Turning the Tide:

Preliminary Climate Actions for Camden, Maine

Watershed School

July 2020

TURNING THE TIDE

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by

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WATERSHED SCHOOL

Camden, Maine

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Introduction

In February 2018, at the urging of students in Camden, the town Select Board voted to sign on to the Global Covenant of Mayors for Climate and Energy, the first town in Maine to do so. Watershed School's global climate change class agreed to do much of the work required to meet the Covenant's requirements (see below).

Camden's Global Covenant for Climate and Energy Commitments

1. Register commitment
2. Year One – Take Inventory
   a. Community-wide greenhouse gas (GHG) inventory focusing on buildings and transportation
   b. Identification of climate hazards that are likely to affect Camden
   c. Report to Covenant
3. Year Two – Assess Vulnerability and Set Reduction Targets
   a. Inventory of GHG emissions from waste
   b. Set targets to reduce GHG emissions and establish a system for measuring
   c. Evaluate climate change vulnerability
   d. Report to Covenant
4. Year Three – Establish an Action Plan
   a. Action Plan that addresses how Camden will reduce its GHG emissions (mitigation)
   b. Adaptation Plan that addresses how Camden will adapt to climate change (adaptation).

To date, Watershed School students have completed four reports related to municipal energy use, greenhouse gas emissions and climate change vulnerability (see Appendix A). This spring, we began work on an action plan, which is the focus of this report.[1] The Year Three commitment requires establishing both an action plan and an adaptation plan. This was more than we could accomplish in a semester-long course, so we decided to focus on just the action plan portion.

[1] A summary of all of Watershed's completed reports for the town is included in Appendix A.

This report summarizes 10 key actions, which are critical to Camden achieving its commitment goals. Establishing emissions reduction and renewable energy targets is an essential first step. This is Action 1. We recommend that the state targets be adopted by the town as soon as possible and that a group of stakeholders be pulled together to figure out how best to phase these targets in. We also think it is essential to hire a climate/energy planner to complete the action plan, monitor and report progress, and coordinate the hard work needed to implement actions. This is Action 2. Most of the remaining actions focus on the residential building and transportation sectors. We focused on houses and transportation because together they account for 76% of the town's greenhouse gas emissions (Facq et al. 2018).

Methods

This project had many steps which are briefly described below:

- We began by reviewing action and adaptation plans from other towns in Maine and elsewhere. The most relevant were those for Aspen, Colorado. We looked at their master list and methods to help identify priority actions for Camden.

- The most important resource for this report was the work of the Maine Climate Council (MCC) We spent much of the semester evaluating the preliminary recommendations of the Buildings, Housing and Infrastructure Working Group (BIH) and the Transportation Working Group. We went to the MCC's initial meeting on climate change impacts in Maine, met with the co-chair of the BIH, read the working group strategic plans, and attended related webinars by the MCC, ReVision and Maine Natural Resources Council.

- We conducted a rooftop solar analysis of all buildings within the Camden town boundary. Our analysis was modeled after a Solarize MDI project that used a sophisticated program developed by MIT to determine solar potential of buildings. This program was run by a GIS intern at the College of the Atlantic. Unfortunately, the program isn't publically available, so we developed a simplified technique that could be done relatively quickly. We used Google My Maps (2019 imagery) to locate roofs that were oriented within 45 degrees of due south. Using a customized protractor we classified buildings as follows: full sun, partially shaded, flat, and existing solar array. For flat roofs, we also calculated area. Roofs with partial shade were evaluated qualitatively – we looked for major shadows and/or large trees near south-facing roofs. We used a set of

town tax maps that showed all buildings so we could check off sections as we finished them.

- Early on, we met with Jeremy Martin (Planning and Development Director), David St. Laurent (Public Works Director), Anita Brosius-Scott (Energy and Sustainability Committee Chair) and Alison McKellar (Select Board member) to learn about work Camden is doing to reduce municipal energy use (see Appendix B). Audra Caler-Bell shared the many reports and studies that the town had completed to date.

- We contacted Waldoboro Town Planner Max Johnstone about Waldoboro's public transit survey. Max shared his questions, results and analysis with us. We then tried the survey out on friends and faculty and made refinements. The survey questions are in Appendix C.

- We met with Rockland Sustainability Coordinator Davis Saltonstall to learn about what a similar position could look like for Camden and find out about challenges he faces.

- Using all of this information, we identified priority actions that were most relevant to the Camden situation and were at the scale needed to meet the targets we propose. Each of us chose one or two actions to research, reviewed our findings with each other, and them summarized the results on a template that we modified from one used by the Maine Climate Council.

- Finally, we gave a zoom presentation to the school in early June and invited town staff, Energy and Sustainability Committee members and the Select Board to attend.

We view this preliminary action plan as a working document for several reasons. First, due to the Covid-19 pandemic, we did not have the time or resources to evaluate actions outside of the residential building and transportation sectors. Second, after the stay safer at home order, the town was unable to provide information or staff support. Third, energy technology, energy policy and what we know about climate science are changing quickly and the town's actions and how it adapts to a warming climate will need to evolve as more is known. Finally, we are at a point where the town and more stakeholders need to be more involved and take the lead role in meeting the Global Covenant commitments. Due to the Covid-19 pandemic, we were not able to collaborate with the town this spring, but hope to strengthen our partnership going forward.

Preliminary Actions

Action 1. Adopt Maine's renewable energy and greenhouse gas emissions reduction targets.

Background

In June, 2019, LD 1679 – "An Act to Create the Maine Climate Council to Assist Maine to Mitigate, Prepare for and Adapt to Climate Change" became law. These targets match global targets that the IPCC says are essential to keep global temperatures from rising more than 2°C above preindustrial levels (IPCC 2014). An increase above this is likely to result in a world that our civilization can not adapt to. LD 1679 includes the following renewable energy and emission reduction goals:

By January 1, 2030

80% of electricity consumed in Maine must come from renewable sources.
Maine shall reduce its annual GHG emissions to at least 45% of 1990 levels.

By January, 2050

100% of electricity consumed in Maine must come from renewable sources.
Maine shall reduce its annual GHG emissions to at least 80% of 1990 levels.

As part of its Global Covenant of Mayors commitment, Camden is required to set emissions reduction targets. We recommend that the state targets be formally adopted by the Camden Select Board and incorporated into Camden's climate action planning process. The town can then figure out how to phase these in when it completes its action/adaptation plan in the next one to two years.

How would this benefit Camden? Who would benefit?

Although it is important for high population areas and the highest emitters to reduce their CO_2 emissions, change needs to occur everywhere. In the short term, acting to meet these goals could negatively affect fossil fuel-related industries, but in the long run all Camden residents will benefit due to a less volatile climate, cleaner air, and less expensive energy produced closer to home.

What are the potential costs? There is no cost to establishing these targets.

What are some Camden-specific barriers to implementing this action?

Fear of change; the pace of decision-making built into the local government process; disruption due to the Covid-19 pandemic.

What are some Camden-specific advantages to implementing this action? This will allow Camden to set interim targets to phase in specific actions. Camden would be a regional climate action leader and would inspire other towns to act.
What is the potential timeframe for implementation? Can be done immediately. If the town decides a town vote is needed, this action could be placed on the June 2021 ballot.
Is there a model for this, either in another Maine town, the state as a whole, or elsewhere? Many towns and cities in Maine and elsewhere have adopted these or even more stringent targets (e.g., Portland, South Portland, Rockland, Aspen, CO).
What resources do Camden or Maine have that would help implement this action? Committed town staff, Select Board, and Energy and Sustainability Committee; the students and staff at Watershed School have laid the groundwork for planning through their research and reports and are available to work with the coordinator on future plans and actions.

Action 2. Hire a Climate/Energy Action Coordinator.

Background

We recommend that a Climate Action/Energy Coordinator be hired as soon as possible to complete and implement a community-wide Climate Action and Adaptation Plan for Camden and develop an outreach/education program. A coordinator is needed to 1) stay abreast of Maine Climate Council work, state and federal legislation and incentives, climate research and impacts, energy technology, adaptation strategies, and grant opportunities that will benefit the town; 2) work with all town departments to complete and implement the action plan (with phased in targets that reflect increased electricity demand) and keep the plan up to date; 3) educate Camden and residents about the work being done, involve stakeholders in the process, and encourage the transition to renewable energy; 4) monitor and report progress as required by the Global Covenant of Mayors on Climate and Energy.

