

Centre County Planning Opportunities

Energy Conservation

Centre County Comprehensive Plan — Phase II Implementation Strategies

Introduction

In 2003, the Centre County Board of Commissioners adopted a County-wide Comprehensive Plan which included background studies, inventories of existing conditions, goals and recommendations. These recommendations, revised and updated, continue to serve as a vision and a general direction for policy and community improvement. Those specific to energy conservation will be discussed here along with implementation strategies to achieve the recommendations. For more detailed background information please refer to the 2003 Comprehensive Plan available on the Centre County Planning and Community Development web-page:

<http://www.co.centre.pa.us/planning/compplan/default.asp#county>

Centre County seeks to balance growth, protection of resources, investment in compatible new building development, and incentives for sustainable development. Much of this effort includes stewardship, community outreach and expert professional service.



Small wind turbines like erected at the DEP Moshannon Office, can help offset electricity costs to the property.

County-wide Planning Goals Adopted 2003

#1 — Identify, preserve, enhance and monitor agricultural resources.

#2 — Identify, preserve, and monitor environmental and natural resources.

#3 — Preserve historic and cultural resources.

#4 — Ensure decent, safe, sanitary and affordable housing in suitable living surroundings, compatible with the environment for all individuals.

#5 — Appropriately locate and maintain existing and proposed community facilities, utilities, and services for all residents.

#6 — Identify and promote economic development initiatives to maintain and grow a diverse economic base in each of the County's planning regions.

The Keystone Principles

In 2005, Pennsylvania adopted the "Keystone Principles for Growth, Investment and Resource Conservation", a set of principles that have focused Pennsylvania on reinvestment and reuse of its assets.

Initially intended for state agencies, these principles are becoming embraced by local governments as a tool to guide local decisions and have become adopted into county comprehensive plans.

- Redevelop first
- Provide efficient infrastructure
- Concentrate development
- Increase job opportunities
- Foster sustainable businesses
- Restore and enhance the environment
- Enhance recreational and heritage resources
- Expand housing opportunities
- Plan regionally and implement locally
- Be fair

This plan update recommends county-wide adoption of these principles.

Current Trends and Considerations:

Energy conservation has been a frequently discussed topic in recent years and has increased in importance with the rising heating and cooling costs coupled with population forecasts. The Pennsylvania State Data Center 2030 population forecasts that the state population will increase by 7.4% and Centre County's population will increase 22.4%. The practice of conserving energy should not only be a response to help overcome high prices, but to ensure that the growing population does not compromise the planet. A reduction in the consumption of fossil fuels, like oil, could lead to a healthier lifestyle as well as a healthier environment. The need for energy conservation has created a variety of programs that are already in place and new programs instituted by all levels of government are an effort to achieve a robust economy, a cleaner environment and energy independence from other countries.

Statewide initiatives have placed Pennsylvania as one of the leaders in energy conservation practices. Act 213 of 2004, the [Alternative Energy Portfolio Standards Act](#), signed into law by Governor Edward G. Rendell on November 30, 2004, requires that 18 percent of the electricity sold to retail customers in Pennsylvania come from renewable and advanced energy sources within 15 years. Act 213 made Pennsylvania the first state to include fossil fuels in renewable portfolio standards in order to make fossil fuel consumption a clean

form of energy. Utility companies comply with Act 213 by purchasing Alternative Energy Credits (AECs) from qualified alternative energy resource facilities. The type and percentage of alternative energy purchased (identified in two tier categories) determines the amount of credits received by the utility company.

A more recent development in Pennsylvania is Act 129, which was signed into law October 15, 2008. Act 129 is designed to give the Pennsylvania Utility Commission (PUC) oversight into reducing overall energy consumption and demand. This act will be implemented in phases and places new requirements on electric distribution companies (EDC) as well as amending the Public Utility Code. The first phase will be to adopt an energy efficiency and conservation (EE&C) program by Jan. 15, 2009. The subsequent phases are designed to streamline the EDCs in order to operate in a more energy efficient manner.

Accordingly, Centre County will need to contribute to Pennsylvania's energy goals by setting energy goals of its own. Currently, there are programs in Centre County that aid in energy conservation. The expansion of these programs along with new programs that lead to energy conservation are vital to future generations.

Mass Transportation



A CATA bus in downtown State College

Mass transportation is a major contributor to energy conservation because it allows large quantities of people to be transported in one trip. According to the American Public Transportation Association (APTA), multiple-occupancy vehicles use less energy than automobiles on a passenger-mile basis. Centre County is fortunate to have mass transportation available to its residents through the Centre Area Transportation Authority (CATA).

