



The Engineering Consultant



"Excellence in Engineering"

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Alternative Energy 101 by James E. Eckman, PE, LC, LEED AP, CBCP

As a society we are forever dependent on energy to maintain our life style and economic growth. Without energy our society would cease to exist. Do you remember the big power outage in 2003 and the satellite image of the darkened eastern United States at night? How we produce this energy will be one of our greatest challenges.

We have all thought about the direct and indirect impact our life style and the associated need for energy to maintain this lifestyle has on our environment and our pocketbooks. We have all heard about global warming and climate change. There should be no doubt that climate changes are occurring. There continues to be discussion about the cause of these changes. Do humans have a role in this or is nature just doing what it always has done and humans have no direct or indirect involvement in what is occurring? Unfortunately the issue has become political rendering all common sense and logical debate irrelevant. Regardless of your position on the cause of climate change we all have a responsibility to decrease pollution and conserve our natural resources.

As our energy needs continue to grow and the cost of energy continues to increase we must develop alternative energy solutions to meet the growing needs and offset the increased costs. As a point of reference the average US household uses about 800 kwh per month or 9600 kwh of energy annually. As of 2005 there were over 111 million households in the US. This equates to over 1,065 billion kwh of energy annually

just for US households!

There can be a difference between saving energy and saving money in the context of alternative energy. Economics will continue to play a key role in the expanded use of alternative energy solutions. The government must continue to promote the use of alternative energy solutions through tax credits and other incentives until the costs of these technologies decreases to the point that the economic paybacks are a least reasonable. Without these incentives pure economics will not permit the wide spread use and continued development of these technologies and prolong the time it takes to make these solutions common place.

Over the next several months *The Engineering Consultant* will discuss the "current state of the art" regarding several alternative energy solutions. We will provide useful information regarding each of these technologies that will include current viable applications and associated costs. It is our hope that you, our clients, will find this information both timely and helpful in your day to day business or at least be able to use this information when the topic comes up.

One thing that can be guaranteed is that alternative energy solutions will continue to develop and improve over time. The "state of the art" so to speak will change very rapidly. The viability of an alternative energy solution today may be different tomorrow. More than likely, many technologies will improve and their associated costs will decrease but it could

also mean that a technology will not be economically feasible in the near future or even longer.

SBM will continue to monitor developments in these and other alternative energy technologies and provide a resource for you and your business.

Alternative energy is an umbrella term that refers to any source of usable energy intended to replace energy produced by fuel sources such as fossil fuels that produce high carbon dioxide emissions.

Renewable energy is energy which comes from natural resources such as sunlight, wind, rain, and tides which are naturally renewable.

An energy source can be an alternative energy and not be a renewable energy. Fuel cells and nuclear power would fall into this category.

Net metering:
With any alternative energy system, net metering is an essential issue. Typical utility power meters only permit the flow of electricity from the utility to the load. Net metering permits the bi-directional flow of power to and from the utility. If you are producing more power with your alternative energy system than you are consuming you can actually "spin" your power meter backward thereby reducing your electric bill. Rules and regulations regarding net metering as well as actual rates for the alternative power produced can vary between utilities and should be check early in design. The credit kwh rate for alternative energy produced can be less than the

Special points of interest:

- Alternative and renewable energy definitions
- Net metering
- Tax incentives, grants and rebates
- Renewable energy credits (REC's)

Look for upcoming issues:

- Solar Power and Photovoltaic cell technology.
- Wind Power Technology
- Fuel Cell Technology
- Geothermal Technology

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SBM Continues to grow...

Scheeser Buckley Mayfield continues to grow with the addition of Doug Smelker, Mechanical Engineer, to our Columbus office. Doug attended Indiana Institute of Technology where he received his Bachelor of Science in Mechanical Engineering. Doug has experience in designing HVAC systems, plumbing systems, fire protection systems and medical gas systems. He also has experience in the construction phase reviewing shop drawings, answering RFI's and issuing field instructions.



SBM leader in Innovative Digital Lighting Design

The University of Akron Multiplex Housing project designed by Ron Radabaugh, PE, LC, Principal at SBM was selected as a case study in the recently issued Lithonia Lighting LED Digital Lighting System Catalog. Almost 700 LED lighting fixtures were installed on this project. This case study can also be seen at www.lithonia.com/RTLED. Select the Marketing Tools tab then Applications.



Alternative Energy 101 Continued

kwh rate the utility charges. These rates must be used in any payback calculations. There are also National Electrical Code (NEC) design and safety considerations that must be taken into account and incorporated into the design.

System battery storage:

All of the alternative energy systems and associated costs to be discussed will not include battery storage. A benefit of on-site storage batteries is that they provide limited power in the event of a power outage. However, batteries add both initial cost to the systems and ongoing cost due to maintenance requirements associated with the batteries. The systems evaluated are simple grid tie systems that reduce the power required from the utility when demand exceeds the alternative energy source capacity or provides power to the utility grid when demand is less than the alternative energy source capacity.

Tax Incentives, Grants and Rebates:

In addition to net metering, the available tax incentives, rebates and grants are an important component that has a huge impact on the financial viability of the alternative energy system being considered. State and Federal tax credits or grants are constantly changing and must be evaluated for each project. The Database of State Incentives for renewables and Efficiency (DSIRE) (www.dsireusa.org) is an excellent reference for available state and federal tax credits and grants for both solar and wind systems.

Federal Grants and Tax Credits:

At this time the federal tax credit or grant is approximately 30% of the total system cost for solar, wind and fuel cell systems. Accelerated depreciation is available for commercial installations.

Ohio solar system incentives:

State of Ohio Advanced Energy Grants are available up to the lesser of \$3.00 per estimated

kwh production or 50% of the total system cost up to \$150,000 for commercial or \$25,000 for residential. System minimum sizes apply.

Ohio wind system incentives:

State of Ohio residential wind energy credits are available up to the lesser of \$2.00 per estimated kwh production or 50% of the total system cost both up to \$25,000 maximum.

Non residential Renewable Energy Incentives are available up to the lesser of \$2.00 per estimated kwh production or 40% of the total system cost up to \$200,000 maximum.

Ohio fuel cell system incentives:

Currently the State of Ohio does not offer any credits or incentives for the use of fuel cells.

Unfortunately the current state of the art of all alternative energy solutions has not yet developed to the point of financial viability (typically

acceptable rate of return) without tax credits and grants. This will change as technology improves and as more systems are installed.

Renewable Energy Credits (REC's)

In addition to tax credits and incentives, Renewable Energy Credits (REC's) also known as Green Tags or Tradable Renewable Certificates (TRC's) are available to provide additional financial incentives to purchase carbon neutral alternative energy solutions. These include solar, wind, geothermal, and fuel cells if not produced from fossil fuels. REC's are tradable energy commodities that can be bought and sold in voluntary and compliance markets.

1 REC equals 1Mwh of energy produced from an eligible renewable energy source.

1 wind REC is being sold for approximately \$20.00 each.

1 solar REC is being sold for approximately \$60.00 each.