

# Climate Action Plan Phase II - Recommendations for Action

Submitted to Cumberland Town Council  
& MSAD 51 Board of Directors  
April 2022

By  
Climate Action Plan Subcommittee  
Cumberland Lands and Conservation Commission (LCC)



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## EXECUTIVE SUMMARY

The Cumberland Lands and Conservation Commission (“LCC”) in 2019 formed a Climate Action Plan Subcommittee (“CAPS”) to expand on the work of the 2009 Cumberland Comprehensive Plan, as updated. The Town<sup>1</sup> is committed to the goal of fostering sustainability including reduction of carbon emissions and energy conservation. This is not a long-term abstract idea. It has become increasingly urgent to mitigate and adapt to climate disruption of the magnitude now predicted by the scientific community. Urgent action is called for at all levels. Further, the costs of inaction on climate change will be acutely borne by the vulnerable among us, who should be given due consideration for support from climate actions.

Under its Charter, the CAPS was tasked with taking an inventory of Cumberland’s greenhouse gas (“GHG”) emissions and proposing to the LCC a goal and action plans to reduce GHG in the coming years. Using 2015<sup>2</sup> as a baseline, the CAPS estimates that the GHG emissions in that year were approximately 66,160 metric tons (“MT CO<sub>2</sub>e”). In percentage terms, these emissions were from Town Government (1%), MSAD 51 (7%), Business (13%) and Households (79%). The CAPS finds that through actions taken since 2015 the Town and MSAD 51 have already reduced their GHG emissions by 25%.

As part of its research and analysis, the CAPS held regular monthly meetings open to the public, met with stakeholder groups and undertook a survey of citizen viewpoints on sustainability. In line with the Charter of the Climate Action Plan Subcommittee of the LCC (Appendix II), this document presented Phase I of the CAPS work in January 2021: to develop a goal and action plans for the Town and MSAD 51. This Report, in February 2022, presents Phase II: to develop a goal and action plans for the Business and Household sectors.

For Phase I, the CAPS proposed the following Goals, which were accepted:

- that the Town and MSAD 51 adopt a goal of zero GHG emissions by 2030; and
- that the Town promote a town brand of “Sustainable Cumberland”.

For Phase II, the CAPS proposes the following Goals:

- further promote actions to promote the brand of Sustainable Cumberland. Create a permanent Sustainability Committee for the Town, coordinated by a fulltime new Town Sustainability Coordinator.
- 50% GHG reduction of Cumberland residential footprint by 2030; climate neutral by 2050. Aspire to be climate positive by 2050.

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<sup>1</sup> “Town” here means the Town Government – the Town Council and its subsidiaries. “Cumberland” means Town Government, MSAD 51, businesses and households. MSAD 51 is the Cumberland and North Yarmouth K–12 school district.

<sup>2</sup> All dates in this document refer to the start of that Fiscal Year (FY), consistent with Town budgeting, which runs from July 1 to June 30 of the year following.

To achieve the second Goal of Phase II, the CAPS recommends the following actions or Targets for approval by the Town Council. We believe that these are all actionable and achievable. Moreover, we believe that, if implemented, they have the potential for Cumberland to achieve its aspirational goal of becoming “net positive”, i.e., avoiding more GHG than we emit. The targets are presented below in rank order, ranking highest those actions we estimate have greater potential to avoid greenhouse gases (measured in carbon dioxide equivalents [CO<sub>2</sub>e]).

Phase II Recommended Actions		MT CO <sub>2</sub> e Avoided
1	Reduce GHG emissions from home energy use – promote heat pump use	24,000
2	Reduce GHG from transport	18,000
3	Adopt ecologically productive, low carbon/ low water landscaping practices	10,000
4	Support 30X30 goal of conserving 30% Cumberland’s lands by 2030	4,000
5	Purchase low-cost carbon offsets from Town owned forest lands	3,000
6	Install low-cost solar panels	1,600
7	Decrease food waste through composting	1,000
8	Adopt the 2021 IECC “stretch” energy efficiency goal for new construction	800
9	Buy more locally grown food.	Not yet calculated
10	Ensure the integrity of water quality in Broad Cove.	Not yet calculated

Each item is described in a common table format in **PART III: ACTIONS & TARGETS TO ACHIEVE OUR GOALS**. The format shows for each theme how that challenge of climate change is being experienced globally, in the USA, in Maine and in the Town of Cumberland – and what we can do locally to help mitigate this global challenge. The CAPS hopes that this material in this format can be easily and broadly communicated and actioned.

The CAPS further recommends that the Town consider another phase of climate action planning, to make the Town resilient to the impacts of climate change. A complete Climate Action Plan must contemplate actions to reduce the causes of climate change and to build resilience to the inevitable consequences of climate change. The CAPS work to date has focused largely on what Cumberland can do to reduce the causes of climate change. We recommend that the Town next undertake resilience planning to complete its Climate Action Plan. The resilience planning process should consider the draft content and proposed recommendations in the Appendix to this report. This action can be undertaken with the new administrative resource recommended in Goal 2, see **PART II: CLIMATE CHANGE MITIGATION GOALS**.

## PART I: THE BASELINE & PLATFORM FOR THIS CLIMATE ACTION PLAN

### 1. Guiding Principles

- CAPS will focus on areas of agreement and strive for consensus.
- CAPS members agree that reducing waste, increasing energy efficiency, moving towards GHG free energy sources, and smarter land use planning are important in their own right but also have overlapping benefits.
- Bold actions are called for, and ambitious, innovative, and pioneering approaches are required.
- Obstacles to reaching our goals are not only technological, scientific and economic, but also about changing how we live, think and do business.
- Utilize a variety of recommendations: some by government, some by individuals, some by business; some small, some big, some easy, some not, some which we expect will be greeted with consensus, others which require further work and dialogue.
- A mixture of incentives, regulation and education is necessary.
- A well-informed community is critical and a substantial role for education and outreach is called for.
- Action items should be based on their GHG reduction potential, cost effectiveness, feasibility and sustainability co-benefits.

## 2. Baseline GHG Emissions Inventory, 2015

Figure 1: Cumberland Carbon Footprint 2015

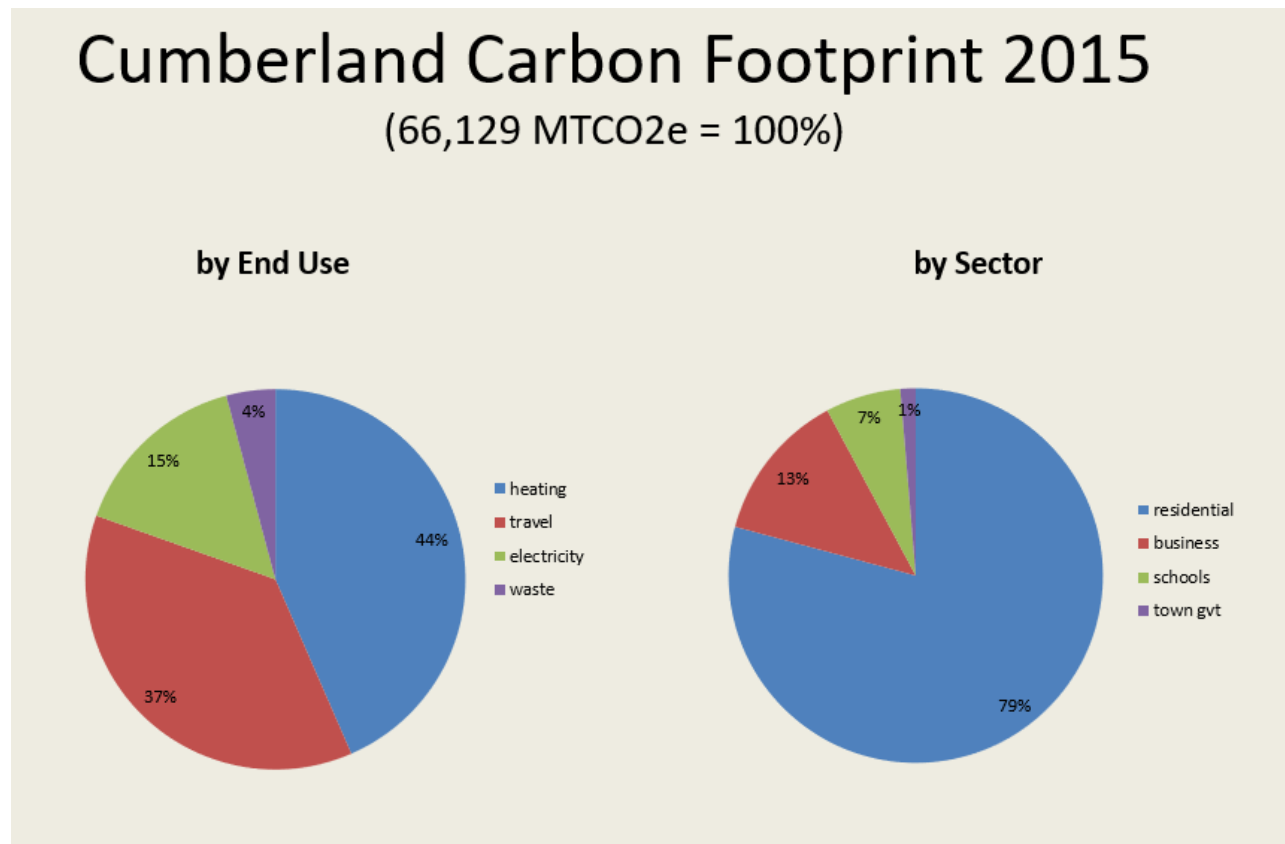


Figure 1: Cumberland Carbon Footprint 2015 takes 2015 as a baseline and estimates that Cumberland's GHG in that year were approximately 66,130 MT CO<sub>2</sub>e. In percentage terms, these emissions were from Town Government (1%), MSAD 51 (7%), Business (13%) and Households (79%).

Phase II is concerned to achieve net zero emissions from the residential and business sectors, which account for 62,590 tons of CO<sub>2</sub>e or 92% of Cumberland's emissions.

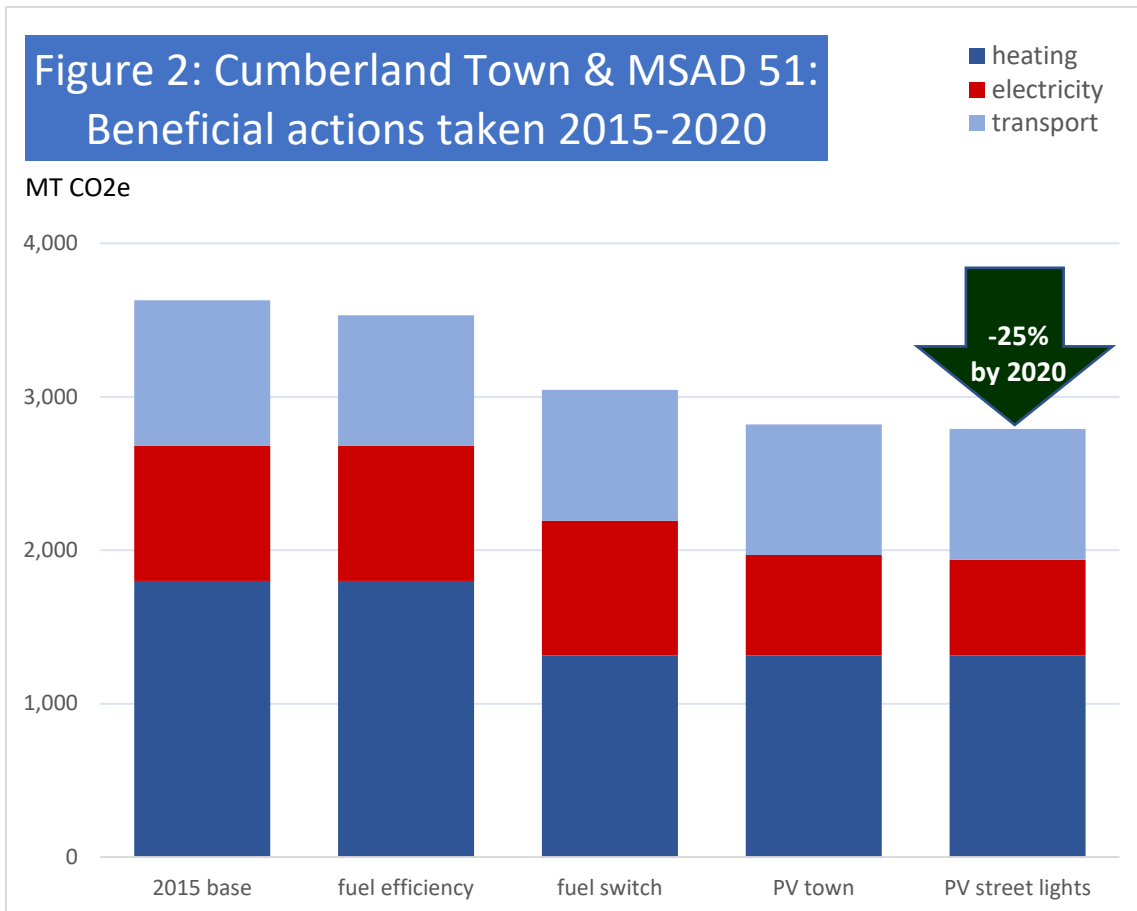
## 3. A Note on GHG Target-Setting

As with the CAP Phase I plan and recommendations, this Phase II document presents an action plan and specific steps for the residents of Cumberland to reduce their GHG emissions. The calculations of the baseline footprint, as well as the benefits of specific actions that are recommended here, are based on documented assumptions. For example, the State of Maine has made a commitment that its electricity grid will be 80% carbon free by 2030. This assumption is key to this report's calculation of the GHG benefits of homes investing in heat pumps, or the town investing in electric vehicle (EV) school buses.



