

Perspectives

A newsletter covering the research, demonstration and education projects of the Iowa Energy Center

Wind Industry Sets New Records Internationally and At Home, Legislation Extended

1999 was another record breaking year for wind generation. According to estimates from the American Wind Energy Association (AWEA), more than 3,600 MW of new wind capacity was installed around the world, boosting the total global capacity to 13,400 MW. This is the largest international growth in wind capacity in a single year. Germany, the United States, Spain and Denmark installed 80% of that new capacity, and are also home to 70% of the turbines around the world.

In addition, nearly 200 MW of existing capacity was “re-powered” with new turbines replacing older, less efficient models. The global market for small systems (under 100 kW of generating capacity) also grew 35% during last year. Small wind systems, which usually power homes and small businesses including farms and ranches, currently account for nearly 15 MW of generating capacity in the United States

Iowa Wind

Closer to home, Iowa now has the third largest wind generating capacity in the US, behind California and Minnesota. The state is home to 327 large-scale wind turbines, with a total generating capacity of 242 MW.

The largest wind farm in Iowa and the *country*, the Storm Lake Wind Power Facility, also came on line in 1999. This 193 MW facility is located in Buena Vista and Cherokee counties and is owned and operated by Enron Wind Corporation. The wind farm consists of 257 wind turbines each capable of generating up to 750 kilowatts. According to the Enron Wind Corporation web site, the facility will, on average, generate enough electricity to supply 72,000 Iowa homes or 192,000 people. The electricity is being purchased by Mid-American and Alliant Utilities.

There was also good news in 1999 for three wind turbines in Algona, Iowa which produced 13% more electricity than was predicted before construction. The tur-

bines are owned by a consortium of seven Iowa municipal utilities and have a capacity of 2.25 MW. One of the utilities

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Letter from the Director

As we enter a new year, a new century and a new millennium, it's useful to look back and measure the progress we have made in energy efficiency and renewable energy.

One very healthy sign is that the energy intensity of the U.S. economy (measured in energy per unit of Gross Domestic Product) is dropping. In other words, the economy is getting more efficient. Analysis by the American Council for an Energy Efficient Economy projects that if the U.S. still used as much energy per unit of Gross Domestic Product as it did in 1970, we would consume around 153 quadrillion British thermal units (Btus) this year. In fact, we will consume 95 quadrillion Btus. The 68 quadrillion Btu reduction provides consumers and businesses with trillions of dollars in energy savings and greatly reduces their environmental impact.

Data from the federal Energy Information Administration shows that U.S. economic output grew by 13% between 1996 and 1999, while energy use grew only 2%. Stated a different way, U.S. energy intensity dropped 10% during these three years.

A number of factors underlie these efficiency improvements. New technologies and industrial production processes have been developed. Many energy users have a better understanding of how to use energy effectively. Government policies for building codes and appliance efficiency standards have been substantially strengthened. Additionally, there have been some fundamental changes in the nation's economy including shifts to high-tech, less energy intensive industries, and increased use of information technology and e-commerce. Research, development, demonstration and education have been essential components of all these changes.

In 1970, most renewable energy technologies were relatively new, not very reliable and expensive. Today, these technologies have substantially evolved. Energy production efficiencies for these technologies have risen significantly, reliability of the equipment has improved and costs per kilowatt-hour produced have dropped dramatically.

According to the American Wind Energy Association, electricity produced by wind turbines in the early 1980s cost 25 cents per kilowatt-hour. Today, it costs around 4 cents per kilowatt-hour. That's not quite competitive with conventional fossil fuel technologies, but it's getting very close. Electricity produced by photovoltaic panels still costs over 10 cents per kilowatt-hour, but the technology has found a number of niches (calculators, navigation buoys and other remote applications) where it is more cost effective than supplying power by any other means.

Once more, significant public and private investments in research, development, demonstration and education are behind these improvements.

We have made great progress over the last quarter century. Are we done yet? Not by a long shot! While the rate of energy use in the U.S. has slowed, it is still growing. Worldwide, energy use is exploding as billions of people seek to live as we do. And, as energy use expands, environmental impacts will continue to grow.

Our economy can be more energy efficient, even while it grows. Renewables can be made even more cost effective. We, at the Iowa Energy Center, and our colleagues around the world in research, development, demonstration and education still have much to do.

--Floyd Barwig

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The Iowa Energy Center was created by the 1990 Iowa Energy Efficiency Act. Its mission is to help Iowans reduce their reliance on imported fuels and nonrenewable resources and to increase efficiency in all areas of energy use. This is accomplished in part through a competitive grants program which sponsors energy efficiency and renewable energy research and demonstration projects.

