Sutton Town Plan DRAFT UPDATE

IX. ENERGY PLAN

A. Goals

- ❖ To encourage the efficient use of energy and the acquisition and development of residential-scale renewable energy resources at least cost.
- ❖ Achieve community awareness about the available resources and ongoing activities in energy efficiency and to encourage further participation.
- ❖ Promote energy conservation and weatherization activities at the household and municipal level.
- ❖ To encourage development patterns that result in efficient use of land and related energy costs.
- ❖ Develop municipal renewable energy siting standards that limit adverse impacts
- ❖ Conform to State of Vermont "substantial deference" criteria detailed in Act 174

B. Objectives of Sutton Energy Committee Charter

- Seek means to reduce energy use and increase energy efficiency savings.
- Support awareness, appropriate siting, and use of renewable energy within the Town of Sutton.
- Establish metrics and develop baseline data points followed by measurable objectives in regard to energy use within the town.
- Meet objectives contained within the Sutton Energy Plan.
- Contribute to the goals contained within the Sutton Town Plan.
- Research grant and funding opportunities to fund these projects. Projects will be evaluated on the basis of cost and long-term financial benefit to the town.
- Engage the community in fulfilling the tasks set forth by the Energy Committee, including an educational and outreach component in conjunction with the Sutton School.
- Network with other town energy committees, NVDA, Vermont League of Cities and Towns, and others to leverage communication of ideas and programs for the benefit of Sutton residents.

- Assist the town of Sutton in conforming to the State of Vermont's Energy Action Plan where ever possible.

- Work with adjoining towns and NVDA to promote a unified effort to address energy use in our area.

C. Sutton's Energy Strategy for 2050

This amendment to the 2019 Sutton Plan outlines our strategies for supporting the ambitious goals and policies of the Vermont Comprehensive Energy Plan of 2016, namely to meet 90% of Vermont's energy use through the use of renewables by the year 2050.

Specifically, we aspire to meet the "enhanced energy planning standards" of Act 174[1], which include:

- **Current and Future Energy Use**- An analysis of the needs, scarcities, problems, and costs across all energy sectors – thermal, transportation, and electrical;

- **Conservation and Energy Efficiency:** Achieving the "90 x 2050" goal is only possible through aggressive weatherization and efficiency measures; and that is where the Town of Sutton sees the greatest opportunity to improve the quality of life of its residents. By 2025 we want to improve the energy efficiency of 25% of homes in Sutton. By 2028 we will have reduced our GHG emissions to 50% below 1990 levels. According to the 2019 Sutton Community Survey, 25% of respondents' homes were built before 1950 and another 25% before 1980, leaving about 50% of our homes built prior to significant changes in insulation and heating efficiency. Seventeen percent of respondents indicated that they have had an energy audit in the past five years. Forty-seven percent would like an energy audit. According to the 2019 Sutton Community Survey, nearly 75% of homes use wood as either the primary or secondary source of heat. Of those homes, only 25% have a wood stove with a catalytic converter. Most of Sutton residents are supplied with electricity by Lyndonville Electric Department. Thanks to efficiency measures, customers have reduced their average use in recent years. According to the 2019 Sutton Community Survey efficiency measures that have been carried out include light bulb replacement to LED, upgrading of lighting fixtures and replacement with Energy Star appliances, installation of more efficient heating equipment, installation of low-flow shower heads, purchase of a new or used vehicles with better gas mileage, improvements in insulation and replacement of old windows. Energy audits of Sutton's public buildings were completed in 2011. The audit of the Fire Station has been addressed by the construction of a new fire station which complies with current energy standards and has had an energy audit completed on it. The Town Clerk's Office/Garage audit still needs addressing. The town should follow up on these recommendations to make sure they are

[1] Act 174 (2016) establishes a new set of municipal and regional energy planning standards, which if met allow those plans to carry greater weight in the siting process for energy generation. https://publicservice.vermont.gov/content/act-174-recommendations-and-determination-standards

energy efficient and as safe as possible. An audit of the school building should also be done.

- **Land Use** Sutton's Unified Development Bylaws encourage development that is more energy efficient by minimizing fragmentation of open space as is feasible for a rural community. Additionally, our development policies discourage the creation of new roads and provide incentives for innovation in site design to minimize rural residential sprawl and site new structures to make optimal use of renewable energy sources.

- **Local Energy Generation**: Use of domestic-scale renewable energy resources such as solar, wind, hydro and wood ought to be encouraged. Vermont has a number of programs that encourage and defray the cost of renewable energy installations. The Energize Vermont Website has links to a number of resources pertaining to solar sources. It also features the community energy initiative and the Power Up Vermont Program. www.energizevermont.org. Energy from commercial energy facilities located in the Town of Sutton must benefit town residents and businesses.

There are clear advantages for developing a plan that meets the standards of Act 174. Towns receive increased consideration in Section 248 proceedings, the Public Utility Commission's process for reviewing grid-connected energy generation. Prior to Act 174, municipal plans were given "due consideration," in Section 248 proceedings – a status that was never actually defined in statute. By contrast, Act 174 establishes a new set of municipal and regional energy planning standards. If these standards are met, regional and municipal plans may carry greater weight – "substantial deference" – in the Section 248 process. Unlike "due consideration," "substantial deference" is defined in statute:

"…that a land conservation measure or specific policy shall be applied in accordance with its terms unless there is a clear and convincing demonstration that other factors affecting the general good of the State outweigh the application of the measure of policy."

