



Gibson C. Armstrong,
100th Legislative District,
Chairman

An Alternative Energy Update

As your State Representative, I have labored to promote agriculture and protect the environment. One of the committees I serve on is the Environmental Resources and Energy Committee, where I worked hard to pass the Advanced Energy Portfolio Standard. That legislation we passed will make it easier for farmers and others to produce their own energy through means like manure digesters and wind turbines—and get paid fairly for any surplus power they put back on the grid.

As the Secretary of the \$300 million Pennsylvania Energy Development Authority (PEDA), I have been proud to help Turkey Hill Dairy get a grant to become the very first solar production facility in the state. Another PEDA grant helped PPL and the Frey Landfill turn methane being produced from decomposing trash into electricity for Manor and Conestoga homes.

As the only House member on the Governor's Agriculture Renewable Energy Commission, I am working with the Public Utility Commission to ensure that farmers who produce power on their farms can sell it back to the grid for the highest price possible.

As Chairman of Alternative Energy Caucus, I am working to educate legislators, community leaders and concerned citizens about how clean, renewable energy can benefit not only our farmers and rural communities, but our state and our nation as well.

Recently, Red Knob Farms in Little Britain Township got a grant to build a manure digester. In the days ahead, I will continue to work closely with DEP Secretary McCinty and Agriculture Secretary Wolff to ensure that our local farming community can take full advantage of opportunities that are coming available through alternative energy.

Solar Project Gets Boost from PEDA

In January, the Pennsylvania Energy Development Authority (PEDA) approved a \$348,000 Energy Harvest grant to install a solar project on the roof of the Turkey Hill Dairy beverage facility in Conestoga, Lancaster County.

This is a clean energy project that not only is environmentally friendly, but will help Turkey Hill diversify their energy sources, thereby stabilizing costs and ensuring a constant flow of energy.

The grant was awarded to Citizens for Pennsylvania's Future (PennFuture), which is working with Turkey Hill to implement the solar project. PennFuture, an organization that helps companies apply alternative energy sources, contacted Turkey Hill after seeing a possibility for the company to benefit from a solar project.

"There are a couple of goals we (Turkey Hill) are after," John Cox, executive vice president of Turkey Hill. "Implementing a strategy in which we look for opportunities which diversify our energy sources and also provide a hedge against inflation in energy costs is one of those goals."





Armstrong speaks about energy issues at a recent interview.

Chairman's Letter

Welcome to the first newsletter of the Alternative Energy Caucus. This quarterly publication will inform policy makers, community leaders and interested citizens about alternative energy news and trends that are making a positive impact on people's lives today.

Every month, developing countries like China, India and Indonesia consume more natural resources than they did the month before. Meanwhile, the global supply of these commodities continues to shrink. As a result, energy prices continue to rise. In the Keystone State, we need to move away from our "oil addiction" toward a state of energy independence.

When it comes to developing our own "home-grown" energy supply, Pennsylvania is off to a good start, with the potential to become a national energy leader—but we have a long way to go. In rural Pennsylvania, our fields and open spaces provide great opportunities for wind turbines, bio-digesters and emerging solar technology.

To help take advantage of those prospects, last year the legislature passed the Advanced Energy Portfolio Standard. The law mandates that a certain amount of our power come from clean, reliable, affordable energy. It is already beginning to benefit several farmers around the state. But it is only the first step: a lot of work remains to be done. This newsletter will help keep you up to date with the progress the Keystone State is making in moving toward energy independence.

Making Dollars and Sense of It All

Redefining Fuel Efficiency Standards

Your mini-van gets how many miles per gallon? Are you sure?

Soon most vehicle owners in the United States may receive a shock - news that their vehicles may get significantly lower fuel mileage than advertised.

It is not that vehicles will suddenly become less fuel efficient, it is just that the Environmental Protection Agency (EPA) is pushing for MPG estimates to be closer to reality.

Under a proposal recently released by the EPA, the EPA's fuel mileage testing regimen will include tests that mimic the effects of high speed and rapid acceleration, use of air conditioning, and cold temperatures.

The EPA is also pushing for across-the-board adjustments of fuel mileage estimates to account for a variety of factors not included in the tests.



