



# CLIMATE ACTION PLANNING:

## A FRAMEWORK FOR WESTPORT, CONNECTICUT

### **CAPSTONE TEAM**

Abigail Orzolek  
Charlie Salzer  
Charlotte Scott  
Elissa Knight

John Michael Borg II  
Joshua Strake  
Keren Kuperman  
Marcela Diaz

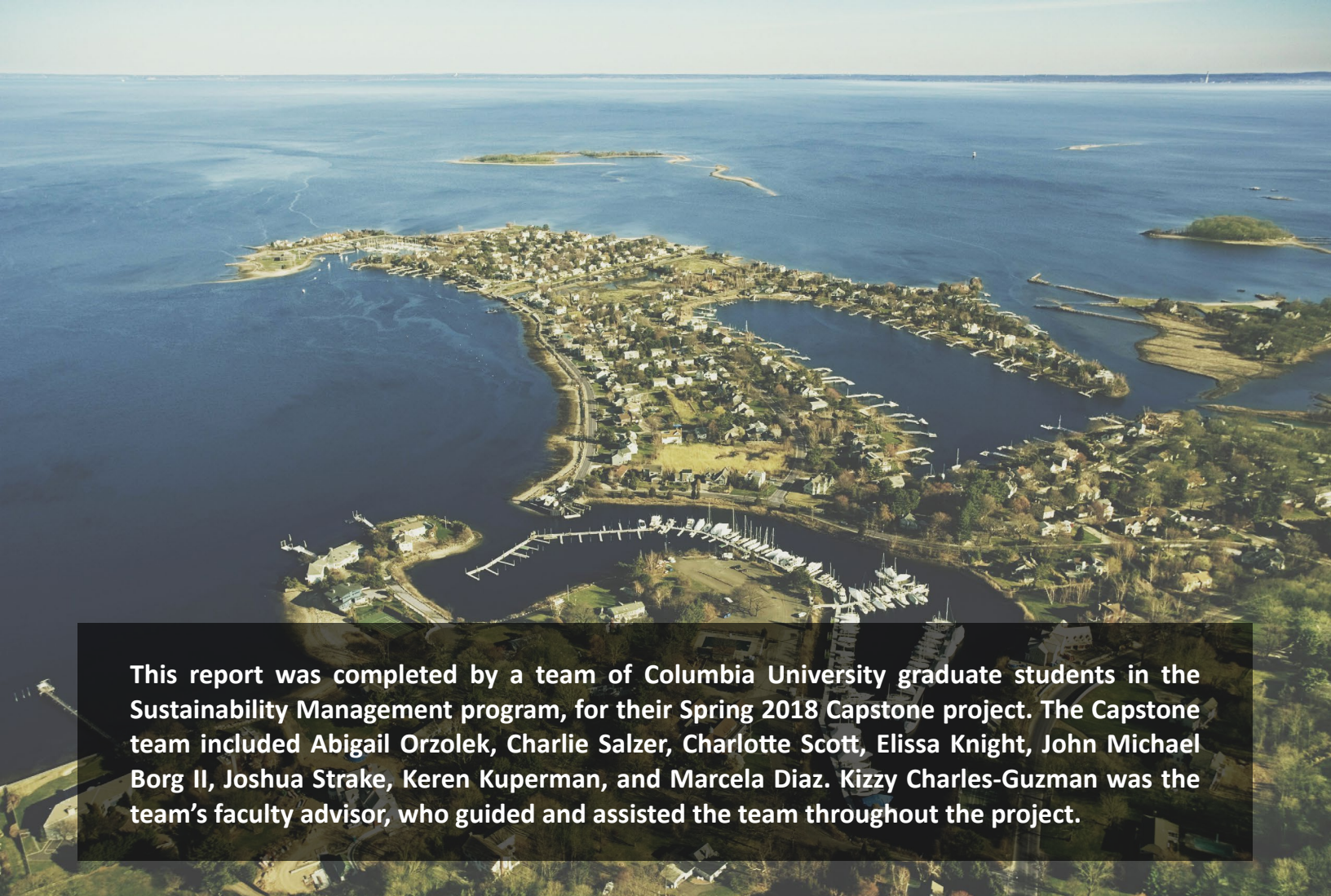
### **ADVISOR**

Kizzy Charles-Guzman

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This report was completed by a team of Columbia University graduate students in the Sustainability Management program, for their Spring 2018 Capstone project. The Capstone team included Abigail Orzolek, Charlie Salzer, Charlotte Scott, Elissa Knight, John Michael Borg II, Joshua Strake, Keren Kuperman, and Marcela Diaz. Kizzy Charles-Guzman was the team's faculty advisor, who guided and assisted the team throughout the project.

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**NET - ZERO**

# 1

# EXECUTIVE SUMMARY

In 2017, Westport established a goal to achieve Net-Zero energy, waste, and water by the year 2050. The Town's Net-Zero goal and its environmental initiatives are championed by the Green Task Force (GTF), an advisory body to the Town's First Selectman. This Capstone team was asked to provide recommendations to the GTF that would steer Westport to Net-Zero by 2050, with specific attention paid to community engagement and residential energy consumption.

The team began by conducting an energy benchmark of the residential sector for Westport to better understand the most pressing areas for improvement within the sector. More than 500 relevant energy and community engagement initiatives from a combination of 44 climate action plans (CAPs), sustainability plans, and other environmental plans, from cities around the United States (U.S.) were then reviewed. The elements of these plans were documented to analyze trends and commonalities within and across cities, which was used to identify the most relevant and essential elements for the GTF to consider when planning the Town's CAP.

Fourteen "peer" and "similar" cities, which share relevant socio-economic, demographic and geographic traits with Westport were identified to target initiatives that would be most effective and applicable for the Town. This report presents eight initiatives with 32 sub-initiatives for Westport to pursue, which address three strategies: (1) effectively engage the community, (2) reduce energy consumption, and (3) increase renewable energy supply and generation. This report also presents methods of community engagement that will be relevant to Westport across action areas and assess the impacts of selected technologies on residential consumption. Lastly, the GTF will be provided with an analysis of the CAP planning process, a climate action implementation pathway, along with a toolkit to facilitate the creation of a CAP to enable the Town to achieve its goal by 2050.

# 2

## INTRODUCTION

Westport, CT is a coastal, suburban town located 50 miles northeast of New York City (NYC). Westport has a population of approximately 27,840 residents, and a population density of 1,322 people per square mile. The Town is typified as an affluent community, with many residents employed by finance, insurance, and retail firms located in both NYC and within Fairfield County.<sup>1</sup> The median value of a home in Westport is \$1,087,700, compared to the state’s median value of \$269,300, and over 50% of the homes in Westport have greater than four bedrooms.<sup>2</sup> In addition, the median household income of a Westport resident is \$166,307 compared to Connecticut’s \$71,755.<sup>3</sup>

US Census QuickFacts		
Connecticut	Topic	Westport
3,576,452	Population	27,840
67%	Owner-occupied housing unit rate	84%
\$269,300	Median value of owner-occupied housing	\$1,087,700
2.56	Persons per household	2.81
\$71,755	Median household income	\$166,307

Figure 1: Comparative “QuickFacts” (source: [U.S. Census](#))

### Governance Structure

The chief elected official for Westport is First Selectman, Jim Marpe, whose main role is to manage Town affairs, direct the administration of all departments and officers, and execute ordinances.<sup>4</sup> Jim Marpe and two additional selectmen have the executive authority to approve contracts related to the Town. The rest of the legislative body in Westport is controlled by those who serve in the Representative Town Meeting (RTM), which is composed of 36 members representing Westport’s nine districts.<sup>5</sup>

Aside from the RTM, there are five additional major elected governmental components: the Board of Assessment Appeals, Board of Education (BOE), Board of Finance, Planning and Zoning Commission, and Zoning Board of Appeals.<sup>6</sup> Each of these governmental bodies has an obligation to support Westport’s sustainability efforts and goal of becoming a Net-Zero community.

Westport is required to follow Connecticut’s building codes, which follow 2012 International Building Codes. This means there are restrictions to any energy efficiency efforts that Westport would like to pursue that are above and beyond existing codes. Coupled with Westport’s ambitious Net-Zero by 2050 goal, this legislative barrier played a significant part in the resulting recommendations in this report.



## Westport's Existing Sustainability Efforts

Westport has already taken steps towards its Net-Zero by 2050 goal.<sup>7,8</sup>

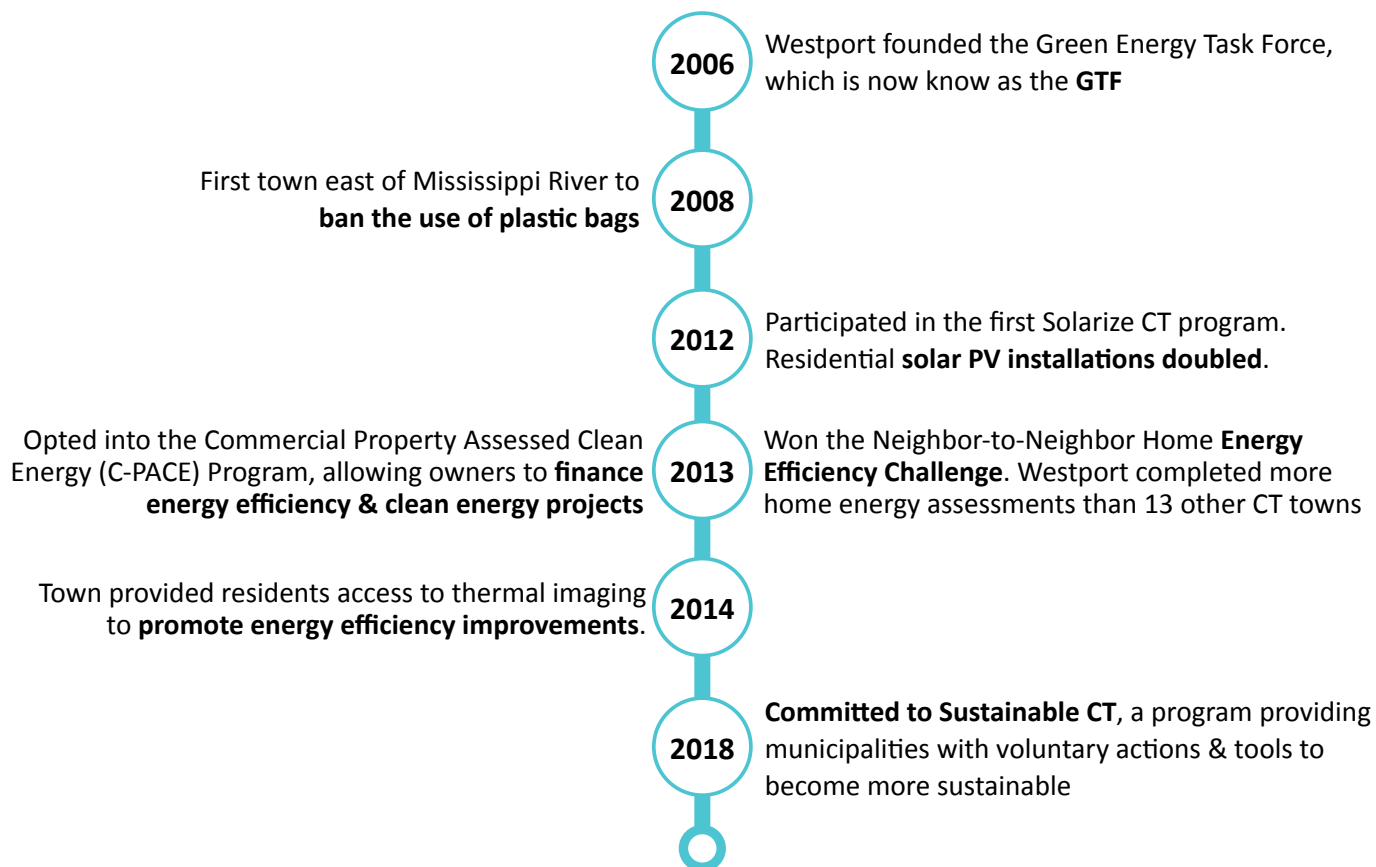


Figure 2: Fifth anniversary of the plastic bag ban (source: WesportNow)

## The Green Task Force (GTF)

The client, the GTF, is composed of 13 residents who aim to promote environmental policies and “assist Westport’s residents, businesses, and the Town itself on a broad array of sustainability issues.”<sup>9</sup> To do so, the GTF advises Westport’s First Selectman by providing input on recommended sustainability actions for the Town.<sup>10</sup> Furthermore, the GTF targets areas of municipal operations for improvement, reviews relevant programs, and advocates for resolutions that will move Westport towards sustainability. Overall, the GTF addresses issues and projects in Westport that have a significant potential to impact the Town’s sustainability goals such as Net-Zero by 2050.

