Craftsbury Proposed Enhanced Energy Plan (Amendment to Town Plan sec. 8: Energy)

Purpose of the Energy Plan

The 2015 Craftsbury Community Survey indicated a broad concern among residents about the siting of renewable facilities, especially large-scale industrial projects. More than 70% of respondents want siting standards for large-scale projects, especially wind, hydro, and biomass facilities. About 50% of respondents were concerned about smaller installations, and about 35% were concerned with household scale.

Energy generation and transmission systems that are linked to the electrical grid are preempted from local land use regulation by 24 V.S.A. §4413(b). They are instead regulated by the Vermont Public Utility Commission ("PUC") under 30 V.S.A. §248. These include net-metered distributed energy installations, as well more commercial, utility-scale generation, transmission, and distribution facilities. The Town encourages the PUC to consider project conformance with municipal plans and regional plans prior to issuing a Certificate of Public Good.

The Town enjoys statutory party status in Section 248 PUC proceedings, pursuant to 30 V.S.A. §248(a)(4)(F), and receives notice of applications (petitions) before the PUC. The Town may participate informally by providing comments on a proposed project or request more formal status as an intervener with rights to participate and appeal.[1] Should the Town choose to intervene, it recognizes that it still must submit comments within the established timeframe in the review process. Town participation in the state's review process, based on the Community Renewal Energy Siting Guidelines of this plan, is one way to ensure that local conservation and development objectives are considered and weighed by the PUC.

Until recently, the PUC has only been obligated to give "due consideration" to the recommendations of the municipal plan when determining if a proposed project will not "unduly interfere" with the orderly development of the region. Vermont statute does not define "due consideration," not does it indicate who shall determine what constitutes "due consideration."

Act 174 of 2016 established a new set of 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 codified in statute to mean:

> "...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."

The Craftsbury plan has been revised to meet receive substantial deference under Act 174. It is important to note, however, that substantial deference does not carry the weight of zoning. Projects that fall under the jurisdiction of Section 248 are still exempt from local zoning and permitting.

[1] The Town recognizes that it must file a motion to intervene before the PSB in Section 248 cases, as was established in *Petition of SSE New Haven Solar II LLC for a) certificate of public good, pursuant to 30 V.S.A.) §§ 219a and 248, to install and operate a) 350 kW group net-metered solar electric) generation facility in New Haven, Vermont*, Docket No. 5978, Order entered 12/15/2015.

Nevertheless, this plan reflects our attempt to have a greater say in the siting of renewable energy projects.

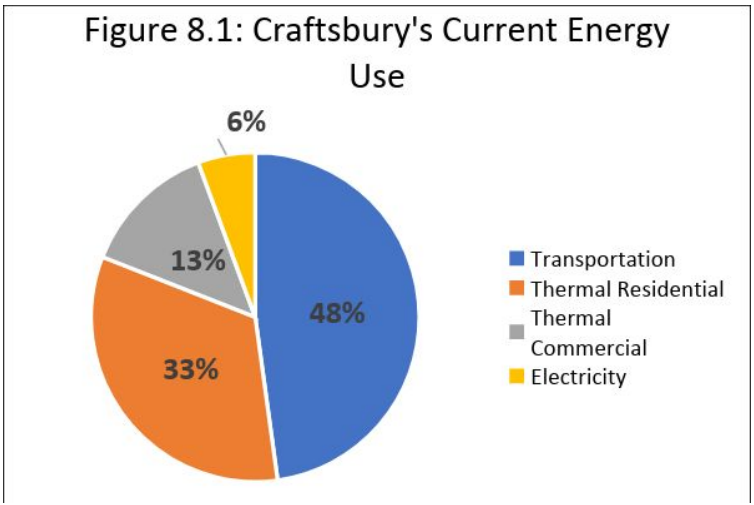
Craftsbury Energy Committee

The Craftsbury Energy Committee ("CEC") recommends continued efforts toward the goals of reducing energy consumption, promoting greater comfort and reduced annual energy costs for all citizens, and protecting the Town of Craftsbury's historical and natural heritage. The CEC believes this serves a larger societal goal of reducing the Town's carbon footprint, improving the Town's stability and resilience in meeting our daily energy requirements, while protecting our historical and natural heritage.

Founded to provide active focus on energy issues and support initiatives to educate, assist, and encourage the Town and its residents to use energy wisely, the Committee has met regularly, organized workshops about energy use and conservation, provided a forum for the public discussion of policy issues, advocated for appropriate renewable energy generation, and provided advisory services to people seeking energy solutions. Since 2008 the Committee has focused on weatherization priorities, public awareness of viable energy savings solutions, and basic research about energy use in the Town of Craftsbury. The CEC has sought to align its efforts with other statewide initiatives, such as those efforts of Efficiency Vermont and the PACE (Property Assessed Clean Energy) program, in order to leverage the impact of limited financial resources. In addition, the Committee seeks to align efforts with the goals of the State of Vermont's Comprehensive Energy Plan. As the CEC moves ahead, its intention is to review changes and impacts of the last six years of work, set specific targets for energy use to guide future efforts and elicit support for them, continue outreach and education efforts, and help the Town stay abreast of best practices and opportunities for efficiency and the reduction of our carbon footprint.

Activities sponsored by the Energy Committee have been annual weatherization workshops, trainings for and the enactment of informal energy assessment walkthroughs for Town residents, and multiple annual public meetings about energy technologies and building techniques. Outreach efforts at fairs and in Town venues have included promoting energy programs that are available to help Town residents and working with local schools and students on energy awareness and conservation of the use of electricity. In addition, the CEC notes a substantial increase in the number of renewable electrical generation facilities in the Town, and as of 2015, over 30 net metering projects are in operation in the Town, along with a number of off-grid installations. PACE (Property Assessed Clean Energy) is in also place as of 2015.

Energy Usage



NVDA estimates indicate that transportation accounts for the largest energy use in Craftsbury, followed by very closely by thermal (heating space and water). (Figure 8.1)

Thermal Residential and Commercial

NVDA developed its residential thermal estimates using American Community Survey 5-Year Estimates for primary heating sources. Average household square footages were developed from ACS estimates, as well as American Housing Survey estimates. Although this calculation uses best available data, it clearly has some limitations. Like most Northeast Kingdom residents, Craftsbury residents are likely to use multiple heating sources. NVDA's estimate accounted for the age of the housing stock, since pre-1940 housing structures are likely to be "leaky" and poorly insulated. Craftsbury has some fairly old housing stock: About 30% of owner-occupied and 44% of renter-occupied housing units are pre-1940. NVDA assumed 80,000 BTUs per square foot for pre-1940 housing stock, 45,000 BTUs for all other. Total thermal usage for occupied housing stock is estimated at 45,776 MM BTUs.

