
Andover Enhanced Energy Plan

Adopted – June 11,
2018

Planning Commission
Public Hearing:
December 4, 2017

Selectboard Public
Hearing:
June 11, 2018

Enhanced Energy Plan for the Town of Andover, Vermont

A. Introduction

Andover's *Enhanced Energy Plan* is a component of the *Andover Town Plan* prepared in accordance with 24 V.S.A., Chapter 117, Subchapter 5. The intent of this plan is to address the requirements of Act 174 of 2016 and to meet the enhanced energy planning standards developed by the Vermont Department of Public Service (DPS). This document was prepared based upon the *Guidance for Municipal Enhanced Energy Planning Standards* (DPS; March 2, 2017) in order for the Andover Town Plan to be given greater weight in the Section 248 process.

The Southern Windsor County Regional Planning Commission (SWCRPC) is currently developing a regional energy plan to meet these standards in order to receive Section 248 substantial deference. Andover is coordinating the development of this municipal energy plan with the SWCRPC so that:

1. The municipal plan is informed by the ongoing regional energy planning process; and,
2. The municipal plan is compatible with the regional plan.

This Plan was developed with assistance from the SWCRPC through funding provided by the Vermont Department of Public Service.

A.1 Energy Goals

Through the 2016 Vermont Comprehensive Energy Plan (CEP), the State of Vermont has identified a number of goals and strategies to achieve energy conservation throughout the state. The most significant of these goals being;

By 2050, 90% of Vermont's total energy will be derived from renewable sources.

The CEP includes additional goals to fully achieve the overall, long-term "90x50" goal. These goals serve as the platform for determining energy policies, targets and pathways for the Town of Andover, as articulated throughout this plan.

A.2 Andover's Energy Goals

The Town of Andover hereby adopts the goals established in the 2016 CEP, and through the detailed policies and actions contained in this plan, Andover will strive to achieve these goals. Below is a list of some of the methods outlined in this plan to further energy conservation and efficiency efforts within our community:

- Reducing total energy consumption throughout all sectors, including: electricity, space heating, and transportation.
- Support efforts at the local level to choose energy efficient and renewable options.
- Create a diverse mix of energy sources to reduce the impact of supply restriction.
- Utilize local, renewable sources of energy to decrease reliance on out-of-region, and out-of-state forms of fuel.
- Select energy choices that help preserve the environment.

- Strive for both an adequate supply of electricity, as well as a distribution network to meet the region’s needs.
- Maximize energy efficiency by matching fuel type to end use.
- Support adaption and lifestyle changes which are consistent with changes in future energy use and generation.
- Reduce greenhouse gas emissions.

B. Analysis of Current Energy Use

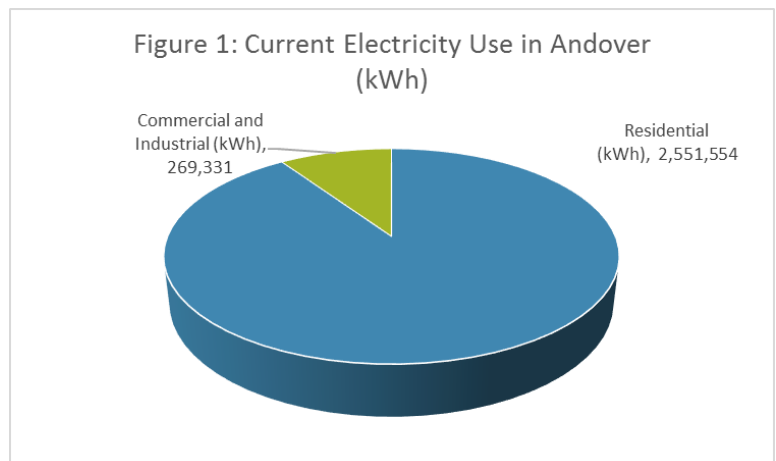
This section involves a summary and analysis of existing conditions in Andover with respect to energy use. Appendices A and B include more detailed data figures, which are summarized in this section. This section relies on data analysis provided by the Southern Windsor County Regional Planning Commission and, as such, the Regional Energy Plan for Southern Windsor County contains an important regional context for this analysis of Andover’s energy use and targets.