How would this benefit Camden? Who would benefit?

Based on conversations with similar staff in other towns (they are often called Sustainability Coordinators), this position has the potential to save the town money in the long term by preparing and adapting before climate crises effect the town, generating grant revenue, and energy savings. The position would benefit all Camden residents.

What are the potential costs? The cost of a new staff person is significant. Initially, this could be a half time position (as Rockland has done), or a shared position. If it is shared, we recommend working with towns that are facing similar climate change impacts, share water supplies and waste disposal facilities, are in the same school district, and share key natural resources such as Megunticook Lake and Camden Hills State Park (e.g., Rockport, Lincolnville and possibly Hope).

What are some Camden-specific barriers to implementing this action?

In the short term, cost is a barrier, but we are convinced that the position would pay for itself over time and recommend that the town talk with towns that have hired Sustainability Coordinators. Also, given that the impacts of the climate crisis will dwarf all other issues and have a huge impact on the next generation, the town we recommend that the town consider diverting funds from the Camden Snow Bowl or other departments.

What are some Camden-specific advantages to implementing this action? Camden has a town government and staff that support climate action and the town has committed to climate action by signing on to the Global Covenant of Mayors. Having an active coordinator would make Camden a regional climate action leader and this would inspire other towns to act and open up possibilities for grants. The town has already done a lot of research and work on reducing municipal energy use (see Appendix A), but much more community-wide work is needed.
What is the potential timeframe for implementation? Can be done immediately. If the town decides a town vote is needed, this action can be placed on the June 2021 ballot.
Is there a model for this, either in another Maine town, the state as a whole, or elsewhere? A number of Maine towns have hired coordinators. Some we are aware of include Kimberly Darling (Falmouth), Troy Moon (Portland), Julie Rosenbach (South Portland), Jami Fitch (Scarborough), Davis Saltonstall (Rockland), and Karina Graeter, coordinator for regional sustainability and coastal resiliency for six towns in York County (Kennebunk, Kennebunkport, Wells, Ogunquit, Kittery and York). Davis Saltonstall's focus to date has been on Rockland's municipal energy use and conservation. Bar Harbor, which has a staffed nonprofit called Climate to Thrive that fulfills this role, is another model.
What resources do Camden or Maine have that would help implement this action? Committed town staff, Select Board, and Energy and Sustainability Committee, the CHRHS Windplanners, and the students and staff at Watershed School, who have laid the groundwork for climate action planning through their research and reports.

Action 3. Weatherize existing homes for maximum energy efficiency.[2]

Background

Camden's homes account for nearly half (48%) of the town's greenhouse gas emissions (Facq et al. 2018), which is far greater than the statewide average of 23% for this sector. Reasons for this are that ~77% of Camden's more than 3,000 homes heat with oil (Facq et al. 2018), many houses are old and not well insulated, and the average household size is only 1.9 (Comprehensive Plan Committee 2017).

Improving home energy efficiency through weatherization is the logical first step in reducing emissions because it will reduce the amount of energy needed for heat pumps and other energy saving measures, making them more cost-effective. The first step to weatherize a home is to do an energy audit. Brian Robinson, of Evergreen Home Performance, estimates that only 5% percent of homes in Camden have been audited to see how they can be made more energy efficient (Robinson, personal communication 2020). Audits are often provided for free by weatherization companies and Efficiency Maine provides rebates. The Maine Climate Council Buildings, Housing and Infrastructure Working Group recommends expanding this program significantly.

The town has proposed implementing an Efficiency Camden program that would use town trust fund dollars to leverage Efficiency Maine funding to improve energy efficiency in Camden homes. The goal would be to provide subsidies to low to moderate income households for insulation, HVAC upgrades, etc. Informing both year-round and seasonal Camden residents about Efficiency Camden, Efficiency Maine, Window Dressers, free preliminary audits offered by Evergreen Home Performance and others, low interest loans, and others resources and programs, is essential to encourage and enable homeowners to weatherize their houses.

In addition, the town is working to make municipal buildings more energy efficient. An energy efficiency assessment of the Opera House, library, wastewater treatment plant, public works and public safety buildings, and the Snow Bowl is complete (Town of Camden 2020). Recommended upgrades to heating systems, insulation, and efficiency have the potential to reduce energy use by 15-20%. The town continues with small on-going improvements, such as installing window inserts at the Opera House.

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[2] Note that most of the statistics in actions related to buildings and transportation come from the Maine Climate Council (see Maine Climate Council 2020a and 2020b).

The Energy and Sustainability Committee recommends that energy demand be considered - and preferably fully offset - in every new building the town builds/maintains in the future, and that energy demand also be a factor to evaluate when new businesses come to town. The Committee asks that every effort be made to achieve the challenging goals set by the State Legislature and our GCoM commitment.

How would this benefit Camden? Who would benefit?

Individual homeowners at all income levels can benefit from retrofitting their homes through lower annual energy costs (for both heating and cooling) and increased air quality and comfort. Energy efficiency in new and old constructions is one of the most cost-effective carbon mitigation strategies. In addition, this would reduce the town's overall GHG emissions, helping to mitigate the impacts of climate change, and improve overall air quality. And there is potential to create many new jobs with an expanded need for more auditors and weatherization companies.

What are the potential costs?

Companies like Evergreen Home Performance currently provide a free 1-1.5 hour consult with homeowners to discuss ballpark weatherization opportunities and other concerns. They conduct a full audit for free once a client has committed verbally to improvements. The following weatherization estimates for a typical home are from Evergreen Home Performance (Brian Robinson, personal communication). A typical project in the midcoast costs about $11,000, with can be done over time. Many average-sized homes (24'x36' footprint) can stop wasting 25% of their heating fuel use with a $6,000 - $7,500 investment and also receive $1,000 to $1,500 cash back in Efficiency Maine rebates. Many can save 40-50% by treating both the attic and basement and adding thermal window inserts with an investment of between $12,000 - $15,000 and can qualify for $2,500 in Efficiency Maine rebates. In general, insulating uninsulated basements usually saves 25%, bringing attics to R-60 saves about 15% (assuming they are not totally uninsulated), insulating uninsulated walls saves another 15%, and window inserts save about 5%. Air sealing is rolled into each of these renovations. We recommend that homeowners that weatherize, which increases the value of their home, not be penalized with higher taxes.

What are some Camden-specific barriers to implementing this action?

This action is voluntary, so much more needs to be done to inform residents about the benefits of weatherization. Upfront costs can be a barrier for low to moderate income residents. Again education about rebate programs is needed. Are there enough auditors and retrofitters to phase in weatherization quickly?

What are some Camden-specific advantages to implementing this action?
Would reduce town's emissions and help mitigate impacts of climate change.
Would reduce heating and cooling costs and increase comfort and indoor air quality.
The proposed Efficiency Camden program could accelerate improvements in homes of low to moderate income residents.

What is the potential timeframe for implementation?
While weatherization is voluntary, homeowners will be more likely to have their homes audited and weatherized if they know how much they can save and what programs are available. Education needs to be comprehensive and ongoing and is a logical responsibility of a climate action/energy coordinator. We recommend preparing an informational brochure that could accompany tax bill to distribute starting in 2021. Audits and weatherization work could be phased in with goal of weatherizing 50% of Camden's homes by 2030 and 100% by 2045.

Is there a model for this, either in another Maine town, the state as a whole, or elsewhere?
We haven't seen a coordinated approach for this. Bar Harbor's Climate to Thrive is a potential model, as well as the Maine Climate Council's strategies. We recommend that the town lead by example by weatherizing all public buildings using best practices for building materials and techniques, and actively publicize the benefits.