Table 8.1: Residential Thermal Energy Use

Fuel Type: Space Heating	Households	Total avg. Use (Annual)		% Use: (All HHs)	Percent of Use: Owner	Percent of Use: Renter	% of Cost (All HHs)
Tank/LP/etc. Gas	55	60,197	gallons	12%	12%	16%	22%
Electricity	6	178,934	KwH	1%	1.5%	0%	4%
Fuel Oil	175	125,668	gallons	38%	36%	54%	40%
Wood	217	1,095	cords	48%	50%	30%	35%
Coal/Coke	-	-	tons	0%	0%	0%	0%
Other	3	-		1%	1%	0%	-

No information is available on heating sources for non-occupied seasonal housing units, but Department of Public Service guidelines suggest that it is reasonable to assume that a seasonal unit accounts for about 5% of the average owner-occupied housing unit. There are 233 seasonal housing units in Craftsbury. Assuming 5% of the average owner-occupied unit (102), seasonal units account for another 1,185 MMBTUs annually.

Non-residential thermal estimates were developed using data from the Department of Public Service and the Vermont Department of Labor's economic and Labor Market Information. The Census does not have estimates on heating sources, but the Department of Public Service is able to estimate average heating loads on types of business.

Table 8.2: Non Residential Heating Uses

Estimated number of commercial buildings, per Vt. Dept. of Labor:	25
Average annual heating load per building:	**759 MMBTUs**
Estimated total heat energy consumption:	**18,975 MMBTUs**

The Town Survey results show that more than 20% of Craftsbury respondents have installed more efficient heating systems in the past five years. Local heating sources, according to 183 respondents, are comprised of nearly 50% wood and wood pellets, 32% oil, 12% propane, and a mix of others.

The majority of people also have a second, backup heating source, fueled mostly by wood, propane, and then oil. Craftsbury Academy is heated by wood pellets.

Table 8.3: Cost of Fuels, 2011-2016

		November 2011			*November 2016*				
Types of Energy	**BTU/Unit**	**Adj. Effic.**	**$/Unit**	**$/MM BTU**	**Typical Effic.**	**$/Unit**	**$/MM BTU**	***High Effic.****	***High Efficiency$/MM BTU***
Fuel Oil, gallon	138,200	80%	$4.08	$36.89	80%	$2.23	$20.14	*95%*	*$16.96*
Kerosene, gallon	136,600	80%	$4.45	$40.71	80%	$2.80	$25.65		
Propane, gallon	91,600	80%	$3.37	$46.05	80%	$2.54	$34.64	*95%*	*$29.17*
Electricity, kWh (resistive)	3,412	100%	$0.16	$46.37	100%	$0.15	$43.46		
Electricity, kWh (heat pump)**	n/a					$0.15	##	*240%*	*$18.32*
Wood (cord-green)	22,000,000	60%	$192.03	$14.55	60%	$227.00	$17.21		
Pellets (ton)	16,400,000	80%	$263.51	$20.09	80%	$275.00	$20.96		

Source: Department of Public Service, Vermont Fuel Price Report (2011 Adjusted for Inflation)

Table 8.3 demonstrates the various costs of heating sources available to Craftsbury residents. When oil prices were high, many NEK residents turned to alternative fuels, especially wood pellets, which 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 stable in recent years, although there have been some shortages in recent heating seasons. Wood pellet stoves and furnaces may be a significant investment for most homeowners, so they have continued to use pellets even after the price of heating oil dropped.

In 2015 the Vermont Fuel Price report was amended to account for "High Efficiency" ratings of furnaces, which are manufactured to meet higher efficiency standards and can result in savings on energy for the customer.

Heat Pump Technologies:

The Vermont Fuel Price Report has also begun including information on electric-powered heat pump technologies, which deliver proportionately more heat than the energy required to power them. This high return rate – called a coefficient of performance (COP) – offsets the increased electricity usage.

Geothermal, or "ground source heat pump systems", extract natural low-temperature thermal energy from the ground during colder months for heating, and transfer thermal energy from the building to the ground in warm months for cooling. A geothermal system in Vermont can save roughly $1,000 to $2,000 annually in heating costs and have a "simple payback time" of between 10-20 years. This technology operates much like a refrigerator, utilizing a heat pump, heat exchanger and refrigerant. While geothermal systems do require electricity to operate the pumps, the systems generally deliver

between 3 to 5 times more heat than the electrical energy they consume (depending on the type of system).

In recent years, manufacturers have developed air-sourced heat pumps that operate more consistently over Vermont's vast temperature ranges, thanks to new refrigerants and more advanced air compressors. Also called "cold climate heat pumps" or "mini splits", these units also have a high COP over propane and fuel oils. Unlike geothermal units, they do not require excavation or duct work and are therefore less expensive to install. Typically, one pump per room, or a multi-zone setup is required, which may pose a challenge for larger older homes with multiple wings or ells. Despite recent improvements in effectiveness on cold days, a backup heating source is required for sub-zero temperatures. Despite these considerations, cold climate heat pumps may be particularly useful in Craftsbury as a highly effective supplemental heating source – and as a primary heating source for outdoor work spaces.

Transportation

Energy use in transportation is most influenced by the development patterns of the region. Long commutes and incidental trips require NEK drivers to drive an average of 14,000 miles per year. Estimates based on the number of light-duty vehicles, Craftsbury residents probably drive about 12.7 million miles annually, accounting for $1.3 million in fuel costs. As Table 2.2 indicates, nearly all of this energy is non-renewable. Ethanol currently accounts for nearly all renewable transportation energy usage – about 6% of total BTUs – while electricity accounts for a mere .05%.

Table 8.4: Transportation Energy Use in Craftsbury	
Total Light Duty Vehicles	906
Total Internal Combustion Engine (ICE) Vehicles	902
Average Miles per gallon for ICE	22
Average annual Vehicle miles travelled ICE	14,000
Total annual VMTs ICE	12,628,000
Total Gallons ICE	574,000
MM BTUs, Fossil fuel	63,338
MM BTUs, Ethanol	4,376
MM BTUs Total ICE	67,715
Total Electric vehicles (EVs) (as of Jan. 2017)	4
Average annual VMT for EVs	7,000
Total annual VMTs for EVs	28,000
Average fuel economy per kWh	3
Total kWh for EVs	9,333
MMBTUs for EVs	32
Sources: American Community Survey, Department of Public Service, and NVDA estimates.	

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.

There are two types of EVs:

- All-Electric Vehicles (AEVs): An AEV can range as far as 80 miles on a single charge, but on very cold days, this range can be cut in half. AEVs are therefore best used as a second car.
- Plug-in Hybrid EVs (PHEVs): A PHEV generally does not range as far as an AEV, but they can switch over to gasoline when the battery charge runs low, making this a more likely choice for those with longer drives (and greater distance from public charging stations). About 75% of EVs registered in Vermont are PHEVs.