The GTF approached Columbia University seeking guidance on the execution of a plan to address the Net-Zero goal, specifically regarding energy. As Westport continues to consider the implementation of a CAP, the GTF would like a framework for developing one. CAPs are unique to each particular town or city, and the GTF requested information on a CAP structure and key elements that would work specifically for Westport. Additionally, the GTF would like to implement best practices in the areas of municipal policy, governance, programming, and community engagement as they relate to residential energy usage. To assist the GTF in this area, CAPs from other cities were assessed, a residential energy use benchmark for Westport was conducted, energy initiative recommendations were compiled, and suggestions were provided for staffing and partnerships.

## Scope of Work

1. Benchmark Westport’s residential energy consumption.
2. Provide targeted strategies, tailored initiatives, and metrics aimed at reaching Net-Zero by 2050, within the sector of energy. Identify costs, co-benefits, scope, and potential greenhouse gas (GHG) emissions reduction for potential actions.
3. Assess CAPs from other cities to guide the GTF in the planning, structuring, and implementation of a CAP in Westport.
4. Identify financial incentives related to energy initiatives.
5. Offer recommendations for improving the effectiveness of the GTF structure by assessing the feasibility, risk, and benefits of hiring a sustainability director (Appendix C), and establishing a partner organization with non-profit status.

## Westport’s Net-Zero Goal

In September 2017, Westport became the first town in CT whose executive and legislative bodies committed to a Net-Zero by 2050 goal. As a signatory of “We Are Still In”, a network of cities and organizations in the U.S. committed to taking steps towards tackling climate change,<sup>11</sup> Westport made its pledge to uphold the climate commitments of the Paris Agreement. As such, Westport plans to “become a Net-Zero Community by the year 2050, where the community has reduced its impacts across energy, water, and waste so that they are sustainably managed.”<sup>12</sup>

Regarding energy, Westport’s definition of Net-Zero is to “reduce the community’s energy consumption through energy efficiency and conservation measures; and produce or buy enough clean energy to meet those needs.”<sup>13</sup>



# 3

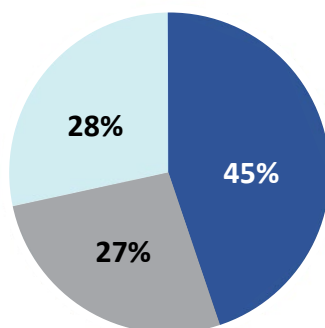
## RESIDENTIAL ENERGY CONSUMPTION

To grasp where Westport currently stands in their energy consumption, and assist in helping it move towards its goals, a benchmark of energy consumption was established for this project. The GTF expressed particular concern regarding the level of energy consumed in the residential sector, which is why a residential energy benchmark for the year 2015 was calculated for this study. Data provided to the GTF by Eversource, a local utility, indicates that residential electricity consumption is higher than both commercial and municipal, making the residential sector the greatest source of electricity demand within the town. With this in mind, the team created a benchmark using 2015 as the ‘base year,’ and measured consumption levels in British Thermal Units (BTUs) and kilowatt hours (kWh). The benchmark was established using residential electricity and natural gas data provided by the GTF, while heating oil data was compiled through independent outreach and research. The team also considered the specific increase in electric load that the charging of Electric Vehicles (EVs) may bring, assuming different 2050 penetration rates, especially since Westport has been an early EV adopter.<sup>14</sup> The results of this analysis established the 2015 benchmark of residential energy consumption.

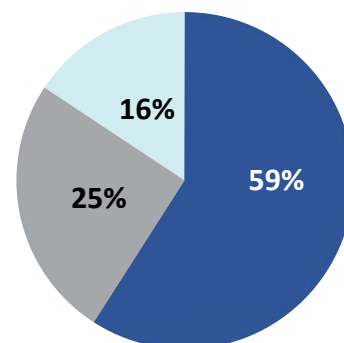
### Residential Energy Benchmark Results

For the benchmarking year of 2015, energy consumed was converted into an equivalent greenhouse gas (GHG) unit of metric tons of carbon dioxide (MtCO<sub>2</sub>e). Westport’s residential energy consumption is split into three groups that comprise the clear majority of the Town’s energy mix: natural gas, heating oil, and electricity. Data sources were gathered from Eversource, Southern Connecticut Gas (SCG), and individual oil vendors operating within Westport. Initial findings on residential consumption and associated GHG emissions are indicated in Figure 3 below. A notable observation was the discovery that heating oil represents 45% of estimated residential energy consumption, and 59% of expected residential GHG emissions.

**Residential Energy Consumption**  
2015



**Residential GHG Emissions**  
2015



■ Heating Oil  
■ Natural Gas  
■ Electricity

Figure 3: Ratios of consumption and emissions from Westport’s energy mix

## Natural Gas

When addressing natural gas, it is important to make the distinction between utility-provided natural gas delivered to a home, and natural gas that is used to generate electricity for supply by the utility to the consumer. The natural gas used on the supply side of the utility is covered in the ‘electricity’ portion of the 2015 benchmark.

SCG consumption data for Westport was utilized for this benchmark. Included in the data were residential sector consumption measurements, which were applied directly to the 2015 benchmark. The CCF (Hundred Cubic Feet) of natural gas used was converted to BTUs<sup>15</sup>, and a MtCO<sub>2</sub>e was also calculated. In 2015, for example, SCG reported 5.19 million CCF of natural gas, which converts to 155 million kWh of energy, which is equivalent to 27,561 MtCO<sub>2</sub>e for our GHG estimate. The findings are illustrated in Figure 4 below.

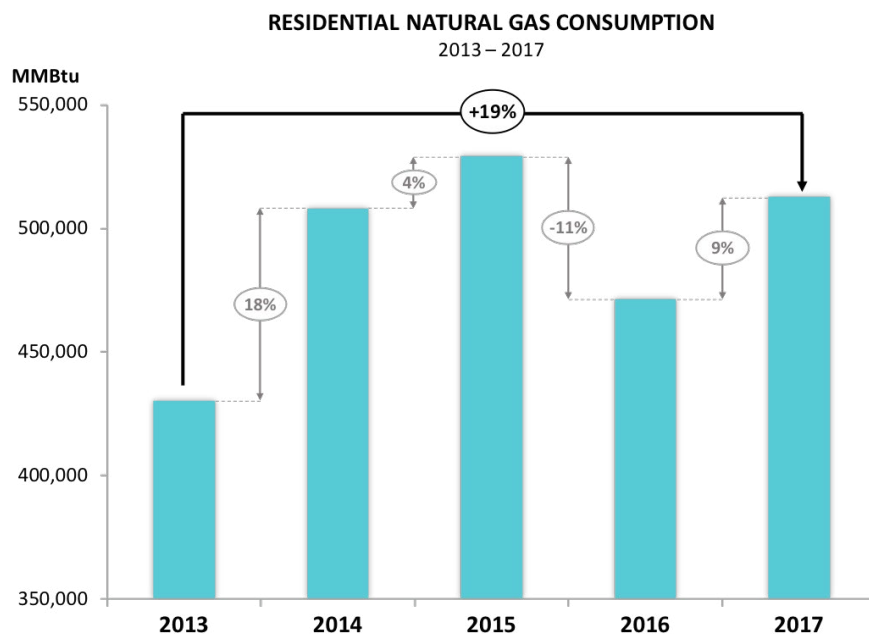


Figure 4: Westport's 2013-2017 residential natural gas consumption

## Heating Oil

Since Westport's heating oil is provided by private vendors, there is no consumption data available publicly. This presented a large data gap, as approximately 67% of households use distillate fuel oil #2 as their main source of fuel for heating.<sup>16</sup> With a high demand to heat homes, and the lack of efficient heating systems, our estimations for fuel oil consumption were an important part of the benchmarking process. The team identified that over 50% of houses in Westport were built before 1960, and have an average living area of 3,000 square feet. Overall, the Town's housing stock is old, large, and inefficient. Figure 5 illustrates Westport's housing stock by square footage and year built.

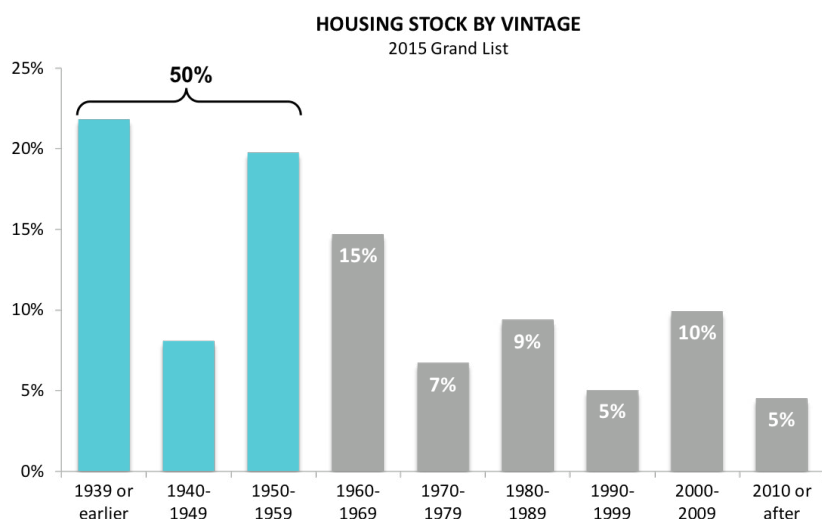


Figure 5: Westport's housing stock by vintage

a local oil vender, shared a simple, yet effective formula to estimate oil consumption for homes in Westport. The formula is based on the assumption that: "A brand new, 4,000 square foot home, with a family of four, uses approximately 1,000 gallons per year."<sup>18</sup> Figure 6, below, presents the formula applied to the 6,361 homes that used heating oil in 2015. Overall, in 2015, heating oil accounted for 45% of residential energy consumption, and released 64,764 MtCO<sub>2</sub>e.

Estimating Oil Consumption	
Year Built	Formula
Post 2010	1 gallon per 4 square feet
Pre 2010	1 gallon per 3 square feet

Figure 6: Formula to calculate oil usage

To continue benchmarking residential energy consumption, the GTF should utilize the heating oil methodology used in this study. There are three main reasons why: (1) applicability - formula can easily be applied within the annual Building Grand list, (2) standardization - even if the formula is not 100% accurate, it allows for the same methodology to be applied each year and track changes, and (3) costs - besides man hours, it is completely free. Finally, we recommend introducing heating degree days (HDD) into the model as this will account for variable weather and the associated fluctuations in heating oil consumption.

## Electricity

For an estimate of residential electricity consumption, the team worked with data provided by the GTF. This data provided residential-specific measurements and was incorporated into the 2015 benchmark. A GHG equivalent was estimated through a 2015 Generation Report from ISO New England, an organization that oversees New England's wholesale electricity market. With this report<sup>19</sup>, estimations were made for the portion of generation that came from renewables, such as solar, wind, and hydropower, as well as nuclear, coal-fired generation, oil, and natural gas. Each source was assigned a CO<sub>2</sub> equivalent ("CO<sub>2</sub>e") cost per kWh, which allowed for the creation of a weighted average CO<sub>2</sub> equivalent cost per kWh supplied to Westport, illustrated in Figure 7.

Direct outreach to heating oil vendors proved to be an effective approach in gathering knowledge, even though no raw data was exchanged. Based on conversations with local oil vendors<sup>17</sup>, the team was able to establish a range for the average number of gallons of oil a household in Westport consumes per year: between 1,000 and 1,300 gallons. While the range provided was a good baseline to work from, applying it to all homes would not produce accurate results because neither size nor age were not taken into consideration. A representative from Devine Bros Inc.,



2015 Electricity CO <sub>2</sub> e Calculations			
Source	% of generation	kgCO <sub>2</sub> e per MMBtu	kgCO <sub>2</sub> e per kWh
Wind	2%	0	0
Other Renewables	7%	0	0
Pumped Storage	1%	0	0
Hydro	6%	0	0
Coal (all types)	4%	95.4	194,514
Nuclear	30%	0	0
Oil	2%	73.2	149,254.6
Natural Gas	48%	53.1	108,262.8
<b>Weighted Avg kgCO<sub>2</sub>e*</b>		30.75	0.1049
<b>Weighted Avg MTCO<sub>2</sub>e*</b>			0.0001
*The weighted average means the ratios of source within total generation is considered to generate an expected CO <sub>2</sub> cost in the portfolio (ISO N.E.)			