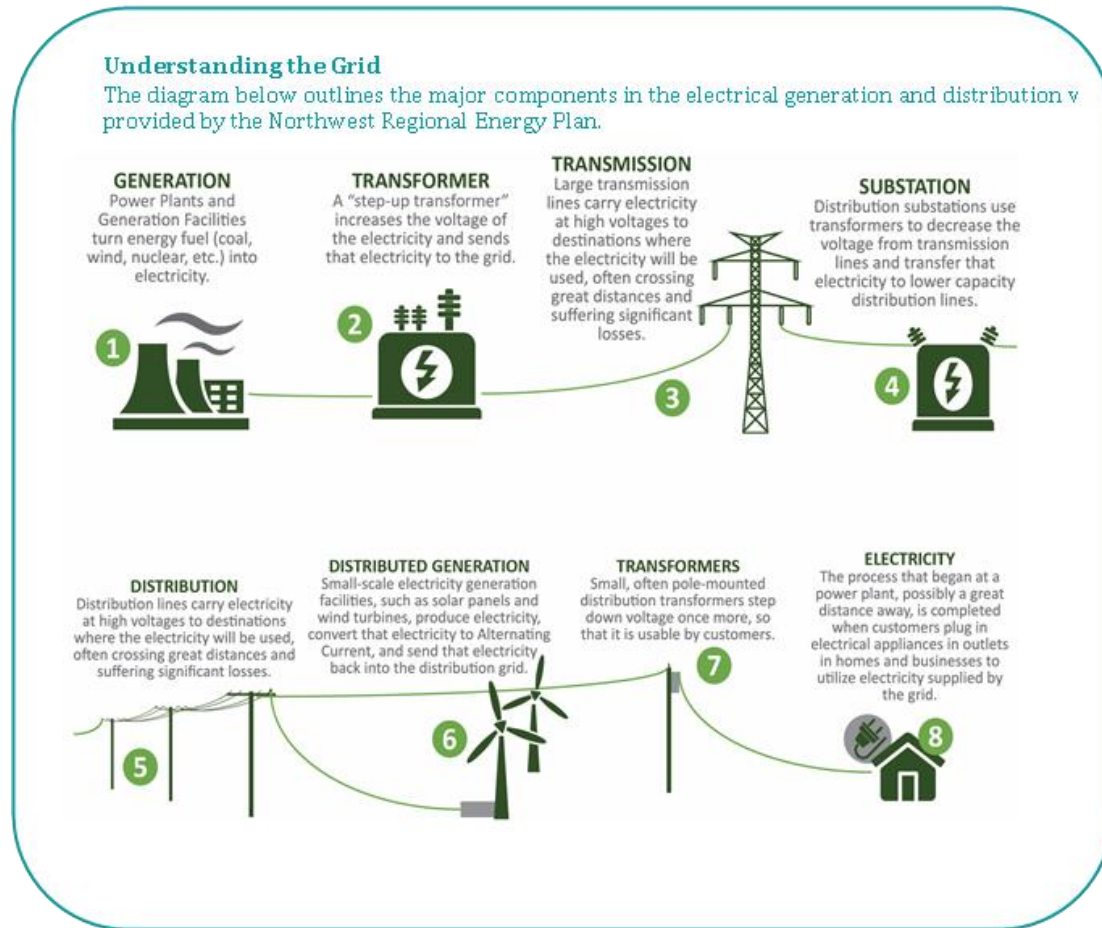
Vermont’s Comprehensive Energy Plan calls for 25% of remaining energy needs to be met by renewable sources by 2025, 40% by 2035, and 90% by 2050. To help put that into perspective, existing renewable energy facilities in Andover generate about 2.9% (84,376 kWh) of the total annual electricity used in Town (2,820,885 kWh).

B.1 Electricity

Electricity is provided by Green Mountain Power throughout Andover. Presently, one transmission line more or less parallels Andover’s eastern town boundary with Chester. Two three-phase distribution lines pass through Andover; one following the VT Route 11 corridor and the other is along Hilltop Road and the Weston-Andover Road. The maps in Appendix B show these facilities.

Residences accounted for 90.5% of the current total electricity usage in Andover. Andover is a very rural town, so it is not surprising that commercial and industrial use accounts for only 9.5% of the total 2,820,885 kWh used in Andover that year. See Figure 1 that summarizes electricity use data provided by Efficiency Vermont. According to Department of Labor Statistics, there are 12 commercial establishments in Andover. Electricity use has leveled off in recent years.

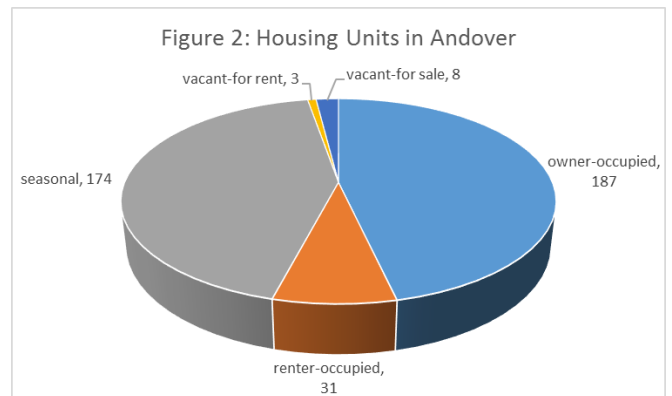




B.2 Thermal (Space Heating)

Since it is adjacent to a ski town (Ludlow/Okemo Mountain Resort), Andover has a large number of seasonal housing units (about 43% of the 408 total housing units). See Figure 2 which summarizes total housing units in Andover by type from the 2010 Census Bureau.

According to American Community Survey (ACS) data (2011-2015), the predominant ways to heat homes in Andover include fuel oil (42.9%), wood (40.8%) and propane (13.6%). See Appendix A for home heating data, including estimates for square footage heated and BTUs. The Appendix also includes data about heating the commercial and industrial establishments in Andover.



B.3 Transportation

As mentioned above, Andover is a very rural town without any dense, mixed-use village. The local transportation network is predominantly of roadways. Walking and bicycling are generally accommodated along the sides and shoulders of existing roads, some of which are better suited for those uses than others. Public transportation services are provided in Andover by The Current.

Although there are no fixed routes serving the Town, Dial-a-Ride services are available to residents. Due to the very low density development patterns, most residents rely on driving to get to most common destinations, as discussed in more detail in the Transportation Chapter. Commuting patterns are highly varied. Common work destinations for residents are Chester and other surrounding towns.

Data was compiled and is presented to understand the existing transportation energy use in Andover (see Appendix A). According to ACS data, there are about 1.5 vehicles per occupied household. The average vehicle miles traveled in a year is estimated at nearly 15,000, which accounts for approximately 250,000 gallons of total fuel used at a total cost of more than \$599,000 for fuel.

