

Energy

Introduction

This chapter provides information on Littleton's current energy supply and consumption and provides a road map for future energy conservation and efficiency efforts. Being both environmentally aware and fiscally conservative, the Town of Littleton is committed to maximizing energy conservation and efficiency, acknowledging its myriad of benefits including significant savings on energy costs, reducing the town's overall carbon footprint, and promoting stewardship of the town's shared natural resources. The town also recognizes the need to investigate ways to promote alternative forms of energy as a way to reduce greenhouse gas emissions.

While Littleton has undertaken steps to achieve this goal, much more remains to be done that will challenge residents, nonprofits, businesses, and municipal organizations to work together in unprecedented ways.

The Town is uniquely positioned to address energy efficiency issues because of its municipally owned and operated electric utility, Littleton Water and Light, which supplies electric power to residents and businesses. ***The town should continue to find ways to work with Littleton Water and Light to promote energy efficiency and renewable energy sources while maintaining its low municipal utility rates.*** Additionally, there is significant economic development potential for local entrepreneurs who promote the use of renewable energy from local resources and provide energy efficient products and services. Thoughtful, incremental measures are needed through a combination of incentives, voluntary actions, and, where necessary, regulations.

Energy Conservation Committee

In 2007, Littleton adopted the New Hampshire Climate Change Resolution and established the Energy Conservation Committee (ECC). The purpose of the ECC is to promote energy conservation and efficiency practices, with a local and regional focus, by educating the private sector and advising the public sector in the areas of cost reductions and sustainable, renewable energy sources. The goals of the ECC are to reduce energy consumption town-

Energy Planning provides many benefits for local communities including:

- **MUNICIPAL COST SAVINGS**
Increasing energy efficiency and conservation in municipal facilities and operations (as well as supplementing with renewable sources) can reduce fuel and utility bills over the long term.
- **GREATER INDEPENDENCE AND SECURITY**
Ensuring a diversity of energy sources safeguards residents and businesses from worldwide energy price shocks and supply shortages.
- **LOCAL INFLUENCE OVER ENERGY SITING**
Developing land use regulations for energy systems provides more control to local authorities for siting new energy systems.
- **MORE EFFICIENT COMMUNITIES**
Energy planning enables communities to integrate goals with transportation and land use planning strategies, resulting in more compact and efficient use of land.
- **HEALTHIER COMMUNITIES**
Reducing energy use improves local air quality and associated health benefits. Efficient land use and transportation planning can promote walking and cycling opportunities which promotes healthier behaviors.
- **A CLEAN ENVIRONMENT**
Investing in energy efficiency and renewable energy can result in reduced greenhouse gas emissions, improved air quality, and healthier ecosystems.

The list above was adapted from the "Energy Planning and Implementation Guidebook for VT Communities".

wide, to conserve natural resources, and to save money. Currently, the Energy Conservation Commission is inactive in the community.

The following priority projects have been accomplished in recent years:

- The Energy Management Plan has been institutionalized
- Lighting retrofits in municipal buildings have been completed
- Heating systems have been improved at the fire station, highway garage, and opera house
- Energy audits were performed on the old highway garage, fire station, public library, and opera house
- The Energy Committee provided energy efficiency advice on the construction of the new highway garage and assistance to the Littleton Food Coop for the installation of an Electric Vehicle charging station

The following energy projects were initiated, but not completed:

- A solar initiative for the retired landfill was supported by the Town, but not Littleton Water and Light and was abandoned
- Conversations with the school system related to energy efficient upgrades have been slow to get off the ground

New Hampshire's Office of Strategic Initiatives (OSI) recently released its updated 10-year State Energy Strategy in 2018. The Plan notes that New Hampshire has the third highest electricity rates in the contiguous

United States, impacting all NH residents, but especially low-income earners. The graph on the right shows electricity generated by a variety of sources in the state, the highest producer being nuclear energy. The purpose of the State Energy Strategy is to inform decisions about energy related challenges and the state's energy future. Its primary goals are to enable business and consumer cost savings, create

