

Renewables reality check

by Peter Nye with Scott Gates

(Excerpted with permission from July 2008 *RE Magazine*)

In their search for a “magic bullet” that will secure America's energy independence while also curbing emissions of greenhouse gases, namely carbon dioxide, from power plants, policymakers have turned all eyes on renewable resources - primarily wind, but also solar, small hydro, biomass (including landfill gas, livestock waste, timber byproducts, and crop residue), and geothermal.

Unfortunately, many elected officials have overlooked obstacles limiting a “green power revolution,” namely a lack of transmission lines and dependence on federal tax credits that let renewables stay cost-competitive with conventional generation sources.

Of more concern, some see renewables as a viable alternative to baseload coal-fired and nuclear power plants in providing a reliable supply of electricity at an affordable price - a goal not possible without significant technological advances and one that even most renewable energy groups don't advocate.

“Renewables certainly have a key part to play in our nation's energy future. But contrary to conventional wisdom, they can't meet growing demand for electricity by themselves. Curbing carbon dioxide and other greenhouse gas emissions from power plants while ensuring that our nation's power needs are met must include a blend of advanced clean coal, nuclear, natural gas and renewable generation sources. Fortunately, electric co-ops, serving areas linked to resources like wind and biomass, are naturally positioned to take maximum advantage of alternative power options,” comments NRECA CEO Glenn English.

In a 2007 study, *Electricity Technology in a Carbon-Constrained Future*, the Electric Power Research Institute (EPRI), a Palo Alto, Calif.-based non-profit consortium whose members include electric co-ops, showed how electric utilities could help the United States reduce carbon dioxide emissions below 1990 levels within 23 years - even after adding 30 percent more load, half generated by coal - by taking aggressive steps in seven principal areas, including vastly expanding renewable energy supplies.

Leaving hydropower out of the mix, EPRI sees renewables, led by wind, leaping from 24,000 megawatts (MW) produced nationally in 2006 to more than 120,000 MW by 2030 - or from 2.5 percent of kilowatt-hours (kWh) produced today to roughly seven percent.

“For renewables to graduate even further, to become baseload sources, we need lots of breakthroughs and lots of political will,” asserts Anthony Ahern, president and CEO of Buckeye Power, a Columbus, Ohio, generation and transmission (G&T) co-op that supplies wholesale energy to 25 member electric distribution co-ops, and an EPRI director. “Right now, our electric infrastructure isn't equipped to let renewables take on that role.”

EPRI's estimates are driven by 26 states and the District of Columbia having adopted mandatory renewable portfolio standards (RPS) that require investor-owned utilities and competitive electric generation suppliers to add increasing amounts of “clean and green” electricity - ranging from 10 percent to 25 percent to their power supply mix between 2018 and 2025. (Hawaii, Nevada and North Carolina allow energy efficiency to count toward half of their RPS total.)

A report released recently by the U.S. Department of Energy (DOE) Lawrence Berkeley National Laboratory found that RPS laws, covering approximately 40 percent of the country's electric load - some 1.6 million megawatt hours (MWh) - are having a “sizable impact” on the deployment of renewable energy generation. Since 1998, more than half of non-hydro renewable capacity additions, 8,900 MW (93 percent wind), occurred in RPS states. Programs now in place will add nearly 61,000 MW of new renewable capacity by 2025 assuming full compliance.

However, even with this increase, non-hydro renewables will only represent 4.7 percent of total capacity in 2025.

Another study, *The Race for the Green: How Renewable Portfolio Standards Could Affect U.S. Utility Credit Quality*, by the Wall Street ratings firm Standard & Poor's cautions that the RPS “green marathon” may result in con-

sumer pain - and possible erosion of political support: "RPS laws are moving utilities and other load-serving entities squarely away from least-cost procurement and toward acquiring often above-market renewable generation in unprecedented quantities. At the same time, consumers have yet to fully experience the cost and retail rate impacts of this shift."

The analysis elaborates that little data exists to assess the costs of implementing RPS (since most laws have only been around for five years), while legislators and the media have largely accepted the notion that renewable generation can supplant fossil fuels for producing power without significant impact.

"Absorbing RPS expenses into retail rates could have credit implications for some utilities," Standard & Poor's warns, "especially at a time when the electric industry must cope with rising costs for fuel, construction materials [like steel, concrete and copper], operations and maintenance expenses, and labor."

The ratings agency further notes that "the growth of renewables has had a negligible impact on U.S. power supply over the past 15 years [it makes up the same portion of the market as in 1993]" and that wind generation - the primary renewable energy source - "remains an infinitesimal fraction of U.S. generation."

"The lack of price transparency has helped RPS gain acceptance," relates Jay Morrison, NRECA senior regulatory counsel. "But a lesson we've learned from electric deregulation is that when consumers have a choice to buy green power at a premium price, few do."