Equally important, however, an "enhanced" energy plan establishes a blueprint for local action in order to minimize the impact of climate change.

D. Sutton's Current and Future Energy Use

1) Overview

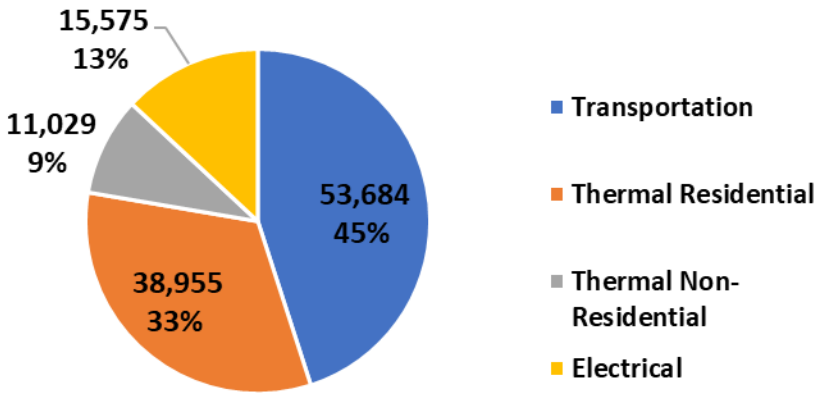
Sutton has a small village center surrounded by extensive rural settlement and open space (24 people/sq. mile). According to the Sutton Community Survey, 88% of the housing stock consists of detached single-family homes, and another 6% of mobile homes. The majority of Sutton residents travel out of town for work, shopping, and other necessities. The average daily commute for work is an average of 38 miles round trip. This pattern of development requires considerable energy use to meet transportation and heating needs.

Sutton's energy use estimates were developed by Northeastern Vermont Development Association and follow the same data methodologies used for the 2018 amendment to the

Regional Plan for the Northeast Kingdom. (www.nvda.net)[2]. Energy use data were based on the best available data and **should be considered broad approximations to be used for general planning purposes rather than precise measurements**. Fuels are measured in different ways – by cord, by gallon, by kilowatt – so this plan converts units of measurement into British Thermal Units (BTUs) in order to compare their energy output consistently.[3]

According to NVDA estimates, the town of Sutton uses more than 119,000 MMBTUs (11.9 billion BTUs) annually to meet its energy needs (Figure 1). The majority of energy use is for transportation, followed closely by thermal (heating space and water).

Figure 1: Sutton Energy Use by Sector (in MMBTUs)



Sutton's existing energy use is dominated by fossil fuels. Although residents rely heavily on the use of wood for heating, more than half of heating sources still come from fuel oil and propane. Just 6% of Sutton's transportation energy use can be attributed to renewable resources, nearly all of which consists of ethanol.

To meet the 90% of its energy use through renewable resources by 2050 (90x2050) goal, Sutton will need to pursue an aggressive two-fold strategy:

1. Reduce overall energy use: Sutton's housing stock has grown in recent years, leading to increased energy demand. Aggressive efficiency and conservation measures and behavior modifications (e.g. telecommuting, ride-sharing) can offset increased demand, but they require a sustained effort between local and regional entities and residents. It is therefore essential that

[2] NVDA's regional energy plan has an appendix that provides more detail on the methodology for creating the energy use estimates: http://www.nvda.net/regional-plan.php

[3] According to the US Energy Information Administration a BTU is the measurement of the quantity of heat required to raise the temperature of one pound of liquid water by 1° F at the temperature that water has its greatest density (approximately 39 °F.) One BTU is a miniscule amount, so BTUs are often measured in the millions (MM BTUs) or thousands of MMBTUs (billions of BTUs).

Sutton residents are well informed about efficiency and weatherization opportunities/incentives and the benefits that accrue from them.

2. Switch to clean-burning sources: The 90x2050 goal entails replacing traditional fossil-fuel uses with electricity, which can come from emission-free nuclear or from renewable sources like wood, solar and hydro.

The following analyses of Sutton's transportation, thermal, and electrical utility sectors use NVDA's estimates as well as projections from a LEAP analysis[4] to identify possible pathways to reach 90 by 2050 energy goals.