Not surprisingly, Chittenden County has the highest concentration of EVs on the road – about one-third of all EVs in the state. Nevertheless, Northeast Kingdom residents are beginning to use them as well. As of January 2017, there were 4 EVs registered in Craftsbury (and 134 in the entire Northeast Kingdom.) The highest use is found in the region's population centers – St. Johnsbury, Lyndon, Hardwick, Derby, and Newport. The nearest dealership (and public charging station) is Lamoille Valley Ford in Hardwick. All the public charging stations within an approximate 20-mile radius of Craftsbury are "level 2" charges, which means drivers will need at least one hour to get a charge sufficient for 10 miles. (In very cold weather, drivers might need at least two hours to get the same charge.) Several level 2 public charging stations are available in Stowe. DC fast charges are more suitable for drivers on occasional errands because they only require 20 to 30 minutes to get an 80% charge. The nearest DC fast charge, however, is more than 25 miles away in Danville.

Table 8.5: Public Charging Stations within a 20-Mile Radius for Craftsbury

Town	Location	Approx. Distance
Hardwick	Lamoille Valley Ford	8 miles
Hyde Park	McMahon Chevrolet Buick	12 miles
Morristown	Municipal Offices	12 miles
Barton	Village Offices	12 miles
Johnson	Municipal Offices	15 miles
Johnson	Vermont Electric Coop	16 miles
Source: US Department of Energy's Alternative Fuel Locator		

Price volatility of gasoline in the first half of the past decade helped to spur an interest in the development of alternative fuels. Biodiesel is commonly made from soybeans, rapeseed (canola), and sunflowers; all of which can be grown in Vermont. Biodiesel can be blended with diesel up to 5% (B5) to be safely used for on-road vehicles. Higher blends, including pure biodiesel (B100) can be used in off-road equipment and farm vehicles. Black Bear Biodiesel, located just outside of the region in Plainfield, is a B100 fueling station.

Research has found that oilseed crops, when grown in rotation with other crops, can help to support sustainable, diversified, and profitable agricultural enterprises. The Vermont Bioenergy Initiative, a program of the Vermont Sustainable Jobs Fund, provides early-stage grant funding, technical assistance and loans to producers. The Town encourages further innovation and research into this area as a long-range economic opportunity.

Electricity Use

Craftsbury's electric utility data is collected by Vermont Energy Investment Corporation. Customers are primarily residential, the number of which have dropped in recent years. Thanks to efficiency measures, residential customers have dramatically reduced their average use in recent years – from an average of 22 MMBTUs per customer, to only 11. Similar data for commercial and industrial users is not available, but this sector has also seen a considerable reduction in use.

Table 8.6: Annual Electricity Usage in Craftsbury (in kwH)			
Sector	**2014**	**2015**	**2016**
Commercial & Industrial	857,049	897,104	511,276
Residential	3,666,267	3,740,458	1,833,539
Total	4,523,316	4,637,562	2,344,815
Count of Residential Premises	650	662	663
Average Residential Usage	6,547	6,574	3,211
Source: Vermont Energy Investment Corporation			

Craftsbury's Energy Committee has been aggressive in pursuing efficiency measures, in both residential and commercial & industrial sectors. This has resulted in a three-year total reduction of 1,101 MM BTUS. (Table 8.7).

Table 8.7: Annual Savings for Craftsbury				
	2014	**2015**	**2016**	**Total**
Electric Savings (KWh)	76,872	114,625	131,297	322,794
Residential	68,524	69,563	76,547	214,634
Commercial & Industrial	8,348	45,063	54,750	108,160
Thermal Savings (MMBTU)	7	596	725	1,329
Residential	9	35	99	143
Commercial & Industrial	(1)	561	626	1,186
Total Customer Cost Savings	$12,691	$36,778	$29,479	$78,948
Residential	$11,539	$12,050	$14,951	$12,050
Commercial & Industrial	$1,152	$24,729	$14,529	$24,729

Table 8.8 shows the types of efficiency measures that have been carried out by residential and commercial and industrial utility customers. The bulk of measures consist of light bulb replacements, but additional measures have been taken to upgrade equipment and hardwiring, and improve thermal efficiency.

Table 8.8: Efficiency Measures in Craftsbury, Residential and Commercial & Industrial				
	2014	**2015**	**2016**	**Total**
Air Conditioning Efficiency	0	1	1	2
Cooking and Laundry	6	12	8	26
Health and Safety	0	0	1	1
Hot Water Efficiency	11	4	10	25
Industrial Process Efficiency		0	2	2
Light Bulb/Lamp	1698	1,686	1,482	4,866

Lighting Efficiency/Controls	0	59	0	59
Lighting Hardwired Fixture	86	67	234	387
Motor Controls	0	1	0	1
Motors	7	2	18	27
Office Equipment, Electronics	71	32	8	111
Refrigeration	4	4	9	17
Space Heat Efficiency	23	14	19	56
Space Heat Fuel Switch	0	0	4	4
Space Heat Replacement	0	2	1	3
Thermal Shell	0	1	4	5
Ventilation	0	2	1	3
Source (Table 8.7 and 8.8): Vermont Energy Investment Corporation				

Generation and Distribution

Craftsbury is served by two electric utilities, Hardwick Electric Department (HED) and the Vermont Electric Coop (VEC), both of which have become increasingly involved with the issues and policies associated with renewable energy production, particularly distributed, small-scale power generation. Hardwick Electric (like all municipal utilities in Vermont) is represented by the Vermont Public Power Supply Authority (VPPA), which has broad authority to buy and sell wholesale power on behalf of all the municipalities. VEC is a member owned electric distribution facility. Both primarily serve residential customers (about 72% and 88% respectively.) Both utilities maintain diverse power supplies using a variety of fuel mixes and combinations of short- and long-term contracts to minimize costs and maintain price stability. There is no one set equation for achieving this delicate balance.

Figures 8.2 and 8.3 depict the current power supply of each utility.[2]

Hydro – a major part of the fuel mix – is generated on a run of the river facility in Wolcott owned by HED. Both utilities obtain hydro from other sources, including Hydro Quebec and New York Power Authority. Biomass production includes the McNeil Plant in Burlington and Ryegate Power Station, which distributes power through Vermont's Standard Offer Program.[3]

Both utilities are expanding solar capacity. In late 2016, VEC opened a "community solar" project" in Alburgh, which allows VEC customers to sponsor solar panels in return for a credit on their monthly utility bill. In 2015, VPPSA was awarded two standard offer contracts for solar projects in Lyndon, sized at 475 kW and 500 kW.

