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Wind Farm Construction Explodes While Manufacturing Lags

by Michael Vickerman, RENEW

After being held in check for several years, windpower development in the Badger State is finally on the move! Construction will begin this year on four utility-scale projects in eastern Wisconsin, three of which are located wholly or partially within Fond du Lac County. They are:

- ✓ We Energies' Blue Sky Green Field project. This 88-turbine project will straddle the towns of Marshfield and Calumet overlooking the eastern shore of Lake Winnebago;
- ✓ Alliant Energy's Cedar Ridge project. The project will be built in the Town of Eden, east of We Energies' two turbines along US Interstate 41;
- ✓ Invenergy LLC's Forward Wind Center. Located south of Fond du Lac and east of Horicon Marsh, this project will serve three utilities and will likely be the largest in Wisconsin; and
- ✓ Eurus/Midwest Wind Energy's Butler Ridge project. The energy from the 36 turbines in southeast Dodge County will be sold to Wisconsin Public Power, Inc.

Having secured all the necessary approvals from local, state and federal authorities, project owners have a little more than 18 months to complete their installations. In all four cases, the construction timetable envisions achieving commercial operation on or before December 31, 2008, in time to capture the federal Production Tax Credit (PTC), now worth 2 cents/kWh, before it expires under current law.

To put the size and sweep of this wave of windpower projects in perspective, Butler Ridge, the smallest of the four projects, will by itself outperform Wisconsin's fleet of existing utility-scale turbines, all 55 of them. Currently at 53 megawatts (MW), Wisconsin's wind generating capacity should total between 400 and 480 MW by the end of 2008, an increase of nearly one order of magnitude.

When completed, the new projects will produce about one million carbon-free megawatt-hours each year, or 1.5% of the total volume of electricity likely to be sold in Wisconsin in 2009. These projects will reduce the carbon footprint of Wisconsin's electric system by about one million tons of CO₂ a year.

Both the Forward Wind and Butler Ridge projects will be built with GE 1.5 MW turbines, while Blue Sky Green Field will feature 1.65 MW turbines from Vestas, the Danish manufacturer. Alliant Energy, which received approval in April to construct Cedar Ridge, has not yet committed to a particular manufacturer, though it is expected to announce its decision in June.

Even if the turbines aren't delivered until next year, construction crews will be busy this summer and fall grading roads, pouring foundations, building transformer pads, and digging trenches for the underground cabling that will connect the turbines to the grid. Almost all of the site preparation work will be performed by local construction companies.

However, it seems unlikely that the fully assembled turbines will feature much in the way of local manufacturing content. There are only a handful of companies in Wisconsin that fabri-

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cate components for wind turbines. Unless this situation is addressed soon, this wave of utility-scale turbines will create relatively few jobs and manufacturing orders here in Wisconsin. Considering the enormous expense involved in transporting large and heavy components such as blades and towers, the paucity of local manufacturing content packs an economic double-whammy for Wisconsin, in the form of higher installation costs and production orders that went elsewhere.

Consider the example of towers, which are manufactured in sections weighing from 30 to 60 tons apiece. The handful of U.S. companies that fabricate them cannot keep up with the furious pace of installations now underway. In fact, almost all of them are fully committed through 2009! Yet while the wind indus-

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New RENEW Members

RENEW welcomes the following new businesses and individuals who joined since the last newsletter:

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More Wind Farms

Continued from page 1

try fully understands the value of shortening supply lines, the infrastructure to serve the rapidly growing U.S. market is almost nonexistent.

The case of Blue Sky Green Field is also instructive. To ensure the timely completion of this installation, Vestas must find fabricating companies that have spare capacity. If U.S. suppliers are fully committed, Vestas has no choice but to look overseas for components. As a result, We Energies' turbines will be equipped with blades made in Europe, and towers imported from faraway Vietnam. This arrangement deprives Wisconsin of an opportunity to both rebuild some of the productive capacity lost to globalization as well as retain energy dollars within the state.

Several states, like Iowa and Pennsylvania, are pulling out the stops to provide a U.S. base for wind industries planning to expand. Earlier this year, Iowa assembled a package of incentives—\$5 million in float loans, grants, tax abatements and road improvements—to entice global powerhouse Acciona Energía to plow \$23 million into an existing building at a West Branch industrial park. In a year's time Acciona expects to produce nearly one turbine a day, employing more than 100 people at an average wage of \$15.14 an hour.



