUNCH AN EDUCATION CAMPAIGN FOR WINDHAM RESIDENTS ON ENERGY EFFICIENCY
- 3.3 STRATEGY:** CONDUCT OUTREACH FOR COMMUNITY SOLAR PROGRAMS TO WINDHAM RESIDENTS
- 3.4 STRATEGY:** FINANCIAL INCENTIVES OR REBATE PROGRAMS
- 3.5 STRATEGY:** INCREASE THE TOTAL NUMBER OF EV CHARGING STATIONS IN WINDHAM

Priority Area 1

Improve Energy Efficiency in Municipal Buildings and Facilities

STRATEGY: Monitor and track the energy usage for municipal buildings

Energy benchmarking is a method used to measure and compare a building's energy performance over time. Energy benchmarking can lead to significant cost savings by lowering utility bills, freeing up financial resources that can be reinvested in other areas. Consistent benchmarking generates valuable data on energy consumption patterns and will enable Windham to make informed decisions regarding energy efficiency initiatives.

Building energy audits should be done complimentary to the energy benchmarking process to establish a baseline understanding of building energy use. Conducting building audits every 5 years will help the Town identify areas where a building may be wasting energy, and provide recommendations for improvements that can save energy, reduce costs, and improve the overall comfort of building occupants. Energy audits typically involve a comprehensive assessment of a building's energy use, including a review of its systems and equipment, a measurement of energy consumption, and an analysis of the building's thermal performance, air quality, and lighting systems.

According to the EPA, buildings benchmarked on a consistent basis saved an annual average of 2.4% on energy. Over the span of several years these savings can increase property value and result in notable energy savings.

For example, a 500,000 square foot office building that is saving 2.4% for 3 years could achieve a total energy cost savings of \$120,000 and an increased asset value of over \$1 million.

ACTIONS

- » Conduct updated energy audits for Windham's buildings and facilities every 5 years for municipal buildings with the highest energy intensity.
- » Establish an energy benchmarking plan with ENERGY STAR Portfolio Manager to measure and track the energy use of municipal buildings over time.

Responsible party for driving the action:
Facilities & Grounds Manager

Secondary for driving the action:
Sustainability Coordinator

The Town buildings with the highest energy intensity are the Public Works facility, Town Offices, and the Fire & Safety buildings. However, both the Town Offices and Public Safety facilities have higher energy intensities than the national average so additional improvements to overall energy efficiency in these buildings are important for delivering cost reductions. Additionally, the Public Safety building and the Town Offices have heating systems that are over 20 years old. By establishing an energy benchmarking plan and conducting an energy audit every 5 years, the Town can monitor energy usage for these municipal buildings and implement energy efficient modifications to lower municipal energy costs.

The Town is planning to move the Parks & Recreation department, Social Services, and the Public Library to the current Windham Middle School located at 408 Gray Road in 2026, when a new middle school building is expected to be built. It's an older building from the 1970's and will function as a community center for the town. Due to the age of the building, it will be necessary for the Town to conduct an energy audit for this new municipal location before the move occurs.

Holland, MI set an energy baseline based on an inventory of all city buildings in 2010 and made 25 retrofits to their buildings which resulted in **average energy savings of 34%** with an annual average savings of \$28,000.³

In 2011 and 2012, Windham conducted municipal building energy audits for the Library, Town Offices, Public Safety building, and the North Fire Station. As a result of these energy audits the town has made several energy improvements to these buildings that helped reduce energy waste and improve efficiency. A comprehensive list of actions taken can be found in table 11 below.

TABLE 11. Town Completed Energy Audits

MUNICIPAL BUILDING	YEAR COMPLETED	ENERGY AUDIT RESULTS/ACTIONS
Public Safety	November 2011	<ul style="list-style-type: none"> • Partial LED Conversion (2021) • Replacement of 2 boilers (2021) • Increased Insulation
Library	March 2011	<ul style="list-style-type: none"> • Blow-in insulation (2015) • Replacement of 25% of Windows (2017)
Town Offices	October 2011	<ul style="list-style-type: none"> • Full window replacement (2012) • Complete LED conversion (2020)
North Fire Station	January 2012	<ul style="list-style-type: none"> • Living quarters LED conversion (2016)

3 https://clas.iusb.edu/pdf/sustainability-studies/white-papers/SB%20Energy%20Management%20Whote%20Paper_Final%2012-7-15.pdf

STRATEGY: Utilize LED lighting and controls in all municipal buildings and facilities

LED (light-emitting diode) lights are more energy efficient than traditional incandescent light bulbs. LED bulbs use up to 80% less energy than traditional bulbs, which means that they can significantly reduce your energy consumption and save you money on your energy bills. LED bulbs also have a longer lifespan than incandescent bulbs, lasting up to 25 times longer. Reducing the need for replacement saves money and limits waste.

Lighting controls can have a significant impact on energy efficiency by reducing the amount of energy used for lighting. Lighting controls include devices such as occupancy sensors, daylight sensors, timers, and dimmers, which allow users to adjust the lighting level or turn lights off when they are not needed.

Windham purchased the existing town-owned streetlights from CMP and completed an LED conversion in 2021.

The public library has been 50% converted to LED lights. The Public Works, Town Hall, and Fire & Rescue South Station have all been fully converted to LEDs.

Although LED bulbs cost around eight times more than traditional, they last 20–25 times longer and are more efficient to run. By switching from a 100-watt incandescent bulb to a 14-watt LED bulb it will **save you \$310.80 per year.**⁴

ACTIONS

- » Convert all internal and external lighting within the Public Safety building, the East and North Fire & Rescue stations, and the Medical Loan Closet to LED bulbs.
- » Equip all municipal buildings with lighting control devices that have occupancy sensors, so electricity usage decreases when rooms are inactive over time.