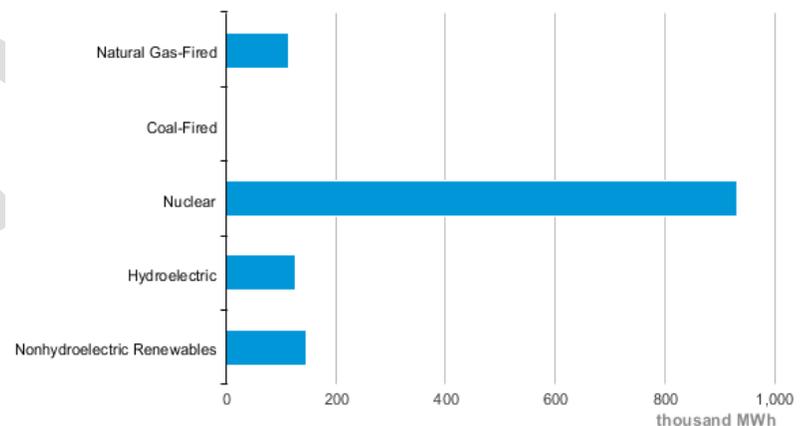
NH Climate Action Plan

In 2009, New Hampshire underwent a planning process that created a Climate Action Plan. Acknowledging the changing climate and its associated impacts (including a higher frequency of extreme weather events like droughts and floods, shorter winters, and others), *its overarching objective is to achieve the greatest feasible reductions in greenhouse gas emissions while also providing the greatest possible long-term economic benefits to the citizens of NH.*

The plan identifies action items that aim to:

- reduce emissions from buildings, electric generation, and transportation
- protect the state's natural resources to maintain the amount of carbon sequestered
- support regional and national initiatives to reduce greenhouse gases
- develop an integrated education, outreach, and workforce training program; and
- adapt to existing and potential climate change impacts.

New Hampshire Net Electricity Generation by Source, May. 2018



 Source: Energy Information Administration, Electric Power Monthly

jobs, spur economic growth, promote industry competitiveness, protect the natural environment, and support a reliable and resilient energy system.

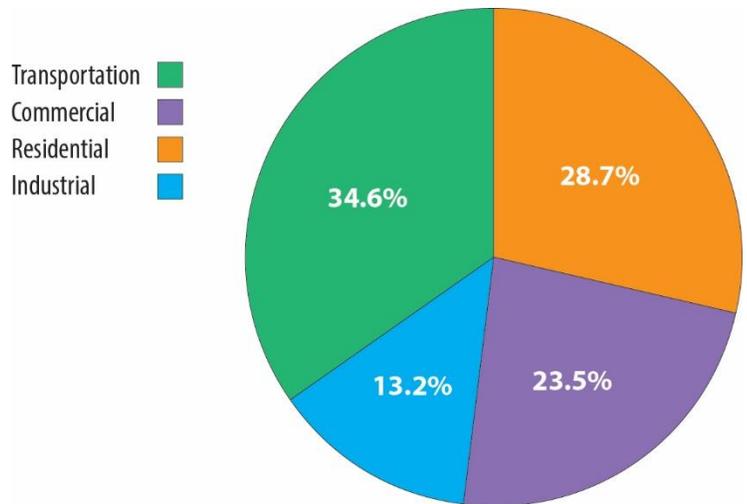
Additionally, national trends are showing an increase in renewable and clean energy development. Emerging renewable energy systems provide an opportunity to improve energy independence and local resiliency by increasing the diversity of energy production methods and infrastructure in communities. Additionally, New Hampshire has committed to a Renewable Portfolio Standard (RPS) that mandates that 24.8% of its energy in 2025 originates from nonnuclear renewable sources.