But Acciona Energía's goal of becoming a dominant presence in the Midwest depends heavily on other companies' decisions to produce all the other components that go into a functioning wind turbine—towers, blades, gearboxes, generators, nose cones, and electronic controls, to name a few. These companies are likely to cluster in states that have strategies and inducements designed to encourage investments in wind manufacturing.

Is Wisconsin one of those states? No. While Wisconsin has done an admirable job of generating demand for wind-generated electricity, most recently through last year's Energy Efficiency and Renewables Act (Act 141), state officials have been slow to grasp the need for a complementary business development strategy. If the state believes that a renewable energy standard on utilities is sufficient for stimulating wind energy manufacturing opportunities, then it is headed for certain disappointment.

Yet it's not too late for Wisconsin policymakers to wise up to windpower's tremendous promise as an industry of the future. The state's strategic position on the Great Lakes gives it a distinct advantage in serving such high growth markets as Pennsylvania, New York, and Illinois. Though the manufacturing sector has contracted as a result of globalization, Wisconsin companies still have a well-deserved reputation for manufacturing high-quality equipment, and many of them are already participating in the energy sector.

The Public Service Commission expects wind energy to supply about 90% of the renewable electricity added to the Wisconsin grid between now and 2015. That translates into an increase of nearly 2,000 MW in installed wind generating capacity, more than half of which is likely to be built in-state. With this capacity growth hard-wired into Wisconsin's energy future, the case for organizing a state economic development strategy around windpower could not be stronger.✪

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WISCONSIN RENEWABLE QUARTERLY

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RENEW Wisconsin is a nonprofit organization advocating the adoption of clean energy strategies to power Wisconsin businesses and households in an environmentally responsible manner. Through a combination of public policy and private sector initiatives, RENEW aims to increase the use of clean, self-renewing energy resources to generate electricity or displace fossil-generated electricity.

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RENEW also moderates a blog at www.renew-energy-blog.org.

“But What’s the Payback?” An Environmental Economics Editorial

by Dennis Briley, President
RENEW Board of Directors

We have been acculturated to react with an expected response, “But, what is the payback?” when presented with an investment opportunity. “What’s the payback?” of course means the simple payback method of judging monetary value of an investment. If investment dollars are involved then it is purely an economics question, isn’t it? Yes and no, particularly when the investment involves energy or other environmental resource values. But, we don’t yet seem to be able to articulate a simple, concise, effective alternative way of discussing what economists call “intangibles.”

When considering a capital investment in energy efficiency or renewable energy, wouldn’t we like the financial question replaced with how much energy, fossil fuel or greenhouse gases am I saving, and is this the best way to obtain the greatest environmental benefit?

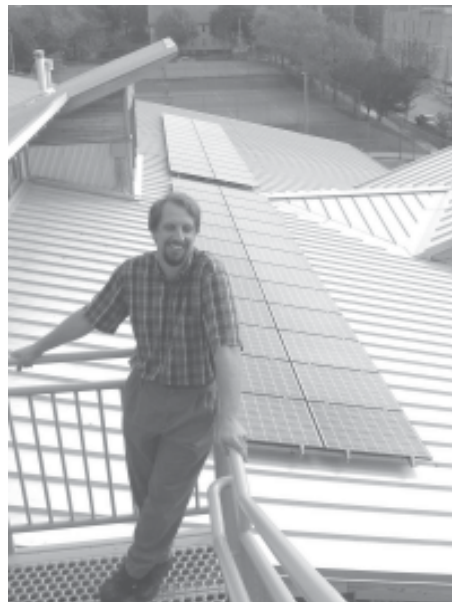
It is my observation that earth care is growing momentum. The public seems to be considering renewable energy with favor. Perhaps the time is here for reframing the renewable energy investment as a gift to the earth.

An investment in renewables is a choice, like giving a gift. And choosing to give a gift is viewed as a good thing. We feel good when we give a gift. With an endowment gift to the planet’s health, we don’t need to consider payback.