Wind in the wires. U.S. wind power capacity expanded 45 percent in 2007, from 11,574 MW to 16,818 MW, says the Washington, D.C.-based American Wind Energy Association (AWEA).

Wind power, located in 34 states, provides one percent of the nation's electricity supply and will generate an estimated 48 million MWh (in 2008). Leading wind producing states are Texas, California, Minnesota, Iowa and Washington.

"Close to 150 electric co-ops either own wind turbines or buy output from wind farms, amounting to more than 820 MW, or about five

percent of U.S. wind generating capacity," remarks Kirk Johnson, NRECA vice president of environmental policy. "Co-ops also have plans to build an additional 961 MW of wind over the next few years. Wind will definitely be the favored renewable power source for years to come, at least until solar technology evolves and comes down in price."

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American Wind Energy Association's vision - supported in a May 2008 DOE report - means erecting 6,819 turbines a year on land and offshore.

To fully realize a "20 percent solution," though, wind must overcome two main challenges: transporting generation from wind farms, usually located in rural

areas, to cities and suburbs; and intermittency - wind doesn't blow all of the time.

AWEA Executive Director Randall Swisher argues that it is a fundamental mistake to try and make wind into a capacity resource. "It is an energy resource. You take the wind when nature delivers it and rely on other system resources when it is not available. Storage should be added where it will provide the greatest value to the overall system," he says.

AWEA doesn't believe it will be cost effective or necessary to achieve baseload characteristics for wind in the foreseeable future.

Wind's variability also makes life difficult for grid operators, who must ensure backup energy on short notice if breezes suddenly fizzle. That happened on February 26, 2008 when wind production in the West Texas corridor plummeted from 1,700 MW to 300 MW. At the same time, load demand rose 2,500 MW in 40 minutes. To handle the crisis, Electric Reliability Council of Texas grid operators called on industrial "interruptible" customers who had agreements to forego power during an emergency. Peaking facilities fueled by natural gas provided generation to avoid a brownout. The situation lasted for three hours, and highlighted the need for better wind forecasting.

In Ohio, Buckeye Power's President and CEO



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Anthony Ahern heard a group was championing how wind turbines placed on Lake Erie could supply the state with 20 percent of its electricity needs—around 32 million megawatt hours (MWh) annually.

So he checked the math. “I assumed 2-megawatt turbines at 35 percent annual capacity factor. Each turbine generates about 6,150 MWh per year. Therefore, we would need 5,200 wind turbines in Lake Erie,” he says.

Map verification indicated that 5,200 wind turbines would entirely fill Ohio’s ownership of Lake Erie with a 30 x 175 array of wind turbines spaced 4,600 feet apart. “This is obviously impractical,” Ahern continues. “I tell people that when they hear someone make claims, don’t be afraid to ask questions. Sometimes expectations exceed realities.”

Any “gust” of wind power deployment could also quickly vanish without a 2 cents per kWh federal production tax credit (PTC) provided to investor-owned utilities or Clean Renewable Energy Bonds (CREBs) available to electric co-ops. These incentives help lower the costs of wind (and other renewable) projects to make them competitive with conventional sources of generation.

Missing link. Today, more than 80 percent of the nation’s 900-plus rural electric systems supply some of their electricity needs from renewables, owning or purchasing 1,415 MW, enough to power at least 1.2 million homes, notes NRECA Strategic Planning & Analysis. Another 1,093 MW of co-op renewables are on the drawing board.

But any large-scale expansion of renewables - enough to offset a big chunk of traditional baseload generation - begins with adding at least 30,000 miles of high-voltage transmission lines to wheel energy generated at remote wind farms and other facilities to urban load centers. On wind alone, American Electric Power, one of the biggest investor-owned utilities and owner of the country’s largest transmission system, estimates the nation needs to build 19,000 more miles of 765-kV lines over the next 20 years to deliver 300,000 MW, an investment of \$60 billion.

“Planning and permitting approvals take many years and run a gauntlet of not only federal, state, and local governments but also citizen and environmental activists. Even building 75 miles of transmission line poses a big challenge because of NIMBY [Not In My Backyard],” explains Revis James, director of EPRI’s Energy Assessment Center.

A recent Standard & Poor’s report finds that connecting electricity from new renewables will “lead to billions of dollars in outlays for utilities and higher bills for ratepayers.”

To enable renewable energy development and limit costs to consumers, NRECA has proposed creation of National Renewable Transmission Corridors and called on Congress to “develop policies and funding mechanisms for transmission lines that could exceed \$2.5 million per mile.”

South Central Power members are encouraged to go to www.ourenergy.coop and begin (or continue) an energy policy dialogue with their elected officials in Washington DC.