Under these tests designed to show real-world driving scenarios, city fuel mileage estimates for most vehicles would drop 10 to 20 percent from today's estimates depending on the vehicle, while highway mileage estimates would generally drop 5 to 15 percent, according to the EPA.

The federal government has urged consumers to practice energy conservation, and the EPA's new tests would allow motorists to have a more accurate reflection of how much fuel they consume.

The last time changes were made to EPA fuel estimate methods was 1985 when an adjustment factor was introduced to bring estimates closer to real-world figures. The agency has opened a 60-day comment period on the proposal.

Source: CNN Money, www.money.cnn.com

Trash to Treasure - Farmer Benefits from Used Vegetable Oil

If necessity is the mother of invention, then Glenn Brendle of Green Meadow Farm has put the proverb to the test and won.

Like many small farming operations, money can be tight, especially when it comes to major expenses like heating green houses. While most grumble and continue to pay high heating bills, Brendle decided to take his engineering background and turn his dilemma into something positive for both himself and the businesses he provides services to.

Brendle's small farming operation is in Cap, Lancaster County, where he grows and distributes high-end produce to nearly 30 restaurants in Philadelphia. One day while delivering produce to Monks Café, Brendle noticed jugs of used vegetable oil sitting in a storage area. Monks Café, known for their fresh tasting French fries, empties their fryers daily, producing large amounts of waste vegetable oil which they must pay to have disposed.

"Since heating a greenhouse is expensive even in the best of times, when I saw the jugs sitting in the storage area, I thought maybe I could make an oil burner to use vegetable oil," Brendle said.

It was then that Brendle, also an engineer and Penn State graduate, began to modify his oil burners to run on vegetable oil.

"I literally stumbled over it," Brendle said in regards to this alternate form of heating. "This is now the third full year we've been doing this."

Although the farm has had small setbacks, Brendle said that by and large, implementing the upgraded heating system has worked exceptionally well.

"We've managed to save a great deal of money

and I think it is the same kind of good thing that anyone else could do by using my model," Brendle said.

Brendle's farm uses roughly 8,000 gallons of vegetable oil a year to heat two greenhouses, one 2,400 square feet and one 1,600 square feet as well as heating his two-story home. At those specifications, Brendle estimates that Philadelphia probably produces enough waste vegetable oil to support 160 similarly sized farming operations.

"There are very extensive possibilities," Brendle said. "Heating requires the least effort to initiative (when converting to alternative energy) and this could have a very significant impact on this area," in regards to southern Lancaster, known for its rich farming tradition.

Invention aside, Brendle said that one of the biggest problems for small operators who want to expand their business and seek out alternative sources of energy is finding funding to do so.

"The biggest problem has been getting past the first level of the grant process," Brendle said, referring to the Energy Harvest grant program.

His first generation heating system is not as efficient as it could be, and Brendle wants to seek out grants and additional low-cost funding for improvements.

One of the best parts of Brendle's vegetable oil usage is that nothing goes to waste. By not using fossil fuels, the environment is not being polluted and even the thick sludge left over at the bottom of the barrel Brendle is able to give to a neighbor who uses it to pave his dirt driveway. Restaurants save money by not have to pay to have their waste oil disposed of and a small, but prospering farm continues to stay that way.

Brendle's future vegetable oil endeavors include installing a diesel generating system that would use waste vegetable oil to run all of the farms electrical needs and plans to convert his car and delivery truck to run on vegetable oil.

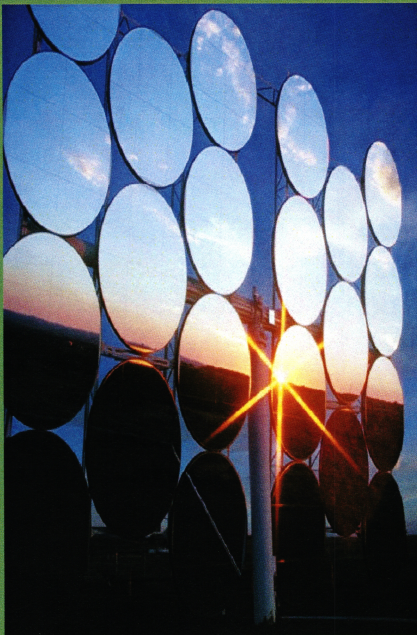


Above is a heater Brendle modified to run on vegetable oil



Inside of one of Brendle's greenhouses that is heated with used vegetable oil.