Marketing renewable energy as a gift would involve a cultural change -- a sensitive one, but one with emerging opportunities. We certainly need to acknowledge and respect the mind set of each customer, but to grow the market we need to coax out the fresh insight that may be hidden in the customer’s ever evolving mind.

I hope that we are practicing and experimenting with this dialogue in renewable energy marketing, learning from the process and educating each other.✧

PV Makes Giant Strides, Part 1



The Urban Ecology Center became host to the state’s largest PV installation when it expanded its original nine kilowatt installation (left) to 44.4 kilowatts with the support of Focus on Energy, We Energies, and other contributors.

Renewables Profiles

Jeff Riggert: Living and Loving Post-Peak Oil Lifestyle

by Ed Blume, RENEW

Few people live the all-renewable life that Jeff Riggert subscribes to. Solar electric and hot water collectors adorn the roof of his net-zero-energy ranch-style house on Madison's east side. A wood stove along with solar thermal evacuated tubes eliminates 100% of fossil-fuel heat. A cold-frame garden on the south-facing side of his home gives him kale, lettuce, spinach, and other vegetables in mid-winter.

But it's Riggert's fridge that draws attention from visitors. Four-inch insulating foam glued to the exterior makes the normally nondescript kitchen appliance less than attractive, though highly efficient.

Riggert grew up with a presumably unmodified refrigerator in Marin County, California and Seward, Nebraska. To feed his love for studying life, Riggert earned a bachelors of science in biology (with honors) from the University of Nebraska-Lincoln (UNL) in 1992.

After graduation, he held three jobs at once - director (and co-founder) of the UNL Environmental Resource Center, an information and referral service with nearly 200 magazines that the school library didn't have; sales rep for high-efficiency commercial lighting systems; the first recycling coordinator for the student unions and residence halls.

Riggert sought more education and headed to UW-Madison where he picked up an master's degree in Land Resources with a Certificate in Energy Analysis and Policy from the Gaylord Nelson Institute for Environmental Studies.

After a few months as a manager of a WP&L (now Alliant) energy efficiency program in Beaver Dam, Riggert joined TecMRKT Works, a firm providing energy efficiency program evaluations, primarily for utilities. The company changed ownership in 2003 and became Innovologie, LLC, headquartered in Rockville, Maryland.



Jeff Riggert (center) stands on the roof of his net-zero-energy home and explains the workings of an evacuated tube solar water heater to Ross DePaolo (left) and another visitor during an open house in April.

Q. Why did you do all of the work on your house? You've gone to the extreme.

I don't think it's extreme. It's all worth doing to save money and the environment. I'm experimenting with and demonstrating the technology. It gives me an advantage professionally to know how energy efficiency and renewables work.

For instance, I measured the energy use of the refrigerator with a watt meter for a full week before adding the foam panels and a full week afterward. Electricity usage dropped from 971 kilowatt hours (kWh) a year to 505 kWh.

I also subscribe to MG&E's time-of-day rate and shifted most of the home's electricity use to evenings and

weekends by putting the appliances on timers. The refrigerator runs only once for 45 minutes in the middle of the day, then it runs normally at night. I keep the freezer loaded with food and ice that act as thermal mass so the temperature always stays below freezing and fluctuates only five degrees.

The out-of-pocket cost of the two solar systems and a dozen or so energy efficiency measures was \$15,301, and the investment gives me a simple payback period of only 4.3 years. The payback varies for each energy efficiency and renewable measure, of course. The quicker payback of the energy efficiency measures brings down the longer payback period of the solar installations.

Now I sometimes get a credit on my monthly utility bill instead of owing money. It's a different kind of feeling,

having the money flow the other direction.

Q. *Did you do all of the work yourself?*

I self-installed most of the energy efficiency measures, but I had to get a contractor with a high velocity blower for the dense-pack cellulose wall insulation. H&H Solar installed the solar thermal evacuated tubes and PV panels. I helped a little to get hands-on knowledge.

For the most part, all of the work has been pretty straight forward. Any homeowner could do it, and I'd encourage them to spend 20 or 30 dollars for a watt meter so that they can actually see how much each appliance uses and what they might save.

Q. *You're the president of the Wisconsin chapter of the AESP. What's the AESP? It's probably not a topic of discussion at many dinner tables.*

It's the Association of Energy Service Professionals, a professional association with nearly 1,000 members. We have members from utilities, government agencies, the national energy labs, and consulting firms, just to mention a few. The national convention draws over 300 people annually.