Figure 8.2: HED 2013 Fuel Mix

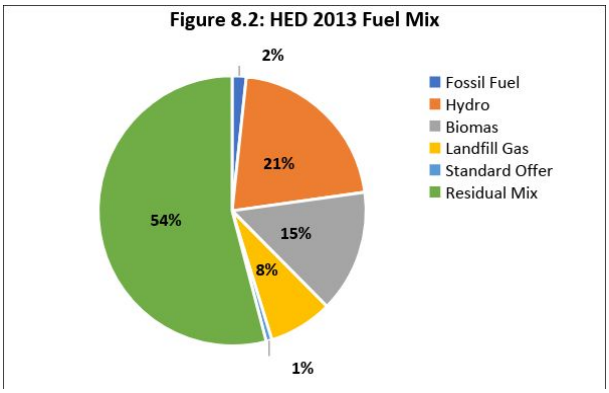
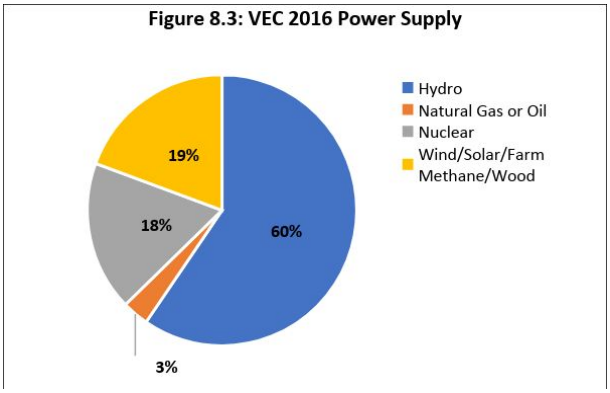


Figure 8.3: VEC 2016 Power Supply



[2] Figure 8.1 Vermont Public Power Supply Authority: Town of Hardwick Electric Department Integrated Resource Plan, 2015-2034; Figure 8.2 http://www.vermontelectric.coop/keeping-the-lights-on/power-supply

[3] (Standard Offer, is a program created by the Vermont General Assembly that allows developers of renewable projects to negotiate a multi-year contract to sell power at a fixed rate to utilities. The rates are set in an annual bidding process.)

Figure 8.4 shows the service boundaries of the two utility companies.

The Town has seen a rapid growth in the installed capacity of renewable energy systems in the past five years. Over 30 households (better than 5% of households in the Town) generate most or all of their electricity from renewable systems. In addition, several substantially larger arrays with a total production of over 100,000 kwh per year became fully operational at the end of 2015. The Town has begun to meet its own electricity needs with the installation of a solar tracker producing 6,000 kwh annually to help meet the Town buildings' electrical use (estimated to produce 30% of the annual electric consumption for the Town Hall and Town Garage).

Based on the results of the 2015 Town Survey, 12% of the 160 respondents have installed renewable energy systems on their property and an average of 49 % have completed basic household conservation. The Craftsbury Energy Committee lauds this progress and encourages continued growth, while recognizing the need to work closely with our utilities as they seek to manage their operations to effectively utilize grid-tied distributed generation.

As of December 2016, the Town of Craftsbury was generating annual total of 759.7 MWh of solar energy, accounting for about 9% of the entire county's output. (Table 8.9)

Table 8.9: Existing Solar Generation in Craftsbury

Solar Type	Type	Location	Utility	Capacity (kW)	Annual Production (kWh)
Ground-mounted PV: Tracker	Institution	230 Dustan Road	HED	8	9,811
Ground-mounted PV: Tracker	Residential	306 Seaver Brook Rd	VEC	4	4,906
Ground-mounted PV: Tracker	Residential	407 Wells Pl	HED	4	4,906
Ground-mounted PV: Tracker	Institution	535 Lost Nation Road	VEC	41.8	51,264
Ground-mounted PV: Tracker	Residential	654 N Craftsbury Rd	HED	3	4,675
Ground-mounted PV: Tracker	Residential	295 Creek Rd	HED	4	6,568
Ground-mounted PV: Tracker	Residential	1747 King Farm Rd	HED	4	4,906
Ground-mounted PV: Tracker	Institution		HED	96	117,734
Roof-Mounted PV	Residential	91 Young Rd	HED	1.8	2,208
Roof-Mounted PV	Residential	2426 Collinsville Rd	VEC	3.8	4,800
Roof-Mounted PV	Residential	1163 W Hill Rd	HED	4.8	5,887
Roof-Mounted PV	Residential	23 Summer Drive	HED	6	7,358
Roof-Mounted PV	Institution	535 Lost Nation Road	VEC	66.3	81,310
Roof-Mounted PV	Residential	450 Whetstone Brook Road	HED	1.9	2,330
Roof-Mounted PV	Residential	1291 Town Line Rd	VEC	2.9	3,557
Roof-Mounted PV	Residential	453 Ketchum Hill Road	HED	3.5	4,292
Roof-Mounted PV	Residential	375 Young Rd	HED	6.8	8,340
Roof-Mounted PV	Residential	1410 South Albany Road	HED	2.9	3,557
Roof-Mounted PV	Residential	147 Creek Rd	HED	6	7,358
Roof-Mounted PV	Residential	450 Whetstone Brook Road	HED	2	2,453
Roof-Mounted PV	Residential	622 Wylie Hill Road	VEC	4.2	5,151
Roof-Mounted PV	Residential	321 N. Craftsbury Rd	HED	2.8	3,434
Roof-Mounted PV	Municipal	46 Town Garage Road	HED	6.2	7,604
Roof-Mounted PV	Residential	89 Breitmeyer Dr	HED	9	11,038
Roof-Mounted PV	Residential	275 Shatney Road	VEC	5	6,132
Roof-Mounted PV	Residential	1529 Lost Nation Road	VEC	5	6,132

Roof-Mounted PV	Business	1543 East Craftsbury Road	HED	144	176,602
Roof-Mounted PV	Residential	288 Dustan Rd	HED	4.6	5,641
Roof-Mounted PV	Residential	1859 Mill Village Rd	VEC	1.35	1,656
Roof-Mounted PV	Residential	4510 East Hill Road	VEC	5	6,132
Roof-Mounted PV	Farm	266 S. Craftsbury Rd	HED	142.5	174,762
Roof-Mounted PV	Residential	2411 South Albany Rd	VEC	9	11,038
Roof-Mounted PV	Residential	948 Wylie Hill Road	VEC	5	6,132
Total				**617.15**	**759,671**
Source: Renewable Energy Atlas, accessed from the Vermont Community Energy Dashboard. Output is calculated using the following formula: (kw capacity) * (8,760 hours per year) * (0.14 capacity factor)					

Craftsbury also annually produces about 16.5 MWh of wind energy from a farm on Strong Road. This generation is net-metered by HED and is a small-scale wind tower with a 9.5 kW capacity.

