

Climate Action Plan

Phase I - Recommendations for Action

Submitted to Cumberland Town Council
& MSAD 51 Board of Directors
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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 Town¹ 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 2015² as a baseline, the CAPS estimates that the GHG emissions in that year were approximately 66,160 metric tons (“MT CO₂e”). 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 GHG 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 presents Phase I of the CPAC’s work: to develop a goal and action plans for the Town and MSAD 51. Phase II, to develop a goal and action plans for the Business and Household sectors, will be completed by January 2022.

¹ “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.

² 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.

The CAPS hereby proposes:

For Phase I:

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

For Phase II: that Cumberland

- adopt a goal for all Cumberland of 50% GHG reduction by 2030 and 100% by 2050; and
- take further actions to promote the brand of Sustainable Cumberland.

The CPAC believes that Phase I goals are readily attainable by taking the additional actions described in the Recommendations section, viz:

- 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.

PART I: GENERAL INFORMATION

1) Background

As stated in its 2009 Comprehensive Plan, the Town is committed to the goal of fostering sustainability. The Town Council appointed volunteers to a new standing committee called the Cool Cities Committee. The charge of the Committee was to explore and make recommendations for policies and initiatives related to the reduction of carbon emissions and energy conservation, and more specifically to develop policies to:

- i. Reduce the carbon footprint and emissions for Cumberland (Town and MSAD 51; and subsequently the residents and businesses, see Appendix II).
- ii. Explore, inventory and recommend policies to the Town Council for energy saving and efficiencies.
- iii. Work with surrounding communities to collaborate on regional energy savings, carbon reductions and emissions.
- iv. Explore life-cycle costs for recommended policies or initiatives, including pay-back costs.

The Comprehensive Plan presented more than 50 recommended actions and policies in its chapter on Sustainability. Among the numerous actions taken since 2009 include:

- i. Establishing an anti-idling policy for town-owned vehicles and for vehicles on town-owned properties.
- ii. Supporting the development of sidewalks, bike lanes and trails to provide safe, non-vehicular transportation.
- iii. Adopting a small wind energy system ordinance to permit residential use of wind turbines and solar panels/ photovoltaics (PVs).
- iv. Whenever feasible, trading non fuel-efficient Town vehicles in for alternative fuel and hybrid vehicles.
- v. Implementing HVAC (heating, ventilation and air conditioning) controls to include setback capability and programmable thermostats in Town facilities.

At the same time, the U.S. Conference of Mayors endorsed a Climate Protection Agreement calling for cities, communities and the federal government to take actions to reduce global warming pollution. The agreement references the finding of the Inter-Governmental Panel on Climate Change (IPCC), that climate disruption is a reality and that human activities are largely responsible for increasing concentrations of global warming pollution.

Climate disruption of the magnitude now predicted by the scientific community will cause extremely costly disruption of human and natural systems throughout the world including increased risk of floods

or droughts; sea level rises that interact with coastal storms to erode beaches, inundate land, and damage structures; more frequent and extreme heat waves.

In 2019, the Maine Legislature enacted PL476 - An Act to Promote Clean Energy Jobs and To Establish the Maine Climate Council – which states that "By January 1, 2050, the State shall reduce gross greenhouse gas emissions to at least 80% below the 1990 gross annual greenhouse gas emission level." Further, Governor Mills' 2019 Executive Order - To Strengthen Maine's Economy and Achieve Carbon Neutrality - states that "Maine shall strive to achieve a carbon neutral economy no later than 2045."

Considering the above, the LCC in 2019 formed the CAPS to expand on the work of the Comprehensive Plan. Under its Charter (see Appendix II), the CAPS will take an inventory of Cumberland's GHG emissions and propose to the LCC a goal for reducing GHG in the coming years.

2) Framework: Climate Change, Mitigation, Adaptation

The State of Maine and Cumberland have experienced the effects of climate change and will need to take action to mitigate such effects by reducing GHG and adapting to them where needed.

A summary³ of effects specific to this region is as follows.

Temperature

Maine's statewide annual temperature has increased by 3.2° since 1895, with most of the warming driven by rising overnight low temperatures than by daytime highs. Climate models project that Maine could warm an additional 2-10° by 2100 depending on the scenario of greenhouse gas emissions and societal development. Maine is experiencing longer summers and shorter winters, where summers have become about two weeks longer and winters two weeks shorter over the past century. Most of the warm season increase has occurred during early fall. There has likewise been a net increase in the length of the growing season. These trends are expected to continue over the next century.

Precipitation

Maine's statewide annual precipitation (rainfall and snowfall) has increased by 6 inches since 1895, with the signal⁴ heavily impacted by the unusually wet 2005-2014 interval. These annual precipitation surpluses are mostly due to increased rainfall in summer and early fall. Most climate models project that Maine will continue to get wetter over the next century as increased heating intensifies the hydrologic cycle (wetter wet periods and drier dry periods).

Ocean Temperature

The temperature of Gulf of Maine has exhibited considerable decadal variability, with a notable warm period in the middle of the 20th century and a strong warming trend over the last 15 years. Recent warming has been punctuated by strong "marine heatwaves" in 2012 and 2016. Under all climate scenarios, the climate (30-year average) of the Gulf of Maine will continue to warm through at least 2050.

Sea Level Rise

Over about the last century, 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 one foot/century or three times the millennial rate. These local changes have been following short- and long-term global averages. About half of the last century's sea level rise in Maine has occurred since the early 1990s and it is likely that sea level in Maine will rise between three

³ Excerpted from Scientific Assessment of Climate Change and its Effects in Maine prepared by the Maine Climate Council Scientific and Technical Subcommittee February 2020

⁴ The term "signal" notes a trend. In climate science, it is used to distinguish a statistically significant trend of global warming versus random year-to-year variations. The year-to-year variations are often referred to as *noise*, whereas the trend is the *signal*.

and five feet by 2100 based on an intermediate sea level rise scenario, although scenarios of higher rise are physically plausible. Sea level is expected to rise along the Maine coastline well beyond 2100.

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 management and ecosystem function. Ocean warming has played a key role in distributions of commercial and noncommercial species shifting northwards along the Maine coast, as well as contributing to an ever increasing suite of nonnative species invading from the south that exacerbate losses of native marine organisms through predation, competition and other biotic factors.

Forest Ecosystems

Forests currently cover nearly 89% of Maine's area and the forest industry sector is statewide, multi-faceted, providing between \$8-10B in direct economic impact. However, both the natural forest and industry expect significant challenges in the decades to come. For example, the State has some of the highest densities of non-native forest pests in the US, linked to changes in both climate and human behavior, which are expected to continue to increase in the coming decade. The spruce-fir forest type will likely decline as a result of less snow and warmer winter temperatures, but some supplementary suitable habitat along the southern edge of species' ranges will generally persist. Hardwoods, particularly paper/yellow birch and red maple, are expected to displace spruce-fir with a much greater fraction of the landscape considered as a mixed forest type.