We have 40 or 50 people in Wisconsin. We host three or four events a year with speakers such as PSC commissioners and the head of the state's energy office, along with technology tours and field trips.

Q. *With Innovologie located in Maryland, you obviously work out of your home. How does telecommuting work for you?*

I like working from home. I save an hour a day in commuting, and I can work any time of day or night, or even weekends. I have control over my own work environment, and I'm not in a cubicle.

I communicate with Innovologie staff in Maryland or others in the company at least once a day. I see the other employees once or twice a year at conventions or other meetings.

Q. *Do you work more hours because work is always there to be done?*

I probably work the same number of hours, but work more effectively. I'm not in that nine-to-five office mode. I took a call at 7:00 p.m. the other day from someone in California. In an office setting, the caller wouldn't have gotten a return call until the next day.

My work isn't exactly 9 to 5 either. It involves research methods, software, writing and thinking about data and its interpretation, presenting results and making conclusions and recommendations. The processes go on all the time.

Q. *Why do utilities want any evaluation of their energy efficiency programs?*

They want to know whether their programs work. They want to know the saving and the impacts of their programs. They often have to meet regulatory requirements for energy efficiency. Energy efficiency programs can also help them avoid the high capital costs associated with new power plant construction. They may also gain local control of energy use to avoid usage spikes that force them to go out in the market and buy electricity during summertime peaks.

Utilities and government agencies also care about the non-energy benefits (NEBs) and other benefits, at least some of them do. Many in the private sector want to be good corporate citizens and stewards of the environment as well. They ask about the NEBs — social, environmental, economic and security ones — and Innovologie has several quantitative databases of NEBs and calculating tools.

Q. *Do utilities consider peak oil and natural gas or global warming?*

There's rapidly increasing awareness, but it's not a topic in lot of corporate board rooms yet. I hear some technical and mid-level management people talking about those issues. The utilities have to respond to shareholders, regulators, customers, and other interests. It's human nature to be pretty short-sighted. How many of us think about future generations when we buy a car or adjust the thermostat?

Q. *Where do we stand on energy efficiency? Have we done most of what we can do?*

Oh, no. Energy efficiency remains a largely untapped resource for modern civilization. There's a lot of low-hanging fruit. We have much to be gained from the security, environmental and economic perspectives. We need more education and awareness along with personal and institutional change. The recent study on Curbing Global Energy Demand Growth by McKinsey and Company shows how far we still have to go. (See www.mckinsey.com/mgi.)

Q. *You see energy efficiency and renewable programs all across the country. How does Wisconsin's Focus on Energy program stack up?*

Well, California is No. 1 by far. New York does quite a bit. But it's hard to size up any state's entire effort. I see good things here and there. Some states do well in one area, and other states do better in others. Many programs, including Wisconsin, are undercapitalized. Wisconsin would be well served by stronger recommendations from evaluators. We could do more. We only spend 1.2 percent of our utility costs on efficiency and renewables. We need stronger political will and long-term commitment.✪

Can Ethanol Kick the Fossil Fuel Habit?

by Michael Vickerman
RENEW Wisconsin

Discussions of the net energy balance of grain ethanol tend to gravitate toward the fossil fuels used for growing and shipping corn. Somewhat overlooked in the net-energy-return debate are the substantial quantities of natural gas and electricity consumed at ethanol refineries.

An ethanol refinery that produces 50 million gallons a year burns about 50,000 therms of non-renewable natural gas a day for process heat. This is no trivial expense. Using today's prices, a refinery operator would need to budget at least \$15 million over the next 12 months to secure enough fuel to keep that plant running nearly every hour of the year. After corn, natural gas is the second-largest cost component of ethanol production.

That plant also exerts, on average, a 5 to 10 megawatt load on the electrical grid. The quantity of electricity consumed at that plant could support nearly 6,000 households in Wisconsin. About 75% of the electricity from Wisconsin's power grid comes from coal combustion.