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To be added to the Center's mailing list call 515-294-8819 or e-mail iec@energy.iastate.edu. Online versions at www.energy.iastate.edu.



Continued from front . . .

BECON Builds Up and Out

In Cedar Falls, Iowa, offers customers the opportunity to sign up for wind power if they pay an extra \$2.50 per month. Over 600 residential customers have signed up since last February.

Tax Credits Extended

The wind industry got another boost in December when President Clinton signed legislation extending the wind energy Production Tax Credit (PTC) for another 30 months.

This 1.5 cent per kilowatt-hour credit will be effective retroactively from June 30, 1999 (the date it expired) until December 31, 2001.

Senator Chuck Grassley (R-Iowa) and Rep. Bill Thomas (R-Calif.) played an invaluable role in the extension of the production tax credit. "Gaining the PTC extension was made possible by leadership from Sen. Chuck Grassley (R-Iowa) and Rep. Bill Thomas (R-Calif.), both of whom sponsored legislation calling for a five-year extension," said AWEA executive director Randall Swisher. "At each step along the way, Sen. Grassley and Rep. Thomas made sure the wind tax credit was part of the mix."

AWEA noted in their press release that during the 1990s, wind has been the fastest growing energy technology in the world, with an annual growth rate of 22.6%.

In 1999, AWEA estimates over 900 MW of new or repowered capacity will have been installed, bringing wind energy generating capacity in the United States to approximately 2,500 MW.

For more information on the tax credits, or wind energy, visit the AWEA web site at www.awea.org.

Construction continues at the Iowa Energy Center's BECON (Biomass Energy CONversion) facility, as two more buildings are added. These pre-engineered metal buildings are easy to construct, relatively low in cost and ideal for the BECON site.

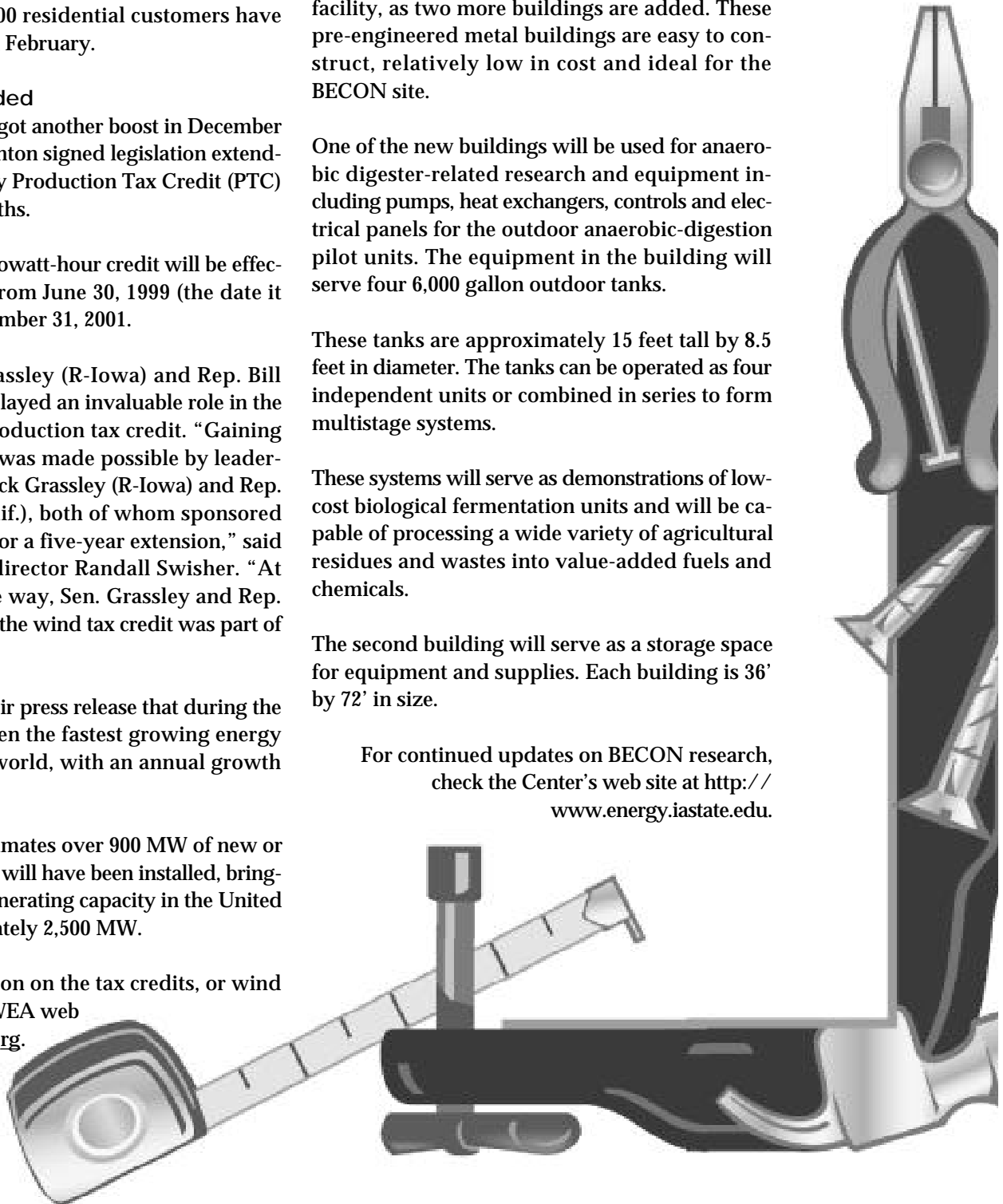
One of the new buildings will be used for anaerobic digester-related research and equipment including pumps, heat exchangers, controls and electrical panels for the outdoor anaerobic-digestion pilot units. The equipment in the building will serve four 6,000 gallon outdoor tanks.