CATA promotes mass transit by providing easily accessible public transportation to the most populated regions of Centre County. In addition to Centre County municipalities, Penn State also utilizes CATA's bus services. CATA's Loop and Link services facilitate transit use on and around University Park

campus, which eliminates thousands of car trips on campus while school is in session.

The Centre Commute Program, a carpooling program facilitated by CATA helps people form carpools and vanpools throughout Centre County and its 10-county surrounding region. CATA is also pursuing the expansion of transportation services to include Park and Ride stations, which allow commuters and other people wishing to travel into employment centers to leave their personal vehicles in a parking lot and transfer to a bus. Such facilities have been proposed in the Penns Valley and Moshannon Valley Region. Recognizing an increasing need for commuter services for people living outside of Centre County, CATA is collaborating with Area Trans-

portation Authority (ATA) to provide commuter bus service from Clearfield to State College and Altoona-based AmTran is upgrading service between Altoona and State College.

CATA operates a fleet using compressed natural gas, which is safer for the environment than gasoline, diesel, or propane fuel. Recently, CATA received a Clean Fuels Grant from the Federal Transit Administration (FTA), which will allow the exploration of natural gas/electric hybrid technology in busses.

Recycling

Recycling is an important for energy conservation. Recycling is the reuse of materials that have already gone through processing. A variety of goods can be recycled from plastics, glass, and aluminum from home use; to construction materials from residential, commercial, and industrial use. According to the Pennsylvania Department of Environmental Protection (DEP), recycling in Pennsylvania in 2004 saved over 66 trillion BTUs of energy, enough to power 643,000 houses.

The Centre County Solid Waste Authority (CCSWA) offers recycling services to Centre County residents. CCSWA also provides education on the proper disposal of yard wastes through composting or leaving grass clippings on the lawn rather than collection and disposal, the proper disposal of tires and other automotive wastes, curbside recycling and drop off stations, removal of hazardous wastes and household appliances, as well as disposal of household appliances and scrap metal.

In addition to recycling, the CCSWA understands the need for energy efficiency and has purchased biodiesel compatible vehicles, is pursuing converting from natural gas heating to a geothermal heat pump and is looking at the possibility of trading carbon credits. In addition to CCSWA, organizations like Habitat for Humanity ReStore offer locations to purchase and recycle new and used building materials.

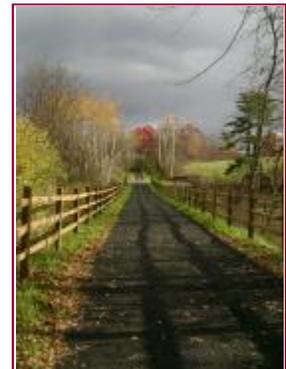
Ag Land Preservation and Greenways

The protection and preservation of farmland is inadvertently beneficial for energy conservation. Centre County participates in Pennsylvania's Agricultural Land Preservation Program and also has a private, non-profit Farmland Trust. Through the protection of farmland, air quality is enhanced from crops that use carbon dioxide, a greenhouse gas, by photosynthesis and the release of oxygen into the air. The preservation of farms also helps eliminate the potential of sprawl. Large dairy farms have the potential to use manure digesters to generate methane gas, which

in turn can be used to produce electricity. In addition, preserving farms in Centre County provides an available stock of locally grown foods to residents and retailers. Purchasing locally grown foods saves energy by reducing costs and emissions associated with shipping foods over long distances.

Greenway Plans are a tool that agencies can use to identify recreation and conservation corridors. Greenways identify environmentally sensitive areas such as wetlands and ridge tops in order to protect them from develop-

ment. Much like the Ag Land Preservation program that protects farms; the protection of open space through greenways allows plants to reduce carbon dioxide. Greenway plans also identify land or water corridors that can be used as alternative routes of transportation for non-motorized vehicles, such as hiking, biking, or boating. Currently, there are two Greenway Plans in Centre County, the Centre County Recreation and Greenway Plan and the Nittany and Bald Eagle Greenway Plan.



A completed section of the Bellefonte Central Rail Trail—a possible bicycle route from Bellefonte to State College once completed.

The Pennsylvania State University

Centre County is fortunate to have a world-class research institution within its borders. Universities like Penn State are one of the catalysts for energy conservation research. Penn State colleges like the College of Agricultural Science and the College of Earth and Mineral Sciences receive funding from Federal

and non Federal entities to provide research in areas vital to the livability of our planet such as global warming, alternative fuels, and energy systems.

In addition to academic research, Penn State also provides community outreach opportunities to give others

the opportunity to learn about cutting edge technology. Penn State has facilitated large-scale outreach programs in the areas such as wind energy, natural gas well drilling, energy conservation, and green energy design.