Human Health

Climate change may result in a high risk of adverse health outcomes for Mainers. Mainers are vulnerable to the health effects of exposure to extreme heat because of a lack of physiological adaptation to heat; low rates of home air conditioning rates; older demographics; high rates of some chronic diseases; high rates of outdoor occupations; and a high proportion of the population living in rural areas. Tick-borne diseases (TBDs) transmitted by the deer tick (*Ixodes scapularis*) in Maine include Lyme disease, anaplasmosis, babesiosis, and Powassan encephalitis virus. Case numbers and geographic extent of TBDs have been increasing in Maine since the late 1980s. The frequency and severity of allergic illnesses, including asthma and hay fever, are likely to increase as a result of a changing climate. Also anticipated is greater incidence of mosquito-borne diseases in Maine such as West Nile virus, Eastern Equine Encephalitis, and Jamestown Canyon virus.

Economy

Climate change will affect all sectors of Maine's economy from tourism, agriculture, forestry to transportation. The state has already experienced economic losses and may continue to do so in some sectors. The agricultural sector will also likely have a longer and warmer growing season. Areas of concern including recreational experiences (e.g., snowmobiling) that may be degraded by increasing

temperatures and negative impacts on traditional industries such as lobsters and shellfish harvesting. These losses can be offset by economic opportunities such as the growing renewable energy industry including land and ocean-based wind power, solar, and biofuels. Growing renewable energy production and use also means importing fewer supplies of fossil-based energy sources of which Maine has none.

3) Community Context

Cumberland is a town in Cumberland County, Maine, United States. It is part of the Portland–South Portland–Biddeford, Maine Metropolitan Statistical Area.

Cumberland was once part of North Yarmouth, but in 1821 it was incorporated as a separate town. The town was officially named by Ephraim Sturdivant when the new town government elected him to do the task. Chebeague Island, long a part of Cumberland, formed its own town in 2007.

Cumberland has a rich agricultural history, but only a small number of working farms remain, such as Sweetser's Apple Barrel and Orchard and Spring Brook Farm & Market.

Cumberland has a few small businesses, which are primarily on Route 26, also called the Gray Road, and on Route 1. Across Main Street from the high school, there is a convenience store called Food Stop. New construction has brought two eateries to the Town, Cumberland Food Company and Louie's Grille. There are also two dentists' offices and a post office. A new bank was built in 2010. The Cumberland Congregational Church is in the center of the Town.

According to the United States Census Bureau, Cumberland has a total area of 26.25 square miles, of which 3.37 square miles is water. Net landed square miles are 22.88 or 14,645 acres. Cumberland stretches inland from Cumberland Foreside, on Casco Bay, to West Cumberland, which borders Windham. It has approximately 2.5 miles of coastal waterfront.

As of the 2010 census, there were 7,211 people, 2,697 households, and 2,079 families living in Cumberland. The population density was 315.2 inhabitants per square mile. There were 2,902 housing units at an average density of 126.8 per square mile. The racial makeup was 97.2% White, 0.5% African American, 0.2% Native American, 0.8% Asian, 0.3% from other races, and 1.0% from two or more races. Hispanic or Latino of any race were 1.2% of the population. The average household size was 2.67 and the average family size was 3.06.

Cumberland's median age was 45 years. 26.9% of residents were under the age of 18; 4.7% were between the ages of 18 and 24; 18.2% were from 25 to 44; 35.6% were from 45 to 64; and 14.5% were 65 years of age or older. The gender makeup was 47.8% male and 52.2% female.

According to Census.gov Quick Facts, the most recent estimate of median household income is \$110,136 and median per capita income \$57,094. Median house value is \$366,900. Percent of persons in poverty is 3.5%

The school system that serves Cumberland and North Yarmouth is known as Maine School Administrative District 51 or MSAD 51. There are three schools in the district: Mabel I. Wilson School, Greely Middle School, and Greely High School. In June 2014, the North Yarmouth Memorial and Drowne Road Schools were closed. Students were moved into the expanded Greely Middle School.

