Energy Conservation Profile

The availability and use of energy resources is an important consideration for residents, businesses, developers, institutions, and all levels of government. Energy heats and cools our indoor environments, fuels our vehicles, and powers our computers, appliances, and equipment. Energy is critical to our modern lifestyle. As the technology in our modern lifestyle increases, so does our reliance on energy resources.

Ever-changing energy usage, costs and availability highlights the need to understand and manage energy consumption patterns. The energy crisis of the 1970s sparked interest in energy conservation measures, such as carpooling and alternative energy sources. Community development plans and policies developed in subsequent years often highlighted energy conservation through energy efficient residential site design practices. Unfortunately, as energy supplies increased and costs fell, conservation measures became less popular. Facing similar instability in the Middle East at the outset of the 21st century, awareness for energy consumption and opportunities for conservation has risen. In conjunction with increasing concern for the limits of non-renewable resources, their impacts on the environment, and the impacts of sprawl on local government, public interest in transit, construction standards, (e.g. road and parking design minimums), and alternative energy sources has been renewed.

This profile will analyze the impact of community development patterns, the transportation network, and public infrastructure among other plan components on the present use of energy in Lebanon County. It will identify current measures and additional opportunities to reduce energy consumption and trends in renewable energy sources.

Energy Uses

Energy is integrated in the operation of most of our modern built-facilities. Homes, offices, factories, schools, hospitals, and infrastructure systems rely on electricity and other energy sources for lighting and indoor climate control—heating, ventilation, and air conditioning. In addition, the operation of these facilities increasingly relies on electronic systems, in addition to advanced appliances and equipment, for their respective functions.

In modern society, the vast majority of transportation is aided by vehicles—vehicles that are powered by gasoline or other fuels. Automobiles, trucks, busses, trains and airplanes carry people, goods and services within and between communities. They transport supplies between business and industry, students to schools and recreationists to leisure, sports and entertainment destinations. In urban areas where residences, work places, and leisure destinations are close to one another, people can walk or bicycle, take public transportation, or hire taxi service to their destinations. While these options may be available in rural areas, they may not be efficient or realistic for destinations that are far-removed from one another.

Lebanon County is a county in transition from rural to urban status. Its city, boroughs and even portions of surrounding townships along the Route 422 corridor are clearly urban yet the remainder of the county is still strongly characterized by agricultural and forested landscapes. This duality makes is difficult to determine countywide policy that will fit each community. Energy choices, particularly for travel, are more limited in rural areas, as is the sense of need for providing and managing such choices. Nonetheless, in a time of increased awareness for energy costs, it is prudent to consider where and how municipal policy and regulations can impact energy use by residents and the public sector.

Energy Sources

Utility Gas

Utility gas, or natural gas[1], is comprised mainly of methane. As a household fuel, natural gas is used in fuel stoves, furnaces, water heaters, clothes dryers and other household appliances. The availability of natural gas is also important for economic development, as major industry generally requires natural gas as an available resource for production of steel, glass, paper, clothing, brick, and electricity as well as heating purposes.

[1] Energy Information Administration, www.eia.doe.gov.

Natural gas burns more cleanly than other fossil fuels. It has fewer emissions of sulfur, carbon, and nitrogen than coal or oil, and it has almost no ash particles left after burning. As with other fossil fuels, burning natural gas produces carbon dioxide, a greenhouse gas. However, its relatively clean-burning properties, when compared to other carbonaceous fuels, are one reason that the use of natural gas, especially for electricity generation, has grown so much and is expected to grow even more in the future. Additionally, compressed natural gas can be used as a clean alternative to other vehicle fuels, with an energy efficiency comparable to gasoline engines but lower than most modern diesel engines.

Bottled Gas (Propane)[2]

Propane is a non-renewable fossil fuel, like the natural gas and oil from which it is produced. When commonly sold as fuel, it is also known as liquefied petroleum gas (LPG or LP-gas). Like natural gas (methane), propane is colorless and odorless, therefore foul-smelling mercaptan is added to make gas leaks easy to detect. Because of its clean burning properties and portability, propane is often chosen to fuel indoor equipment such as fork lifts and as an alternative transportation fuel. Propane-fueled engines produce much fewer emissions of carbon monoxide and hydrocarbons compared to gasoline engines. Like all fossil fuels, propane emits water vapor and carbon dioxide, a greenhouse gas.

Although propane accounts for 3 percent or less of home heating fuels in Pennsylvania and Lebanon County, it has some very important uses. Propane is the most common source of energy in rural areas that do not have natural gas service. It is used for heating homes, heating water, cooking and refrigerating food, drying clothes, and fueling gas fireplaces and barbecue grills. On farms, it is used to dry corn and power farm equipment and irrigation pumps. Businesses and industry use propane to run their fork lifts and other equipment. About 40 percent of propane is used by the chemical industry as a raw material for making plastics, nylon, and other materials. While only a small fraction of propane is used for transportation, it is the largest alternative transportation fuel in use today. Instead of gasoline, propane is often used to fuel fleets of vehicles used by school districts, government agencies, and taxicab companies. In recreational pursuits, hot air balloons use propane to heat the air that makes them rise.

Petroleum

Petroleum is the most commonly used energy source, supplying about 40% of the planet's energy. Petroleum is used to produce fuels, such as gasoline (petrol), diesel, and numerous fuels for heating. This rich energy source is obtained from the processing of crude oil (including lease condensate), natural gas, and other hydrocarbon compounds.[3]

Diesel Fuel

Diesel is a specific fractional distillate of fuel oil (mostly petroleum) that is used as fuel in diesel engines. Diesel is not as dense as lube oil, but is about 15% denser than gasoline and releases about 15% more megajoules per liter than gasoline. Diesel is generally simpler to refine than gasoline and often costs less, but contains higher quantities of sulfur. European emission standards have forced oil refineries to dramatically reduce the level of sulfur in diesel fuels. The United States has lagged behind in this initiative, although more stringent emission standards have been adopted with the transition to ultra-low sulfur diesel (ULSD) starting in 2006 and becoming mandatory in 2010. Although high levels of sulfur in diesel are harmful for the environment, lowering sulfur also reduces the lubricity of the fuel, meaning that additives are required to lubricate engines. Diesel fuel in the United States typically also has a lower measure of ignition quality, resulting in worse cold weather performance and some increase in emissions. The benefit of diesel is that it contains approximately 18% more energy per unit of volume than gasoline, which, along with the greater efficiency of diesel engines, contributes to fuel economy (distance traveled per volume of fuel consumed). [4]

Fuel Oil

Fuel oil provides high efficiency and low emissions. New oil heating systems boast energy efficiency ratings ranging from 83 to 94 percent. The emissions from home heating oil are about the same as those from a similar-size gas burner. The latest oil-fueled home heating systems are nearing zero emissions for smoke and combustion discharge, resulting in cleaner air. Fuel oil is the most common form of primary home heating fuel in Lebanon County and is sold by several local suppliers.