Whether the goal is to reduce greenhouse gas emissions or enhance energy security, it makes little sense to pin our hopes on an agricultural commodity with such an outsized appetite for fossil-fuel-derived energy. When all is said and done, what this biofuel represents is the repackaging of stored energy (coal, petroleum and natural gas) into a land-intensive flow product (corn). Even though several months' worth of sunshine goes into the production of corn, the amount of usable energy contained in ethanol is barely higher than would have been available from using the fossil energy directly.

In other words, the U.S. ethanol industry has become a monumentally elaborate enterprise for moving our energy economy sideways. But if it's forward motion we desire, then ethanol producers must begin finding renewable energy replacements for the fossil en-

ergy sources consumed in the distillation process.

There is no reason, for example, why ethanol refineries in the Midwest cannot make arrangements to source their electricity primarily from wind turbines and biodigesters. If all the ethanol refineries in the region were to commit to sourcing all electricity from renewables, it becomes virtually impossible to justify the new coal-fired power stations that utilities are itching to build for serving them.

The linkage between ethanol's rapid expansion and utility plans to add coal-fired generating capacity has received little public attention. But ethanol refineries are round-the-clock operations, which require baseload power. Moreover, refining capacity is expanding rapidly. According to the Renewable Fuels Association, there are 116 operating distilleries and 78

Nineteen out of 20 ethanol plants are outfitted with natural gas boilers. Some plant operators are considering switching to coal.

plants under construction around the United States. It would take at least one new coal-fired power station and part of a second to serve the added load from 78 new ethanol distilleries.

But the fossil fuel that is giving the ethanol industry its biggest headache is natural gas. As noted in a Reuters article, the ethanol boom "could add roughly 1 percent to U.S. natural gas demand within a year and a half, magnifying an already tight balance between production and rising consumption from homes, businesses, and power plants."

Nineteen out of 20 ethanol plants are outfitted with natural gas boilers. Though they are considerably less expensive to build than coal boilers, soaring natural gas prices cancel out that savings. As a result, some plant operators are considering switching to coal.

A much more sustainable approach would be to use either the crop residues that are trucked into the plant or pellets made from wood and grasses grown on nearby fields. Moreover, the cost of "bioheat" sources like crop residues and pellets would be relatively unaffected by rising natural gas prices. In the long run, locally available bioheat is the optimal approach from an environmental, economic, and risk management perspective.

But time is running out on the U.S. ethanol industry to make the transition to renewable sources of process heat. After a year of relative calm, the natural gas market is showing signs of tightening, and the growth of the ethanol industry is partly responsible for that trend. The other factor contributing to a growing supply squeeze is the observed slowdown in natural gas drilling in Canada. About half of Canada's natural gas output is exported to the United States, supplying 15% of the volume sold here.

The curtailments in rig activity are a consequence of low commodity prices and tighter capital budgets, said Roger Soucy of the Petroleum Services Association of Canada. And while U.S. natural gas output is expected to rise marginally in 2007, it may not be sufficient to offset declining exports from Canada.

In the words of senior analyst Christopher Jarvis, Caprock Risk Management, "It's almost frightening where natural gas prices could be in two to three years."

For a fuel that is classified as renewable, corn-derived ethanol carries with it a very heavy carbon footprint, due to the enormous amount of fossil energy that goes into it. Yet there is a decent chance that the ethanol industry will soon head toward a more "de-fossilized" energy path. If this transition happens, the motivation for it will have little to do with global climate change but a lot to do with simple economic survival.✪

New Coal Rush Negating Wind Energy's Promise

by Michael Vickerman
RENEW Wisconsin

New wind energy projects will reduce the carbon footprint of Wisconsin's electric system by about one million tons of CO₂ a year. (See story on page 1.)

That may look like a substantial reduction, but in reality, it isn't. The total volume of CO₂ discharged from in-state sources rose to 122 million tons in 2005, according to the most recent edition of *Wisconsin Energy Statistics*. In 2003, emissions totaled 120.2 million tons, meaning that Wisconsin's Class of 2008 wind projects will offset about an average year's increase in CO₂ discharges.

The Public Service Commission estimates that wind generation will account for about 90% of the four million megawatt hours a year of new renewable electricity that Wisconsin utilities must provide by 2015. That equates to about 1,800 megawatts of new capacity, which would displace the equivalent of four years' growth in CO₂ emissions. It would take about 1,000 commercial wind turbines to produce all that energy, by no means a cakewalk given the state's volatile siting environment and its pretty-good-but-not-great wind resource.