What resources do Camden or Maine have that would help implement this action?
In June 2020, the Maine Climate Council Building, Housing and Infrastructure Working Group identified strategies that could help Camden reach its goals. Maine is on the verge of adopting the 2015 International Energy Conservation Code which has a much tighter air change per hour standard (a measure of leakiness). The BIH report includes recommends developing a roadmap to reach net zero emission building codes for new construction by 2035 and commit to the training and resources necessary to expand and increase code compliance. Some other ideas being discussed are:

- requiring an energy audit/certification before a house is sold, which would document how each house matches up to the 2015 energy code (or future even tighter codes)
- tighter standards for reducing global warming potential of insulation and other building products
- promotion of wood structural materials
- encouraging seasonal home owners to install sensors to reduce energy use when they aren't there

Camden will need to align its work with MCC's recommendations and actively support and promote new legislation and programs.

Action 4. Transition to cleaner heating and cooling systems.

Background

Replacing fossil fuel space and water heating with heat pumps and heat pump water heaters would significantly reduce the town's greenhouse gas emissions. About 77% of Camden's homes heat with oil (Facq et al. 2018). Heat pumps can heat or cool basically any type of building (single family homes, affordable housing, multi-family apartments, commercial buildings, etc.). They are 2-3 times less expensive to operate than fossil fuel heating systems and run on electricity, which, in Maine, is relatively clean and on a pathway to being primarily derived from clean, renewable sources (see graphic at the end of this action). They can replace or supplement existing systems and, in addition to reducing long term energy costs, result in better indoor air quality because there is no carbon monoxide and there are no fuel leaks. When fitted with smart controls, they can be managed to reduce peak demand on the grid, and improve grid reliability, and they can be combined with storage to provide power when the grid goes down (BIH Working Group 2020).

In 2019, the state passed LD 1766 "An Act To Transform Maine's Heat Pump Market To Advance Economic Security and Climate Objectives," which established the goal of installing 100,000 heat pumps in Maine by 2025. The BIH working group has proposed expanding the Efficiency Maine program to make all homeowners eligible, regardless of income. The town's proposed Efficiency Camden program, using trust fund dollars would provide subsidies to low to moderate income households for HVAC upgrades.

The municipal government is working on HVAC upgrades in some town buildings and the new middle school plans to install a heat recovery system capturing heat generated by the Camden Wastewater Treatment Plant.

How would this benefit Camden? Who would benefit?

- Homeowners would benefit through reduced long term energy costs, cleaner air inside their homes and air quality in Camden would be improved.
- Could create many new high paying jobs including for HVAC installers, plumbers, and electricians.
- Potential for students to benefit from continuing education via apprenticeships and lifelong learning.

What are the potential costs? (from BIH 2020)

A 15k BTU heat pump can heat 800-1,000 square feet. Heat pumps can supplement

or replace oil or propane burners and a single heat pump can cover 50-80% of the heat load depending on how well a house is insulated. The average cost for a single-head, Efficiency Maine-qualifying mini-split ductless heat pump, including equipment and installation, is $3,750. Costs are about 50% more for multiple-heads and about 30% less when costs of customer acquisition are avoided (e.g., when installed for eligible low-income dwellings). In a typical Maine home, whole-home heat pump systems cost at least three times as much as single-head systems; in smaller homes, including mobile homes, one or two mini-split heat pumps should be sufficient to heat the space. Financial incentives are currently offered by EMT through 2023. The cost is going down for this technology.

The average cost of heat pump water heater retrofit/conversion is $1,000-2,000 for equipment and $300-600 for installation. When fitted with smart controls, heat pumps and heat pump water heaters can be managed to reduce peak demand on the grid, thus improving grid reliability.

What are some Camden-specific barriers to implementing this action?

This action is voluntary, so much more needs to be done to inform residents about rebates and the long term energy savings associated with heat pumps and other technology. Upfront costs can be a barrier for low to moderate income residents.

What are some Camden-specific advantages to implementing this action?

- reduce town's emissions and help mitigate impacts of climate change
- reduce heating and air conditioning costs and increase comfort and indoor air quality
- the proposed Efficiency Camden program could accelerate improvements in homes of low to moderate income residents
- improve air quality of town

What is the potential timeframe for implementation?

While installation of heat pumps is voluntary, homeowners will be more likely to replace or supplement existing heating with heat pumps if they know how much can be saved and what programs are available. Education needs to be comprehensive and ongoing and is a logical responsibility of an climate action/energy coordinator. We recommend preparing an informational brochure that could accompany tax bills to distribute starting in 2021 and that Camden lead by example – by installing heat pumps in municipal buildings. This action could be phased in. Installing heat pumps in 20% off Camden's homes by 2025 would be in keeping with the state's overall goal of 100,000 heat pumps in that time frame. We propose getting to 50% by 2030 and 100% by 2045.

Is there a model for this, either in another Maine town, the state as a whole, or elsewhere? Efficiency Maine is a leader and there are now many heat pump installers in the area. We recommend that the town lead by example by installing heat pumps in all public buildings and sharing information on savings with residents.
What resources do Camden or Maine have that would help implement this action? Camden will need to align its work with the Maine Climate Council's final recommendations (or be even more ambitious) and town officials and residents should be encouraged to actively support and promote new legislation and programs.

Cost of Heating Comparison

The Case for Heat Pumps with Solar

Heat pumps are less than *half* the cost to operate vs. the equivalent oil or propane system on a per BTU basis. This chart gives you a quick breakdown of relative costs:

Fuel Source	Cost / Unit	Cost / Million BTUs	Cost to Heat Typical Home
Heating Oil	$3.70 / gal	$41	$3,938
Heating Oil	$2.30 / gal	$25	$2,447
Propane	$2.60 / gal	$33	$3,686
Electric Baseboard	$0.15 / kWh	$44	$4,489
Heat Pump	$0.15 / kWh	$18	$1,706
Heat Pump with Solar	$0.07 / kWh	$8	$744

Based on fuel data and pricing from: Maine Energy Office. Assumes typical oil boiler operating at 65% efficiency, propane at 85% efficiency, resistive electric at 95% efficiency and heat pump at 250% efficiency (COP of 2.5). Solar PV kilowatt-hour cost of 7 cents per kilowatt-hour based on typical pricing economics of a 4.8kw + system.

Action 5. Convert individual and town vehicle fleets to all electric.

Background

As of 2016, transportation accounted for about 28% of Camden's greenhouse gas emissions (Facq et al. 2018) and is the second largest emissions source after buildings. For the state as a whole, and likely for Camden too, transportation is the one sector where emissions have been increasing over time. A typical gasoline vehicle emits about 5.5. metric tons of CO_2 per year, while a typical EV emits 1.12 tons of CO_2 per year (Efficiency Maine 2020). According to the Maine Climate Council Transportation Working Group (TWG), to meet Maine's GHG emission reduction goals we will need to expand electrification of light-duty passenger cars and trucks to between 50-90% and heavy-duty vehicles to 55-80% of the total fleet by 2050 (Maine Climate Council 2020b), with the range depending on the extent we combine this action with reducing total vehicle miles traveled. As of April 2019, EVs represented only 0.1% and plug-in hybrids about 2% of registered vehicles in Maine (McGuire 2019). We do not have a breakdown for Camden.

The state and federal governments currently offer rebates and tax credits that can reduce the cost of an EV by $7,500. Efficiency Maine is considering expanding its rebate program and making incentives available for used light duty electric vehicles as well as medium and heavy duty vehicles.

Camden plans to replace its municipal fleet with hybrids and has already replaced one police cruiser. As vehicles are rotated out hybrids will be rotated in (Caler-Bell 2020). In addition, the town has a grant to purchase an all electric school bus (Marc Ratner, personal communication). We recommend that Camden look at EV technology instead of hybrids. We predict that hybrid technology will soon be obsolete.

How would this benefit Camden? Who would benefit?

For those purchasing new cars, over the vehicle's lifetime, EVs can save owners money due to reduced fuel and maintenance cost (e.g., no oil changes or brake replacements). In addition, there are many community benefits, such as:

- no tailpipe emissions, which means cleaner air and idling wouldn't be an issue when there are traffic jams in town
- EVs are quiet and high tech (fast acceleration)
- electricity can be produced locally and from renewables
- immediate emissions reductions with every sale

What are the potential costs?