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[2] Energy Information Administration, www.eia.doe.gov.
[3] Oracle ThinkQuest Education Foundation. library.thinkquest.org/21794/energysources.html
[4] Wikipedia. http://en.wikipedia.org/wiki/Diesel

Electricity

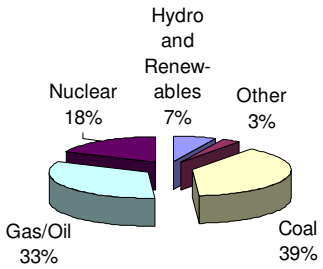
Electricity is a second generation energy source, as it is generated through the burning of natural gas, oil or coal, by nuclear generators, or by wind turbines or hydroelectric dams. These primary sources have a variety of costs and environmental impacts.

Pennsylvania was one of the first states to deregulate its retail electric power markets, signed into legislation in December 1996 by Governor Tom Ridge. Under the restructuring plan, which started January 1999, customers of Pennsylvania's 8 largest investor-owned utilities were allowed to shop for alternative sources of power.[5] As a result, buyers have greater choice in the source (and impacts) of their electricity generation.

According to the Federal Energy Information Administration, in 2004, over half of electric power generation in Pennsylvania was fueled by coal (54.6%) as can be seen in Table 10-1. The next highest generation category was nuclear at 36.1%, reflected in the dramatic shift in energy production from electric utilities to independent power providers seen in Table 10-1.

Electricity ranks third among home heating sources in Lebanon County. The two primary residential and commercial electric providers in the county are PPL Electric and Metropolitan Edison (Met Ed). Both generate electricity from a variety of fuel sources. PPL's fuel source composition is shown in Figure 10-2.

Figure 10-1
PPL Power Supply by Fuel Source
(generating capacity)



General Public Utilities (GPU) generates electricity at the AES Ironwood plant in South Lebanon Township however it does not provide local service. The AES Ironwood plant is a combined cycle gas turbine (CCGT) plant. The $330 million plant started commercial operation on December 31, 2001, and has a 730 MW output. The plant's main fuel is natural gas. It also has dual fuel capacity to burn distillate oil, though it has never been used. The plant is connected to the existing North Lebanon–South Lebanon 230 KV line in the GPU Energy system, which is then sold and distributed to the Pennsylvania – Maryland – New Jersey markets.[6]

The AES Ironwood power plant requires Zero Liquid Discharge (ZLD) technology using an integrated total water management system. ZLD systems eliminate liquid waste steam from the plant and recycle high purity water for reuse. In many cases, plant water consumption can be reduced up to 90% with the addition of a ZLD system. This can minimize the potential risk associated with plant waste in streams and help to improve unfavorable public perceptions of new facilities.[7]

In addition to the AES Ironwood power plant, PPL Corporation has entered into an agreement with the Greater Lebanon Refuse Authority to purchase methane gas produced at the county landfill. The methane gas will be used to generate electricity for the equivalent of 4,000 homes. The deal will replace the authority's contract with Lebanon Methane Recovery which is set to expire May 31, 2007. Site work for the plant is to begin in January 2007, with construction to be finished by May and the plant in operation by June. The electricity generated will be sold to the Metropolitan Edison Company, subsidiary of First Energy Corporation, and used throughout the power grid that covers Pennsylvania, New Jersey, and Maryland.

Coal

Coal[8] is used to generate more than half of all electricity produced in the United States. In addition to electric utility companies, industries and businesses with their own power plants use coal to generate electricity. When coal is burned as fuel, it gives off carbon dioxide, the main greenhouse gas that is linked with global warming. Burning coal also produces emissions, such as sulfur, nitrogen oxide (NOx), and mercury, that can pollute the air and water. The Clean Air Act and the Clean Water Act require industries to reduce pollutants released into the air and the water.

[5] Energy Information Administration, www.eia.doe.gov/cneaf/electricity/page/fact_sheets/pennsylvania.html
[6] Power Technology. www.power-technology.com
[7] GE Infrastructure, Water and Process Technologies. Formerly Ionics, Inc., www.ionics.com/applications/zld/index.htm
[8] Energy Information Administration, www.eia.doe.gov.

Table 10-1 Electric Power Industry Generation by Primary Energy Source, 1990 Through 2004

Energy Source	Percentage Share								
	1990	1995	1998	1999	2000	2001	2002	2003	2004
Electric Utilities	**94.3**	**91.1**	**91.0**	**83.1**	**48.1**	**14.1**	**14.9**	**14.6**	**15.8**
Coal	58.1	52.2	55.7	44.0	18.2	7.1	7.8	7.7	8.6
Petroleum	2.3	1.7	2.1	1.6	0.8	0.0	0.0	0.0	0.0
Natural Gas	0.1	1.2	0.3	0.5	0.1	0.0	0.0	0.0	0.0
Nuclear	32.9	35.8	32.0	36.4	28.4	6.7	6.7	6.1	6.5
Hydroelectric	1.5	0.9	1.1	0.8	0.8	0.4	0.6	0.8	0.8
Pumped Storage	-0.5	-0.7	-0.2	-0.2	-0.2	-0.1	-0.1	-0.1	-0.1
Independent Power Producers and Combined Heat and Power	**5.7**	**8.9**	**9.0**	**16.9**	**51.9**	**85.9**	**85.1**	**85.4**	**84.2**
Coal	2.7	5.1	5.2	13.2	39.4	49.9	47.9	48.5	46.0
Petroleum	0.4	0.3	0.2	0.2	1.0	1.8	1.3	2.2	1.9
Natural Gas	1.5	1.5	1.7	1.5	1.2	1.5	3.3	2.7	4.6
Other Gases	0.5	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.3
Nuclear	0.0	0.0	0.0	0.1	8.2	30.8	30.6	29.9	29.6
Hydroelectric	0.2	0.2	0.2	0.2	0.3	0.4	0.5	0.8	0.7
Other Renewables	0.5	1.3	1.4	1.4	1.4	1.4	1.3	1.4	1.4
Pumped Storage	0.0	0.0	0.0	0.0	0.0	-0.2	-0.2	-0.2	-0.2
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Electric Industry	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Coal	60.7	57.3	60.9	57.2	57.6	56.9	55.7	56.2	54.6
Petroleum	2.7	2.0	2.4	1.8	1.9	1.8	1.3	2.2	1.9
Natural Gas	1.6	2.7	2.0	2.0	1.3	1.5	3.3	2.7	4.6
Other Gases	0.5	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.3
Nuclear	32.9	35.8	32.0	36.6	36.6	37.5	37.2	36.0	36.1
Hydroelectric	1.6	1.1	1.2	1.0	1.1	0.8	1.1	1.6	1.5
Other Renewables	0.5	1.3	1.4	1.4	1.4	1.4	1.3	1.4	1.4
Pumped Storage	-0.5	-0.7	-0.2	-0.2	-0.2	-0.3	-0.3	-0.4	-0.3
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: Energy Information Administration, www.eia.doe.gov.