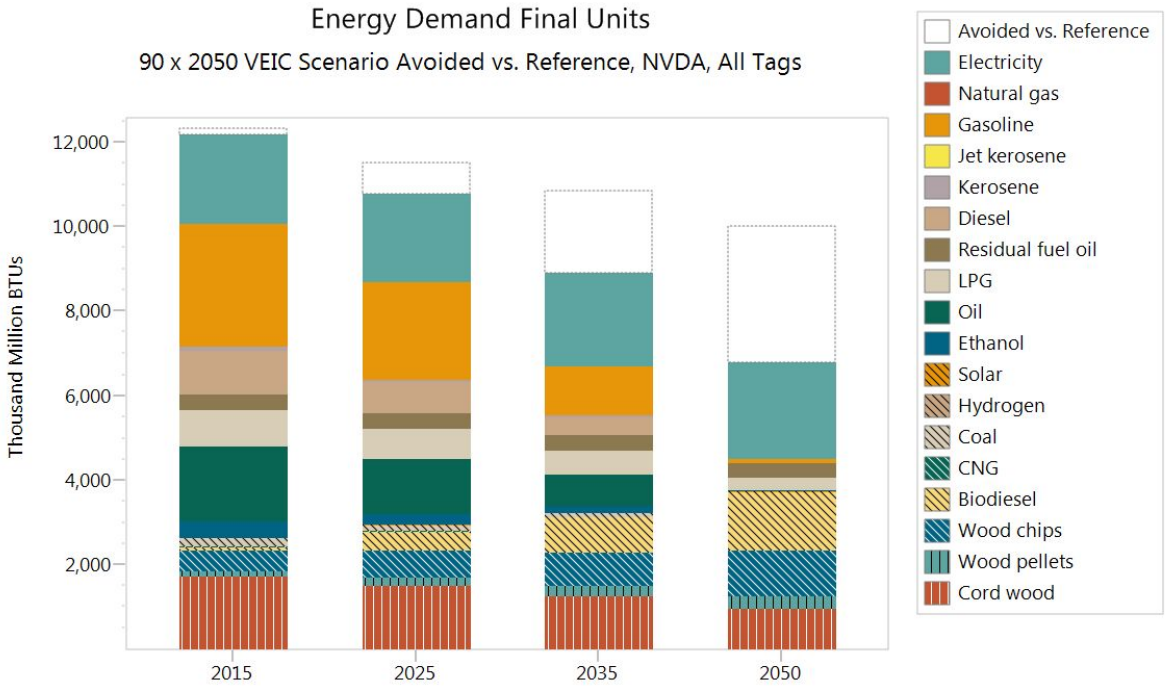
The Craftsbury Energy Committee specifically recommends that the Town avoid disincentives, such as taxing renewable projects, and recommends that the Town continue to increase its own electrical generation and carefully site renewable projects so that historical values and good neighbor policies are maintained without inhibiting renewable generation installations.

Getting to 2050: Craftsbury's Plan for Meeting Statewide Energy Goals

Craftsbury's Energy Plan supports Vermont's 2016 Comprehensive Energy Plan (CEP), which contains the following goals:

- Reduce total energy consumption per capita by 15% by 2025, and by more than one third by 2050.
- Meet 25% of the remaining energy need from renewable sources by 2025, 40% by 2035, and 90% by 2050.
- Achieve three renewable end-use sector goals for 2025: 10% transportation, 30% buildings, and 67% electric power.

The chart below shows what the region's total end use of ALL fuels might look like if the "90x2050" goals of the CEP were met. This scenario is based on Long-Range Energy Alternatives Planning (LEAP), an integrated modeling tool that can estimate and track consumption across all sectors, based on a set of assumptions, such as population growth. This LEAP scenario reduces demand enough to make 90% renewable supply possible. This scenario makes use of wood energy, but there is more growth in electric heating and transportation to lower total energy demand. Where the graphs show "Avoided vs. Reference," that is the portion of energy that is no longer needed because of the efficiency improvements through weatherization, equipment upgrades, and fuel switching. Despite a modest growth rate of population and economy, overall energy use declines because of efficiency and electrification. Electrification of heating and transportation has a large effect on the total demand because the electric end uses are three to four times more efficient than the combustion versions they replace.



Source: Vermont Energy Investment Corporation

Efficiency and weatherization

Energy efficiency is, generally, the most cost-effective method of saving energy and reducing the Town's carbon footprint. Therefore, it is recommended that residents pursue energy efficiency solutions first, such as home energy audits and energy efficiency retrofits, before investing in the installation of renewable energy systems. The 2016 Vermont Comprehensive Energy plan states that efficiency will ensure an affordable and stable cost of doing business, increase entrepreneurship opportunities, improve labor market conditions, drive production, and drive improvements in demand-side thermal and electric efficiency and conservation. Vermont energy committees work to help their towns meet those goals.

The Town of Craftsbury participated in the 2013 Weatherization Challenge Program sponsored by Efficiency Vermont. The goal was for 15% of all year round homes in each VT town to be weatherized based on Energy Audit recommendations. CEC members were trained to perform walk-through layman audits to help homeowners save fuel and make their homes more comfortable in winter. About 15 audits have been done in Craftsbury, which contributed to Craftsbury residents weatherizing 13% of our homes. Town funding was appropriated at the 2015 Town Meeting for the assessment and weatherization of the Craftsbury Elementary School building (to be completed in 2017).

Below are targets for reducing heat energy demand (through weatherization), which is an absolutely essential component of meeting 90x50 goals. Increased fuel switching (from non-renewables to

renewables) will not compensate for lower weatherization targets. On the other hand, more aggressive weatherization strategies will reduce fuel switching targets.

These projections estimate a 6% increase in number of housing units/commercial establishments over each period. Weatherization projects are assumed to achieve an average of 25% reduction in MMBTUs for residential units and 20% for commercial establishments, although some weatherization projects can achieve deeper savings. For Craftsbury, that would represent an average reduction of 26 MMBTUs per residence and 138 MMBTUs per commercial establishment.