C. Scenarios (Targets)

The standards that the Department of Public Service has established for targets must be met if this Plan is to receive substantial deference in Section 248 energy siting proceedings. Andover is utilizing targets (or scenarios) developed using the Long-Range Energy Alternatives Planning (LEAP) Model and provided to Andover by the SWCRPC. The background for the targets are described in more detail in the draft 2017 Southern Windsor County Regional Energy Plan. The purpose of the targets, when combined with the analysis presented in the previous section, are intended to provide an overview of existing energy use and projections for the pace of change that is needed over the next three-plus decades. In order to meet 90% of Vermont's energy need from renewable sources by 2050, a significant amount of conservation efforts and the development of new renewable energy generation will be necessary.

In order to meet the 90% by 2050 goal, total energy use in southern Windsor County will need to decrease by 50%. Primarily this must involve a vast reduction in the use of non-renewable fuels, such as gasoline and fuel oil. At the regional level, the LEAP model includes the following generalized assumptions to reach the 90% by 2050 goal:

- Electricity use today is about 20% of total energy consumption, but it will increase to 35% of total consumption in 2050;
- The use of non-renewable fuels will be vastly reduced from about two-thirds today to about 10% by 2050;
- Renewables will increase from about 18% now to more than half by 2050. This involves wood consumption remaining relatively constant and biodiesel usage increasing substantially.

Please note that the above section is intended to summarize the assumptions made for this LEAP model. In the intervening years between 2017 and 2050, there are likely to be technological advances that may help us to achieve our energy goals and targets in ways that we cannot anticipate today.

C.1 Electricity

Targets for electricity are mixed. Significant efforts to reduce electricity usage through conservation and efficiency measures will be needed. However, the LEAP model utilizes increased use of electricity to achieve the goal for both transportation (i.e. electric vehicles) and space heating (i.e. cold-climate heat pumps). See Figure 3 below.

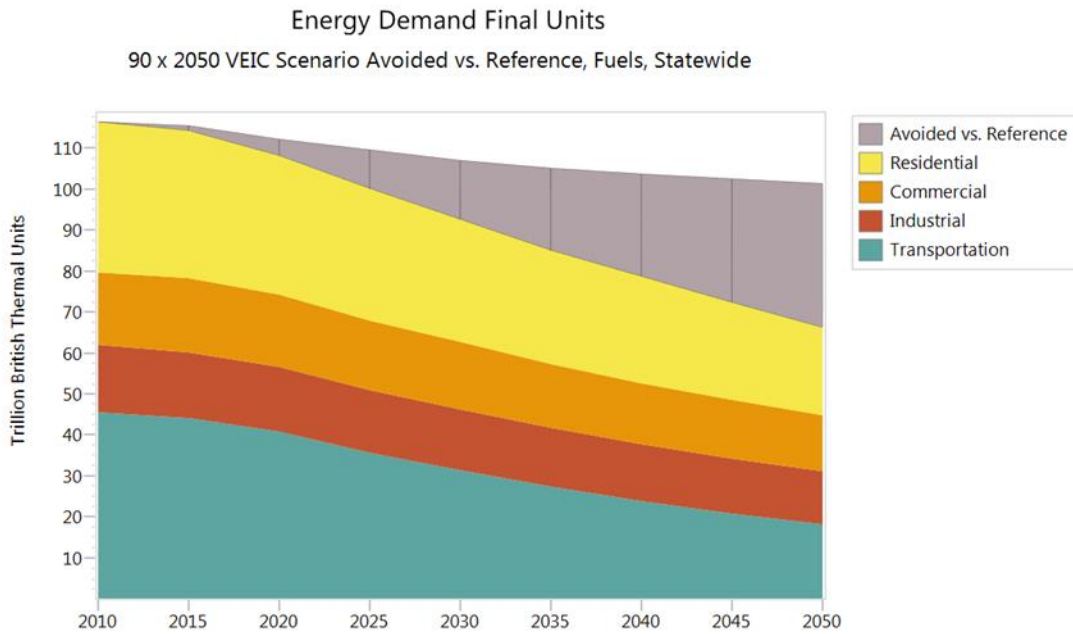


Figure 3: Vermont must significantly reduce total energy use by 2050 to be successful in implementing the goals of the Comprehensive Energy Plan. The LEAP model referenced in this Plan calls for substantial reductions in energy use by residences and transportation. The line above the grey area represents projections for if we do nothing else to reduce energy demand. The grey area itself represents efforts needed to reduce total energy demand.

Reducing electricity demand through energy conservation and efficiency measures will involve taking advantage of programs offered by Efficiency Vermont, utilization of high-efficiency/energy star appliances, LED lighting upgrades, and other efforts at energy demand management.

Electricity targets also include the development of renewable energy generation in Andover and the surrounding region. The LEAP model also includes additional imported renewable energy from sources such as Hydro Quebec. However, local generation is also required. Targets for local renewable generation are summarized below in Table 1 and discussed in more detail in the renewable siting discussion under Section D.

Table 1: Renewable Generation Targets (in MWh)			
	2025	2035	2050
Total renewable generation in MWh	2,565	5,130	10,261

C.2 Thermal (Space Heating)

The first step to reduce energy demand for space heating is to weatherize homes and businesses (e.g. air sealing, insulation). Table 2 shows the targets for weatherizing existing structures in Andover in both percentage of the total existing households and commercial buildings and the number of units of each. We assume that all new applicable structures will comply with the State energy building codes (i.e. [Residential Building Energy Standards](#), [Commercial Building Energy Standards](#)).