The coal industry has found several ways to reduce sulfur, nitrogen oxides, and other impurities from coal. They mine and burn low-sulfur coal and clean the coal more completely before it leaves the mine. Power plants use "scrubbers" to clean sulfur from the smoke before it leaves their smokestacks. In addition, industry and government have cooperated to develop "clean coal technologies" that either remove sulfur and nitrogen oxides from coal, or convert coal to a gas or liquid fuel. The scrubbers and NOx removal equipment are also able to reduce mercury emissions from some types of coal. Scientists are working on new ways to reduce mercury emissions from coal-burning power plants, since the Environmental Protection Agency (EPA) has set tighter mercury limits for the future.

Wood[9] and Wood Pellets

Wood burning stoves and fireplaces have been a common alternative to fossil fuels and the instability of fuel cost and supply. In the mid-1970s, purchases of wood stoves soared as people sought to hedge their energy bills against high oil prices and threats of shortages. In 1999, sales increased again as residents prepared for a potential Y2K electrical supply failure. The terrorist attacks of September 11, 2001 and political instability in the Middle East have created yet another surge in wood stove sales.

[9] Wood Heat Organization

Wood as an energy source offers several benefits:

- It's renewable. Woodlands can be cut for firewood and managed for natural or planted regeneration.
- It recycles carbon dioxide and reduces global warming.
- It is not reliant on electricity for distribution.
- It's inexpensive, particularly in rural areas where woodlands are abundant.

Many wood stoves can burn wood pellets as well as logs. Wood pellets are essentially sawdust that has been compressed into uniformly shaped pellets. Wood pellet production is an example of recycling in that the raw materials (sawdust and other wood waste products) of the pellets are typically a waste product of other wood processing industries that can be made into useable products.

Solar Energy[10]

Energy from the sun can be categorized in two ways: (1) in the form of heat (or thermal energy), and (2) in the form of light energy. Solar thermal technologies use the sun's heat energy to heat substances (such as water or air) for applications such as space heating, pool heating and water heating for homes and businesses. There are a variety of products on the market that utilize thermal energy. Often the products used for this application are called solar thermal collectors and can be mounted on the roof of a building or in some other sunny location. The sun's heat can also be used to produce electricity on a large utility-scale by converting the sun's heat energy into mechanical energy.

Photovoltaic (PV) is a technology often confused with solar thermal and is in fact what many people mean when they refer to "solar energy". Photovoltaics (photo=light, voltaics=electricity) is a semiconductor-based technology (similar to the microchip) which converts light energy directly into an electric current that can either be used immediately or stored, like in a battery, for later use. PV panels/modules are very versatile and can be mounted in a variety of sizes and applications; e.g. on the roof or awning of a building, on roadside emergency phones or as very large arrays consisting of multiple panels/modules. Currently they are being integrated into building materials (such as PV shingles, which replace conventional roofing shingles).

Solar energy is not widely used as an energy source in the county; however, as the technology improves and systems become more manageable and architecturally pleasing, this energy source will become more attractive to residents and businesses.

Geothermal Energy

Geothermal energy is a form of renewable energy derived from heat deep in the earth's crust. This heat is brought to the near-surface by thermal conduction of heat from groundwater. The heated groundwater can be used for direct heating of homes and businesses, and also to produce electricity. Geothermal energy is used today where good geothermal resources exist, including many locations in the western United States.

Geothermal energy can also be utilized in other areas of the country by different means. In most areas of the country, the temperature of the earth, several feet below the surface, remains constant (rather than outside air which is generally colder in winter and warmer in summer). Because of this, geothermal heat energy can be extracted from the earth in cold months of the year and displaced into the earth in warmer months. The geothermal energy is harnessed using a geothermal heat pump (GHP). These ground-source heat pumps use the natural heat storage capacity of the earth or ground water to provide energy efficient heating and cooling. In addition, geothermal heat pumps can provide domestic hot water. GHPs should not be confused with air-source heat pumps that rely on heated air. Geothermal heat pumps are appropriate for retrofit or new homes, where both heating and cooling are desired. They can be used for virtually any size home in any region of the U.S.

Wind Energy

As a renewable resource, wind is classified according to wind power classes, which are based on typical wind speeds. These classes range from class 1 (the lowest) to class 7 (the highest). In general, wind power class 4 or higher can be useful for generating wind power with large turbines. Class 4 and above are considered good resources.

[10] www.solarenergy.com

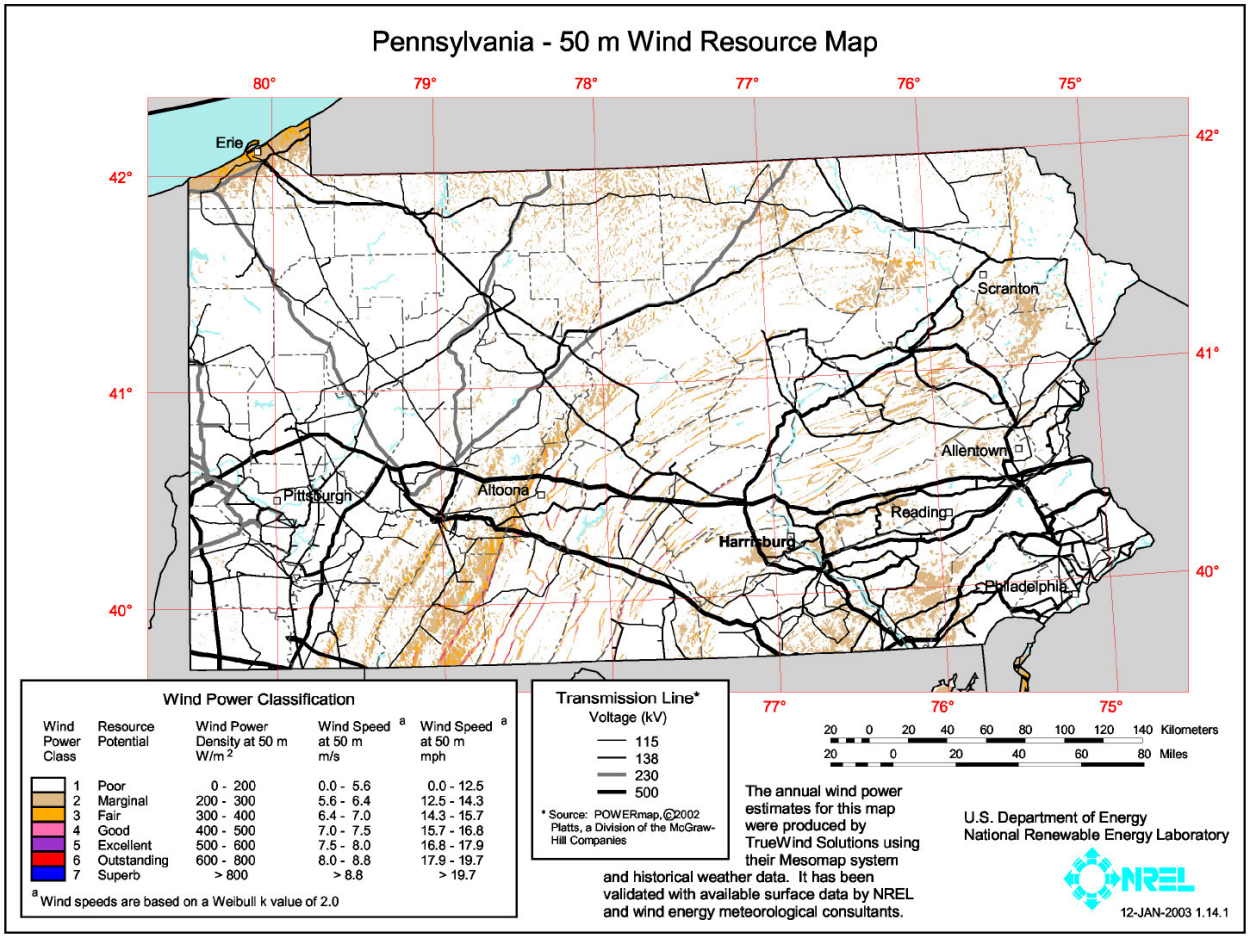
The US Department of Energy's Wind Program and the National Renewable Energy Laboratory (NREL) recently published a new wind resource map (Figure 10-2) for the state of Pennsylvania. This resource map shows wind speed estimates at 50 meters above the ground and depicts the resource that could be used for utility-scale wind development. Future plans are to provide wind speed estimates at 30 meters, which are useful for identifying small wind turbine opportunities.