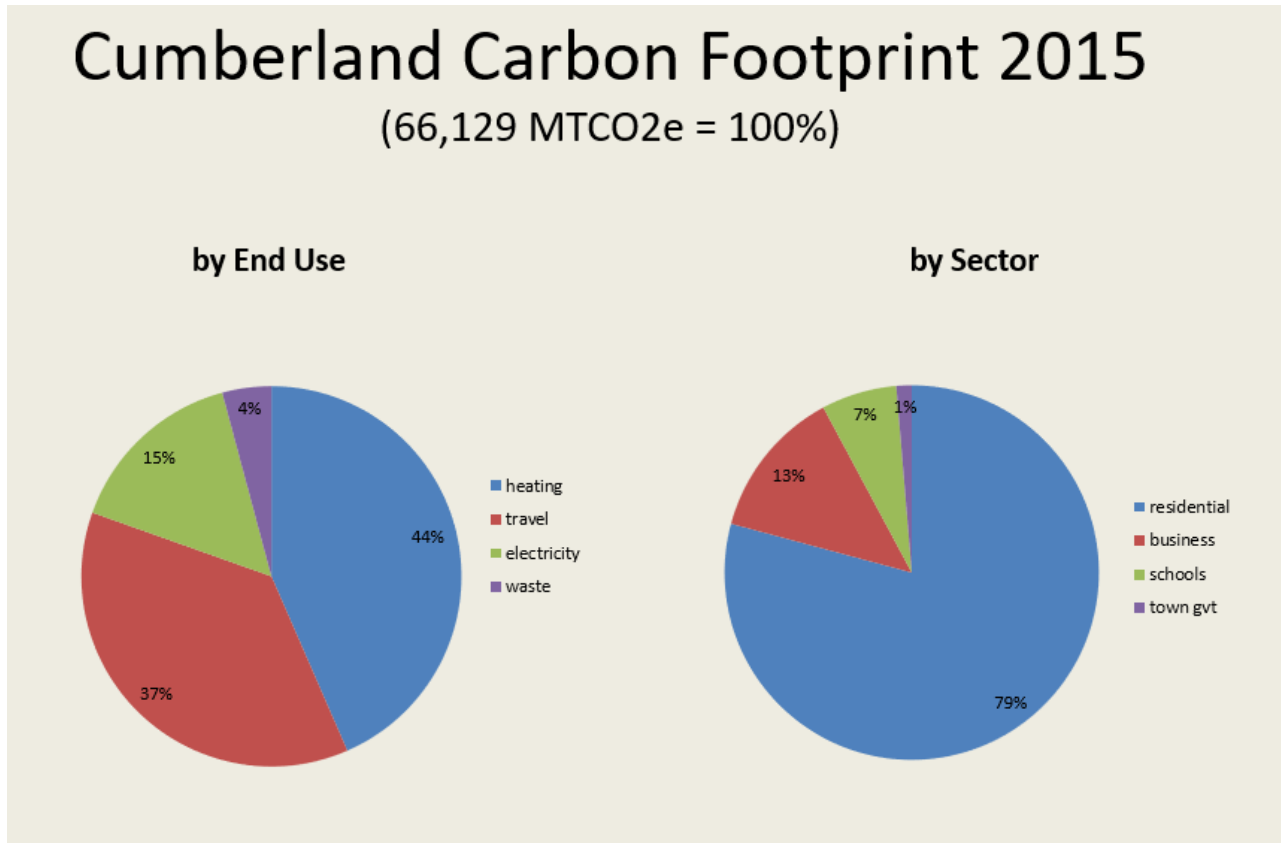
PART II: THE BASELINE & PLATFORM FOR THIS CLIMATE ACTION PLAN

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

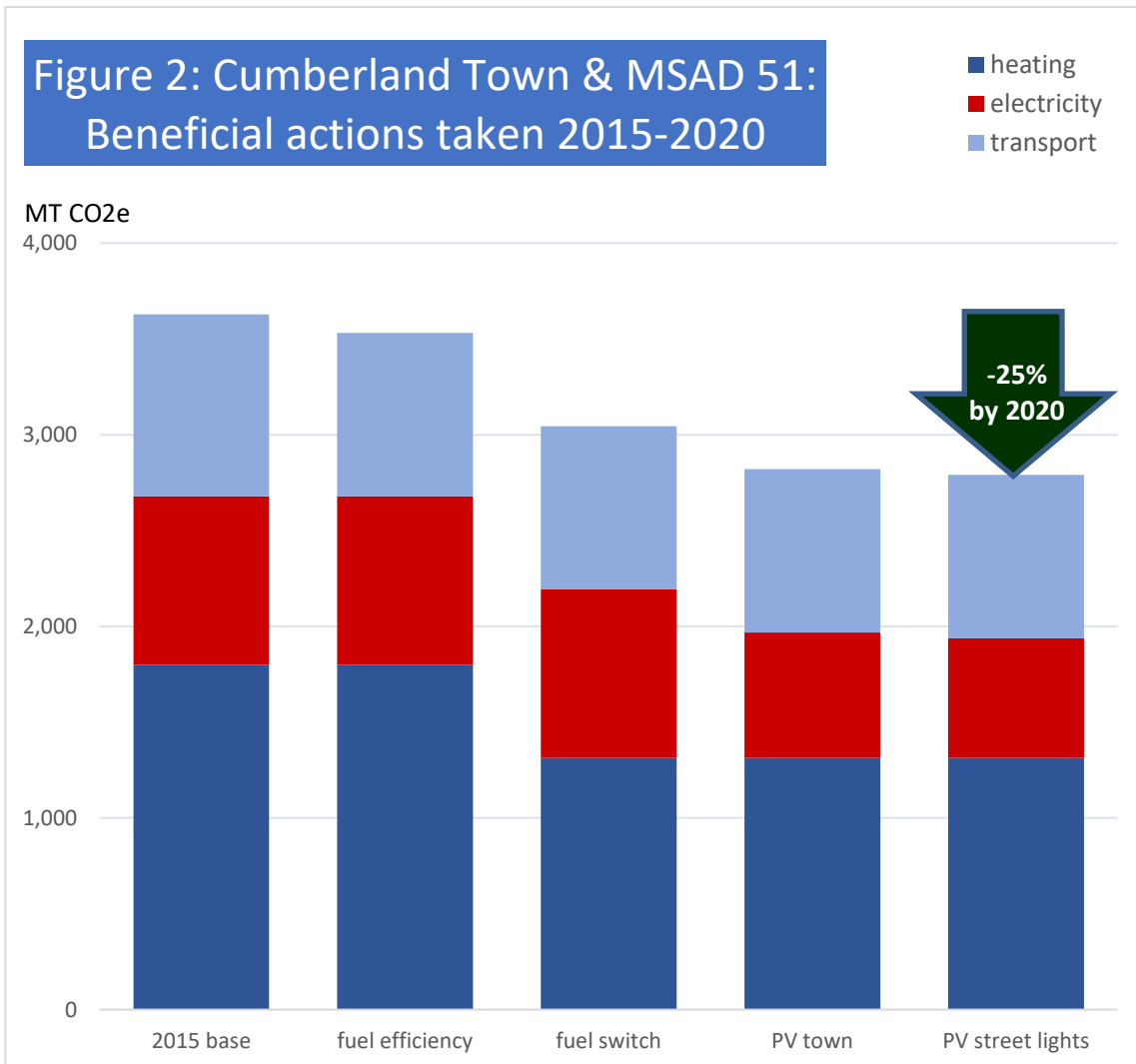
Figure 1: Cumberland Carbon Footprint 2015



Using 2015 as a baseline and as illustrated in the Cumberland Carbon Footprint 2015, the CAPS estimates that Cumberland's GHG in that year were approximately 66,160 MT CO₂e. In percentage terms, these emissions were from Town Government (1%), MSAD 51 (7%), Business (13%) and Households (79%). See Figure 1: Cumberland Carbon Footprint 2015.

3) 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. CPAC 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.

These results were achieved from several projects, highlighted below:

- i. **Fuel efficiency projects.** Both the Town and MSAD 51 have undertaken energy efficiency projects in recent years resulting in GHG reductions.
 - With a grant from Efficiency Maine, the Town installed a solar hot water heater for the central office.
 - Using the state sponsored §15915 energy service companies and 3rd-party financing program, MSAD 51 has undertaken several rounds of energy service company (ESCO) projects⁵ for boiler upgrades, lighting retrofits, HVAC upgrades using heat pumps, etc. These projects are eligible for state subsidy.
 - Single sort recycling and composting program at MSAD 51.

- ii. **Fuel switching.** Fuel oil is the most GHG intensive heating fuel used in Maine. Fuel oil and propane have been the two primary heating fuels used by the Town and MSAD 51. In recent years natural gas lines were extended to some parts of Cumberland including the Town Center. While still a fossil fuel, natural gas has a lower GHG intensity than fuel oil and propane.
 - The Town switched to natural gas for its central office, fire station, library and the fire barn and meeting hall on Blackstrap Road. In addition to a dollar savings, GHG emissions were reduced by an estimated 20%.
 - MSAD 51 switched its entire campus to natural gas from fuel oil. The dollar savings have been substantial and GHG emissions have dropped close to 30%. Because of the size of MSAD 51's heating load, GHG reductions were more than 400 MT CO₂e per year or the equivalent of taking 87 cars off the road.