Figure 7: Calculations of electricity CO<sub>2</sub>e per generation source

The findings indicated that there was an estimated CO<sub>2</sub> equivalent cost of 0.105 kg per kWh consumed by Westport's residential sector. For 2015, the residential sector consumed 164.7 million kWh, making the equivalent CO<sub>2</sub> cost equal to 17,276 MtCO<sub>2</sub>e. Figure 8 below illustrates residential electricity consumption between 2013 and 2017.

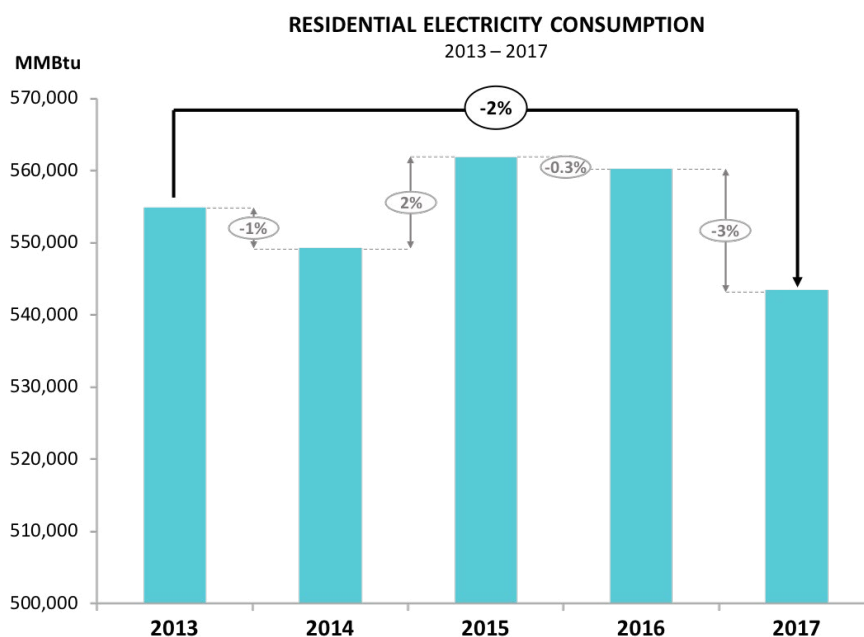


Figure 8: Westport's 2013-2017 electricity consumption

## Looking Ahead

### Electric Vehicles (EVs)

Westport has been an early-adopter of EVs, which establishes potential for the share of Light-Duty Vehicles that are electric to increase, especially as 2050 projections are made. At present, the residential charging of EVs is accounted for in existing residential electricity consumption data. Major changes in vehicle stock may occur in the next few decades, and the increased penetration of EVs will have a significant impact on residential electricity consumption due to the need to charge EV batteries.

Several key assumptions were made about future conditions regarding the impact of EVs on residential electricity use. The assumptions included: expected technological efficiency increases in EVs (getting more mileage per kWh of electricity), amount driven per year, per capita in CT, changes in Westport's population, and most importantly, projected penetration of EVs by 2050. The projected penetration dictates all expected new electricity load in the model, but also varies widely depending the source. Bloomberg New Energy Finance (BNEF), for example, projects upwards of 60% penetration of EVs by 2050<sup>20</sup>, whereas the Energy Information Administration (EIA) has a penetration of around 10% by 2050 in their Annual Energy Outlook for 2018.<sup>21</sup> To reconcile these varying projections, a 25% penetration by 2050 was settled on as a likely compromise of expectations for EVs. The model for future EV consumption is included in Figure 9 below.<sup>22</sup>

Electric demand from EV charging, as compared to 2015 benchmark					
EV penetration by 2050	2020	2030	2040	2050	
10%	1,508,162	4,434,448	7,243,671	9,939,330	kWh
20%	3,016,324	8,868,896	14,487,342	19,878,661	kWh
* 25% *	3,770,404	11,086,120	18,109,177	24,848,326	kWh
30%	4,524,485	13,303,344	21,731,012	29,817,991	kWh
40%	6,032,647	17,737,792	28,974,683	39,757,322	kWh
50%	7,540,809	22,172,240	36,218,354	49,696,652	kWh

Figure 9: Estimated demand of EVs by varying penetration rates until 2050

### Air Source Heat Pumps (ASHPs)

One technology that must be examined is Air Source Heat Pumps (ASHPs), which could have major impacts on the emissions and energy associated with residential heating in Westport in the years to come. ASHPs are quite relevant to Westport, as 67% of homes in Westport use heating oil for their heating needs – ASHPs present an opportunity for these households to save money while also reducing their emissions. Below follows an analysis of ASHPs, and a straightforward model to demonstrate their potential to save energy and reduce emissions.

#### Benefits of Air Source Heat Pumps

The clearest benefit of ASHPs is that they are a more energy efficient technology; saving money and reducing GHG emissions at the same time. Another benefit of ASHPs is that they shift consumption

away from heating oil and natural gas, and onto the grid. The grid is continuously evolving, which means it can improve its emissions factor over time and is doing so through state RPS measures. Oil cannot do this. Thus, ASHPs give residents' heating-related emissions flexibility over time that they didn't have before.

#### Downsides of Air Source Heat Pumps

ASHPs installations costs residents money and time, and it can be difficult to persuade residents to make changes, since most already have functional systems in place. In many cases residents will still need a backup system for when conditions are too cold, which can be relevant to Westport. Despite causing a decrease in net energy consumption, ASHPs also increase electricity consumption for a household.

#### Assumptions and Impacts

Due to the high cost of residential electricity in CT, natural gas is often a cheaper option to heat a home.<sup>23</sup> As a result, the more feasible play is to incentivize households that use oil to switch to ASHPs. The logic in this assumption is that GHG reductions are easiest to achieve when they accompany financial savings, in a "win-win" scenario for residents. The residents with the most to gain from upgrading to an ASHP are the residents who currently heat with heating oil.

A key assumption to be made in assessing ASHPs is to determine the ratio of electricity consumed to heat energy generated. The Department of Energy (DOE) states, "when properly installed, an air-source heat pump can deliver one-and-a-half to three times more heat energy to a home than the electrical energy it consumes."<sup>24</sup> For our model, a 2:1 ratio of electric energy consumed to heat energy generated was assumed.

Referring to our residential oil data, there were an estimated 6,274,447 gallons of heating oil consumed in 2015. This was converted to the equivalence of 886,048 MMBtu of energy being expended, with a CO<sub>2</sub>e of 64,764 metric tons. Furthermore, after consulting the 2015 Grand Building List for Westport, of the 9,478 households in the Town, 6,361 are reported to heat with heating oil. Combining these data sources, the potential impacts of ASHP installations are represented Figure 10.

Impact of Switching from Heating Oil to ASHP						
HH switching from heating oil to ASHP	Electricity Consumption		Heating Oil Avoided		NET IMPACT	
	Energy (MMBtu)	GHG (MTCO <sub>2</sub> e)	Energy (MMBtu)	GHG (MTCO <sub>2</sub> e)	Energy (MMBtu)	GHG (MTCO <sub>2</sub> e)
10%	44,302	1,362	88,604	6,476	-44,302	-5,114
20%	88,604	2,724	177,209	12,952	-88,604	-10,228
50%	221,512	6,811	443,024	32,382	-221,512	-25,570
100%	443,024	13,623	886,048	64,764	-443,024	-51,140

Figure 10: GHG emissions reduced by switching from heating oil to ASHPs

This model suggests that a complete switch of households from heating oil to ASHPs, could reduce GHG emissions for the residential sector by 51,140 MTCO<sub>2</sub>e, which would reduce residential emissions by 47% below 2015 levels, a significant shift. It is evident why ASHPs have such a strong potential for impact within Westport's residential sector. A full and editable version of this model is provided in conjunction with this report.



# 4

## STRATEGIES & TAILORED ENERGY INITIATIVES

### Defining Peer Cities

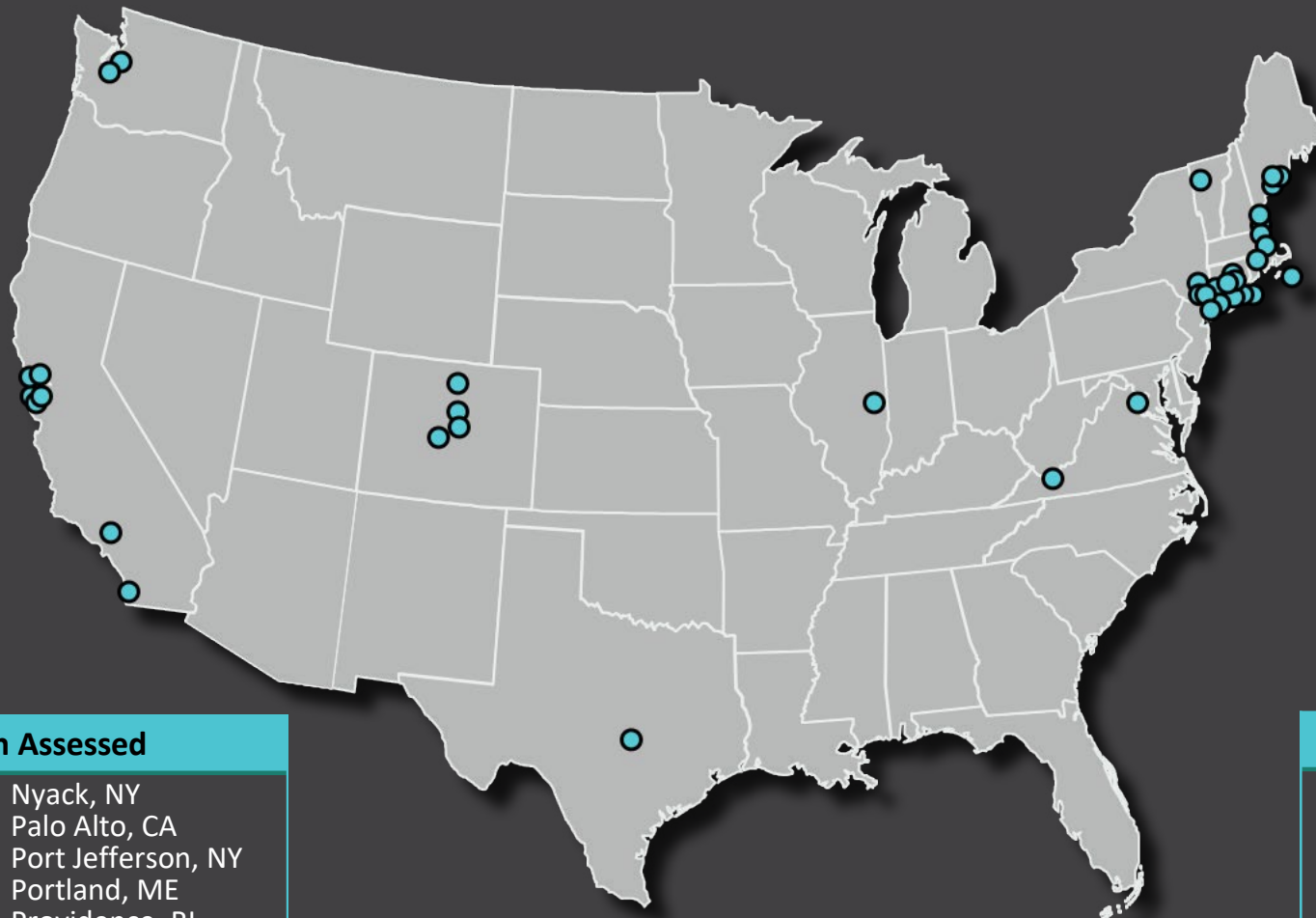
In determining the most effective actions that can help Westport reach Net-Zero by 2050, our team assessed initiatives from “peer” cities. First, a literature review of U.S. cities that had a CAP or similar report was conducted, which led to a list of 44 cities used in this project (Figure 11). These 44 cities, as well as others that had set Net-Zero goals or produced valuable insights that could be applied to Westport’s target initiatives for 2050 were further investigated. To ensure identification of not only best practices for Westport, but also ones that could be tailored, a variety of municipal planning documents from each of the cities in question were reviewed. Formats considered were CAPs, sustainability plans, energy plans, and resiliency plans among others. Due to our focus on energy, if a town did not have a plan with energy components, or offer insights into community engagement strategies, it was taken out of consideration. Once a reasonable set of like-kind locations were established, further prioritization of the vast array of initiatives was possible.