Energy Conservation Tools and Techniques



Source: U.S. DOE

Households use about one-fifth of the total energy consumed in the United States each year. Much of this energy is not put to use. Heat pours out of homes through drafty doors and windows, and through ceilings and walls that aren't insulated. Some appliances use energy 24 hours a day, even when they are turned off.

In the United States, buildings account for:

- 39% of total energy use
- 12% of the total water consumption
- 68% of total electricity consumption
- 38% of the carbon dioxide emissions

Source: U.S. EPA, 2008

Reductions in energy consumption are necessary in order to provide a positive impact on the natural environment, human health, and the economy. The built environment is accountable for a large percentage of total energy consumption and is an area prime for energy saving techniques. These techniques are referred to as green building or sustainable construction. Green building describes a technique used to design and build buildings using a method and materials that promote energy conservation and environmental sensitivity. Green construction can be implemented with new construction or be utilized with existing buildings in a process referred to as energy conservation retrofitting.

Green building in new construction should incorporate sustainable materials from renewable resources. Sustainable materials include reused or recycled, durable materials that do not need to be replaced as often and create healthy, indoor environments with minimal pollutants. Some examples of these products include Forest Stewardship Council-certified wood, native plants for reduced watering, and high-efficiency windows. The building's location, envelope with proper insulation, intended use, hours of operation, occupancy levels, and equipment loads in determining heating, ventilating, and air conditioning (HVAC) requirements are also very important in order to ensure that the completed building is as energy efficient as possible. Building siting should be oriented in such a way that outdoor elements are utilized

to their fullest potential including sun, for natural lighting, and shade for natural cooling.

The greenest form of construction occurs when new construction does not occur, which is defined as adaptive reuse. Adaptive reuse encourages the use of existing buildings for development as opposed to the clearing of undeveloped land. However, adaptive reuse is not always feasible, in which case there are actions the developer can take to become a steward of the site.

Homeowners and businesses in existing buildings can reduce their energy costs through energy retrofitting and weatherization. In retrofitting, there are a variety of improvements that can be made to the structure to improve energy efficiency. Retrofitting includes the installation of energy efficient appliances, the replacement of incandescent light bulbs with compact fluorescent bulbs, proper sealing of the building envelope and/or weatherization to prevent air leaks, and proper maintenance or replacement of HVAC equipment.

Weatherization includes a wide variety of energy efficiency measures that encompass the building envelope, its heating and cooling systems, its electrical system, and electricity consuming appliances. According to the US Department of Energy (USDOE), on average, weatherization reduces heating bills by 32% and overall energy bills by \$358 per year at current prices. Pennsylvania also offers assistance to low to moderate income

Green Construction

homeowners for weatherization through the PA Department of Community and Economic Development (DCED). Centre County residents can receive assistance locally through Central Pennsylvania Community Action (CPCA). In the past 10 years, CPCA has assisted 280 homes with energy efficiency through weatherization with improvements totaling \$542,563.

Leadership in Energy and Environmental Design (LEED) is a Green Building Rating System that utilizes third party certification and is the nationally accepted benchmark for the design, construction and operation of high performance "green" buildings. LEED promotes a whole-building approach to sustainability in new construction or existing buildings by recognizing performance in five key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality. LEED consists of a five-tiered rating system that ranges from Certified, Bronze, Silver, Gold, and Platinum. There are currently four LEED recognized projects in Centre County:

Certified: Penn State Ballpark, Medlar Field – University Park

Silver: School of Forest Research Building – University Park

Gold: Geisinger-Gray's Woods—State College, PA-DEP Moshannon District Office - Philipsburg, School of Architecture and Landscape – University Park

Established Growth Boundaries

Patterns of development can affect the manner in which people operate. The way a community is organized can either cause a surplus in energy usage or be conservative in energy consumption. While established communities may feel little can be done to control the way development occurs, there are techniques available to facilitate a more sustainable future.

A Growth Boundary is a tool that is implemented by a local government in order to protect farm land, open spaces, and environmentally sensitive areas from threats like

sprawl. Sprawl is characterized by low density residential development, automobile oriented transportation systems, vanishing farmland and open spaces, and commercial strip development. Sprawling patterns of growth unnecessarily destroy green space and farmland, pollute rivers, streams and other waterways and force us to be overly dependent on vehicles, which in turn create air pollution. By setting growth boundaries, agencies can ensure proper growth management and prevent sprawl by regulating where development can occur.

In addition to growth boundaries, planners can prevent sprawl through design regulations and downtown revitalization techniques. Compact building design (or conservation subdivision design), mixed use developments, and walkable communities.