- iii. **Landfill solar / photovoltaic (PV) farm.** In 2018 the Town Council accepted the winning proposal put forward by Revision Energy of Portland, ME to construct a 475-kilowatt solar farm at Cumberland's capped landfill off Drowne Road. Annual production is estimated to be 617,518 kWh.
 - 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.
 - By siting the solar farm on the capped landfill, the Town converted a brownfield with little or no value to a greenfield that will be supporting a substantial investment in productive infrastructure for the benefit of the entire community. Further, the solar farm will only occupy 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.

⁵ Energy service companies (ESCOs) develop, design, build, and arrange financing for projects that save energy, reduce energy costs, and decrease operations and maintenance costs at their customers' facilities. See <https://www.energy.gov/eere/femp/energy-service-companies-0>

- 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.
 - Compared to taking the standard offer from Central Maine Power, the Town would reduce its carbon dioxide emissions by approximately 182 MT CO₂e 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.
- iv. **LED streetlight project.** In October 2020 the Town awarded a contract to RealTerm Energy to upgrade all 234 existing streetlights to LED. This should deliver substantial financial and energy savings.
- Annual electricity consumption was reduced by 69% from 137,168 to 42,050 kWh.
 - Annual GHG will be consequently reduced by an estimated 30 MT CO₂e or 4% of the total Town GHG emissions.
 - Total project cost was \$165,113 including \$42,306 to purchase existing fixtures from Central Maine Power. Annual savings are expected to be around \$34,500 per year for a project payback period of 4.5 years.
- v. **New central fire station.** During the design process for the new fire station, the committee and architect paid close attention to the energy efficiency of the new structure to both save expense and minimize GHG. Without seeking actual certification (a costly process) the intent was to adhere to the Leadership in Energy and Environment Design (“LEED”) standards. At the conclusion, Port City Architecture stated that the final design was in line with the LEED silver level:
- South facing, passive solar orientation
 - Efficient air exchange systems
 - Heat pumps/high efficiency gas boilers for HVAC
 - At code or better insulation throughout
- vi. **Acquisition of open and forested land.** The Town government has for some years pursued an active policy to acquire and protect open and forested land, a policy that the CAPS supports. It should be noted that the Town has also sold land where this makes business sense, for example the Historical Society, two gravel pits and a 20 acre farm. However, legacy property plus recent acquisitions now comprise close to 1,000 acres of town owned forest land – about 7% of all land in Cumberland. The Forestry Subcommittee is now in the process of completing management plans for all these properties and proposing goals for future management. Under the auspices of a Project Canopy grant, the Knight’s Pond forest is being inventoried and analyzed for its potential to sequester GHG. In addition to Town acquired woodland, other programs in Town have set aside woodland for conservation.

The total open and forested land in Cumberland is estimated to be in the range of 3,100 acres or 22% of the Town's land area. These programs include (acres in parenthesis): Town acquired (985), Town open space (260), Tree Growth (1,440) and Chebeague and Cumberland Land Trust (405)⁶. This represents a unique asset to the Town, which we explore in the Recommendations section.

⁶ CCLT holds conservation easements on a number of Town-owned woodland that are counted in that total.

PART III: WHAT DO RESIDENTS WANT?

This CAP reflects the views of Cumberland residents. This is consistent with our Guiding Principles and is crucial for the success of the Plan. CAPS members are all residents of Cumberland and were appointed because of their interest in and knowledge of climate change issues. The CAP has been developed in a transparent process. The CAPS holds monthly meetings on the 4th Wednesday of every month. The general public is invited to attend, and minutes for each meeting are submitted to the LCC and made part of its public record. In addition, the CAPS developed and published a citizen survey.

1) Results of Our Citizen Survey on Climate Change

Created in Survey Monkey and designed to take 5-7 minutes to complete, the Citizen Survey covered attitudes toward and possible solutions to the problem of climate change. Responses were solicited through a survey link posted on the Town website, promotion in the Cumberland Crier and prompted by a postcard mailing to all Cumberland households. Lastly, hard copies were available at the November election site. The survey was open from September through December 2020 and received 742 responses, representing 28% of households.

Key findings:

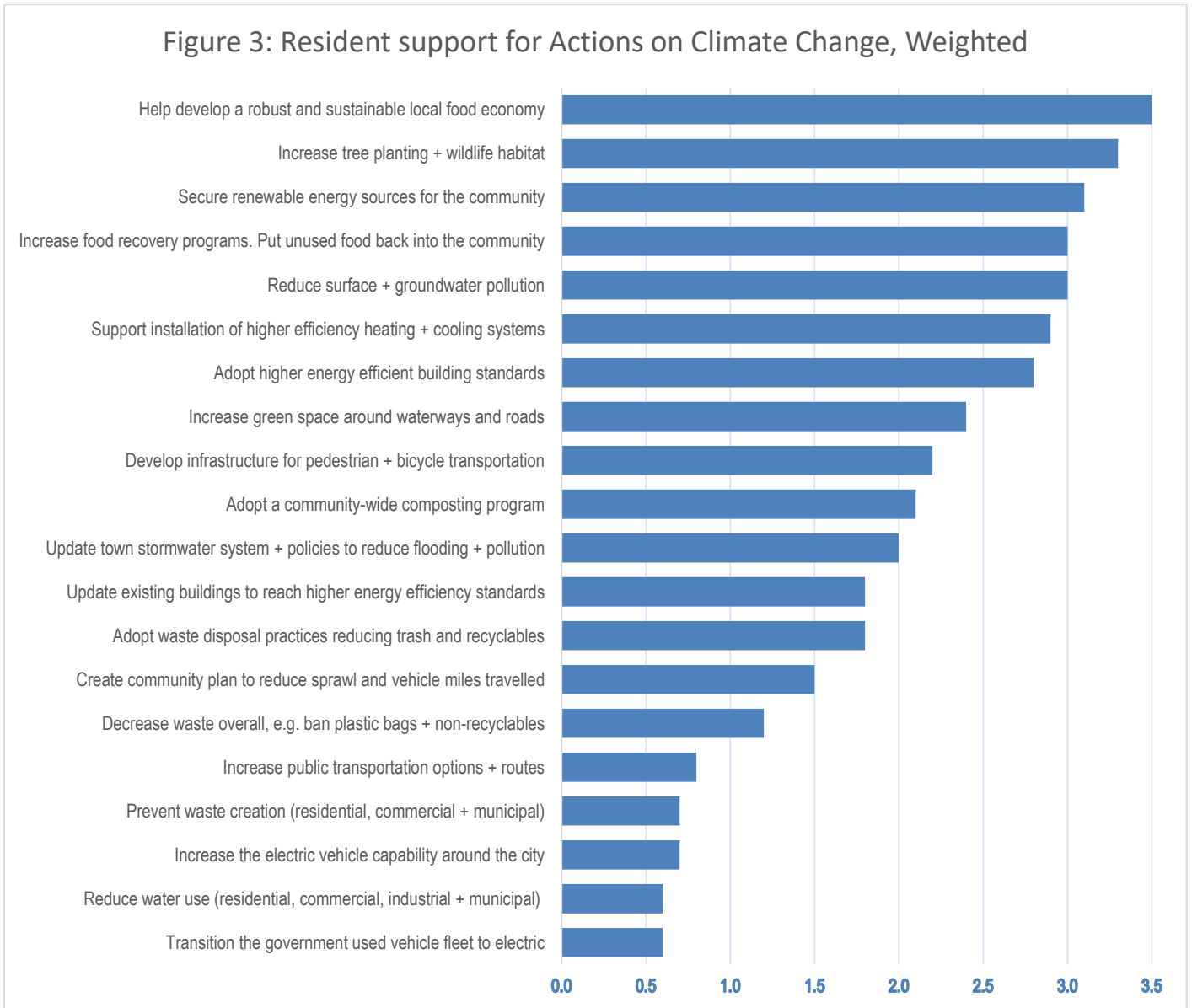
Residents are clearly engaged in the topic of climate change. Seventy six percent of respondents think about climate change every day or once a week; 18% once a month or a few times a year; and 6% less than that. Eighty three percent of respondents consider themselves well informed or moderately informed about climate change, 14% consider themselves somewhat informed and 2% think they know little or nothing about the topic.