Responsible party for driving the action:
Facilities & Grounds Manager

Secondary for driving the action:
Sustainability Coordinator

The Social Services building, Public Safety building, East, and North Fire & Rescue Stations are the primary municipal buildings that remain to be fully updated to LEDs. The Public Library had 50% of the building's lights converted to LEDs between 2019-2020. However, if some of these departments move into the middle school building in 2026, the Town should shift its focus to assessing this building for energy efficient lighting. The Public Safety building had the third highest energy consumption of all municipal buildings using 124,560 kW and has an occupancy schedule of 24/7.

4 <https://safelumin.com/small-cities-are-saving-money-by-switching-to-led-lights/>

STRATEGY: Update heating and cooling systems in municipal buildings

HVAC stands for Heating, Ventilation, and Air Conditioning. It refers to the systems that control and regulate the temperature, humidity, and air quality in buildings. HVAC systems typically include heating systems, such as boilers or furnaces; cooling systems, such as air conditioning units or chillers; ventilation systems, which provide fresh air and remove stale air from buildings; and air filtration and purification systems, which remove pollutants and improve indoor air quality. The design and operation of HVAC systems are critical to maintaining occupant comfort and health, as well as minimizing energy consumption and operating costs in buildings.

Installing ENERGY STAR certified heating and cooling systems can provide annual energy bill savings of **10-30%**.⁵

HVAC improvements that increase energy efficiency can reduce operating costs and improve comfort and air quality in buildings, making them a worthwhile investment for building owners and operators who are committed to sustainability and energy efficiency.

ACTIONS

- » Identify municipal buildings with old or outdated heating and cooling systems and develop a replacement plan by 2030. The Public Safety building and the Town Offices have the oldest heating systems that are over 20 years old and should be prioritized for replacement.
- » Utilize Efficiency Maine rebate programs to upgrade the Town Offices and Public Safety building's heating & cooling systems to high efficiency heat pumps.

Responsible party for driving the action:
Facilities & Grounds Manager

The Public Works and Town Offices are the only municipal buildings using HVAC systems as their primary heating source. The Town Office HVAC system has 6 rooftop units that are over 20 years old and the Public Works HVAC system had 2 rooftop units added to the building in 2019. The Family Resource Center and the South & North Fire & Rescue Stations all have primary heating systems that run on natural gas. The natural gas cost for the South Fire & Rescue Station was \$21,070 in 2019 and \$11,592 for the North Fire & Rescue Station. The Public Safety building has the oldest primary heating system of all municipal buildings, original to the building from 1989 that uses heating oil.

⁵ https://www.energystar.gov/ia/partners/publications/pubdocs/ENERGY%20STAR%20HeatingCooling%20Brochure_508.pdf

STRATEGY: Expand Windham's renewable energy production and storage

Renewable energy sources such as solar, wind, hydro, and geothermal produce electricity with significantly lower or zero greenhouse gas emissions compared to fossil fuel-based power generation. Renewable energy systems can also provide long-term cost savings for municipalities. Although the Town is already utilizing clean solar energy, as heating, cooling, and transportation shift towards electrification, the Town will experience increased electricity demand. Windham should continue to monitor and expand its renewable energy profile and assess opportunities to further reduce dependency on fossil fuel-based electricity and save money.

ACTIONS

- » Explore additional power purchase agreements (PPA) and expand municipal renewable energy production to continue off-setting Windham's current and future electricity usage. Conduct a cost assessment for energy storage to complement renewable energy production.
- » Explore the feasibility of establishing a community wind project in Windham.

Responsible party for driving the action:
Sustainability Coordinator



A 40 kW solar electric system installed on the roof of the Windham Fire Department (Photo by ReVision Energy)

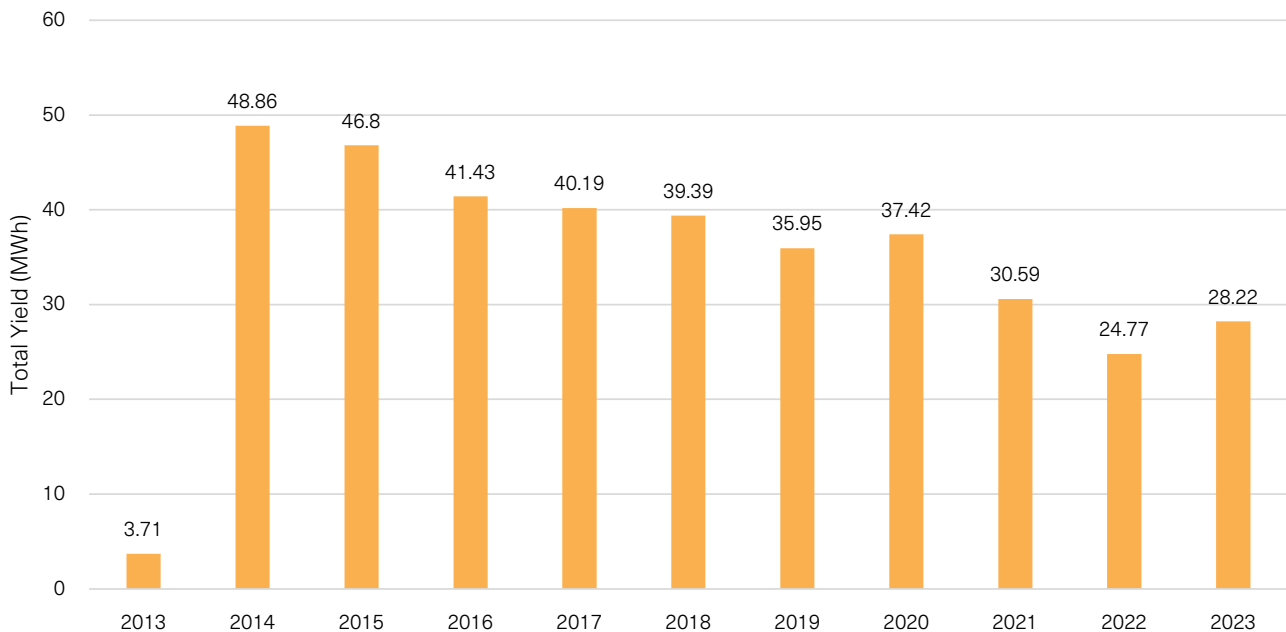
In 2013, The Town of Windham installed a 39.78 kW array on the East Windham Fire Station. Since purchasing the system in 2021, the energy has offset the electricity generation at the East and North Windham Fire Stations. The savings for both stations in the fiscal year 2022 were approximately \$3,245. In 2022, the 504-kW solar array on top of the Windham capped landfill had a cumulative savings of \$50,244.