Pennsylvania downtowns are filled with empty store fronts as a result of sprawl. By supporting and participating in programs, such as the Main Street Program, communities can return businesses into their downtowns, which are designed for mixed use with storefronts on the first floor

and residential/office use in the higher floors.

In order to reduce air pollution, growth should be regulated to the main population centers and transportation corridors in mixed use developments. These growth centers are more sustainable because they reduce travel time to places of employment, reduce the dependence on the automobile because of the close proximity to amenities, and encourage non-motorized transportation because of ease of travel. Compact developments in turn reduce sprawl and keep our open spaces open.

Walkable Communities

Walkable communities foster energy conservation by reducing the dependency on motorized transportation. In order to achieve a walkable community, there are policies that exist to help communities create transportation routes for all modes of travel. One technique used to design a walkable community policy is called *Complete Streets*. A complete street is a street that works for motorists, for bus riders, for bicyclists, and for pedestrians, including people with disabilities (American Planning Association, 2005).

To aid the complete streets movement, the U.S. Department of Transportation (USDOT) implemented Design Guidance Accommodating Bicycle and Pedestrian Travel: A Recommended Approach policy statement that integrates bicycling and walking into transportation infrastructure. Their goal is that public agencies, professional associations, advocacy groups, and others would adopt this approach as

a way of committing themselves to designing complete streets.

One method to achieve a complete street is to design from the right-of-way limits to the center of the road, rather than the centerline to the right-of-way. Designing the roadway from the right-of-way limits in, allows for the incorporation of sidewalks, paved shoulder or bike lane and then allocating the remaining area for motorized transportation. Greenways foster walkable communities by planning bike lanes along major transportation routes.

Walkable communities allow people to live and work in areas where they can travel safely whether on foot, bicycle, or car. Through proper planning and by incorporating walkable community techniques, harmful emissions from automobiles and sprawl can be reduced by creating communities in which people want to live.



BEFORE: Wide lanes for automobiles encourage speeding and are not friendly towards pedestrians or bicyclists.



AFTER: Narrower lanes allow for traffic calming and the addition of a bicycle lane and still allow for automobile parking.

Source: Walk and Bike for Life, Inc., 2008

Transit-Oriented Development



Providing bicycle facilities, like this photo taken in Amsterdam, is an example of what can be accomplished in a TOD

Mass transportation is an important link between walkable communities and energy conservation. In fact, developers applying to be LEED certified must provide access to mass transportation by providing a bus stop to residents. Municipalities can provide incentives for developers to incorporate energy conservation through mass transportation. Bellefonte Borough reduced parking requirements for business district apartment buildings if the property owner/landlord provided bus passes to its tenants. This was accomplished by revising the park-

ing requirements established by their zoning ordinance. Other governments have investigated the idea of the reactivation of abandoned rail lines in order to reduce commuter traffic. Penn State offers the incentive of convenience for university employees who utilize CATA rather than park on campus by paying for the bus pass with payroll deduction rather than an upfront cost from CATA.

While providing incentives for mass transportation use may work in developed communities, new construction can be

designed so that mass transportation is the primary means of travel. Transit-oriented development (TOD) incorporates mass transportation, non-motorized transportation, a reduction in parking, increased building density, and mixed-use development. An environmental benefit to TOD includes reduced traffic due to the increase of transportation amenities other than personal vehicles, which in turn, will reduce the average cost of car ownership per year through reduced fuel consumption.

Geothermal Energy

“By implementing conservation measures and generating more of our energy needs from clean energy sources, we will reduce air pollution emissions that lead to climate change and smog.”

- acting PA
Environmental Protection
Secretary John Hanger.

Geothermal energy is heat or electricity that is generated from steam or hot water within the earth. **Geothermal energy is a renewable source of energy because the water is replenished by rainfall and the heat is continuously produced inside the earth.** The USDOE characterized geothermal energy in three uses: Direct Use and District Heating Systems, electricity generation, and geothermal heat pumps.

Direct Use is the most basic use of geothermal energy. Direct Use occurs when hot water from natural mineral springs is used for cooking, bathing, or heating. District Heating Systems access the hot water near the earth's surface and pipe the water directly into buildings or industries for heat.

Electricity is generated at geothermal power plants. Geothermal power plants generate

energy from hydrothermal resources from dry steam wells or hot water wells by drilling wells one to two miles deep and piping the steam or water to the surface. The geothermal reservoirs are tapped in areas with water temperatures around 400 degrees Fahrenheit, which in the U.S. are found along the west coast.