This map indicates that Pennsylvania has wind resources consistent with utility-scale production. These are most concentrated on ridge crests in the southwestern part of Pennsylvania, located southwest of Altoona and southeast of Pittsburgh. Commercial wild turbines have been developed in Somerset County and more have been proposed in Bedford County.

Lebanon County has wind resources of marginal quality for utility-scale wind generation through the Lebanon Valley and along the northern ridges. A few areas of these northern ridges have higher wind speeds and qualify for a “fair” classification. These resources are sufficient for the numerous small-scale wind turbines used on farms throughout the valley.

According to DCNR, wind power might be appropriate for consideration on a few (1 – 3%) state lands based on the wind map of Pennsylvania. However, DCNR will not engage the environmental community, wind developers and local governments in discussion of wind generation on state lands until the wind industry and local governments begin to cooperate in Pennsylvania. As DCNR owns land along the northern ridges, this position may be a point of future discussion.

Figure 10-2 Pennsylvania – 50 m Wind Resource Map



As a renewable resource, wind is classified according to wind power classes, which are based on typical wind speeds. These classes range from class 1 (the lowest) to class 7 (the highest). In general, wind power class 4 or higher can be useful for generating wind power with large turbines. Class 4 and above are considered good resources.
Source: US Department of Energy

Biodiesel

Biodiesel can be thought of as any liquid biofuel suitable as a diesel fuel substitute, additive, or extender. Biodiesel fuels are typically made from oils such as soybeans, rapeseed, or sunflowers, or from animal tallow. Biodiesel can also be made from hydrocarbons derived from agricultural products or rice hulls.[11]

Biodiesel is a clean burning alternative fuel, produced from domestic, renewable resources. Biodiesel contains no petroleum, but it can be blended at any level with petroleum diesel to create a biodiesel blend. Biodiesel is simple to use, biodegradable, nontoxic, and essentially free of sulfur and aromatics.[12] It can be used in diesel engines with little or no modifications; however, some manufacturers are concerned about cold weather performance and its impact on engine durability.[13]

Biodiesel use has increased more than 50 times in the last five years, and is easier and cheaper to produce than ethanol. A Cumberland County biodiesel production plant, Keystone Biofuels, reports that most of their soybeans are purchased from Pennsylvania farms.[14]

13. Ethanol and Ethanol 85

Ethanol is an alcohol-based fuel produced by fermenting and distilling starch crops that have been converted into simple sugars. Feedstocks for this fuel include corn, barley, and wheat. Ethanol can also be produced from "cellulosic biomass," such as trees and grasses, and is called bioethanol. Ethanol is most commonly used to increase octane and improve the emissions quality of gasoline.

Ethanol can be blended with gasoline to create E85, a blend of 85% ethanol and 15% gasoline. E85 and blends with higher concentrations of ethanol qualify as alternative fuels under the Energy Policy Act of 1992. Vehicles that run on E85 are called flexible fuel vehicles (FFVs) and are offered by several vehicle manufacturers. Driven by environmental, economic, and energy security concerns, the availability and use of E85 is growing nationally.[15]

There is not nearly enough corn production in the U.S. to sustain fuel consumption needs, though demand for agricultural production is expected to increase. There are over 100 ethanol plants in the United States, but none in Pennsylvania. An ethanol plant was proposed in Conoy Township, Lancaster County, and is now proposed in Greene Township, Franklin County, but the plant has been met with resistance by local residents in both locations[16].

Energy Use Factors

Climate

The energy that is required to heat and cool buildings is determined in part by how buildings and their sites are designed with respect to climate. Sun, cold winds, warm breezes, landscaping, and topography affect a building's heating and cooling needs. The orientation and arrangement of buildings with respect to the sun and seasonal winds and the use of landscaping are examples of actions that can be taken to moderate climate extremes, save energy, and make a living environment more comfortable through natural means.

Building Size, Design, Materials, Condition and Function

Energy demand for facility operations, particularly heating and cooling of buildings, is determined in large part by the structure itself. The building's size, design, construction materials, condition, and function may all influence the energy usage.

[11] Energy Information Administration, www.eia.doe.gov.
[12] www.biodiesel.org
[13] U.S. Department of Energy – Energy Efficiency and Renewable Energy, Alternative Fuels Data Center. www.eere.energy.gov.
[14] WGAL Channel 8, 8 On Your Side, www.wgal.com.
[15] Ibid.
[16] Ibid.

Building size and design is a big determinant of energy usage. Large single story buildings with extensive external walls require more energy for heating and cooling than multi-story buildings of similar internal size.
Buildings with many or large windows will typically require more energy to heat because of their low efficiency.
Wide overhangs can block the sun's thermal energy, saving on cooling costs. Building that are oriented to the south will absorb more thermal energy and be warmer in winter because of the angle of the sun. Protecting a building from the predominant winter winds through site placement and landscaping will also save energy on heating costs. Buildings with light-colored exterior walls and roofs will reflect the suns energy and be cooler, where as buildings with darker featured roofs will be warmer. Certain external building materials provide better heat absorption or heat loss protection than others; masonry products, for example, absorb and retain heat better than wood or plaster.

Energy efficiency can be quickly diminished if a building has not been properly maintained. Broken or cracked door and window seals that allow air to penetrate the building from the outside will decrease energy efficiency. Cracks that occur from building settlement and long term exposure to the elements will decrease energy efficiency. Buildings that are under-insulated or improperly insulated will also not be energy efficient.

The overall function of a building can help to determine how much energy will be consumed within its walls. For example, commercial and industrial uses tend to consume much more energy for their operations than residential properties, due in large part to the amount, type and size of equipment. The number of hours of active operation influences energy use, as well. Businesses that operate for 8 hours a day and those that operate around the clock will use significantly different energy amounts. In residential circumstances, the energy that is used will be determined by the number of people in the home, the hours they are home, and their technological lifestyle (how many and the types of appliances and electronic equipment).