Windham can complement its solar production by implementing energy storage technologies such as batteries to store excess energy generated during peak production times. Any stored energy can then be used during periods of low production to ensure a consistent and reliable energy supply.

Energy being produced by this 40-kW array can be monitored through the online Sunny Portal.⁶ Figure 3 above displays the total solar energy produced by the system since 2013.

In early 2021, the Town of Windham partnered with ReVision Energy to install a 504-kilowatt solar array on top of a capped landfill. The array consists of 1,344 photovoltaic panels and will produce over 684,000 kWh of solar energy annually, providing clean energy to the town's residents. According to ReVision, this project will **save over 671,000 lbs. of CO2 each year.**

FIGURE 3. East Windham Fire Solar Array Yield 2013-2023



STRATEGY: Improve the weatherization of municipal buildings and facilities

Weatherization helps reduce the energy needed to heat or cool a building, lowering energy costs and reducing greenhouse gas emissions. By improving municipal building insulation and air sealing, weatherization can help prevent heat loss during the winter and heat retention during the summer. Once fully weatherized, municipal buildings will require less energy to maintain a comfortable indoor temperature, which can result in significant energy savings over time.

Rockland Public Library undertook an insulation and air sealing project that reduced the draft in the library by 50%, reducing heating costs by as much as **\$11,000 per year.**

Weatherization may involve a variety of measures, such as adding insulation to walls and attics, sealing air leaks around windows and doors, installing energy-efficient windows, upgrading heating and cooling systems, and improving ventilation. In many cases, weatherization is carried out through a combination of these measures and customized to the specific needs of the building.

ACTIONS

- » Identify and prioritize town buildings that are older and have high energy usage for weatherization projects.
- » Assess the potential for weatherization retrofits for the Town Offices, Public Works, and Fire & Safety buildings.
- » The Windham Middle School building that will eventually house the Parks & Recreation department, Social Services, and the Library should also be prioritized for energy efficiency updates and weatherization retrofits.
- » Develop a strategic plan for implementing and funding weatherization retrofits.

Responsible party for driving the action:
Facilities & Grounds Manager

Municipal building weatherization is an efficient strategy for improving energy efficiency, reducing Town energy costs, and mitigating climate change. The Town offices and the Fire & Safety buildings are some of Windham's older municipal buildings with high energy usage and would benefit the most from efficiency investments.

Priority Area 2

Reduce Transportation Costs and Emissions from
Municipal Fleet

2.1

STRATEGY: Right-size the municipal fleet

Right-sizing the municipal fleet refers to optimizing the number and types of vehicles in the fleet and matching the operational needs of an activity with the correct vehicle. This process involves evaluating fleet usage patterns, considering alternative transportation options, and making informed decisions about fleet composition. Right-sizing the Town fleet can reduce vehicle idle time, reduce overall fuel consumption, position a fleet to successfully adopt alternative fuels and technologies, and optimize maintenance schedules.

Windham's municipal fleet of 84 vehicles consumed 46,169.6 gallons of gasoline and 26,781.7 gallons of diesel fuel and traveled approximately 640,358 miles in 2019. The fleet consists of light-duty passenger cars, medium-duty pickup trucks, and several heavy-duty dump trucks and off-road vehicles.

ACTIONS

- » Windham should complete an annual fleet inventory of all municipal vehicles, documenting their intended and allowable uses, vehicle sizes, age of vehicles, mileage, and usage patterns.
- » Assess the specific needs of each department's fleet in Windham to ensure the most fuel-efficient vehicles available are being utilized for each task. Consider factors such as the distance traveled, payload requirements, passenger capacity, and specialized equipment needs.

Responsible party for driving the action:
Public Works Director, Fleet Coordinator



Windham Planning Department Kona charging at UMaine Conference (Photo by Town of Windham)

The Public Works Department fleet had the highest fuel consumption at 21,341 gallons of gasoline and 4,823 gallons of diesel, which resulted in approximately 332 MT CO₂e, or 46% of total municipal fleet emissions.

2.2

STRATEGY: Conduct a comprehensive fleet analysis

A comprehensive fleet analysis entails evaluating and assessing the performance, efficiency, and cost-effectiveness of all the vehicles within the municipal fleet. Conducting a fleet analysis involves collecting several data points, including the number and types of vehicles, their age and condition, fuel efficiency, maintenance costs, and usage patterns.