	2025	2035	2050
Weatherize Homes (percentage, number)	17% 37	31% 68	63% 137
Weatherize Commercial Establishments	4% 1	7% 1	15% 2

The next step is to move toward the widespread utilization of renewable energy to heat homes and businesses. The LEAP model established the following targets for doing so in Andover. Table 3 shows the scale to which buildings should switch over to renewable heating systems in order to meet the state energy goals.

Thermal renewable energy use	2025	2035	2050
	48%	63%	93%

In order to achieve the overall renewable target for heating, the LEAP model is calling for investing in new efficient wood heating systems, cold-climate heat pumps or ground-source heat pumps. (See Table 4.)

	2025	2035	2050
New efficient wood heating systems	1	2	17
New heat pumps	41	111	214

Cold-climate heat pumps are also referred to as air-source heat pumps, mini-splits or ductless heat pumps. These systems are a good option to retrofit existing houses, and can be used to supplement the existing heating system. As explained on the [Efficiency Vermont website](#), “heat is collected from the exterior air, concentrated via an outdoor compressor, and distributed inside through an indoor room unit. Heat pumps require electricity to run, but can deliver more energy than they use.” They also provide air conditioning during the warmer months.

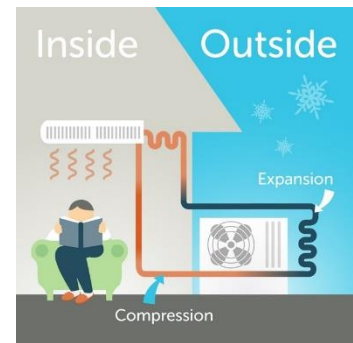


Figure 4: Illustration of how cold-climate heat pumps work. Source: Efficiency Vermont.

Ground-source heat pumps provide space heating and cooling. They work similarly to air-source heat pumps, but instead they pump water or other fluid through pipes buried in the ground to collect heat. A more detailed description for how these systems work can be found on the [US EPA website](#). These are generally a better option for new construction installations.

Heating with wood is generally encouraged as it uses a locally-available fuel. However, sustainable wood harvesting is important in order to protect the environment and provide a viable, long-term local energy source. New efficient wood stoves that are EPA-certified are encouraged. Wood-chip heating systems are considered a good option to heat larger commercial, industrial or institutional buildings. See the [Efficiency Vermont website](#) for more information. A number of schools in the region use such heating systems.

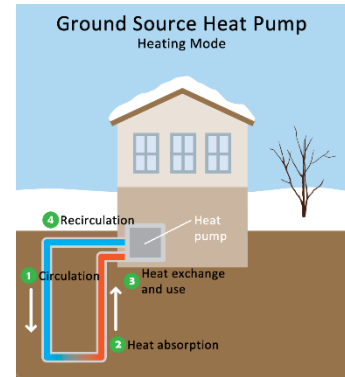


Figure 5: Illustration of how ground-source heat pumps work. Source: US EPA.

C.3 Transportation

Transportation is probably the most difficult area to “bend the curve” in order to meet the energy goals. Changing behaviors is challenging. However, it must be done if we are to achieve the 90% by 2050 goal. The LEAP model used a number of assumptions in addressing this issue. The following targets are based on that LEAP model.

Use of renewables for transportation	2025	2035	2050
	10%	31%	90%

Overall, transportation needs to shift to renewable fuel sources as shown in Table 5. The LEAP model is largely expecting this to happen through using electric vehicles, and the use of biodiesel by the trucking industry. Table 6 below shows the fuel switching targets for Andover. Efficiency Vermont has information on its [website](#) about ways to achieve transportation efficiencies. Also required to meet the goals will be additional efforts to lessen the use of energy for transportation, including land use patterns that encourage walking and bicycling, public transportation, driving less and ride sharing.

	2025	2035	2050
Passenger cars switch to electric vehicles	26	181	374
Trucks switch to biodiesel	46	85	141

D. Implementation Actions (Pathways)

In order to meet our stated energy goals and targets, the Town of Andover identify the following implementation actions, also referred to as “Pathways”. The following sub-sections are intended to be consistent with the pathway standards used in the *Guidance for Municipal Enhanced Energy Planning Standards* (VDPS; March 2, 2017).

D.1 Pathways Standard: Conservation and Efficient Use of Energy

- a) The Town of Andover encourages the conservation and efficient use of energy.

Andover has identified the following implementation actions in Sections 6A, 6B, 6C and 6D to achieve this policy. The Town can use Andover Word and the Town email list to get information out to residents regarding many of the following implementation actions.

D.1.1: Encourage Conservation by Individuals and Organizations

Andover cannot control the use of energy by individuals and organizations. However, the Town can lead by example, serve as a resource, and encourage individuals and organizations to conserve and use energy efficiently. To do so, Andover identifies and promotes the following resources to provide guidance to individuals and organizations:

- a) Inform residents and businesses about available programs that can assist with energy conservation and efficiency improvements, including:
 - 1) Programs available through [Efficiency Vermont](#), such as workshops and educational opportunities to businesses on efficiency in new construction, retrofits, and conservation practices; and,
 - 2) Weatherization Assistance Program through Southeastern Vermont Community Action ([SEVCA](#)) for low-income households.
- b) Inform residents about Efficiency Excellence Network (EEN) contractors by providing [links to EEN information](#) through a municipal website or through other means.
- c) Provide data that demonstrates why these improvements make sense for residents (e.g. estimated return on investment, case studies).
- d) Hold an information forum at the Town Hall and invite residents to speak about the energy improvements that they have made to their homes.