These tanks are approximately 15 feet tall by 8.5 feet in diameter. The tanks can be operated as four independent units or combined in series to form multistage systems.

These systems will serve as demonstrations of low-cost biological fermentation units and will be capable of processing a wide variety of agricultural residues and wastes into value-added fuels and chemicals.

The second building will serve as a storage space for equipment and supplies. Each building is 36' by 72' in size.

For continued updates on BECON research, check the Center's web site at <http://www.energy.iastate.edu>.



Perspectives on Renewable Energy

A new 32-page booklet from the U.S. Department of Energy's National Renewable Energy Laboratory provides an overview of the opportunities and challenges surrounding the increased use of renewable energy in the United States. *Choices for a Brighter Future: Perspectives on Renewable Energy* looks at the use of renewable energy in eight regions of the nation, plus Alaska and Hawaii. A regional approach was used because each area has its own energy needs, electrical system constraints, policy issues and environmental concerns.

The booklet also discusses the implications of the emerging competitive market for electricity and the policy options that would support the use of renewable energy.

Choices was funded by the Department of Energy's Office of Power Technologies. The public can obtain copies by writing the National Technical Information Service (NTIS), U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161; calling (800) 553-6847; or going to the NTIS web site at <http://www.eren.doe.gov/power/choices.html>.

Email Anyone?

In an effort to save paper and resources, reduce postage and printing costs, and be more efficient, the Center is trying to update and upgrade its mailing list. Part of this effort includes gathering email addresses.

If you have an email address you are willing to share with us, please drop us a line at

iec@energy.iastate.edu.

The Center does **not** share or sell its mailing lists.

Also, if we are mailing unneeded, multiple copies to your office, or the copies are addressed to the wrong person, please let us know. Address corrections can also be

Bioproducts Directory On-Line

The New Uses Council has added a valuable element to its web site – an on-line, fully searchable bioproducts directory.

This on-line directory lists over 150 individual and organizational web sites related to bioproducts and research. Each web site is linked from this site, <http://newuses.org/BRD/>. If your organization and web site are not listed, they can be added for free on-line.

The New Uses Council is a nonprofit membership organization run by volunteers dedicated to expanding the development and commercialization of new industrial, energy, and nonfood consumer uses of renewable agricultural, forestry, livestock and marine products.

FAA Approves Ethanol-Blend for Aircraft

AGE85 is the name of a new ethanol-blended aviation fuel recently approved for use by the Federal Aviation Administration (FAA). The new fuel was approved after a series of in-flight tests and engine

teardowns proved the fuel could meet FAA standards for performance, materials compatibility and engine wear.

The new fuel-blend, which contains 85% ethanol, was created by the University of North Dakota's Energy and Environmental Research Center (EERC). EERC research manager Ted Aulich was quoted in *Oxy-Fuel News* saying, "We believe AGE85 is an economic alternative. Based on a current price of pure ethanol at (95 cents per gallon), AGE85 is expected to sell at the pump for about (\$1.10 per gallon), compared to the current avgas (aviation gas) price of \$2 per gallon."

Aulich also said that AGE85 is 15% less efficient than conventional avgas. The demand for aviation fuel in the U.S. is currently between 600 and 700 million gallons per year.