Data collected during a fleet analysis is analyzed to identify opportunities for cost savings, improve operational efficiency, and reduce the environmental impact of the vehicles. This data will also help identify areas where the fleet can be improved, such as replacing older vehicles with more fuel-efficient models or implementing enhanced maintenance practices.

The [Alternative Fuel Life-Cycle Environmental and Economic Transportation \(AFLEET\)](#) calculator is a nationally recognized user-friendly tool for conducting comprehensive fleet analysis and identifying improved fleet management opportunities. AFLEET is an Excel-based tool developed by Atlas Public Policy and can be used to evaluate procurement ownership structures of vehicle types and explore different procurement scenarios. It can also calculate a cost-per-mile comparison.

ACTIONS

- » Complete a fleet analysis by 2025 and establish a process for updating the fleet inventory annually.
- » Adopt a fleet transition plan to replace existing municipal fleet vehicles with more fuel-efficient vehicles.

Responsible party for driving the action:
Public Works Director, Fleet Coordinator



*Cumberland County Soil & Water Conservation District & Shared Municipal Parking with Stormwater Retrofits
(Photo by Town of Windham)*

2.3

STRATEGY: Telematics and fleet tracking

Utilizing telematics software is a valuable tool for enhancing overall cost and fuel efficiency in various industries. By integrating telematics systems into vehicles or machinery, businesses can access real-time data on vehicle performance, driver behavior, and fuel consumption. This software enables the Town to identify inefficiencies and implement targeted improvements. Telematics software provides insights into factors like excessive idling, aggressive driving, and suboptimal routing, allowing companies to optimize their operations and reduce fuel consumption.

By monitoring and analyzing this data, Windham can develop proactive maintenance plans, detect potential issues before they become costly problems, and ensure vehicles operate at peak efficiency.

Telematics systems facilitate route optimization, enabling fleets to choose the most efficient paths, minimize mileage, and reduce fuel expenses. By leveraging telematics software, Windham can document a comprehensive understanding of their fleet's performance, make data-driven decisions, and ultimately improve overall cost and fuel efficiency.

ACTIONS

- » Explore telematics software to integrate throughout the municipal fleet vehicles to help track optimal routes, vehicle performance, maintenance, fuel management, driving behavior, and more.
- » Identify municipal fleet vehicles that are the least efficient based on operational costs and duty-cycles and prioritize upgrades.

Responsible party for driving the action:
Public Works Director, Fleet Coordinator

2.4

STRATEGY: Prioritize low and zero emission vehicles for municipal fleet

ACTIONS

- » Adopt a vehicle purchasing policy that prioritizes low and zero emissions vehicles for the appropriate replacement cycles whenever technology is available and feasible. Consider hybrid or electric for light-duty vehicles, and a biodiesel fuel blend for heavy-duty vehicles.

Responsible party for driving this action:
Town Manager, Public Works Director,
Sustainability Coordinator, Fleet Coordinator

A low & zero-emission purchasing policy is a policy that requires an organization, such as a municipality, business, or government agency, to prioritize the purchase of electric vehicles over traditional combustion engine vehicles whenever possible. The policy outlines the criteria for purchasing low & zero-emission vehicles, the infrastructure needed to support the operation of these vehicles, and the funding and incentive programs used to support the purchase. By adopting a low & zero-emission purchasing policy, the Town can significantly reduce routine operation and maintenance costs, reduce their carbon footprint, and promote sustainable transportation options. The total cost of ownership for hybrid and zero-emission vehicles is outlined in the figure on the following page.

ELECTRIC VEHICLE COST SAVINGS

Electric vehicles (EVs) use significantly less energy than fossil fuel powered vehicles and produce less carbon emissions and air pollution. One of the biggest barriers to making the switch to EVs is the associated cost.

While electric vehicles generally have a higher purchase price than gasoline-powered vehicles in the modern economy, there is also the consideration of the long-term financial benefits of purchasing an EV. As can be seen in the table below, in 2021, the average price for a new electric vehicle was over \$19,000 more than the average price for a new gasoline sedan.¹ However, the average costs per mile for both fueling and maintaining a medium-sized gas sedan were higher than their hybrid and electric competitors.

Electric vehicle resources and funding opportunities can be found on [Efficiency Maine](#)'s website and technical assistance and resources can be found on the [Clean Cities](#) and [Maine Clean Communities](#)' website.

FIGURE 4. Vehicle Cost of Ownership Comparison

	AVG. STICKER PRICE (USD) ²	AVG. FUEL COST/MILE (CENTS, USD) ³	AVG. MAINTENANCE COST/MILE (CENTS, USD)
Gasoline	\$19,900	6.84	8.83
Hybrid	\$30,800	5.93	8.78
Electric	\$39,000	3.66	7.70

There are also online tools available to compare costs and search for rebates. The U.S. Department of Energy hosts a tool through the Alternative Fuels Data Center that allows users to compare costs for makes and models of most vehicles. The same site also provides information on laws and incentives for alternative fuel vehicles by region.

Data Used for Vehicle Cost Comparison

To provide a simplified assessment of cost savings from switching to a partially or fully renewably powered vehicle, data was taken from the AAA 2021 Driving Costs report.