Alternative Energy Options



Alternative energy is a field that has been in existence for years; however, oftentimes the everyday consumer doesn't look beyond status-quo energy sources until a natural disaster, like Hurricane Katrina, hits.

Energy demands worldwide are increasing every year and current methods of providing for that energy such as the burning of fossil fuels will not be an option forever.

Here are some things to consider:

- Over 50 percent of the nation's electricity is generated from coal. Coal represents 23 percent of total U.S. energy consumption.
- In 2003, net imports of petroleum amounted to 56 percent of domestic consumption. U.S. imports are expected to grow to 68 percent in 2025.
- The U.S. consumed 22.0 trillion cubic feet (Tcf) of natural gas in 2003. Tcf by 2025 - a 40 percent increase. The current network of gas transmission pipeline is not adequate to meet this growth demand.
- Nuclear power produces around 11 percent of the world's energy needs. America's 103 nuclear power plants in 31 states provide 20 percent of the electricity generated in the U.S. With improved productivity and reliability, the average production cost in 2004 was 1.7 cents/kWh - cheaper than the average cost of electricity. However, because of the risk involved, nuclear power is the second slowest-growing source of power in the world.

As businesses and homeowners look for more efficient, reliable and potentially cheaper ways to

fuel their factories and homes, there are several alternatives. However, please keep in mind that everything is a trade-off and there are pros and cons for any type of energy production.

Fossil Fuels

- **Advantages** - New technologies may extend oil and gas supplies for decades, in addition to other incentives and advances in coal production, gas and oil sources could be sustained through the middle of this century. There is a sophisticated global, national and local infrastructure for extracting, refining, and distribution.

- **Disadvantages** - Even if you don't believe in global warming, it is undeniable that fossil fuels produce harmful pollution in all steps of the process from extraction to refining to use. Gas and oil are running out. And given political tensions and the often remote areas oil and gas can be found, this adds to the problems of reliability and affordability.

- **Renewable** - No.

Nuclear Power

- **Advantages** - There have been few negative incidents and although fuel is expensive, a relatively small amount is needed to produce huge quantities of energy. Nuclear

power is generally a cheaper way to generate electricity than from fossil fuels. It does not produce



smoke or carbon dioxide.

- **Disadvantages** - Difficulties of safely disposing waste materials are massive and very real. Incidents at facilities like Three Mile Island solidify the fact that there is danger involved in the process. Nuclear power of any type is associated with the threat of nuclear weapons production.

- **Renewable** - No.

Wind Power

- **Advantages** - This is a free source of energy and available in limitless quantities with little or no pollution. Dual use of affected land is possible. It is accessible, even in remote locations. Technology and infrastructure for generation and distribution of wind-generated power is proven.

- **Disadvantages** - Wind-driven electricity production can be unreliable and has associated high-maintenance costs. The placement of new wind farms has come under political opposition in most potential locations. Some of the best locations for windmills are coastal areas where land is expensive and environmentally sensitive.

- **Renewable** - Yes.

Solar Power

- **Advantages** - Free and limitless source of energy, although the infrastructure for converting solar energy into usable energy at scale will be hugely expensive to develop and maintain. There is little or no pollution. It is accessible in remote areas and is very convenient for users that require only low levels of energy.

- **Disadvantages** - Lack of infrastructure, development of affordable technology to collect and transport over distances, likely political opposition to developing large solar power plants.

- **Renewable** - Yes.

Tidal Power

- **Advantages** - Free and limitless source of energy with little or no pollution. Technology to generate electricity in quantity exists but has not been widely implemented.

- **Disadvantages** - Current technology only allows for power to be produced while a tide is flowing, or essentially 10 hours a day. This is an expensive process and environmentally risky.

- **Renewable** - Yes.

Hydro-electric

- **Advantages** - Low cost, no pollution, and proven technology for mass production at numerous locations worldwide. Water flows are generally very reliable and dams can store water and energy to regularize production and provide for any unexpected water flow issues.

- **Disadvantages** - Dams are expensive to build and politically controversial. Land, including farmland, is lost when a major hydro installation is developed. Water quality may be affected.

