

Chapter 10 - Energy Conservation



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Energy Conservation

A. Introduction

As the population grows, and with it increased energy dependence, our non-renewable energy resources are being exhausted at an increasing rate. Energy conservation needs to be given a higher priority than ever before. How we use our resources, and how technology can lessen the negative effects of energy production, will have a profound impact on future generations. As business, industry and the public become more aware of energy concerns, changes will have to be made in land uses, development types, and transportation technologies.

Energy conservation has increasingly become a topic of discussion throughout Berks County. Many organizations are focusing training and education resources on energy conservation techniques and practices. As non-renewable sources of energy are being depleted, the costs associated with production and manufacturing of energy related resources is growing. More people are looking for ways to become educated and informed about other options available to help reduce energy associated costs. As the public becomes more aware of energy conservation techniques and practices, more people will want to incorporate and use them. This will require municipalities, the private sector, and residents to become more active in promoting and permitting energy conservation techniques throughout Berks County.

B. Wind, Solar, and Geothermal Energy

Harnessing the kinetic energy from wind movement, light energy from the sun, and heat energy from inside the earth can save on energy production and reduce the amount of non-renewable resources needed to create energy. Using these forms of energy reduces the amount of pollution created from the burning of non-renewable resources and fossil fuels.

Wind turbines, also referred to as windmills, convert wind energy into electricity. Wind passing over the turbine blades causes the blades to move. The blades are connected to a shaft that spins when the blades move. The shaft is connected to a generator which converts the blade motion into electric energy. Many larger wind turbines are used for commercial wind farms. These farms contain multiple wind turbines and connect to an electrical grid to provide power. Wind farms can create between a minimum of 100 kilowatts to several megawatts of electricity. The smaller wind turbine systems that generate less than 100 kilowatts are generally used for individual needs.

Photovoltaic systems convert light energy from the sun into electricity. These systems consist of cells which are generally composed of crystalline silicon. Because silicon has reflective properties, a thin anti-reflective coating is applied to the top of the cell. Silicon, combined with boron and phosphorus, create a type of conductor. When light energy strikes the cell, it causes the electrons in the conductor material to move in one direction which creates electricity. The cell by itself does not create large amounts of electricity. Multiple cells are usually put together to form a module, otherwise known as a solar panel. The solar panel consists of several encased solar cells and has a covering, which is usually glass, that allows light to pass through while remaining weatherproof. Multiple solar panels are generally used to generate enough power for a home or business. Groups of solar panels are connected for form arrays. Solar fields are essentially arrays that connect to an energy suppliers' power grid. Excess energy generated from

the solar field that is not used can be sold back to the supplier company to provide additional power to the power grid.

Geothermal energy converts the heat energy found inside the earth into heating and cooling for homes and businesses. Below the surface of the earth, the temperature remains a constant 50 to 60 degrees Fahrenheit throughout the entire year. A series of pipes is buried underground at a point where the temperature remains constant. The pipes are filled with fluid which connects to a compressor and an exchange system. In the summer, the fluid carries the heat from the house into the pipes in the ground where it cools. When it comes back up to the exchange system the cooler fluid helps cool the house. In the winter, the fluid warms slightly and is carried up to the exchange system to help warm the house.

C. Incentives

The separation of land uses that require more driving, the underuse of public transportation, and the increase on energy dependent devices all waste energy and promote pollution. Incentives help encourage the public to transition from energy demanding habits to energy conserving habits.

The U.S. Department of Energy offers tax credits and rebates up to a certain amount for specific energy-saving products as funding is available. Tax credits can be offered for various items such as biomass stoves, non-solar water heaters, and roofing. Rebates can be offered for certain appliances that reduce energy consumption. To obtain many of the incentives, the products are generally required to be considered ENERGY STAR qualified. ENERGY STAR is a labeling program, created jointly by the U.S. Environmental Protection Agency and the U.S. Department of Energy, that identifies appliances, various electronic devices, and much more as being considered an energy conserving product. Generally, those products rated as an ENERGY STAR product, consume less energy. Use of ENERGY STAR products can save money for the consumer as well as contribute to conserving energy.

Many energy generating companies are providing incentives for their consumers as funding is available. Some companies provide programs that can help identify areas in a home where energy is being lost or wasted and offer solutions to the problems. There can also be incentives, such as rebates, for the purchase of energy efficient light bulbs, or CFL (Compact Fluorescent Light) bulbs, at participating retailers. Many companies offer rebates on larger appliances that conserve water and energy use such as ENERGY STAR qualified washers and refrigerators.

Using energy efficient vehicles can reduce the amount of non-renewable resources being consumed. Many newer vehicles are being created to address the consumption of gas and alternative forms of energy. Several vehicle manufacturers are developing hybrid vehicles that operate using gasoline and another form of energy, usually electric. There are even vehicles being developed that operate using only electricity from charged batteries. Incentives may develop, if funding becomes available, to support the transition from older vehicles that are not energy efficient to newer vehicles that operate by other means than just gasoline power. As people increasingly use hybrid or electric vehicles, it will become more important to provide the necessary infrastructure to accommodate the change.

D. Building Considerations

This Comprehensive Plan uses smart growth principles to guide the created policies. Smart growth principles also aid in establishing groundwork for energy conservation in Berks County. It reduces infrastructure costs and promotes energy conservation through its ten principles. Consideration for the type of materials and the way buildings/structures are constructed can also greatly reduce dependence on energy. According to the EPA, “Smart growth is development that serves the economy, the community, and the environment by supporting healthy communities while creating economic development and jobs.” Green building corresponds well to this concept as it promotes energy and water conservation, preserves open spaces through brownfield redevelopment, and has access to public transportation.