Second, to determine the most applicable options for Westport, categorical filters were established to ensure a municipality match was being made. For purposes of this study, a “peer” city is defined as one that matches two of the following criteria: is located in Connecticut, is similar in population size, and is within a close range of Westport’s median household income, referenced in Figure 12. The added filtering process produced 14 cities, and to ensure a sound methodology, the criteria matching was reviewed by the GTF. Ultimately, two cities met three of the criteria above, and achieved GTF agreement as a “peer”. Thus, the remaining 12 cities remained in consideration for our analysis as “similar” cities to Westport. Towns deemed “similar” or “peer” were the resources from which initiatives for the Net-Zero goal were tailored. From here on, all 14 cities will be referred to as “peer” cities.

PEER CITY CRITERIA	
Criteria	Justification
Located in Connecticut	Similar regulatory landscape, seasonal weather, and the same state RPS and governance structure.
Population <50,000	Westport’s size typifies the community as a town, rather than a city. The parameter was set using the U.S. Census’ definition of an Urban Cluster.
Median HH income >120% of U.S. average	Considering towns whose median household incomes are significantly greater than the national average captures wealthy towns that are likely to have similar housing stock characteristics, and consumption behaviors.

Figure 12: Criteria used to determine peer cities to Westport

**44 cities analyzed, totaling a population of 15.5 million**



#### City Plan Assessed

Alexandria, VA	Nyack, NY
Austin, TX	Palo Alto, CA
Bedford, NY	Port Jefferson, NY
Berkeley, CA	Portland, ME
Burlington, VT	Providence, RI
Blacksburg, VA	San Diego, CA
Boulder, CO	Santa Cruz, CA
Boston, MA	Seattle, WA
Bridgeport, CT	South Hampton, NY
Brookline, MA	South Portland, ME
Cambridge, MA	Tacoma, WA
Denver, CO	Urbana, IL
Fort Collins, CO	New York City, NY
Hartford, CT	Kingston, NY
New Haven, CT	Lancaster, CA

#### Peer Cities

Aspen, CO
Atherton, CA
Avon, CT*
Branford, CT*
Cape Elizabeth, ME
East Hampton, NY
Fairfield, CT
Hillsborough, CA
Huntington, NY
Nantucket, MA
New Castle, NY
Portsmouth, NH
Rye, NY
Stamford, CT

**Figure 11: Map of Cities Analyzed**

# Tailoring Energy Initiatives for Westport

From the 14 "peer" cities, 216 energy related initiatives were assessed, as shown in Figure 13. We developed a selection method based on criteria other cities have used to prioritize their initiatives. Aspen, Colorado (CO) and Brookline, Massachusetts (MA) were the only cities in this study that documented their initiative selection process. The list of initiatives was narrowed down to eight main initiatives and 32 sub-initiatives.

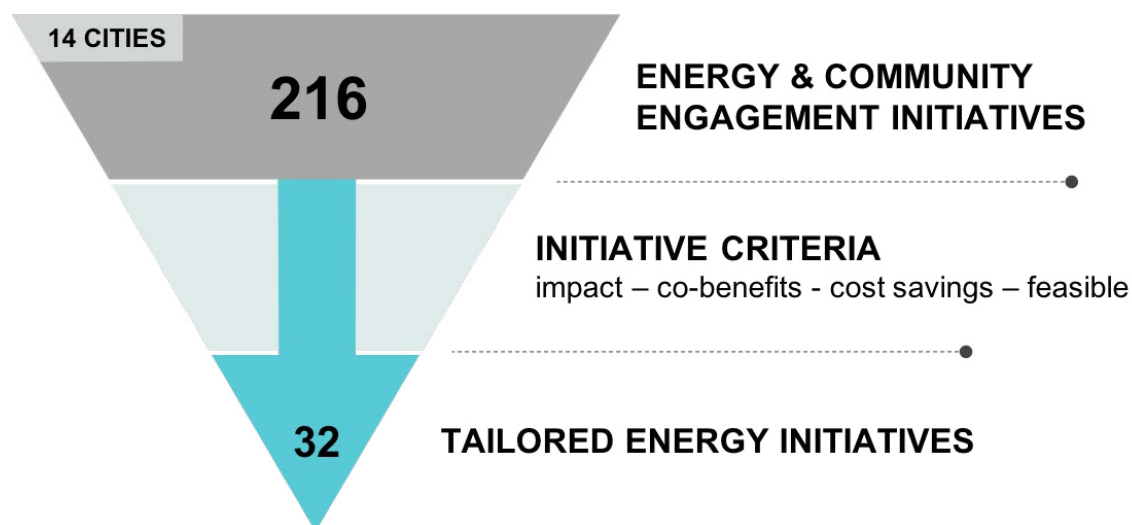


Figure 13: Process of reviewing and tailoring energy initiatives for Westport

The selected initiatives were tailored to ensure they are applicable as best practices for Westport by assessing their impact, co-benefits, feasibility, and cost savings. Figure 14 shows the rationale behind the selected criteria.

Initiative Criteria			
Energy Impact	Co-benefits	Feasibility	Cost Saving
<ul style="list-style-type: none"><li>• Reduce energy consumption</li><li>• Increase renewable energy</li></ul>	<ul style="list-style-type: none"><li>• Environmental</li><li>• Social</li><li>• Economic</li></ul>	<ul style="list-style-type: none"><li>• Supporting policy</li><li>• Easy to implement</li><li>• Complete within reasonable time frame</li></ul>	<ul style="list-style-type: none"><li>• Short-term cost reduction</li><li>• Favorable ROI</li></ul>

Figure 14: Criteria used to assess potential initiatives



## Recommendations for Westport

The selected initiative recommendations address Westport's Net-Zero energy goal to reduce energy consumption through energy efficiency and meet the resulting demand by producing or purchasing renewable energy.<sup>25</sup> The initiatives are categorized into three strategies. The first initiative is paired with Strategy 1: Engage the Community. Initiatives two through five correspond to Strategy 2: Reduce Energy Consumption. Strategy 3: Increase Renewable Energy Supply and Generation includes initiatives six through eight. A summary of metrics for sub-initiatives, the towns that inspired these recommendations, and the suggested department lead are provided in Appendix F.

1

### ENGAGE THE COMMUNITY



Cultivate awareness of the Town's Net-Zero by 2050 energy goal

2

### REDUCE ENERGY CONSUMPTION



Increase efficiency in all existing buildings



Promote the use and implementation of technology that increases energy efficiency



Adopt energy efficient design and construction guidelines for new buildings



Develop energy efficiency finance mechanisms

3

### INCREASE RENEWABLE ENERGY SUPPLY & GENERATION



Foster a community and regional transition to clean energy



Continue to promote solar PV installations



Establish renewable energy finance mechanisms

# STRATEGY #1

## ENGAGE THE COMMUNITY

A key factor in achieving energy conservation efforts at the community level is community engagement and the adoption of behavior change<sup>26,27</sup> based initiatives. These initiatives engage and motivate residents to work towards shared goals. The peer city analysis was developed to identify ideas, but operationalization comes through the engagement of Westport's community. Efforts must include information sharing regarding the benefits of energy conservation, establishing guidelines to achieve reductions, and offering tools or incentives to keep Westport's residents actively participating. The following community engagement initiative and sub-initiatives are recommended for Westport:



### **Initiative 1: Cultivate Awareness of the Town's Net-Zero by 2050 Energy Goal**

- 1.1 Launch a challenge in the commercial sector that showcases local businesses who have proven to be leaders in energy efficiency achievements
- 1.2 Implement a competition where households aim to reduce energy use by 10% per year through a voluntary pledge that allows residences to commit to energy efficiency
- 1.3 Facilitate energy conservation competitions in schools
- 1.4 Encourage schools to participate in the Connecticut Green LEAF Program<sup>28</sup>
- 1.5 Incorporate energy efficiency curriculum and projects within Westport's public-school system.

### **Implementation and Engagement**

To ensure energy initiatives make the most impact, awareness from businesses, community members, and schools will help drive these efforts. Cultivating awareness through local business challenges and household competitions will encourage people to participate. Awareness calls for a cultural shift in all areas of Westport, with the goal of impacting sectors through education, partnerships, incentives, and the dissemination of relevant tools.

### **Community Engagement: Relevant Methods and Practices for Westport**

In addition to the initiatives listed above that revolve around awareness building and communal action, four overarching areas of community engagement were identified. It is important to understand these areas to ensure that Westport's initiatives gain the necessary traction and support to be successful. The four defined areas are: Education, Partnerships, Incentives, and Tools. Below are explanations, examples, and motivations for these community engagement areas.

## Education

Community education and public awareness constitute the first component of an effective community outreach effort. Misperception may provide a critical explanation for why individuals frequently underinvest in efficiency measures. There is such a frequency of this type of phenomenon that it has been denoted as the “energy efficiency gap”.<sup>29</sup> These deficiencies in potential outcome suggest that with a well-designed community engagement and marketing effort, the options to improve the public’s understanding of energy use and savings could pay large dividends in long-term behavior change.

The combination of strategies employed to engage communities about the efforts of climate action should aim to educate the community on: (1) energy-related GHG emissions and why it is a problem, (2) the co-benefits associated with reducing energy consumption, and (3) actions to reduce consumption.

### K-12 and Higher Education

K-12 and higher education students are an effective force for social change.<sup>30</sup> As a part of this study, the team interviewed Westport high school students and parents, and spoke with administrators in both private and public schools. Through structured and informal interviews, with an emphasis on residents that have children in the public schools, it was evident that the direct outreach with even a small sample (15-20 residents) revealed that a consensus exists. Starting in middle school, students can have a meaningful influence on their parents’ behaviors and in turn become agents of change within the larger community.

Students expressed that Westport could achieve its goal by establishing a work-based or engaged educational option for credit, where the greater issues of climate change can become an integrated learning opportunity. Westport and the GTF can benefit from a relationship between administrators and faculty within the Board of Education and private schools. Placing a member from the educational sector within the GTF would allow for informed input on the creation of environmental-based educational opportunities for students. Fairfield County, for example, has demonstrated that this has added value to the curriculum.<sup>31</sup> The Milton School in Rye, New York (NY), has also established an environmental committee, which supplements the school’s curriculum by organizing field trips, assemblies, and lesson plans that are related to climate change, recycling, and pollution. These experiences are meant to empower children, helping them feel capable of taking collective action on environmental issues.

As the GTF develops Westport’s CAP, the academic research, survey work, writing, and visual illustrations that go into this type of a document can be completed on a for-credit basis, or as part of a community service offering. Engaging students from nearby institutions such as Yale University, Fairfield University, the University of Bridgeport, and community colleges provides an opportunity for skilled input. Another example is the annual Nantucket Energy Office summer study program, which engages students from the Worcester Polytechnic Institute, resulting in the research projects related to EVs, solar PV technologies, and environmental change through behavior modification.



### “Viral” or “Learn-Do-Teach” Programs

“Viral” or “Learn-Do-Teach” programs empower and initiate behavior change through the process of community volunteers, local professional practitioners, and administrative staff. For example, the GTF could offer to train the members of such a group to start a “viral” spread of inspiration to others. This is a casual, cost effective, and proven form of disseminating information.<sup>32</sup> Rye has offered training programs on green buildings, energy code procedures, and financing to municipal employees to promote the adaptation of green building practices and the decrease of long-term costs.

### Event-Based Education

Event-based education can offer the advantage of reaching larger portions of the Westport community. To curb high capital and personnel needs for a singular event, it is recommended that the best utilization of event-based education is through energy reduction challenges. This will allow distribution of communication and messaging through pre-established events. Options could include an Earth Day fair, local concert, art festival, or carnival, which would minimize costs and optimize potential for impact. “Go Green” seminars and workshops could be organized to promote topics such as home energy efficiency, options for heating using solar energy, and insulating private homes. Fairfield, for example, has developed numerous community workshops and events on various issues including renewable energy, energy efficiency and climate change.<sup>33</sup> The Town of East Hampton has an active community outreach effort that produces educational materials and reference guides on energy efficiency, residential retrofits, and green living.<sup>34</sup> It is recommended that the GTF continues to drive and support event-based education.