#### 4. Cumberland GHG Mitigation Action: 2015-2020

Since 2015, Cumberland has proactively invested in action to reduce GHG emissions that provides a platform for this Climate Action Plan. The CAPS found that the Town and MSAD 51 has achieved 25% GHG savings, from 2015-2020, as shown Figure 2: Cumberland Town Government & MSAD 51: Beneficial actions taken 2015-2020.



These achievements are the result of longstanding support from the Town for action for environmental stewardship and climate change mitigation, both in projects to directly reduce GHG and in the proactive preservation of land and forests. These forward-looking activities were inspired, sponsored and promoted by residents, members of Town committees including the LCC, and the Chebeague and Cumberland Land Trust. They have, over time, become a feature of Cumberland's identity and an asset for its current and future residents.

Our 2020 Citizen Survey, described in Part III, shows that town residents strongly support these actions. The combination of land preservation, and the history of effective GHG mitigation actions already taken, provided a solid platform for this CAP.

## 5. Scope of this Phase II Report – The Residential and Business Sectors

### Residential Sector

Cumberland is growing. As of the 2020 Census Cumberland has a population of 8,473, an increase of 1,262 or 18% since 2010. The 2019 American Community Survey indicated 2,878 households with an average of 2.9 people per household. Median income was \$111,890. 69% of adults have a college degree versus 32% for Maine as a whole. The poverty rate was 4.1%. Cumberland's residential GHG emissions were 52,373 in 2015, our baseline year.

There were 3,039 housing units in Town of which 67% were built before 1991. 33% or some 1,000 housing units are less than 30 years old. Consistent with Maine overall, about two thirds of Cumberland homes are heated with carbon-intensive fuels: 64% of households heat their homes with fuel oil, 15% with natural gas, 14% with propane, and the balance by wood, electricity and other. The average household used 10,889 kwh of electricity in 2020 (Central Maine Power data); total residential electricity use was 31.3 million kwh.

According to the Maine Department of Environmental Protection in 2020, there were 7,454 vehicles owned by Cumberland residents, i.e. 2.6 per household.

- 56% were light duty passenger trucks, 32% passenger cars and the balance commercial
- 99% had gasoline (96%) and diesel (3%) engines
- 1% were EVs
- the top three makes were Toyota (16%), Subaru (11%) and Ford (11%)
- the top selling model was the Toyota Rav4

The average household drove 14,722 miles in 2019 (Maine Department of Motor Vehicles data). Cumberland vehicles in 2020 were, on average, eight years old. Assuming an eight-year turnover, by 2050 we would potentially see four more car choices being made. This would provide opportunity to alter the mix of vehicles towards greater fuel efficiency, and more adoption of hybrids and electric alternatives.

As reflected in Phase I Report - Citizen survey revealed that Cumberland citizens are highly engaged in mission of sustainability and some key sub-elements. We can expect enthusiasm for elements of the recommendations in this Report. Taking action may be more challenging. As has been noted by researchers of behavioral economics, it is very difficult to achieve behavior change. Consumers need multiple sources of encouragement, for example, to switch to more prudent food consumption.<sup>3</sup>

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<sup>3</sup> NAS 2020: [A National Strategy to Reduce Food Waste at the Consumer Level](#)

## Business Sector

According to the Maine Department of Labor, in 2020 Cumberland has 309 business establishments employing 1,292. The top five sectors by employment are:<sup>4</sup>

1. Administrative and waste services (222)
2. Professional and technical services (209)
3. Health care and social assistance (130)
4. Manufacturing (128)
5. Construction (127)

According to Central Maine Power, in 2020 the business sector consumed 6.2 million KWH of electricity. Based on modelling from the Greater Portland Council of Governments (“GPCOG”), Cumberland businesses likely occupied 6 million square feet of commercial space.

The CAPS estimates that the business sector emits annually in the range of 8,900 MTCO<sub>2</sub>e or 13% of the 2015 baseline.

Beyond the above aggregate data, the Town at present has little additional information about the business sector, both as to individual GHG or actions already taken or planned to mitigate GHG emissions.

The CAPS did conduct a brief survey of 51 local businesses based on email addresses provided on the Business Directory section of the Town website. Only 6 responses were received with incomplete information provided in several cases.

Based on lack of knowledge about the activities of Cumberland businesses, the CAPS is not able to recommend any climate actions for this sector.

According to GPCOG, this dearth of information on the business sector is not atypical. To address the shortfall, some municipalities such as South Portland are now requiring annual GHG reporting by local business.

The Town Council may wish to consider taking such a step or perhaps commissioning a professionally administered survey.

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<sup>4</sup> Maine Department of Labor: Center for Workforce Research and Information

## PART II: CLIMATE CHANGE MITIGATION GOALS

Cumberland’s two Phase II Goals that the Town further promotes its unique brand of Sustainable Cumberland and appoints a Town Sustainability Coordinator to help do so; and are that its residents should be Carbon Neutral by 2050 – with the ambition to be Climate Positive.

### Goal 1: Further promote its Unique brand of Sustainable Cumberland

To date, the significant accomplishments of the town in the direction of sustainability and climate change mitigation has been achieved through the year-on-year dedication of the Council and members of various Committees, including the Lands and Conservation Commission. There has been no separate budget provision for sustainability. Going forward, it is our view that the urgency and interconnectivity of the issue now merits the allocation of a budget for, and the appointment of, a dedicated staff resource of a Sustainability Coordinator. In the towns of Portland, South Portland, Windham, Westbrook and Scarborough, staff have been appointed that manage sustainability part or full time.

The Charter of the Climate Action Plan Subcommittee of the LCC mandates that the CAPS is dissolved at the end of calendar year 2021. The CAPS recommends that its Charter (see Appendix 3) be revised and extended and it transitions to become a permanent Sustainability Committee for the Town. The members of this Committee would work with the new Sustainability Coordinator to offer guidance and to technical support. In the immediate term, this permanent Sustainability administration will mean that there will be a central group responsible to ensure that the approved actions of the Climate Action plans are implemented; and newer issues are included - such as the Resilience Plan and the inclusion of town businesses.

At its January 2022 meeting, the LCC asked the CAPS to adopt a charter to continue its efforts as a Sustainability Subcommittee (SSC), that would be considered at its February meeting. This proposed Charter was approved and is attached as Appendix IV.

### Goal 2: 50% GHG reduction of Cumberland residential footprint by 2030; Climate Neutral by 2050. Aspire to be Climate Positive by 2050.

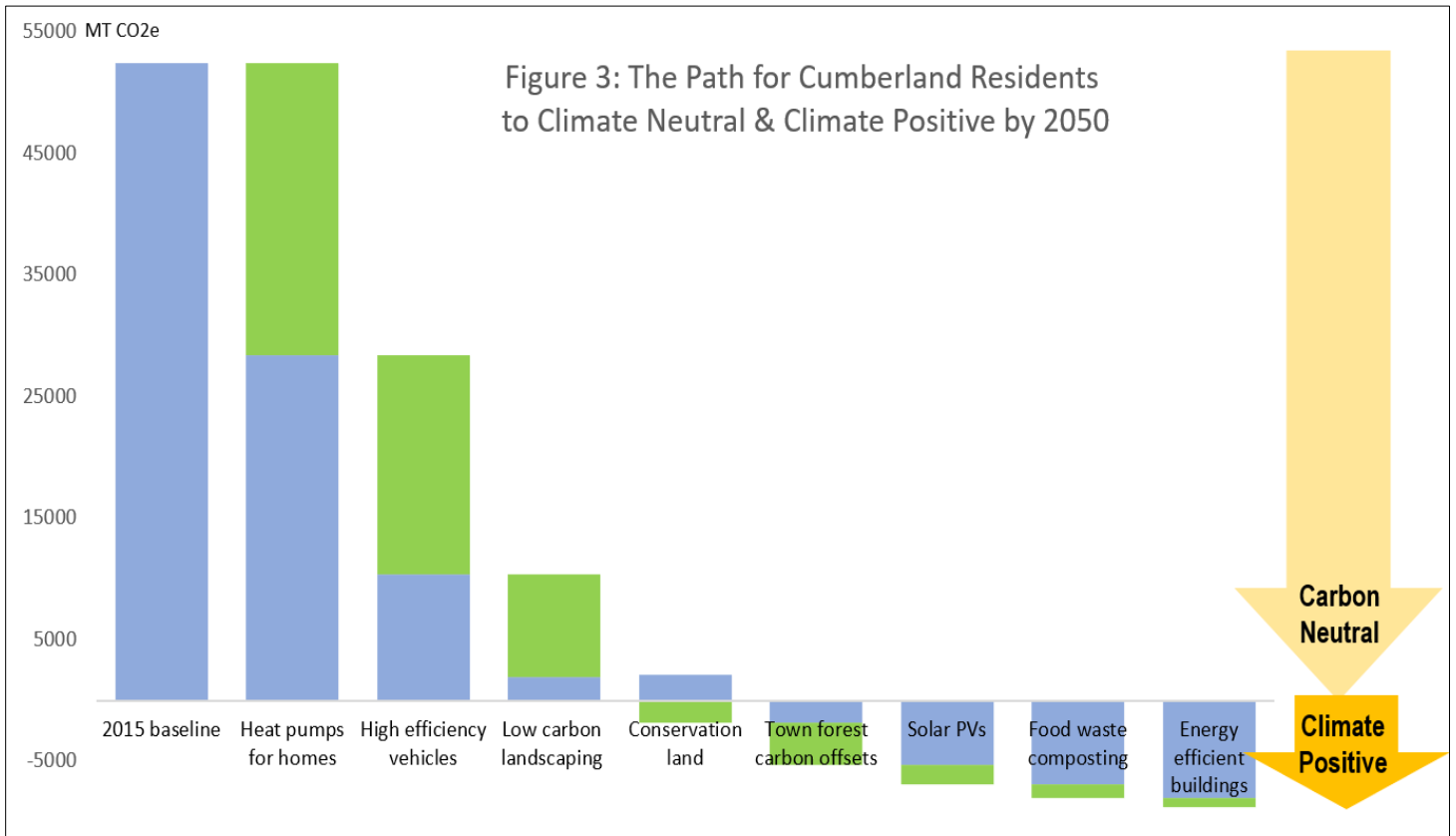
If all the 10 actions proposed in this report are implemented, and all 10 targets are met by 2050, the town as a whole will be Climate Neutral, i.e. its avoided carbon will equal its carbon emitted. However, residential carbon emissions could also become Climate Positive, in that they could be avoiding more than 8,000 MT CO<sub>2</sub>e beyond what they emit. Our calculations show that the average household carbon footprint, which was 19.2 MT in 2015, had already dropped to 16.5 MT CO<sub>2</sub>e in 2021. With the implementation of the action items in this Report we estimate that it will be -1.0 MT CO<sub>2</sub>e in 2050. This is achievable, and this is our aspiration for 2050.

Moreover, households will be climate positive in that they will each be avoiding an average of one ton of carbon each year. See Table 1: Town Residents Household Carbon Footprint (average MT carbon per household) and Table 2: Impact of each Recommended Mitigation Action on Cumberland’s Residential Carbon Budget.

Table 1: Cumberland Household Carbon Footprint (average MT carbon per household)		
2015	2021	2050 projected
19.2	16.5	-1.0

Table 2: Impact of each Recommended Mitigation Action on Cumberland's Residential Carbon Budget

	2015 base	Heat pumps	Transport	Landscaping	Land conservation	Forest offsets	Solar panels	Food Waste Composting	Energy Efficient Buildings
GHG balance	<b>52,373</b>	<b>28,378</b>	<b>10,378</b>	<b>1,878</b>	<b>(2,122)</b>	<b>(5,122)</b>	<b>(6,680)</b>	<b>(7,802)</b>	<b>(8,162)</b>
Impact of action	<b>52,373</b>	<b>24,000</b>	<b>18,000</b>	<b>8,500</b>	<b>4,000</b>	<b>3,000</b>	<b>1,558</b>	<b>1,122</b>	<b>810</b>



## PART III: ACTIONS & TARGETS TO ACHIEVE OUR GOALS

The ten proposed actions, or targets, presented below are provided in poster-like presentations on a common format. They can be viewed and communicated alone or as a set. However, the “whole” is greater than the sum of the individual targets, and many targets are interdependent. For example, keeping Casco Bay free of nitrates from residential landscape runoff (Target 3) will help build coastal resilience to sea-level rise and help restore native fish and fauna and preserve coastal property values (Target 10). Investing in heat pumps for home energy (Target 1) will help improve overall building energy efficiency (Target 8).

Two targets are not included in the carbon accounting here: Targets 9: Buy more locally grown food, and 10: Ensure the integrity of water quality of Broad Cove. We expect that once the carbon accounting research has been done, these targets will prove to be among the most important actions that can be taken by individuals as well as the Town.

This vision of Sustainable Cumberland will also invite – and depend on -- the active and informed civic participation of all the town residents. Attainment of these targets depends heavily on timely adoption of supporting actions by local homeowners, who generate an estimated 80% of community wide emissions, and by the Town’s ability to offer incentives for them to do so, such as through a “Community Carbon Bank.” It also depends heavily on the Town’s commitment to coordinate these activities by appointing a dedicated Sustainability Coordinator.

Some of these actions can start now.

Converting residential home energy use to electric heat pumps is the most important step Cumberland residents can take to reduce their own and the town’s GHG emissions, see Target 1. Efficiency Maine and others currently provide financial incentives to homeowners to adopt more climate friendly practices such as weatherization and use of air source heat pumps for heating and cooling.