D.1.2: Promote Efficient Buildings

Space heating for buildings accounts for about 30% of all energy consumed in Vermont. Creating more efficient buildings can be achieved through weatherization and high-performance construction methods. Andover identifies the following to encourage efficient buildings:

- a) Promote the use of Vermont’s [residential building energy label/score](#).
- b) Promote the use of the residential and commercial building energy standards:
 - 1) The Administrative Officer will distribute State energy code information to all applicants seeking a zoning permit for a structure that is heated or cooled.
 - 2) The Administrative Officer will not issue a certificate of occupancy until the applicant provides a certificate that ensures compliance with the State energy code.
- c) Promote benchmarking (using the free [EPA Portfolio Manager tool](#) and/or with assistance from Efficiency Vermont) for commercial buildings.

- d) Encourage that all residential and commercial projects follow the [stretch energy code or guidelines](#).
- e) Promote the use of [landscaping for energy efficiency](#).
- f) Offer house inspections to check on energy savings measures appropriate to that particular house.

D.1.3: Promote Decreased Use of Fossil Fuels for Heating

Heating buildings accounts for about 30% of all energy consumed in Vermont and is the second largest contributor to greenhouse gas emissions. Home heating is heavily reliant on fossil fuels at this time. Solutions to address this situation involve high-efficiency heating system upgrades and fuel switching. Andover identifies the following to encourage using less fossil fuels to heat buildings:

- a) Provide educational presentations on ways to decrease the use of fossil fuels, in coordination with Efficiency Vermont.
- b) Promote the use of [cold-climate heat pumps](#) for retrofitting existing buildings.
- c) Encourage the use of [ground-source heat pumps](#) for new construction.
- d) Promote wood stove change-out programs that take older non-[EPA certified stoves](#) out of service and replace them with more efficient and lower emitting cordwood or pellet stoves.
- e) If renewable energy systems are not practicable, encourage homeowners to replace old furnaces or boilers with [high-efficiency models](#).

D.1.4: Demonstrate the Municipality's Leadership by Example with Respect to the Efficiency of Municipal Buildings

Andover wishes to lead by example and demonstrate to individuals and organizations the benefits of building efficiency through the following efforts:

- a) Seek support and guidance from Efficiency Vermont for efforts to improve the efficiency of municipal buildings.
- b) Assess the life cycle costs of potential energy improvements during design and construction planning. For example, investment in a new, efficient heating system may be more expensive up front, but more economical to operate over time.
- c) The municipality will construct all new public buildings according to standards of energy efficiency at least equivalent to U.S. EPA Energy Star rating or similar certification where it can be demonstrated to be cost-effective.

D.2 Pathways Standard: Transportation

- a) The Town of Andover encourages the reduction of transportation energy demand and single-occupant vehicle use.
- b) The Town of Andover encourages the use of renewable or lower-emission energy sources for transportation.

Andover has identified the following implementation actions in Sections 7A, 7B, 7C, 7D and 7E to help achieve these policies.

D.2.1: Encourage Increased Use of Public Transit

Public transit utilization at a meaningful scale to make a difference toward this goal is not likely considering Andover's rural, very low density development patterns. However, improving access to

public transit services is a priority. Andover will implement the following actions to encourage public transit:

- a) Improve awareness of existing public transit services available to residents (e.g. Dial-a-Ride services from The Current). For information about public transportation services, see the SWCRPC's [A to B Mobility Study](#).
- b) Coordinate with the SWCRPC and neighboring towns to investigate park and ride lot opportunities that might better connect residents with public transit services.

D.2.2: Promote a Shift Away from Single-Occupancy Vehicle Trips

Existing public transit services can meet the mobility needs of only a limited number of residents. Additional efforts will be needed in order to reach the energy goals for reducing transportation energy use. Feasible options to do this in a very rural town are limited. Andover will work to encourage the following actions to encourage a reduction in single-occupant vehicle trips:

- a) Encourage better utilization of the existing high-speed internet speeds to enable telecommuting by residents.
- b) Promote the [Go Vermont](#) webpage, which provides rideshare, vanpool, public transit and park-and-ride options.

D.2.3: Promote a Shift Away from Gas/Diesel Vehicles to Electric or Other Non-Fossil Fuel Transportation Options

To meet State energy goals, municipalities will need to contribute toward efforts to reduce the number of vehicle-miles traveled (see 7B), and switch to renewable, non-fossil fuel transportation options. Andover has identified the following pathways to shift toward electric vehicles and other non-fossil fuel travel:

- a) Increase awareness of the benefits of electric vehicles and alternative-fuel vehicles through education and outreach efforts.
- b) Seek grants to fund the installation of electric vehicle charging infrastructure at the Town Offices or at a suitable location along the VT Route 11 corridor.
- c) Encourage the use of biodiesel in all diesel vehicles in a manner that does not compromise the manufacturer's engine warranty.