### Direct Education and Promotion

A basic form of community education is a website, which is a relatively simple and cost-effective way to communicate directly with residents, that also helps boost the visibility of energy reduction programs. This can be elevated through social media advertising and no-charge media platforms such as Google AdWords, Facebook, or Twitter. To further develop messaging, a branding strategy, including the design of a logo, needs to be established. This would help identify the GTF as an independent organization, and has a set of key messages. Messaging must be community driven, participatory, and result in options to engage the community. The GTF website is currently a work in progress, and can serve as a great medium for explaining the Town’s commitment to Net-Zero and showcasing all the resources available to residents to facilitate their participation.

### Educational Content and Positive Modeling

To maximize participation and generate enthusiasm for Westport’s efforts, emphasis should be placed on the second and third elements of Westport’s education priorities: the benefits that come with energy conservation efforts, and the actions that can reduce energy use. The “how to” that empowers the residents to act on energy reduction measures and the direct financial or environmental benefits of their actions will motivate people more than abstract and vague messages. To produce long-term, positive behavior change, the community needs to receive specific messages that align with goals for the GTF’s efforts. For example, Westport can showcase examples of how residents have cut their emissions by having tours that open homes and businesses for a ‘show and tell’ event. Through these opportunities, residents can learn that making an impact is feasible and part of community values. This strategy could focus on EV drivers, solarized homes and businesses, and innovative recycling programs within Westport.<sup>35</sup>

## Partnerships

Successful community outreach programs are the product of public and private partnerships. When two or more organizations align their value systems and aim for the same goals, the scope and success of one action can be magnified. Programs such as fairs, events, or other outreach that target community engagement and behavior change, generate more participation. In the context of reducing energy consumption, partnerships can provide vital financial support.

### Government

Several government agencies at the state level are already managing community outreach initiatives with energy-saving messages. In most instances, Westport will be at the leading edge of the efforts, but there are lessons to be learned from previous outreach efforts elsewhere.

Stamford, CT, joined “Rebuild America”, a voluntary network of community partnerships, established by the DOE in 1994, to reduce the amount of energy consumed by buildings. The initiative, “Rebuild Stamford”, “consists of facilities and engineering department staff along with Connecticut Light and Power, controls companies, contractors, and architects collaborating to implement energy efficiency projects throughout city buildings and facilities. Under this program, a number of energy efficiency measures were implemented at municipal buildings and facilities.”<sup>36</sup>

### Business

Business partners in Westport’s community outreach programs can provide material support, access to a wide range of residents, and can give insight into best practices in the private sector. Many businesses in Westport are in the financial industry, and are highly capable of measuring, quantifying, and encouraging their employees to be part of the local economy. If the GTF were to initiate a partnership dialogue with private schools, retailers, or Bridgewater Associates for instance, these local businesses may welcome the opportunity to participate in acting towards the Town’s goal. Forging active partnerships in advance, aligning goals, and obtaining local buy-in is important as a community engagement method, but will also stimulate behavior change in a positive way. Some larger corporations may demonstrate the ability to provide financial support in the form of sponsorship or donated goods that relate to the Westport’s more holistic sustainability initiatives. This provides the exchange of a business’ effort and involvement for brand distribution in association with environmental responsibility and the development of social well-being.

### Nonprofit

It is recommended that the GTF forms partnerships with neighboring communities via Sustainable Fairfield County. Additionally, enrolling environmental groups such as Westport’s Garden Club as partners will benefit the GTF, as groups like these have years of experience in implementing environmental initiatives. Partnerships with non-environmental community groups such as churches and synagogues will also provide key support in promoting community initiatives.



# STRATEGY #2

## REDUCE ENERGY CONSUMPTION

Westport must first reduce its energy consumption in the municipal, commercial, and residential sectors. Doing so requires engagement through mechanisms such as policy, monetary and non-monetary incentives, as well as educational and community outreach activities. The initiatives detailed below, if implemented, will support the energy reduction portion of Westport's Net-Zero goal. This strategy will be measured by benchmarking energy consumption year after year, to verify if there was a reduction in energy consumption.



### Initiative 2: Increase Efficiency in All Existing Buildings

Increasing energy efficiency is vital, especially because approximately 50% of Westport's housing and building stock was built before 1960. The age of the existing buildings is reflected in the Town's high energy consumption, which is 40% higher than the national average. One way to reduce consumption is to implement strategies that increase efficiency in existing buildings.

The sub-initiatives proposed will benefit residents by lowering electricity bills and increasing property value. For example, in 2.4 below, studies have shown that older houses that have energy certifications, such as Energy Star or a Home Energy Rating (HER), sell at a higher price, as evidenced in Rye, NY.<sup>39</sup> From our peer city analysis, we found that 9 out of 14 peer cities have initiatives that relate to increasing energy efficiency in existing buildings.

- 2.1 Mandate energy audits for all municipal buildings including schools and affordable housing units
- 2.2 Draft legislation requiring commercial buildings to conduct energy audits<sup>40</sup>
- 2.3 Promote professional residential energy audits by partnering with private companies offering free or low-cost assessments
- 2.4 Encourage all new residences sold or transferred to obtain a HER<sup>41</sup> or Home Energy System (HES)
- 2.5 Implement cost effective retrofits in municipal buildings, offices, facilities, and affordable housing units based on energy audit findings
- 2.6 Seek to develop partnerships with ESCOs and utilities to offer potential rebates and incentives for residential retrofits based on the recommendations from audits
- 2.7 Launch an energy benchmarking pilot program for public schools

### Implementation and Engagement

Several methods of engagement can aid in the development and implementation of effective actions for both energy audits and retrofits. For commercial and municipal buildings, for example, policy is a powerful tool, which can be used to mandate audits and retrofits. When considering the residential sector, additional emphasis on community engagement is required to encourage voluntary actions. For residents to pursue energy audits and HERs, Westport should seek partnerships with home energy contractors and with Eversource, to provide rebates or discounted services to residents. Westport should seek to inform residents of the benefits of energy audits through direct education and promotion, by distributing relevant information on energy audits to the community. The first step for Westport is to create opportunities for residents to conveniently and affordably obtain an energy audit. The second step is to inform residents about said audit opportunities.





### **Initiative 3: Adopt Energy Efficient Design and Constructions Guidelines for New Buildings**

Increasing energy efficiency in new buildings is an important measure to adopt in order to effectively tackle consumption. In the case of Westport, its Code of Ordinances follow state mandated building codes, which prohibits municipalities from enforcing energy efficiency standards that exceed state standards (104.10.1 explicitly denies the modification to existing codes).

A strategy around this impediment is to promote voluntary adoption through incentives, more specifically by expediting the permitting process. For example, Rye's Sustainability Plan calls for action to accelerate the processing service for projects that demonstrate a high degree in energy efficiency and/or are LEED certified.<sup>43</sup> Other cities such as Seattle, Fort Collins, and Boston have adopted a goal similar to Westport's, and have promoted incentives for the construction of efficient new buildings.

- 3.1 Institute an accelerated permitting process for new commercial and residential developments that demonstrate high efficiency standards, utilizing LEED or Net-Zero Energy Building certifications
- 3.2 Support inclusion of Life Cycle cost analysis in conceptual design in order to obtain permits

#### **Implementation and Engagement**

Westport can help foster an environment that encourages energy efficient design and construction primarily by educating residents and municipal staff on the associated benefits. Specific examples include energy workshops or professional development seminars. To this end, the Town should seek partnerships with educational institutions that can provide exposure, and develop relevant programs, such as classes on green building. Furthermore, when implementing an accelerated permitting process, Westport is helping promote energy efficient design through a reward structure where energy efficiency leads to a better permitting experience. This reward concept could be taken even further through the creation of recognitions such as an 'Energy Efficiency Stewardship' or 'Green Building' Award, which recognizes new constructions exceeding the states efficiency standards.



## **Initiative 4: Promote the Use and Implementation of Technology that Increases Energy Efficiency**

Technologies can be utilized to regulate and minimize energy consumption. To outfit buildings and facilities, municipal government can create a procurement protocol that mandates the purchase of equipment that follows certain efficiency standards, such as ENERGY STAR or EPEAT. Furthermore, installing smart systems such as occupancy sensors in municipal buildings, as Avon, CT has done,<sup>44</sup> or deploying a Building Management System (BMS) in municipal buildings, as seen in Huntington, NY,<sup>45</sup> ensures the excessive energy used to illuminate rooms and the irregular management of heating and cooling buildings is unified.

- 4.1 Install occupancy sensors in municipal buildings
- 4.2 Replace street lighting fixtures with LEDs<sup>46</sup>
- 4.3 Explore the feasibility of incorporating smart technologies such as battery storage solutions, smart thermostats and cooling technologies
- 4.4 Pursue partnership with companies offering new and innovative efficiency technologies at discounted rates for residents
- 4.5 Adopt a municipal procurement policy requiring efficiency standards for equipment replacements
- 4.6 Deploy Building Management Systems (BMS) that control heating and cooling functions in municipal buildings

### **Implementation and Engagement**

The Town of Westport needs to lead by example for residents to consume energy wisely, increase the use of clean energy sources, and adopt a lifestyle that conserves resources. The Town can pursue and implement all practical and cost-effective actions to reduce energy use in buildings and consider adopting street lighting technology innovations as they become more cost effective. LED lighting or augmented building control systems are easy places to start in this regard.

The GTF should seek to make already approved plans as energy efficient as possible. Projects going forward should include all potential improvements with paybacks that meet an established guideline, perhaps 5 years or less as Avon, CT, has done. Decisions regarding purchases of equipment should also always consider the energy requirements associated with alternatives.

The GTF can take the lead in identifying and communicating information to the community regarding companies offering innovative energy efficiency technologies, especially ones offered at a discounted rate for residents. An example from a peer city comes from Avon, where lighting upgrades and controls have been installed in most municipal and school buildings through the Connecticut Light and Power incentive program. The "BOE replaced 9,904 32W bulbs with 25W long life high efficiency bulbs in all school classrooms, re-lamped exterior/parking lot lighting with lower wattage bulb and re-ballasted fixtures, and installed LED lighting for exterior/parking lot fixtures at all schools."



## Initiative 5: Develop Energy Efficiency Finance Mechanisms

Along with legislative barriers, financing energy efficiency initiatives can be a major hurdle for municipalities. This is particularly true for Westport. Currently, over 60% of the FY2018 municipal budget is allocated to the BOE, leaving the Town with \$78 million for standard governmental services.<sup>47</sup>

The purpose of this initiative is to leverage existing Town resources to better enable the financing of other Town-wide initiatives, and find a means for financing that may not be possible otherwise. As an example, in the Town of Fairfield, the United Illuminating Company, in partnership with the Connecticut Energy Efficiency Fund, provided a loan to the municipality, enabling energy efficiency upgrades. This loan is being repaid, interest-free, and continues to be paid in this form until the cost of the upgrades are recouped by the payments directly made through utility bills.<sup>48</sup> This is not unique in approach. The Natural Resources Defense Council (NRDC) presents many advantages in this sort of mechanism, including the broadening of potential customer eligibility for energy related efforts. By providing institutions such as United Illuminating Company with a new option for investing in efficiency, Fairfield was able to produce more than one result through a single action. Most formatively, such a practice encourages market transformation by enabling existing service providers to take charge of new trends, while also shifting community engagement.<sup>49</sup>

- 5.1 Pilot an on-bill financing program to fund efficiency upgrades in the residential sector
- 5.2 Establish a revolving loan program for businesses that pools private and public funding for the purposes of energy efficiency upgrades

### Implementation and Engagement

As an implementation pathway for Westport, there is one existing arena where energy efficiency measures should take place: public schools. Using a competitive framework, students and parents can engage with faculty to establish baseline data analysis and learn the methodologies that can help the Town achieve its Net-Zero goal. Results can be used to approach the Town's finance department, school administrators, and in turn could go to the CT Green Bank or the electric utility for funding options. This partnership approach with a pairing of education and target of the education sector would allow for an economical means to engage the community as well as ensure parents and Town staff are seeing long-term results. As students of the public high school have alluded to in interviews with the Capstone team, "it would be a great item to put on a resume." The competitive landscape would prime the relationship needed for other more difficult areas to make energy efficiency changes.

# STRATEGY #3

## INCREASE RENEWABLE ENERGY SUPPLY & GENERATION

To balance the energy equation to zero, and further Westport's Net-Zero by 2050 goal, the resulting energy demand after efficiency measures must be supplied by renewable resources. From the "peer" cities, 27% of energy initiatives involved renewable energy and our research shows there are two approaches to this. The first approach is generating renewable energy on site, for example, by utilizing rooftop solar panels that supply energy to a building or the grid. The other approach relies on sourcing renewable energy from the grid, for example, by negotiating with the utility company to provide a larger percentage of its portfolio with renewables such as wind or solar energy. This would allow Westport's residents and municipality to select the mix of their electricity supply.