¹ <https://newsroom.aaa.com/wp-content/uploads/2021/08/2021-YDC-Brochure-Live.pdf>

²The figures used for Average Sticker Price in this table are based on the average MSRP of the five top-selling vehicles of 2021 in each category.
 Medium Sedan — Chevrolet Malibu, Honda Accord, Hyundai Sonata, Nissan Altima, Toyota Camry
 Hybrid Vehicle — Ford Explorer, Honda CR-V, Hyundai Ioniq, Toyota Prius Liftback, Toyota RAV4
 Electric Car — BMW i3, Chevrolet Bolt, Hyundai Kona Electric, Nissan Leaf, Tesla Model 3

³Data points for fuel and maintenance costs included in this table are based on the five top-selling vehicles of 2021 in each respective category. The gasoline vehicle figure uses averages attributed to a small, or compact, sedan.

STRATEGY: Explore viability of adopting alternative fuels, specifically biofuels

Electrification of heavy-duty vehicles still poses a serious challenge as the mileage range is limited and often does not match duty cycles. Biodiesel is a viable transportation fuel and is actively being used by several Maine fleets as an effective strategy to immediately reduce transportation emissions without costly vehicle upgrades. Biodiesel is produced locally in Portland at Maine Standard Biofuels and can offer an immediate emissions benefit with no modifications necessary to run a B5-B20 blend. In 2019, the municipal fleet used 31,604 gallons of diesel and emitted approximately 323 MT CO₂e. By incorporating biodiesel into the diesel fleets, Windham can expect to see an immediate 15% emissions reduction in diesel emissions with a B20 blend.

MaineDOT Biodiesel Pilot

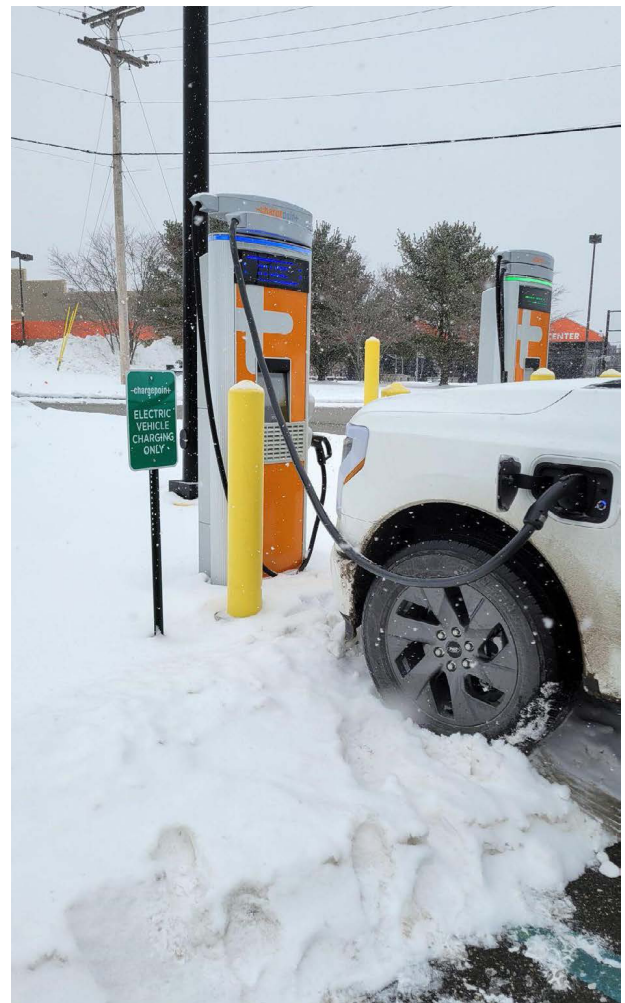
In 2021, after a successful pilot utilizing a biodiesel blend, MaineDOT expanded the use of biodiesel to several other fueling stations along Interstate 95. Throughout 2021, MaineDOT utilized 129,763 gallons of biodiesel fuel. The fleet runs a B20 blend during half the year and transitions to a B5 blend in the colder months.

MaineDOT has a biodiesel fueling station located at 28 Portland Road in Gray, Maine that allows municipalities to fuel up with no locked-in commitments utilizing a DOT fuel card.

ACTIONS

- » Explore the viability of adopting biodiesel as an alternative fuel for the municipal fleet.

Responsible party for driving this action:
Public Works Director, Sustainability Coordinator, Fleet Coordinator



Windham Hannaford ChargePoint Station in Winter
(Photo by PlugShare)

Priority Area 3

Engage the Windham Community for Energy Efficiency Improvements

3.1

STRATEGY: Increase the energy efficiency of buildings through energy codes

Incorporating energy efficiency into building codes can help promote sustainable development and reduce energy consumption, leading to cost savings and environmental benefits for municipalities and building owners. Adopting energy-efficient building codes will ensure that new construction and renovations minimize energy waste, reduce overall energy consumption, and lower demands on the local energy grid. Energy-efficient buildings optimize energy use, resulting in lower energy costs for businesses and residents, and tend to have higher property values due to their reduced operating costs. Lower overall energy consumption helps lower utility bills, making buildings more affordable to operate over time.

In 2021, Maine adopted the 2015 International Energy Conservation Code (IECC) as the baseline energy code for the Maine Uniform Building and Energy Code (MUBEC), with the 2021 IECC as a stretch code. The IECC 2021 is two cycles ahead of Maine's base code, and the Department of Energy has determined that it is 10% more efficient than the IECC 2015. The increase in construction cost of switching from the 2015 IECC to the 2021 IECC is projected to be 1% or less. This investment would result in energy savings starting in the first year, and once the initial investment is covered, the cost savings would

The cities of Portland, South Portland, and Freeport have adopted the 2021 IECC stretch code as of 2023.

ACTIONS

- » Explore adoption of stretch codes for new construction and renovations that require buildings to meet certain energy efficiency requirements, such as minimum insulation levels, efficient HVAC systems, and lighting efficiency.