The cost of an EV is now comparable to similar gasoline-powered models, e.g., the current cost of a Hyandai Kona is $27,450 after the federal tax credit and state rebate is applied. Reduced fuel and maintenance costs make an EV less expensive over the car's lifetime. For example, it costs 4 cents a mile to drive an electric Nissan Leaf versus 15 cents per mile to drive a similar sized gasoline powered sedan. Many EV models now have ranges of 300 or more miles on a charge and batteries last 10-20 years.

Efficiency Maine currently offers a $2,000 rebate for individuals and business organizations and $3,000 to qualified low-income Maine residents. The federal government offers a federal tax credit of up to $7,500 (for first 200,000 cars sold of a given model).

What are some Camden-specific barriers to implementing this action?

- need for outreach to increase consumer awareness of advantages
- lack of charging infrastructure
- although new cars are cost effective, there are very few used ones for people who can't or don't want to buy a new car
- uneven playing field on fuel prices – gas and diesel fuels don't pay for conservation or carbon pollution
- range anxiety exists, although many models now get 300 miles on a charge, which is comparable to a tank of gas
- supply change issues – there is a limited range of models, trucks are just starting to come on line; technology not there yet for heavy duty vehicles
- will need to figure out gas tax issue and how to pay for roads (this is a statewide issue)
- need to figure out how to monitor number and type of vehicles registered in town as well as miles driven so progress toward reducing emissions from transportation can be tracked

What are some Camden-specific advantages to implementing this action?

Lack of staff time and expertise to educate the community about the advantages of EVs and the environmental importance of switching from gas to electric. Camden could partner with the Natural Resources Council of Maine to sponsor a midcoast EV ride and drive expo, which they've done in other parts of the state.

Based on our rooftop solar analysis (Action 8), Camden has many south-facing homes that could have rooftop solar. The TWG estimates that 6-12 solar panels will produce enough power to support a vehicle's daily needs, based on the assumption that the

average person drives approximately 13,500 to 15,000 miles each year (TWG 2020). The town government is on board with converting its municipal fleet to hybrids. We encourage them to consider all-electric.
What is the potential timeframe for implementation? The average Maine vehicle stays on the road for about 12 years. With a good outreach and education program about the real cost of EVs and the incentives available, it would be possible to transition the town's fleet from gasoline to electric within the next 10 to 15 years. The town needs to develop charging infrastructure at the same time.
Is there a model for this, either in another Maine town, the state as a whole, or elsewhere? Many states have rebates, and many are expanding these programs. Maine is considering this as well. At least 14 countries (e.g., Norway, Costa Rica) are requiring all cars to be electric from between 5-30 years, depending on the country.
What resources do Camden or Maine have that would help implement this action? MCC is working to develop and expand equitable incentive programs. Camden needs to support these and other efforts that support the transition to EVs such as the Transportation and Climate Initiative (TCI). This is a proposed regional initiative that would cap the amount of greenhouse emissions from cars and trucks. It would require fossil fuel importers and suppliers to buy emissions credits to pollute and then use the proceeds to reduce greenhouse gas emissions through increased public transit, better rural transit, and electric vehicles. It would involve 12 states from Maine to Virginia and Maine's share is estimated to be $130-160 million dollars/year (Susan Ely, Natural Resources Council of Maine, personal communication). The town could consider ordinances or tax incentives to encourage EV and solar-ready houses and commercial buildings. We did not look at marine fuel use. The town could consider things like higher docking fees for motor boats.

EV Accelerator Rebate Program

Type of Vehicle	Individuals, Businesses, Organizations	Qualified Low-Income Maine Resident*	Maine Governmental Entity or Tribal Government*
Battery Electric Vehicle (BEV)	$2,000	$3,000	$7,500
Plug-In Hybrid Electric Vehicle (PHEV)	$1,000	$1,500	$2,000

Hyundai Kona Electric
Manufacturer Website

Less Info

Combined MPGe: 136 MPGe	**Estimated Total Price:**
Electric Range: 258 Miles	Base MSRP $36,950
Battery Size: 60 kWh	Efficiency Maine Rebate -$2,000
Charge Time: 9 Hours Estimated 100% Level 2 Charge Time (240v)	Maximum Federal Tax Credit -$7,500
	Your Estimated Price **$27,450**

efficiency MAINE

Action 6. Develop EV charging infrastructure.

Background

To speed up the transition from gas powered vehicles to EVs, we need to make it possible for EV owners to charge their vehicles along major highways, at public places, at work and at home. To help with this, Camden will need to install EV charging stations at frequently used and easily accessible locations and encourage businesses to do the same. In addition, the town can expand its solar capacity (municipal and residential) to support Level 2 chargers. There are currently no public charging stations between Belfast and Rockland and no Level 3 charging stations between Brunswick and Ellsworth. The Maine Climate Council's Transportation Working Group (TWG) has identified several "EV fast-charge corridors" on major highways. One of these is Route 1, from Freeport to Ellsworth. The state recommends improving local access and destination charging with publically available Level 2 chargers. The only publically available Level 2 chargers in the region are at the Camden Hannaford (a single plug that isn't visible), the Farnsworth, and Lincolnville General Store. As of May 2020, Lyman Morse and 8 local inns had chargers for their guests.

The TWG is recommending that the state conduct and implement a Comprehensive EV Expansion Study/Plan. This is something a town climate/energy planner will need to stay on top of.

How would this benefit Camden? Who would benefit?

By informing homeowners about rooftop solar potential, creating ordinances that require EV ready buildings, and seeking grants to subsidize Level 2 charging stations, Camden will be able to support more EVs, which will save residents money in the long run over the life of their vehicles, reduce GHG emissions and air pollution, as well as increase energy independence.

What are the potential costs?

For most homeowners, as well as many businesses, Level 2 charging is a good option as it will replenish 10-24 miles of range per hour of connection (John Luft, ReVision Energy, personal communication). On average, a Level 2 charger costs about $2,000 to install (current ReVision Energy estimate). A 240 V outlet (similar to an electric dryer outlet) is required. At least through 2020, there is a 30% federal tax credit on hardware/installation costs capped at $1,000 for residential and $30,000 for commercial. Efficiency Maine is considering reopening a grant program for Level 2 chargers for workplaces, and public and destination charging at some point this year

(ReVision Energy). Utility programs offered by CMP and Emera Maine have pending applications before the Maine PUC to create make-ready pilot programs to help subsidize the cost of EV charging infrastructure (TWG 2020).

Level 3 chargers are the fastest way to charge electric cars, but they are expensive (~$50,000) and designed for commercial use or for large charging networks. Batteries can be recharged at a rate of around 150 miles of range per hour. This is possible because the car's on-board charger is overridden and power is supplied directly to the battery (TWG 2020).

What are some Camden-specific barriers to implementing this action?

- lack of information about the costs and benefits of rooftop solar and charging potential
- upfront costs for infrastructure
- hard to stay on top of technology and funding opportunities and actively educate Camden's residents and businesses with existing staff and volunteers

What are some Camden-specific advantages to implementing this action?

- reduce GHG emissions
- reduce transportation bills over the long term
- improve air quality
- Camden has an environmentally friendly population and a town government that is active on the climate change issue
- inspired students who are willing to volunteer their time and energy

What is the potential timeframe for implementation?

The sooner Level 2 charging stations are installed, the sooner Camden residents will be comfortable investing in EVs. We recommend that Camden prepare information on the advantages of EVs and rooftop solar and charging stations while working to install EV charging stations at 5-10 easily accessible and highly visible locations in the village area within the next 3-5 years. Logical places to put them are along Route 1 in the village center, at the town landing, at Camden Hills State Park, by the Opera House and library, at gas stations and at grocery stores and other busy places that attract visitors.