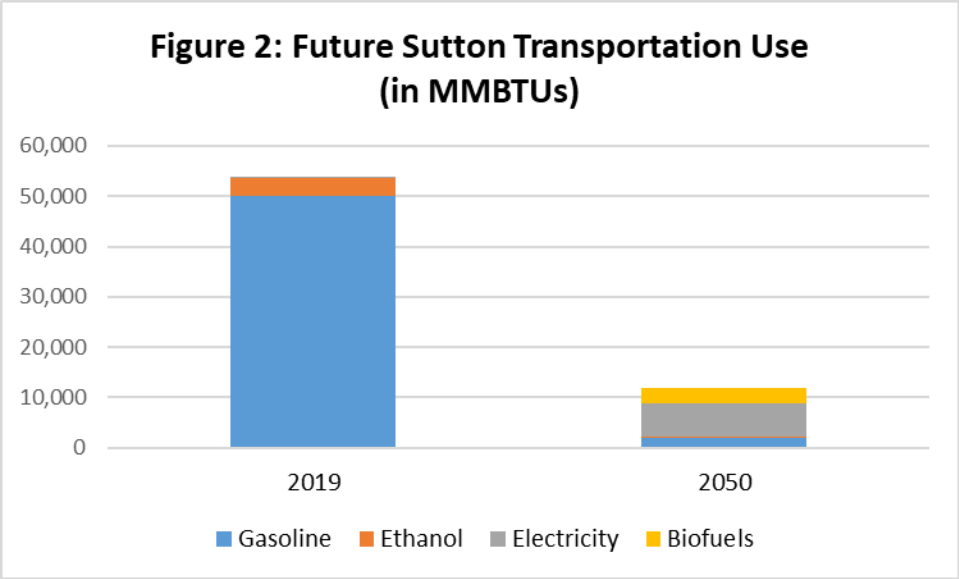
2) Transportation

Energy use in transportation is greatly influenced by the development patterns of the region. Long commutes (38 miles average) and incidental trips require NEK residents to drive an average of 14,000 miles per year. Collectively, Sutton residents drive nearly 10 million miles annually, accounting for 454,000 gallons (53,000+ MMBTUs) of fossil fuel. Nearly all of this energy is non-renewable. Nine percent ethanol is included in nearly all locally available gasoline and amounts to about 6% of total BTUs. Electricity used for transportation currently accounts for a mere .05%.

Plug-in electric vehicles (EVs) have the greatest potential to reduce Vermont's statewide greenhouse gas emissions. "Refueling," which is as simple as plugging into an electric outlet, costs the equivalent of about $1.00 per gallon. The most current estimates from Efficiency Vermont (June 2020) indicate that there were three registered EVs in Sutton in 2019. All were plug-in hybrids.

Much of the dramatic reduction of energy use in the 2050 LEAP projections is predicated on the superior efficiency of electric vehicles (EVs), as well as increased fuel economy of EVs and biofuels (Figure 2).

[4] LEAP stands for Long-Range Energy Alternative Planning Systems, a widely used software tool for energy policy analysis. Sutton's LEAP projections are derived from statewide projections, using the town's population as a percentage of the statewide population. The LEAP targets are **not the only way to reach energy goals, but they give a sense of the scope and scale of change needed to minimize climate crisis.**



Electric end-uses are three to four times more efficient than the combustion versions they replace. For example, figures from the EPA (2016) show that an EV in the northeastern US typically has the efficiency equivalent of about 102 miles per gallon, up from about 78 miles per gallon in 2009. With even more efficient models coming onto the market, increased average efficiency will lead to lower greenhouse gas emissions. Despite the lack of infrastructure and hilly terrain of the region, industry forecasts predict that more than half of all new car sales will be EVs by the year 2040.

Transportation Fuel-Switching Targets for Sutton (LEAP Projections)

	2025	2035	2050
Estimated # of cars in Sutton	804	905	1,018
Total number of using electricity	92	295	635
Total number of cars using biofuel blends	562	386	68

2) Space Heating

According to the Sutton Community Survey, most of Sutton's houses are heated by fuel oil, followed closely by wood. About 25% are heated by bottled, tank, or LP gas, and a handful of homes use a variety of "other" resources. Firewood is produced locally, improves our local economy, and for many, is the most affordable option for space heating.

Occupied Residential Heating by Fuel Source

Fuel Type: Space Heating	**Households**	**Total Use (Annual)**		**% of Use: All**	**% of Use: Owner**	**% of Use: Renter**
Tank/LP/etc. Gas	48	53,928	Gallons	13%	15%	4%

Electricity	4	149,674	KwH	1%	0.00%	7%
Fuel Oil	146	114,416	Gallons	40%	34%	74%
Wood/	142	731	Cords/Tons	39%	43%	15%
Coal/Coke	9	47	Tons	2%	3%	0%
Other	17	-		5%	5%	0%

Commercial thermal estimates are more difficult to calculate because there are no published datasets on heating sources. The estimates from the Department of Public Service and the Vermont Department of Labor's Economic and Labor Market Information assume that total commercial thermal use in Sutton is about 11,029 MM (billion) BTUs annually. The methodology identifies just six commercial (i.e. non-residential) uses, and all but the Sutton School are very low thermal users.

LEAP projections for Sutton show a substantial reduction in total thermal use by 2050: for residential, a reduction by about 48% from 2015 levels, and for commercial, a 25% reduction over the same period. Even though these estimates assume a slight increase in residential and commercial structures by 2050, the overall use declines because of:

- aggressive weatherization projects (ones that reduce overall thermal use by 20% to 30%)
- fuel switching, such as replacing residential heating units with heat pumps, and efficient wood burning systems (like wood pellet furnaces)

According to ACS 5-year estimates, roughly 18% of Sutton's owner-occupied housing units predate 1950. These older structures are likely to be "leaky" and poorly insulated, accounting for as much as 80,000 BTUs per square foot. (By comparison, statewide estimates put average thermal residential use to be about 63,000 BTUs per square foot). As of 2018, 31 housing units in Sutton have been comprehensively weatherized to date, resulting in a total savings of 49 MM BTUs. Clearly more effort is needed.[5]

Weatherization Targets for Sutton (LEAP Projections)

	2025	**2035**	**2050**
Estimated number of households	388	411	436
# of households to be weatherized	100	182	195
Estimated number of commercial establishments	6	7	7
# of commercial establishments to be weatherized	0	0	0

Wood pellets are cleaner burning, more efficient than cord wood, and relatively easy to use. Stoves and furnaces can be controlled by a thermostat. Their prices have remained relatively

[5] Vermont Community Energy Dashboard, accessed December 11, 2019

stable. Cold climate heat pumps, which are sometimes called "mini splits", are a significant form of fossil fuel replacement for thermal uses. Thanks to major technical improvements in recent years, these units can be two to three times more efficient than propane and fuel oils. Unlike geothermal units, they do not require excavation or duct work and can be much less expensive to install. Cold climate heat pumps have the capacity to heat about only 50% to 70% of a building, depending on the size and layout of the structure, so many homes will need more than one. Despite recent improvements in effectiveness on extremely cold days, a backup heating source is usually required for sub-zero temperatures.