Responsible party for driving the action:
Code Enforcement Director, Planning Director

continue. The U.S. Department of Housing and Urban Development (HUD) estimated that families can save over 35% on energy costs by building homes using the 2021 IECC.

In 2021, Maine adopted the 2015 International Energy Conservation Code (IECC) as the baseline energy code for the Maine Uniform Building and Energy Code (MUBEC), with the 2021 IECC as a stretch code. The IECC 2021 is two cycles ahead of Maine's base code, and the Department of Energy has determined that it is 10% more efficient than the IECC 2015. The increase in construction cost of switching from the 2015 IECC to the 2021 IECC is projected to be 1% or less. This investment would result in energy savings starting in the first year, and once the initial investment is covered, the cost savings would continue. The U.S. Department of Housing and Urban Development (HUD) estimated that families can save over 35% on energy costs by building homes using the 2021 IECC.

STRATEGY: Launch an education campaign for residents on energy efficiency

Raising awareness and providing education about energy efficiency enables community members to learn how to reduce their energy consumption and lower their energy bills. Education campaigns can help bring community members together and encourage them to take an active role in addressing energy-related challenges for the town of Windham.

Outreach initiatives help community members understand how energy consumption affects their finances and the environment. Effective outreach campaigns can lead to behavior changes and the adoption of energy efficiency practices. By providing information, resources, and incentives, outreach efforts can empower individuals to make informed choices and take action to reduce their energy consumption. By involving residents, businesses, and community organizations, outreach programs help foster a sense of collective responsibility and encourage collaboration.

Targeted outreach on residential energy efficiency would be an impactful strategy as Windham has a relatively older housing stock that would greatly benefit from weatherization. Windham's 2016 Comprehensive Master Plan noted that 61% of homes in Windham were built in 1989 or earlier.

Orono Energy Efficiency Fair

This energy fair provides lectures to share knowledge of cleaner energy options for everyday life, reduce energy bills, and reduce the use of fossil fuels for residents and businesses. The goal of this event is to bring local contractors and businesses to one location so residents can discuss potential project options with them.

ACTIONS

- » Implement an outreach effort to encourage businesses and residents to utilize Efficiency Main's rebates and incentives.
- » Establish an energy efficiency educational program with local schools to host energy workshops and fairs.
- » Promote the weatherization of Windham's older housing stock.

Responsible party for driving the action: Economic Development Director, Sustainability Coordinator, Energy Advisory Committee

As of 2023, more than half (58.5%) of the homes in Windham are still over 34 years old, and over a third (36.2%) of homes are over 54 years old. These older homes may lack proper insulation in walls, attics, and floors, leading to higher heat loss in the winter. Additionally, older homes tend to have more gaps and cracks that allow air to leak in and out, reducing energy efficiency.

Resilient Bath

The Resilient Bath Initiative created a set of resources for modern building efficiency, the future of transportation, and a renter's guide to sustainable living. These resources were created to help educate and encourage residents and businesses to take steps to improve energy efficiency and save money.

3.3

STRATEGY: Conduct outreach for community solar programs to Windham residents

Community solar programs enable residents and businesses who may not be able to install solar panels on their properties to still benefit from renewable energy. Residents can subscribe to a shared solar project and receive credit or discounts on their electricity bills. Community solar programs can aid in reducing the barriers to entry for solar energy adoption. Participants don't need to make a significant upfront investment in panel installation or maintenance, making renewable energy accessible to a broad range of individuals, including renters, HOA residents, and low-income residents.

Solarize Hanover

This program is a town-led campaign to support the solarization of Hanover residents. The campaign supports the development of community solar programs and its residents looking to transition their residential energy to renewable sources.

ACTIONS

- » Improve the permitting and zoning processes specific to community solar projects to encourage their development. This includes developing clear guidelines, reducing administrative burdens, and providing support to project developers.
- » Promote community engagement and education about the benefits of community solar programs with public outreach campaigns, workshops, and informational materials. Collaboration and open dialogue with community members and organizations are critical to developing successful community solar programs, policies, and projects.

Responsible party for driving the action:
Sustainability Coordinator, Planning Director,
Energy Committee



Residence in Windham, Maine (Photo by Sundog Solar)

STRATEGY: Enhanced financial incentives or rebate programs

Energy-efficient investments can be expensive and are particularly burdensome on low-income residents. Rebates can help residents and businesses offset the initial costs of energy-efficient upgrades and purchases. Financial incentives can reduce investment costs and make energy-efficient products and technologies more affordable. Rebate programs often include educational components, providing information on energy-efficient practices and technologies.

Low-moderate-income households typically spend a higher percentage of their income on energy costs compared to high-income households. Rebates and incentives for low- to moderate-income residents can help alleviate this financial burden by reducing energy costs and making energy-saving upgrades more affordable.

The Town of Windham has an average household energy burden of 3%, with residents spending approximately \$2,858 on energy costs. This is slightly higher than the Cumberland County average energy costs of \$2,485, a 2% energy burden. A high energy burden is considered anything above 6%, and a severe energy burden is households spending above 10% on energy costs.

Funding opportunities for residents can be found by navigating through the energy.gov website.⁷

ACTIONS

- » Explore the feasibility of implementing residential rebates or financial incentive programs to drive energy-efficient investments by town residents - possibly including small funding mechanisms to target low-income residents to support adoption of weatherization, heat pumps, etc

Responsible party for driving the action:
Sustainability Coordinator

In 2022, the City of Bangor offered a rebate of up to \$2,000 to residents for heat pumps and weatherization assistance in addition to Efficiency Maine's rebates.

