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Teacher Edition

Can Ameren Go Green In Time?

Mike Ruby

According to a new Missouri initiative, Ameren UE has to more than double their output of electricity coming from clean energy sources in the next twelve years. What is their plan for doing so?

In November of 2008, Missouri citizens passed the Missouri Clean Energy Initiative by a vote of 2 to 1. This initiative decrees that by the year 2021, all utilities in the state must produce at least 15% of their electricity from clean energy sources. According to the Ameren website, the company currently has the capability to produce 7.1% of their electricity from hydroelectric power. The rest comes from coal, oil, natural gas and nuclear. How is Ameren going to deal with this initiative? The initiative defines clean energy as being one of the following forms: wind, solar, landfill gas, hydroelectric and biomass. According to Lisa Cosgrove of the renewables group with Ameren UE, most of these resources could be in Ameren's plans. "Once we identify regional resources with the most technical and economic potential, we will implement a plan to develop these resources." Cosgrove stated via e-mail.

Along with the hydroelectric generation Ameren already generates they have just contracted with the Horizon Wind Energy's Pioneer wind farm in Iowa to purchase 102 mW per year for the next 15 years. This represents enough energy to power 26,000 homes per year.

Cosgrove also mentioned wind farms that are currently being developed in Northwest Missouri. These farms could produce between 100-150 megawatt hours (MWh) of electricity per year. This would be a good beginning according to Renew Missouri, who claims that Missouri ranks 20th of the 50 states in wind energy potential, yet ranks 45th in the amount of energy produced from wind.

The initiative requires that at least 2% of the utilities electricity production must be from solar. According to Cosgrove, no large scale solar projects are presently in the plans at Ameren due to the high cost and low capacity factor. Ameren is looking into purchasing electricity from solar sources, much like they will be doing with wind energy.

The passage of the clean energy initiative does, however, offer encouragement to individual homeowners and businesses to explore solar for themselves. According to Missouri Solar Living, LLC, residents and businesses in Missouri can receive $2 per watt rebates for installation of solar power systems. They also can receive a federal tax credit of 30% and the $2000 cap on tax credits has been eliminated. Also, the Missouri Net metering and easy connect act that took effect on January 1, 2008 now allows individuals and businesses to sell any excess power they generate to local utilities. Cosgrove also talked about the Ameren Pure Power program. This program, named by

Wind farms – generating energy, photo credit: freefoto.com

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The I-64 Makeover: More Than Just a Face Lift

Laura Pearce

The I-64 project status sign, located on the I-170 approach to Brentwood, Missouri, has been counting down the months and days until project completion since early January of 2008. Recently it reached the 6 month milestone. When the countdown finally reaches zero and the new I-64 opens for traffic, nearly $500 million dollars (and countless hours of motorist angst) will have been spent on the state-of-the-art highway. If construction continues on schedule, motorists will enjoy the smooth surface and enhanced safety of the new roadway by Christmas and a direct shot from downtown Saint Louis to Chesterfield for the first time in nearly two years.

Two sections of the roadway have been alternately closed to traffic forcing motorists to seek other routes. According to Dan Galvin of Gateway Constructors, the complete closures have been necessary because of the deteriorating condition of the roadway and the 30 bridges along the route, many of which had to be demolished and replaced. "When a bridge is new it is rated a 9, and by the time the condition deteriorates to the point where it is rated a 2 you have to close it for safety. Of the 30 bridges on the project, half were rated a 3 or a 4." Galvin compared the bridges along the I-64 corridor to the I-35 bridge in Minneapolis that collapsed in August of 2007 taking thirteen lives. The I-35 bridge was rated a 4.

Had I-64 remained partially open during bridge and roadway reconstruction, the project would have taken an additional 4 years, resulting in more cost to taxpayers and increased risk of injury to workers. Gateway Constructors has led a consortium of contractors working on the I-64 project.