The FAA's approval of AGE85 only applies to its use in various models of Cessna aircraft with Continental engines. The EERC said it expects half of the existing aircraft fleet in the U.S. will be certified by the FAA to use AGE85 in the next 18 months.

New NLP/IP Lighting Publications Posted

The most current data on over 300 screwbase compact fluorescent lamps (CFLs) is now available on the National Lighting Products Information Program's (NLP/IP) web site.

The product data are available in searchable databases and the full report is available in Adobe Acrobat file format. Due to a partnership the Iowa Energy Center has with the NLP/IP's parent organization, the Lighting Research Center, all of this information is FREE to Iowans. The NLP/IP web site address is <http://www.lrc.rpi.edu/NLP/IP/index.html>.

Additionally, two new *Specifier Reports* on dimming electronic ballasts and residential luminaries are also available. Each takes an in-depth look at the performance issues for the technologies.

Other highlights of the LRC's web sites:

Lighting Specifiers – Ideal for anyone specifying lighting products for commercial and residential applications. Readers will find in-depth reviews on a wide range of products and applications. <http://www.lrc.rpi.edu/specifier.html>

Lighting Design Professionals – Energy professionals who evaluate, deploy or design lighting solutions should take a look at the recent posting of three new lighting design patterns for private offices, dormitories and home offices. <http://www.lrc.rpi.edu/designer.html>

Home Lighting Enthusiasts – If you're building a new home or renovating, check out the resources on residential lighting, including interactive demonstrations of kitchen and living room lighting. <http://www.lrc.rpi.edu/indexedu.html>

New Small Projects Grants

Changes were recently made to the Iowa Energy Center's grants program, making it easier for small organizations to apply for workshop, conference, exhibit and small demonstration grants. These changes will also assist the Center staff in responding more quickly to funding requests – usually within four weeks of receiving the proposal.

The Center will provide up to 50% of an eligible project's cost, up to a maximum of \$7,500 per grant. Grant proposals will also be accepted on a continuous basis throughout the year. Funding proposals can be submitted in a letter format and need not be long; a 2-3 page letter should suffice in most cases.

The proposed projects must be located in Iowa, demonstrate a clear tie to energy efficiency and/or renewable energy and have a clear educational purpose. Some examples of eligible projects include:

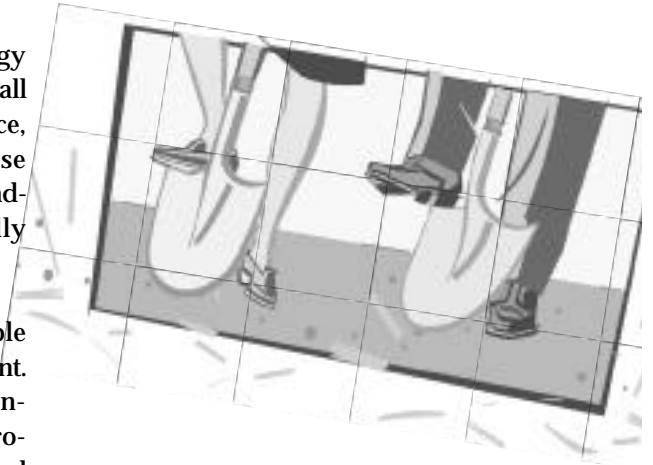
- a conference at which Iowans explore wind energy, solar energy or home improvements to boost energy efficiency;
- a workshop at which architects or engineers learn to use software to calculate energy use in buildings;
- a course that teaches home builders best practices for installing insulation;
- a rental of a previously developed display on renewable energy for exhibition at a fair or science center;
- and the design and installation of a working demonstration of photovoltaic panels to produce electricity, coupled with an on-going educational program that uses the demonstration as its focal point.

The Center will provide up to 50% of an eligible project's cost, up to a maximum of \$7,500 per grant. Grant proposals will also be accepted on a continuous basis throughout the year.

Organizations eligible to receive Iowa Energy Center funds include Iowa private nonprofit organizations, foundations and educational institutions. The Center is not permitted to award grants to other state entities such as state, county or local government agencies. A proof of an organization's nonprofit status may be required.

The Center also encourages applicants to collaborate with other groups and build partnerships. Collaborating organizations do not have to be Iowa-based and they can also include for-profit groups.

A copy of this latest small grant Request for Proposal can be found on the Center's web site at <http://www.energy.iastate.edu/grants/grantops.html>. An application can also be received by calling the Center's main office at 515-294-8819



Up and Coming . . .

