



2021 Hamden Municipal Energy Plan

Presented to:

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Sustainable CT

Submitted by:

Energy Use & Climate Change Commission – Town of Hamden

INTRODUCTION

The Mayor of Hamden, the Town's Legislative Body, its various commissions and physical plant personnel, along with retail and manufacturing business operations and neighborhood associations must play a vital role in monitoring, managing and controlling the energy usage of town buildings and vehicle fleet operations. Additionally, energy consumption is the single largest variable expenditure that residents of Hamden must contain and reduce if we are to reign in spiraling energy costs. We recognize that energy is the lifeblood of life in the town. As one of the largest expenditures of any budget, energy is used to heat and cool our homes and businesses, run our appliances and to travel to and from work.

As a municipality of more than 62,000 people, most residents agree that Hamden should be a leader in promoting energy efficiency and renewable energy in town buildings, all commercial businesses and single and multi-family homes. The EUCC has been tasked with preparing this Municipal Energy Plan for the purpose of guiding it toward greater energy efficiency, sustainability and resiliency. Carrying out this plan will yield many benefits for Hamden's buildings, its residents and businesses including:

- Savings: We estimate that the town can reduce its energy expenditures significantly. And we can keep more of the money we spend right here in town.
- Health: The Plan intends to reduce our reliance on fossil fuels. The result will be to improve air quality leading to a range of health benefits including the lowering of asthma rates.
- Internal Environmental Comfort: Adding air and lighting controls to render them "Smart Buildings" will bring about a whole new level of fresher air quality, superior lighting and elimination of mold/mildew susceptibility.
- Resiliency: Through greater reliance on local energy generation and a more modern electric grid, the town can take better control of the effects of damaging weather such as outages, impassible travel situations, and access to food stores, restaurants and medical facilities.

The 2021 Municipal Energy Plan (MEP) will be linked in the Plan of Conservation and Development (POCD) and will satisfy the requirements for Sustainable CT Action 6.5, entitled Develop a Municipal Energy Plan toward Hamden's 2021 application for certification with Sustainable CT.

BACKGROUND

Two key projects that provide a foundation for pursuing the MEP are the nearly complete **Portfolio Manager benchmarking database** and the imminent **Energy Savings Performance Contract**.

First, the Hamden Departments of Finance and Economic Development have completed an extensive energy-use benchmarking program on all Hamden buildings, using Portfolio Manager. The Portfolio Manager software was developed by the US-EPA Energy Star program and disseminated nationally as open source software to the public sector. Hamden now has on file three years of data tracking energy consumption in each building (municipal and schools) by natural gas (therms), oil (btu), electricity (kWh), and fuel cells (methane or hydrogen btu). We are grateful to United Illuminating for providing Portfolio Manager consulting and training services to Hamden for the purpose of completing the initial Portfolio Manager data entry and training. **Sustainable CT Action 6.1: Benchmark and Track Energy Use** interfaces with Portfolio Manager for ease of submitting reports for credit toward certification. Monitoring, updating and tracking the Portfolio Dashboard are staffed collaboratively among Hamden Finance, Economic Development and the Board of Education.

With Celtic Energy serving as Owner’s Representative through the RFP process, Hamden is poised to embark on Energy Performance Contracting services with NORESKO to effect dramatic energy reductions in a subset of buildings between 2021 and 2023. Smart building technologies to maintain optimum performance efficiencies in internal temperature control, computer-controlled LED lighting, thermal and infrared occupancy lighting, replacement of roof top air handlers with VAV’s and VFD’s, installation of new high efficiency boilers, chillers and cooling towers, programmable dashboard controls with central energy monitoring and building envelope improvements are all on the table.

THE PLAN

OBJECTIVE:

The objective of the plan is the management of the energy goals through operational efficiency, cost savings, CO2 emissions reduction, resiliency and sustainability. NOTE: The MEP is a roadmap that should be reviewed and updated regularly. The core of the plan is centered on a:

Energy Efficient Buildings Pledge: *

Hamden will, by percentage, reduce its energy consumption in accordance with the following schedule;

- Year 2019 – Baseline Year
- Year 2025 – reduction by 15%
- Year 2030 – reduction by 30%
- Year 2040 – reduction by 50%
- Year 2050 – achieve 100% renewable energy

*This pledge requires the monitoring, management and measured trending of all municipal and school energy consumption. The plan to fulfill our energy reduction goals includes planning for 25% to 50% energy reduction in all of Hamden’s municipal buildings and school facilities

Strategies that use best practices for this purpose include:

- Adopting guidelines for municipal buildings and schools as described by LEED Platinum, Energy Star and CHPs (schools) as produced by experienced Architects/Engineers
- Working with an independent consultant to plan the sequence of municipal building for performing Investment Grade Audits and preparation of a Request for Proposals from Energy Service Companies (underway with Celtic Energy, Inc., contract in 2019).
- Entering into a Energy Savings Performance Contract for building (s) to guarantee specific savings levels over term of contract (underway with NORESKO, pending contract agreement in Aug/Sep 2019).
- Participating in Demand Response and Peak Load Shedding, both of which provide an economic return to Hamden.
- Upgrading existing high-pressure sodium streetlights with LED lamps and heads.