- **Renewable** - Yes.

Geothermal

- **Advantages** - Low cost, no pollution, available technology to produce reliable power, virtually limitless supplies and most locations.

- **Disadvantages** - Useful only at certain sites. Uniqueness of these locations can create environmental and political issues.

- **Renewable** - Yes.



Wave Power

- **Advantages** - Free and limitless source of energy. No pollution, inexpensive. Wave power has been used for localized needs for decades.

- **Disadvantages** - Weather is difficult to predict. Several technological advances must be made before commercial viability is possible.

- **Renewable** - Yes.

Sources: U.S. Dept of Energy; Dynamic Business, Oct. 2005

Power PA - Wind Turbines

Pennsylvania has one of the highest coal dependencies in the nation. Currently, the state receives nearly 60 percent of its electricity from one of the highest pollution energy sources: coal. Carbon dioxide, the main greenhouse gas responsible for climate change, is a major by-product of coal and the amount of this gas emitted into Pennsylvania's air has placed the state third behind Texas and California in carbon dioxide emissions.

Fortunately, the Commonwealth boasts the ranking of being a leader in the production of wind energy, through the use of windmills, or wind turbines. Windmills capture the energy of wind with blades that are mounted on a rotor to generate electricity. The turbines sit atop towers and take advantage of stronger and less turbulent winds at 100 feet (30 meters) or more above ground. When the wind blows against the blades, they start to spin and cause the rotor to spin like a propeller, and the turning shaft spins a generator to make electricity.

Windmills can be used for industrial size electricity production such as found in "wind farms," or on a more small-scale level on farms or in rural areas. Wind farms are collections of large windmills in the same location used to generate electricity that could be used to supply electricity to thousands of homes. On the other spectrum, the use of smaller – in size and quantity – windmills in rural land areas can be used to generate electricity to support a home, a business or a farm.

More than two dozen wind turbines have been installed and produce enough power to meet the electric needs of nearly 2,800 households. There are proposed plans to install 150 more wind turbines that will produce enough power to meet the electric needs of 53,000 homes. By

2010, Pennsylvania has a goal of producing 10 percent of the states power through wind energy.

The use of windmills to produce electricity not only has a positive impact on the environment but also on the economy. A report by PennFuture, Tax Policies for Energy Security, Job Creation and Environmental Quality, concluded that with a small public commitment, the state could generate 1,000 megawatts of new wind power and attract up to \$1 billion of private investment. This could generate enough electricity to power at least 250,000 households with non-polluting energy while increasing reliability of the electric system and helping control prices by increasing supply.

The 1,000 megawatts would also create 750 short-term construction jobs and 450 long-term operation positions;

boost rural economic development by increasing local tax revenues by \$7 million and lease payments of \$2.6 million to landowners; and cut global warming emissions by 2.7 tons per year, avoiding the pollution equivalent of planting 235 million trees or not driving 4 billion miles.

With the ever-increasing prices of natural energy sources, the use of windmills to create electricity is an environmentally friendly alternative to fossil fuels that will cut down on harmful emissions and help to lower the cost of energy bills.



Wind Projects in Pennsylvania

Pennsylvania's gentle rolling hills make several areas across the state ideal areas for housing wind turbines. Wind turbines can be used for large commercial wind operations or small farms and homesteads.

New wind projects in Pennsylvania:

- Near Somerset County
- Jackson and McIntyre Township, Lycoming County
- Pocono Mountain Region
- Schuylkill



The first windmills were created in Persia around 500-900 AD and were used for pumping water.

Source: Pennsylvania Wind Association and the state Department of Environmental Protection

Power PA - Fuel Cells

Dependence on petroleum imports, poor air quality and greenhouse gas emissions are several challenges plaguing America today. Hydrogen and fuel cells have the potential to help alleviate these problems.

Hydrogen is the simplest and most abundant element in the world. It is an energy carrier and not an energy source; it stores and uses energy in a usable form – combined with fossil fuels, plant material and water. Because of the elements ease of integration with other elements and compounds, hydrogen can be used with fuel cell systems to provide fuel for vehicles, energy for heating and cooling, and electricity to power our communities.