Residents can benefit from Maine's renewable portfolio standard for electricity, which is consistent with a carbon neutral goal by 2050. Individual residents can also invest in electric vehicles and in heat pumps for their homes. These technologies are available now and are generally affordable.

The Town could consider sale of excess (beyond that needed for the CAP as above) forest carbon offsets to voluntary markets and returning some or all of proceeds to Cumberland residents to subsidize purchase of carbon free technologies such as air source heat pumps and renewable energy. Use of forest carbon offsets in attainment of Phase I goal (Town and MSAD 51) should be limited to 20% of 2015 baseline emissions or approximately 725 MT CO<sub>2</sub>e annually. It is quite likely that carbon sequestration of Town-owned forest land (estimated at 1,000 acres) will substantially exceed that amount.

**1. Reduce GHG emissions from home energy use – promote heat pumps (-24,000 MT GHG)**

**WHY SHOULD WE CARE?**

In the world	Residential energy accounts for 11% of all global GHG emissions (2020). <sup>5</sup>
In the USA	Roughly 20% of US energy-related greenhouse gas (GHG) emissions stem from heating, cooling, and powering households. If considered a country, these emissions would be considered the world’s sixth largest GHG emitter, comparable to Brazil and larger than Germany. <sup>6</sup>
In Maine	~2/3 of Maine households are heated with carbon-intensive fuel oil. <sup>7</sup> Heating, cooling, and lighting of buildings are responsible for almost one-third of Maine’s GHG emissions. Maine can reduce GHG by modernizing our buildings to use cleaner energy, increasing energy efficiency, and utilizing lower-carbon building materials. <sup>8</sup> Governor Mill’s January 2020 program <i>Lead by Example</i> encourages state and local communities to prioritize energy efficiency in their building codes and procurement practices
In our Town	Home heating makes up the largest percentage of Cumberland’s GHG emissions. There are now viable alternatives to obtain 100% home energy from electricity. As the grid greens, this heating will emit zero GHG emissions.

**WHAT HAVE WE ALREADY ACCOMPLISHED IN THIS AREA?**

	More than 70,000 homes in Maine have already installed heat pumps, including more than 20,000 in 2021. These systems operate at full capacity as low as -15 F, and are often installed as the only heat source in homes. Further, in the last year Efficiency Maine has been rebating energy efficient heat pumps 10 to 1 over high efficiency boilers, showing their growing popularity.
	High efficiency heat pumps provide year-round comfort at a lower cost than fossil fuel alternatives. Running heat pumps on electricity means that, as our grid becomes greener, so does the heating and cooling of your home. Efficiency Maine offers rebate incentives for Maine residents to make the switch.  “The first upgrade we made after purchasing our house was to install heat pumps throughout our home to replace our 20-year-old forced hot water system and oil boiler. The cost of electricity to run the heat pumps is less than what we paid for oil deliveries our first winter in the home, and we are keeping the temperature at a much cozier 68 degrees all winter long. The best part is our heat pumps also provide cooling all summer long and are twice as efficient as a window AC unit! Our entire home stays comfortable at a reasonable cost year-round.” - Cumberland Resident Elizabeth Love.

**RECOMMENDATION: REDUCE GHG EMISSIONS FROM HOME ENERGY USE – PROMOTE USE OF HEAT PUMPS**

**Our Town is committed to zero GHG by 2030, and almost zero GHG from electricity**

	<ul style="list-style-type: none"> <li>• Deploy high efficiency air source heat pumps for air conditioning in summer and to supplement/ reduce use of oil/natural gas furnaces in winter.</li> <li>• Assuming 80% adoption overall,<sup>9</sup> this action can avoid an estimated 24,000 MT GHG -- potentially the largest single action that can be taken to reduce to residential and commercial GHG emissions.</li> </ul>
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<sup>5</sup> <https://ourworldindata.org/ghg-emissions-by-sector>

<sup>6</sup> [The carbon footprint of household energy in the U.S.](#) PNAS 2020

<sup>7</sup> [The carbon footprint of household energy in the U.S.](#) PNAS 2020

<sup>8</sup> Maine Won’t Wait, p11, 47-52

<sup>9</sup> We assume here that industrial scale heat pumps would be added to Town and MSAD 51 buildings to take on at least 80% of the heating load of such buildings, with natural gas supplementing in colder weather; and that heat pumps are installed in 80% of homes and businesses by 2050. We assume that the grid decarbonizes as per the State Climate Change targets, see “A Note on Target-Setting”, page 7 above.

## HOW CAN RESIDENTS HELP?

- Learn more about the benefits of high efficiency heat pumps for heating and cooling your home at Efficiency Maine. They have rebates up to \$1,200 for high efficiency systems.
- Consider installing one or more high efficiency mini-split heat pumps to either replace or supplement current heating and cooling systems in your home.
- If you already have heat pumps installed, share your experience with your friends and neighbors.



## 2. Reduce GHG from transport (-18,000 MT GHG)

### WHY SHOULD WE CARE?

In the world	16.2% of all GHG (2021). <sup>10</sup>
In the USA	29% GHG (2019). It is the largest contributor of all sectors. <sup>11</sup>
In Maine	54% GHG (2017), an increase from 1990 (44%). Maine's relative GHG from this sector is high compared to the global % as it does not have a large manufacturing sector, has spread out geographies and limited public transportation. <sup>12</sup> Maine's 2030 GHG reduction goals assume a 5x increase New Light-duty Electric Vehicles (EV) sales, and a range of public investments to reduce our reliance on fossil fuel for transport. <sup>13</sup>
In our Town	37% GHG (2015) – 24,500 MT per year. Eliminating this will require action from the Town and School district, but mostly from individual residents.

### WHAT HAVE WE ALREADY ACCOMPLISHED IN THIS AREA?

	<ul style="list-style-type: none"><li>• Our Town is committed to zero GHG by 2030, including for most vehicles</li><li>• In 2015, Town and School GHG emissions were 850 MT GHG. By 2020, Fuel efficiency had reduced this by 100MT to 750MT!</li><li>• The Town and School have accepted a target of carbon neutral transport. They plan to reduce transport GHG by 2030 by another 100MT and to offset the rest with forest carbon offsets.</li><li>• Plans to phase in hybrids and EVs for Town new car purchases: avoid 100 MT GHG</li><li>• Approved the CAP proposal to phase in EV school buses and avoid &gt;400 MT GHG!</li><li>• Cumberland's police department has acquired a new new Hyundai Ioniq Electric Vehicle sedan (EV) – this on top of its two hybrid-electric Ford Interceptor frontline police cruisers that were already in operation. Police Chief Charles ("Chip") Rumsey noted: "The [EV and hybrids] have worked well for my team. They perform as reliably and safely as the standard vehicles, with the added benefit of less cost and time spend on refueling and fewer tailpipe and GHG emissions, particularly from idling. Right now, two of our four frontline police cruisers, so 50%, are hybrids. I look forward to continuing to transition 100% of our fleet over time, on our planned purchase schedule."<sup>14</sup></li></ul>
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### RECOMMENDATIONS: UPGRADE TO HIGH EFFICIENCY VEHICLES SUCH AS PLUG IN HYBRIDS AND ALL ELECTRICS (FOLLOW THE EXAMPLE OF THE TOWN)

	<ul style="list-style-type: none"><li>• Once the town adopts EVs for fleets, particularly for school buses, these can potentially add renewable power back into the grid and be paid for doing so. School buses are essentially mobile mini-power plants with known schedules. Maine is a member of the New England Independent System Operator grid (<a href="https://www.iso-ne.com/">ISO-NE</a>),<sup>15</sup> which has stakeholder processes to determine the rules of electricity markets. The CAPS recommends that the Town explore whether the school district could be paid for services its electric buses provide to the grid.</li><li>• Transportation GHG from Cumberland businesses and residents was 23,650 MT (2015). These groups should adopt the same ambition as the Town and School System, but by 2050. This would mean potentially up to 100% carbon neutral transportation.</li><li>• Residents and businesses should upgrade to high efficiency vehicles such as plug in hybrids and all electrics.</li><li>• This action could avoid 18,000 MT GHG per year from residential GHG emissions, the second largest action residents can take.</li></ul>
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<sup>10</sup> <https://ourworldindata.org/ghg-emissions-by-sector> Definition includes cars, trucks, commercial aircraft and railroads.

<sup>11</sup> <https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions>

<sup>12</sup> LCC CAP Phase 1 report – as are all data about the Town and Maine

<sup>13</sup> Maine Won't Wait 2020, p 10, 107

<sup>14</sup> See "[Cumberland's Blue is Going Green](#)", accessed February 10 2022

<sup>15</sup> <https://www.iso-ne.com/>

## HOW CAN RESIDENTS HELP?

- Get educated about fuel efficient (and safer) driving.
- Carpool where you can. Plan your trips to minimize your personal miles traveled.
- If you are buying a new vehicle, consider the new hybrid and electric technologies
- Use the School buses, especially once they migrate to EVs!!
- Become educated about, and advocate for, the new plans to supplement the greater Portland transportation infrastructure with trains, buses and cycle routes.

3. Adopt ecologically productive landscaping practices (-8,500 MT GHG).<sup>16</sup>

WHY SHOULD WE CARE?

In the world	Plants are central to a functioning global ecosystem. Plants oxygenate the atmosphere and reduce atmospheric pollutants. Ecological restoration in both developed and developing countries is a primary strategy for mitigating the impacts of climate change. Native plant communities are not only key to the global ecosystem, but also crucial to environmental and human health at the residential and neighborhood scales.
In the USA	<p>Urbanization has fragmented what were ecologically-productive landscapes. The Audubon Society estimates that the continental U.S. has lost 150 million acres of wildlife habitat and farmland to urban sprawl over the last century.</p> <p>American lawns cover an area roughly the size of Florida, making grass <a href="#">the most common irrigated plant in the country</a>. And all that grass comes with an environmental cost. Lawn fertilizer high in nitrogen and phosphorus winds up in surface and ground water, entering waterways of all sizes. To keep weeds at bay, homeowners deposited around 59 million pounds of pesticides onto their residential landscapes in 2012.<sup>17</sup> Both fertilizer and pesticides leach into the waterways and affect water quality and fauna and fish. These pesticides also <a href="#">potentially expose children and pets</a> to harmful chemicals.</p> <p>This irrigation consumes about 7 billion gallons of water a day, <a href="#">a third of all residential water consumption</a>. Roughly half of that water is wasted because of runoff, evaporation or overwatering. Equipment used for mowing, edging and leaf blowing mostly powered by gas <a href="#">emitted 26.7 million tons of pollutants</a> into the atmosphere in 2011. Those emissions contribute to climate change.<sup>18</sup></p>
In Maine	Maine is experiencing more frequent rainfall events and floods associated with climate change. These are eroding residential land and topsoil. Sustainable residential landscaping practices can help build a network of productive landscapes. Native plants can regenerate sustainable plant communities and reconnect fragmented ecosystems in residential areas. Creating a network of productive ecosystems supports the biodiversity essential to our food web and boosts human health and well-being by <a href="#">bringing nature’s benefits right to residential yards and outdoor spaces</a> . <sup>19</sup>
In our Town	"More native trees, shrubs, and flowers; less lawn." This phrase might serve as helpful guidance as homeowners consider landscaping decisions. Traditional turf lawns are quite demanding of resources to mow and maintain, while limiting food for native insects, birds, and other wildlife; in addition, the compacted, shallow roots of most lawns contribute very little to the absorption and filtering of rainwater. By contrast, native groundcovers, flowering plants, shrubs, and trees absorb and filter groundwater and provide food and shelter for pollinating insects and the wildlife that depends on them. Trees capture and store carbon and provide a helpful buffer against the heaviest rainfalls that have become more common with climate change. Well-situated native plants add interest to your landscape and are less costly to maintain.

WHAT HAVE WE ALREADY ACCOMPLISHED IN THIS AREA?

	"Learning that even small changes in landscape practices can make a difference has been very empowering and hopeful. Adjusting my garden aesthetics to native plants, shrubs, and trees has been a positive process of discovery with immediate benefit to pollinators and birds! I encourage everyone to try some of the recommended actions." Sukie Curtis
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<sup>16</sup> This item should be read alongside Target 10: ENSURE THE INTEGRITY OF WATER QUALITY OF BROAD COVE.

<sup>17</sup> EPA data

<sup>18</sup> <https://www.nytimes.com/2019/04/10/climate/climate-newsletter-lawns.html>

<sup>19</sup> <https://dirt.asla.org/2017/08/21/new-guide-restoring-ecological-landscapes-at-home/>

## RECOMMENDATION: ADOPT LOW-CARBON LANDSCAPING PRACTICES

- Homeowners can make positive contributions toward a more Sustainable Cumberland by adopting lower carbon, more resilient landscaping practices. Even those with very small properties can make a difference. This could avoid 8,500 MT CO<sub>2</sub>e per year.
- The Town can set aside, in its LCC budget, \$5,000 per year for incentives to homeowners who pilot demonstration projects of sustainable landscaping practices. After a two-year pilot, the proposed Sustainability Subcommittee (SCC) would evaluate and adjust as needed.
- Creative other ideas should be considered.<sup>20</sup>

## HOW CAN RESIDENTS HELP? PRACTICES FOR CUMBERLAND HOMEOWNERS TO CONSIDER

- If you have a lawn: mow less frequently and raise your mower to at least three inches. Where possible, phase out gas-powered mowers in favor of electric. Eliminate the use of gas-powered leaf blowers, which are especially high emitters of greenhouse gases and other pollutants.
- Reduce or eliminate the use of lawn fertilizers that are harming Cumberland's coastal waters.
- Use native ground covers, ferns, or flowering plants to replace turf lawn around the bases of trees. Look for other areas of your yard where lawn could be converted to meadow or to an area for native shrubs and trees. Leave mature trees in place and include saplings for the future.
- Add native trees to your yard. Native species of oaks, birches, maples, cherries, and aspens excel at capturing and storing carbon in their wood and roots; absorbing and filtering rainwater; and providing essential food for beneficial insects and the birds that depend on their larvae. "Leaving the leaves" in parts of your yard gives shelter to wildlife and helps to replenish the soil.
- Reduce watering with potable water. Reduce the frequency of watering; re-use rain or suitable grey water. Use rain barrels to store water for later use.
- With increasing rainfall, learn about [stormwater management](#): Help excess water slow down, soak in, and reduce erosion by creating a rain garden, swale, or vegetated buffer. A "rain garden" consists of moisture-loving native shrubs and plants in a naturally low area to reduce run-off from heavy rainfalls.<sup>21</sup> Use native shrubs and other plants instead of traditional "foundation plantings."
- Look for creative neighborhood projects that could include renters and non-property owners, like planting a community pollinator garden or a small grove of trees on common property.