Residents see climate change issues as connected to broader issues. Respondent concerns – and their proposed solutions – indicate that residents see climate change connected to other issues such as biodiversity, human health and the economy. More than half the respondents were concerned about climate change-related habitat and species loss; the impacts on agriculture and food production; insect-borne diseases; decreasing lake and river quality; and diminishing air quality.

Residents are taking action to reduce their impact on climate change. Ninety percent of respondents are reducing waste through reuse, recycling and composting; 76% are buying locally produced or sold goods and products, and 72% are reducing their energy consumption.

Residents have clear proposals for future climate change mitigation action in their Town. Reflecting their concerns about climate change, residents' strongest priorities also reflect the connectivity between multiple issues of sustainability – environmental, social and economic. They want the Town to secure renewable energy sources for the community; to support a sustainable food economy and local farming; and to increase tree planting and wildlife habitats.

These preferences are clear in the residents’ ranking of support for proposed broad future actions that the Town might take on climate change, shown in the Figure 3 and Table 1: Resident support for Actions on Climate Change, Weighted.⁷



⁷ Answers are ranked from high to low based on the number of standard deviations from mean response and adding 2 to make each rank score a positive number. This is a long-tailed distribution on the low side – meaning that the bottom five actions have modest support. This shows that the top priorities – the same as those that were “strongly supported” - are also well supported overall.

The full set of rankings, high to low per proposed action, is shown in Table 1: Resident support for Actions on Climate Change, Weighted.

Table 1: Resident support for Actions on Climate Change, Weighted						
Rank	ACTION ITEMS: Please rate your degree of support for the following suggested possible broad future actions for the Town of Cumberland on the core areas below	strongly support	Somewhat support	Neither support/ not	Somewhat oppose	Strongly oppose
3.5	With the help of neighboring farms, develop a robust and sustainable local food economy	68%	21%	7%	1%	3%
3.3	Increase the planting of trees and create wildlife habitat	66%	21%	7%	2%	3%
3.1	Secure renewable energy sources for the community	72%	13%	5%	3%	7%
3.0	Reduce surface and groundwater pollution	62%	24%	9%	2%	3%
3.0	Increase food recovery programs to put unused food back into the community	64%	19%	11%	2%	3%
2.9	Support the installation of higher efficiency heating and cooling systems	62%	22%	10%	2%	4%
2.8	Adopt higher energy efficient building standards	62%	24%	7%	2%	5%
2.4	Increase green space around waterways and roads	59%	22%	12%	2%	5%
2.2	Develop infrastructure for pedestrian and bicycle transportation	59%	21%	11%	4%	6%
2.1	Adopt a community-wide composting program	54%	23%	17%	2%	4%
2.0	Update the Town's stormwater system and other policies to reduce flooding and pollution	52%	28%	13%	4%	4%
1.8	Adopt waste disposal practices reducing trash and recyclables	53%	24%	12%	5%	6%
1.8	Update existing buildings to reach higher energy efficiency standards	48%	33%	9%	4%	6%
1.5	Create community plan to reduce sprawl and vehicle miles travelled	51%	24%	12%	4%	8%
1.2	Decrease waste overall. By, for example, banning plastic bags non-recyclable products	55%	20%	9%	5%	11%
0.8	Increase public transportation options and routes	41%	30%	17%	5%	7%
0.7	Increase the electric vehicle capability around the town	43%	27%	16%	6%	8%
0.7	Prevent the creation of residential, commercial, and municipal waste	41%	26%	20%	5%	7%
0.6	Transition the government used vehicle fleet to electric	42%	29%	14%	6%	9%
0.6	Reduce residential, commercial, industrial, and municipal water use	38%	32%	18%	6%	7%

PART IV: CLIMATE CHANGE MITIGATION GOALS

1) Phase I to 2030: A Carbon Neutral Town and MSAD 51

Cumberland’s two Phase I goals are to achieve a carbon neutral town and MSAD 51 by 2030; and to launch and promote a unique Town brand of Sustainable Cumberland