Fuel cell systems are a new technology that can provide extreme efficiency over a wide array of sizes, achieving an overall efficiency of 80 percent or more in some systems when heat production is combine with power generation. They also provide a great benefit to our nation's energy security, emission and pollution levels and economy.

Fuel cells work by combining hydrogen (or hydrogen-rich fuel) and oxygen to create electricity. If pure hydrogen is used as fuel, fuel cells only emit heat and water – no harmful gases or pollutants.

There are four basic components of a fuel cell system: fuel cell stack, fuel processor, current converter and heat recovery system. It is important to note that most fuel cell systems also include other components to control fuel cell humidity, temperature, gas pressure and wastewater.

A fuel cell stack is the “heart” of a fuel cell power system. A direct current (DC) generates electricity from chemical reactions that take place in the fuel cell. One fuel cell can only provide a small amount of electricity; therefore, fuel cells are usually combined in a series to create a fuel cell stack.

The second component, the fuel processor, converts fuel into a form usable by the fuel cell by filtering out any impurities in hydrogen gas or converting hydrogen-rich fuels into a gas mixture of hydrogen and carbon compounds called “reformat.”

Fuel cells produce electricity in the form of a direct current (DC), which flows in one direction; however, electricity in homes or work places is in the form an alternating current (AC), which flows in either direction

on alternating cycles. Current converters, or inverters or conditioners, adapt the electrical current from the fuel cell to suit the electrical needs of the application.

The fourth and final component is the heat recovery system. Because fuel cell systems are not used to generate heat but do produce significant amounts, the excess energy can be used to produce steam or hot water or converted to electricity via a gas turbine or other technology, increasing the overall efficiency of the system.

There are still some challenges that face fuel cell technology. The major challenges include cost and durability. Currently the costs for automotive internal combustion engine power plants are about \$25-\$35/kW; for transportation applications, a fuel cell system needs to cost \$30/kW for the technology to be competitive; and for station-

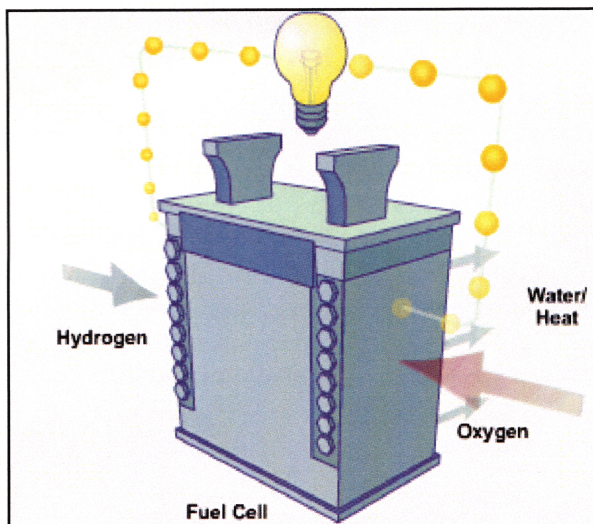
ary systems, the acceptable price point is considerably higher (\$400-\$750/kW for widespread commercialization and as much as \$1000/kW for initial applications).

Since the concept of the fuel cell is considerably new, the durability has not been established. For transportation applications, fuel cell power systems will be required to achieve the same level of durability and reliability of current automotive engines and the ability to function over the full range of vehicle operating conditions.

Other challenges include a reduction in the size and weight of current fuel cell systems to meet the packaging requirements for automobiles; air, thermal and water management; and improvements to the heat recovery systems must also be made.

Although there are many challenges facing the commercialization of the fuel cell system, there are positive benefits that would far outweigh the challenges in the end. Widespread use of hydrogen as an energy carrier in this country could help address concerns about energy security, global climate change and air quality. Hydrogen and fuel cell technology have the power to strengthen our national energy security by reducing our dependency on foreign oil; reduce air pollution and the harmful emission of greenhouse gases – responsible for changes in global climate; and improve our nations energy efficiency by reaching efficiencies of up to 85 percent in automobiles compared to less than 30 percent now.

Source: U.S. Department of Energy



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Coming soon!

The House Bipartisan
Alternative Energy Caucus is
currently working on several
exciting projects including:

- Web site with helpful links to energy information
- Updated mission statement



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