Thermal Fuel Switching Targets for Sutton (LEAP Projections)

	2025	**2035**	**2050**
New Efficient Wood Heat Systems in Residences	213	175	127
New Heat Pumps in Residential Units	63	134	169
New Efficient Wood Heat Systems in Commercial Establishments	0	1	1

4) Electricity Use

Most Sutton residents are supplied with electricity by Lyndonville Electric Department, while the service area to the north is covered by Barton Electric and Vermont Electric Cooperative. With notable exceptions being the Portland Pipeline Pumping Station, several dairy farms, and the local garage, Sutton customers are primarily residential.

Sutton's Electrical Usage 2016-2018

	2016		**2017**		**2018**	
	KWh	**MMBTU**	**KWH**	**MMBTU**	**KWh**	**MMBTU**
Commercial & Industrial	1,517,506	5,178	1,472,579	5,024	1,381,630	4,714
Residential	3,008,439	10,265	3,005,794	10,256	3,183,146	10,861
Total	4,525,945	15,443	4,478,373	15,280	4,564,776	15,575
# of Residential Premises	438		438		440	
Avg. Residential Usage	6,869	23	6,863	23	7,234	25

Sutton's electric utility data are collected by Efficiency Vermont. Thanks to efficiency measures, customers have reduced their average use in recent years. The predominant efficiency measures have been insulation, replacement of light bulbs and hardwired lighting fixtures. Residents also report that they have improved water heating efficiency, purchased Energy Star appliances, and more efficient electronic equipment.

	2016	**2017**	**2018**	**TOTAL**
Electric Savings (KWh)	49,526	169,712	70,098	289,335
Residential	43,778	86,775	49,797	180,350
Commercial & Industrial	5,748	82,937	20,301	108,985
Thermal Savings (MMBTU)	52	41	57	150

Residential	2	50	70	121
Commercial & Industrial	50	(9)	(13)	29
Total Customer Cost Savings	$8,934	$26,907	$12,706	$48,547
Residential	$7,380	$14,081	$10,039	$31,501
Commercial & Industrial	$1,554	$12,826	$2,666	$17,046

The negative savings (increased usage) incurred by the Commercial & Industrial sector in 2017 and 2018 may be illustrative of *interactive* effects of electrical and thermal efficiency measures. In industrial settings, for example, a switch from incandescent bulbs (which emit a substantial amount of heat) to LED bulbs (which emit very little heat) can actually require additional energy to heat the space. This may explain the negative savings in Sutton. The installation of a cold climate heat pump may produce thermal savings, but it may also increase electrical use because it is replacing a fuel-oil system. This switching to clean electrical sources, sometimes called *beneficial electrification*, will increase Sutton's electricity usage exponentially, making demand side management critical. More electrical upgrades, such as replacement of fixtures, appliances, and power strips will be necessary.

Targets for Electrical Efficiency Upgrades (LEAP Projections)

	2025	2035	2050
Estimated number of residential customers	628	666	706
# of residential customers to upgrade electrical equipment	158	249	365

E. Conservation of Energy

Using less energy with greater efficiency saves money and conserves resources. To that end both State and Federal governments have initiated both mandates and educational programs. Efficiency Vermont, through its website, as well as other forms of public outreach, provides information and resources to both individuals and businesses. www.efficiencyvermont.com

Northeast Employment and Training Organization (NETO) provides services to both low- and average-income Vermonters, including the State Weatherization Assistance Program and its energy audit services: www.vtneto.org

Heat Squad, a service of NeighborWorks of Western Vermont, recently expanded its service into the Northeast Kingdom, offering low-cost whole house energy audits: www.heatsquad.org/

The Town of Sutton encourages energy conservation and acknowledges individual responsibility for conservation of energy while sustaining our natural resources. The most effective conservation efforts begin with the individual who improves home or business weatherization, who replaces old inefficient appliances with Energy Star models, who installs efficient light bulbs, who drives fewer miles in a more fuel-efficient vehicle, and who carpools when possible. Due to flexibility of hours worked, the use of private vehicles as part of work and the variety of

places worked, carpooling is not seen as a viable option for most people. Use of more fuel-efficient vehicles and telecommuting will be the major forms of savings in transportation.

F. Land Use and Energy Conservation

Local land use policy can and should play a critical role in Sutton's energy conservation strategies. The Town of Sutton, for example, encourages new and denser development in and around the village area, which is close to existing development and services (such as municipal water, the town offices and the school). The Town can also discourage growth in areas not well-serviced by roads and public infrastructure or which have important natural resources, such as Sutton's working lands. Encouraging clustering and avoiding large lot residential development in these areas will help to preserve Sutton's agricultural and forestry resources. It can also help to preserve shade and windbreaks. In addition, allowing for flexibility in site design of new properties should allow for access for passive solar orientation for residential uses.

There are several "green building" developmental techniques that lend themselves to the conservation of energy. Southern orientations, cluster housing, and the use of topography or vegetation to shield structures from the prevailing winds reduce energy usage.