<sup>20</sup> Some examples are: the Town could sponsor bulk tree purchases and residents can purchase trees at a discount. The Sustainability Coordinator could encourage resident "bee-keeper" volunteers to look after town-planted trees.

<sup>21</sup> <https://extension.umd.edu/resource/adapting-your-garden-impacts-climate-change>

4. Support 30X30 goal of conserving 30% Cumberland’s lands by 2030 (–4,000 MT GHG)

**WHY SHOULD WE CARE?**

In the world	Along with 50 other world leaders, President Biden has aligned with an international country effort to protect from development of 30% of nationally-owned lands by 2030. <sup>22</sup> Honoring our existential interdependence will require what humanitarian Albert Schweitzer termed a “reverence for life.” Indigenous cultures have nurtured this way of being over millennia, but it is largely absent in the dominant culture today. Reclaiming that view will be central to the 30x30 effort. “This step toward sustained coexistence with the rest of life,” the naturalist E.O. Wilson once wrote, “is partly a practical challenge and partly a moral decision.”
In the USA	In the USA, this 30x30 commitment is part of the Biden Administration’s <i>America the Beautiful</i> initiative. <sup>23</sup> The Initiative can help secure a massive natural carbon sink, while stabilizing those areas to continue to produce sequestration benefits, for example to reduce the intense destructiveness of western wildfires. The natural world provides critical resources that sustain all life on Earth including human life - from the air we breathe and the water we drink, to the food we eat and the ecosystem services that counteract the damaging impacts of climate change.
In Maine	Maine currently has approximately 20% conserved lands or about 4 million acres. <i>Maine Won’t Wait</i> , the State’s Climate Action Plan calls for an increase of the total acreage of conserved lands in the state to 30% by 2030, through voluntary, focused purchases of land and working forest or farm conservation easements. <sup>24</sup>
In our Town	Build on goals of the 2009 Comprehensive Plan such as preserving Cumberland’s open spaces, scenic beauty and rich agricultural heritage

**WHAT HAVE WE ALREADY ACCOMPLISHED IN THIS AREA?**

	The total conserved land in Cumberland is estimated to be in the range of 3,100 acres or 22% of the Town’s land area. This is a higher ratio than any of our peer towns. Current programs include (acres in parenthesis): Town acquired (985), Town open space (260), Tree Growth (1,440) and Chebeague and Cumberland Land Trust (405).
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**RECOMMENDATION: SUPPORT 30X30 GOAL OF CONSERVING 30% CUMBERLAND’S LANDS BY 2030 (APPROXIMATELY 1,000 ADDITIONAL ACRES)**

**Support 30X30 goal of conserving 30% Cumberland’s lands by 2030**

	<ul style="list-style-type: none"> <li>• Conserving 30% of Cumberland’s land would require additional 1,100 acres conserved by 2030.</li> <li>• This is the fourth strongest action residents can take to avoid GHG emissions and would avoid 4,000 MT GHG per year.</li> </ul>
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<sup>22</sup> [High Ambition Coalition for Nature and People](#). The [2020 report of the Congressional Research Service](#) notes that the national average of federally owned land in the US is 27%, this is higher in Alaska and western states. In Maine 1.5% of the state, 301,000 acres, is federally owned.

<sup>23</sup> <https://www.americanprogress.org/article/nature-loss-threatens-americas-best-defense-against-climate-change/>

<sup>24</sup> *Maine Won’t Wait*, page 76.

## HOW CAN RESIDENTS HELP?

- Cumberland's new Conservation Subdivision Ordinance should provide a steady increase to Town open space as new housing developments are brought forward. The Ordinance requires that each new residential development set aside and protect 50% of the land as open space. Residents can support the Planning Board, which has an important role in facilitating this type of development.<sup>25</sup>
- Residents can support the Forestry Subcommittee in its education and outreach programs to large landowners. If they own forest land, residents can join conservation programs such as Tree Growth and Tree Farm. Tree growth for example requires a forest management plan prepared by a Licensed Maine Forester. The plan highlights the benefits of exemplary silviculture and frequently leads to landowners opting into more permanent forms of protection such as conservation easements or will directives.
- Residents can donate conservation easements on land they own and also provide financial support to the conservation efforts of the Chebeague and Cumberland Land Trust.

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<sup>25</sup> NOTE: Tree growth and Town lands are not permanently protected unless a permanent conservation easement, a binding grant agreement, or similar document also exists.

5. Buy low-cost carbon offsets from Town owned forest lands (-3,000 MT GHG)

WHY SHOULD WE CARE?

In the world and in the USA	Carbon dioxide (CO <sub>2</sub> ) is the largest source of GHG emissions. It can be reduced in two primary ways: Mitigating, by reducing the source of emissions such as changing from a propane to heat pump water heater; and Offsetting, by acquiring the right to processes that reduce emission elsewhere such as methane destruction at landfills. Carbon offsets can be a critical component of a climate action plan where the mitigation solutions are not readily available using today's technology. Examples include concrete manufacturing and airplane fuel.
In Maine	Maine's forest coverage is 89% of the state. Overall, the state's forests sequester 75% of the state's annual carbon emissions. <i>Maine Won't Wait</i> , the recently adopted climate action plan for our State, plans to use carbon offsets to cover 20% of GHG emissions to achieve carbon neutrality by 2045. The bulk of these offsets is expected to be drawn from natural systems such as salt marshes and forests.
In our Town	The Town's forest coverage is 22% of its land area. Cumberland's forest on town-owned land sequesters more carbon than currently emitted by the Town and MSAD 51 on an annual basis.

WHAT HAVE WE ALREADY ACCOMPLISHED IN THIS AREA?

	Phase 1 of Cumberland's CAP will use offsets to cover 20% of baseline emissions to become carbon neutral by 2030. This approach takes into account that mitigation solutions are not readily available for some uses such as heavy-duty trucks and heating 100% of municipal buildings.
	The CAP will make use of the 975 acres of forest that the Town now owns outright. As part of their natural growth cycle, forests sequester carbon from the atmosphere and store it in the new wood they add each year. The Town Forester estimates that because of their age, species and health the town forests currently sequester between 3,000 – 4,000 MTCO <sub>2</sub> e per year. Like the State, Cumberland plans to use these forest carbon offsets to cover 20% of its baseline GHG emissions or 750 MTCO <sub>2</sub> e. To do so, it will set aside 225 acres as a forest carbon reserve until 2050 and conduct no timber harvests until after that date.
	"We celebrate the dual milestones of carbon neutrality and this \$100 million solar project in western Maine," said Bowdoin College President Clayton Rose in 2018. Bowdoin achieved carbon neutrality in part by purchasing carbon offsets from local projects such as a methane-capture facility at a landfill in Berlin, NH.

RECOMMENDATION: TOWN SHOULD MAKE AVAILABLE SURPLUS CARBON OFFSETS FROM ITS OWN FORESTS AND OFFER THEM TO HOMEOWNERS AT DISCOUNTED PRICE

	<ul style="list-style-type: none"> <li>As shown above, the CAPS estimates that the average Cumberland household emits 20 MTCO<sub>2</sub>e of GHG emissions per year. 20% or 4 MTCO<sub>2</sub>e per year could be offset by setting aside 1 acre of town-owned forest.</li> <li>The requested action is for the Town Council to initiate a program to make available forest carbon offsets from Town-owned forest at the discounted price of \$5 per MTCO<sub>2</sub>e, renewable annually and with a limit of 4 MTCO<sub>2</sub>e per household. 50 acres would be set aside as a forest carbon reserve for this purpose for a three-year trial period and revised as needed after that time.</li> </ul>
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HOW CAN RESIDENTS HELP?

	<ul style="list-style-type: none"> <li>Residents can reduce their personal carbon footprint by purchasing low-cost forest carbon offsets from the Town, thus supplementing its revenues. The current open market price of carbon offsets is \$10 per MTCO<sub>2</sub>e.<sup>26</sup></li> </ul>
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<sup>26</sup> <https://terrapass.com/product/personal-carbon-offset-grouped>

6. Install low cost photovoltaic (PV) solar panels (-1,600 MT GHG)

WHY SHOULD WE CARE?

In the world	41% of all GHG (2021). <sup>27</sup>
In the USA	25% of all GHG (2019). <sup>28</sup>
In Maine	Heating, cooling, and lighting of buildings are responsible for almost one-third of Maine’s GHG emissions. Maine can reduce GHG by modernizing our buildings to use cleaner energy, increasing energy efficiency, and utilizing lower-carbon building materials. <sup>29</sup> Governor Mill’s January 2020 program <i>Lead by Example</i> encourages state and local communities to prioritize energy efficiency in their building codes and procurement practices, including energy efficient lighting and lighting retrofits.
In our Town	15% of all GHG (2015 baseline)

WHAT HAVE WE ALREADY ACCOMPLISHED IN THIS AREA?

	<ul style="list-style-type: none"> <li>• In 2018 the Town Council accepted the winning proposal put forward by Revision Energy of Portland, ME to construct a 475-kilowatt PV solar farm at Cumberland’s capped landfill off Drowne Road. Annual production is estimated to be 617,518 kWh.</li> <li>• The solar farm was sized to meet the bulk of Town Government’s annual electricity needs and consists of 1,376 solar panels occupying approximately 4 acres.</li> <li>• By siting the solar farm on the capped landfill, the Town converted waste land to a substantial investment in productive infrastructure for the benefit of the entire community. Further, the solar farm only occupies a portion of the full 10 acres of the capped landfill, leaving the balance free for other infrastructure or recreation projects that make sense down the road.</li> <li>• Taxpayers stand to reap more than \$2 million savings over the 40-year life of the project. The Town is currently paying more than 9 cents per kilowatt hour for electricity. It is estimated that the levelized cost of electricity from this project will be in the range of 5 cents per kilowatt hour. Further, this cost will be locked in and sheltered from inflation and spikes in electricity prices.</li> <li>• Compared to taking the standard offer from Central Maine Power, the Town would reduce its CO<sub>2</sub> emissions by approximately 182 MT CO<sub>2</sub>e per year. This is the equivalent of taking 40 cars off the road. Other pollutants, for example sulfur dioxide - one of the prime contributors to acid rain, will also be reduced.</li> <li>• In 2020 Town Council adopted a state-of-the-art ordinance for installation of solar energy systems. The Drowne Road PV solar project “turned a brownfield to greenfield,” said Eric Fitz, Cumberland resident and member of the Climate Action Team.</li> </ul>
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<sup>27</sup> <https://www.planete-energies.com/en/medias/close/electricity-generation-and-related-co2-emissions>, viewed Jan 23 2022

<sup>28</sup> <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>

<sup>29</sup> Maine Won’t Wait, p11, 47-52



## RECOMMENDATION: INSTALL LOW-COST PV SOLAR

- Our Town is committed to zero GHG by 2050 from all sources including electricity use. This action could avoid 1,600 MT CO<sub>2</sub>e per year
- According to the U.S. Energy Information Administration, the average Maine homeowner consumes approximately 530 kilowatt hours (kwh) per month at a cost of \$0.16 per kwh. The average monthly cost is approximately \$85.
- PV solar is best suited to buildings with a south facing roof that is completely shade free. Sites with less favorable conditions can sometimes be accommodated with ground mounted panels or other techniques but affordability declines as a result.
- For those with an optimal site, a PV solar system costing approximately \$9,750 would be needed to supply all of the 530 kwh needed. The equipment is very reliable and has a 25-year warranty for most parts.
- Currently the cost of PV solar electricity is approximately \$0.08<sup>30</sup> per kwh – half the cost of utility supplied electricity for homeowners.

## HOW CAN RESIDENTS HELP?

- Contact a local solar installer for an estimate based on your needs and particular site.
- Act quickly to take advantage of state and federal rebates and tax credits.

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<sup>30</sup> Different methods of electricity generation can incur significantly different costs, and these costs can occur at significantly different times relative to when the power is used. For an apples-to-apples comparison, the best metric is the levelized cost of electricity (LCOE). LCOE includes the initial capital, and the costs of continuous operation, fuel, and maintenance as well as the costs of de-commissioning and remediating any environmental damage. These costs are levelized over the 25-year warranty period. Assumptions are 22% federal tax credit, 2% real cost of capital, installation cost of \$2500 per kw, generation of 1200 kwh per kw.

7. Decrease food waste through composting (- >1100 MT GHG).<sup>31</sup>

WHY SHOULD WE CARE?