Table 8.10: Craftsbury Weatherization Targets, Electrical Upgrades, and Fuel Switching Targets

	2025	2035	2050
Estimated number of households	483	512	543
% of households to be weatherized	29%	48%	48%
# of households to be weatherized	141	245	262
Estimated number of commercial establishments	30	31	33
% of commercial establishments to be weatherized	6%	10%	18%
# of commercial establishments to be weatherized	2	3	6
Estimated number of customers	725	769	815
% of customers to upgrade electrical equipment	29%	42%	58%
# of customers to upgrade electrical equipment	207	325	476
New Efficient Wood Heat Systems in Residences	247	203	147
% of households with Wood Heat Systems	51%	40%	27%
New Efficient Wood Heat Systems in Commercial Establishments	5	7	10
New Efficient Wood Heat Systems in Commercial Establishments	5	7	10
% commercial establishments with wood heat systems	18%	22%	29%
Estimated commercial establishments with Heat Pumps	2	4	6
Projected number of light-duty vehicles in the area, by year	1,019	1,147	1,290
Number of vehicles powered by electricity	121	386	830
% of vehicles powered by electricity	12%	34%	64%
Number of vehicles using bio-fuel blends	821	565	99
% of vehicles using bio-fuel blends	81%	49%	8%

While electricity currently accounts for the smallest share of overall use, its use will increase exponentially. For non-thermal uses alone, it could reach 3,000 MWh by 2050. Therefore, improving electrical efficiency will be vital.

A number of efficiency improvements have already been achieved in Craftsbury through electrical upgrades – hardwiring, fixtures, etc. This assumption is based on the projected number of households through 2050 and multiplies by 1.5 (generally, there are more utility customers than households) and assumes an average savings of 400 kWh.

The projected number of vehicles in the area is estimated to be roughly commensurate with projections of population and households. Estimates assume a gradual increase in EV fuel economy from 3 miles per kwh to 4 miles per kwh by 2050.

Craftsbury's Future Energy Portfolio

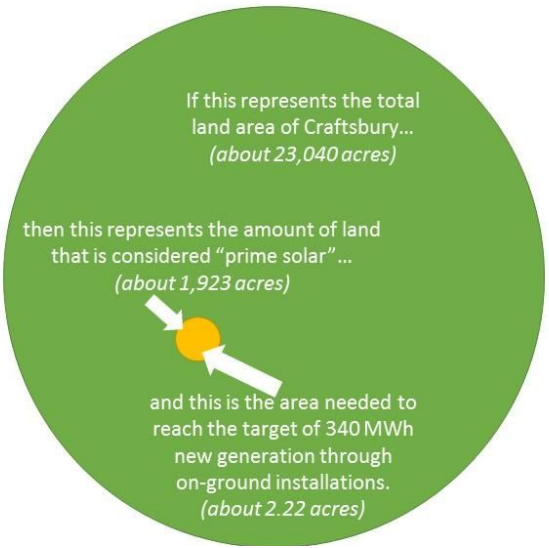
Craftsbury's new net generation in support of 2050 goals is 340 MWh. This is based on Craftsbury's share of the regional population. Existing generation in Craftsbury does not count toward this target, but the region already has a low net generation target, mainly because of the industrial wind production in Sheffield and Lowell. The region's net generation target for new solar ranges from 246 MW to 377 MW. There is no regional net generation target for wind.

Craftsbury has sufficient land for the orderly development of solar, according to NVDA's mapping analysis. These maps, which are to be used to gauge overall siting potential rather than a definitive siting tool, identify known constraints, as well as potential constraints:

- Known constraints are areas not likely to be developed 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, 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.

Solar

Using conservative estimate of prime solar acreage alone (i.e. no constraints), Craftsbury has 1,923 acres with potential for development. About eight acres are required to produce 1 MW of solar power. Obviously, not every prime acre in Craftsbury is actually available. Property owners may not be interested in leasing their land, interconnection costs may be too high in some areas, and certain sites may still be unsuitable due to neighbor objections or other factors. This plan therefore assumes a more conservative estimate of **1 MW for every 60** acres.



The potential of rooftop solar should not be overlooked. While not every rooftop is viable, a conservative estimate of one out of every ten residential structures could produce considerable output by 2050. This estimate includes seasonal residences as well, since seasonal use in Craftsbury tends to be year-round. There is also some limited opportunity for rooftop commercial, which might include barns and other outdoor structures.

Table 8.12: Craftsbury Solar Potential		
	Total MW	Total MWh Output
Residential Rooftop	.3	373
Commercial Rooftop	.04	49.1
Ground Mounted	32.05	39,3118.0
Total Solar	32.39	393,540.1

Wind

Craftsbury has few high elevation areas conducive to speeds needed for commercial wind. There are, however, some opportunities for residential- and farm-scale wind, in addition to what already exists. Our analysis assumes about 9.5 kW (typical of a small-scale turbine) for every 25 acres of 335 acres of prime wind areas. As with solar not every acre will actually be able to accommodate residential-scale wind. With this more conservative scenario, we estimate a potential output of .13 MW, with a total output of 223 MWh.

Methane

Methane, a common gas found in the environment, can be burned to produce electricity. Large amounts of methane are produced through the anaerobic digestion of manure, agricultural wastes, and other organic wastes. In agricultural practices, the procedure also destroys harmful pathogens, reduces water quality impacts, reduces manure odors, and provides a new source of income to local farmers. The solids left over from the anaerobic digestion process can also be used as animal bedding. Excess heat can be used to heat greenhouses. Currently there are three farms in Orleans County with methane digesters. Collectively, their permitted capacity represents about 675 kW. Nevertheless, onsite systems are costly with multi-year payback periods and only feasible for very large farms. Access to three-phase power is necessary. It is possible that by aligning financial and technical resources, Craftsbury could host one methane generator.

Hydro

Craftsbury has no areas identified as suitable for hydro, and with existing licensing regulations, it is highly unlikely that the town could establish a hydro facility of any scale. Nevertheless, hydro should be considered an important part of Craftsbury's energy portfolio. While it is understood that hydro power facilities can also alter the ecosystem of a waterway, causing stress to fish populations and riparian-habitat wildlife, the existing FERC relicensing requirements may reduce or even eliminate some of the in-state hydro facilities that serve our region and utilities. Overall, hydro-power is considered a long-term resource and is relatively secure and stable. Many of the facilities in the region were built in the early 1900s and have required significant upgrades over the years. At this time, facilities in other regions of the state are facing some significant challenges in relicensing. The

Town of Craftsbury supports region-wide efforts to maintain existing generation infrastructure, upgrade aging infrastructure, and improve safety standards.