### Initiative 6: Foster Community and Regional Transition to Clean Energy

Increasing renewable energy supply involves fostering a community and regional transition to clean energy. This initiative can be accomplished through taking part in existing regional programs. Westport already partners with organizations such as CT Green Bank on solar PV projects, and it is recommended that these efforts are continued.<sup>50</sup> Furthermore, establishing a collective of local governments and utilities, and use of energy procurement models such as Community Choice Aggregation (CCA) are also recommended initiatives in this area (Figure 16). In Atherton, CA, the municipality enrolled all residences and municipal facilities in CCA. Atherton predicts this initiative will reduce GHGs by 48% by 2030 because renewable energy is purchased for all enrolled buildings.<sup>51</sup> CCA would be a new endeavor for Westport; however, it can be achieved in CT.

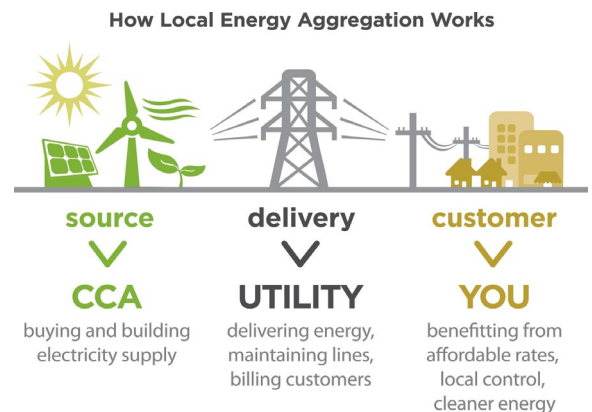


Figure 16: Community Aggregation (source: [Lean Energy](#))

- 6.1 Participate in regional energy efficiency and renewable financing programs
- 6.2 Establish collective of local governments and utilities to drive a clean energy transition
- 6.3 Advocate for a transition to Community Choice Aggregation (CCA), an energy procurement model that replaces the default supplier of electricity for cleaner energy at a lower cost.

### Implementation and Engagement

The lack of available funds and staff resources are major barriers in the transition to clean energy. Participation in regional energy efficiency and renewable financing programs would allow Westport residents to complete energy-efficiency upgrades or install solar systems with a minimal upfront cost. In addition, it is recommended that the GTF explore the option to obtain funds from the CT Green Bank and communicate information to the community on how to access existing renewable energy funding.



Westport should actively participate and engage with the county organization, Sustainable Fairfield County, to promote collective strategies that increase the installed capacity of renewable energy in Fairfield County. Collaboration with local governments and utilities will highlight important lessons learned from previous outreach efforts, as well as organizational advice.

Furthermore, the CT Public Utilities Regulatory Authority (PURA) allows for electric aggregators, which gather “consumers for the purpose of negotiating the rate for generation service from an electric supplier.”<sup>52</sup> A group of Westport’s residents could work together as a voluntary group with an electricity aggregator on behalf of the Town’s electricity consumers to receive competitively priced renewable energy supplied to them by Eversource, which has the potential to advance the Town’s progress significantly in the utilization of renewable electricity. Alternatively, all residential accounts could be enrolled in CCA by a municipality, and consumers would have the option to decline.<sup>53</sup>



### **Initiative 7: Establish Renewable Energy Finance Mechanisms**

For Westport to continue the achievements already established in the transition toward a clean energy future, it is important for the Town to promote consumer financing mechanisms to enable residents in becoming engaged, educated, and deliver on projects that help the community achieve its goal. As mentioned, financing initiatives can be a difficult challenge for municipalities, so finding new ways to develop capital is critical to success. One way for Westport to do this is by leveraging the existing membership the Town has in the Commercial Property Assessed Clean Energy Program (C-PACE). In 2016, Earthplace, the Nature Discovery and Environmental Learning Center in Westport, secured funding from C-PACE for phase II of its sustainability plan. This project added 32 kW of solar with heating system upgrades and included a major LED lighting retrofit. The total cost of this project was \$300,000, of which \$178,000 was paid for through the C-PACE program. As a result, there will be a reduction of 103,233 kWh/year in grid supplied electric power, a reduction of 1,742 gallons/year in heating oil use, a carbon reduction of over 40 tons/year and a particulate matter reduction of 40%.<sup>54</sup> Encouraging through new means, the work that is already being done through C-PACE can be done by also going to means of legislation.

In 2008, Aspen, CO launched the Renewable Energy Mitigation Program (REMP). The REMP is suited to residences with 5,000 square feet or more, in addition to homes or businesses that have outdoor spas, pools, or snowmelt systems. Aspen took the REMP program, localized it to its community, and was able to design promotional programs for citizens to deploy renewable energy and energy efficiency systems. This program has been a success in that environmental impacts have been mitigated and REMP has raised over \$12 million for energy efficiency and renewable energy projects.

- 7.1 Improve access to Commercial Property Assessed Clean Energy (C-PACE) and other specialized financing mechanisms available for the other sectors
- 7.2 Draft legislation to require the residential sector to offset energy use by installing renewables on-site or pay mitigation fees

## Implementation and Engagement

An effective method to support the implementation of renewable financing mechanisms is through event based education, promoting at events and community gatherings, or by marketing at other public venues that the Town has available at little or no cost. A campaign can be created that promotes the brand Westport will need to establish in its own CAP process. By meeting residents where they literally and physically are, the GTF will be in a better position to reach the Net-Zero goal. Municipal staff and employees, as well as marketing firms, can engage in open forum dialogues, workshops, and other behavior changing public events as a means of educating the community about C-PACE programs or others like what Aspen has put to work.



### Initiative 8: Continue to Promote Solar PV Installations

Westport has made strides to increase its solar PV installation. Specifically, in the residential sector, through Westport's participation in the Solarize CT program in 2012, Westport increased citizen awareness of solar PV, and in turn doubled the installations of solar PV in the residential sector, as shown in Figure 17. During the four month long program, homes installed over 382 kW of solar capacity.<sup>55</sup> As a means of continuing this effort, the initiatives proposed below can increase solar PV installations in Westport, thus resulting in a reduction of CO<sub>2</sub> emissions and a decrease in electricity purchased from the grid. More than 55% of the peer cities had initiatives that directly relate to increasing solar PV installations. As a "peer" city example, from 8.4 below, New Castle participated in a town-supported solarize program in partnership with a neighboring town, Somers. The program selected Direct Energy Solar to offer solar electric systems to both homeowners and commercial property owners. Costs reduced, and the program ultimately resulted in 76 homes installing solar PV.<sup>56</sup>

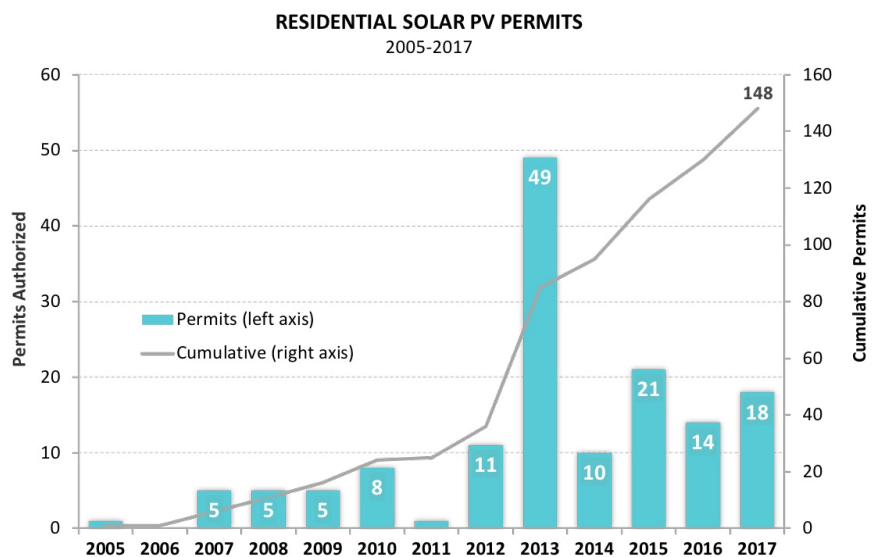


Figure 17: Increase in Westport's solar PV installations between 2005-2017

- 8.1 Install Solar PV on all municipal buildings where technically feasible
- 8.2 Create a solar demonstration project at a municipal building location that achieves maximum exposure to the community
- 8.3 Identify and utilize financial incentives from state programs to install solar PV on schools<sup>57</sup>
- 8.4 Provide community solar opportunities by bringing solar developers and interested households together
- 8.5 Support local vendors and stakeholders at town-held workshops

## Implementation and Engagement

Similar to other initiatives, schools are a near perfect venue to ensure education in the community happens where it counts. Students inform their parents and that in turn spreads in a viral form with little to no cost to the Town. The BOE and GTF can work with the First Selectman to install solar at schools not only on rooftops, but also in parking lots. With public engagement, student participation and ultimately with the public aware of the values that youth have, it will make for long-term community engagement and behavior change; not something easy to do directly without the option of a school venue. For example, the use of existing municipal controlled property for increasing renewables is an acceptable practice. Workshops, “show and tell” public events, and EV charging stations can be integrated to ensure teachers, administrators, and Town departments are working with this as a place to start. With even the slightest success, the train parking lots, commuter lots, and even the retail parking areas in Downtown Westport will all offer options to educate the community, increase renewables, and shift the behavior of the residents in a ‘see and do’ teaching format.



Figure 18: Projection of solar PV installation at Fairfield’s Ludlowe High School (source: [Fairfield Daily Voice](#))

# 5

# CLIMATE ACTION PLANNING, STRUCTURING & IMPLEMENTATION

To provide the GTF with a guide for planning, structuring, and implementing a CAP, the team researched and assessed 39 existing climate action and sustainability plans from cities and towns within the U.S. The resulting analysis provided the team insight for recommending a structure for Westport's CAP, specifically identifying key elements that Westport should consider including when developing the Town's CAP.

## Results

Developing a CAP is a complex process, involving a large group of stakeholders and scope of action. Cities structure and approach their CAPs differently because they are tailored to address local priorities, and must consider budget, politics, regulations, human resources, population, culture, physical assets, and timelines, which vary across cities. Although such specificities in content differ across CAPs, there are common key elements, themes, sections, and trends that are widely applicable. Westport can utilize the resulting analysis of the 39 plans assessed in this study to determine how to structure its own CAP in the most effective way possible.

### Setting the Tone

To successfully set up a CAP, the plan must address challenges, have a vision, and include issue areas, long-term goals, detailed initiatives, and milestones. It is important that a CAP provides a clear statement regarding the challenges faced in the community, not only to increase their relevance, but also to address specific initiatives. Next, the plan's vision provides a unifying message as to why the plan matters, which helps readers understand and support it. The main issue areas that the plan could address are recommended to be separated by sections, and these can be the actual chapters in the plan, which further address how to achieve the vision and overcome the challenges described. Furthermore, long-term goals are vital to enhance internal and external accountability, and can generate public support and buy-in. Detailed initiatives demonstrate to readers a town's commitment, as well as the path forward to achieve goals. Finally, setting near-term milestones enables the community to demonstrate progress to residents.

### Planning Process

There is a significant planning process involved in creating a CAP. The completion of a baseline assessment, identification and engagement of stakeholders, and prioritizing potential actions are essential practices.

#### Baseline Assessment and Interim Targets

Conducting a GHG inventory is part of the planning process and is essential for Westport. Such an assessment is needed to identify the baseline against which targets are measured. A baseline will further inform where the Town should prioritize its actions and will provide a starting point by which progress can be measured. The process of setting interim targets and measuring baselines needs to be conducted for all the areas of action in the CAP, including water and waste.



As Westport starts to create a pathway to its long-term Net-Zero goal, the GTF should advise the Town to adopt near-term milestones. Over 75% of the plans assessed have adopted interim targets because they can help a community combine near, medium, and long-term deadlines. Furthermore, it is recommended that as part of Westport’s target setting process, the GTF play an integral role to determine the scope of each target (i.e. municipal operations or community-wide), and establish a clear, easily understood definition of Net-Zero.<sup>58</sup>

#### Stakeholder Engagement

A key to successful CAP development is stakeholder engagement throughout the planning process, from the initial drafting of the CAP through implementation and monitoring. This is widely recognized by cities, as 89% of the plans assessed mentioned the importance and development of stakeholder engagement strategies. Initiating, building, and sustaining relationships with a diverse set of stakeholders will not only lead to a more inclusive planning process<sup>59</sup>, but also has the potential to gain community buy-in. As such, the messaging developed to support a Net-Zero commitment should explicitly link actions that serve local issues, connect climate action to tangible benefits for residents, and explore whether the community understands and is motivated by the goal.