In the world	<p>17% of total global food production may be wasted, mostly from households (11% in households, 5% in food service and 2% in retail).<sup>32</sup></p> <p>Food waste causes ~8% of all global GHG emissions. If GHG emissions associated with food loss and waste were compared to a country, it would be the third largest emitter after China and USA.<sup>33</sup></p> <p>One ton of edible food results in ~2.5 tons of full lifecycle carbon dioxide emissions.<sup>34</sup></p> <p>Reducing food waste increases food availability and food insecurity. It reduces degradation of land, forest and sea resources. It saves money spent to haul, tip and treat food waste. It reduces related environmental costs from GHG and SO<sub>2</sub> emissions.<sup>35</sup></p>
In the USA	<p>30-40% food produced in the USA is never eaten – a \$160B value.<sup>36</sup> This in a country where &gt;10% of our population are food insecure.</p> <p>Other states are stepping up! In 2020, the state of Vermont law banned disposal of food scraps in the trash or landfills, including from all households.</p>
In Maine	<p>&gt;90% food waste is landfilled, but &gt;11% Mainers are food insecure – the highest in New England.<sup>37</sup></p> <p>Maine Climate Action Plan 2020: “Reducing food waste that contributes to Maine’s greenhouse gas emissions is an important aspect of a strong local food system.”<sup>38</sup></p>
In our Town	<ul style="list-style-type: none"> <li>• Food waste is 40% of all waste in Cumberland, the largest portion of the Town’s total waste.<sup>39</sup></li> <li>• If 80% of our current food waste was composted, it would avoid the equivalent 1,122 mt CO<sub>2</sub>e.<sup>40</sup></li> </ul>

WHAT HAVE WE ALREADY ACCOMPLISHED IN THIS AREA?

	<ul style="list-style-type: none"> <li>• Cumberland uses the <a href="#">Save as You Throw (SAYT) system</a>, (also called Pay as You Throw (PAYT)), which provides an incentive to residents to reduce trash to landfill.</li> <li>• MSAD 51 was providing food composting in all cafeterias (stopped because of COVID)</li> <li>• 17% of households (500 households) use the weekly curbside food compost pickup, Garbage to Garden. In 2021, they collected an average ~2.4 tons of compostables per Cumberland household per week: ~124.8 tons/year. Cumberland residents using this program have already avoided ~310 tons of CO<sub>2</sub>e!<sup>41</sup></li> <li>• CAPS reached out to the Sen. George J. Mitchell Center for Sustainability Solutions at the University of Maine. Going forward, we will work with their Maine Food Waste Solutions team..</li> <li>• Sukie Curtis, longtime Wildwood resident, helped bring Garbage to Garden service to Cumberland Foreside: “I grow a few vegetables at home and make a point of buying our produce and eggs from local farmers. I try to buy only what we will eat, but it’s good to know that all our food waste goes to compost, where it helps grow more food!”</li> </ul>
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<sup>31</sup> This item should be read alongside Target 9: BUY MORE LOCALLY GROWN FOOD

<sup>32</sup> <https://www.unep.org/resources/report/unep-food-waste-index-report-2021>

<sup>33</sup> [Save Food for a Better Climate](#), FAO 2017

<sup>34</sup> FAO, 2015: [Food Wastage Footprint: Impact on Natural Resources](#).

<sup>35</sup> NYSERDA 2017: [Benefit-Cost Analysis of Potential Food Waste Diversion Legislation](#)

<sup>36</sup> <https://www.mainepublic.org/environment-and-outdoors/2021-09-20/why-food-waste-may-be-one-of-the-most-pressing-climate-issues-facing-maine>

<sup>37</sup> <https://www.pressherald.com/2021/10/03/pandemic-highlights-food-insecurity-in-maines-tribal-communities/>

<sup>38</sup> [https://climatecouncil.maine.gov/future/sites/maine.gov.future/files/inline-files/MaineWontWait\\_December2020.pdf](https://climatecouncil.maine.gov/future/sites/maine.gov.future/files/inline-files/MaineWontWait_December2020.pdf) P 64.

<sup>39</sup> Public Works estimates, August 2021, Bill Shane.

<sup>40</sup> Calculated by taking a medium range of pounds of food waste per household (NRDC) x 2.5 MT CO<sub>2</sub>e per MT food waste (One Climate Report p124) x 80% of 2802 households.

<sup>41</sup> Based on [EPA Warm model](#) and data from Garbage to Garden. Portland/South Portland One Climate Future, 2021, page 124 and 125. Food waste is sent to the Exeter (Maine) Agri-Energy anaerobic digester to create sustainable electricity, farm fertilizer, and animal bedding for dairy cows at Stonyvale Farm.

## RECOMMENDATION: SUPPORT FOOD WASTE COMPOSTING

- Alongside communities like Portland and South Portland, the CAPS recommends that Cumberland set a target to reduce organic waste in our trash streams by 80% by 2050, and avoid 1,122 MT CO<sub>2</sub>e vs its 2015 baseline.
- The Town Council could consider additional enabling regulations like SAYT, to further incentivize businesses and residents to eliminate food waste. Other supporting activity should include offering a town food recycling facility (see next bullet); working with [Garbage to Garden](#) and other vendors to increase curbside pickup; actively communicating about food literacy through town communication channels like The Crier and through MSAD 51; continuing to support our town Food Pantry; expanding food waste recycling by households, businesses, and organizations throughout the town, and actively engaging with Maine programs and peer communities.<sup>42</sup>
- CAPS proposes to add food waste to the Town's current composting of brush and yard waste (\$50-80,000 capital expense, recouped in <2 years).<sup>43</sup> Eliminating 100% of town food waste from landfill can avoid an estimated annual 680 tons of food waste and save \$52k waste disposal costs. Together with curbside composting, residents have the opportunity to avoid an estimated 400 tons of CO<sub>2</sub>e and sequester an additional 93 tons. Together, we can potentially create an incremental GHG benefit of 493 tons of CO<sub>2</sub>e.

## HOW CAN RESIDENTS HELP? A HIERARCHY OF ACTIONS

1. Reduce what you source (the easiest and most important action!): Buy only the food you need and will consume.
2. Reuse and/or Redistribute: Donate suitable unused food to the [Cumberland Community food pantry](#); or as livestock feed. Have a weekly "clean out the refrigerator" day and make a meal with all the leftovers.
3. Recycle/ compost and regenerate: Eliminate or radically reduce your use of your in-sink disposal, this will avoid about 10 kg/capita/year of household food waste.<sup>44</sup> Compost all your household food waste at home; or through our local food composting service; or by supporting our proposal for our town to invest in a food composting facility.

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<sup>42</sup> One Climate Future p125

<sup>43</sup> The Town is considering good ways to compost food – either a farm based [Total Mix Ration \(TMR\)](#) system, or a Tub Grinder. The latter is ~\$80k. The TMR could reduce costs to \$35-\$50k, and grants may be available for half of this. The TMR process would involve food scraps being mixed directly into the existing horse manure pile, dropped around the pile and mixed into the manure while it awaits composting. The compost and manure-laden food waste are mixed in the TMR and no additional screening is needed. Farmington and Readfield have very successful programs. Bill Shane and his team will visit this Spring.

<sup>44</sup> [UNEP Food Waste Index Report 2021](#), p48

8. Adopt the 2021 IECC “stretch” energy efficiency goal for new construction (–800 MT GHG).<sup>45</sup>

**WHY SHOULD WE CARE?**

In the world	Buildings are responsible for about 40% of all GHG emissions. Reversing climate change <a href="#">simply can’t happen without addressing the efficiency and carbon emissions from our buildings</a> . <sup>46</sup> The International Energy Conservation Code (IECC) addresses energy efficiency, including cost savings, reduced energy usage, conservation of natural resources and the impact of energy usage on the environment. The 2021 Code has been issued. <sup>47</sup>
In the USA	Once the model code is issued, it’s <a href="#">up to cities and states to adopt it</a> . <sup>48</sup> The IECC is used by more than 40 states, although not all are using the latest version. It also is recognized by the Department of Energy (DOE) and cited in federal law. DOE data: <a href="#">energy codes with modest updates over the years</a> could save consumers \$126 billion on their utility bills from 2010 – 2040 and avoid 841 million MT GHG - equivalent to the GHG emitted by 177 million passenger vehicles driven for one year or the CO <sub>2</sub> e emissions from 245 coal power plants for one year. <sup>49</sup> Building codes are <b>the</b> most powerful tool that states and towns have available to them to require higher levels of performance from new buildings. Massachusetts was an early adopter of the stretch energy code: 278 municipalities, covering some 85% of the MA population, have adopted the stretch code (Nov 2019).
In Maine	All towns within the State of Maine are obligated to adopt as a minimum, the base Maine Uniform Building and Energy Code (MUBEC). Stretch energy codes are optional. In July 2021, the MUBEC (and the town of Cumberland) adopted the 2015 IECC. This is 24.9% more energy efficient than the 2009 IECC. Municipalities can now choose to adopt the 2021 IECC stretch code The towns of Portland and South Portland have done so; Falmouth and Yarmouth are considering it. The stretch code is estimated to improve energy efficiency by 4.3% over the current code and have paybacks of 1 year for commercial buildings and 2-3 years for residences.
In our Town	The 2021 IECC will eventually become the base code. Adopting it now would set the town of Cumberland apart as a leader in sustainability. For the average Cumberland household, the first-year energy cost savings is \$978 of annual utility bill savings (or a 30-year overall savings of \$23,772). It will also reduce statewide CO <sub>2</sub> emissions equivalent to the annual CO <sub>2</sub> e of 85,810 cars on the road (1MMT CO <sub>2</sub> = 217,480 cars driven/year).

**WHAT HAVE WE ALREADY ACCOMPLISHED IN THIS AREA?**

	According to the Greater Portland Council of Governments, the stretch code matters to Cumberland businesses and residents because the Code further reduces costs to consumers by assuring buildings meet advanced levels of energy efficiency, thereby reducing utility bills. MUBEC reduces energy costs and dependence on heating oil. CAPS member and Cumberland resident, Jesse Lamarre-Vincent, and his wife retrofitted their 230-year-old home with heat pumps and solar panels and say that their “home is more comfortable with heat pumps and the savings will be around \$700 or more on average per year over the life of both systems.” Assuming electricity costs will increase over time, this savings estimate will likely increase in response.
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<sup>45</sup> A “stretch” energy code is an alternative to the base energy code that must be adopted by all towns within the State of Maine (base code in Maine is called MUBEC, or the Maine Uniform Building and Energy Code). Base energy codes are required to be adopted and enforced, while stretch energy codes are optional for communities to adopt.

<sup>46</sup> <https://www.nrdc.org/experts/lauren-urbanek/better-energy-code-holiday-gift-planet>

<sup>47</sup> <https://www.nrdc.org/experts/lauren-urbanek/2021-energy-code-final-and-more-efficient-ever>

<sup>48</sup> [https://cdn-web.iccsafe.org/wp-content/uploads/IECC\\_Whats\\_New\\_FLR.pdf](https://cdn-web.iccsafe.org/wp-content/uploads/IECC_Whats_New_FLR.pdf)

<sup>49</sup> This conclusion factors in the fact that states adopt the model building codes at varying rates and in different climate zones <https://www.nrdc.org/experts/lauren-urbanek/better-energy-code-holiday-gift-planet>

**RECOMMENDATION: ADOPT THE 2021 IECC “STRETCH” ENERGY EFFICIENCY GOAL FOR NEW CONSTRUCTION**

- The CAPS recommends the Town of Cumberland become an early adopter of the 2021 IECC stretch energy building code. It would bring energy cost savings to Cumberland residents and set the Town apart as a leader in sustainability.
- The stretch code would also help improve health and safety and resilience to extreme weather. This, in turn, would avoid 810 MT CO<sub>2</sub>e, helping Cumberland reach its climate goals.
- Codes principally affect new or renovated housing and can miss meeting the needs of low-income families. The Town should consider utility programs and programs that target low-income weatherization, such as the Low-Income Home Energy Assistance Program (LIHEAP)<sup>50</sup> and other creative programs already being deployed in Maine. These include York County’s weatherization partnership with Habitat for Humanity<sup>51</sup> and the town of Saco’s Aging in Place program that, in conjunction with Thornton Academy, have worked on weatherization projects like building window inserts that can cut down on drafts.

**HOW CAN RESIDENTS HELP?**

- Become educated about the “[Pretty Good House](#)” (a Maine initiative!) and “[Passive House](#)” models for building and retrofitting homes.
- Learn about fuel efficient lighting, heat pumps, and renewable electricity. If retrofitting your current home or building a new one, consider doing so according to the 2021 IECC stretch energy code standard.