Green, sometimes referred to as sustainable, building involves using practices and techniques through all the phases of the development process that minimize and reduce negative environmental impact. The development process includes everything from siting and design, to maintenance, renovation, and demolition. Green buildings reduce negative impacts on human health, minimize air pollution generated during all phases of development, and minimize waste. In addition, they reduce negative impacts by efficiently using energy, water, and other resources.

In 2000, the U.S. Green Building Council, a non-profit organization, developed the Leadership in Energy and Environmental Design (LEED) building certification system. The system rates buildings based on key elements of environmental and human health. Some of these elements include sustainable site design, water efficiency, energy efficiency, materials selection, and indoor environmental quality. A building that meets the minimum requirements can be assessed. After an assessment, a building may be certified based on the number of points received. The projected outcome of a building being LEED certified is that the building will have lower operating costs, increased asset value, reduce waste to landfills, conserve energy and water, reduce harmful greenhouse gas emissions, and be healthier and safer for occupants.

E. Examples of Energy Conservation in Berks County

In 2010, Berks County educated its employees through the Berks Energy Expo. Northeast Energy Services Company, Inc. (NORESCO) informed employees about conservation techniques they could do to help the County conserve energy. Simple things, such as turning lights off in restrooms and shutting down computers at night all help reduce energy consumption. The infrastructure of many County facilities has been improved by weatherizing them through sealing cracks along windows and joints to minimize the amount of unwanted air infiltration. The County also has replaced many of the older lighting fixtures with newer, more energy efficient fixtures. As technology progresses and financing becomes available, the County will continue to upgrade its facilities to make them more energy efficient.

The Berks County Community Foundation building, located at 3rd and Court Streets in Reading, is the first building in Berks County to receive LEED certification. One feature of the building is a 5,000 gallon cistern located in the basement that stores rainwater that is used for flushing toilets. The building used recycled materials in its construction as well. Stairs were made from boards that were removed from boardwalks in Coney Island, N.Y. and countertops were made from recycled glass chips and shredded U.S. currency. The building faces south to allow more

natural daylight to be used for lighting while trees along the front are a source of shading and cooling for the building.

Energy conservation is being noticed as a visible change across the landscape of Berks County. Many residents and businesses are incorporating solar panels and windmills on their properties to help reduce their own energy costs. Solar panels for individual use can be seen in Bern Township, Ontelaunee Township, and Laureldale Borough. Solar fields can be seen in Caernarvon Township and Ontelaunee Township. Windmills can be seen outside of Shoemakersville and in Tilden Township. Constructed by Mid-Atlantic Renewable Energy Association, the Kempton Fairgrounds has one of the first windmills erected in Berks County. Many municipalities have updated their ordinances to include provisions for these energy conservation structures. However, several municipalities still need to consider incorporating policies to address these types of structures.

School districts are beginning to incorporate energy conservation infrastructure into new and existing structures. The Reading School District incorporated a green roof into the new design of its Millmont Elementary and 6th Grade Magnet School in 2008. The green roof can help keep the building cooler in the summer by absorbing some of the heat, and keep the building warmer in the winter by acting as an insulator and retaining heat. The Conrad Weiser School District is adding a geothermal system to its existing West Elementary School. By installing and using a geothermal system in the facility, the system will pay for itself over time due to the lesser costs associated with its operation while reducing the carbon footprint for this structure.

In 2009, Berks Area Regional Transportation Authority (BARTA) added five hybrid buses to its fleet of public transportation vehicles. And, in 2010, BARTA added four more hybrid buses to its fleet. The buses run on a combination of diesel and electric power. These buses use less fuel and do not put as many pollutants into the air because of the ability for the bus to run on either diesel fuel or electric power.

Energy Conservation Policies

Energy Conservation Goal:

To conserve energy through land use and transportation planning methods and education.

a. Energy Awareness

Goal:

To promote education on energy conservation techniques and practices.

Policies:

- (1) The County will encourage public and private organizations to participate in educational programs that promote the benefits of energy-saving techniques and technologies.
- (2) The County will increase the awareness of employees on the benefits of energy conservation practices in County-owned buildings and facilities.
- (3) The County will support state and federal programs and incentives for energy conservation.
- (4) The County will promote the environmental and energy-saving benefits of recycling materials and water conservation.
- (5) The County will promote weatherization programs for all types of buildings.

b. Involvement

Goal:

To promote the wise use and conservation of all energy resources.

Policies:

- (1) The County will promote renewable energy sources such as geothermal, wind, and solar.
- (2) The County will encourage municipalities to incorporate energy conservation regulations into their municipal ordinances.
- (3) The County will encourage residents to use energy efficient light bulbs, appliances, and devices.
- (4) The County will encourage municipalities and developers to incorporate and provide infrastructure for energy efficient vehicles through ordinance and code updates.

c. Building Conservation

Goal:

To incorporate into the development process new energy-efficient technologies while, at the same time, using site and architectural designs and location choices that take advantage of existing energy and transportation resources.

Policies:

- (1) The County will promote energy-saving upgrades to existing and new structures where appropriate.
- (2) The County will continue to incorporate energy conservation techniques throughout County-owned facilities.
- (3) The County will encourage and promote LEED standards in new and existing structures.
- (4) The County will encourage subdivision designs that maximize passive solar energy, and incorporate landscaping techniques that reduce heating and cooling requirements.

- (5) The County encourages green development and structures.