Is there a model for this, either in another Maine town, the state as a whole, or elsewhere? The Maine Climate Council is developing an action plan due in December 2020 with strategies for expanding charging infrastructure. A number of states and many countries, including Belgium, Denmark, Finland, France, Germany, Italy, Luxembourg, Norway, Spain, Sweden, The Netherlands, and the United Kingdom

have EV incentives including subsidies for purchase grants, tax benefits, and local benefits such as free parking, reserved parking spots, toll exemption, and more. https://wallbox.com/en_us/guide-to-ev-incentives-europe
What resources do Camden or Maine have that would help implement this action? Efficiency Maine had a 2019 program where it awarded Level 2 chargers for workplace, public space and multi-unit dwellings. The Maine Climate Council proposes to expand this and to develop more permanent funding streams for EV/PV ready houses. In addition, they recommend expanding Efficiency Maine Trust funds for infrastructure through legislation packages that focus on making electricity rates attractive for medium and heavy-duty trucks, reducing costs of charging stations, requiring utilities to plan for renewable development and more (TWG 2020). The town will need to stay on top of all of this.

Action 7. Reduce vehicle miles driven by increasing public transit and pedestrian travel opportunities.

Background

According to the Maine Climate Council's Transportation Working Group (TWG 2020), the average Maine-registered light-duty vehicle is driven 12,000 miles per year. Rural drivers make twice the number of trips as urban drivers, and most people drive alone. The average Maine household spends $13,500 per year, or 30% of its income, on transportation costs and low income households spend upwards of 40%. Many students don't ride school buses – for example, 60% of the students attending RES are transported by personal vehicles. Even with a large number of elderly residents, many of whom can no longer drive, Camden does not have a public transit service.

To keep electric vehicle adoption rates mentioned in Action 5 realistic, the TWG (2020) recommends that the miles driven per light-duty vehicle needs to decline 25% by 2030 and 40% by 2050, and for heavy-duty vehicles, miles driven need to decline 2.1% by 2030 and 4.2% by 2050. They propose three main strategies: 1) concentrate development in priority areas – emissions are reduced when the places people need to go are located nearby, at rural crossroads, and in village areas and neighborhoods. This makes it easier to walk, bike, operate public transit, and share rides; 2) develop public transit; and 3) expand telework and teleservice opportunities.

Camden is currently not tracking miles driven and the school district does not have policies that discourage transport to school by car rather than bus. In 2015, Camden and Rockport developed a Bicycle and Pedestrian Master Plan to increase accessibility of all roads to bicyclists, pedestrians, and other non-motorists, especially in developed areas. A stated goal of the town is to reduce the need to travel by car on Camden streets. This plan is in line with Complete Streets programs in many other towns and states. We recommend expanding the Camden/Rockport plan to address wheelchair users, support community and commuter buses, such as the DASH program in Belfast and the state's GoMaine program, increase school bus ridership, and explore the possibility of using school buses for mass transit, particularly for elders who need transportation.

The town of Waldoboro sent a public transit survey to all households (500 responded) to gauge interest in using public transportation. We recommend that Camden send out a similar survey, but include high school students as well. We developed a survey that the town can refine and use as a template (see Appendix C) that is modeled after

the Waldoboro survey.

How would this benefit Camden? Who would benefit?

- every vehicle trip avoided would lower emissions
- roads and sidewalks would be safer for cars, pedestrians, bicyclists, and wheelchair users
- encourage walking and bicycling for regular commuting
- provide more opportunities for exercise and recreation
- fewer cars on the road, less traffic congestion, less noise and more parking available
- would make the Camden village center more appealing
- students would have safer routes for walking/biking to school
- add to Camden's attraction as a year-round destination

What are the potential costs?

The biggest costs will be for new paved bike lanes and road widening, as well railings along sidewalks, shoulder repair, pavement markings, and traffic signal improvements. Like most of our recommended actions, to implement this in a timeframe that meets our proposed targets will require staff time. This is another logical responsibility of a climate/energy planner.

What are some Camden-specific barriers to implementing this action?

Cost – but Camden can continue to incrementally phase in
Staff/volunteers to monitor use, track VMT, and vehicle type driven

What are some Camden-specific advantages to implementing this action?

Town already has volunteers that sit on the Camden/Rockport Pathways Committee, which is actively exploring many of the ideas we recommend. The high school and middle school are near each other.

What is the potential timeframe for implementation?

We recommend that the town evaluate public transit options such as DASH, GoMaine use of the school bus fleet, and conduct a survey of residents to figure out demand by 2022 and establish a goal of having public transit in place by 2025. We suggest that the Pathway goals be moved up, with a completion goal of 2025 as well. The ultimate goal would be to reduce VMT in Camden by 25% by 2030 and 40% by 2050, which is the amount recommended by the MCC to achieve the state's overall transportation emissions reduction goals.

Complete Streets work in Camden is well underway. According to the Pathways

Committee (Camden, 2020):

- bids are out for a sidewalk along Route 1 from Quarry Hill to 56 Commercial Street and a sidewalk extension along Route 105 to Shirttail Point Park
- the section of the Riverwalk from 4 Knowlton Street to the Wastewater Treatment Plant is complete
- the Committee is working with the Route 1 North Advisory group, which is advocating for a five-foot wide bicycle lane/shoulder signed for bicyclists as part of the reconstruction of Route 1 from the State Park to the Lincolnville town line and is working with the town to find funds to improve the northbound sidewalk along Elm Street from Park Street to Union Street
- the Committee is exploring ways to connect the Route 90 schools (RES and CHRHS) via public pathways to the Camden and Rockport village centers

In addition, the Committee recommends setting a 10 year goal to complete:

- A multiuse pathway along Route 1 from Camden town line to the intersection of Routes 1 and 90.
- pedestrian or multi-use path along Route 90 between Route 1 and the Camden Hills Regional High School (priority to connect the high school to new middle school).
- An extension of the existing pathway along the south side of outer Elm Street (in Camden) from Camden Street, past the traffic signal at Hannaford Shopping Plaza, to the bus station (Maritime Farms).

Is there a model for this, either in another Maine town, the state as a whole, or elsewhere?

Many communities in Maine have adopted Complete Streets policies (sometimes through ordinances) including Portland, Lewiston, Auburn, Windham, Fort Kent, Bath, Yarmouth, and Scarborough. The State Department of Transportation adopted a Complete Street policy in 2014 (Davis et al. 2018). We don't know if Camden has formally adopted a policy, but the Pathways Committee is doing much of this work.

We did not run across an example of a town that is integrating all of the options to reduce VMT (complete streets, public transit, ride/bike sharing, school bus use, etc.).

What resources do Camden or Maine have that would help implement this action?

The Maine Climate Council's final recommendations are due in December 2020. This will lead to legislation and programs that could help Camden.

Action 8. Solarize Camden.

Background

Camden is ahead of many Maine towns when it comes to municipal solar power. The high school led the way by installing rooftop solar in 2015 and continues to work toward a net zero carbon footprint. The CHRHS's rooftop installation, which will soon be paid for, will reduce the schools electric bill by 85% (Parrish 2015). The new middle school is also considering installing solar. The town government is actively working to offset municipal electricity use with solar and is exploring both rooftop and solar farm options. In 2017, the town installed a 122.9 kW PV system at Sagamore Farm that offsets about 7% of municipal electricity use. In 2019, the town hired Maine Solar Engineering to research ways to offset all municipal electricity use (Maine Solar Engineering 2019). The study concluded that 1.5 MW would be needed and that the town has 5 potential sites than can be used for PV (photovoltaic) systems, including:

1. Camden Public Safety Building – 60.8 kW PV system, 78,000 kWh per year.
2. Public Works Facility– 59.3 kW PV system, 76,500 kWh per year.
3. Sagamore Farm Expansion– 250 kW PV system, 322,500 kWh per year.
4. Old Tannery site– 250 kW PV system, 322,500 kWh per year.
5. Camden Snow Bowl – this site is marginal for a small system.

Together, these could offset about 30% of the town's electricity use. To get to 100%, 5-6 acres of land would be needed. The town is considering using land in another town with power generation credited to the town's electricity accounts.

