

Land Use and Energy: Connecting the Dots to Enhance Communities

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Why Do Land Use and Energy Matter?

Local decisions about energy and land use affect everything from municipal and personal budgets, to sense of place and economic growth. Land use refers broadly to how we modify or conserve land, as for example in agriculture, industry, housing, transportation, recreation, and open space. In turn, how we manage and use land impacts how much energy is consumed by local governments, businesses, institutions, and residents. Generally speaking, the energy we use is derived from oil, gas, solar, hydropower, geothermal, nuclear, and other forms of energy in order to generate electricity for lights and appliances, power our automobiles, and run industry. Land use significantly drives a community's energy consumption, which not only impacts the environment, but also has a range of effects on household and municipal budgets.

As a planner, community decision maker, or civic leader, you have the ability to influence how efficiently energy is used in your community. You can start by identifying all the ways in which energy is used. For example, as opposed to a more traditional village development pattern, "sprawl" development places greater demands on personal transportation, movement of goods and services, sewer and water infrastructure, and local distribution of electrical supply. This information brief explores the tools and approaches that can be employed in land use planning to enhance energy efficiency in our communities.

Who Makes Decisions about Land Use and Energy?

Local decisions about land use and energy begin with a community's master plan, which sets out a vision for local growth and development. The master plan is the basis for land use regulations in a community, including the zoning ordinance and regulations for subdivision of land and for non-residential site plans. As such, the master plan shapes how land is used. You can strengthen your plan by asking the following questions:

- What land use patterns in your community induce greater consumption of energy, and can new development be more efficient in its use of energy?
- Can new development be guided to use renewable energy resources, thereby promoting local economic self-reliance?

Exploring these questions sets a course for informing local land use decisions that impact energy consumption. To formalize your community's thinking on these questions, your planning board should consider creating a master plan chapter related to energy, authorized by RSA 674:2, III(n), which may include "an analysis of energy and fuel resources, needs, scarcities, costs, and problems affecting the municipality and a statement of policy on the conservation of energy."



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Having completed your amendments to the master plan, you're then ready to undertake regulatory changes based on the plan's recommendations. Zoning can regulate the use of land in a particular area (i.e., whether it is used for residential or commercial purposes), and it may regulate density, building design, or energy requirements. The ideal approach is comprehensive and considers how multiple uses can benefit from being in close proximity to one another, often called "mixed-use."

A community may also create a local energy commission, which can play an integral role in formulating and advising on energy strategies that are incorporated into land use (see Lebanon case study). These local bodies are authorized by RSA 38-D, and they can research municipal energy use and associated costs and can also make recommendations to other local boards and committees pertaining to municipal energy plans and sustainable practices such as energy conservation, energy efficiency, energy generation, and zoning practices.

How Does Mixed-Use Development Reduce Energy Consumption?

Mixed-use development combines two or more different types of compatible land uses, such as apartments and small-scale retail either in the same building or in close proximity to each other. For example, a single building could include a business on the first floor and residential uses on the upper floors. At a community level, cities and towns can create mixed zoning districts that provide for a combination of uses in a core area, commonly on a main street or downtown area. In areas that are predominantly residential, the zoning ordinance may provide for small-scale retail and service uses that are intended to accommodate the daily needs of the area's population

In mixed-use areas, transportation modes are commonly intertwined, such as streets with bike lanes, sidewalks, and bus stops making transportation alternatives more accessible. In areas where public transportation is not yet available because development density historically has not supported sufficient demand, some communities are encouraging development to be "transit-ready".

Mixed-use development provides many benefits for individuals and municipalities, from cost savings and reductions in carbon footprint, to enhanced public health and accessibility to businesses and services. First, mixed-use provides cost savings by enabling people to live closer to where they work. Even for those people who continue to commute by car, this decreases the number of miles needed to drive to get to local services, also called "vehicle miles traveled" or VMT, and affords greater access to alternative modes of transportation. When residences and businesses stand in close proximity to one another, people can choose to walk or bike to where they need to go.

A reduction in VMT also reduces the number of cars traveling on municipal roads. This decreases maintenance needs for roads and reduces individual expenditures on gas and car upkeep. It also enhances air quality and alleviates traffic congestion. Conversely, when land use policies produce sprawl, more energy is needed to move people, goods, and services. This can result in greater costs to individuals and to municipal budgets, as well as increased air pollution and greenhouse gas emissions.



Source: Municipal Research and Services Center, <http://www.mrsc.org/subjects/planning/lu/mixedusedev.aspx>

Case study

City of Lebanon, New Hampshire Plans for Mixed-use Villages

The City of Lebanon is home to more than 13,000 people and is New Hampshire's 23rd largest municipality. With a Community Planning Grant, Lebanon is implementing actions to accommodate future growth by concentrating development into "mixed-use villages" – areas able to accommodate a mixed-use core or main street. Basic tools for this initiative include amendments to the city's master plan chapters on land use, transportation, and energy. The planning board is also considering changes to its zoning ordinance.