Taking a broader look, carbon dioxide discharges from Wisconsin sources have risen 25 million tons per year since 1990, an increase of nearly 26% over the benchmark year established under the Kyoto Agreement. If offsetting one year's worth of growth means building 450 MW of wind generation, how many additional turbines would have to be installed to counteract the growth in emissions from the entire electricity generation sector since 1990? Answer: 3,000 turbines.

Simply stated, Wisconsin has neither the physical space nor the resource to accommodate a "moon-shot" CO₂ reduction campaign strictly by substituting renewable energy for fossil energy.

In reality, the challenge is even more daunting than what is suggested by those

numbers. While actual electricity usage in Wisconsin has climbed by more than 40% since 1990, CO₂ emissions have lagged behind, reflecting a period when natural gas dethroned coal and became the utilities' default energy resource. But when natural gas proved to be a costly flirtation, the utilities responded by bringing King Coal back from exile, and he's making up for lost time. Two Wisconsin utilities are now building three large coal-fired power stations, totaling 1,700 MW. Once they're placed in service, these units will generate about 15% of Wisconsin's electricity.

How many additional wind turbines are needed just to offset the carbon footprint from these three coal plants? Answer: Another 3,000.

No matter how many wind turbines are added to the grid, a reduction in carbon emissions is unachievable so long as the utilities are allowed to build new coal plants. And it is virtually impossible to

cut emissions back to 1990 levels without shutting down existing coal plants. To borrow a line from the Christopher Buckley's new book *Boomsday*, we can run from that kind of math, but we can't hide.

If the goal is to remove carbon from the atmosphere, we need to take stronger action than simply establishing quotas for renewable electricity production. We have no alternative but to impose quotas as well on fossil fuel usage that ratchet down over time. Yes, wind turbines produce clean energy without adding to the volume of CO₂ going into the atmosphere. But absent a complementary reduction in electricity demand, as measured by actual reductions in the quantities of coal, gasoline, diesel and natural gas consumed over time, new wind turbines will have no effect on overall levels of CO₂. For that we must simply use less fossil energy, starting today. ✧

PV Makes Giant Strides, Part 2



Employees of Seventh Generation Energy Systems install the roof-mounted panels of the 19-kilowatt installation that also includes two pole-mounted arrays at the new home of Madison-based Wisconsin Energy Conservation Corporation (WECC), administrator of Wisconsin's Focus on Energy programs. The LEED Gold-certified building also features solar collectors to heat water for the restrooms and showers, and a HVAC system that reduces heating and cooling costs by 40 percent compared with standard systems.

Renewable and Energy Efficiency Events

June 12-13, 2007	Small Wind Conference. Custer, WI. Conference brings together stakeholders involved in the specification, installation, maintenance, funding, and permitting of systems up to 100 kW. Sponsored by the Midwest Renewable Energy Association. More information at www.the-mrea.org .
June 15-17, 2007	Renewable Energy and Sustainable Living Fair. Custer, WI. The world's oldest and largest fair of its kind. Sponsored by the Midwest Renewable Energy Association. More information at www.the-mrea.org .
July 21-22, 2007	HybridFest. Madison, WI. The Midwest's largest event dedicated to clean transportation solutions. More information at www.hybridfest.org .
Aug. 11-12, 2007	Illinois Renewable Energy and Lifestyle Fair. Oregon, IL. The sixth annual Illinois Renewable Energy and Sustainable Lifestyle Fair will be held at the Ogle County Fair grounds. More information at www.illinoisrenew.org .
Sept. 12-14, 2007	2007 I-Renew Energy EXPO. Salon, IA. Features workshops and speakers covering wide range of topics, including renewable energy, wind, solar, green building, entrepreneurship and DIY (Do-It-Yourself), children's art, energy efficient technology, renewable fuels, alternative transportation, and advocacy. More information at www.irenew.org .
Sept. 8-9, 2007	Greening the Heartland/SE2. Madison, WI. The premier annual conference on green building and sustainability in the Midwest. Sponsored by the Wisconsin Green Building Alliance. More information at www.wgba.org .
Sept. 15, 2007	Introduction to Biodiesel. Custer, WI. Introduction to biodiesel and SVO with an emphasis on biodiesel in noncommercial applications for the DIY-er using free waste fryer oil from restaurants and food markets. Sponsored by the Midwest Renewable Energy Association. More information at www.the-mrea.org .