D.2.4: Facilitate the Development of Walking and Biking Infrastructure

Active transportation, such as walking and bicycling, offers significant health benefits and requires no outside energy resources. As a very rural town, there are very few transportation trips between 0.5 and 2 miles in length that residents routinely make within Andover (e.g. distances that are generally suitable to make by walking or bicycling). However, Andover will strive to make reasonable accommodations to facilitate safe walking and bicycling along certain roadways. Winter conditions limit walking and bicycling for many residents, so these facilities are likely to experience seasonal use. In order to do this, Andover has identified the following pathways:

- a) Maintain roads in order to better accommodate travel by walkers and bicyclists. For example, this includes paving/overlays to maintain a smooth roadway surface on major roads as well as modest shoulder widening in areas where pedestrian activity is observed or desired.
- b) Continue to maintain the existing trail networks for walking and other suitable uses.

D.2.5: Demonstrate the Municipality's Leadership by Example with Respect to the Efficiency of Municipal Transportation

In order to meet the State energy goals, municipalities should lead by example and demonstrate to individuals and organizations the benefits of energy efficiency in transportation. Andover wishes to do so through the following ways:

- a) Install an electric vehicle charging station.
- b) When purchasing new vehicles, the Town will seek a model with the best fuel efficiency standards available.

D.3 Pathways Standard: Land Use Patterns and Densities

- a) The Town of Andover encourages maintaining the historic settlement pattern of compact village centers surrounded by rural countryside in accordance with [24 V.S.A. §4302](#), recognizing that the entire Town of Andover functions as the rural countryside. The centers of Chester and Ludlow are the closest compact village centers in this context, nearby Londonderry and Weston may also serve in this capacity as it relates to the surrounding rural countryside in Andover.
- b) The Land Use Chapter of the Andover Town Plan encourages maintaining the rural countryside in keeping with the above state planning goal.
- c) Zoning bylaws adopted by the Town are consistent with the goals of the Town Plan.
- d) Andover does not have a village core area that is suitable for designation as a Village Center under 24 V.S.A. Chapter 76A.

The DPS anticipates that if municipalities are actively participating in the above statutory frameworks for community planning, they will likely meet Pathways Standard 8. Andover continues to be active with the SWCRPC in order to plan for broader, regional land use development patterns and densities that encourage the conservation of energy.

D.3.1: The Plan Includes Land Use Policies (and Descriptions of Current and Future Land Use Categories) that Demonstrate a Commitment to Reducing Sprawl and Minimizing Low-Density Development

According to the enhanced energy planning guidance, the reduction of sprawl and low-density development not only reduces energy consumption but also can improve the local and regional economy.

- a) The Land Use Chapter in the Town Plan limits commercial activity to a few very small clusters indicated on the Future Land Use Map, and it generally calls for low density rural development patterns elsewhere in keeping with the rural countryside aspect of the state planning goal.
- b) Also included in the Land Use Chapter of the Town Plan is a statement that discourages sprawl and strip commercial development in much of the land area in Andover.
- c) The Andover Town Plan calls for sound access management, especially along VT Route 11.

D.3.2: Strongly Prioritize Development in Compact Mixed-Use Centers

As indicated in the enhanced energy planning guidance, households within a compact, mixed-use center typically use less energy than those located in outlying areas. As noted above, Andover does not have any compact, mixed-use centers within the Town. Andover is the rural countryside that surrounds the centers of Chester, Ludlow, Londonderry and Weston. Since prioritizing development in village centers is outside of Andover's direct control, the Town chooses to encourage this by:

- a) Working with the SWCRPC to plan for broader, regional land use development patterns and densities that encourage the conservation of energy.
- b) Evaluating future Andover Town Plan updates within the broader, regional context as described above.

D.4 Pathways Standard: Statement of Policy on the Development and Siting of Renewable Energy Resources

The heating, transportation and conservation targets and pathways combined are not sufficient to meet the 90% by 2050 energy planning goal. The LEAP model also assumes the purchase of additional out-of-state renewable energy will help to reach this goal; however, that is also not sufficient to meet the energy goals. New local renewable energy generation is also needed in order to achieve the ambitious “90x50” energy goal. The following sections discuss how the municipality wishes renewable energy generation to take place in Andover.

D.4.1: Evaluate Existing Renewable Energy Generation

There are currently 11 known existing solar sites in Andover, representing 69 kW of installed capacity and 84,376 kWh of generation output. There are no other grid-tied renewable energy generation sites in Andover at this time. In other words, there are no known net-metered wind turbines, hydro power, or biomass power facilities in Andover currently. However, there are at least two wind turbines in Andover at this time that are not connected into the grid. See Appendices A and B or the [Community Energy Dashboard](#) for more detail.

D.4.2: Analyze Generation Potential from Preferred Sites and/or Potentially Suitable Areas

An analysis of renewable energy generation potential was conducted for Andover by the SWCRPC. This consisted primarily of an analysis of available GIS mapping data and based upon the guidelines established by the DPS for enhanced energy planning. Table 7 below summarizes the findings of this analysis.

Table 7: Potential Renewable Energy Generation

Type	Installed Capacity (MW)	Generation Output (MWh)
Roof-top Solar	0.55	672
Ground-mounted solar	285	349,570
Wind	2,121	6,502,220
Hydro	0	0
Total	2,406.55	6,852,462

Based upon this analysis, there is significant potential to generate power from renewable sources in Andover, primarily through ground-mounted solar and wind. There is no realistic potential for new hydropower, based upon assumptions about the challenge of permitting new hydro projects. There is potential to generate about 6.5% of Andover’s target through rooftop solar alone. Ground-mounted solar and/or some forms of wind will be needed in order to meet the “90 by 50 goal”.