Using American Rescue Plan Act (ARPA) funding the City of Auburn launched the Sustainable Auburn Matching Rebate Program in 2021. The program matched Efficiency Maine rebates for residents and doubled their rebates.

In 2022, the City of Portland partnered with Revision Energy to run its first round of an Electrify Everything campaign that helped residents gain access to additional rebates and incentives for electrification and solar energy projects. The following rounds of this program will use ARPA funding. The second round was an incentive to help residents purchase an electric bicycle to provide a reliable and practical transportation option that does not rely on fossil fuels.

Yarmouth's Town Council has approved the use of their Affordable Housing Fund to create a town rebate program called "Efficiency Yarmouth". The goal of this program is to help low to moderate-income residents improve energy efficiency; the first round will focus primarily on heat pumps. It is the goal that the program will evolve over time to include home energy assessments, weatherization, insulation, air sealing, and hot water heat pumps.

STRATEGY: Increase the total number of EV charging stations in Windham

An EV infrastructure ordinance sets minimum requirements to install charging in new parking area, it facilitates and encourages the use of electric vehicles, expedites the build-out of cost-effective charging infrastructure, and supports long and short-term parking needs. Ordinances usually specify the number of parking spaces in new development or construction that are classified as EV-capable, EV-ready, and EV-installed. A parking space defined as 'EV-capable' ensures adequate electrical capacity and conduit is laid to support EVSE. Parking spaces defined as 'EV-ready' have dedicated branch circuits for future Level 2 ESVE. EV installed refers to parking spaces where an EV charging station has been fully installed. The policy will prepare new developments in Windham for the future, and significantly reduce the costs of EVSE installation.

An EV infrastructure cost effectiveness report from Oakland, CA states installing a complete circuit with a rating of 240 volts and 40 amps during new construction saves approximately \$1,000-\$1,600 per parking structure.⁸



*Windham Hannaford ChargePoint Station
(Photo by PlugShare)*

ACTIONS

- » Adopt an EV infrastructure development ordinance that requires a threshold of EV-ready and EV-capable parking spaces in new construction and parking lot renovations.

Responsible party for driving the action:
Sustainability Coordinator, Planning Director

City of South Portland EV Charging Ordinance

South Portland City Council passed an electric vehicle charging infrastructure ordinance on November 15, 2022. This ordinance will set requirements for new/reconstructed parking lots to add EV charging infrastructure at the opportune time to prevent expensive retrofits at a later date. It will also require EV chargers to be installed in some scenarios.

Model EV Ordinance Language

Southern Maine Planning and Development commission developed model EV ordinance language for municipalities in Maine interested in adopting their own.

IMPLEMENTATION PROCESS

The table below outlines actions that the Town can take to effectively implement the identified energy efficiency strategies. This table includes a cost indication represented by the number of dollar signs. An in-depth cost analysis has not been conducted for every strategy and is rather meant to provide a frame of reference for associated implementation costs.

#	STRATEGIES	IMPLEMENTATION PROCESS	COST
1.0 Improve Energy Efficiency in Municipal Buildings & Facilities			
1.1	Monitor and track the energy usage for municipal buildings	Complete an annual energy usage inventory of electricity, natural gas, propane, and heating oil used in each building.	\$
1.2	Utilize LED lighting and controls	Complete a cost assessment to finish converting the remainder of lighting in municipal buildings and facilities. Determine if funding sources are available.	\$\$
1.3	Update heating and cooling systems in municipal buildings	Work with Dept. leaders operating out of the Town Offices building to coordinate an HVAC assessment to determine initial costs.	\$\$\$
1.4	Expand Windham's renewable energy production	As Windham's energy demand increases from electrical heating, cooling, and transportation sources, continue exploring additional PPAs with solar, wind, and geothermal energy sources.	\$\$\$
1.5	Improve the weatherization of municipal buildings and facilities	Conduct an energy audit for the Town Office building and receive quotes for weatherization improvements.	\$\$
2.0 Reduce Transportation Costs and Emissions from Municipal Fleet			
2.1	Right-size the municipal fleet	Fleet managers determine allowable use cases for each vehicle and review with all staff.	\$
2.2	Conduct a comprehensive fleet analysis	Fleet managers and fuel master inventories municipal vehicles utilizing AFLEET tool.	\$
2.3	Telematics and fleet tracking	Contact fleet telematics software vendors to understand cost and applicability to integrate into all vehicles.	\$\$
2.4	Prioritize low and zero emission vehicles for municipal fleet	Complete a fleet assessment to identify the best vehicles for electrification	\$\$
2.5	Explore viability of adopting alternative fuel infrastructure	Obtain quotes for storage and fueling infrastructure and determine feasibility for incorporating a biodiesel blend into existing diesel vehicles.	\$\$\$

#	STRATEGIES	IMPLEMENTATION PROCESS	COST
3.0 Reduce Transportation Costs and Emissions from Municipal Fleet			
3.1	Adopt updated energy efficient building codes as Windham continues to develop designated growth areas	Work with town planners and engage local developers to discuss the implications of adopting the updated stretch codes.	\$
3.2	Launch an education campaign for Windham residents on energy efficiency	Host public meetings with subject matter experts to discuss the topics of energy efficiency, renewable energy, and weatherization. Consider adding additional information on the town website and include links to Maine resources.	\$\$
3.3	Community solar programs	Work with local solar and housing developers to explore the viability of implementing community solar programs for residential properties.	\$\$
3.4	Financial incentives or rebate programs	Work with the Town finance manager on how to leverage various funding mechanisms to create an incentive or rebate program for low-income residents. Consider using these funds for matching or supplementing existing state incentive programs.	\$\$\$
3.5	Increase the total number of EV charging stations in Windham	Engage the planning board to explore developing new parking ordinance	\$

INDICATORS FOR TRACKING COST SAVINGS & EMISSIONS REDUCTION



STATIONARY ENERGY

Additional indicators for stationary energy can provide the Town with a better understanding of community efforts to increase energy efficiency and reduce reliance on fossil fuels in homes and businesses within the community. This can be especially important for Windham with an older housing stock and expanding growth zones.