#### Prioritizing Actions

Prioritizing actions over a specified time frame is essential during the CAP development phase. A CAP with hundreds of actions may seem comprehensive, but realistically, a narrowed focus will enable Westport to successfully complete tasks and achieve progress towards near-term milestones. One of the "peer" cities assessed in this study, particularly because of its similar median household income and population to Westport, is Aspen, CO. Aspen serves as a great example of a city that has a comprehensive CAP and prioritized its actions during the planning process. Aspen’s ‘CAP Advisory Committee’ initially identified over 400 potential actions to reduce the City’s GHG emissions. Within two months, the committee developed a decision-based criterion on how to prioritize actions for implementation over a three-year timespan. The decision criteria yielded implementation priorities that can be useful to Westport, detailed in Figure 19.<sup>60</sup>

Criteria to Prioritize Actions
Have the potential to significantly reduce GHG emissions
Are innovative yet feasible
Could create desirable co-benefits
Complement existing plans and priorities
Build on past efforts
Are aligned across sectors
Represent a consensus from stakeholders across all sectors

Figure 19: Aspen’s criteria for prioritizing climate actions

As a result, Aspen’s current CAP has a refined focus, possessing a list of 46 actions. Additionally, the city created a “GHG Reduction Toolkit,” which documents over 250 actions and is meant to serve as a model for other cities that are in the CAP development process.<sup>61</sup>

## Essential Elements

Through a frequency assessment, the team identified the most essential elements that cities include in climate action and sustainability plans, shown in Figure 20. While similar in nature, the structure of these two types of plans differ. For the purposes of this report and the GTF, the key elements of Westport’s CAP should focus on the sectors described in the Town’s goal: energy, waste, and water. In this regard, Westport has an abundance of resources to aid in tackling issues within these sectors. The team’s results show that of the plans assessed, 96% address energy efficiency, 82% specifically plan for renewable energy generation, 93% focus on waste, and 76% address water. Lastly, to become a Net-Zero community by 2050, Westport must address its transportation sector. In our assessment, every city with a Net-Zero goal incorporates transportation as a standalone section in their CAP. Westport does not need to reinvent the wheel, and should seek to learn from other communities, towns, and cities who have achieved results in any of these sectors.



Figure 20: The results of our CAP analysis, displaying the key elements of an effective CAP

## Implementation

A major finding in this study indicated that only 36% of plans have an implementation schedule, and only 24% address financing. While 89% of plans have adopted goals and targets, being unable to implement them inhibits effectiveness and transparency. Even though small in overall impact, it is essential that the Town of Westport lead by example and track progress of its operational footprint, along with the footprint of the entire community.

### Lead by Example

Westport must lead by example and first address its Net-Zero goal in the municipal sector. 89% of cities assessed in this study take immediate action within municipal operations because their governments have direct control over city impacts. Action items in the municipal sector are critical to provide highly visible examples, demonstrate value, and to pilot new technologies. For example, the GTF can utilize resources and advocate for Westport to set a more ambitious deadline to reach Net-Zero for municipal operations.

### Establish Metrics & Monitor Progress

Out of the 39 plans assessed, 56% do not mention or associate metrics with specific indicators or actions. Alternatively, every city that has committed to a Net-Zero or carbon neutral goal outlines metrics in their CAP. Effective metrics measure the actions taken to achieve a specified goal, as well as the outcome of the achievement. Metrics also serve as a unit of measurement for an indicator. When applied in the correct context, indicators are an effective way to monitor and track progress towards long-term goals. For this reason, it is imperative that Westport associates a metric with each climate action goal.

# 6

## CONCLUSION

To fully achieve a Net-Zero status in 32 years is challenging; however, the key to success is deliberate action with strong metrics that track progress. We have provided the GTF with a report to help understand which steps must be taken, and how to begin. Our internal research process which included an extensive analysis of 44 U.S. cities that had a CAP or similar report, followed by targeted "peer" city research, was used to provide the GTF with a framework with which to move forward on the development of a CAP for Westport.

Westport set its Net-Zero goal for the community, and the only way to fully reach this goal is for the community to actively work towards it. While a necessary component, municipal action alone will not get Westport to Net-Zero. It is crucial that all sectors across the entire community are committed and motivated by the Town's goal. By this same logic, the state of CT cannot reach its "80% reduction in GHG emissions by 2050" goal without action from towns like Westport; there is a need for commitment from stakeholders at all levels. Achieving progress will require significant leadership, engagement, and a shift away from "business-as-usual" behavior in both the near and long-term future. The climate leadership that Westport and its residents have demonstrated in the past indicates the strong potential for residential impact over the next 32 years.

While some cities set aggressive long-term targets, and have crafted CAPs, others adopt near-term targets. Our suggestion to Westport is to do both; creating a CAP that includes long-term goals to 2050 is essential, and interim targets, progress reports, and updates are also vital in supporting these goals. Through this report, we presented key considerations for Westport in creating a plan, as well as research and analysis into CAP structure, initiatives, selected technologies, and community engagement strategies. A custom toolkit with several helpful reports, interactive spreadsheets, links, and data is also provided to the GTF.

This report will equip the GTF with the necessary resources to begin the process of developing the Town's first CAP. By following the strategy and initiative recommendations, and utilizing the toolkit items provided, the GTF and Westport will have a solid foundation to build upon and advance their progress towards achieving Net-Zero by 2050.



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# A. GLOSSARY

**Benchmark:** The practice of comparing measured performance over time, with the goal of informing and motivating performance improvement.

**CO<sub>2</sub>e:** Carbon Dioxide equivalent is the universal unit of measurement to indicate the global warming potential (GWP) of each Greenhouse Gas. It is used to evaluate and combine the climate impact of releasing (or avoiding releasing) different Greenhouse Gases.

**Commercial:** The sector relating to businesses based in or with storefronts in town.

**Community:** The unification of the Municipal, Residential, and Commercial sectors.

**Embodied Energy:** Total expenditure of energy involved in the creation of buildings and materials.

**Emissions:** The release of Greenhouse Gases into the atmosphere, contributing to the Greenhouse Gas effect.

**Energy Use Intensity (EUI):** Measured in kBtu/sqft, this calculation is a tool used to compare energy consumption relative to a building's square footage. The EUI score allows a municipality to provide diverse perspectives of town-wide energy use and helps target where energy improvement measures will have the largest impact.

**Greenhouse Gas (GHG):** Gases that are emitted primarily by human activity, i.e. combustion from automobiles, or the burning of heating oil in a home. These particular gases contribute to the "Greenhouse effect", preventing, to a degree, the reflection of UV rays back through the lower atmosphere. The most frequently referenced GHGs include Carbon Dioxide, Methane, Nitrous Oxide, and Hydrofluorocarbons.

**Greenhouse Gas Inventory:** A quantified list of a community's Greenhouse Gas emissions organized by sector.

**Initiative:** A specified effort within the overarching strategy.

**Mitigation:** Actions or initiatives taken to reduce Greenhouse Gas emissions.

**Municipal:** The sector relating to city government buildings, plants, vehicle fleets, and services. Schools, town hall buildings and affordable housing are included in this category.

**Paris Climate Agreement:** An agreement within the United Nations Framework Convention on Climate Change (UNFCCC) which requires financial contribution and efforts towards Greenhouse Gas emissions beginning in the year 2020.

**PV:** Photovoltaic; a treated semiconductor material that converts sunlight into electricity.

**Reach/Stretch Codes:** Legislation that allows for actions outside of the scope of existing building codes, i.e. mandating energy efficiency standards that exceed existing code.

**Renewable Portfolio Standard (RPS):** A state mandated standard that requires electrical utility providers to source a defined percentage of their portfolio from renewable energy sources.

**Representative Town Meeting (RTM):** The legislative body of a municipality. Among the RTM's responsibilities are enacting Ordinances and reviewing proposed changes to zoning regulations.

**Residential:** The sector relating to the citizens of the city, usually involving their homes or their own behavior.

**Strategy:** By this team's definition, an overarching effort that works towards Westport's Net-Zero by 2050 goal, as it relates to Energy, that can involve any or all of the three sectors.

**Sub-Initiative:** A particular action item, with metrics to mark success and designated leads in municipal government to advocate for its implementation.

**We Are Still In:** A coalition of US cities, companies, and other groups that have pledged to stay committed to the Paris Climate Agreement, despite the federal government of the United States' withdrawal.

# B. CONTRIBUTORS

Our Capstone team would like to extend a special thanks to the following individuals for their invaluable contributions to our research and recommendations presented in this report:

**Colleen Pratt**, Westport Assessors Office

**Michele Onofrio**, Westport Building Department

**George & Lily**, Staples High School

**William Maag**, People's Action for Clean Energy (PACE)

**George Rodericks**, City Manager, Atherton, CA

**Terese Kinsley**, Chief Sustainability Officer, Huntington, NY

**Oil Providers servicing Westport, CT:**

- Devine Bros Inc.
- Dominick Fuel Inc.
- Levco
- Steve's Oil Company
- Reliable Oil

**Steve Smith**, Westport Building Dept, Green Task Force member

**Chris Menges**, Climate and Sustainability Analyst/Planner, City of Aspen

# C. THE VALUE OF HIRING A SUSTAINABILITY DIRECTOR

As a dedicated advisory position to Westport's First Selectman, a sustainability director can bring together stakeholders from across sectors and municipal silos. This person would be able to access available tools and expertise that would assist Westport in the achievement of its Net-Zero goal. Investment beyond the current voluntary efforts offered by the GTF are needed to advance Westport in its sustainability efforts. The group is an essential catalyst, but more is required from Westport. To maximize benefits, Westport should think beyond fiscal austerity, because the role of a sustainability director can assist Westport in getting the most out of the Town's current sustainability efforts and would guarantee that every project or initiative the government engages in has co-benefits.

The role can ensure that if Westport is going to repave a road for example, the effort does not serve a single purpose. A flood barrier could also be constructed at the same time, which could be coordinated by additional communication across government departments. By bringing light to this secondary purpose, Westport would be a safer place for residents. This process has the potential to improve community cohesion, and even raise awareness by educating residents regarding issues related to sealevel rise. Westport would accomplish multiple goals through one project while also saving time, money, and effort. This is a common reason for why companies and municipalities consider the addition of a sustainability director role.

The City of Boulder's sustainability manager is preparing for uncertainties by building flexible local capacity, inclusive plans, and engaging community in collaboration. This is demonstrated through their efforts in making resiliency and sustainability more accessible as a concept, engaging volunteers, preparing businesses, and cultivating artistic engagement to educate the community at large.<sup>62</sup>

Municipalities that have made Net-Zero commitments are forecasting for the long-term when it comes to waste, water, and energy. They make robust, equitable, and comprehensive plans for how to approach implementation of specific strategic challenges, which allows for these cities to continue to make progress on Net-Zero targets.

Of note, UL LLC's Sustainable Edge publication shows that 87% of global consumers consider a company's social and environmental commitment before making important purchasing decisions. The publication notes that "44% of business executives agree sustainability is a source of innovation and 39% see it as a source of new business opportunities."<sup>63</sup>

Municipal brands allow for residency retention and in turn tax basis growth. As sustainability becomes more integrated into city operations, the processes and communications allow for the sustainability wave to gather momentum on all fronts. Municipalities of all sizes with Net-Zero goals should consider having someone on staff to handle the environmental, social, and economic responsibilities as it not only helps their efforts toward sustainability, but also allows them their brand to stay competitive, just as a private sector operation does.

Westport has made strides, as the setting of a Net-Zero goal is a multi-generational mission. It will take time to transform Westport so that it can improve the quality of life for its residents. Promoting community cohesion, reforming government agencies, and improving building codes does not have to cost a significant amount of money, and it can make a significant difference for the Town of Westport. It is inevitable, a sustainability director is required it is just a question of the best time to do it.