The State Energy Strategy and growing national trends provide Littleton with opportunities to invest in local renewable energy infrastructure and energy efficient practices and policies, while reducing the environmental, economic, and health costs of burning fossil fuel. Municipal policies and practices can support these initiatives while encouraging distributed energy initiatives, increased transportation options, and other efforts that will build resiliency over time.

Energy Conservation

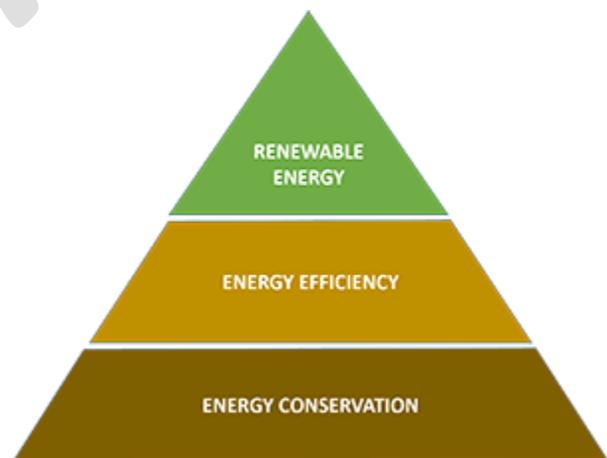
The objective of conservation is to reduce the current energy load and associated costs while ensuring that residents and businesses have access to the energy they need. In 2014, the ECC established the Energy Management Plan (EMP) to systematically track energy consumption and efficiency in building and facilities, look for trends in use, and recommend remedial action when necessary. An associated data base records energy consumption of municipal buildings that includes electricity, water, and heating and cooling systems. Members of the ECC also periodically visiting department heads to track progress.

Energy Efficiency



NH Energy Consumption by End-Use Sector, 2012
Source: Energy Information Administration, State Energy Data System

In 2015, the Littleton public library was cited for its outstanding effort at reducing energy use in the ECC's 2015 Energy Management Report.



The energy pyramid shows us how these three efforts can be considered to achieve clean energy goals. Energy conservation is shown on the bottom as it is often the simplest changes and most affordable retrofits for property owners. Renewable energy is at the top because it has the highest savings but may not be as accessible for everyone without assistance.

While conservation measures are a great first step, energy efficiency upgrades have even greater savings potential. Investment in efficiency reduces the reliance on imported fossil fuels, boosts the economy by creating in-state jobs, and lowers energy costs for residents and businesses. Upgrades can range from simple insulation of an attic or basement to comprehensive air-sealing measures. The type of upgrades that is right for a building depends on many factors, and the best way to make informed decisions about these upgrades is to conduct an energy audit on the building.

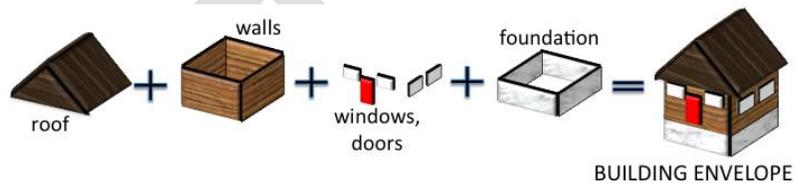
Energy efficient homes and non-residential spaces save money and help the environment. The Town of Littleton is strongly committed to good stewardship of its citizens' tax dollars, and energy efficiency at the office is just good business. Accordingly, an energy policy was adopted in 2015 that applies to all departments. The Town also amended the Purchase Policy to require consultation with the ECC before purchasing or replacing equipment.

Buildings

Typically, about 60% of all energy is consumed in buildings, making reduction of this energy sector a common public and private goal.