State law already requires builders to file residential and commercial energy code certificates in the town land records within 30 days of completion of project. Recent changes to state law, however, now impact the local zoning process. The zoning administrator must now provide code information to anyone who applies for a building permit. Also, prior to the zoning administrator issuing a certificate of zoning compliance, applicants/builders must file an energy code certificate. Processes ensuring compliance with these laws in Sutton are needed.

Audits of Town of Sutton public buildings were completed in 2011. The most pressing concerns identified in the energy audits of the Town Clerk's Office/Garage and the Fire Station/Grange Hall were related to improving their thermal envelopes. The audits also identified a code violation (improper venting in the Grange Hall) and the potential for a carbon monoxide leak from the Town Garage into the Town Clerk's Office. While the Grange Hall is not presently in use and Sutton has a new energy-efficient Fire Station, the Town should follow up on the audit recommendations to make sure that the Town Clerk's Office/Garage are energy efficient and as safe as possible. The Kingdom East School District, which is leasing the Sutton School, should be approached to ensure the school is kept up to efficiency and safety standards.

G. Planning Considerations

1) Energy Burden

Energy burden, which is expressed as energy spending as a percentage of income, is fairly high in the rural Northeast Kingdom. A new report from Efficiency Vermont estimates average energy burden statewide to be about 10%. Sutton's energy burden is estimated to be 11%. While 86% of respondents for the Sutton Community Survey noted heating/fuel as one of their top three expenses, the greatest determinant of energy burden is *income*, not fuel cost, so even though many residents are able to reduce their costs by burning wood, they still struggle to make ends meet.

Energy burden further complicates meeting 2050 challenges of the statewide energy plan because more-burdened households are less likely to pursue weatherization or fuel switching. Even if those measures save money in the long run, owners simply can't afford it. The same economic challenges that drive inequities across the state are likely to reduce energy program participation among low-and moderate-income Vermonters.[6] While energy efficiency utilities typically focus on large users to achieve more dramatic savings, services must be aligned to energy-burdened users as well. Heat Saver loans offer 0% financing for low-income customers, up to $40,000 for weatherization and heating improvements. To date, Sutton residents have used more than $43,000 in Heat Saver loans to make their homes more efficient. [7] Heat Squad's recent entry into the Northeast Kingdom makes affordable whole-energy audits available to low- and moderate-income households. Similar programs are needed to ensure participation for the more than 160+ households in Sutton with incomes below the county median income.

2) Biomass

The attached Woody Biomass map illustrates Sutton's potential for providing wood energy. Forests cover about 85% of the town's land mass, making the use of residential wood heat a time-honored tradition. Sutton residents use forests predominately for firewood, timber, wood chips, and maple sugaring.

Sutton's large areas of forest cover provide critical wildlife habit as well as opportunities for non-consumptive, non-motorized recreation. They also provide critical ecological functions by fostering biological diversity and passage for wildlife adapting to changing weather patterns. Upland forests provide flood control through water infiltration and retention capacity that also recharges ground water and reduces flood flows in increasingly erratic and severe weather.

Forests are also a critical tool for mitigating the effects of climate change because of their potential to sequester atmospheric carbon. Just how much carbon a forest sequesters varies widely (generally 1-3 tons/year) and depends on a number of factors, including the size of the forest block; the number, species, and age of trees; soil type and depth; amount of dead organic material; and disturbances such as insect defoliations and storm damage. Nevertheless, each acre of Vermont forests, on average, stores the rough equivalent of annual emissions from 62 cars. Overall, Vermont's forests are considered a net sink (i.e. they take in more CO2 than they release). Incremental fragmentation and poor management practices, however, can diminish their ecological functions and threaten their viability. In addition to state-managed lands, the town has a large number of enrollments in the Current Use program and several conservation easements, all of which promote effective stewardship of working lands. Finally, the town's zoning bylaw has a working lands district that discourages fragmentation by allowing for the creation of small lots while maintaining an overall low density.

[6] Vermont Energy Burden Report, October 2019

[7] Vermont Community Energy Dashboard, Community Progress Maps, accessed December 12, 2019.

One of the implementation strategies for this section we will be to invite the Agency of Natural Resources, the Energy Action Network and Energize Vermont to collaborate with Sutton and other towns to develop a method of accounting for carbon sequestration.

H. Development of Renewable Energy Resources

1) Existing generation

The Northeast Kingdom Regional Plan has a new net annual generation target of 18,680 MWh (i.e. new generation after 2017.) This target is fairly low to account for the substantial amount of energy generation already coming out of the region, including utility wind projects in Sheffield and Lowell. Sutton's annual generation target, which is based on the town's share of the region's population is 298 MWh/year.

The PUC has issued five Certificates of Public Good (CPGs) in Sutton since 2017. All are for solar installations – three roof-mounted, two ground-mounted. They have a collective capacity of 37.7 kW and generate an estimated 46.2 MWh annually. In conjunction with building the new fire station, the town has installed a photovoltaic cell array on the roof that has begun to meet its electricity needs. The potential exists to expand this array to offset the town's electrical use.

2) Target Generation and Potential Generation

The attached solar and wind resource maps identify potential areas for siting and quantifying generation output. Underlying assumptions were made about suitability factors, such as slope and direction of land, elevation and wind speeds, and access to three-phase power. Prime areas for renewable generation are locations with no known or potential constraints.