Transportation

Transportation-related energy conservation efforts are typically aimed at changing the fuel type used to one that more efficient or cleaner-burning, or at reducing energy consumption by changing the overall way in which people travel.

Recently, record-high gasoline prices and concerns over environmental and security issues surrounding fossil fuels have turned increased attention to alternative fuel and energy sources. Those alternatives with the most likely impacts on Lebanon County and the surrounding region are ethanol, biodiesel, natural gas, and hydrogen.

Some automobile manufacturers are releasing vehicles that use a mix of ethanol and gasoline called flex-fuel. This is expected to increase demand for ethanol, E85 and other ethanol blends.

Biodiesel use is increasingly rapidly and is most often used with larger vehicles, such as farming equipment.

Natural gas is already being used with success in Pennsylvania. The Centre Area Transit Authority (CATA) was one of the country's first to run its fleet using natural gas, an energy source that is 90% domestically produced. Starting in 1996, CATA began using buses that run on natural gas, and all 52 CATA buses have done so since 2004. Indiana County, Pennsylvania also has buses running on natural gas[17].

Hydrogen fuel has perhaps the most appealing long-term potential but currently lags behind other alternative fuel sources in availability. While hydrogen fuel cells would have higher fuel efficiency, cleaner emissions, and be based on the world's most abundant element (hydrogen), the cost in harnessing the energy is still very high. Despite the costs, automobile manufacturers are aiming to produce hydrogen-powered vehicles early in the next decade. In the more immediate future, CATA is nearing the release of buses that use a blend of 30% hydrogen and 70% natural gas fuel[18].

Reducing energy consumption often implies more significant changes in operations or lifestyle than just switching fuel types. For business and industry, such changes can mean new ways of shipping, e.g. by rail rather than by truck. For residents, those changes can mean carpooling or using mass transit. Municipalities may need to consider adopting regulations to create developments better connected by sidewalks or to increase densities which make mass transit use attractive and affordable.

There are several initiatives to reduce energy consumption, some of which can be implemented in the short term. The Lebanon County Long Range Transportation Plan recommends several non-motorized transportation projects, including

[17] WGAL Channel 8, 8 On Your Side, www.wgal.com; Centre Area Transit Authority, www.catabus.com/accngprog.htm.
[18] Ibid.

short-term and long-term Lebanon Valley Rail Trail extensions, the South Lebanon Township Trail Project, and Safe Routes to School projects in North Lebanon School District and Jonestown Borough. Once completed, these projects will offer real alternatives for school- and recreation-related travel.

Additionally, the plan recommends continued partnership with the Susquehanna Regional Transportation Partnership to reduce single-occupancy vehicle (SOV) dependence in the region. Land use strategies that support alternative transportation methods such as walking, car-pooling and public transportation will further the efficacy of these programs, and will play a long term role in transportation-based energy conservation.

Cost/Affordability

Cost is perhaps the most readily measured factor of energy demand. While taxes and subsidies adjust the price paid by the consumer, the cost of the energy or fuel itself often influences how much a consumer will purchase, if at all.

Energy Use and Rate Reports

Electricity - Statewide

The price of electricity in Pennsylvania over the past 45 years has grown steadily with dramatic increases during the seventies and early eighties, as shown in Table 10-2.

Table 10-2 Average Retail Price of Electricity 1960-2005 (per kilowatt-hour; includes taxes)

Year	Residential	% Increase	Commercial	% Increase	Industrial	% Increase
1960	2.60		2.40		1.10	
1965	2.40	-7.69	2.20	-8.33	1.00	-9.09
1970	2.20	-8.33	2.10	-4.55	1.00	0.00
1975	3.50	59.09	3.50	66.67	2.10	110.00
1980	5.40	54.29	5.50	57.14	3.70	76.19
1985	7.39	36.85	7.27	32.18	4.97	34.32
1990	7.83	5.95	7.34	0.96	4.74	-4.63
1995	8.40	7.28	7.69	4.77	4.66	-1.69
2000	8.24	-1.90	7.43	-3.38	4.64	-0.43
2005	9.42	14.32	8.68	16.82	5.57	20.04

Source: Energy Information Administration, www.eia.doe.gov.

Pennsylvania's restructuring of its retail electric power markets in 1999 provided for price caps for retail customers, plus the residential and commercial customers received an additional 8 percent rate reduction. These changes have affected trends in Pennsylvania's retail electricity rates in the following ways: [19]

- Through the 1990s, Pennsylvania's nominal retail electricity prices—prices unadjusted for the effects of inflation—have been relatively stable at approximately 8.0 cents per kilowatt-hour (kWh). Lower coal prices used in coal-fired power plants and improved operating efficiencies in nuclear plants, which together accounted for almost 90 percent of Pennsylvania's power generation, have contributed to Pennsylvania's price stability over the 1990s.

- Because nominal electricity prices have been stable, real electricity prices—prices from which the effects of inflation are eliminated—in Pennsylvania have been decreasing throughout the 1990s, reaching a low of 7.67 cents per kWh in 1999.

- In 1999, industrial customers in Pennsylvania paid an average 5.22 cents per kWh while residential customers paid 9.19 cents per kWh in 1999 (see map). Compared to many other States, and compared to national averages, these prices were relatively high. In 1999, national average retail electricity prices were 4.43 cents per kWh for industrial customers and 8.16 cents per kWh for residential customers.

[19] Energy Information Administration, www.eia.doe.gov/cneaf/electricity/page/fact_sheets/pennsylvania.html

- Three factors were implemented to help lower Pennsylvania's retail electricity rates over the past few years. First, electricity prices were capped at 1997 levels for utilities for nine years and distribution rates, the charges to deliver electricity over the lines, were capped for 4.5 years. Second, Pennsylvania's utilities agreed to rate reductions; the level of reduction varies by utility. Third, coal-fired and nuclear power were used to help to keep retail prices down.

Nonetheless, Pennsylvania prices have started to increase again. Since most electricity in Pennsylvania is generated from coal and nuclear power, electricity costs have been buffered from the turbulent prices of petroleum and natural gas.

Other Fuels - Statewide

Pennsylvania consumes many different fuels in the course of a year. Three fuels were examined from 1995-2004 to see if their use has increased or decreased over this ten year period. The three fuels chosen were fuel oil, propane and natural gas. These fuels were chosen because they are used to heat buildings, make electricity and power the equipment of homes, business and industry. Over the past four years there has been a decrease in fuel oil sales to Pennsylvania. Over the past three years, there has been an increase in the sales of propane and natural gas to Pennsylvania.

Table 10-3 Fuel Delivered to Consumers in Pennsylvania 1995-2004

Year	Fuel Oil	% Increase	Propane	% Increase	Natural Gas	% Increase
	1000 Gal/Day		1000 Gal/Day		MMcf	
1995	2940.1		912.5			
1996	3238.1	10.1	871.0	-4.5		
1997	3164.0	-2.3	840.2	-3.5	664782	
1998	3202.1	1.2	818.2	-2.6	609779	-8.3
1999	3228.4	0.8	879.6	7.5	648194	6.3
2000	3308.3	2.5	858.7	-2.4	659042	1.7
2001	3251.1	-1.7	765.9	-10.8	595625	-9.6
2002	3143.9	-3.3	822.8	7.4	632035	6.1
2003	3017.4	-4.0	957.2	16.3	651567	3.1
2004	2801.1	-7.2	970.6	1.4	661928	1.6

Source: Energy Information Administration, www.eia.doe.gov.