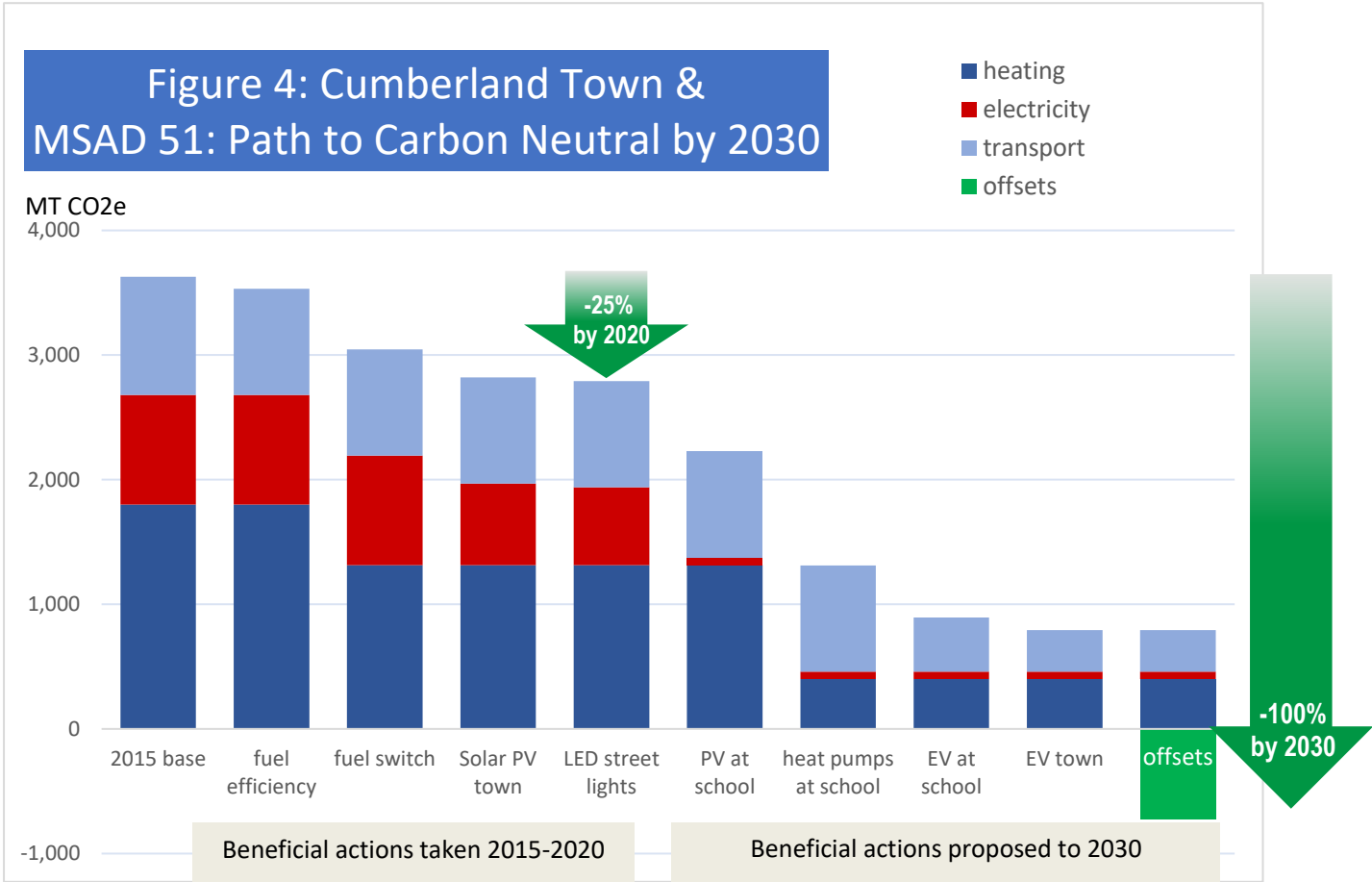
i. Achieve carbon neutrality for the Town and MSAD 51

The combined effect of action already taken to 2020, and additional actions recommended in the section following, will by 2030 bring to zero the GHG emissions of the Town and MSAD 51. This will mean an emission of 69 MT CO₂e in 2030 vs its 2015 baseline, in the manner indicated in Table 2 and Figure 4: Cumberland Town Government & MSAD 51: Path to Carbon Neutral by 2030.⁸

The combined actions recommended here will reduce the total GHG emissions by 80%. The last 20% are (1) the remaining 30% of heating provided by natural gas, and (2) no substitute yet for diesel heavy equipment used by public works. The CAP proposes to offset that 20% with forest carbon credits.

	Achieved, 2015-2020					Phase I Goals, 2020-2030				
MT GHG/ action taken	2015 base	Fuel efficiency	Fuel switch	PV Town	Street lights	PV school	70% heat pumps (hpm) *	EV school	EV Town	Forest offsets
Heating	1,800	1,800	1,314	1,314	1,314	1,314	400	400	400	400
Electricity	879	879	879	654	624	60	60	60	60	60
Transport	950	852	852	852	852	852	852	434	334	334
Offsets										-725
Total MT GHG	3,629	3,531	3,045	2,820	2,790	2,226	1312	894	794	69
Benefits per Action		98	486	225	30	564	914	418	100	725

⁸ “70% heat pumps (hpm)” refers to the climate action item whereby industrial scale heat pumps would be added to Town and MSAD 51 buildings to take on at least 70% of the heating load of such buildings, with natural gas supplementing in colder weather.



ii. Promote a town brand of Sustainable Cumberland

Cumberland’s legacy of conservation and forest stewardship created a natural asset of 3,100 acres of open and forested land – about 22% of the Town’s total land area, more than most towns in Maine. This quilt of lands owned and managed by the Town, private landowners and the Chebeague and Cumberland Land Trust, provide a healthy recreational asset for the Town and visitors. Trees also sequester carbon and if suitably managed can allow the Town to offset part of its GHG emissions, as we propose in the short- and long-term goals of this Plan.

This unique asset gives Cumberland the opportunity to offer a leadership model for municipal carbon sequestration and community resilience. The concept of natural asset valuation is integral to many town and municipal climate change action plans, including that of One Climate Future, the plan recently issued from Portland and South Portland.⁹ Cumberland’s prior investments allow the Town to show leadership, as in the recommended action steps in Part V.

⁹ One Climate Future: Charting a Course for Portland and South Portland. Draft Sept 16, 2020. https://www.oneclimatefuture.org/wp-content/uploads/2020/09/OneClimateFuture_091620_small.pdf Viewed November 16, 2020. Green Infrastructure, pages 240-242.

They include proposals to develop forest carbon offsets from existing Town land; make land available to support local farmers; and to plant trees in public land and easements.

This CAP proposes that the Town defines and promotes a brand of Sustainable Cumberland to residents and potential residents. Nancy Marshall, a local marketing professional, writing in December 2020 in a Portland Press Herald Op Ed, identified municipal sustainability branding as an opportunity for towns to create a unique value proposition that would help strengthen community and attract new residents.¹⁰ A brand of Sustainable Cumberland can make Cumberland distinct among its neighboring municipalities and help build community identity.

The CAPS propose that the Sustainable Cumberland logo on the cover of this report becomes the logo for this brand campaign. The logo was developed by Sukie Curtis, a member of the CPAC and an artist resident in Cumberland.

2) Phase II to 2050: A Carbon Neutral Community

Cumberland's first Phase II goal is that the whole Town community should achieve carbon neutrality by 2050, with an interim target of 50% GHG emissions reduction by 2030. Its second goal is to reach beyond climate change mitigation and GHG reduction and embrace the broader concept of sustainability – Sustainable Cumberland. These goals, and actions towards them, will be explored in the Phase II report, due to be completed by January 2022.