Known constraints are considered unsuitable for renewable energy because they contain one or more of the following: vernal pools; river corridors; FEMA floodways; significant natural communities; rare, threatened and endangered species, national wilderness areas, and wetlands (Class 1 and Class 2).

Possible constraints are areas that would likely require mitigation because they contain the one or more of the following: agricultural soils; special flood hazard areas (outside of the floodway); protected (conserved) lands; deer wintering areas; Act 250 mitigated agricultural soils; hydric soils, and highest priority forest blocks.

In addition to known and possible constraints, unsuitable areas are shown in yellow on the wind and solar map. These are lands with an elevation of 2,000 feet or more that should be protected from any large-scale commercial or industrial development characterized by a structure height of 100 feet or more, and an acre or more of permanent site disturbance, such as clear-cutting. These lands contain one or a combination of factors that make them unsuitable to such development: contiguous forest cover; sensitive wildlife and plant habitat; conservation lands and recreational assets; managed forestland; and headwaters and ephemeral surface waters, which are highly vulnerable to erosion and man-made disturbance. This high-elevation forest cover must be kept unfragmented for the attenuation of flood flows, the integrity of wildlife

habitat and landscape-scale connections/linkages, and for public enjoyment through non-consumptive, non-motorized recreation.

To calculate total generation potential, this plan uses generous contingencies to conservatively account for potential constraints and connectivity issues.

Estimated Generation Potential for Sutton

	Capacity (MW)	Output (MWh)	Assumptions
Roof- mounted solar	.15	179.5	One out of every 10 existing year-round residences, each with a 4 KW capacity, and a capacity factor of 14%[8]
Small commercial rooftop structures (including barns)	.02	24.5	One structure, with a 20 KW capacity, with a capacity factor of 14%
Ground-mounted solar	20.83	25,542.0	One MW for every 60 acres of prime solar land, all with a capacity factor of 14%
Wind	.01	10.0	One 9.5 kW system for every 25 acres of prime wind, with a capacity factor of 20%. (High elevations lands are unsuitable for utility scale development, so only home-scaled systems are used in this calculation.)
Small hydro	.026	91.1	Based on a 2008 study on existing dams. Stringent licensing requirements make the establishment of small hydro very unlikely.
Total	**21.036**	**25,847.1**	

4) Resources

The cost of home-based solar heat/power installations has been dropping rapidly and, if properly sized, can pay for themselves in just a few years through net metering. The town encourages rapid growth in the number and installed capacity of these roof-top systems.

Use of domestic scale renewable energy resources such as solar, wind, hydro and wood ought to be encouraged. Vermont has a number of programs that encourage and defray the cost of renewable energy installations. The Energize Vermont Website has links to a number of

[8] Solar estimates only assume a capacity factor for a fixed system to err on the conservative side. Trackers would increase the capacity factor.

resources pertaining to solar sources. It also features the community energy initiative and the Power Up Vermont Program. www.energizevermont.org

The Property Assessment Clean Energy (PACE) program provided financing for homeowners to invest in efficiency or renewable energy improvements through a special assessment tied to the property. Unfortunately, this program is inactive. The town encourages efforts to revive PACE or a similar mechanism for financing residential renewables.

I. Renewable Energy Siting Standards

1) General Standards

- In-place upgrades of existing transmission lines, distribution lines, and substations are needed to serve the town and region: To the extent feasible, existing utility systems, including transmission lines, distribution lines, and substations, should be upgraded or expanded on site or within existing utility corridors before new facilities or corridors are considered.

- Energy facility development must benefit the Town of Sutton and its adjacent communities (residents and businesses). The benefit must be in direct relation and proportion to the documented impacts of the proposed development on community facilities, services, economy and resources.

- The region has recently experienced a sharp increase in the number of renewable energy applications which will worsen already congested transmission, particularly in the Sheffield-Highgate Export Interface (SHEI), where several existing generators are frequently curtailed by the ISO. While the Town of Sutton encourages appropriately scaled renewable energy development, such development must be sustainable and feasible, and should not merely substitute one renewable resource with another. The Town of Sutton, therefore, supports energy development that will not exacerbate curtailment at issue within the SHEI. It is unlikely that any single solution will solve congestion within the SHEI and, as such, it is anticipated that incremental progress will be achieved as partial solutions are implemented. In the meantime, the Town of Sutton will support projects that are consistent with the land use and conservation measures in this plan. Additionally, we will expect project developers to work with utilities and other stakeholders to explore innovative strategies that shift generation away from the hours when generation exceeds load within the SHEI area or otherwise avoids exacerbating congestion on the grid. An example of such a project would pair a battery with a solar facility to control when the project's power is exported to the grid.

- The height, setbacks, and access of renewable energy projects must be carefully considered with the goal to minimize impact to the viewshed and neighboring landowners.

- Siting should involve the Agency of Natural Resources at the start of the project to avoid problems with wetlands and protected or threatened species. Siting must avoid hazard areas such as floodplains and steep slopes, conservation areas where there will be an

adverse impact on surface waters, primary agricultural land as mapped by the USDA, Natural Resource Conservation Service for the state and significant wildlife habitat areas. Impacts to forestland should be minimized by using existing roads and locating along existing tree lines to avoid forest fragmentation.

- All facility certificates shall specify conditions for system decommissioning, including required sureties (bonds) for facility removal and site restoration to a safe, useful, and environmentally stable condition. All materials and structures, including foundations, pads, and accessory structures (to a depth of 18 inches below pre-project grade), must be removed from the site and safely disposed of in accordance with regulations and best practices current at the time of decommissioning.