Opportunities and Challenges

Land Use and Development

Compact, mixed-use development can reduce residents' reliance on the automobile, vehicle miles traveled, and inherent system energy costs — including energy costs associated with maintaining roads and related infrastructure. Targeting economic and residential growth within areas intended for more concentrated development allows people to walk to their destinations and makes public transit services between growth centers more economically feasible. At the site level, a south facing building orientation and landscaping can effectively reduce energy demand. Clustering and other energy efficient development patterns should be encouraged. While smart growth principals are worthy goals for Craftsbury, they remain in many ways aspirational, with a number of land and socio-political constraints. There are limited opportunities for development in Craftsbury's existing village centers, which are characterized by poor soils without access to off-site waste water systems. An analysis of long-term development trends in Craftbury has shown that market demands favor scattered and dispersed development. While Craftsbury has been wary of land use regulations to drive development back to the centers, some measures have been taken to provide incentives for reinvestment. The town has sought and obtained Village Center Designation for Craftsbury Village, Craftsbury Common, and East Craftsbury.

Transmission Constraints and Electricity Demand

The central-west and northwestern area of the Northeast Kingdom (which includes Craftsbury) is served by a severely constrained transmission line, which already carries the significant outputs from Kingdom Community Wind and the Sheffield Wind projects. Both wind generations sites have faced transmission challenges and shut-downs, leading to financial losses to the developers and utilities. While the transmission line upgrade is a short-term fix, it is a costly one. Constraints are further exacerbated by the reality that the area generates far more power than it consumes, leading utilities to oppose a number of recently proposed renewable projects in the area. Ironically, our area has been highly efficient in reducing electric demand through a variety of efficiency measures. While this is in principal, good for the community and the environment, the reduced demand for electricity further hampers the financially viable development of new renewable generation.

While the short-term solution is the upgrade of the transmission line, the long-range solution is ***beneficial electrification***, the replacement of traditional fossil-fuel sources with electricity. Fuel switching, as in the installation of heat pumps and the increased use of EVs, is critical to the reduction of greenhouse gasses and attaining energy independence.

To meet the new renewable energy portfolio requirements, utility companies and energy service providers provide incentives for fuel switching to build demand for electricity. Vermont Electric Coop, for example, is offering financial incentives to individuals who purchase EVs. Additionally, its Clean Air Program offers customized service to underserved and off-grid customers. There is a significant opportunity for Craftsbury to identify its electrification needs as incentives programs are refined and implemented.

Siting Standards

The purpose of municipal energy policies is to promote the development of renewable energy resources and energy facilities in the Town, while limiting the adverse impacts of such development on public health, safety and welfare, the Town's historic and planned pattern of development, environmentally sensitive areas, and our most highly-valued natural, cultural, and scenic resources - consistent with related development, resource protection, and land conservation policies in this plan. Additionally, all new facilities and proposed system upgrades must be consistent with the Vermont Comprehensive Energy Plan, the Vermont Long-Range Transmission Plan, and the utilities' Integrated Resource Plans (IRPs). These policies are to be considered in undertaking municipal energy projects and programs and in the review of new or upgraded energy facilities and systems by the Town and the PUC under 30 V.S.A. § 248.

General Standards

1. **In-place upgrades of existing facilities, including existing transmission lines, distribution lines, and substations as needed to serve the town and region:**: To the extent physically and functionally 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.
2. Energy facility development must benefit the Town of Craftsbury 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.
3. 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 Craftsbury encourages appropriately scaled renewable energy development, we have a commitment to ensure that such development is sustainable and feasible, and does not merely substitute one renewable resource with another. The Town of Craftsbury 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 Craftsbury 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.
4. 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.
5. Siting should involve the Agency of Natural Resources at the start of the project to avoid problems with wetlands and protected and threatened species. Siting must avoid hazard area 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.

Wind Generation Siting Standards

- Craftsbury 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 Craftsbury supports the policy of the NVDA's regional plan, which states that upland areas of 2,000 ft or more, 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 development in Lowell. Expansion of such development, or new development on adjacent ridgelines will exacerbate an already profoundly negative impact on the natural profile of the mountain, which forms an iconic backdrop visible from many points in Craftsbury. Because no locations in Craftsbury have 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.
- **Decommissioning**: 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, must be removed from the site and safely disposed of in accordance with regulations and best practices current at the time of decommissioning.

Solar Siting Standards

- The Town of Craftsbury encourages solar energy development, of any scale, on building rooftops.
- The Town strongly 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 may benefit people who might not otherwise be able to participate in a clean energy project. (For purposes of this plan, "community solar projects" are group net metered installations between 15 kW and 150kW in capacity, with shares in the facility sold to the site owner, neighbors, community members, nonprofits organizations, and local businesses.)
- 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.

For all new ground-mounted solar facilities with a capacity of 15 kW or greater:

- 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 Craftsbury 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.
- The impact on productive forested lands -- either enrolled in Current Use or with a site class of 1, 2, or 3 -- 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 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;
  - ➢ Significant Ridgelines: Ridgelines are defined as the line formed by the meeting of the tops of sloping surfaces of land. Significant ridgelines are ridgelines which, in general, are highly visible and dominate the landscape;
  - ➢ 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 or cultural resources, including state or federal designated historic districts, sites and structures, and locally significant cultural resources identified in the Craftsbury Town plan. Prohibited impacts to historical and cultural resources include:

  - ➢ 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.