# D. NET-ZERO DEFINITIONS

From the perspective of a city or town, Net-Zero goal-setting, planning, and implementation is a way to advance a community's carbon mitigation efforts. The decision on how to frame long-term climate goals and ambitions plays an important role in policy within communities, and as Net-Zero has grown in popularity, descriptions of its purpose have proliferated. A wide variety of definitions span existing literature on the subject and there seems to be no consensus to date about a universal definition for Net-Zero. Some of the discrepancies revolve around whether 'Net-Zero' refers to operational energy, life-cycle energy, greenhouse gas emissions, zero-waste or water. In addition, not only do terms such as '100% Renewable,' 'climate neutral', and 'carbon neutral' exist within the same sphere, but Net-Zero energy can refer to the net accounting of zero energy generated, electricity generated, or Greenhouse Gas (GHG) emissions generated.

Definitions of Net-Zero	
Alternative Terms	Description
Operational Net-Zero	Targets energy consumed through municipal services, operations, and buildings.
Community-wide Net-Zero	Targets energy consumed by commercial and residential buildings, transportation within regional boundaries, and municipal buildings and services. The energy demand is met by sources, which are zero-emission.
Life Cycle Net-Zero	This is a hybrid, life cycle based methodology for cities, which incorporates surface and airline transportation, as well as the indirect upstream emissions of key urban materials (food, water, fuel, and concrete). The hybrid methodology enables cities to separately report the GHG impact associated with direct end-use of energy by cities, as well as the impact of extra-boundary activities such as air travel and production of key urban materials.
Net-Zero GHG emissions	Targets GHG emissions from all sectors, and requires a reduction of emissions to near zero. The remaining emissions would be balanced with either direct removal of emissions (i.e. carbon capture and sequestration), or by negating emissions with offsets.

# E. PEER CITY ANALYSIS

Peer City Criteria		
Criteria	Parameters	Justification
Is the town/city in Connecticut?	Yes/No	Sharing a state with Westport is important because it means having a similar regulatory landscape, seasonal weather, as well as have the same state RPS and same state governance structure.
Is the population below 50,000 residents?	Westport has a population of 27,840	Westport's size typifies the community as a town, rather than a city. Using the U.S. Census' definitions of Urban Cluster versus Urban Area, the parameter was set for any community below a population of 50,000 people.
Is the Median Household Income more than 120% of the United States Median Household Income?	Westport has a median income of \$166,307	Westport is perhaps best known as a wealthy town, but it's median household income is astronomically high, so to capture other wealthy towns in this rendition, we decided to consider towns whose median household incomes are significantly more than the national median household income. Similarly wealthy towns will be more likely to have similar housing characteristics, and similar consumer patterns.

Peer City Identification					
Town	State	Population	Median HH Income	Peer City Score	Status
Branford	CT	28,026	\$78,609	3	Peer
Avon	CT	18,364	\$124,608	3	Peer
Aspen	CO	6,700	\$71,207	2	Similar
East Hampton	NY	22,009	\$104,531	2	Similar
Cape Elizabeth	ME	9,015	\$108,277	2	Similar
Fairfield	CT	59,404	\$115,348	2	Similar
Portsmouth	NH	21,598	\$69,096	2	Similar
Stamford	CT	129,105	\$81,634	2	Similar
Hillsborough	CA	11,413	\$200,000	2	Similar
New Castle	NY	17,569	\$200,000	2	Similar
Nantucket	MA	7,446	\$94,246	2	Similar
Atherton	CA	7,147	\$200,000	2	Similar
Huntington	NY	18,046	\$120,718	2	Similar
Rye	NY	16,000	\$168,954	2	Similar



# F. METRICS

The following pages include a summary of potential metrics for each initiative, the "peer" cities that inspired recommendations, and Westport specific departments that are suggested to lead and implement the sub-initiatives. Each of the governmental bodies has an obligation to support Westport's sustainability efforts and goal of becoming a Net-Zero community.

Although not listed here, implementing these initiatives also requires the collective action and resources of public authorities, utilities, the private and non-profit sectors, and the community as a whole.

It is recommended that the GTF expands upon this outline during the planning process of the Town's CAP as additional internal and external stakeholders are identified and become engaged.

## Acronyms and Abbreviations

<b>BD</b>	Building Department
<b>BOE</b>	Board of Education
<b>BOF</b>	Board of Finance
<b>BOS</b>	Board of Selectmen
<b>DPW</b>	Department of Public Works
<b>GTF</b>	Green Task Force
<b>P&amp;Z</b>	Planning & Zoning Commission
<b>RTM</b>	Representative Town Meeting



INITIATIVE	SUB-INITIATIVE	INDICATOR / METRIC	SOURCE CITY	LEAD DEPT.
Cultivate awareness of the Town's Net-Zero by 2050 energy goal	<b>1.1</b> Launch a challenge in the commercial sector that showcases local businesses who have proven to be leaders in energy efficiency achievements	# of businesses participating in challenge	New Castle Stamford Rye	GTF
		% of businesses that reduced energy consumption		
		# of new customers		
		Annual avoided costs (kWh or Btu's saved/business)		
	<b>1.2</b> Implement a competition where households aim to reduce energy use by 10% per year through a voluntary pledge that allows residences to commit to energy efficiency	# of new households participating in challenge	Stamford	GTF BD
		Energy use per household (Btu's/HH)		
		# of residential energy audits/retrofits		
	<b>1.3</b> Facilitate energy conservation competitions in schools	# of schools participating in challenge	Avon Fairfield New Castle	GTF BOE
		Electricity use per student (kWh/student)		
	<b>1.4</b> Encourage schools to participate in the Connecticut Green LEAF Program	# of schools provided with information on program	Rye	GTF BOE
		% of schools participating in Green LEAF		
	<b>1.5</b> Incorporate energy efficiency curriculum and projects within Westport's public-school system.	Climate change / sustainability literacy	New Castle Stamford Rye	BOE
		# of students attending/participating in environmental committees		
		% of schools adopting climate change subjects in curriculum		



INITIATIVE	SUB-INITIATIVE	INDICATOR / METRIC	SOURCE CITY	LEAD DEPT.
Increase energy efficiency in all existing buildings	<b>2.1</b> Mandate energy audits for all municipal buildings including schools and affordable housing units	# of audits completed	Aspen Branford Fairfield Huntington Nantucket Stamford Rye	RTM BOE DPW BD
		Energy saving measure carried out		
		kWh savings per sector		
	<b>2.2</b> Draft legislation requiring commercial buildings to conduct energy audits	Approved legislation	Aspen	GTF
		# of commercial entities in support of legislation		
	<b>2.3</b> Promote professional residential energy audits by partnering with companies offering free or low-cost assessments	Average cost per audit	Atherton Hillsborough Huntington Nantucket	RTM
		% of residential units audited		
		Savings potential (kWh) per household		
		Savings potential (kWh) in residential sector		
	<b>2.4</b> Encourage all new residences sold or transferred to obtain a Home Energy Rating (HER) or Home Energy System (HES)	Average # of weeks on the market for homes with a HER/HES	Rye	GTF
		Time on the market difference between rated and non rated homes		
		# of residential units with rating		
	<b>2.5</b> Implement cost effective retrofits in municipal buildings, offices, facilities, and affordable housing units based on energy audit findings	Energy saved after the retrofit (kWh/yr)	Aspen Branford Nantucket Stamford Rye	BOF P&Z
		ROI (Dollars saved/yr after retrofit)		
		Number of completed retrofits		
		% change in annual energy consumption		
		% change in annual municipal energy GHG from baseline		
	<b>2.6</b> Seek to develop partnership with ESCOs and utilities to offer potential rebates and incentives for residential retrofits based on the recommendations from the audits	Number of partnerships created	Huntington	GTF
		Avoided annual costs from rebates and incentives		
		% of audit recommendations implemented in retrofit		
		Dollar amount invested per kWh saved		
	<b>2.7</b> Launch an energy benchmarking pilot program for public schools	# of schools benchmarked	Avon	GTF BOE
		% change in annual energy consumption		
		Energy Use Intensity (EUI) (kBtu/sq. ft.)		



INITIATIVE	SUB-INITIATIVE	INDICATOR / METRIC	SOURCE CITY	LEAD DEPT.
Adopt energy efficient design and construction guidelines for new buildings	3.1 Institute an accelerated permitting process for new commercial and residential developments that demonstrate high efficiency standards	# of building permits requested/granted which exceed the minimum standards for energy conservation	Rye	P&Z BD
		Annual avoided O&M costs		
		Dollar amount invested per unit of energy saved (\$/kWh, \$/kBtu)		
	3.2 Support inclusion of Life Cycle cost analysis in conceptual design in order to obtain permits	Annual avoided O&M costs	Atherton Avon Fairfield	GTF
Promote the use and implementation of technology that increases energy efficiency	4.1 Install occupancy sensors in municipal buildings	# of occupancy sensors installed	Avon	GTF RTM BD BOS BOF
		% change in electricity consumption		
		Annual avoided cost (Dollar amount invested per kWh saved)		
	4.2 Replace street lighting fixtures with LEDs	% of street lighting fixtures replaced	Atherton Portsmouth	DPW GTF
		% of town's street lights with LED		
		Dollar amount invested per MWh saved		
	4.3 Explore the feasibility of incorporating smart technologies such as battery storage solutions, smart thermostats and cooling technologies	Energy savings (% change in peak load kWh)	Nantucket	GTF
		# of smart devices installed per technology		
	4.4 Pursue partnership with companies offering innovative technologies at discounted rates for residents	Dollar amount saved by discounts	Nantucket	GTF
		# of partnerships developed		
	4.5 Adopt municipal procurement policy requiring efficiency standards for equipment replacements	% of equipment inventory replaced	Fairfield	RTM DPW GTF
		kWh saved from improved efficiency of replacement		
	4.6 Deploy Building Management Systems (BMS) that control heating and cooling functions in municipal buildings	# of BMS deployed	Branford	BD GTF RTM BOS BOF
		MBtu saved per sq. ft.		



INITIATIVE	SUB-INITIATIVE	INDICATOR / METRIC	SOURCE CITY	LEAD DEPT.
Develop energy efficiency finance mechanisms	5.1 Pilot an on-bill financing program to fund efficiency upgrades in the residential sector	# of new residents utilizing the on-bill program	Fairfield	BOF BOS
		Amount financed through the program (\$/yr, \$/household)		
		Energy saved after upgrade		
	5.2 Establish a revolving loan program for businesses that pools private and public funding for the purposes of energy efficiency upgrades	Amount collected for the revolving fund	Branford	BOF BOS
		Amount invested from the fund in EE projects per sector		
		Amount invested from the fund in renewables projects per sector		
Foster a community and regional transition to clean energy	6.1 Participate in regional energy efficiency and renewable financing programs	# of regional programs adopted	Hillsborough	GTF BOF
	6.2 Establish collective of local governments and utilities to drive a clean energy transition	% of renewable energy provided by Eversource	Aspen	GTF BOF BOS
	6.3 Advocate for a transition to Community Choice Aggregation (CCA)	% of total energy supply met with renewables	Atherton Nantucket New Castle Rye	GTF BOF
		Cost (\$/kWh)		
		% of households enrolled		
Establish renewable energy finance mechanisms	7.1 Improve access to Commercial Property Assessed Clean Energy (C-PACE) and other specialized financing mechanisms available for all sectors	# of energy efficiency grants/rebates awarded per year	Aspen Rye	GTF
		# of businesses/projects that received PACE financing		
	7.2 Draft legislation to require the residential sector to offset energy use by installing renewables on-site or pay mitigation fees	Approved legislation	Aspen	GTF RTM BD BOF
		Dollar amount collected in mitigation fees		
		Dollar amount invested in renewable energy projects		
		% of households paying mitigation fee		
		kW installed post policy implementation		





INITIATIVE	SUB-INITIATIVE	INDICATOR / METRIC	SOURCE CITY	LEAD DEPT.
Continue to promote solar PV installations	<b>8.1</b> Install Solar PV on all municipal buildings where technically feasible	kW installed	Fairfield Huntington New Castle Rye	GTF BOS RTM DPW
	<b>8.2</b> Create a solar demonstration project at a municipal building location that achieves maximum exposure to the community	# of residents aware of demonstration project	Stamford	GTF
		kW installed in the project		
	<b>8.3</b> Identify and utilize financial incentives from state programs to install solar PV on schools	Dollar amount procured from state grants	Avon	GTF
		% of total rooftop/parking lot area with solar PV		
		Annual electricity generation as % of total demand		
	<b>8.4</b> Provide community solar opportunities by bringing solar developers and interested households together	kW installed solar	Huntington Stamford	GTF
		# of public events held per year		
		# of household with PV installations		
	<b>8.5</b> Support local vendors and stakeholders at town-held workshops	# of workshops held per year	Aspen Avon Rye	GTF
		Participation rates		



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