Momentum is Building Contractors' Conference

Hosted By: Iowa's Electric Utility Cooperatives
When & Where: February 10-11; Hotel Fort
Des Moines, Des Moines, Iowa
Focus: This conference is geared toward heating,
ventilation and air conditioning contractors, home
builders and electricians. Speakers will discuss the
latest information on insulation products; the effects
of moisture and mold on buildings and indoor air
quality and how to prevent and cure these problems;
and a comprehensive review of energy-efficient
windows issues including customer comfort, condensation
and efficiency ratings.
For More Information: 319-366-4512, ext. 358

Advanced Tools and Techniques of Cool Daylighting

Hosted By: University of Wisconsin and the Energy
Center of Wisconsin
When & Where: April 20, Madison, Wisconsin
Focus: This training session is the third in a series
of seminars produced by the Daylighting Collaborative.
It offers practical tools and techniques for developing
and testing your own daylighting solutions for unique
projects and building types.
For More Information: 1-800-462-0876; [http://
pd.engr.wisc.edu/brochures/9109.html](http://pd.engr.wisc.edu/brochures/9109.html)

Affordable Comfort 2000

Hosted By: Affordable Comfort, Incorporated
When & Where: April 3-8; Columbus, Ohio
Focus: This annual event focuses on residential
energy efficiency and weatherization. The conference
features nearly 100 workshops plus advanced technical
sessions and trade show.
For More Information: 724-223-7750;
www.affordablecomfort.org

2nd Annual National Green Building Conference

Hosted By: National Association of Home
Builders Research Center
When & Where: April 5-7, Denver, CO
Focus: This event covers resource-efficient
construction for the mainstream home builder and
features green information, techniques and technologies.
For More Information: 1-800-638-8557;
www.nahbrc.org/builders/index.html

NEED 2000 Energy Conferences for Educators Series

Hosted By: National Energy Education Development
Project (NEED)
When & Where: May 1 registration deadline;
courses July 8-12 in Ventura, California; and July
22-26 in Charleston, South Carolina
Focus: These five-day energy education programs
help educators – both classroom and corporate –
implement comprehensive energy programs for their
respective audiences. Participants gain an understanding
of energy and the tools and knowledge necessary to
facilitate energy programs in their regions. Scholarships
are available.
For More Information: 1-800-875-5029

8th National Conference on Building Commissioning

Hosted By: Portland Energy Conservation, Inc.
When & Where: May 3-5, Kansas City, MO
Focus: The conference covers recent trends and
developments in commissioning and operating
buildings. Designed for building owners, managers,
architects and engineers, construction managers
and contractors, operators and commissioning
service providers to come together to discuss how
commissioning can improve the quality, performance
and energy efficiency of commercial buildings.
For More Information: 1-503-248-4636, extension
204; www.peci.org/ncbc/2000/index.html

One-Day DDC Course Offered By Popular Demand

In response to popular demand, the Iowa Energy Center is offering a one-day course on Direct Digital Controls (DDC) Friday, March 31. Jay Santos of Facility Dynamics Engineering, will teach the course. Jay is an instructor for the week-long DDC courses offered by the Center.

The course will be held at the Center's Energy Resource Station, located on the Des Moines Area Community College campus in Ankeny. The course is designed to show how a DDC system gathers information, makes decisions and does its job by adjusting control equipment, tracking energy use and issuing alarms.

Participants will become familiar with the basics of DDC including:

- the basic components of control loops and the various types of control loop responses;
- the concepts of system inputs, outputs and scaling;
- programming tools used to describe common

HVAC control sequences;

- a basic approach to developing control logic diagrams;
- developing control strategies for heating coils, cooling coils and mixed air subsystems;
- single-zone system structures;
- the criteria for specifying a DDC system;
- system control logic for various HVAC system types;
- and acquiring and commissioning a DDC system.

This course is ideal for building owners, facility engineers, HVAC design engineers, controls contractors, facility managers and energy efficiency professionals.

The one-day course will be held from 8 a.m. to 4:30 p.m. There is a fee of \$100 which includes reference material, lunch and refreshments (CEU credit has been applied for). If participants register before March 3, the early registration fee is only \$85. Registration is required before March 24 and space is limited. To register for the course, contact Denise Junod at the Energy Resources Station, 515-965-7055, djunod@energy.iastate.edu or register on-line at www.energy.iastate.edu.

If you have an energy-related event you would like to have included in *Perspectives*, please send the information at least two months in advance to: *Perspectives*, Iowa Energy Center, 2521 Elwood Drive, Suite 124, Ames, Iowa 50010-8263, fax the information to 515-294-9912 or e-mail iec@energy.iastate.edu.

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