Efficiencies can be realized through better building envelopes, operating systems, and appliances. Littleton should strive to improve efficiency in **existing buildings** and **new buildings** by conducting energy audits to identify and prioritize problem areas, and determine grants, incentives, or low interest loans to remediate inefficiencies. The town should develop a process for **enforcing the state energy code and consider adopting voluntary or mandatory local energy building codes**. The Town might also

Components of a Building Envelope



In 2014, Littleton Regional Healthcare installed a biomass (wood chips) heating system at the hospital. While some oil is used as a supplemental heating source, daily use dropped from 1,200 gallons to 20, and wood chips cost about a third of what was previously spent on oil. The average annual saving is \$400,000 with an excellent payback of 5.4 years. The annual thermal output allows the hospital to sell 6,000 Renewable Energy Credits.

In 2015 and 2016, the majority of the lights at the Fire Station, Opera House, Transfer Station, Waste Water Treatment Plant, and Senior Center were retrofitted to higher efficiency lighting, primarily LEDs and high performance fluorescent. Funding from the Town was matched by a NH state rebate program.

In 2016, audits were performed of the Opera House and Fire Station. Subsequently the cost effective insulation and air sealing measures were installed in the Opera House.

In 2013, a new distributed biomass (wood pellet) heating system was installed for the Fire Station and the existing highway garage. Cost savings over a period of 20 years were estimated to be in excess of \$300K.

In 2015, a new Highway Department building was completed that incorporated energy efficient design.

In 2018, the conducted a Waste Water Treatment Plant energy audit and benchmarking was completed as part of a statewide NH Office of Energy Planning program. The town's plant scored well (in the top 20% of similar plants). The report included a number of energy saving measures which our operations contractor could implement.

In 2019, Littleton Water and Light is replacing all street lights with high efficiency LEDs partly funded by RGGI rebate state funding. Installation ongoing by LW&L linemen.

consider contracting a building inspector, whose services could be shared with other towns, to ensure compliance with any state and local codes or ordinances.

BUILDING RETROFITS

According to the U.S. Green Building Council, green retrofits are any kind of upgrade to an existing building to improve energy and environmental performance, reduce water use, and improve the comfort and quality of the space in terms of natural light, air quality, and noise—all accomplished in a way that it is financially beneficial to the owner. New England, in general, has a very old building stock, which often consumes and wastes high amounts of energy through poor insulation. Retrofitting the town’s municipal buildings to be more energy efficient will save taxpayer money over time. Wood, solar, wind, geo-thermal, and biomass energy systems should be considered for all types of existing structures (municipal, school, commercial, and residential).

NEW CONSTRUCTION AND LAND USE

New construction should incorporate state-of-the-art energy efficiency technology and renewable energy sources into the design of the building envelope and operating systems.

As a municipal government, Littleton is the primary authority having jurisdiction over construction in Town through building standards that regulate fire safety, plumbing, structural integrity, as well as land use regulations that provide oversight on location, use, and appearance of buildings. Today, many municipalities regulate construction to ensure energy efficiency and compliance with the state energy code. At a minimum, ***existing zoning ordinances and other policies should be reviewed to make sure they do not limit renewable energy systems.*** The town should also consider site plan review regulations as a way to promote energy efficient design in new commercial buildings.

Denser development and conservation subdivisions should be incentivized because they protect valuable land resources and save energy in transportation. ***Land use regulations should consider the energy implications of our land use pattern to properly manage growth and development.***

AHEAD Town and Country Apartments

Littleton Town and Country Family Housing provides affordable apartments for working families. The affordable housing development is owned and maintained by AHEAD, a local non-profit housing organization based in Littleton. The apartments were built using modern sustainable building design practices including increased insulation, energy start light fixtures and appliances, krypton gas-filled windows, and incorporated such programs as mandatory recycling. These apartments also showcase appropriate siting of housing, located within walking distance of downtown and other important amenities.



NH Saves partners with local organizations and municipalities to offer weatherization workshops, such as the “Button Up” series throughout the state. Shown above is an example of a workshop.