¹⁰ An Op Ed piece issued in the Portland Press Herald on 12/15/2020: "During the pandemic, Maine must focus on municipal branding" by Nancy Marshall, CEO of Marshall Communications in Portland, is relevant here. Marshall noted: "Do you want to position your city as "green"? Then promote your efforts to become more sustainable. Do you want to applaud your town's parks and recreational activities? Then explain how they set your town apart. Create an eye-catching logo. Produce a tagline that is informative and welcoming. By marketing themselves, Maine's cities and towns can generate the online buzz that gets people talking and visiting and eventually living in them"

PART V: ACTIONS TO ACHIEVE OUR GOALS

1) Phase I to 2030: Actions for Our Town and MSAD 51

Target 100% carbon neutral by 2030. While ambitious, progress to date plus implementation of known technologies – combined with the forest carbon offsets from the Town’s forest assets – make such a goal reasonable for the Town Council and MSAD 51 Board to consider. The first four actions recommended here correspond to the GHG reduction actions described in the chart and table on pages 19-20. The chart and table separate the steps of GHG reductions from EVs for the Town Government and for the MSAD 51; they are consolidated in one recommendation below. An additional six actions are recommended for their supplementary contributions to carbon adaptation and community sustainability.

- i. **Develop a MSAD 51 solar farm.** In the fall of 2019, the MSAD’s Finance and Facilities Committees decided to begin exploration of a solar farm to provide 100% of its electricity needs. In 2019 MSAD 51 consumed approximately 2,700,000 kwh. Meeting this demand would require a solar farm of 2.1 megawatts and necessitate around 10 acres of land. Some roof top solar would be available on school buildings but would likely be more expensive.

ACTION REQUEST: By the end of March 2021, MSAD 51 should request proposals for participation in a community solar farm on terms comparable to current standard offer for electricity, with a view to completing this contract before the end of December 2023. The site could be in Cumberland or at a remote location within the Central Maine Power area. We estimate that this could avoid 564 MT CO₂e within the goal period.

- ii. **Install industrial scale heat pumps to supplement natural gas heating and mitigate the GHG effects of natural gas heating.** Variable refrigerant flow (VRF) heat pumps are a variable capacity, multi split technology primarily targeted at commercial heating and cooling applications. A VRF heat pump is comprised of a single air or water-cooled compressor utilizing refrigerants to supply multiple indoor fan coil units. Like their smaller residential-scale heat pump technology counterpart, VRFs have continued to improve in efficiency, introducing high performance cold climate versions designed to provide rated heating capacity even in low ambient outdoor temperatures. In Europe and Asia, market share of VRF heat pumps represent approximately 80-90 percent of installed HVAC systems in commercial buildings.

ACTION REQUEST: By December 2021, the Town and MSAD 51 should request proposals for the installation of heat pumps in the next decade. The aim would be to save money, save an estimated 70% natural gas fired heat and avoid an estimated 912 MT CO₂e within the goal period.

- iii. **Phase in automobiles, light duty vehicles and school buses as EV or plug in hybrid.** In 2019 MSAD 51 and the Town each emitted about 400 MT CO₂e from diesel and gasoline consumption

for transport. Almost all the MSAD 51's use is by school buses. Under pending legislation, the Maine Department of Education would be implementing a program to phase out diesel with electric school buses without increasing annual expense to the local schools. The Town's use is almost equally split between police and public works. Autos and light duty vehicles should be phased out in favor of hybrid or electric vehicles, as costs for these two technologies come into parity with gas/diesel. For heavy duty equipment used by public works, no practical alternative is yet available nor expected in the near term.

ACTION REQUEST: The Town and MSAD 51 could undertake feasibility studies of this idea and report back to the Council by December 2021. If charging stations are under consideration for office employees, it should integrate charging stations for these vehicles. If practically feasible, MSAD 51 could consider requesting proposals to replace diesel fuel school buses with electric buses. These would reduce GHG emissions and potentially improve student and driver health. If the idea is supported, these vehicles could begin operating before the 2023/4 school year. This report estimates the action would also avoid 518 MT CO₂e, of which 418 MT CO₂e savings would be contributed from MSAD 51 (taking it to zero carbon from buses) and 100 MT CO₂e from the Town, within the goal period.

- iv. **Set aside a 225-acre forest carbon reserve from Town-owned woodlands.** In its 2009 Comprehensive Plan as updated, the vision of the Town of Cumberland includes preserving the community's rich agricultural heritage and implementing programs to assure environmental sustainability. In the years since 2009 the Town has implemented that key goal in part by adding to its ownership of forest land so that the total is approximately 1,000 acres. Responsibility for the stewardship of this forest land falls to the Forestry Subcommittee of the LCC. A goal of the Subcommittee is to have complete and up-to-date forest management plans on all the Town's forest land including an inventory to guide future harvesting of wood products by 2021. The inventory will include a carbon stocking analysis and a growth/yield analysis of the carbon sequestration of the Town's forest land – currently estimated at approximately 3,000 MT CO₂e per year.

ACTION REQUEST: The CAPS recommends that 20% of the 2015 baseline – 725 MT CO₂e per year – be credited as forest carbon offsets against annual Town/school emissions. To justify these offsets, up to 225 acres of Town-owned woodlands would be set aside for the next 30 years as a carbon reserve. During this period there would be no harvest or other removals unless some or all the forest carbon offsets were no longer needed to mitigate GHG. This action will likely complement approaches to reducing the impact of invasive species such as buckthorn. High impact areas benefit from reduced removal of natural species.

- v. **Design and build new public buildings to a zero-carbon standard.** The ZERO Code is a national and international building energy standard developed by Architecture 2030 that applies to new commercial, institutional, and mid- to high-rise residential buildings, the prevalent building types being constructed in cities today. The ZERO Code, which can be adopted immediately,

integrates cost-effective energy efficiency standards with on-site and off-site renewable energy resulting in Zero-Net-Carbon (ZNC) buildings.

ACTION REQUEST: The Town and MSAD 51 could undertake feasibility studies of this idea and report back to the Town Council by December 2021. If economically feasible, these standards could be integrated into Town building permits and codes. Any energy savings from this action would be additional to the plan in this Report.

- vi. **Make available 5 - 10 acre parcels of Town-owned land to market gardeners.** The most highly rated responses 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.”

Local food production is relevant because Maine, despite its rural base, imports 90% of the food consumed. Farmland acreage and the number of farms have decreased in the past decade. Roughly 13% of people in Cumberland County are food insecure.¹¹

According to Maine Farmland Trust and the Chebeague and Cumberland Land Trust, the biggest impediment to formation of new farms in this area is the high cost of arable land. For market gardeners, by way of example, cost of land needs to be \$1,000 or less per acre for the operation to be cash flow positive. Such land is available in rural Maine but sufficiently distant from Cumberland as to be neither neighboring nor local. In a recent report¹², University of Maine indicates that diversified vegetable farming is a vibrant sector and currently generates an average annual revenue of \$22,117 per acre with 3-5 acres typically under tillage. Annual cash flow is positive and capital costs low. Such a cropping system might be a good fit for Cumberland and attractive to aspiring farmers given the proximity to a substantial customer base. Opportunities exist to work on this and related activity with organizations like the CCLT and the Maine Organic Farmers and Growers (MOFGA).