2) Wind Generation Siting Standards

Sutton has limited potential for wind energy development, and the municipality lacks areas with elevations sufficient to support utility scale wind development (100KW or greater). Moreover, the Town of Sutton supports the policy of the NVDA's regional plan, which states that upland areas of 2,000 ft elevation or higher, headwaters, forest coverage of site class 1, 2, or 3 priority forest habitat blocks, and state natural areas and fragile areas are unsuitable for utility-scale energy development. The Town has consistently objected to and testified against such a development in Sheffield. Expansion/repowering of such development, or new development on adjacent ridgelines will exacerbate an already profoundly negative impact on the natural profile of the mountain ridgeline, which forms an iconic backdrop visible from many points in Sutton. As it is, our peaceful night skies have been compromised by eight flashing red collision-avoidance lights. Because no locations in Sutton have a suitable wind resource, infrastructure availability, or areas free from significant environmental constraints, no utility-scale wind energy facilities should be located in town. Smaller scale wind projects, including residential-scale turbines (generally less than 10 kW) may be appropriate as long as noise from the turbines does not adversely affect neighboring residential properties. While these constraints are protective, they may be overruled in the PUC's Section 248 permitting process and in such instances the following specific standards shall apply.

- Turbines shall be restricted to a height of not more than 100 feet to tip of blade in vertical position.

- Turbines shall be set back from property boundaries a minimum of one and a half miles.

- With the intent of meeting the World Health Organization noise building-interior standard of 30 fast A-weighted decibels (LAFmax), with windows fully open at any time of year, the exterior standard shall be 31 dBA max when measured 100 feet from an occupied residence in the direction of the nearest wind turbine.

3) Solar Siting Standards

- The Town of Sutton encourages solar energy development, of any scale, on building rooftops as long as the maximum building height does not exceed 35feet. All solar generation shall be considered a conditional use, shall meet the industrial performance

standards (Section 408 of the Sutton Unified Development Bylaws) and shall be subject to appropriate screening provisions.

- The Town supports the development of small-scale (150 kW capacity or less) electricity generation from solar energy at homes, businesses, schools, and other institutions, as well as community solar projects, which benefit Sutton residents who might not otherwise be able to participate in a clean energy project. (This policy is intended to be more restrictive than state-defined "community solar projects" which are group net-metered installations between 15 kW and 150kW in capacity, with shares in the facilities sold to the site owner, neighbors, community members, nonprofit organizations, and local businesses and from which renewable energy credits (RECs) remain with the project)

- The Town strongly supports the integration of on-farm solar generation into active agricultural uses that can help farms reduce expense, generate extra income, and remain viable. The town supports siting solar on existing farm structures, or in a manner that supports grazing, the establishment of pollinator crops, or the creation of buffers between organic and non-organic production areas.

- **Mass and Scale:** Except for projects located on preferred sites, solar facilities larger than 2 acres, individually or contiguous, cannot be adequately screened or mitigated to blend into the municipality's landscape and are, therefore, explicitly prohibited.

- **<u>For all new ground-mounted solar facilities with a capacity of 15 kW or greater:</u>**

    - All new solar facilities must be evaluated for consistency with community and regional development objectives and shall avoid undue adverse impacts to significant cultural, natural, scenic, and aesthetic resources identified in the Sutton Town Plan. When evaluating the impacts of a proposed solar facility under the criteria set forth in this Town Plan, the cumulative impact of existing solar facilities, approved pending solar facilities, and the proposed solar facility itself shall be considered. It is explicitly understood that a proposed solar facility which by itself may not have an adverse impact, may be deemed to have an adverse impact when considered in light of the cumulative impacts of the proposed solar facility and existing and pending facilities.

    - All new solar facilities shall be sited in locations that do not adversely impact the community's traditional and planned patterns of growth, of compact (village) centers surrounded by a rural countryside, including working farms and forest land. Solar facilities shall, therefore, not be sited in locations that adversely impact scenic views, roads, or other scenic areas identified in this plan, nor shall solar facilities be sited in locations that adversely impact any: views across open fields, especially when those fields form an important foreground; prominent ridgelines or hillsides that can be seen from many public vantage points and thus form a natural backdrop for many landscapes; historic buildings and districts and gateways to historic districts; and, scenes that include important contrasting elements such as water. The impact on prime and statewide agricultural soils currently in production shall be minimized.

- **Screening:** All new solar facilities shall be sited and screened so that visual impacts of such facilities, including but not limited to, solar panels, transformers, utility poles, fencing, etc., are mitigated as viewed from public streets and thoroughfares, scenic viewpoints, and/or adjacent properties. Screening shall provide a year-round visual screen and shall occur on property owned or controlled by the owner and/or operator of the solar facility. A diversity of materials shall be used to create a diverse, naturalized screen rather than a large expanse of uninterrupted, uniform material. Materials may include: trees and shrubs indigenous to the area, and berms, or a combination thereof, to achieve the objective of screening the site. All screening shall be maintained to optimize screening at all times by the owner and/or operator of the solar facility until the solar facility is decommissioned and removed. Plantings that die or become diseased shall be replaced within six months of dying or becoming diseased.