When it comes to residential solar, much more could be done. Based on our Camden rooftop solar analysis, the potential for generating residential energy through solar arrays on roofs is enormous (see screenshot at end of this action to see a typical sample from our analysis). We found that:

- 1,019 buildings (31.6%) faced within 45° of south and received full sun
- 705 buildings (21.8%) faced within 45° of south but were partially shaded for part of the day
- 50 buildings (1.5%) had flat roofs that might be able to support solar arrays. Collectively, these had a total surface area of ~7.4 acres and most were commercial buildings in the down town area.
- Only 22 buildings (0.7%) had existing solar arrays.

A typical rooftop can fit an average of 12-30 panels (John Luft, personal communication). This would be enough panels to provide all the electricity for a typical Camden household (assuming most houses still heat with oil or propane rather than heat pumps). Larger roofs could hold more panels that could also power heat

pumps, an EV, or battery storage. Any of these steps would reduce residential and transportation emissions significantly.

We encourage the town to develop an outreach program to provide information to homeowners about rooftop solar costs, incentives, and resources and to make new municipal solar arrays highly visible.

How would this benefit Camden? Who would benefit?

Installing solar on homes would directly benefit homeowners through smaller electric bills. Power purchase agreements[3] make it possible for anyone to install solar, regardless of income, although the long term savings will be smaller than for those who can afford or choose to pay for the array up front. Homeowners also have the option of buying shares on a solar farm if they can't or would prefer not to put solar panels on their roof. Any municipal solar installations will reduce the town's municipal electricity costs and benefit Camden taxpayers.

What are the potential costs? (Estimates below are from ReVision Energy)

The average Maine home uses between 4,000 and 10,000 kWh per year. Three solar panels can produce about 1,250 kWh/yr which means it would take an average of 15-20 panels to power a typical Camden home. More would be needed to power heat pumps (about 6-8 panels per heat pump or an electric car driven 10,000 miles per year). The cost varies depending on who installs the array, but overall, the savings can be significant.

There is a federal 26% tax solar rebate through 2020 which will be reduced to 22% after that. Maine currently has no state solar power rebates and doesn't offer property tax exemptions for solar installations. The MCC may recommend state rebates.

What are some Camden-specific barriers to implementing this action?

- lack of information and outreach for residents
- upfront costs for low to moderate income residents
- are there enough electricians and installers to scale this up?
- building codes that require new buildings to face south and be PV ready
- Camden's forests sequester a lot of carbon. One recommendation of the Maine Climate Council is to incentivise landowners to keep land forested and let trees

[3] A power purchase agreement is a contract between an investor, who owns the PV generation system, and a property owner, who owns the home or property where the solar array is installed. The owner buys electricity from the investor at a discounted rate for the time period that the investor owns the PV system. The owner has the option of buying the system at a future date.

grow older. The town doesn't have a lot of land that it can put large solar arrays on. The tannery and Sagamore sites wouldn't involve clearing trees – so these are good sites for solar farms. Another possibility is to look into is the cleared land within CMPs transmission corridor that goes to the wastewater treatment facility.

What are some Camden-specific advantages to implementing this action?

- reduce town's emissions and help mitigate impacts of climate change
- reduced electric bills
- improve air quality
- create new well-paying jobs
- energy dollars kept close to home

What is the potential timeframe for implementation?

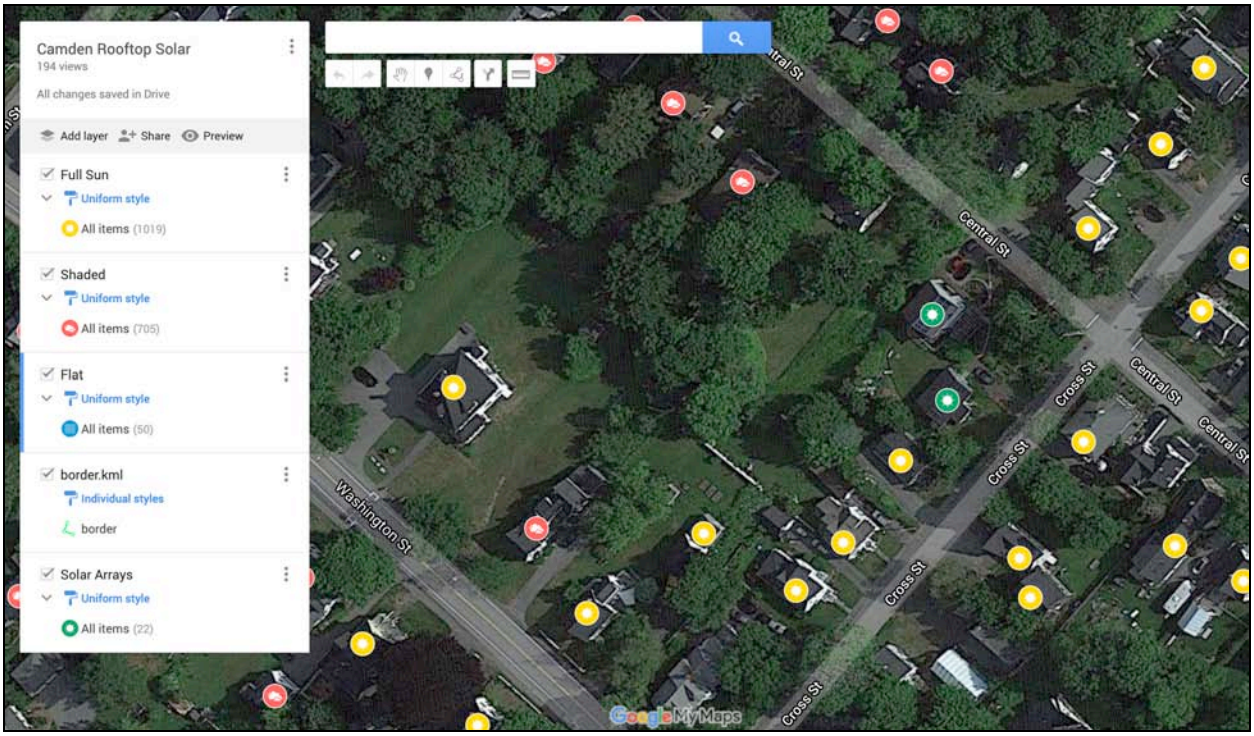
Municipal projects are underway and could be completed within 5 years. A major outreach effort is needed to encourage homeowners to install rooftop solar to power their homes, heating and transportation. Need to work with town (ideally a climate/energy planner) to develop phased in targets as heating, cooling and transportation shift away from fossil fuels.

Is there a model for this, either in another Maine town, the state as a whole, or elsewhere? Other nearby states, especially Vermont and Massachusetts, are way ahead of Maine when it comes to solar installations and offer incentives like no sales tax on equipment, property tax exemptions for solar installations, and state income tax credits for solar and battery storage. The Maine Climate Council is working to expand incentives for solar installations and related technology. If Biden wins the presidential election, we expect a lot of support for technologies that replace fossil fuels and additional incentives to speed the transition to renewables.

Climate to Thrive, an organization based on Mount Desert Island, had a Solarize MDI program to encourage more people to put panels on their roof. They may have some good educational resources. Bangor established a Solarize Bangor program in 2017. These could be good sources of information about how to inform communities about the benefits of solar.

What resources do Camden or Maine have that would help implement this action?

ReVision Energy, SunDog and other renewable energy installation groups in the region can provide expertise.


Camden Rooftop Solar
194 views
All changes saved in Drive
Add layer
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All items (1019)
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Uniform style
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Action 9. Monitor progress and report to Global Covenant of Mayors.

Background

Since 2015, Watershed School's global climate change class has taken the lead on collecting information on town energy use and emissions, climate vulnerability, and potential climate actions. This work has typically taken place during the last 6-8 weeks of the spring semester and has required additional unpaid time from faculty. The Global Covenant of Mayors on Energy and Climate requires specific commitments, one of which is to submit data from the emissions inventory report and other studies on the GCoM platform. After this, Camden is expected to monitor and report on its progress in achieving its emissions reduction and adaptation goals every three years. We have not had time to report to the Global Covenant of Mayors on our progress and have requested that the town's Energy and Sustainability Committee or a town staff person take this on. We recommend that the town take the lead in tracking and monitoring progress as part of its Global Covenant of Mayors commitment.

How would this benefit Camden? Who would benefit?