Some residents are interested in the re-establishment of a Cumberland Community Garden where they can plant 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.

Farming can also be beneficial as a source of conservation. Land-based carbon drawdown projects are being promoted in other cities in the USA¹³ 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.

¹¹ One Climate Future, p220

¹² Daigneault, A et al, (2020): Maine Forestry and Agricultural Natural Climate Solutions Mitigation Potential

¹³ See <https://urbandrawdown.solutions/>

ACTION REQUEST: The Town may wish 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.

- vii. **Develop tree planting program for public ways and easements.** Trees are effective allies both in the work of reducing carbon in the atmosphere and in mitigating the impacts of rising temperatures. Well-known for their absorption of carbon dioxide in photosynthesis and for the storing of carbon in their living cells, trees also help to keep air temperatures cooler in high heat through transpiration (akin to sweating) and through providing shade. In addition, asphalt, brick, and other building materials absorb and retain more heat than natural living surfaces such as trees, shrubs, and grass, making green areas with generous tree canopy noticeably cooler in hot weather, especially at night. Retaining and maintaining the tree cover that we do have and expanding the presence of trees on Town streets and easements, the borders of parking lots and playgrounds, and recovering and replanting areas of Town forest that currently host invasive vegetation are important components of our climate action plan. Resilient open space planning is being promoted in other cities in the USA¹⁴ including in Portland and South Portland¹⁵. This proposal has the support of the Chebeague and Cumberland Land Trust.

There is also interest in land use planning and design that prevents sprawl and conserves natural resources. The CAPS will explore this in Phase II.

ACTION REQUEST: The Town should assess public open spaces based on carbon sequestration capacity and potential. In addition to the direct opportunities from trees, sequestration opportunities should also be sought from general ecosystem stewardship such as improved soil health, expanded wetlands, the maintenance of biodiversity, reducing nonnative invasive species, and connecting disparate parcels of protected land. The Town should seek qualification as a Tree City USA.

- viii. **Engage the MSAD 51.** Teachers might consider the integration of sustainability principles and local Town Climate Action planning into K-12 curricula. Examples could be school buses; community gardens; citizen scientists; high school driver education (safety); playing fields chemical use; and air quality and water monitoring.

ACTION REQUEST: MSAD 51 could propose to the School Board that it research appropriate resources to integrate sustainability principles into K-12 curricula. One example we can recommend is the Children’s Environmental Literacy Foundation: <https://celfeducation.org/>

- ix. **Delegate to Town staff the duty to analyze and report annually the Town’s GHG emissions.**

¹⁴ See <https://urbandrawdown.solutions/>

¹⁵ One Climate Future, pages 211-213

2) Phase II to 2050: Actions for Our Community

The Phase II Goals looks to the entire town community and targets a 50% GHG reduction by 2030 and 100% by 2050, coupled with a recognized identity or brand as Sustainable Cumberland.

Phase II will also provide guidance for the community to increase resilience to the possible negative effects of climate change such as increase of TBD and more frequent high-wind events.

Attainment of these goals 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." This vision of Sustainable Cumberland will also invite – and depend on -- the active and informed civic participation of all the town residents.

Some of these actions can start now.

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 (above needed for 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 CO₂e annually. It is quite likely that carbon sequestration of Town-owned forest land (estimated at 1,000 acres) will substantially exceed that amount.

PART VI: 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.

APPENDIX I: The U.S. Mayors' Climate Protection Agreement, 2014



The U.S. Mayors Climate Protection Agreement

(As presented to the 82nd 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 CO₂; 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.

APPENDIX II: Charter of the Climate Action Plan Subcommittee of the LCC

CHARTER Climate Action Plan Subcommittee Lands and Conservation Commission Cumberland, Maine

WHEREAS, the State of Maine has committed to reduce state-wide net Greenhouse Gas Emissions “GHG” by 2050 by 80% from a 2009 baseline and is developing a Climate Action Plan to accomplish this reduction,

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 “CLCC”) believes it would be beneficial for the Town and the School to develop a Climate Action Plan (the “CAP”) that would specify a GHG reduction goal and set out a coordinated and formal plan of action to achieve such goal,

NOW THEREFORE BE IT RESOLVED, that the CLCC establish a Climate Action Plan Subcommittee (the “CAPS”) to research, engage with local stakeholders and develop recommendations for establishing a CAP for adoption by the Town Council and the School Board,

BE IT FURTHER RESOLVED, that the CAPS consist of up to seven (7) members appointed as needed by the CLCC with initial members being Sukie Curtis, Denny Gallaudet, Jennifer Grasso and Jesse Lamarre-Vincent,

BE IT FURTHER RESOLVED, that the CAPS develop a current GHG inventory including emissions from fossil fuels and also drawdowns from natural systems such as Town-owned forestland. To the extent that compilation of this inventory requires the service of professional consultants, the CAPS will present for approval of the CLCC a subsequent budget proposal for such service,

BE IT FURTHER RESOLVED, that the CAPS will develop stakeholder groups of residents, business owners, school officials and other interested parties to provide input into the setting of GHG reduction goals and plans. As part of the process, the CAPS will consider the benefits of a citizen survey on the need and scope for a climate action plan,

BE IT FURTHER RESOLVED, that the education of the citizens of Cumberland is a critical component of the complex actions that will be needed to implement a successful CAP,

BE IT FURTHER RESOLVED, that Phase I of the CAP be restricted to the GHG of the Town and School only and be completed by December 31, 2020 for consideration by the Town Council and School Board.

BE IT FURTHER RESOLVED, that Phase II will address the roles of commercial and residential GHG conservation and reductions and the dovetailing of same with actions taken by the Town and School; it will be completed by December 31, 2021.

Adopted January 8, 2020

APPENDIX III: Acronyms and Definitions

CAPS	Climate Action Plan Subcommittee
CAP	Climate Action Plan
CAPS	Climate Action Plan Subcommittee
CCLT	Chebeague & Cumberland Land Trust
CO ₂ e	Carbon Dioxide equivalent
EV	Electric Vehicle
GHG	Greenhouse Gas Emissions
HPM	Heat pump
HVAC	Heating, ventilation and air conditioning equipment
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 ₂ e	Metric tonnes of GHG equivalent
TBD	Tick borne disease
Tree City USA	Designation by meeting a set of four standards of the Arbor Day Foundation