An Energy Efficient Highway Department

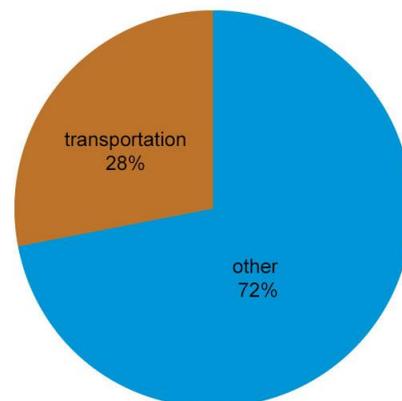
- **Insulation:** The walls are rated at R24 and the ceiling at R33.
- **Doors:** Large, overhead, passive solar doors provide natural light and supplemental heat during the winter months. Using less artificial light will save on electricity.
- **Lighting:** Highly efficient LED lights, augmented by large solar doors, and occupancy sensors.
- **Heating:** The existing biomass (wood pellet) system continues to be the primary heating source, supplemented and backed up by a new propane system. Radiant floors work especially well in tandem with the wood-based heating system. Radiant heat also keeps the slab floor dry, a life-safety enhancement.
- **Gas Saving:** Less idling will be required to warm up vehicles in the winter.

Transportation

The second biggest consumer of energy in the United States (and the first biggest consumer in NH) is the transportation sector. Littleton is committed to reducing reliance on automobiles by expanding alternative transportation infrastructure and promoting multiple modes of travel. Alternative transportation options reduce fuel use, promote physical activity, protect air quality, reduce traffic congestion, and its infrastructure is now seen as a desirable community feature. Alternative transportation includes:

- **Active Transit**, which is any self-propelled, human-powered mode of transportation such as walking or bicycling. Sidewalks, bike lanes, and multi-use trails provide safe and convenient infrastructure for these travel modes and reduce fuel use. Littleton recently adopted a [Bicycle and Pedestrian Plan](#) which should help the town continue to make improvements that facilitate active transportation more efficiently including improved or new sidewalks, crosswalks, and bicycle lanes. Eventually, ***the community should strive for a non-motorized "greenway" network that supports all transportation modes throughout the entire Town.*** In addition, the Zoning Ordinance should encourage mixed use development and dense residential development within walking distance to jobs, school, shopping, and services.
- **Mass Transit** is a form of travel offered locally that enables more people to travel together along designated routes, such as buses or rail. Currently, the Concord Coach stops in Littleton and offers a way for residents to travel to southern parts of the state by bus. Tri-County Transit also provides public transportation services to the general public (but especially, seniors, low-income persons, and the disabled) in the North Country region around Littleton.
- **Ridesharing** is any means of transportation in which multiple people use the same car, truck, van, or vehicle to arrive at a similar destination. Though ridesharing companies Uber and Lyft don't have a huge presence in Littleton now,

Share of total U.S. energy used for transportation, 2018



Source: U.S. Energy Information Administration, *Monthly Energy Review*, Table 2.1, April 2019, preliminary data 

they may grow in the future. Additionally, park and ride lots near interstate highways also provide opportunity for ridesharing to occur.

- **Energy Efficient Single Occupancy Vehicles**, such as electric cars, are rising in popularity and are much more fuel efficient than non-electric vehicles. Littleton should be promoting the use of electric vehicles and establish charging stations at key locations in Town. Currently, electric vehicle charging stations exist at the Food Coop and at the Mill Street Studio School and the Town is pursuing an additional station as part of the Mill Street streetscape project.

In 2011, the Littleton Police Department enacted a gas-saving, anti-idling policy. As well as limiting idling to only those situations operationally necessary. The policy also encourages the use of walking and biking patrols. This policy is being used as a model in NH.

According to the American Community Survey, Littleton has the highest rate (10.5%) of housing unit occupants with no vehicle in Grafton County. Living in a rural area requires individuals to have a vehicle to access a variety of services. Littleton also has the county's highest rate (11.4%) of individuals living below the poverty level. Littleton's workforce needs inexpensive and easily accessible means of getting to their place of employment. Littleton should consider this when planning for equitable, well-connected, and diverse transportation options.