<sup>50</sup> <https://www.benefits.gov/benefit/623>

<sup>51</sup> <https://www.habitatyorkcounty.org/weatherization>

9. Buy more locally grown food.<sup>52</sup>

WHY SHOULD WE CARE?	
In the world	Food production, processing, and delivery account for more than one-third of global greenhouse gas emissions caused by human activity.
In the USA	In the US, food systems produce roughly 24 percent of all emissions caused by human activity. Production processes, including the use of fertilizers, and changes in land use, such as deforestation for grazing or farming, account for most of the emissions associated with our food systems. Fluorinated gases used in industrial food refrigeration are also a major contributor to greenhouse gas emissions. While food transportation itself accounts for less than 5% of food-related emissions, locally grown food purchased directly from farmers or small-scale markets involves less refrigeration, packaging, and transportation. Food waste is also significant in the US. (See Item 7: Reduce food waste through composting.)
In Maine	Local food production is relevant because Maine, despite its rural base, imports 90% of the food consumed. Farmland acreage and the number of farms has decreased in the past decade. Roughly 13% of people in Cumberland County are food insecure. Farming can also be beneficial as a source of conservation. Land-based carbon drawdown projects are being promoted in other cities in the USA <sup>13</sup> including in Portland and South Portland. This proposal has the support of the Chebeague and Cumberland Land Trust. Carbon drawdown projects include regenerative agriculture approaches such as cover cropping and biochar use. <sup>53</sup>
In our Town	Southern Maine is very fortunate to have a healthy network of small farmers committed to responsible (in many cases, organic) farming practices, and Cumberland itself is home to several such farms. Locally grown, responsibly raised vegetables, fruits, dairy and meat products incur fewer GHG emissions than food shipped long distances. Purchasing locally grown food supports our farmers and strengthens the local food network for a more sustainable future.
WHAT HAVE WE ALREADY DONE IN THIS AREA?	
	CAP I noted that the most highly rated response to the citizen survey was: “with the help of neighboring farms, develop a robust and sustainable food economy to increase the availability of local food.”
	The Town accepted a proposal to consider entering into low-cost leases with aspiring farmers on Town-owned land; and support the creation of a Community Garden in a suitable location. <sup>54</sup>
RECOMMENDATION: PROMOTE MORE LOCALLY GROWN FOOD	
	<ul style="list-style-type: none"> <li>• Support the re-establishment of a Cumberland Community Garden where residents can grow vegetables. The past garden was not well sited; the view is that a better sited garden (flat with the right sun and soil) would receive more support.<sup>55</sup></li> <li>• Support the proposal to provide land for local farming</li> </ul>

<sup>52</sup> This recommendation should be considered together with Target 7: DECREASE FOOD WASTE THROUGH COMPOSTING

<sup>53</sup> CAP I p 26

<sup>54</sup> Recommendation made in CAP I p26, this would be to reiterate it and get resident support

<sup>55</sup> CAP I p26

## HOW CAN RESIDENTS HELP?

- Grow your own food in the Town Community Garden or your own garden. Resources are available at the UM program, Victory Gardens for Maine.<sup>56</sup>
- Buy more locally grown food through the Cumberland Farmers Market and other nearby farmers markets. Talk to farmers about their farming practices; advocate for regenerative agriculture and other practices that support soil health and carbon sequestration.
- Support one or more farms more directly through supporting the Cumberland Farmers Market, or by purchasing a Community Supported Agriculture (CSA) "share", or support stores that already provide locally sourced food.
- Purchase locally grown food that is available at local grocery stores, and request that more locally grown food be made available.

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<sup>56</sup> In 2020, UMaine Extension released its first video of the weekly Victory Garden for ME series. This series consists of short pre-recorded videos geared towards Mainers growing their first vegetable garden.

<sup>57</sup> Cumberland's Farmers' market supports local growers, see <https://cumberlandfalmouthfarmmarket.com/vendors>. Other sources of local food can be obtained at Pinelands Farm, Pine Ridge Farm, and other local farmstands. Rosemont Market in Falmouth and Yarmouth offers locally sourced food. Major food chains (Hannafords and Shaws, in Falmouth and Yarmouth) offer locally sourced food. Education is provided by the Maine Organic Farmers and Gardeners Association (MOFGA). Local nurseries can provide education on how to set up your own vegetable garden



10. Ensure the integrity of water quality of Broad Cove.<sup>58</sup>

WHY SHOULD WE CARE?

In the world	Oceans absorb a third of humanity's CO <sub>2</sub> emissions and 90% of the excess heat generated by increased GHG emissions; oceans are the largest carbon sink on the planet. But the ocean is under stress. The rate of ocean acidification is at least 100 times faster at present than at any other time in the last 200,000 years and may be unprecedented in Earth's history.
In the USA and in Maine	<p>The Gulf of Maine is warming faster than 99% of the global ocean. Over the last 15 years, the region warmed at more than seven times the global average rate.<sup>59</sup> In recent years the warming has resulted in strong "marine heatwaves," an area of the ocean experiencing temperatures above the 90th percentile for more than five consecutive days.<sup>60</sup> Under all climate scenarios the climate (30-year average) of the Gulf of Maine will continue to warm through at least 2050.<sup>61</sup> The best available projections indicate that sea level in Maine will rise between 3 and 5 feet by the year 2100 based on an intermediate sea level rise scenario, higher projections are possible and will continue to occur well beyond 2100.</p> <p>Extreme weather events: primarily extreme precipitation events, coastal storms and nor'easters; are likely to increase in frequency and intensity as Maine's climate warms. This may lead to increases in storm-related injuries and deaths; outbreak of waterborne diseases; carbon monoxide poisonings and foodborne illnesses following power outages; and mental health impacts.</p> <p>Ocean warming is one key reason why commercial and noncommercial fish species have shifted northwards and offshore along the Maine coast. It has also contributed to an ever-increasing suite of non-native species invading from the south. These exacerbate losses of native marine organisms through predation, competition and other biotic factors. Warming temperatures, especially warmer winters, have prompted an increase in the invasive green crab population, which has decimated soft-shell clams and eelgrass habitat in coastal Casco Bay.</p> <p>Healthy coastal grasses, salt marshes, and eelgrass beds can serve as "blue carbon" sources, storing carbon to keep it from contributing to coastal acidification, and buffer against the effects of storms by holding sediment in place and absorbing moisture.<sup>62</sup> Unhealthy marshes cause eelgrass beds to die off and decompose and contribute to coastal acidification. South Portland, Maine has good examples of pesticide and fertilizer ordinances that could be considered and adapted to Cumberland's needs.</p>
In our Town	<p>Cumberland faces challenges similar to other parts of the Maine and its coastline. Of concern is increasing coastal acidification from nutrients carried into the ocean through stormwater discharges (which carry fertilizers from lawns and other sources), point source discharges from municipal sewage treatment plants, and from leaching septic systems. These excess nutrient loads stimulate phytoplankton and macro-algae blooms. Cumberland has experienced these macro-algae blooms secondary to excess nitrogen-loading in the coves along Sanderson Road. They smother marine life under them, depleting dissolved oxygen and making the sediment acidic. As the blooms die, they release CO<sub>2</sub>, which mixes with sea water to form carbonic acid and causes acidification.</p> <p>Cumberland's shoreline runs along Broad Cove, which extends from Yarmouth through Cumberland Foreside to Falmouth. Because it is partially under public control (the Reserve and management of our shellfish and boating resources) and mostly privately owned and controlled</p>

<sup>58</sup> This action item is supported by a longer description provided in the Appendix: Cumberland's Coastal Resources – proposals for a Management Plan. This item is addressed principally to the Town of Cumberland rather than its residents, and supplements the Phase I CAPS Report. It should be read alongside Target 3. ADOPT ECOLOGICALLY PRODUCTIVE, LOW CARBON AND LOW WATER LANDSCAPING PRACTICE

<sup>59</sup> <https://gmri.org/stories/marine-heatwave/>.

<sup>60</sup> Id.

<sup>61</sup> Maine Climate Council, Science and Technical Subcommittee Phase 1 Report, at 12 (2020). Also see: <https://extension.umaine.edu/climatesolutions/adaptation-resources/>

<sup>62</sup> Id. at 17.



	(some landowners have posted their beaches as private and forbid public use of them for recreation), the Town must consider this duality in the choices it makes to address the effects of climate change on our coastal resources.
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<b>WHAT HAVE WE ALREADY ACCOMPLISHED IN THIS AREA?</b>	
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	<p>With respect to management of its public resources, Cumberland employs two Harbormasters and four shellfish wardens. These law enforcement staff are responsible for the safe and responsible use of our mooring fields. They monitor water quality seasonally, as directed by Department of Marine Resources, to ensure our public beach waters are safe for swimming and our shellfish are safe for consumption. They also manage the efficient use of our shellfish beds, monitor our mooring fields (including ensuring that boat traffic does not damage eelgrass beds), enforce boating laws, and help site certain local aquaculture projects (as permitted by state law) to avoid conflicts with other uses of the Cove. The Town also has a Coastal Waters Commission and Shellfish Conservation Commission.</p> <p>The “Recommendations” below propose that these town staff and commissions are involved in crafting recommendations and implementing measures under this Phase II of the Climate Action Plan.</p>
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<b>RECOMMENDATION: ENSURE THE INTEGRITY OF WATER QUALITY OF BROAD COVE</b>	
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|--|--|
|  | <ul style="list-style-type: none"> <li>• Identify Town staff to participate in the Casco Bay Regional Shellfish Working Group and GPCOG projects.</li> <li>• Consider appointing a Coastal Resilience Task Force composed of Town staff and volunteers to develop these preliminary recommendations into actions that the Town might or should take to protect its coastal resources and its residents from the impacts of climate change.</li> <li>• Consolidate and maintain the most relevant regional data for use in resilience planning. Identify data gaps and means to fill those gaps.</li> <li>• Designate Town staff to participate in the GPCOG planning process to help Casco Bay coastal towns develop local and regional plans intended to help our coastal resources be resilient to the most severe aspects of climate change. Identify nature-based pilot projects or actions to protect its coastal resources, and appropriate regulatory measures such as a fertilizer ordinance or zoning changes that could protect coastal property and assets.</li> <li>• Adopt a pesticide and fertilizer ordinance.</li> <li>• Evaluate the financial harm that will occur to its tax base and assets if it does not act, to balance the cost of action against inaction.</li> <li>• Designate a Town staff person to track and participate in state reform of coastal land use laws and regulations, as there have been recent changes designed to enhance community resilience to flooding and other climate impacts.</li> </ul> |
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<b>HOW CAN RESIDENTS HELP?</b>	
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|--|--|
|  | <ul style="list-style-type: none"> <li>• Be mindful of these issues and aware of what you can do to help. Follow instructions on trails and in waterways that define actions that protect our environment.</li> <li>• Support the recommendations in Target 3: ADOPT ECOLOGICALLY PRODUCTIVE, LOW CARBON AND LOW WATER LANDSCAPING PRACTICE</li> </ul> |
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## PART IV: CONCLUSION

This Climate Action Plan outlines action opportunities to build a future Sustainable Cumberland: a town that supports a carbon bank to subsidize investments in clean energy; where local farmers produce and sell local food and improve local food security; where forests and ecosystems thrive and encourage healthy recreation.

Cumberland residents are informed and concerned about the complex and interconnected consequences of climate change. They are stepping up as individuals and as a town to mitigate some of these effects. They are looking to their town to take a lead on these issues.

Cumberland's proactive, multi-year and multi-stakeholder investments in land and forest conservation position Cumberland as an innovative leader in climate change mitigation and provide a platform for further action.

We ask that the Town Council and MSAD 51 Board of Directors support the proposed actions, starting with the approval for a new position of town Sustainability Coordinator.

## **APPENDICES:**

## I. PHASE I RECOMMENDATIONS

Phase I Recommendations were:

- i. Develop a MSAD 51 solar farm.
- ii. Install industrial scale heat pumps to supplement natural gas heating and mitigate the GHG effects of natural gas heating.
- iii. Phase in EV or plug-in hybrid automobiles, light duty vehicles and school buses
- iv. Set aside a 225-acre forest carbon reserve from town-owned woodlands.
- v. Design and build new public buildings to a zero-carbon standard.
- vi. Make available 5-10 acre parcels of town-owned land to market gardeners.
- vii. Develop a tree planting program for public ways and easements.
- viii. Engage MSAD 51 staff to integrate sustainability principles and the CAP into K-12 curricula.
- ix. Delegate to the Town staff the duty to annually analyze and report the GHG emissions generated within Cumberland.

## II. THE U.S. MAYORS' CLIMATE PROTECTION AGREEMENT, 2014



### **The U.S. Mayors Climate Protection Agreement**

(As presented to the 82<sup>nd</sup> Annual U.S. Conference of Mayors Meeting, Dallas, 2014)

- I. **National Action:** As leaders of the nation's cities, we continue to urge the federal and state governments to enact bipartisan legislation, policies and programs to assist mayors in their efforts to lead the nation toward energy independence, create American jobs that can't be shipped overseas, and protect our environment, eliminate waste, and fight climate change. Such efforts will help achieve the national target of reducing greenhouse gas emissions in the range of 17 percent by 2020 and urge the United States to adopt an ambitious post 2020 target. We urge congress to enact policies and programs that:

- a. Promote greater energy independence and reduce the United States' dependence on fossil fuels;
- b. Accelerate energy efficiency and the development of clean, economical and renewable energy technologies such as cogeneration, LED/other energy-efficient lighting, methane recovery for energy generation, waste to energy, wind and solar energy, fuel cells, efficient motor vehicles, and biofuels; and
- c. Adapt city buildings, homes, facilities and infrastructures to address changing climatic conditions.

We urge the federal government to reduce carbon pollution through existing authorities such as the Clean Air Act, Appliance Efficiency Standards, Federal Transportation Investments, and Renewable Energy and Energy Efficiency loan and grant programs, including refunding of energy block grant program, and by proposing new legislative initiatives.