According to the EPA, geothermal heat pumps are the most energy-efficient, environmentally clean, and cost-effective systems for temperature control. Geothermal heat pumps operate for homes or businesses using the constant temperatures of the earth located ten feet below the surface. The ground at this depth is a constant 50 to 60 degrees Fahrenheit, which is often warmer or cooler than the air temperature. The geothermal heat pump operates on either a one or two loop

system that contains a refrigerant. This refrigerant is pumped into the building after exchanging heat with the ground to keep them warm in the winter and cool in the summer.

Currently, there are no regulations on the ground loop construction and installation of geothermal heat pumps. The lack of regulations results in poorly installed pumps which can lead to groundwater contamination and irresponsible use of ground water resources.

Wind Energy

Electricity generated from wind is clean, non-polluting, and readily available. However, the turbines used to collect the energy from wind can cause distress to the environmental community. Careful site selection and feasibility studies for wind farms in Centre County must be conducted due to the impacts a wind farm could have on wildlife, proximity to residential areas, viewsheds, and stormwater runoff.

On April 18, 2007, the Pennsylvania Game Commission (PGC) signed the PA Wind and Wildlife Collaborative with public and private entities to minimize, and potentially mitigate any adverse impacts the development of wind energy may have on the state's wildlife resources. In order to minimize impacts to

wildlife species and their habitats caused by wind energy facilities, state agencies have taken steps to ensure the consideration of the protection of wildlife by wind energy developers. Such collaboration is also important on the local level when a wind energy facility plan is presented.

There are two classifications of wind energy facilities: large scale and small scale wind. Large scale require wind speeds of 300 Watts per square meter (W/ m²) or greater and typically, less than one acre is removed from normal use for each 50 acres of wind resource captured. Large scale wind farms create energy that is fed into the national electric power transmission network.

Small scale wind facilities are generally for residential or commercial use and operate on either a horizontal axis or vertical axis. Most wind turbines are the horizontal-axis propeller type systems. Vertical-axis systems, such as the egg-beater like Darrieus and S-rotor type Savonius type systems, have proven to be more expensive. A horizontal-axis wind turbine consists of a rotor, a generator, a mainframe, and, usually, a tail. Small scale operate at wind speeds 200 W/ m² or greater and are installed on top of a tower at least 30 feet high, at least 300 feet away from obstacles.

According to the National Renewable Energy Laboratory (NREL), ridge tops in Centre County have sufficient winds for large scale wind

farm development. An analysis of the wind class data for Centre County identified a few areas suitable for large scale wind farms, and more areas for small scale wind farms. All of the areas with wind speed high enough for large scale wind farms are located on ridge tops. Ridge tops in Centre County are listed as geographical features to be protected and important as a natural viewshed. As a result, plans for large scale wind farms in Centre County must be reviewed carefully. Development of any wind farm should not be completed without the consideration of placement, particularly in the vicinity of residential areas and areas of large, contiguous tracks of wildlife habitat.

Solar Energy



This home is an example of energy conservation using wind and solar energy.

Source: American Wind Energy Association, 2008

Solar energy or energy from the sun, is free, clean, and readily available. Energy from the sun can be captured in two ways: passively and actively. Passive solar energy occurs when a building is sited to take full advantage of the sun's rays as a thermal collector. Passive solar building design uses a structure's windows, walls, and floors to collect, store, and distribute the sun's heat in the winter and reject solar heat in the summer. It can also maximize the use of sunlight for interior illumination (U.S. DOE, 2008).

Active solar energy occurs when a thermal component is added to the structure. The thermal energy that results can be used for heating homes and businesses or the heat can be converted into mechanical energy to produce electricity using photovoltaic (PV) cells to concentrate the solar power. PV or solar cells

can be mounted in a variety of sizes and applications are currently being integrated into building materials such as PV tiles, which replace conventional roofing shingles.

In Bucks County, Pennsylvania, a 3-megawatt (MW) solar energy system is currently among the largest in the country. This solar electricity generation plant, Exelon-EPURON Solar Center features 16,500 solar panels on a 16.5-acre tract adjacent to a landfill and will produce enough electricity to power the equivalent of 400 homes.

The Solar Center is an example of how state government, public utilities and private investors are supporting the large scale development of clean energy in the United States in a manner that has been very successful in Europe. Recognizing the importance of minimizing the amount of air pollution associ-

ated with electricity production, Exelon made an important financial commitment to the project through a 20-year power purchase agreement for the energy produced.

The main drawback of solar energy is the high initial cost. Solar energy is currently one of the more expensive forms of energy generation, but programs like the USDOE's Solar America Initiative invests millions of dollars per year in order to make solar energy cost competitive with conventional grid electricity by 2015. Solar rebates and tax credits are available through the U.S. government. Residential solar system owners are offered a one-time federal tax credit, capped at \$2,000, after the first year of operation. Commercial solar system owners receive a 30% federal tax credit after the first year.