Energy Sources

New Hampshire has no in-state sources of fossil fuels (e.g., coal, natural gas, oil) or nuclear material, relying on energy imports for these sources. Although New Hampshire burns virtually no oil for purposes of electricity generation, its per capita petroleum consumption is one of the highest in the United States. There's also been a shift in recent years to utilizing renewable sources of energy. New Hampshire's renewable portfolio standard requires 25% of electricity sold in the state to come from renewable energy resources by 2025. In 2017, 20% of electricity generation in the state came from renewables.



Above: A solar array helps to power Burndy Manufacturing in Littleton, NH. Installed by Revision Energy. A PV array is also on the roof of the Studio School, the LW&L office and another provides off-grid energy for the LW&L Gale River water supply head works.

ALTERNATIVE SOURCES OF ENERGY

Renewable energy is an important step toward addressing climate change and securing financial and environmentally sustainable energy systems into the future. The five most commonly used renewables are:

- Biomass: including wood and wood waste, municipal solid waste, landfill gas, and biogas, ethanol and biodiesel
- Water (hydropower)
- Geothermal
- Wind
- Solar: Direct solar systems can collect heat to supplement building systems or can generate electricity.

The Transfer Station heats the building with used motor oil turned in by customers and the Automotive Technology Department at the Career and Technical Education Center.

The most practical alternate systems of harvesting energy available to the North Country are **wood, hydroelectric, direct solar collection, and wind**. Littleton has begun to make strides to convert from mostly oil to propane and wood in municipal buildings. There may also be local opportunities for small scale-hydro power and wind energy systems.

Energy Efficiency Resources

The following state programs provide incentives to property owners to plan for and implement energy efficient upgrades to their property.

- **Energy Audit Financing:** Small businesses in the Littleton Water and Light service area may be eligible for low cost energy audits. The NH Community Development Finance Authority will cover up to 75% of audit costs for eligible businesses.
- **NH Rural Renewables:** Lakes Region Community College, along with Plymouth Area Renewable Energy Initiative (PAREI) and New Hampshire Sustainable Energy Association (NHSEA) are teaming together to provide this free technical assistance. Rural small businesses interested in installing solar photovoltaic, solar thermal, wood heat, and other renewable energy technologies can receive helpful educational information and preliminary vendor-neutral site evaluations at no cost.
- **New England Grassroots Environment Fund (NEGEF):** Small grants for education, outreach, and community energy projects are available through revolving grants offered by NEGEF.

The following resources provide information on funding, programs, policies, and education related to energy in the state.

- **NHSaves:** NHSaves provides tools, incentives, & tips for homes, businesses, and towns, to save energy.
- **Local Energy Solutions:** Local Energy Solutions provides guidance and resources to help local energy groups to implement success energy efficiency and renewable energy projects to make their communities more sustainable.
- **Office of Strategic Initiatives Energy Division:** The Energy Division promotes energy efficiency and reducing energy costs by supporting programs for low-income households, municipalities, businesses, and schools; exploring opportunities to expand the use of renewable energy sources, and administer state and federal programs related to energy.