To achieve its renewable energy and emissions reduction targets, the town needs to track and monitor energy use and adaptation work on a regular basis. This information will inform future decisions and can be used to motivate residents to reduce emissions and shift toward renewables.

What are the potential costs?

We recommend that this be a responsibility of a Climate/Energy Coordinator (see Action 2). This position would be a new cost for the town. Another option is a volunteer on the Energy and Sustainability Committee. Ideally, whoever does this would do it for many years.

What are some Camden-specific barriers to implementing this action?

Current lack of time and expertise. Achieving the GCoM commitments has been more than volunteer committee members, existing staff and the select board can keep up with, which is one reason this task has fallen by the wayside.

What are some Camden-specific advantages to implementing this action?

Will allow town to track its emissions reduction and adaptation progress and use this to modify and update its action and adaptation plans over time.

What is the potential timeframe for implementation? This should begin immediately to get the town caught up with its GCoM commitments. The deadline for reporting the emissions inventory data (Year One Commitment) is November, 2020.
Is there a model for this, either in another Maine town, the state as a whole, or elsewhere? Tom Herrod and Kale Roberts are the Senior Program Officers for Network Relations for ICLEI-Local Governments for Sustainability USA and will work with whoever Camden designates to do ongoing monitoring and reporting. Their contact info: tom.herrod@iclei.org Tel: 720-505-5889 kale.roberts@iclei.org Tel: 845-464-3682 Davis Saltonstall, the Rockland Sustainability Coordinator, is familiar with the ICLEI Community Tracking tool that we used to calculate town emissions and may be a good resource.
What resources do Camden or Maine have that would help implement this action? The Maine Climate Council may have recommendations and protocol for monitoring at the state level that could be helpful. Their final report comes out in December, 2020.

Action 10. Develop a community outreach and education program.

Background

While the Camden town government is actively working to reduce municipal energy use, the towns Global Covenant of Mayors commitment involves emissions reductions at the community level. To accomplish this, information needs to be developed and made available to residents about rebates, incentives and programs that promote energy conservation and a transition to renewables. Other important steps to research and promote are reducing consumption and waste overall and saving water. It makes sense for the town to partner with Watershed School, CHRHS, and Midcoast School of Technology, as well as business and civic groups, churches, the Opera House, library and other groups. In addition, the Maine Climate Council is exploring establishing a Maine Clean Energy Corps, which could be a resource. We see this action as a key role of a town Climate/Energy Planner (see Action 2). There is a lot to coordinate, which we don't see happening unless there is one person taking the lead. This person can work with high school students and hire interns to help with specific projects.

A first step is to find out what the community knows about the issue and how receptive residents will be to new technologies and opportunities. This could be done through surveys sent out to residents and businesses with their tax bills, and electronically to juniors and seniors at CHRHS and Watershed School. Our public transit survey in (Appendix C is an example).

We strongly recommend that schools be encouraged, or even required, to offer a course on global climate change. Our generation needs to understand climate science, climate/energy policy, and the technologies needed to transition to renewable energy. Watershed School can provide a model for this. In addition, the town can work with the Midcoast School of Technology, and businesses like ReVision Energy, to promote programs that train people in renewable energy careers.

How would this benefit Camden? Who would benefit?

This would benefit all Camden residents, but would be especially beneficial to the next generation by preparing them shift to renewables and to deal with the consequences of a warming climate.

What are the potential costs?

We recommend that implementing this action be a responsibility of a Climate/Energy Planner position, which would be a new staff position for Camden.

What are some Camden-specific barriers to implementing this action?

- Upfront staffing costs
- Scaled back budget due to Covid-19

What are some Camden-specific advantages to implementing this action?

- prepare students and residents to address the climate crisis – and give the community hope
- reduced town greenhouse gas emissions and it would help mitigate impacts of climate change
- reduce town and resident energy bills over the long term
- Camden has an environmentally friendly population and a town government that is active on the climate change issue
- inspired students at Watershed and CHRHS who are willing to volunteer their time and effort to address the climate crisis

What is the potential timeframe for implementation?

This work could begin as soon as a town Climate/Energy planner is hired. Students and interns could be brought on to work on specific projects. We recommend that this position be created in 2021. Discussions on school curriculum can begin now.

Is there a model for this, either in another Maine town, the state as a whole, or elsewhere?

Many towns have hired sustainability coordinators who are doing some of this work. Mount Desert Island's Climate to Thrive organization provides an excellent model for outreach work and could provide guidance. The Island Institute is another potential resource.

What resources do Camden or Maine have that would help implement this action?

Committed town staff, Select Board, and Energy and Sustainability Committee, plus the students and staff at Watershed School, who have laid the groundwork for planning through their research and reports. Watershed School is starting a semester long program called CALL (Climate Action Leadership Lab) that is designed to bring in students from other schools to actively engage with Camden and other towns on climate-related projects.

Conclusion

We are excited about all the work that the town is doing at the municipal level and the commitment of town staff, committees and the Select Board to mitigate the impacts of climate change in our town. Camden is a quiet leader. The science urges governments to go much further. We recommend that the town integrate climate planning into everything it does and also reallocates funds from other departments to create a staff position that focuses solely on climate mitigation and adaptation. The City of Aspen is several years ahead of Camden when it comes to planning and implementation and could provide a good model for how to implement action and adaptation plans. They used a stakeholder group to review and refine actions and determine how best to phase them in. In the end, Camden needs to think about the climate impact of any action it takes going forward.

We are also encouraged by the incredible work the Maine Climate Council has done this past year. We hope that the Council's work will lead to new and ambitious legislation, policies and programs that will help towns like Camden respond to climate change and meet the targets we recommend. The final Maine Climate Council report is due out in December. We urge the town to follow and support the Maine Climate Council's recommendations as much as it can.

It's been a challenging spring for all of us. We talked a lot about how the pandemic is making us think differently about the future and how we can use it to reset our course and focus on what's really important – living on this earth in a sustainable way. We also know that the climate crisis is just beginning and is not going to go away in our lifetimes. We urge the town to act boldly and tirelessly and keep this front and center. Working together, we can turn the tide toward a better future.

References

Anderson, A., C. Edwards, O. Rancourt, P. Benjamin, P. Wolpers, and J. McMahon (editor). 2019. Facing the Future. A Climate Change Vulnerability Assessment for Camden, Maine. Watershed School, Camden, Maine.

Aspen City Council. 2017. Aspen's Climate Action Plan: A Preliminary Roadmap to Our Sustainable Future. Aspen City Council, Aspen Colorado.

Aspen City Council. No date. Greenhouse Gas Reduction Toolkit: How to Take Action in Your Community. Aspen City Council, Aspen, Colorado.

Caler-Bell, A. 2020. Energy, Sustainability & Resiliency Projects 2020 internal memo.

Clancy, L. 2015. Solar Panels to Top Camden Hills Regional High School Roof. Penbay Pilot, Maine.

Clancy, L. 2018. Camden-Rockport School Engineers Take Harder Look at Heating with Municipal Wastewater. Penbay Pilot, Maine.

Clancy. L, 2020. Camden-Rockport School Board, Five Town CSD Gives Green-light to Solar Power Contract. Penbay Pilot. Maine.

Comprehensive Plan Committee. 2017. Town of Camden Comprehensive Plan. Comprehensive Plan Committee, Camden, Maine.

Davis, N., M. Ondra, and J. Cooke. 2018. Letter to the editor: Complete Streets ordinance good for Rockland. Pen Bay Pilot, May 29, 2018.

Efficiency Maine. 2020. Maine Vehicle Emissions and Fuel Savings Calculations 2_9_20 (Excel Spreadsheet in Maine Climate Council 2020b.

Facq, A., B. Buckley, C. Ray, I. Rodriguez, J. Morse, K. Darney, L. Kalajian, M. Carpenter, R. Sizeler-Fletcher, Z. Bryant, and J. McMahon (editor). 2018. Cleaner Camden, Cleaner World: Taking Inventory. Watershed School, Camden, Maine. 34 pp.