Ever since powered transportation has been created and mass produced, man's lifestyle has become increasingly dependent on this technology. Given that gasoline and diesel fuel power the vehicles of modern society, their usage in Pennsylvania was examined to see if increases or decreases have occurred in both consumption and pricing over the last decade. Prices in both gasoline and diesel fuel have increased dramatically in the past couple of years. Consumption of gasoline has decreased over the last couple of years while the consumption of diesel fuel has increased.

Table10-4 Gasoline and Diesel Fuel Sales and Price Increases in Pennsylvania 1995-2004

Year	Gasoline	% Increase	Price	% Increase	Diesel	% Increase	Price	% Increase
	1000 Gal/Day		Dollars		1000 Gal/Day		Dollars	
1995	13988.2		1.23		97145.6			
1996	13986.0	0.0	1.31	6.4	102756.6	5.8		
1997	13977.2	-0.1	1.30	-0.8	105457.9	2.6	1.24	
1998	13778.0	-1.4	1.10	-14.9	111178.3	5.4	1.13	-9.1
1999	14017.3	1.7	1.19	8.1	117448.9	5.6	1.19	5.1
2000	14001.2	-0.1	1.56	30.9	119326.3	1.6	1.60	35.2
2001	14238.6	1.7	1.49	-4.6	123612.9	3.6	1.48	-8.0
2002	13921.2	-2.2	1.41	-5.2	120944.5	-2.2	1.40	-4.9
2003	13201.4	-5.2	1.64	16.1	125026.3	3.4	1.63	16.4
2004	13111.8	-0.7	1.93	17.9	129277.6	3.4	1.90	16.6
2005			2.35	21.7			2.50	31.2

Source: Energy Information Administration, www.eia.doe.gov.

Home Heating Fuels

Lebanon County's population is dispersed among the City of Lebanon, seven boroughs of varying sizes, and eighteen townships of urban, suburban and rural character. As such, energy sources and demands are different for each municipality. The U.S. Census Bureau collects information on the source of home heating fuel for residents through the long form of the decennial census. Table 10-5 presents a summary of housing heating fuel sources for Lebanon County and each municipality from the 2000 Census.

Table 10-5 Housing Heating Fuel Sources by Percent

	Utility Gas	Fuel Oil	Electric	Bottled Gas	Coal	Wood	Solar	Other
Pennsylvania	**51.4**	**25.5**	**16.5**	**3.0**	**1.4**	**1.6**	**-**	**.4**
Lebanon County	**21.0**	**55.7**	**16.5**	**2.7**	**1.9**	**1.6**	**-**	**.3**
Annville–Cleona SD								
Annville	26.9	53.9	15.7	1.7	1.0	.4	-	.5
Cleona	13.1	55.6	27.9	1.5	.3	.7	-	.5
N. Annville	1.6	66.7	13.5	6.5	6.3	5.0	-	.5
S. Annville	1.6	75.7	14.9	2.5	1.3	3.0	-	.7
Cornwall–Lebanon SD								
Cornwall	1.4	62.1	24.1	9.5	.7	2.2	-	-
Mount Gretna	-	78.6	6.8	12.8	-	-	-	1.7
N. Cornwall	49.3	33.3	15.3	2.0	-	-	-	-
N. Lebanon	18.7	58.7	17.6	1.4	1.0	2.3	-	-
S. Lebanon	23.7	53.0	17.6	2.1	2.1	1.3	-	.2
W. Cornwall	4.8	69.6	14.3	7.2	1.9	1.0	.5	.6
ELCO SD								
Heidelberg	1.0	67.6	19.2	3.2	3.6	4.6	-	.8
Jackson	13.1	56.9	19.0	4.3	2.8	3.1	-	.7
Millcreek	10.6	58.7	17.6	3.4	6.8	2.8	-	.3
Myerstown	25.8	56.4	10.6	3.4	3.5	-	-	.4
Richland	11.3	67.0	18.2	.7	1.7	.7	-	-
Lebanon SD								
Lebanon City	35.3	49.1	12.9	1.2	.7	.1	-	.5
W. Lebanon	16.8	70.9	7.8	2.7	.9	.9	-	-
Northern Lebanon SD								
Bethel	.7	73.0	13.4	5.0	4.2	3.7	-	-
Cold Spring	-	75.0	-	25.0	-	-	-	-
E. Hanover	1.7	66.3	17.8	7.4	1.1	4.6	-	1.2
Jonestown	-	67.7	22.2	3.5	3.5	1.0	-	1.0
Swatara	.7	64.9	17.3	3.5	8.1	5.5	-	-
Union	-	70.3	15.5	5.1	5.5	3.3	-	.4
Palmyra Area SD								
N. Londonderry	31.5	40.9	22.6	1.3	3.1	.3	-	.3
Palmyra	22.5	58.2	17.5	.8	.2	.2	-	.3
S. Londonderry	19.6	52.0	18.3	5.6	1.1	2.9	-	-

Source: U.S. Census Bureau

Countywide Statistics and Trends

- Lebanon County residents have a high dependency on fuel oil as a heating fuel; 55.7% of all housing units in the county rely on fuel oil as a heating fuel compared to 25.5% for Pennsylvania.
- Utility gas or natural gas is the second highest heating fuel source in demand. 21% of all housing units in the county rely upon utility gas as heating fuel.
- Electricity as a source of heating fuel falls third gas in the county as a heating fuel.
- Bottled gas or liquid propane is a popular heating source in Mount Gretna Borough and Cold Spring Township. Bottled gas is becoming more popular as a heating fuel as more homes and businesses are being developed outside natural gas service areas.
- Nontraditional heating fuel sources, such as coal, wood, geothermal and solar are not as popular as the traditional sources; however, as heating fuel costs continues to rise, the need to explore and implement non-traditional sources will increase.

Land Use and Community Development

The Relationship between Energy Use and Community Development

The energy used to move people and goods in a community is determined in part by patterns of development. The spatial relationships of individual buildings, neighborhoods, communities and regions, particularly their density and the degree to which different kinds of uses are integrated, determine how far and by what means people will travel.
The distance between home and work is perhaps the most common example of the relationship between energy use and land development patterns. Where it is not feasible for people to live near to their work place, they have to commute. There may not be housing available that is affordable, or workers may have strong preferences for schools, other community amenities or landscape character. The commute between home and work can be as little as a few minutes or as long as a couple of hours, resulting in the consumption of energy. In urban areas, commuting options can include mass transit, carpooling, bicycling, or even walking. In rural areas, personal vehicles and carpooling may be the only viable travel means. Those who operate home-based businesses have fewer commuter demands, saving themselves time and energy, but suppliers may still have to deliver to the home.

