



More Bluebonnet members are harnessing the wind, capturing the sun and lowering their electric bills

POWER PRODUCERS

Wind and sun are no longer bit players on the energy stage. Technology improvements and availability options make solar and wind generation more affordable today. Owners of homes and businesses around the country are installing more clean energy systems and utilities are adding renewable energy options to their power generation portfolios.

Bluebonnet Electric Cooperative members are following the national trend. Only a few co-op members had installed solar panels or wind turbines a decade ago. Today, Bluebonnet has 208 renewable energy installations – 17 wind and 191 solar – on its electric grid. “Our renewable energy program has evolved over the years,” said Bluebonnet General Manager Matt Bentke. “We have worked with our members who considered or installed wind or solar power systems, listened to their concerns and tailored our program based on what we learned. “As the number of wind and solar power systems increase, we will work with our members to ensure the

impact on our electric grid benefits everyone.” Mike Clark’s family and Dixie Burgess’ family are on the cusp of the renewable revolution. They are the largest residential solar and wind power producers on Bluebonnet’s system. Clark’s weekend getaway near Industry is partially powered by a series of solar panels while Burgess’ retirement home outside Brenham gets part of its power from a 100-foot wind turbine. Read about how Clark and Burgess wholeheartedly embraced renewable energy and what Bluebonnet is doing to assist co-op members who want to go green, too.

— Janet Wilson

What does it mean to be ‘off the grid’

To be “off the grid” means to get your power solely from a solar- or wind-power system, or a generator fueled by gasoline, natural gas, propane or diesel instead of from an electric utility. People who want to be off the grid often use a solar- or wind-power system, or both, to power their homes and charge batteries to provide power at night or when there isn’t enough wind or sun to power their systems. They might also have a generator as a back-up system.



Lukas Keapproth photo

How do I start the process of generating solar or wind power?

An internet search can help you find local companies that install solar panels or wind turbines. You may have many options, so it’s important to thoroughly read reviews of companies to ensure you choose the best one for you and your home. Bluebonnet members considering solar or wind power installations should contact our member service representatives by calling 800-842-7708 or visiting one of our five Member Service Centers in Bastrop, Brenham, Giddings, Lockhart and Manor.

Mike Clark checks the wiring diagrams box for 13 solar inverters, which change the DC current that comes in from his solar panel arrays to the AC current he can use at his family’s weekend compound in Austin County.



Sarah Beal photo

Dixie Burgess and her husband, Ken, installed a 100-foot wind generator tower at their home outside Brenham. “We love to watch that meter, especially on a windy day,” Dixie Burgess said about the meter that records the power produced by wind and the power supplied by Bluebonnet Electric Cooperative.

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MONTHLY MEETING

Bluebonnet’s Board of Directors will meet at 9 a.m. Nov. 15, at the Grand Hyatt San Antonio, 600 E. Market Street, San Antonio. Find the agenda and last-minute updates Nov. 11 at bluebonnet.coop. Hover your cursor over ‘next board meeting’ on our home page.

OFFICE CLOSINGS

Bluebonnet’s offices will be closed Nov. 11 for Veterans Day and Nov. 24-25 for the Thanksgiving holiday.

CONTACT US

Bluebonnet Electric Cooperative
P.O. Box 729
Bastrop, TX 78602
Member services: 800-842-7708, Monday through Friday, 7 a.m. to 5:30 p.m.
Email: memberservices@bluebonnet.coop

OUTAGES

Call 800-949-4414 if you have a power outage. Keep up with outages 24/7 at bluebonnet.coop. Hover your cursor over ‘outage report’ on our home page. You can also send us a text message: To get started, text **BBOUTAGE** to 85700 and follow the prompts. Save that number in your contacts, perhaps as “Bluebonnet Outages.” If your power goes out, text OUT to that number. Download our free mobile app for iPhone or Android and you can report an outage on your smartphone.

ABOUT THIS ISSUE

Bluebonnet Electric Cooperative produced the blue-bordered pages 18-25 in this issue of the magazine with content that is of specific interest or relevance to Bluebonnet members. The rest of the magazine’s content is distributed statewide to any member of an electric cooperative in Texas. For information about the magazine, contact Janet Wilson at 512-750-5483 or email janet.wilson@bluebonnet.coop.