Faunce, J., R. Hamill, M. Lui, S. Kenna-Moore, H. Arno MacDougal, N. Ryan, J. Smereck, E. Wilton, and J. McMahon (editor) 2017. Getting on Board: Preparing for Sea Level Rise in Camden, Maine. Watershed School, Camden, Maine. 23 pp + appendix.

Fernandez, I., S. Birkel, C. Schmitt, J. Simonson, B. Lyon, A. Pershing, E. Stancioff, G. Jacobson, and P. Mayewski. 2020. Maine's Climate Future 2020 Update. University of Maine, Orono, Maine. 38 pp.

IPCC. 2014. Climate Change 2014: The Physical Science Basis. Contribution of Working Group 1 of the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge, UK, Cambridge University Press.

Maine Climate Council. 2020a. Strategy Recommendations to Mitigate Emissions and Support Resilience in Maine Buildings. Report to the Maine Climate Council Developed by the Buildings, Infrastructure, and Housing Working Group, June 5, 2020.

Maine Climate Council. 2020b. Transportation Working Group Recommended Climate Strategy Actions and Measurable Outcomes. Report to the Maine Climate Council, June 5, 2020.

Maine Solar Engineering. 2019. Town of Camden Photovoltaic (PV) Power Generation Feasibility Study (Revised 10/30/19). Maine Solar Engineering, Palermo, Maine.

McGuire, P. 2019. Reducing emissions from transportation is a long difficult road for Maine. Portland Press Herald, December 15, 2019.

National Research Council, Transportation Research Board. 1999. Integrating School Bus and Public Transportation Services in Non-Urban Communities. Onlinepubs.trb.org, The Federal Transit Administration.

Parrish, C. 2015. Camden Hills High School to Lower Electricity Bills by 85% with Addition of Solar. The Free Press, August 27, 2015.

The Camden-Rockport Bicycle and Pedestrian Pathways Committee. 2015. Bicycle and Pedestrian Master Plan. Rockport, Maine.

Town of Camden. 2020. Camden Annual Report. Camden, Maine.

Appendix A.
Watershed School Reports for the Town of Camden

2015 A Carbon Neutral Camden – It's Time to Act

- Detailed look at municipal energy use (included town buildings, wastewater treatment, street lights, public works, public safety, the Snow Bowl, school buses and other sectors)
- Preliminary recommendations on reducing municipal energy use

2017 Getting on Board – Preparing for Sea Level Rise in Camden, Maine

- Analysis of sea level rise scenarios (based on Maine Geological Survey storm surge data as well as field work in Camden) and their potential impacts on harbor and shoreline infrastructure, commercial buildings, and unstable sections of the Camden coast
- Survey of Camden area residents to determine knowledge of issue and receptivity to action

2018 Cleaner Camden, Cleaner World – Taking Inventory (GCoM Year 1 Commitment)

- Used US Community Track Protocol developed by ICLEI to conduct a community scale GHG inventory of the following 5 sectors:
    1. Use of electricity by the community
    2. Use of fuel in residential and commercial buildings
    3. On-road passenger and freight motor vehicle travel
    4. Use of energy in potable water and wastewater treatment and distribution
    5. Generation of solid waste by the community

2019 Facing the Future: A Climate Change Vulnerability Assessment for Camden, Maine (GCoM Year 2 Commitment)

- Analyzed in detail how the climate in midcoast Maine is projected to change by midcentury, looking at 22 different temperature and precipitation-deriv ed climate variables and weather station data.
- Identified and summarized potential climate change hazards and vulnerabilities Camden
- Recommended that Camden adopt Maine's renewable energy and greenhouse gas emissions reduction targets

2020 Turning the Tide: Preliminary Climate Actions for Camden, Maine

- A summary of climate actions recommended for Camden, with a focus on residential buildings and transportation actions

Appendix B.
Town of Camden – Energy, Sustainability & Resiliency Projects

Energy Efficiency		
Project Name	**Description**	**Notes**
LED Streetlight Conversion	Transitioning to town ownership of streetlights and conversion to LED fixtures	LEDs and smart controls will reduce electricity usage
Town Building Performance Contract	Energy Efficiency and building performance upgrades at OH, PS PW, SB Buildings	Upgrading heating systems, insulation, and efficiency of buildings to reduce energy consumption
Town Building Improvements	Small ongoing improvements to Town buildings to increase energy efficiency	OH- window inserts, vestibule
Efficiency Camden	Leverages efficiency Maine funding to improve energy efficiency in Camden homes	Energy efficiency subsidies for low to moderate income households in Camden for insulation, HVAC upgrades, etc.
Complete Streets	Designing and developing streets for pedestrian and cyclist connectivity	Reduce the need to travel by car on Camden streets/roads
Hybrid Vehicles	Replacing town fleet with hybrid vehicles	Police cruiser was the first hybrid to be included in the fleet. As vehicles are rotated out hybrids will be rotated in.
Wastewater Treatment Plant Redevelopment	New processing equipment will be more energy efficient as well as upgrades to buildings.	Will result in a reduction in energy use and dewatering improvements will reduce amount of sludge trucking.
Renewable Energy		
Project Name	**Description**	**Notes**
Green Energy RECs	Green Energy RECs to off-set 100% of the Town's electricity usage	Short term electricity solution
Solar Energy	2 Megawatt Solar Farm to off-set 100% of the Town's electricity usage	Long term electricity solution
Wind Energy	Investigating wind turbines to off-set X% of the Town's electricity usage	Long term electricity solution
Climate Change Resiliency		
Project Name	**Description**	**Notes**
Green Infrastructure/ Stormwater Management	Increasing the capacity of stormwater infrastructure to handle extreme rain events	Includes more absorption and impoundment of stormwater to improve water quality in addition to increasing capacity
River Restoration	Restoring the natural state of the Megunticook River	To the greatest extent possible, restoring the natural state of the river and

		surrounding wetlands will result in a river that can better handle extreme rain events.
Harbor Infrastructure Redevelopment	Redevelopment of infrastructure on the Harbor to better withstand sea level rise	Will include the public landing, dock system and harbor park/seawall
Stream Crossing/Culvert Replacement	Replacing culverts at stream crossings	Improve flood resiliency by increasing capacity of stream crossings to handle higher volumes of water

Appendix C.
Camden Public Transportation Survey Questions

Q1 How many times have you taken Concord Trailways or another bus to during the past year?
__ one trip __ two to five trips __ more than five trips __ never

Q2 If you are a student, do you ride the school bus to school?
__ yes __ no

Q3 If a school bus were available to take to Hannaford, the town office, apartment complexes, and other locations in the local area, would you consider riding it?
__ yes __ no __ maybe

Q4 Some towns have ride-share vans for commuters who work in other towns. Would you take one if it were available and low cost?
__ yes __ no __ maybe

Q5 Have you heard of GoMaine?
__ yes __ no

Q6 If there were a van or bus that traveled to midcoast locations on an hourly basis, would you ride it?
__ yes __ no __ it depends on destination

Q7 What local locations would you consider taking public transit to?
__ Hannaford
__ Camden Library
__ PenBay Hospital/Waldo General Hospital
__ Camden Hills Regional High School
__ local restaurants
__ nearby movie theaters or art centers
__ YMCA
__ Other (please specify)

Q8 What destinations outside of Camden would you consider taking public transit to?
__ Belfast village center
__ Rockland village center
__ Hope village center
__ Lincolnville village center
__ Damariscotta and south
__ Portland
__ Other (please specify)

Q9 Do you ride a bike to go to school or work?
__ yes __ no

Q10 Would you support funding a path between Camden, Rockland and Belfast?
__ yes __ no __ not sure

Q11 If you do support a bike path, where do you suggest it be located?

Q12 If electric bicycle or electric scooter-sharing were available in Camden, would you ride them?
__ yes __ no __ maybe

Q13 Your age
__ under 18 __ 18-24 __25-34 __35-44 __45-54 __55-64 __65+

Q14 On average, how many miles do you drive per year?

Q15 How many cars or trucks in your household?
__ none __ one __ two __ three or more

Q16 If public transit allowed you to go to school, Maybe commute to work, and go out in the evenings, would you consider not owning a vehicle?
__ yes __ no __ maybe