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ENERGY CO-DEPENDENTS:

RUSSIA, AMERICA, AND ENERGY SECURITY

by David Knuti

U.S. Commercial Service (Ret)



Editor's note: In the last nine months, RENEW hosted a series of talks in Madison on a variety of topics relevant to the global and local energy picture. Presenters have included

visiting lecturers of reknown such as Randy Udall (a founding member of the Association for the Study of Peak Oil – USA), RENEW staff, and active and retired energy professionals who can speak to a particular subject with authority. Recent topics addressed in this series include the peak in global energy availability, the outlook for renewable energy locally and statewide, biofuels and bioenergy potential and challenges, and the economics of customer-sited renewable energy systems. The article below summarizes a March 13 presentation given by the author at the UW Union. The event was sponsored by RENEW Wisconsin and the Madison Peak Oil Group.

Why is a far off country, which sells the U.S. little oil or gas, so important to us?

Russia is the world's leading producer of petroleum, and exports practically as much oil as world leader Saudi Arabia. It is by far the world's leader in natural gas production, exports and reserves. Yet Russia supplies only three percent of U.S. oil imports. Further expansion is likely, but will not occur until a new oil port is built in the Russian Arctic and liquid natural gas (LNG) facilities are completed on Sakhalin Island. If completed, these flows could add welcome diversity to U.S. energy supplies, enhancing our "energy security" by reducing dependence on such problematic sources as Venezuela and the Middle East. However, Russia already plays a large role in U.S. energy security by keep-

ing the world's energy bowl filled at a time of inexorably increasing demand from China and India.

Uneasy co-dependent rivals in the global energy system

Russia and the U.S. share a unique degree of energy dependence among the world's great nations. Still the world's third-largest oil producer, the U.S. consumes roughly one-fourth of the world's oil and gas supply. Russia depends on energy for 25% of its GDP and 65 % of its foreign trade earnings and also is the world's the second largest natural gas consumer.

Russia has passed its "Peak Oil" moment and now requires large investments and outside participation just to keep production flat.

Russia and the U.S. are also co-dependent forces in the informal arrangements that constitute the "world energy supply system." They are perhaps the only two "total players" that conduct massive production, long range transmission, and downstream processing of both oil and gas.

In its own hemisphere, Russia dominates or aspires to dominate the energy supplies and delivery systems of its former Soviet and East European neighbors. Moreover, it now supplies half the gas imports of Western Europe, which are vital to that key economy. Russia is also the trans-shipper and de facto gatekeeper of energy supplies from its petroleum-rich neighbors in the Caspian Sea region, including Kazakhstan, Azerbaijan, and Turkmenistan.

The U.S. plays a pivotal role in providing financing and energy service on a world scale. U.S. capital markets intermediate much of the investment flow needed for the world's energy projects.

U.S.-owned oil internationals lead in the real work of executing energy projects everywhere. Russia is uncomfortable with this situation and is trying to expand its influence in other countries. Its state-dominated companies are trying to move into downstream activities in both Europe and the United States (witness the LUKoil stations springing up on the East Coast), while restricting the presence of international companies in Russia. It is also selling stock and borrowing money in world capital markets without customary transparency and legal guarantees.

How is Russia doing as it passes "Peak Oil?"

Unfortunately, Russia's recent strong energy production and international initiatives have generated more dread than appreciation. In this period of high demand growth, the world should be grateful that Russia increased oil output 60% after its catastrophic collapse in the early 1990s, and that it is delivering massive supplies of oil and gas through its thousands of miles of pipelines. Instead, Russia's heavy-handed dealings with its neighbors over gas prices and pipeline control have unnerved observers who worry about Russia's ambitions. Some fear that Russia is positioning itself to dominate its neighboring states to the west as well as the rest of Europe through its energy exports. However, an internally weak Russia probably has neither the means nor the vision to pursue such a program.