Biomass Energy

Biofuels are any fuel that is derived from organic material called biomass made from plants or animals. The energy in biomass can be accessed directly from the organic source or by turning the raw materials of the feedstock, such as starch and cellulose, into a usable form. Biofuels differ from fossil fuels in that biofuels are derived from recent biological material. Fossil fuels are created from organic material that existed millions of years ago. Biofuels are also considered a renewable energy source unlike fossil fuels because the crop and animal products used to produce biofuels are renewed or replanted on an annual or biennial basis. **Transportation fuels are made from biomass through biochemical or thermochemical processes. These include ethanol, methanol, biodiesel, biocrude, and methane.**

Ethanol, the most widely used biofuel today, is a clear, colorless liquid, also known as ethyl alcohol or grain alcohol that is produced from starch- and sugar-based feedstocks such as corn, grain, sugar cane, or cellulosic feedstocks. Ethanol is found to work well in internal combustion engines as a high-octane fuel and when blended with gasoline, corn

ethanol is found to reduce air pollution by up to 52% and cellulosic ethanol by up to 86% (U.S. DOE, 2008). The first corn ethanol plant to be built in Pennsylvania is currently underway. BioEnergy LLC is building what is expected to be the largest ethanol plant in the nation in Clearfield County.

While ethanol is shown to be safer for the environment than traditional fuel sources, the crops grown to produce the ethanol may be detrimental to water quality due to high amounts of fertilizer needed to grow the plants and potential for higher amounts of nitrogen runoff.

Cellulosic ethanol, on the other hand, can be safer for the environment than corn ethanol because cellulosic ethanol sources require less or no cultivation. Cellulosic ethanol can be produced from perennial grasses, the debris left after timber is cut, agricultural crop residues, all of which are readily available in Centre County. These available resources, and the proximity of Centre County to east coast energy markets make cellulosic ethanol production a viable potential industry for Centre County.

Considering the rate of growth of the population, the use of biofuels alone for en-

ergy conservation is not a viable option for the sustainability of the environment. Without the use of Best Management Practices, biofuel production can cause more harm than good, particularly from corn ethanol production. **The use of cellulosic ethanol, as opposed to corn ethanol can be accomplished without the destruction of forests because the biomass used is available without planting.** Increased corn ethanol production may require the taking of carbon-rich forests in order to allow more space for corn cultivation. Centre County should encourage the use of biofuels, but in a manner that sustains communities.

In addition to ethanol, biomass can be used as a heating fuel when manufactured into pellets.

The Pennsylvania Fuels for Schools & Beyond Program is an energy-use initiative promoting the use of local renewable resources for more efficient heating systems in schools and businesses.



"Centre County should encourage the use of biofuels, but in a manner that sustains communities."



Ecological Footprint

An ecological footprint is a technique that federal, state, and local governments can use to measure the environmental impact of their pollution on nature. The human impact on nature is measured by relating the amount of land area required for an average resident for everything they

consume (products and resources) and produce (waste and emissions) per year.

The ecological footprint is useful because it can provide valuable insights into natural resource use and the effectiveness of policies to pursue sustainable development.

There are ways to reduce the ecological footprint. These methods include: use of renewable energy sources (wind, solar, etc.), fuel-efficient vehicles, driving less, building green, buying locally grown foods, recycling, and reducing water and electricity use.



Implementation Strategies and Opportunities

Encourage and promote adoption of land use and capital improvement plans that allow for non-motorized transportation, preservation of green space, and sustainable design.

The Centre County Planning and Community Development Office should continue to facilitate actions that modify existing county and municipal ordinances to promote standards consistent with energy conservation techniques. Sections 603, 604 and 605 of the PA Municipalities Planning Code provide the legal basis for this process.

- Provide incentives to incorporate green technology and adaptive reuse.
- Develop model zoning ordinance language that promotes energy conservation techniques into new construction by establishing building type, building orientation, setbacks, land-

scaping, building height, and other development provisions that reduce energy demand as the preferred or minimum standard.

- Encourage site designs which promote the capture and re-use of waste heat in commercial and industrial processes.
- Set Growth Boundaries to regulate where development can occur.
- Promote energy efficient patterns of growth and sustainable development through planning/design process and the review of subdivision and land development plans for the building of public facilities and services.

- Adopt regulations that would encourage sustainable development by using techniques such as clustering, conservation design, etc. that would promote higher density development and at the same time provide open space/conservation areas.
- Encourage coordinated planning efforts with communities to develop smart growth in communities through regional land use and zoning.
- Develop local bicycle and pedestrian facility design manuals to provide detailed design information addressing on-street bicycle facilities, fully accessible sidewalks, crosswalks, and shared use paths, and

other improvements for developers.