NUMBER OF SOLAR PANEL INSTALLATIONS

Tracking the number of solar panels installed by residents and businesses can help communities track the development of renewable energy in their community. Windham can work with code enforcement or state electrical permitting department to collect this data annually.



ELECTRICITY USAGE PER HOUSEHOLD

Electricity usage per household or per municipal buildings can be a useful indicator for adopting future strategies to reduce greenhouse gases as electricity is a major contributor to the Town's overall emissions. Tracking this data can help the Town identify areas where energy efficiency improvements and clean energy investments will be the most impactful. This can be calculated using the consumption and number of meter data from the residential electricity subsector and dividing it by number of buildings.



HEAT PUMP INSTALLATIONS

Tracking heat pump installations can be an effective way to measure progress towards addressing energy efficiency in buildings. Heat pump installations reduce the Town's overall consumption of fossil fuels used for heating in the winter and electricity consumption for cooling in the summer. The Town can get a sense of overall heat pump adoption within the community by tracking the total number of Efficiency Maine rebates. Efficiency Maine can provide this data annually. Additionally, Windham can track the energy savings achieved by heat pump installations within their own buildings to inform future policy decisions and local incentive programs for further adoption.

2019 Efficiency Maine Rebates in Windham funded:

 **172** HEAT PUMPS

 **33** WEATHERIZATION PROJECTS



CONSERVED LAND

Land conservation can be a key strategy for Windham to increase carbon sequestration and reduce overall GHG emissions. Currently, 1834.59 acres are permanently conserved. However, this does not include the 750+ acres that will be conserved once the East Windham Conservation Project closes.



Windham can track the community’s progress towards more sustainable transportation methods by tracking the total number of registered electric vehicles and the number of EV charging ports installed annually. The Maine DEP publishes a list of all registered electric and hybrid vehicles annually and charging ports are tracked by Efficiency Maine and the Alternative Fuels Data Center Station Locator.

The Maine DEP began tracking EV registration data in 2020 and updates the inventory on an annual basis. This data can be used to indicate the increase of low and zero emission vehicles which can be classified as the following:

- Hybrid Electric Vehicle (HEV)
- Plug-In Hybrid Electric Vehicle (PHEV)
- Battery Electric Vehicle (BEV)

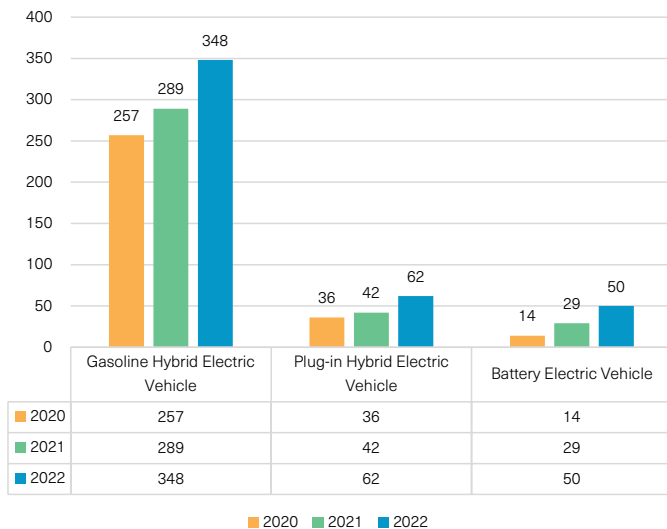


FIGURE 5. Windham Registration Data for Low Emissions Vehicles

EV CHARGING STATIONS	# CHARGING PORTS	LOCATION
Level 2 Charging	6	Town Hall, Public Works, Hannaford parking lot
DC Fast Charging	2	Hannaford parking lot
Tesla Super Chargers	8	Hannaford parking lot

TABLE 13. EV Charging Ports in Windham

Tracking the total number of charging ports can be an indicator of EV accessibility to not only Windham’s local vehicle population but also any tourist or drive-through traffic. As of 2022, there are currently six Level-2 charging ports, two DC fast charging ports, and eight Tesla Super Chargers within the town’s geographic boundary. It’s important to track the total number of ports instead of charging stations as one station might be able to charge multiple cars simultaneously.

CONCLUSION & NEXT STEPS

The Windham Town Energy Plan represents a comprehensive action plan to meet the community's energy needs at the lowest long-term costs, while promoting sustainability and resilience.

Moving this energy plan into an implementation phase will require some crucial next steps.

- Reestablishing the Windham Energy Advisory Committee to lead community engagement.
- Convene all of Windham's municipal departments on a semi-annual basis to collaborate and coordinate inclusion of Town energy investments and priorities into the annual budget.
- Identify key partners and stakeholders to support energy efficiency strategies and actions.
- Seek available funding opportunities for strategy implementation.
- Collaborate with regional partners.
- Conduct a 5-year review of plan progress and update priorities as needed.

By improving Windham's overall energy efficiency, this plan aims to reduce fuel and energy operational costs, reduce reliance on non-renewable fossil fuels, lower greenhouse gas emissions, and enhance the overall quality of life for residents.

APPENDIX

2019 Windham Municipal and Community Greenhouse Gas Emissions Inventory