But commuting to work is not the only reason for traveling. People travel to stores, personal service offices, recreational facilities, schools, religious centers, and entertainment venues regularly. Traditionally, these places were integrated within communities. However, late 20th century zoning practices increasingly separated residential neighborhoods from these destinations, resulting in increased travel that required vehicular assistance as well as expansive public infrastructure (roads, water and sewer systems) to support them.
Compact development, where goods, services, jobs, residences, and recreation are closer together, reduces dependency on vehicles for travel and increases opportunities for walking, bicycling, and public transportation. In addition, compact development more efficiently serves development with public infrastructure.

Community Development Patterns in Lebanon County

Energy conserving principles are evident in Lebanon County. Annville, Cleona, Lebanon, Palmyra, Myerstown and Jonestown are good examples of compact communities that have walkable and bikeable downtowns and neighborhoods. These communities were mainly developed prior to the mid-late 20th century when development patterns became increasingly single use and more dispersed. These communities are now generally built-out and adjacent areas in the townships are generally not zoned to extend these development patterns, i.e. development density or road infrastructure. While these communities are energy efficient, other economic factors have caused their downtowns to become less vibrant.

Development throughout the rest of the county is highly dependent on the use of personal and business vehicles for personal, business/industrial and recreational travel. Rail freight services exist in a narrow corridor of the county. Long term plans for Corridor Two Regional Rail may offer passenger rail service to Harrisburg via the Norfolk Southern Harrisburg Line and throughout south central Pennsylvania in the future. Local and intercity bus services have been losing ridership, reducing the efficiency and raising costs of their services.

Population projections for boroughs and townships countywide suggest that additional development should be expected; regional employment projections suggest additional growth as well. As a result, traffic volumes are expected to increase, unless substantial portions of new residential, commercial and industrial development are located within or adjacent to

existing development and its associated destinations and/or steps are taken to encourage use of existing public transportation and more affordable and efficient public transportation options are developed.

Managing Energy Demand through Municipal Regulations

Energy supply policy is established by the federal and state government. However, energy demand or use is influenced by local government policies on land use and other factors, as discussed above. By considering the impact of local policies on energy demand, local government can encourage energy conservation. Such consideration could take shape in one of three ways: removing barriers to voluntary private energy conservation practices; incentivizing conservation practices in the private sector, or creating development settings in which they are easier to use and more cost effective; and developing regulations that require energy efficiency in new development.

Removing Barriers to Energy Conservation

Unfortunately, some development regulations and design standards currently in use, especially in older ordinances, discourage or impede energy conservation. For example, some communities and homeowners associations prohibit the installation of solar collectors due to their "unattractive" appearance. Height regulations in some communities prevent the installation of solar panels on the roofs of homes. Wind energy systems (commercial windmills) are prohibited in prime areas or are subject to public opposition. Lot layout specifications in subdivision regulations and zoning can limit the most effective passive siting or positioning of buildings. In some cases, design standards are excessive, such as street width requirements and parking capacity. Such standards can actually promote energy consumption. Removing or reducing these regulatory barriers allows developers and property owners to initiate energy conserving design practices at their discretion.

Encouraging Energy Conservation

Planners and public officials are also in a position to actively encourage the use of energy conserving development practices by providing regulatory incentives. Local and county governments have offered developers incentives to provide public amenities in their development proposal, thereby reducing travel distances. Other incentives include increasing densities through zoning district provisions or conditional bonuses and fast-tracking review of development proposals. The 5-Star home rating and reduced application fees are additional examples of incentives offered to developers to make their projects more energy efficient. The 5-Star rating is the top rating from the Home Energy Rating System (HERS), developed jointly by the U.S. Dept of Energy and Energy Rated Homes of America as a system for evaluating the overall energy efficiency of a residential dwelling. Homes are rated on scales of 0-100 points and 1-5 stars. A home that rates at 86.0 points or higher is considered a 5-Star home.

Requiring Energy Conservation in New Development

The final approach to increasing energy conservation incorporates energy conservation techniques into new construction by establishing building type, building orientation, setbacks, landscaping, building height, and other development provisions that reduce energy demand as the preferred or minimum standard rather than the optional exception. Building codes also have an important influence on new construction and remodeling through the quality of materials and techniques used in construction. The ability of the county and local municipalities to develop and enforce energy conserving regulations offers an excellent opportunity to reduce energy demand and its associated costs and impacts.

Municipal Regulations in Lebanon County

Energy Conservation requirements can be addressed in a municipal zoning ordinance and are often coupled with environmental improvement regulations. In Lebanon County, eight municipalities have incorporated requirements for energy conservation into their zoning ordinance, as shown in Table 10-6.

The "standard" requirements that appear in these municipal zoning ordinances are designed, "to allow the installation of renewable energy devices and provide the opportunity for individuals to reduce energy dependence by encouraging the

productive use of solar and wind energy components." [20] Through the ordinance, environmental and energy conserving improvements are required for new subdivisions and developments, new buildings, and for the expansion of buildings or uses except single and two family dwellings, among other development situations. The use of solar, wind, and alternate energy systems is encouraged within the regulations and permitted within any zoning district. There are established regulations guiding the use and placement of such systems.

Table 10-6 Municipalities with Energy Conservation Regulations or Provisions

Municipality	Standard Regulations	Alternative Regulations	No Regulations
Annville-Cleona SD			
Annville		X	
Cleona			X
N. Annville			X
S. Annville			X
Cornwall-Lebanon SD			
Cornwall	X		
Mount Gretna			X
N. Cornwall		X	
N. Lebanon	X		
S. Lebanon	X		
W. Cornwall	X		
ELCO SD			
Heidelberg		X	
Jackson	X		
Millcreek			X
Myerstown			X
Richland			X
Lebanon SD			
Lebanon City		X	
W. Lebanon			X
Northern Lebanon SD			
Bethel			X
Cold Spring			X
E. Hanover	X		
Jonestown			X
Swatara	X		
Union			X
Palmyra Area SD			
N. Londonderry		X	
Palmyra	X		
S. Londonderry		X*	

Source: Lebanon County Planning Department
*Wind farms permitted by conditional use in certain districts; no other energy regulations in place

[20] Lebanon County Planning Department. "Environmental Improvements and Energy Conservation Requirements" excerpt from a municipal zoning ordinance.

Six other municipalities have adopted energy conservation requirements that differ from the "standard", but are similarly intended to promote energy conservation and alternative energy systems. The remaining twelve municipalities have no regulations specifically promoting energy conservation.

Energy Conservation Techniques

Energy efficient development techniques are wide ranging in scope, cost, and effectiveness. Some options are small and easy to use, requiring only minor changes in current development practices. Passive solar orientation is a relatively simple low cost way to reduce the heating and cooling needs of a new building. Other options are more complex to design and implement, such as using mixed-use development to reduce the number and length of automobile trips; thereby, saving energy. As an overview of these techniques, the following describes the range of options that fall into the three categories discussed at the beginning of this profile.

Reducing heating and cooling needs

Passive Solar Heating and Cooling

- Developments can be designed so that buildings are oriented to the sun. This means designing streets to run from east to west, and long axes of buildings to run from east to west.
- It is beneficial to develop south facing slopes first since they are warmer in winter than other slopes.