Additional Planned Energy Efficient Transportation Strategies:

Decreasing transportation-generated emissions in a community such as Hamden can have an immediate effect on local air quality in a way that other sustainability activities may not. Encouraging people-powered transportation (bikes, walkways), increasing public transportation access, and supporting non-fossil fuel transportation options (electric cars) are all ways to move toward this goal.

Transition to Renewable Energy (From 2019 to 2050) Steps to transitioning by maximizing ‘green energy’ alternatives

- 2019 Baseline year – Hamden will issue a pledge to become fully carbon neutral by 2050. Our Town Pledge and Resolution will be approved by the Mayor’s Office, the Legislative Council, the Economic Development Office and all other principle stake holders.
- 2021 – Town expands its scope of work on energy efficiency by adding additional town buildings to the RFP process. Completion of first three buildings. Concentration of ‘green technology’ to focus on solar feasible buildings, fuel cells, heat pumps, geothermal equipment and co-generation production Establish realistic production capacities.
- 2025 – Deployment of Microgrid technology along Dixwell Ave as part of Resiliency program. . Completion of EV charging stations throughout town.
- 2030 – Installation of ground-mounted solar arrays and wind turbines on brownfields, reservoir areas and vacant open space. Initiate construction of a central ‘green energy’ monitoring control center for participation in ISO-New England’s Demand Response and Peak Load Shedding programs. This energy production will serve as back-up kWh energy supply for the business and municipal sectors. A second Microgrid or mini-microgrid shall be completed. Work with the ‘Green Bank’ and C-PACE on innovative programs.
- 2050 – Achieve ‘carbon neutral’ for the Municipal, Residential and Commercial sectors. Elimination of carbon fuels, including natural gas, oil, methane and kWh (using carbon fuels) shall be complete. This is a pathway to achieving 100% renewable status.
- Helps the state meet its renewable energy and greenhouse gas emission goals

Strengthening Hamden’s Supply of kWh Power through Microgrids – Resiliency and Sustainability

Hamden, like all other communities throughout CT must rely on the electric grid to provide electricity to homes, businesses and town facilities. Our current grid performs exceptionally well but was built and designed before the advent of solar panels, allowing individual houses and businesses to generate their own electricity, and batteries, allowing them to store it. Moreover, it is vulnerable to blackouts during major storms and attacks.

As our goal is to continue to encourage more renewable energy and greater resilience, the MEP has been designed to re-think the grid. A key building block of our future grid will be microgrids, consisting of smaller subsets of power sources, users, wires and controls. Microgrids are capable of operating while connected to the wider grid, or they can ‘island’ or operate separately in the event of a grid outage.

An example of a microgrid could be a collection of key town facilities, a solar array, battery, fuel cells, co-generation fuel cell (heat & kWh), and backup generators. This microgrid could be designed to provide full operating power for Hamden High School, the Ice Rink, the retail shopping centers, restaurants, gas stations, banks, emergency care facilities, the Middle School, Town Center, Miller

Library and Hamden Town Hall (including Fire and Police Headquarters. Depending on the size of the microgrid, the system can provide both back-up power and primary production of kWh, thus enabling the Microgrid area to operate “off grid” as it deems necessary.

Microgrid Benefits

- Can enable near total renewable energy through integration of battery storage and smart controls. Electricity can flow in multiple directions allowing for lower kWh operating costs, peak load shedding, avoidance of ‘Brown Outs’ and Demand Distribution
- Greater resiliency, allowing the microgrid or key town facilities (i.e. emergency shelters, Town Center, Town Hall, Police Headquarters and Fire Headquarters) to operate even when the broader grid is down.
- As prices of solar and storage batteries decline, microgrids offer substantial cost reductions in the production of kWh.
- It is security, pure and simple, enabling the buildings within the Microgrid area to always have power.
- A Microgrid can be programmed (1 hour, 4 hour or 24 hour notification) to shed from 5% to 15% energy load when called upon from UI or ISO New England. This is a contractual program providing substantial economic benefit to the Town.
- Peak shaving can be either ‘on demand’ or scheduled at various times throughout the year.
- A microgrid’s resiliency can be greatly enhanced if undergrounding of all wires and cables can be done underground.
- Microgrids can be funded through third parties where the kWh user pays for only the power needed.

Sustainable CT participation

Participation in the statewide municipal certification program **Sustainable CT (sustainable CT.org)** offers Hamden a pathway to community-wide resiliency through the ‘three-legged stool’ approach to sustainability:

- Focus on people: social equity, community gatherings, public arts, historic/notable sites, civic engagement, community recreation, public and non-profit volunteer opportunities, sidewalks for outdoor neighborly encounters;
- Focus on nature: stewardship of waterways, lands, urban trees and forests, farms and gardens, accessible outdoor recreational parks and gardens in easy reach of all neighborhoods, education on challenges related to weather changes, vegetative changes, impacts on air, water, soils and plants;
- Focus on economy: support for local businesses and neighborhood business development; local transportation options – walking, bicycling, mini-transit systems, alongside EV use- to foster local flows of capital and sustain local jobs; redevelop underutilized areas for re-use and co-located residential and commercial.