Answer to energy needs
for couple's Brenham
retirement home is
blowing in the wind

WIND PRODUCERS

By Ed Crowell

When Dixie and Ken Burgess cut back to part-time work and considered retirement, they also had visions of slowing down their electric meter and letting it rest, too. They envisioned a wind generator or solar panels in the backyard of their retirement home.

"We wanted to save money on our electric bills," said Dixie Burgess. "We had had an interest in green energy for a while."

The couple moved four years ago from a Houston subdivision to a country home on five acres just south of Brenham. The large Tudor-style house that now accommodates visits by 12 grandchildren brought higher electric bills.

Ken Burgess, a 69-year-old former Gulf Oil and Alcoa human relations employee, said he read an alternative energy article in Texas Co-op Power magazine that was "an incentive and a good idea, so we started looking around. We talked to the owner of a Brenham tree nursery who had a small wind generator."

"Then we bought a wind turbine in Minnesota on the internet, kind of as a lark picking that one," said Dixie Burgess, 73, who had managed an employee assistance program at ConocoPhillips.

The Burgesses had researched the average annual wind speed in their area and figured the 6-8 mph range could produce a reasonable amount of energy with a tall wind generator.

The unit they bought has a 100-foot tower and a generator atop that with three 14-foot blades and is capable of producing up to 17.5 kilowatts



Sarah Beal photo

Buying and installing a wind generator became a year-long effort in 2014 for Dixie and Ken Burgess. The tower was shipped from Minnesota but they used Brenham-area companies to build the support pad in their backyard and to lift the tower and wind-generator blades into place.

of power at a given moment.

That capacity makes it the largest residential wind energy generator among Bluebonnet Electric Cooperative members. Wind power allowed the Burgesses to pay about 25 percent less for electricity last year.

Getting the generator up and running after it was shipped to their property in late 2013 was no easy task. That process would take a full year and a village of out-of-state and local workers to complete.

The Burgesses bought the generator from a

farmer in Minnesota who already had two other wind generators and who said he didn't need the third one after all, even though it was already assembled.

Once the unit had been disassembled, packed and trucked to Texas, the Burgesses consulted with Bluebonnet about specifications to tie into the electric grid. "We couldn't have been happier with Bluebonnet. They were so helpful and supportive of what we were doing with

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Interested in renewable energy?

Bluebonnet works with co-op members to make installations easy

By Will Holford

Solar arrays and wind turbines are not everyday sights in the 14 Central Texas counties served by Bluebonnet Electric Cooperative. But with an increasing interest in renewable energy, more are coming and the co-op is ready to help.

"We have seen a significant increase in the number of members who have installed solar power systems in the last three years," said Bluebonnet's General Manager Matt Bentke. "Many more members are asking us what it would take to install them at their farms, ranches, homes or businesses.

"We are committed to listening to our members who have or want renewable energy systems, and designing the best policy that benefits all our members."

Bluebonnet works closely with members interested in renewable energy because their systems must be properly connected to the co-op's power distribution system.

To ensure safety and reliability, Bluebonnet developed a policy that addresses power produced near or at the home or business where it is consumed. Power generated at the point of consumption is known in the electric industry as "distributed generation."

Distributed generation can come from renewable sources, like a wind turbine on a farm or ranch, or solar arrays on the roof of a home or business. It can also come from generators that provide back-up power during electric outages.

Some consumers use renewable energy sources to get completely off the electric grid. But it's far more common that wind or solar systems reduce — rather than completely replace — the amount of energy purchased from a local utility.

Bluebonnet requires renewable energy systems to adhere to its policy on distributed generation interconnection, or DGI. Safety comes first.

Bluebonnet requires each renewable energy system and back-up generator to have a switch that can disconnect the system or generator from the co-op's electric grid. The system can still provide power to the home or business, but isolating that power from the rest of the grid in certain circumstances can prevent a potentially dangerous situation or damage to other homes or businesses on that section of line.

"Our crews take every precaution to ensure their safety and the public's safety when working to restore power during an outage or when doing routine maintenance," Bentke said. "It's very important that we know which members have back-up generators and wind and solar systems so during outages or maintenance we can prevent that power from flowing onto the grid and causing an injury or damage to our equipment or their neighbors' homes."