Cathie Farroll, a MoDOT spokesperson for the I-64 project, says that the overall quality of the finished roadway will be enhanced by the complete closures. "By closing the highway in sections, crews are able to produce higher quality pavements and stronger, more durable bridges. Entire bridge decks can be poured at one time, and 24 feet wide sections of pavement are more durable, as well." Farroll adds that the resulting higher quality translates into reduced maintenance costs and a longer life cycle for the pavement and bridges.

Generally, motorists on Interstate highways experience lane closures as repairs are carried out on a lane by lane basis, in most cases using asphalt as a new top layer for the road surface. However, the I-64 project was not suited for this piecemeal approach. The original roadway was constructed during the 1930s and 1940s as part of the old US 40, predating the construction of the Interstate Highway System. Adapting the antiquated roadway to 21st century Interstate standards mandated a complete rework for much of the roadway from top to bottom.

Although the concrete road surface of I-64 will appear new, 130,000 tons of old concrete and asphalt from the remains of the former highway and bridges are being reused for paving. According to some industry studies, concrete is more durable and can last twice as long as asphalt while costing only slightly more. In a 2007 University of Michigan study, records indicated that significant maintenance on concrete roadways were not required for almost 20 years after construction versus 10 years for asphalt.

Accordingly, motorists on the new I-64 roadway should not be detoured again until 2030.

Countdown to completion of I-64 construction project, photo credit: Laura Pearce

Growing Green Oil

Trish Baker

Plans are afoot for Missouri's first algae biofuel facility. Saline County, MO, located two hours west of St. Louis, is in line to become home to what is being called one of the nation's most promising innovations in alternative fuels. The oil extracted from algae can be converted into biodiesel, ethanol, crude and aviation fuels. Company officials say this site will focus on the production of ethanol."

The U.S. currently has 20 small algae producers, and that number is growing, according to Barry Cohen, director of the National Algae Association.

Last July, the Saline County commissioners approved $141 million dollars in revenue bonds to finance a bio-refinery complex that will be home to this venture. Pure-Energy Corporation, a biofuel company located in Paramus, New Jersey, recently purchased the land for the facility, which will be known as EcoAlgae. Plans are underway for the construction of 2,000 one-acre ponds that will house green algae says the alternative energy company.

The U.S. Department of Energy states that, using current procedures, one acre of algae yields 30 times more fuel than the same area planted in soybeans. The agency also estimates that it would only require the amount of space equivalent to the state of Maryland to replace all of the petroleum based fuel used in the U.S. with algae fuel. Algae 2020 , a comprehensive market study released this month by Emerging Markets Online, claims a potential annual production of up to 10,000 gallons of oil per acre. Algae can reproduce every 6 hours, while it takes millions of years to produce crude oil in the ground, according to Joseph LaStella of a similar biofuel company, Green Star Products.

Biofuels made from corn and soybeans are already on the market, but critics contend that using these crops competes with their use as human food. Once processed into a fuel, the algal leftovers can be sold as a high protein and carbohydrate livestock feed supplement. Another potential benefit of algae farming is that it can directly recycle CO_2 emissions from nearby industrial plants. Since algae feeds on sunlight and CO_2, the greenhouse gas would be recycled naturally.

Construction of the algae facility will begin fourth-quarter 2009, and be completed by fourth-quarter 2010, says Irshad Ahmed, President and CEO of Pure-Energy. Any project of this scale has many obstacles to overcome, he tells SciJourner. "I am surprised at how fast, how far the project has come in so short of a time."

According to Ahmed, the Saline County project will be the first of its kind with several biofuel technologies integrated under one roof. Phase I will involve the use of landfill biomass to generate fuel while the later development of Phase II will include the algae biofuel facility. Pure-Energy is involved in seven similar projects, one each in India, Costa Rica and Canada, and four others in the U.S.