The reality is that Russia has passed its "Peak Oil" moment—when its largest and most accessible projects reach maximum output—and now requires large investments and outside participation just to keep production flat. Russia's "super-giant" Western Siberian fields swelled production to record levels in the 1980s and new investment in the 1990s squeezed a recovery from the remainder of these deposits. Now Russia

Energy Security

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must launch intensive work on its frontier deposits in the Arctic north and deep offshore waters. The same holds true with natural gas, although the timing of the “peak” is less clear. Sustaining production will require the most advanced technology, tens of billions in annual investments, and international oil company participation. The only consolation is that continuing high energy prices will certainly justify this high-cost development.

Unfortunately, President Vladimir Putin’s reassertion of government control over Russia’s energy industry and his decision to weaken the legal protection for investors have clouded prospects for the future. While the basic market economy structure remains intact, opportunities for the independent Russian oil companies and international oil majors have been reduced. In the process, Russia dismantled Yukos (perhaps its best private oil company) in a dubious tax evasion case and strengthened the dominant role of the government-controlled oil and gas companies. Russia has now joined many other oil countries in favoring “national oil companies,” which have proved less effective in production although more compliant with government priorities. This bodes ill for the world energy system, which needs maximum Russian production.

Positive relationship possible?

We can only hope that Russia’s dependence on energy revenues will force it to resist the old Russian habits of isolationism and autocracy. Faced with impending energy and climate crises, Russia and the United States should pursue their mutual interest through a strengthened world energy system rather than an obsolete Cold War-type game.

Instead of reflexively hurling threats and condemnations at its old nemesis, the United States should cultivate a more constructive relationship with Russia and

try to alleviate the latter’s sense of insecurity and diminished status. America can continue to support independence and democracy in the former Soviet states without projecting provocative and essentially meaningless military shields of NATO membership and missile defense systems. Negotiations with Russia should be completed to bring it under the umbrella of the World Trade Organization (deferring some issues as with China’s membership). As an installment of good faith, the U.S. should repeal the humiliating Jackson-Vanik Amendment, which long ago outlived its purpose of opening Jewish emigration from the now-defunct USSR.

With improved overall relations, the United States and Russia might reopen the serious dialogue on energy issues that began in the 1990s. A long list of complex problems must be solved to help maximize Russian energy output and avoid transportation gridlock. For example, Russia must be persuaded to provide international oil companies with a more legal framework and operational autonomy, so that they can contribute fully to the difficult projects ahead. Russia needs to clean up its approach to energy initiatives in its neighborhood in order to avoid costly wrangles and stalemates. For its part, the United States should recognize that it’s not in Russia’s interest to continue supplying natural gas to its former Soviet neighbors at rock-bottom prices or to allow them to disrupt pipeline traffic. Russian economic power cannot be denied in the East European sphere, but Russia must learn to pursue

Top World Producers and Net Exporters, 2005

Country	Production		Net exports	
	Rank	Barrells/day	Rank	Barrells/day
Saudia Arabia	1	11.1 mil.	1	9.1 mil.
Russia	2	9.5 mil.	2	6.7 mil.
United States	3	8.2 mil.	*	
Iran	4	4.2 mil.	4	2.6 mil.
Mexico	5	3.8 mil.	10	1.7 mil.
China	6	3.8 mil.	*	
Canada	7	3.1 mil.	*	
Norway	8	3.0 mil.	3	2.7 mil.
UAE	9	2.8 mil.	5	2.4 mil.
Venezuela	10	2.8 mil.	8	2.2 mil.
Nigeria	*		6	2.3 mil.
Kuwait	*		7	2.3 mil.
Algeria	*		9	1.8 mil.

* Not in top ten

it through “soft power” rather than blackmail and internal meddling.

New pipelines and ports are essential to opening new production and facilitating trade, but Russia has delayed progress by insisting on an opaque, unilateral approach to routes and financing managed by its pipeline monopolies. On behalf of the world’s growing ranks of oil-importing nations, the U.S. could weigh in to resurrect the proposed port at Murmansk that could open low-cost sea transportation to the U.S.

More imaginatively, Russia and American could use a new relationship to propose joint measures against climate change—such as ending the widespread flaring of natural gas in Russian oil fields unconnected to the gas pipeline grid. A reinvigorated effort by two of the world’s most egregious greenhouse gas emitters would be a great way for these former superpower rivals to reclaim the moral high ground they have lost so dramatically in recent years.✧