Lebanon began by identifying nearly a dozen areas in the city that are opportunities for mixed-use villages. Next, Lebanon examined the potential energy savings due to transportation changes—in particular, the shift away from use of automobiles that would result from increased mixed-use development.

What are the anticipated savings from transportation shifts? Locally, the plans for mixed-use could reduce VMTs by some 728,750 per year within the city. Regionally, and accounting for growth in the city, such plans could reduce VMT by 4,520,090 every year. This would translate to 191,529 gallons of fuel saved per year. At \$2.24/gallon for gas (statewide average on 1/12/15, NH Office of Energy and Planning), Lebanon's citizens could save \$429,025 that could be directed back into the local economy, while also reducing greenhouse gas emissions.

The key lesson from the City of Lebanon is that mixed-use development can result in a shift away from automobile use with corresponding reductions in energy consumption and significant savings for municipal government and private citizens.

Town of Epping, N.H. Enhances Energy in Land Use through Sustainable Design

The Town of Epping instituted a "sustainable design" ordinance following a series of steps for enhancing land use and energy planning. Leading up to this, the town became a signatory to the US Mayors Climate Protection Agreement and created a master plan chapter on energy efficiency and climate change.

"Article 22 – Energy Efficiency and Sustainable Design" in the town's zoning ordinance requires all new construction to incorporate energy efficiency, conservation, and sustainable design principals. Developers have options for how to satisfy the requirements, similar to LEED, ranging from operational requirements (e.g., no-idling policies, reduced lighting after hours) and building materials and design, to use of innovative technologies and renewable energy.

The article embodies a "graduated compliance system" that uses the square footage of a new development to determine the number of points required to satisfy the ordinance. This system attempts to address the financial concerns of small businesses, while leveraging mainstream practices among larger businesses and their capacity for sustainable design. For example, TD Bank was the first major development in Epping under the new ordinance and included a solar installation, hydronic heating, and recaptured rainwater for toilets and irrigation.

Lessons learned:

- While some believe that installation costs of energy efficiency measures are too high to be practical, an ordinance with a flexible point system allows developers to rationally assess costs and to pursue the measures that make the most economical sense.
- A series of public meetings held to collect feedback on the ordinance helped to clear misconceptions and strengthen the article. Local governments should make a strong commitment to an open public process when creating a new ordinance.

What steps can communities take to manage energy through land use?

- 1. Enhance Building Design and Siting.** If energy efficiency is a priority in a community's master plan (see Epping case study), then design standards can be incorporated into the planning board's subdivision regulations. Communities may also adopt building codes more stringent than state codes, thus resulting in greater energy savings for community members. Communities may also incorporate energy efficiency standards and renewable energy generation requirements in their zoning ordinances. To learn more, refer to the NH Department of Environmental Services' *Innovative Land Use Planning Techniques* handbook, which provides model ordinances and outlines the legal basis for towns to incorporate energy efficiency strategies into local land use decisions. In particular, see Chapter 3.5 "Energy Efficient Development" available at http://des.nh.gov/organization/divisions/water/wmb/repp/documents/ilupt_chpt_3.5.pdf
- 2. Apply Smart Growth Principles.** Adopting regulatory standards based on the concepts of "smart growth" can also help you manage land use to reduce the demand and associated costs for energy while achieving many other benefits for community development. New Hampshire statutes define smart growth as the development and use of land in ways that are appropriate to our traditional and historic landscape, including denser development of existing communities, encouragement of mixed uses, protection of villages, planning to make communities more walkable, and protection of open space, natural resources, and the working landscape (see RSA 9-B:3). Learn more at www.smartgrowth.org.
- 3. Incorporate Energy Efficiency Strategies into Municipal Policies.** Energy efficiency can save communities significant cost. Do you have a no-idling policy for your municipal vehicle fleet? Vehicle idling wastes fuel and results in greater carbon emissions. Does your community have goals for energy efficiency in the construction or operation of municipal buildings? Consider setting policies for green building design or LEED (Leadership in Energy & Environmental Design, is a green building certification program that recognizes best-in-class building strategies and practices) certification in new buildings; consider retrofitting existing facilities to be more energy efficient. To learn more about energy efficiency in municipal buildings, see the NH Office of Energy and Planning's Handbook, <http://www.nhenergy.org/handbooks--guides.html> or the EESE Board/NHSEA Field Guide http://www.nhsea.org/download/Audit_Guidelines_Nov2011.pdf
- 4. Form an Energy Commission.** In 2009, the NH Legislature enacted RSA 38-D, authorizing municipalities to establish local energy commissions. They can be created for the purpose of study, planning, and utilization of energy resources for municipal buildings and built resources, and for making recommendations to local boards and committees pertaining to municipal energy plans and sustainable practices, such as energy conservation, energy efficiency, energy generation, and zoning practices. Check your master plan for reference to energy efficiency goals and, if none exist, consider incorporating energy efficiency into your next master plan update or creating a municipal energy plan. Begin by talking with local residents and civic leaders to gauge interest, assess what your community is already doing or considering toward energy activities, and then talk with your board of selectmen or your city or town council. http://www.nhenergy.org/uploads/1/6/7/3/16738072/hb189_factsheet.pdf

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