- Amend the County Subdivision Land Development Ordinance to allow for bicycle access on new road construction in addition to sidewalks. Bicycle access should be denied only under exceptional circumstances.
- Encourage municipalities to develop transit-oriented development by incorporating overlay districts as part of their zoning ordinance
- Encourage large employers to develop payroll deduction for public transportation

Promote energy conservation by encouraging the use of renewable energy sources.

- Develop model language to incorporate geothermal heat pumps within zoning districts that allows for heat pump construction based on bulk regulations.
- Identify potential locations in Centre County for geothermal power plant sites.
- Identify and map the most and least appropriate areas for wind development based on wind class data and locally identified environmental impacts.
- Develop guidelines to de-

fine how wind projects can be mitigated.

- Develop an educational outreach program when adverse impacts are expected.
- Develop a model Wind Energy Facilities Ordinance for Centre County municipalities.
- Encourage local municipalities to incorporate regulations for wind energy facilities in their ordinances.
- Encourage incentives to

developers who incorporate solar energy options in building design.

- Through sustainable development and green construction techniques, encourage the proper siting of new construction with solar orientation.
- Initiate discussions with electric providers to find support for local solar energy production.
- Centre County Government, by example, should consider passive and ac-

tive solar energy with assistance from state funding programs.

- Work with municipalities to develop policies that will encourage biomass production, but restrict where production can occur.
- Locate and inventory land banked agricultural land and identify viable parcels for biomass production.

Resources

Federal

- Renewable Energy Systems and Energy Efficiency Improvements Program: Established under the USDA Farm Security and Rural Investment Act of 2002, funds grants and loan guarantees to agricultural producers and rural small business for assistance with purchasing renewable energy systems and making energy efficiency improvements.
- Federal-Level Investment Tax Credit (ITC): The ITC, written into law through the Emergency Economic Stabilization Act of 2008, is available to homeowners who install residential small wind turbine systems from Oct. 3, 2008 through Dec. 31, 2016. The tax credit is for 30% of the cost of the system, up to \$500 for each half kilowatt of capacity with an overall maximum of \$4,000.

State

- Alternative Fuels Incentive Grant programs: Enacted in 2004, this program helps improve air quality and reduce the use of imported oil through the use of alternative fuels. To be eligible for the monthly alternative fuels production incentives, applicants must produce and sell 25,000 gallons or more per month of qualified biomass-based diesel in Pennsylvania for transportation or home heating purposes. The Grant will award 75 cents per gallon with no single producer to receive more than \$1.9 million annually. Up to \$5.3 million annually will be available under the program through fiscal year 2010-2011. Those eligible to apply for the grant include: County, Municipality, Authority, School District, Nonprofit, Conservation District, Residents, Corporations, and Businesses.
- The Climate Change Act, 2008: This act requires businesses and industries to conduct an inventory of sources and amounts of pollution, set up a registry that will allow businesses and industries to track their emissions and get credit when they reduce their pollution, charges DEP to develop a state plan to reduce emissions of heat-trapping gasses, and provides for a voluntary greenhouse gas inventory website for businesses to track any reductions of greenhouse gasses.
- Environmental Education Grants Program: DEP is offering grants to schools, universities, nonprofit organizations, and county conservation districts to create or develop projects that support environmental education, including sustainable energy sources, such as solar, wind, biomass, and geothermal and alternative transportation fuels.
- Hybrid Electric Vehicle Rebate Program: DEP offers an opportunity to residents to apply for a rebate to assist with the incremental cost for the purchase of a new hybrid electric vehicle. A \$500 rebate is provided for the purchase or lease of a new hybrid electric vehicle which has a combined EPA City and Highway MPG of greater than 55 MPG and a carbon footprint of less than 7.0 tons/yr of CO₂.
- Pennsylvania Community Transportation Initiative (PCTI): PCTI was developed to provide an incentive for projects that promote collaborative decision-making, advance integrated land use and transportation decisions, and provide incentives for regional and multi-municipal cooperation throughout the Commonwealth. \$60 Million of federal/state transportation funds will be made available for these projects over the first two years of the 2009 Transportation Improvement Program. Projects may receive up to \$5 million for construction activities. (No more than \$300,000 per eligible project may be used for planning activities).
- Pennsylvania Energy Development Authority (PEDA): PEDA provides grants, loan guarantees for alternative energy projects and related research referring to deployment projects, manufacturing or research involving the following types of fuels, technologies or measures: solar energy; wind; low-impact hydropower; geothermal; biologically derived methane gas, including landfill gas; biomass; fuel cells; coal-mine methane; waste coal; integrated gasification combined cycle, and; demand management measures, including recycled energy and energy recovery, energy efficiency and load management.
- PA Energy Harvest Grant: The Energy Harvest Grant is a program that provides funding up to \$500,000 to qualified applicants for projects focused on innovative energy deployment that also address air quality and watershed protection and improvement.