- **Preferred Areas:** The following areas are specifically identified as preferred areas for solar facilities, as they are most likely to meet the siting and screening requirements:
  - Roof-mounted systems;
  - Systems located in proximity to existing commercial, municipal, or industrial buildings;
  - Proximity to existing hedgerows or other topographical features that naturally screen the entire proposed array;
  - Former brownfields;
  - Facilities that are sited in disturbed areas, such as gravel pits, closed landfills, or former quarries;
  - Working farms, where more than 50% of the energy generated by the solar development is used by the farm.

- **Prohibited (Exclusion) Areas**: In addition to those areas that do not meet the siting and screening requirements set forth above, development of solar generating facilities shall be excluded from (prohibited within), and shall not be supported by the Town, in the following locations:
  - Floodways shown on Flood Insurance Rate Maps (FIRMs);
  - Fluvial erosion hazard areas (river corridors);
  - Class I or II wetlands;

- A location that would significantly diminish the economic viability or potential economic viability of the town's working landscape, including productive forest land and primary agricultural soils (as defined in Act 250 and as mapped by the U.S. Natural Resource Conservation Service);

- Rare, threatened, or endangered species habitat or communities as mapped or identified through site investigation, and core habitat areas, migratory routes and travel corridors;

- Ridgelines: Elevations above 2,000 feet, specifically, those within and adjacent to the Willoughby State Forest, Mt. Hor, Wheeler Mountain, and Norris Mountain.

- Steep slopes (>25%)

- Surface waters and riparian buffer areas (except for stream crossings);

- Topography that causes a facility to be prominently visible against the skyline from public and private vantage points such as roads, homes, and neighborhoods;

- Solar energy installations, trackers and roof mounts, should be sited in such a way to prevent adverse impacts to historical and cultural resources including:

  - Removal or demolition;
  - Physical or structural damage,
  - Significant visual intrusion, or threat to the use;
  - Significant intrusion in a rural historic district or historic landscape with a high degree of integrity;
  - Significant visual intrusion into a hillside that serves as a backdrop to a historic site or structure;
  - Creation of a focal point that would disrupt or distract from elements of a historic landscape;
  - Impairment of a vista or viewshed from a historic resource that is a significant component of its historic character and history of use;
  - Visually overwhelming a historic setting, such as by being dramatically out of scale;
  - Isolating a historic resource from its historic setting, or introducing incongruous or incompatible uses, or new visual, audible or atmospheric elements.

For all new solar facilities with a capacity of 150 kW or greater:

Only sites identified as **Preferred solar sites** on the Solar Resource Map or **Preferred Areas** as identified above may be developed for solar generation facilities with a capacity of more than 150 kW. All siting and screening requirements as identified above must be met.

J. Implementation

Action	**Responsible Party**	**Time Frame**
Publicize successful examples of efficiency, weatherization, and renewable energy production to promote change. Continue public education and publicize success stories on weatherization, heating systems and renewable energy projects. Invite the Agency of Natural Resources, the Energy Action Network and Energize Vermont to collaborate with Sutton and other towns to develop a method of accounting for carbon sequestration.	Energy Committee, with assistance from Vermont Community Energy Dashboard (https://www.vtenergydashboard.org/)	Ongoing
Make information available about lending programs that can improve the efficiency of older housing stock, such as Efficiency Vermont's "Heat Saver" loan and USDA Direct and Guaranteed Loan Programs, for single homes and multi-family homes. Provide on-going education and links to professional resources, e.g. Efficiency Vermont, Vermont Energy and Climate Action Network Update Bylaws to complement state standards for siting of outdoor wood-energy boilers	Selectboard, Planning Commission, Energy Committee, Town Clerk's office, Town web site, NVDA	Ongoing

and ensuring they so not become a nuisance.[9]		
Collect data on current energy usage in town buildings.	Energy Committee	2020
Carry out energy audit recommendations for Town Clerk's Office/Garage and Sutton School. Collect data on energy use after implementation of audit recommendations. Publicize the results of energy savings from the town energy audit, weatherization, and energy savings. Publicize the results of weatherization and energy efficiency changes in the school buildings	Selectboard, School District, Energy Committee	2020
Consider town funding of a bulk purchase of LED light bulbs to sell to Sutton residents.	Selectboard, Energy Committee	2020
Hand out information and establish processes that encourage good energy conservation practices, e.g., complying with state regulations for residential building energy efficiency standards, not taxing solar panels or energy efficiency home improvements.	Selectboard, Planning Commission, Town Clerk	2020
Develop more complete baseline data on energy usage including electricity, heating energy, and fuel for road operations in order to identify ways to make additional improvements such as more	Energy Committee	2020

[9] The state regulations are at: https://dec.vermont.gov/sites/dec/files/aqc/laws-regs/documents/AQCD_Regulations_2016_Dec.pdf#page=22

generation of power, conservation, building improvements, and operational practices. Encourage this through crowd sourcing information on the Vermont Community Energy Dashboard.		
Promote pedestrian friendly, bike-friendly facilities to encourage less motor vehicle driving.	Planning Commission	Ongoing
Reduce vehicle idling in private and public spaces.	Selectboard, School District	Ongoing
Ensure fire fighters have training for firefighting in roof-mounted solar buildings.	Fire Department	Ongoing
Provide for and promote net-zero energy use and near-net zero energy construction/development, such as "passive design" principles, and Vermod, https://vermodhomes.com/ in the Unified Development Bylaws.	Planning Commission	2020
Work with the Northeast Kingdom food leadership coalition and others to leverage resources for food producers (such as reverse osmosis systems for maple syrup producers, through Rural Energy for America Grants).	Planning Commission, Energy Committee	Ongoing

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