Bluebonnet's policy also ensures that members are accurately billed for the energy they consume from the grid and, likewise, that they are paid for the ex-

cess energy their renewable system sends to the grid.

When a member's wind or solar system produces more energy than the household or business consumes, those kilowatt hours are "banked" at the end of each billing cycle. Bluebonnet pays members for their excess energy at the average annual wholesale power rate, which was 4.6 cents per kilowatt hour in 2015. Members receive a credit on their electric bill in January or February for the energy their system sent to Bluebonnet's grid during the previous calendar year.

Bluebonnet explains its policy in detail when members or designated renewable energy vendors contact the co-op to inquire about installing a wind- or solar-power system or a back-up generator. The distributed generation interconnection (DGI) agreement and technical specifications to safely and reliably connect a renewable energy system or back-up generator are on Bluebonnet's website at bluebonnet.coop. Hover your cursor over the Net Energy Market tab, then click Home Renewables & Green Energy Rates. Bluebonnet's member service representatives can also provide the information and agreement.

The co-op's engineering department also works with members and vendors to review the design for

Bluebonnet works closely with members interested in renewable energy because their systems must be properly connected to the co-op's power distribution system.

renewable energy systems so that they can be safely and reliably connected to the electric grid. Once the interconnection documents have been signed and the energy system is designed and installed, Bluebonnet inspects the connection between its grid and the wind or solar system and installs the dual-register electric meters that will measure the amount of energy a member purchases from Bluebonnet and the amount of excess power the member's system sends to the grid.

Bluebonnet's distributed generation interconnection agreement is good for five years, but it renews automatically. However, members with renewable energy systems or back-up generators must notify Bluebonnet if any changes are made to the system so the co-op can re-inspect the system for safety and reliability.

After members begin generating power, a Bluebonnet member service representative makes contact to explain logistics, including what their new electric bill will look like, how they will be billed for power they purchase from Bluebonnet and how they will be paid for excess power generation.

Bluebonnet looks forward to partnering with members who want to produce their own energy. After all, teamwork generates the best power.

Windy fact

In 2015, wind power represented almost 5 percent of electricity generation in the United States, with an installed capacity of over 70 gigawatts. That's enough to power more than 18 million homes.

Do I have enough wind?

Check out high-resolution state wind maps at energy.gov that show average wind energy at a 30-meter tower height across each state. These maps create an overview of a state's wind resources, but because wind resources vary due to local features such as trees, hills, and buildings, you should get a professional evaluation of your site before installing a wind energy system.

How would wind work for me?

Small wind energy systems can be used with a grid-connected system, or in stand-alone applications not connected to the utility grid. A grid-connected turbine can reduce your consumption of utility-supplied electricity. If the turbine cannot deliver the amount of energy you need, the utility makes up the difference. When the wind system produces more electricity than the household requires, the excess can be sold to the utility.

Source: energy.gov



Mike Clark, right, didn't want solar panels installed atop his modern-style compound, so he built two large steel parking structures in the nearby pasture that hold a total 5,616 square feet of photovoltaic panels.

Lukas Keapproth photo

SOLAR PRODUCERS

Photovoltaic array lights weekend retreat, provides reimbursement and is 'just the right thing to do'

By Ed Crowell

For the past three years, Michael Clark and his family have enjoyed their weekend retreat in Austin County with the sun providing a large portion of the electricity needed for their compound.

Atop two long and sturdy open-air parking structures are 312 photovoltaic panels.

"It was just the right thing to do," said Clark of his foray into renewable energy.

The installation is capable of producing up to 78 kilowatts of electricity at a given moment, making it the largest residential solar system at Bluebonnet Electric Cooperative.

And Bluebonnet buys back the kilowatt hours that Clark generates but doesn't use.

"I get a pretty good reimbursement at the end of the year from Bluebonnet," Clark said. The electric co-op pays Clark, at the average annual wholesale rate, for the power his system sends to the electric grid.

The longtime Houston resident and his wife Sallie Morian had spent countless hours driving around rural areas outside the city in search of property for a weekend home. In 2008, they settled on 86 acres of rolling pastureland near

the small town of Industry, about 80 miles from their Houston house.

"It is really beautiful out here," Clark said of the quietude they found on the property that at the time had only a metal barn for ranching equipment.