II. **Local Action:**

- a. **Mitigation:** We will strive to establish and meet or exceed locally-established targets for reducing energy use, especially fossil fuels, by taking actions in our own operations and throughout our communities, placing particular emphasis on engaging the community – citizens, businesses, schools and organizations – in a concerted campaign to set and achieve such targets through actions such as:
  - i. Develop an energy plan that addresses and includes water, wastewater and stormwater runoff, heat island effects, preservation of open space and an inventory of emissions from fossil fuels for city operations and for the community using established metrics, set reduction targets and adopt elements that address how to harden and adapt city systems and infrastructures to climatic events;
  - ii. Adopt and enforce land-use policies that reduce sprawl, preserve open space, and create compact, walkable urban communities;
  - iii. Promote transportation options such as bicycle trails, commute trip reduction programs, incentives for car pooling and public transit;

- iv. Increase the use of clean, alternative energy by supporting the development of renewable energy resources, building the renewable energy technology manufacturing capacity of cities, recovering landfill methane for energy production, and supporting the use of waste to energy technology;
  - v. Make energy efficiency and resilience a priority through building code improvements, retrofitting city facilities with energy efficient lighting, urging employees to conserve energy and save money and other actions to maximize the performance of the city buildings;
  - vi. Increase the average fuel efficiency of municipal fleet vehicles, reduce the number of vehicles, launch an employee education program including anti-idling messages, and convert diesel vehicles to bio-diesel;
  - vii. Evaluate opportunities to increase energy efficiency in water and wastewater systems, recover wastewater treatment methane for energy production, and harden these systems to respond to sea level rise and other climatic events threatening the delivery of these services;
  - viii. Increase recycling rates in city operations and in the community;
  - ix. Maintain healthy urban forests; promote tree planting to increase shading and to absorb CO<sub>2</sub>; and
  - x. Help educate the public, schools, other jurisdictions, professional associations, business and industry about the importance of energy efficiency and renewable energy development in reducing carbon and actions necessary to adapt buildings, systems, and infrastructures to respond to changing climate conditions.
- b. **Resilience:** We support investment in climate preparedness strategies that implement the use of green infrastructure to increase resilience of city water systems, encourage preparedness policies that take into account a city's most vulnerable populations and disproportionately affected citizens, and work with state and federal officials to have disaster response systems in place to deal with acute stresses to a city or region. We pledge further to increase community preparedness by assessing and addressing projected impacts such as sea level rise, increased storm surge, extreme heat, drought, floods, and wildfires.

III. **Advocacy:** We pledge to support a grassroots movement, engaging young people especially, in support of conservation initiatives, such as Arbor Day, Earth Day, community events, locally-established conservation corps and other activities, and to recognize "conservationists" in our city as part of a systematic campaign over time to renew and reaffirm public commitments to long-established conservation values in our city, state and nation. We further pledge to work as global ambassadors to share best practices with mayors everywhere.

### III. CHARTER OF THE SUSTAINABILITY SUBCOMMITTEE OF THE LCC

#### CHARTER

Sustainability Subcommittee  
Lands and Conservation Commission  
Cumberland, Maine

WHEREAS, the Town of Cumberland has committed to reduce net Greenhouse Gas Emissions “GHG” by 2050 by 100% from a 2015 baseline,

WHEREAS, the Climate Action Plan Subcommittee has developed a Climate Action Plan (“CAP”) to accomplish this reduction thus fulfilling the goals of its two-year Charter dated January 8, 2020,

WHEREAS, the Town of Cumberland (the “Town”) and Maine School Administrative District #51 (the “School”) have already undertaken important initiatives to reduce individually their GHG,

WHEREAS, the Lands and Conservation Commission (the “LCC”) believes it would be beneficial for the Town and the School to implement the CAP and to enhance the sustainability of the community generally,

NOW THEREFORE BE IT RESOLVED, that the LCC establish a Sustainability Subcommittee (the “SSC”) to guide the development of policies and practices that promote a Sustainable Cumberland, including energy conservation, environmental stewardship, food security and community resilience,

BE IT FURTHER RESOLVED, that the SSC consist of at least six (6) members appointed as needed by the LCC with initial members being Sukie Curtis, Ivy Frignoca, Denny Gallaudet, Jennifer Grasso, Riva Krut and Jesse Lamarre-Vincent,

BE IT FURTHER RESOLVED, that the SSC monitor and promote implementation of the actions recommended by the CAP,

BE IT FURTHER RESOLVED, that the SSC develop stakeholder groups of residents, business owners, town and school officials and other interested parties to provide input into ongoing and future sustainability planning and proposed actions,

BE IT FURTHER RESOLVED, that the support of the Town and the education of the citizens of Cumberland is a critical component of the complex actions that will be needed to implement a successful SSC.

Adopted February 2, 2022

## V. CUMBERLAND'S COASTAL RESOURCES: RECOMMENDATIONS FOR A MANAGEMENT PLAN.

**12/01/2021 Draft**

### **Cumberland's Coastal Resources**

Cumberland has three public access points along Broad Cove: The Broad Cove Reserve, Town Landing and an access walkway north of Teal Drive. The Reserve is a 22-acre property with nearly 11 acres of shoreline. Cumberland Town Landing lies north of the Reserve, at the end of Town Landing Road. The remainder of the Town's shoreline property is privately owned. In Maine, under the common law "Public Trust Doctrine," private landowners whose property abuts the coast own the shore to the low tide mark or for 100 rods subject to the public's right to "fish, fowl and navigate" on the beach. This doctrine has led to many legal controversies regarding what constitutes fishing, fowling and navigation or whether the doctrine itself has been too narrowly interpreted by the Maine Supreme Judicial Court. Many, including the last two Chief Justices of the Court, believe the doctrine should be expanded to include recreation and other uses. A case asserting that is pending before Maine's Superior Court (the court which conducts most trials in Maine and from which matters can be appealed to the Supreme Judicial Court).

Because Cumberland's shoreline is partially under public control (the Reserve and management of our shellfish and boating resources) and mostly privately owned and controlled (some landowners have posted their beaches as private and forbid public use of them for recreation), the Town must consider this duality in the choices it makes to address the effects of climate change on our coastal resources.

With respect to management of its public resources, Cumberland employs two Harbormasters and four shellfish wardens. These law enforcement staff are responsible for the safe and responsible use of our harbor. They monitor water quality seasonally, as directed by Department of Marine Resources, to ensure our public beach waters are safe for swimming and our shellfish are safe for consumption.<sup>63</sup> They also manage the efficient use of our shellfish beds, monitor our mooring fields (including ensuring that boat traffic does not damage eelgrass beds), enforce boating laws, and help site certain local aquaculture projects (as permitted by state law) to avoid conflicts with other uses of the Cove. The Town also has a Coastal Waters Commission and Shellfish Conservation Commission. These town staff and commissions should be involved in crafting recommendations and implementing measures under Phase II of the Climate Action Plan.

### **Summary of Available Science**

Items missing at date of writing: bacteria data, healthy beaches data, DMR NSSP data, eelgrass survey results, green crab data, overview of coastal shellfish resources and threats. Overall recommendation to identify and compile all necessary local data to be included and made readily accessible in Casco Bay Regional Shellfish Working Group data portal or GPCOG data portal.

#### Introduction

This draft provides a general overview of changing conditions in the Gulf of Maine and Casco Bay, with a focus on Broad Cove. Oceans absorb a third of humanity's carbon dioxide emissions and 90 percent of



the excess heat generated by increased greenhouse gas emissions; oceans are the largest carbon sink on the planet. There are data sets that show the warming temperature of Casco Bay and the decreasing pH of its waters. Monitoring to better understand the effects of absorbing so much carbon dioxide on the carbonate chemistry of Casco Bay is less understood and have been studied for less time. Friends of Casco Bay, the University of Maine, the University of New Hampshire, Bigelow Labs, and the Island Institute have conducted such research. Friends of Casco Bay does this through three continuous monitoring stations which it plans to have in the water for the long term.

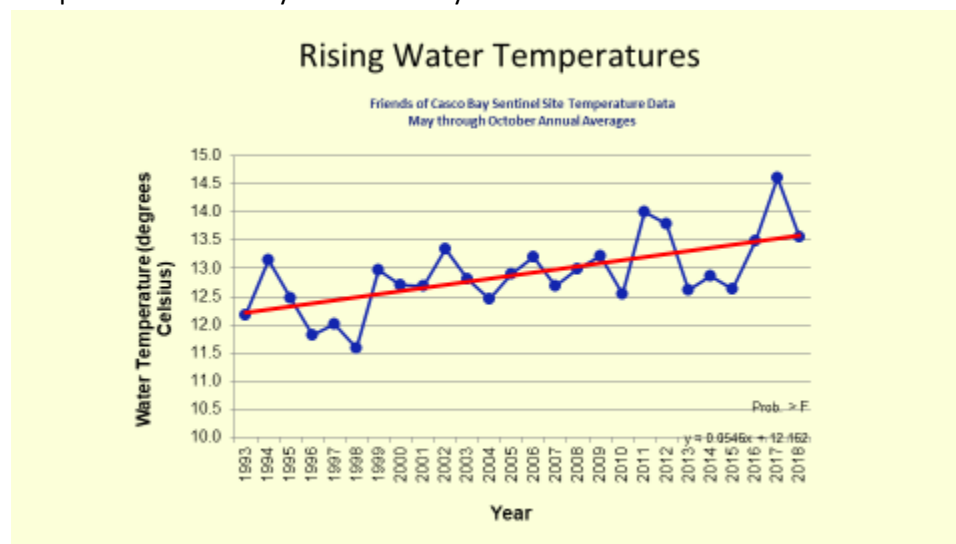
Below is an incomplete summary of conditions of concern to coastal Cumberland. This summary must be augmented by gathering and evaluating all near shore data, identifying data gaps, and planning how to address those gaps. There are two efforts the Town could join to help with this work: The Casco Bay Regional Shellfish Working Group which received a grant to develop a data portal for use by municipalities; and the Greater Portland Council of Government's (GPCOG) grant-funded work to help ten Casco Bay municipalities develop a regional resilience plan that includes development of a data portal and identification of 15 high priority resilience projects.

Here is the draft summary.

### Ocean Temperature

The Gulf of Maine is warming faster than 99% of the global ocean. Over the last 30 years, the Gulf of Maine warmed at a rate of 0.06°C per year (0.11°F per year) — more than three times the global average. Over the last 15 years, the region warmed at more than seven times the global average rate.<sup>64</sup> In recent years the warming has resulted in strong “marine heatwaves,” an area of the ocean experiencing temperatures above the 90th percentile for more than five consecutive days.<sup>65</sup> These have been documented in 2012, 2016, 2018, 2020, and now 2021. Under all climate scenarios the climate (30-year average) of the Gulf of Maine will continue to warm through at least 2050.<sup>66</sup>

Casco Bay, as part of the Gulf of Maine, is also warming. Friends of Casco Bay has been measuring the temperature of the Bay for about 30 years.



<sup>64</sup> <https://gmri.org/stories/marine-heatwave/>.

<sup>65</sup> Id.

<sup>66</sup> Maine Climate Council, Science and Technical Subcommittee Phase 1 Report, at 12 (2020).

With the advent of continuous monitoring (stations in the water that record data every hour of every day), Friends of Casco Bay is documenting warmer winter temperatures, warmer summers, and warmer water temperatures further into the summer.

Cumberland's shoreline runs along Broad Cove, which extends from Yarmouth through Cumberland Foreside to Falmouth. The Town has temperature data for this near shore environment that it has collected through the Maine Healthy Beaches program and monitoring done to ensure that our shellfish resources are safe to harvest and consume.

This data must be collected and analyzed to evaluate how the Town can help its coastal resources be resilient to climate change. For example, warmer temperatures cause shifts in species, may harm eelgrass health, and could cause other concerns. For example, in warmer waters, oyster harvesters and aquaculturists must take precautions to ensure that *Vibrio* bacteria does not grow and concentrate inside shellfish. *Vibrio* might also concentrate in clams.<sup>67</sup> With warmer ocean temperatures, the State might impose *Vibrio* control plans for Broad Cove that will affect commercial and recreational harvests.

Beyond 2050, the warming rate depends strongly on the emissions pathways. These pathways are set forth in more detail in the Science and Technical Subcommittee Report of the Maine Climate Council. Under the low-emission scenario, temperatures stabilize around 2.7 °F (1.5° C) above the 1976-2005 baseline. This would cause the southern coast of Maine to have an ocean climate similar to that of Massachusetts or Rhode Island.<sup>68</sup> Under the high-emission scenario, temperatures continue to rise and exceed 5.4 °F (3° C) above the baseline by the end of the century. This would cause even the eastern coast of Maine to feel like Rhode Island.<sup>69</sup>

### **Sea Level Rise and Storm Surge**

For about 100 years, sea levels along the Maine coast have been rising at about 0.6-0.7 feet/century or two times faster than during the past 5,000 years. Over the past few decades, the rate has accelerated to about 1 foot/century or three times the millennial rate.

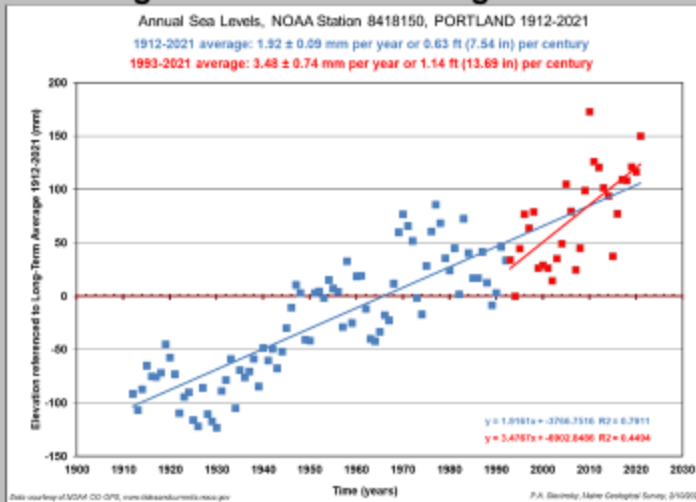
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<sup>67</sup> <https://www.cdc.gov/vibrio/food.html>; <https://www.maine.gov/dmr/shellfish-sanitation-management/vibrio.html>.

<sup>68</sup> Id.

<sup>69</sup> Id.