D.4.3: Identify Sufficient Land for Renewable Energy Development to Reasonably Reach the 2050 Targets

Table 1 in Section C.1 summarizes Andover’s overall targets for renewable energy generation. There is more than an adequate land area in Andover that has potential for solar to meet our 2050 renewable energy target of 10,261 MWh. That target is the equivalent of approximately 8.4 MW of ground-

mounted solar at the installed capacity. The guidance assumes 8 acres of land is generally needed to support 1 MW of solar. This would amount to about 67 acres of land needed to meet this target. This represents about 3% of the total land area in Andover that is estimated to have potential to generate solar power.

A mix of renewable generation types are desirable in order to meet the overall renewable targets for Andover. The following more detailed targets in Table 8 represent one scenario for how Andover can meet the overall renewable generation target for the municipality. Rooftop solar is desirable. Ground-mounted solar is encouraged as long as it meets our siting criteria as articulated in this plan. Residential-scale wind is also encouraged.

Table 8: Detailed Renewable Generation Targets (in MWh)

Type	2025	2035	2050
Roof-top solar	187	299	672
Ground-mounted solar	2,225	4,524	8,976
Residential-scale wind (30 meter hub height)	153	307	613
Total renewable generation in MWh	2,565	5,130	10,261

Wind power – specifically utility-scale (70 meters+) and commercial-scale (50 meters) – is a politically charged issue in Andover and surrounding towns. In addition, we understand that the proposed new state noise standards will make it difficult to permit utility-scale wind turbines in the State of Vermont. This plan embraces the “90x50” goal and we believe that the above analysis demonstrates that Andover’s plan for new renewable energy is adequate to meet our future needs and the renewable energy generation target. Therefore, Andover expressly prohibits utility-scale and commercial-scale wind turbines.

D.4.4: Ensure that Local Constraints do not Prohibit or Have the Effect of Prohibiting the Provision of Sufficient Renewable Energy to Meet State, Regional or Local Targets

Local constraints for renewable energy generation are as summarized in this section. These constraints have been analyzed, and the Town of Andover does not believe that these constraints prohibit or have the effect of prohibiting sufficient renewable projects needed to meet the state, regional or local energy goals.

The following resources are not appropriate locations for renewable energy projects based upon the mapping methodology in the enhanced energy planning guidance and are hereby excluded from the potential wind and solar sites, as depicted on the map (i.e. “known constraints”):

- a) Vernal pools with a surrounding 50 foot buffer;
- b) DEC river corridors;
- c) FEMA floodways;
- d) State significant natural communities and rare, threatened and endangered species;
- e) National wilderness areas; and,
- f) Class 1 and Class 2 wetlands.

Also based upon the enhanced energy planning guidance, the following list represents constraints that will likely require mitigation and which may prove a site unsuitable after a site-specific study has been conducted based upon state, regional or local policies that are adopted and currently in effect (i.e. “potential constraints”):

- a) Agricultural soils (NRCS-mapped prime agricultural soils, soils of statewide importance or soils of local importance);
- b) Act 250 agricultural soil mitigation areas;
- c) FEMA special flood hazard areas (floodplain);
- d) Protected lands (state fee lands and private conservation lands);
- e) Deer wintering areas;
- f) ANR conservation design highest priority forest blocks; and,
- g) Hydric soils.

D.4.5: Statements of Policy to Accompany Maps

Andover hereby promotes the development of renewable energy generation in order to achieve the energy goals and targets as established in this plan. The following statements of policy apply to renewable energy projects:

- a) Andover supports rooftop solar projects.
- b) Andover supports residential-scale wind turbines.
- c) Utility-scale wind and commercial-scale wind projects are not in keeping with goals and policies of the Andover Town Plan and, therefore, must not be allowed within Andover. (These types of facilities are politically very unpopular. Andover has demonstrated that there is ample opportunity to meet our energy needs through other types of renewable energy projects.)
- d) Biomass is suitable only for space heating.
- e) Ground-mounted solar projects and wind turbines must not be located in the following areas:
 - 1. Vernal pools with a surrounding 50 foot buffer;
 - 2. River corridors as most recently mapped by the Vermont DEC;
 - 3. FEMA floodways;
 - 4. State significant natural communities and rare, threatened and endangered species;
 - 5. National wilderness areas; and,
 - 6. Class 1 and Class 2 wetlands.
- f) Ground-mounted solar projects must demonstrate that the proposed project siting is appropriate in scale as it relates to the character of the area in which it is to be located, and the applicant must also demonstrate that all reasonable options have been considered in siting the facility.
- g) All ground-mounted solar projects must meet or exceed the setback standards in 30 V.S.A. §248(s).
- h) All ground-mounted solar projects of 150 kW capacity or greater that are within view of public roadways (i.e. state highways, US routes, and Class 1, 2 and 3 town highways) must provide adequate landscaping in order to screen the project from the view of the traveling public.
 - 1. This landscaping must consist of a mix of native plants that provide adequate screening during all months of the year (i.e. conifers or a mix of deciduous and conifers).
 - 2. All landscaping materials must be planted at a size that provides adequate screening within a period of three years.