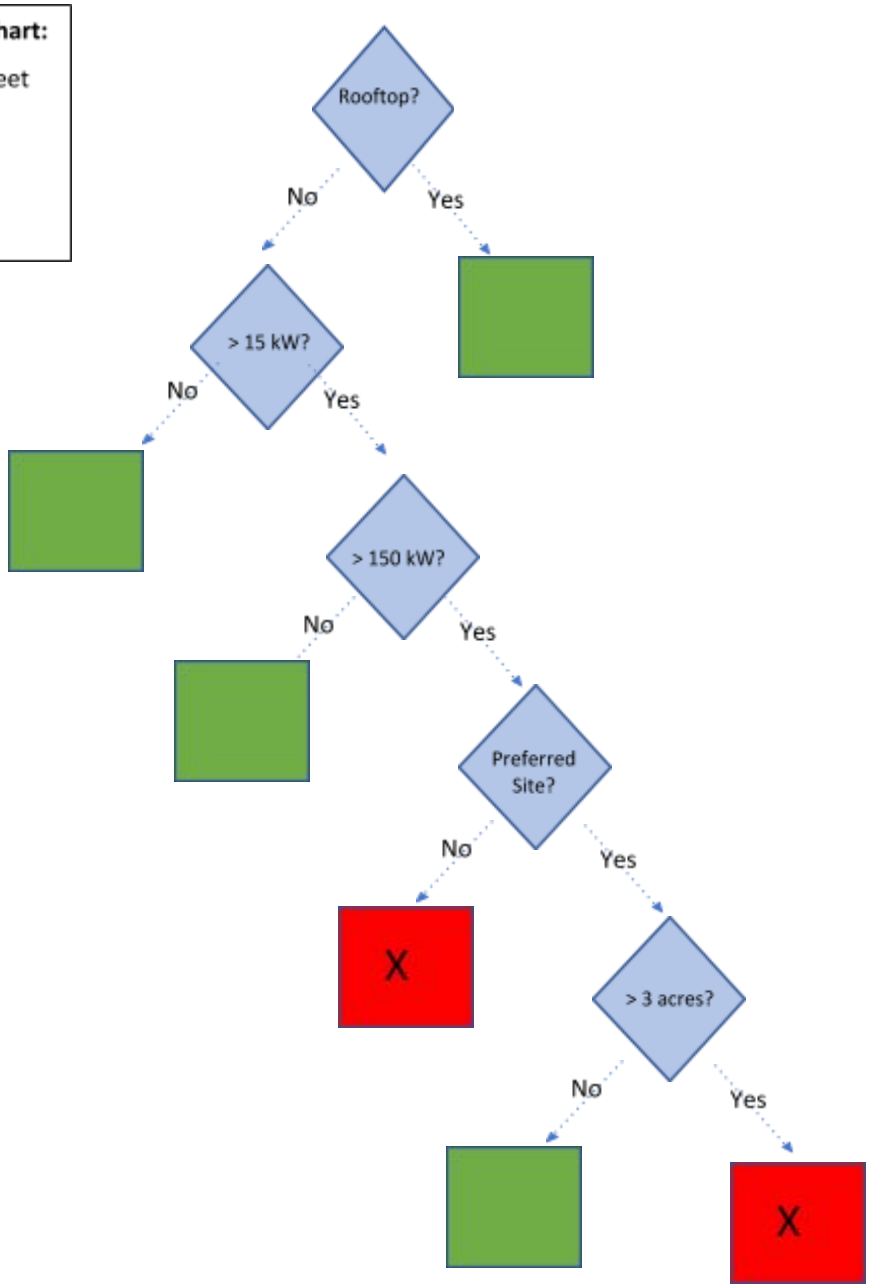
- **Mass and Scale:** Except for projects located on preferred sites, solar facilities larger than three acres, individually or cumulatively, cannot be adequately screened or mitigated to blend into the municipality's landscape and are, therefore, explicitly prohibited.
- **Decommissioning**: All facility 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, must be removed from the site and safely disposed of in accordance with regulations and best practices current at the time of decommissioning.

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.

Solar Siting Decision Flow Chart:

Note: all solar siting must meet screening and general siting standards.



Energy Planning

The Craftsbury Energy Committee recommends continued efforts to increase efficiency in energy use, to increase the proportion of energy needs met by renewables while improving our general standard of living in terms of cost, comfort, and convenience. In the absence of specific zoning or planning mandates, individuals have been responsible for making improvements in energy use and generation. Residents have shown a strong interest in such efforts and have a laudable record of investing in home improvements and small power generating facilities.

Goals:

- Build robust community awareness about the available resources and ongoing activities in energy efficiency, both privately and publicly, to encourage further participation.
- Intensify efforts to promote energy conservation and weatherization activities at the household and Town levels.

Action Steps:

- Publicize successful examples of efficiency, weatherization, and renewable energy production to promote change.
- 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.
- Collect data on current energy usage in Town Buildings.
- Complete energy audits of Town Building and carry out the recommendations.
- Collect data on energy use after implementation of audit recommendations.
- Publicize the results of energy savings from the Town audit, weatherization, and energy savings.
- Publicize the results of weatherization and energy efficiency changes in the school buildings.
- Publicize success stories from Town residents that have installed renewable systems.
- Continue the Town funding of a bulk purchase of LED light bulbs to sell to Craftsbury residents.
- Continue public education and publicize success stories on weatherization, heating systems and renewable energy projects.
- Provide on-going education and identification of professional resources (See Appendix A, **Internet Resources on Energy for Craftsbury Residents**.
- Establish town policies that encourage good practices, e.g. not taxing renewables or energy efficiency home improvements.
- 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 generation of power, conservation, building improvements, and operational practices. The Energy Committee will continue to raise awareness by gathering information, using tools such as the Vermont Community Energy Dashboard.

- Promote pedestrian friendly, bike friendly systems to encourage less motor vehicle driving.
- Reduce vehicle idling in private and public spaces.
- Ensure fire fighters have training for solar installations.
- Promote net-zero and near-net zero development, such as "passive design" principles, and Vermod.
- Work with the Northeast Kingdom food leadership coalition and others to leverage resources for food producers (such as Rural Energy for America Grants).

Internet Resources on Energy for Craftsbury Residents

Contact the Craftsbury Energy Committee: craftsburyenergycommittee@gmail.com

Efficiency Vermont: https://www.efficiencyvermont.com/, 888-921-5990: For businesses and home. Find certified energy auditors. Contractors who do energy efficient buildings. Retailers of energy efficient goods and services. Rebates after purchasing energy efficient appliances. Rebates on home energy audits and cash incentives for work done. And more.

VECAN (Vermont Energy and Climate Action Network): Help with going solar in Vermont: http://www.vecan.net/going-solar-in-vermont/, 802-223-2328

VECAN for Energy Efficiency and Conservation: Links on lighting, weatherization, efficient windows, building efficient homes & more.
http://www.vecan.net/resources/efficiency-and-conservation/, 802-223-2328

Public Service Dept of the State of Vermont: http://publicservice.vermont.gov/ 802-828-2811, Consumer hotline: 800-622-4496

The Public Service Department (PSD) is an agency within the executive branch of Vermont state government, and is charged with representing the public interest in energy, telecommunications, water and wastewater utility matters.

Low-income Weatherization help: http://www.vtneto.org/, 802-334-7378, 800-639-3212: Apply for assistance in weatherizing your home.

Vermont Natural Resources Council: http://vnrc.org, 802-223-2328

Energy and climate action, sustainable communities, energy planning, help for energy committees and more. VNRC has a number of new tools on their website to help people and town Committees. Here is a link:
http://vnrc.org/resources/community-planning-toolbox/tools/http://vnrc.org/resources/community-planning-toolbox/tools/

Property Assessed Clean Energy (PACE):
https://www.efficiencyvermont.com/For-My-Home/Financing/Financing/PACE-Overview,

888-921-5990: A way of financing energy efficient home improvements by borrowing money and tying the payments to a property rather than the owner. PACE financing payments can be transferred to a new homeowner at any time, including before the assessment has been paid off.

USDA Rural Development Rural Energy for America Program Renewable Energy Systems & Energy Efficiency Improvement Loans & Grants: Provides guaranteed loan financing and grant funding to agricultural producers and rural small businesses to purchase or install renewable energy systems or make energy efficiency improvements. http://www.rd.usda.gov/programs-services/rural-energy-america-program-renewable-energy-systems-energy-efficiency, or call USDA RD Vermont offices at