## Sea level is rising and rate is increasing



About half of the last century's sea level rise has occurred since the early 1990s. The best available projections are that sea level in Maine will rise between 3 and 5 feet by the year 2100 based on an intermediate sea level rise scenario. Given the current inability to reduce our emissions at a national and international levels, higher projections are possible and will continue to occur well beyond 2100.

## Maine Climate Council Recommendations

Planning Scenario	"Commit to Manage"	"Prepare to Manage"
Year	Intermediate Scenario	High Scenario
2030	0.8	1.4
2050	1.5	3.0
2070	2.4	5.0
2100	3.9	8.8

*Relative Sea Level Rise (feet) from 2000*

STS/2020/ Table 7b, p. 62

Abrupt sea level change on the order of months, rather than years, can also occur on top of the long-term rise. Several months between 2009 and 2011 saw higher than normal sea levels, with a peak in 2010 of nearly a foot above the level in previous winters. Along the East Coast of the United States, this abrupt change was most pronounced in the Gulf of Maine.

A 1-foot increase in sea level in the future will lead to a 15-fold increase in the frequency of "nuisance" flooding. Nuisance flooding in Portland in the last decade was about 4 times more frequent than the 100-year average. A 1-foot increase in sea level, which could occur by 2050, would cause a "100-year storm" flood level to have a probability of occurring once in every 10 years. Not accounting for changes in storm intensity or frequency, this would

result in a 10-fold increase in coastal flooding in Maine in the next 30 years.

Sea level rise will cause high tides to regularly inundate coastal lowlands with salt water and may cause limited salt contamination of groundwater aquifers. Coastal beaches, salt marshes, dunes, and bluffs are likely to experience increased erosion, landward movement, land loss and sediment redistribution due to long-term sea level rise.<sup>70</sup>

There are tools that can help Cumberland predict how rising sea levels might affect coastal Broad Cove. See e.g. [https://www.maine.gov/dacf/mgs/hazards/slr\\_ss/index.shtml](https://www.maine.gov/dacf/mgs/hazards/slr_ss/index.shtml). The Town should use these tools and the GPCOG planning process to predict how our coast might change by 2050 and 2100, so the Town can modify its coastal land use regulation, identify vulnerable municipal infrastructure and resources, and consider necessary actions to address these vulnerabilities.

### **Extreme weather**

Extreme weather events, primarily extreme precipitation events, coastal storms, and nor'easters, are likely to increase in frequency and intensity as Maine's climate warms, which may lead to increases in storm-related injuries and deaths; outbreak of waterborne diseases; carbon monoxide poisonings and foodborne illnesses following power outages; and mental health impacts.

Droughts and distant wildfires may impact Maine as well, with implications for reduced water quality and quantity, and effects on respiratory health.

Certain categories of storms, such as ice storms and severe wind storms, are complex and difficult to predict, but may become more frequent and/or intense under warming conditions, leading to adverse health impacts such as injuries, deaths, and effects of power outages among Mainers.<sup>71</sup>

Cumberland could participate in the GPCOG planning process to ensure that these factors are considered as part of the sea level rise and storm surge modeling.

### **Ocean Acidification**

Scientific data indicate that the rate of ocean acidification is at least 100 times faster at present than at any other time in the last 200,000 years and may be unprecedented in Earth's history. Since the beginning of the 19th century, the world's surface ocean pH has decreased from 8.2 to 8.1, a 30% increase in the average acidity of ocean surface waters, most of which has occurred in the last 70 years. Ocean acidification is a new concept and regular measurements in the Gulf of Maine only started within the last decade.

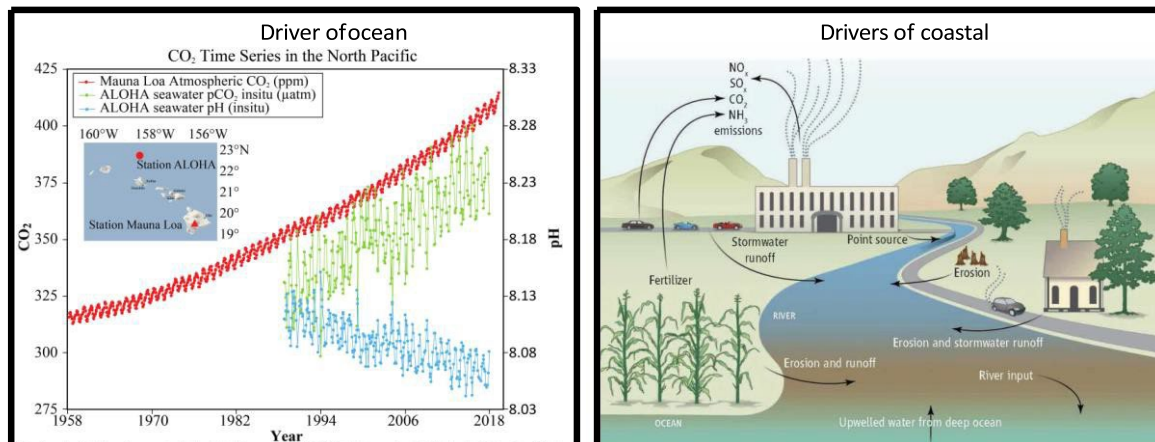
Further reductions in ocean pH are expected, ranging from .05-.33 pH units by 2100, depending upon emissions scenarios. It is not yet clear how conditions in the Gulf of Maine will deviate from these global estimates.

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<sup>70</sup> Id. at 14.

<sup>71</sup> Id. at 23.

Ocean acidification in the Gulf of Maine is considerably different than its nearshore coastal estuaries. In addition to atmospheric CO<sub>2</sub>, other drivers contribute to nearshore acidification and are potentially very important to Cumberland’s marine resources. Coastal acidification is often fueled by nutrients carried into the ocean through stormwater discharges (which carry fertilizers from lawns and other sources), point source discharges from municipal sewage treatment plants, and from leaching septic systems. These excess nutrient loads stimulate phytoplankton and macro-algae blooms. Cumberland has experienced these macro-algae blooms secondary to excess nitrogen-loading in the coves along Sanderson Road. These blooms smother marine life under them, depleting dissolved oxygen and making the sediment acidic. As the blooms die, they release carbon dioxide, which mixes with sea water to form carbonic acid. This is known as coastal acidification.



Ocean and coastal acidification will most heavily impact those marine organisms that produce calcium carbonate to build shells such as scallops, clams, mussels, and oysters. The impact on crustaceans such as lobsters and crabs is less clear, with some studies showing negative impacts and others showing that processes like warming are more likely to influence populations.

One of the most important and urgent challenges is to determine how and where inshore causes of acidification contribute to Maine’s “acidification budget” and what actions we can take at the local scale, in addition to reducing atmospheric CO<sub>2</sub> levels.<sup>72</sup>

Cumberland should track and consider this issue as it relates to the health of our shellfisheries. Given that the drivers in the nearshore are heavily influenced by land-based human activities, the Town has an opportunity to address and minimize the effects of acidification by adopting a fertilizer ordinance, such as the one that South Portland recently adopted.

### Marine Ecosystems

Large areas of the Gulf of Maine are changing rapidly with respect to the assemblage of species. The trend appears to be going in a direction of more temperate and fewer subarctic species, which presents challenges and opportunities for marine resource

<sup>72</sup> Id. at 16

management and ecosystem function.

Ocean warming has played a key role in distributions of commercial and noncommercial species shifting northwards and offshore along the Maine coast, as well as contributing to an ever increasing suite of non-native species invading from the south that exacerbate losses of native marine organisms through predation, competition and other biotic factors. The warming temperatures, especially the warmer winters, also have led to increases in the presence of the invasive green crab which has decimated soft-shell clam populations and eelgrass habitat in coastal Casco Bay.

Cumberland should evaluate and consider how it can best protect its coastal grasses, salt marshes, and eelgrass beds. If these resources are healthy, then can serve as “blue carbon” sources, storing carbon to keep it from contributing to coastal acidification.<sup>73</sup> Cumberland might also consider seeking guidance from experts, perhaps from the Downeast Institute, who are leading efforts to pilot means to protect soft-shell clams from green crab predation and the effects of ocean acidification.

#### **Summary of Recommended Actions**<sup>74</sup>

- Cumberland should identify Town staff to participate in the Casco Bay Regional Shellfish Working Group and GPCOG projects.
- Cumberland should consider appointing a Coastal Resilience Task Force composed of Town staff and volunteers to develop these preliminary recommendations into actions that the Town might or should take to protect its coastal resources for the benefit of the environment and all residents.
- Cumberland should identify all data sources related to its coastal resources and ensure that the data become part of the Casco Bay Regional Shellfish Working Group’s data portal and GPCOG’s data portal to consolidate the most relevant, available, regional data for use in resilience planning. Cumberland should recommend that both efforts identify the means to continue these data bases so they remain current and provide data that has high quality assurance. These data portals could provide Cumberland with a manageable means to base its actions on the best-available data and models.
- Cumberland should identify data gaps and means to fill those gaps.
- Cumberland should designate Town staff to participate in the GPCOG planning process. GPCOG was awarded a National Fish and Wildlife Foundation (NFWF) grant to help Casco Bay coastal towns develop local and regional plans intended to help our coastal resources be resilient to the most severe aspects of climate change. The GPCOG project will build upon a successful model used in southern Maine to develop collaborative, regional coastal plans. The Town could designate staff and perhaps a member of the Coastal Waters Commission and Shellfish Conservation Commission to participate in this process. GPCOG intends to work with Towns wherever they are in their resilience planning process, build a regional data base and portal, develop a regional resilience plan, and identify 15 high priority coastal resilience projects. Through this process, Cumberland could get professional guidance with this aspect of its Climate Action Plan, could identify nature-based pilot projects or actions it might take to protect its coastal resources, and could identify regulatory

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<sup>73</sup> Id. at 17.

<sup>74</sup> A summary of these recommendations is presented in Target: 10: ENSURE THE INTEGRITY OF WATER QUALITY OF BROAD COVE. ENSURE THE INTEGRITY OF WATER QUALITY OF BROAD COVE

measures such as a fertilizer ordinance or zoning changes that could protect coastal property and assets.

- Cumberland could evaluate the financial harm that will occur to its tax base and assets if it does not act, to balance the cost of action against inaction. The Maine Climate Council did some of this analysis which could serve as a starting point.
- Cumberland should designate a Town staff person to track and participate in state reform of coastal land use laws and regulations. In 2021, the Maine State legislature passed LD 1572, which requires that all Maine Departments that regulate coastal land use make recommendations to incorporate into statutes and regulations: (1) consideration of 1.5 feet of relative sea level rise by 2050 and 3.9 feet by 2100; and (2) the strategy designated as "Strategy F3" in the state climate action plan issued by the Maine Climate Council in 2020 pursuant to the Maine Revised Statutes, Title 38, section 577 to enhance community resilience to flooding and other climate impacts. Strategy F contains detailed recommendations to make all of Maine's coastal land use laws forward-thinking. For example, floodplain mapping and regulation should be based on future projected sea level rise and increased storm intensities. Cumberland should track and participate in this process, and then determine whether its coastal land use regulation needs to be revised.
- Cumberland should adopt a pesticide and fertilizer ordinance. As we continue to experience increased precipitation and storm intensities, greater loads of pesticides and fertilizers could be delivered to our coastal waters. Pesticides can poison marine life. Too much fertilizer can cause nuisance algal blooms, cause harmful algal blooms (phytoplankton blooms that are taken up by shellfish and make them unsafe for people to consume, causing serious illness or death), and contribute to coastal acidification (a process of lowered pH and available calcium carbonate in the sea water, making it harder for shellfish to survive and form shells). South Portland, Maine has good examples of pesticide and fertilizer ordinances that could be considered and adapted to Cumberland's needs.
- Cumberland should continue to monitor and track the health of our coastal habitats. Healthy marsh and beach grasses and eelgrass trap carbon and help reduce our carbon footprint. Unhealthy marshes and eelgrass beds die off. As they decompose, they contribute to coastal acidification. These coastal ecosystems also provide critical habitat and buffer against the effects of storms by holding sediment in place and absorbing moisture. The Town should continue to conserve these resources, and could consider consulting with experts at the Casco Bay Estuary Partnership or elsewhere to evaluate our coastal resources and obtain suggestions for how we might manage them.
- Cumberland should incorporate climate change considerations into management of its shellfisheries, including the impacts of rising water temperatures, nuisance algal blooms, green crab populations, coastal acidification and more.

## VI. ACRONYMS AND DEFINITIONS

CAP	Climate Action Plan
CAPS	Climate Action Plan Subcommittee
CCLT	Chebeague & Cumberland Land Trust
CO <sub>2</sub> e	Carbon Dioxide equivalent
EV	Electric Vehicle
GHG	Greenhouse Gas Emissions
GPCOG	Greater Portland Council of Governments
HPM	Heat pump
HVAC	Heating, ventilation and air conditioning equipment
IECC	International Energy Conservation Code
IPCC	Inter-Governmental Panel on Climate Change
LCC	Lands and Conservation Commission
LED	Light emitting diode
LEED	Leadership in Energy and Environment Design Standard
MOFGA	Maine Organic Farmers and Gardeners Association
MSAD 51	Maine School Administrative District 51, serving Cumberland and North Yarmouth
MT CO <sub>2</sub> e	Metric tonnes of GHG equivalent
MUBEC	Maine Uniform Building and Energy Code
Net Positive	A condition where an entity avoids more GHG than it emits.
PV	Photovoltaic
SO <sub>2</sub>	Sulfur Dioxide
TBD	Tick borne disease
Tree City USA	Designation by meeting a set of four standards of the Arbor Day Foundation