Land Use Implications	Potential Actions
Energy Conservation	
<p>Energy conservation practices are integral to securing a resilient and sustainable energy future for Littleton, helping to reduce overall energy use, reducing carbon emissions, and providing individuals and the town significant financial savings.</p>	<p>Delegate a steward/monitor of the Energy Management Plan, now that the Energy Committee is inactive.</p> <p>Continue working with Littleton W&L to explore, develop, and implement robust energy conservation incentives and programs.</p> <p>Continue utilizing the Energy Management Plan to track energy use in municipal buildings.</p> <p>Expand list of items accepted for recycling at the Transfer Station.</p> <p>Promote recycling by placing bins in high traffic areas in public areas, encourage businesses to recycle and compost, and establish a mobile shredding service.</p> <p>Explore the feasibility of municipal composting services.</p> <p>Introduce warrant articles that incentivize the use of green materials in new construction and companies that reduce on-site waste.</p> <p>Investigate the feasibility and efficacy of hiring a building inspector, perhaps shared with another town(s).</p>
Efficiency	
<p>Investment in energy efficiency reduces the reliance on imported fossil fuels, boosts the economy by creating in-state jobs, and lowers energy costs for residents and businesses. Energy efficient construction practices can be used in retrofitting existing building and in new construction.</p>	<p>Continue conducting energy audits of municipal buildings, and encouraging the school, residences, and businesses to do the same. Ensure this is budgeted in the town’s Capital Improvement Plan, as appropriate.</p> <p>Assist remediation of low efficiency buildings through grant research and incentive programs.</p> <p>Promote best practices for energy efficiency at the residential, school, municipal, and commercial levels.</p> <p>Consider municipal incentives that supplement federal and state programs for winter weatherization.</p> <p>Adopt local standards for energy-efficient construction.</p> <p>Consider ways to encourage local business to provide energy efficient products or use natural, sustainable, or recycled materials.</p>
Transportation	
<p>Transportation is a significant emitter of carbon emissions. Transportation systems should be diverse, providing low energy transport options for local trips and energy efficient options for farther transport.</p>	<p>Examine the effect that tax benefits or other incentives might have on encouraging ride-sharing programs, mass transportation, working from home, and shuttle services to recreation areas</p> <p>North Country Transit operates the Tri-Town Trolley in Littleton, Whitefield, and Lancaster and Littleton should continue to support this system to help maintain and expand services.</p> <p>Take measures to establish more satellite parking in town.</p> <p>Currently there are no DOT Park and Ride lots in the North Country. Consideration should be given to negotiating with owners of underused retail lots in Littleton for potential Park and Ride sites.</p> <p>Evaluate ways to reduce fuel usage by the town’s vehicle fleet.</p> <p>Evaluate the potential for using alternate fuels in Town vehicles, and suggest the same be considered by the school bus fleet.</p>

	Promote bicycle and pedestrian traffic, to include: a review of zoning ordinances; bike racks and travel lanes; and, easier biker and walker access within both residential and retail areas.
	Establishing tiered parking garages should be explored as an allowed use in the zoning ordinance.
Renewable Energy	
Littleton should be promoting renewable energy development in town, understanding its link to reducing greenhouse gas emissions, protecting Littleton’s natural resources by addressing climate change head on, and producing clean energy for heating, cooling, and powering local buildings.	Adopt policies and practices which encourage and promote the adoption of renewable energy. This would include approval of an updated net metering policy that encourages local renewable energy generation, including large scale, while simultaneously assuring the Littleton Water and Light’s long-term economic viability.
	Consider adopting a solar energy ordinance .
	Promote the use of renewable energy systems through local tax exemptions or other incentives.
	Consider small-scale demonstration projects for wind and solar.
	Encourage other sources of energy for new construction or retrofits, such as biomass, solar, and geo-thermal.
Land Use	
Land use and energy are closely linked. Smart growth land use patterns reduce energy use, providing denser areas with more opportunities to walk, bike, or take public transit to important destinations and reducing the sole demand on the single occupancy automobile. The town also plays an important role in modeling energy efficiency and exploring more sustainable energy sources in its own buildings.	Explore land use ordinances that might promote energy goals by enhancing protection of natural resources.
	Review the Master Plan, zoning ordinances, and other Town policies for any inconsistencies with the goal of reduced energy usage; for example, promote cluster housing in rural areas and requiring building orientation for active and passive solar systems.
	Consider ordinances that support the principles of managed growth and innovative land-use techniques that also conserve energy.
	Explore the provision of density bonuses for increased residential density that are based on the implementation of energy conservation/efficiency methods in building construction (more stringent energy code or net-zero building).
	Refer proposals for residential subdivisions of 4 lots or greater and commercial development or change of use plans of 4,000 sq. ft. or greater to the Energy Commission for review and non-binding comment.