- i) The applicant must maintain any required landscape mitigation for the entire life of the project, including the replacement of any dead or diseased vegetation serving as part of the landscape mitigation measures throughout the life of the project or until the project ceases commercial operation.
- j) The applicant must provide a plan for the site to be adequately decommissioned at the time when the project ceases commercial operation. This would involve the removal of all parts of the project from the site including, but not limited to, the solar panels or wind turbine, inverters, metal framework that supports the solar panels, fencing, and any necessary site reclamation.
- k) Ground-mounted solar facilities and residential-scale wind turbines must not have undue adverse impacts on significant wetlands, significant wildlife habitat, wildlife travel corridors, stormwater, water quality, flood resiliency, important recreational facilities or uses, scenic resources identified in this plan, or inventoried historic or cultural resources. Project proposals must consider placement of such facilities in locations where aesthetic and wildlife impact is minimal or employ reasonable measures to mitigate undue adverse impacts.

Undue Adverse Effect (Impact):

An adverse impact that meets any one of the following criteria:

- (1) Violates a clear, written community standard intended to preserve the aesthetics or scenic, natural beauty of the area;
- (2) Offends the sensibilities of the average person (i.e. it is offensive or shocking because it is out of character with its surroundings or significantly diminishes the scenic qualities of the area); or,
- (3) Fails to take generally available mitigating steps that a reasonable person would take to improve the harmony of the proposed project with its surroundings.

D.4.6: Maximize the Potential for Renewable Generation on Preferred Locations

Preferred locations include specific areas or parcels that are specifically identified to indicate preferred locations for siting a generator or a specific size of type of generator. Identifying preferred sites informs the community where renewable generation is desired. The identification of such sites can help to streamline the permitting process.

Preferred sites for Andover include:

- a) A canopy over paved parking lots;
- b) Brownfield sites; and,
- c) Disturbed portions of extraction sites (i.e. gravel pit, quarry).

D.4.7: Demonstrate the Municipality’s Leadership by Example

The Town of Andover will lead by example through the following means:

- a) Working collaboratively with the Springfield Regional Development Corporation and other partners to identify opportunities for local renewable energy generation that benefits the community and furthers the goals and policies of this plan.
- b) Consider installing solar systems on the roofs of town buildings.
- c) Create a capital reserve fund to pay for energy improvements to Town buildings.

Appendix A: Enhanced Energy Planning Data

Appendix A: Energy Data



Population

Total Populationⁱ (2015): 550
 Proj. Annual Avg. Growth Rateⁱⁱ: ↑ 0.00106
 Population Density: 19.12 persons/
 square mile

Andover



Households

Owner-Occupied Unitsⁱⁱⁱ: 187
 Renter- Occupied Unitsⁱⁱⁱ: 31
 Total Householdsⁱⁱⁱ: 408
 Avg. Household Sizeⁱⁱⁱ: 2.14 people/
 household



Businesses^{iv}

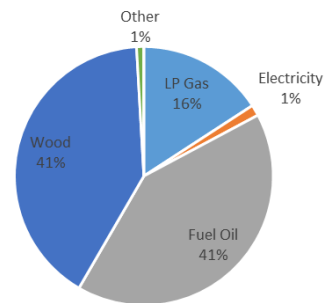
Total businesses in Andover: 12
 Employees working in Andover: 36
 Average wage: \$34,275



Heating

Residentialⁱ (see figure)
 Businesses^v:
 Estimated avg. building space: 2,298 sq. ft.
 Total energy use: 998.3
 million BTUs
 Estimated total annual cost: \$23,806
 Avg. annual cost per business: \$1,984

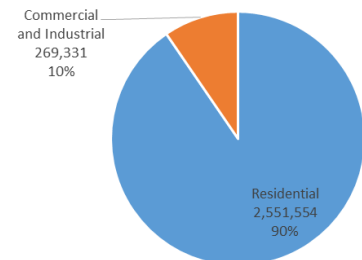
Home Heating Fuels in Andover (2015)



Transportation

Number of vehicles: 323
 Estimated vehicle miles traveled: 6.2 million
 Estimated gal. fuel used per year: 288,848
 Estimated fuel cost per year: \$989,306
 Residents driving alone to work: 69%
 Average commute time: 22 minutes

Electricity Usage by KWh in Andover



Electricity Use

Electricity Usage in 2015^{vi} (see figure)
 Avg. Residential Usage: 6,465 KWh
 Total Usage (2014-2016): ↓ 229,958 KWh
 ↓ 7.5%

Appendix A: Energy Data



Energy Generation

Existing Renewable Energy Generation

Solar	11 sites	69 KW	84,376 KWh
Wind	0	0	0
Hydro	0	0	0
Biomass	0	0	0

Renewable Energy Generation Targets^{vii}

2015 (Baseline)	84.4 MWh
2025	2,565 MWh
2035	5,131 MWh
2050	10,261 MWh

Potential for Renewable Energy Generation^{viii}

Rooftop Solar	0.55 MW	672 MWh
Ground-Mounted Solar	285 MW	349,570 MWh
Wind	2,121 MW	6,502,220 MWh
Hydro	0	0

ⁱ U.S. Census Bureau, American Community Survey (ACS) 2011-2015

ⁱⁱ Based on Scenario B population projections for 2030 (VT ACCD, 2013)

ⁱⁱⁱ U.S. Census Bureau, Decennial Census (2010)

^{iv} Vermont Department of Labor Statistics (2015)

^v Estimated based on number of units, estimated floor space, heating fuel types and average fuel costs for 2015. Floor space was estimated from average commercial/manufacturing floor space per employee from the U.S. Energy Information Administration.

^{vi} Efficiency Vermont (2017)

^{vii} SWCRPC

^{viii} Based upon an analysis of GIS data mapping data (i.e. land area shown on the solar and wind potential maps)

Appendix B: Enhanced Energy Planning Maps