Deciduous vegetation can be used to shade buildings, parking lots, streets, and other paved areas. This prevents overheating of buildings in the summer and lowers summer air temperatures near the pavement. It also helps control thermal changes in small creeks and streams from superheated runoff from parking areas, as well as absorbing pollutants from the air.

- Developments can be designed to take advantage of cooling breezes. The placement of vegetation and the arrangement of buildings can be used to channel breezes through buildings. Developments, especially in hot climates, can be located in places that receive the strongest breezes, often near hilltops and bodies of water.

Wind Protection

- Windbreaks can be used to protect buildings from winter winds. Windbreaks reduce the infiltration of cold air into buildings. It is best to avoid developing low areas of topography where cold air drains and collects, and avoid developing in locations where the winds are the strongest. Another helpful technique is to arrange buildings so that they protect each other from wind.

Housing Type and Design

Housing that is built with a lower proportion of outside surface area to interior space (e.g. more common wall multi-family housing, more compact development) has less outside surface exposed to the elements. Other techniques could include reducing the size of dwelling units and encouraging housing design innovations that save energy.

- Home heating expenses vary with seasonal temperatures. Property owners can mitigate energy costs with proper weatherization and temperature management practices, e.g. a programmable thermostat and reduced settings when the building is unoccupied.

Energy Audits

- A home energy audit can be the first step to assess how much energy a home consumes, and to evaluate what measures can be taken to make the home more energy efficient. An audit will show problems that may, when corrected, save significant amounts of money over time. The audit can pinpoint where a house is losing energy and determine the efficiency of a home's heating and cooling systems. An audit may also show ways to conserve hot water and electricity. Simple home energy audits can be performed by the homeowner, and more thorough audits can be conducted by professionals. The U.S. Department of Energy offers a do-it-yourself home energy audit on the consumer's guide page of

its website, www.eere.energy.gove/consumer, as well as guidance for preparing and hiring a professional energy auditor.[21]

Options for Reducing Transportation Needs

Development Density

- Increased density development makes more efficient use of the land, and may be best suited near activity centers, mass transportation stops, and in areas with existing sewer, water, and street capacity to handle it. By clustering buildings together, it reduces the length of streets and utilities which means more people can be serviced with less infrastructures; thereby, reducing energy needs. Open space and clustering design principles can be used to shorten distances within developments and make mass transit more cost effective and accessible.

Redevelopment and Infill Development

By encouraging in-fill development and redevelopment, especially within the urban centers of the county, land that was once productive, can be functional again. Plus, it may be more cost-effective to redevelop or in-fill land because it may already be served by streets and utilities.

Integrating Uses

- Land uses can be integrated by combining different kinds of functions within development projects and neighborhoods. Integration can be encouraged by allowing development of multiple use buildings and large urban development complexes with residential, hotel, entertainment, office, and commercial uses under one roof. This can also be accomplished on a small scale, for example, by allowing an apartment building to house a few shops. Also, allowing convenience food stores in residential areas provides an alternative to driving long distances for minor purchases.

Bicycling, Walking, and Mass Transit

By providing facilities for bicycling and walking, more people may be encouraged to participate in these activities. Pathways and parking facilities, landscaping, and other amenities in projects can encourage biking and walking. Mass transit use could be encouraged by locating highest density development near mass transit lines and providing amenities and facilities to encourage use. Development should include pathways or sidewalks to connect the development to transit, and shelters should be provided at all timed transit stops.

Efficient Traffic Flow

Street systems should be designed to reduce overall lengths and to facilitate traffic flow. Traffic flow can also be improved by reducing the number of intersections and making efficient connections with the existing street system. Refer to Background Study #8, the Transportation Profile, and the Transportation Plan for additional discussion of the county's transportation network.

Implementing Alternative Energy Sources and Systems

This strategy includes alternative energy sources such as solar, wind, geothermal, and encouraging and promoting the more efficient generation, conversion, and distribution of the resources. The ease with which many of these systems can be used depends in part on how land is developed. The practicality of using solar energy is affected by the amount and location of shadows that are cast by buildings and landscaping. Wind powered energy sources require a steady wind velocity to achieve its production expectations. Initial construction of an individual geothermal system requires a large upfront cost that, theoretically, should be recouped over the life of the system. Integrating alternative energy sources into the mainstream of development and our daily lives requires education about the associated benefits.

[21] U.S. Department of Energy, Consumer's Guide to Energy Efficiency and Renewable Energy, www.eere.energy.gov/consumer/.

Energy Conservation Programs and Initiatives

Commuter Services of South Central Pennsylvania

Commuter Services of South Central Pennsylvania helps commuters and employers in Adams, Cumberland, Dauphin, Lancaster, Lebanon, Perry, and York counties find a better way to get to and from work through free services. The organization offers commuter service options to commuters and to employers, as well as programs to improve community. Commuter Services has recently begun collecting commuter travel data from regional transit agencies. The data will be available in the future, perhaps as early as 2007. Anecdotally, Lancaster County's Red Rose Transit reported a 4%-5% increase in ridership per-month, since early 2006, as reported by WITF in June 2006.[22]

Lebanon County Housing and Redevelopment Authority

The Housing Rehab Program provides up to $25,000 to repair single family owner occupied housing in Lebanon City or County. In addition, up to $10,000 may be available to reduce lead paint hazards. Assistance to homeowners is in the form of grants, deferred payment loans and low interest loans. Applicant's household income may not exceed 80% of median income. Commonly repaired items include roofs, windows, doors, siding, plumbing, heating and electrical systems. The repair of these items directly ties back to energy conservation. Leaky doors and windows which are replaced have a direct impact on heating and cooling costs.

The Pennsylvania Energy Development Authority

The Pennsylvania Energy Development Authority (PEDA) is an independent public financing authority that was created in 1982 by the Pennsylvania Energy Development Authority and Emergency Powers Act and was revitalized by Governor Rendell through an April 8, 2004 Executive Order. The Authority's mission is to finance clean, advanced energy projects in Pennsylvania. Pennsylvania projects that could potentially qualify for funding from the Authority include solar energy, wind, low-impact hydropower, geothermal, biomass, landfill gas, fuel cells, IGCC, waste coal, coal-mine methane and demand management measures. The Authority presently can award grants, loans and loan guarantees and can develop a variety of other types of funding programs. Tax-exempt and taxable bond financing for energy projects also are available through PEDA's partnership with the Pennsylvania Economic Development Financing Authority (PEDFA).

Long Range Transportation Plan

The Long Range Transportation Plan (LRTP) focuses on safety, maintenance, preservation and operational improvements. Many of these improvements have energy conservation components. The Plan recommends several non-motorized transportation projects, including short-term and long-term trail projects, Safe Routes to School projects, and partnership with the Susquehanna Regional Transportation Partnership to reduce single-occupancy vehicle (SOV) dependence in the region. Additionally, the LRTP recommended several transportation policies in conjunction with the Lebanon County Comprehensive plan, such as providing a variety of transportation choices over time, promoting walkable communities, and coordinating land use and transportation decisions in planning and plan review processes.

[22] Midstate transit agencies to observe Dump the Pump Day, 06/07/2006.

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