Despite Ahmed's promises, some local residents are skeptical. "I would wager any amount that zero of what is talked about here ever comes to fruition--that is the modus operandi, talk a lot and produce nothing, or as the old saying goes 'all hat and no cattle'," read one web-posting on the Marshall-Democrat newspaper site.

Algae – the new biofuel, photo credit: Fotolia.

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the U.S. Department of Energy as the "most successful" New Green Power Program of the year in 2007, allows customers of Ameren to pay an additional 1.5 cents per kWh on their electric bills to purchase renewable energy credits (REC's).

The Pure Power program, which as of October 27, 2008 had purchased REC's equal to 37,000 MWh of renewable energy, has been Green-e energy certified. Green-e is the leading renewable energy certification and verification program in the United States.

The REC's are used to develop regional renewable energy resources helping to replace pollution-causing power with clean power. This creates a demand for the development of regional renewable resources thereby creating local jobs and keeping local money in the region.

While Ameren has more plans to make to catch up with the 26 other states that already have clean energy initiatives, they have made a start. According to Cosgrove we should "stay tuned to the local news. An Ameren UE renewable announcement is in the near future."

A Sinking Feeling

Rob Lamb

Now there is a device to detect the sinkhole that can eat your car, the broken pipe that can pollute your neighborhood and even the secret tunnel running under the border. Entech Engineering Inc., a St. Louis based company, says that their instrument can detect damaged pipes or smuggler's tunnels as deep as 50 feet.

Using infrared sensors to see changes in temperature of less than a hundredth of a degree, Entech is able to see through the ground up to a reported 50 feet. Each sensor has an estimated cost of $125,000 and you can only rent their services, the sensors aren't for sale.

The sensor can be mounted on a helicopter, vehicle, or even a hand held device, says the company. The infrared sensor records differences in temperature and creates a visual representation of what it sees in the form of a thermograph.

Beneath the first few feet of earth, the ground stays at a constant 55 ºF. The sun warms the earth's top layer of soil to above eighty degrees, any empty spaces that may exist below will act as natural insulators between the lower and upper soil temperatures, just like the space between to panes of window glass. These empty spaces therefore maintain a different temperature from the surrounding soils. The fact they retains a different temperature even when the surrounding soil has changed allows the infrared sensor to see them clearly.

On a cold day, it would work just the opposite the earth would remain at 55 ºF while the surface would be colder, again causing different temperatures in the soil and any empty spaces. The same idea holds true if you look at your roof after a fresh snow. Anywhere the snow has melted shows a warm spot, while anywhere the snow remains shows an area with good insulation.

One of Entech's first contracts was with St. Louis Metropolitan Sewer District to survey areas of North St. Louis. They found so many leaks and breaks that the repairs took years, says Gary Weil, founder and president of Entech. Even if the street shows no signs of an imminent collapse, an impending sinkhole would be very evident in the thermograph according to Weil.

Weil stated that Entech has also successfully used this technology for tunnel detection on the U.S.-Mexico border. With the helicopter mounted sensor flying at over 2,000 feet, they were capable of covering a distance of 2.5 miles in less than 15 minutes. To search the same area by hand would take the use of high strength microphones to detect sounds of digging or vibration sensors. This could take a week or more, and might completely miss the tunnel if it were already completed and insulated from sound and vibration.

Since 1999, through careful inspection of British Petroleum's pipelines running underneath there refinery, Entech has found potential leaks about every 128 feet. This has saved 90% of the costs associated with pipeline leaks. That translates into millions of dollars for British Petroleum.

At times, it may be either not cost prohibitive or too environmentally sensitive to just dig until problems are found. Roadways can have many different utilities running under them. Many empty lots also have unused fuel tanks lying below. Entech is especially adept at detecting these types of possible hazards.

Entech says their technology saves clients money by avoiding exploratory digging. Although they are guarded as to how exactly their technology works so well, Weil told T*he St. Louis Post Dispatch* in a recent article that they are five years ahead of their closest competition.