Local

- SEDA-Council of Governments: The Energy Resource Center (ERC) provides comprehensive outreach, training, and technical assistance to catalyze the adoption of efficient and renewable energy technologies in their 11-county region. SEDA-COG offers free analysis of home heating and electric bills and an Energy Assessment for \$350. The Energy Assessment is conducted by a SEDA-COG energy technician using blower door and infrared technologies, combined with personal inspection.

Interrelationships

Recent revisions to the Pennsylvania Municipalities Planning Code specify that a comprehensive plan include a statement of interrelationships among various plan components with emphasis given to environmental, energy conservation, fiscal, economic development and social impacts. Additional information of relevance to this discussion as it relates to energy conservation can also be found in other 2003 Centre County Comprehensive Plan Chapter Updates titled: Agriculture, Economic Development, Historic Resources, Housing, and Land Use; and in the newly completed Centre County Greenways Plan.

Environmental Impacts

- Walkable communities decrease the need for motorized transportation and therefore decrease pollutants to the air.
- Using green building techniques encourages the recycling of building materials, which reduces the amount of refuse deposited in landfills.
- The prevention of sprawl will help prevent environmental impacts caused by linear growth patterns. These impacts include loss of wildlife habitat, greenhouse gas emissions, and decline of water quality.
- Wind energy facilities have shown to have an adverse impact on certain species of wildlife, particularly bird and bat populations. Partnerships such as the PA Wind and Wildlife Collaborative exist to assess risk to wildlife caused by wind facilities in order to mitigate for the impact caused by these facilities.
- The production of biofuels helps to clean streams through the absorption of nutrients and the stabilization of sediment through root systems of certain biomass plants.
- The use of biofuels as opposed to traditional gasoline also helps to reduce greenhouse gas emissions.

Fiscal

- Energy conservation practices will reduce the dependence on foreign oil, reduce electricity costs to businesses and homeowners through the use of alternative/renewable forms of energy and efficient homes.
- Automobile maintenance costs are reduced by promoting non-motorized methods of transportation.
- Building construction and rehabilitation costs can go down through the use of renewable and recycled construction materials that are more durable and may need replaced less often.
- Green design practices tend to be more expensive in design and construction, but the long-term cost may be less than traditional practices during the lifetime of the building.

Economic Development

- Solar, wind, biomass energy generation facilities can create jobs.
- Walkable and mixed use communities provide convenience for residents and a concentration of potential consumers and businesses in close proximity thereby increasing businesses viability.
- Preventing sprawl can keep housing costs lower and reduce vehicle miles traveled, which allows for residents to have more income.

Social / Community Development

- Walkable communities facilitate a healthier lifestyle by encouraging people to walk or bike instead of relying solely on their automobile.
- Walkable communities also create a sense of community and engage interaction among neighbors.
- Wind energy facilities, if not properly sited, can impact nearby residents with sound and sight annoyances. In retrospect, some have considered the turbines visibly appealing.

County of Centre



Centre County Planning Opportunities

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Definitions

Alternative Energy (fuel): A popular term for "non-conventional" transportation fuels made from natural gas (propane, compressed natural gas, methanol, etc.) or biomass materials (ethanol, methanol) (U.S. DOE, 2008).

Biofuel: liquid fuels produced from biomass materials and are used primarily for transportation (U.S. DOE, 2008).

Biomass: organic non-fossil material of biological origin constituting a renewable energy source (U.S. DOE, 2008).

Compact Building Design: A technique that suggests that communities be designed in a way which permits more open space to be preserved, and that buildings can be constructed which make more efficient use of land and resources (Smart Growth Network, 2008).

Fossil Fuels: Fuels (coal, oil, natural gas, etc.) that result from the compression of ancient plant and animal life formed over millions of years (U.S. DOE, 2008).

Green Construction (Building): The practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building's life-cycle from siting to design, construction, operation, maintenance, renovation and deconstruction. This practice expands and complements the classical building design concerns of economy, utility, durability, and comfort. Green building is also known as a sustainable or high performance building (EPA, 2008).

Greenhouse Gases: Gases that trap the heat of the sun in the Earth's atmosphere, producing the greenhouse effect. The two major greenhouse gases are water vapor and carbon dioxide. Lesser greenhouse gases include methane, ozone, chlorofluorocarbons, and nitrogen oxides (U.S. DOE, 2008).