Clark's work frequently takes him to far busier places. He is president of Houston-based Interflote, a technology, equipment, fire safety and financing company that is a full-service agent for manufacturing companies. Many of the companies operate in Algeria, Libya and Russia.

The 63-year-old Clark had no experience with solar before he bought the Austin County property off a dead-end gravel road. But the renewable energy source was a prime subject when he hired an architect and builder in 2011 to create a modern-style compound of three separate sleeping quarters and a common dining/recreation building.

Circular Energy, an Austin-based solar company that has installed solar systems on large commercial buildings as well as on houses, was chosen by Clark to work on the project.

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Solar-powered gates, well pumps and lighted walkways make rural living easier

By Sharon Jayson

Solar power has come a long way from just making a pitcher of sun tea. With a myriad of solar-power items in today's marketplace, Bluebonnet Electric Cooperative offers a look at a smattering of solar smarts.

SOLAR GARDEN LIGHTS

Solar lighting uses solar panels to draw energy from the sun to charge batteries that power the lights at night. While older versions provided a dim light and weren't as reliable, technological advances, such as more efficient photovoltaic cells, improved circuitry, more efficient batteries and brighter LEDs (light-emitting diodes) make the newer versions perform well year-round, even during the gloomiest of winter days.

Solar outdoor lighting includes accent lights and path lights as well as spotlights and task lights. Accent lights add a glow to the landscape but don't shine enough to offer guidance along a path. Path lights focus light downward to illuminate walkways, driveways and other areas. Spotlights are the brightest and most expensive of solar landscape lights, but experts say consumers need to remember that even the best solar task light won't cast



An example of solar accent light is the Moonrays Payton Solar LED path lamp, which comes on automatically at dusk and creates a pool of warm light. Cost: \$32-\$59 for package of 8. For greater illumination, spot and task lights are available.

the same kind of light that a standard 100-watt outdoor floodlight used to provide.

SOLAR WELL PUMPS

Advances in durability and reliability have made solar-powered well pumps an efficient and lower cost option for rural locations. Windmills, which are often expensive and are challenging to maintain, are being replaced with solar well pumps that provide power and efficiency with low maintenance. Improved materials, such as stainless steel for the pump housing and pumping mechanism, resist corrosion, won't pollute the water and stand up well to wear.



Solar water pumps can work for watering systems, cultivation farms, gardens, drinking and similar uses. Solar water pumps are best for sunny areas lacking a conventional power supply.

While solar well systems used to cost in the tens of thousands of dollars, technology has driven down such costs considerably. A basic system, including solar panels, could cost about \$2,000. Higher performance systems can be as much as double the price of a basic system, but because these pumps have few mechanical parts, maintenance costs are low.

SOLAR GATES

Property owners who are tired of jumping in and out of the car or truck to manually open and close the driveway gates will

find solar gate openers a way to avoid this inconvenience. Solar-powered automatic gates are an eco-friendly way to have power when you need it. Most openers can be used on round or square gate posts and can be installed on a single swing gate, double gates or a sliding gate.

Because of advancements in solar panel technology, the panels will collect energy even on cloudy days so that your solar-powered gates will work when you need them. A major consideration is the size of the solar panels and the energy you need for your gate.



For people living in rural areas, a swinging solar-powered gate can be very convenient, eliminating the need to get out of the vehicle twice — once to open the gate and again to close it.

SOLAR

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“They more than lived up to their good reputation and the reviews I read,” said Clark.

The cluster of rounded single-story brick buildings is well insulated and set into a big earthen mound created on the site. The compound, which includes a geothermal air-conditioning system, was built to LEED (Leadership in Energy and Environmental Design) standards but has not been officially certified.

Clark decided to build two steel parking structures next to the compound to be topped with 5,616 square feet of solar panels. Underneath are parking spaces for a trailer and a dozen vehicles.

Circular Energy oriented the parking structures and the angle of their solar panels to gather the most sunlight.

The solar panels originally chosen were from a Chinese manufacturer. But those could not be delivered on schedule and were upgraded by Circular Energy to panels from a German-U.S. company that offered a better warranty.

(Early on, Clark checked out the possibility of installing a wind turbine, but realized the wind flow at his property would not be sufficient for the large amount of energy he wanted to produce.)

The high-quality, powerful solar array Clark selected cost \$261,172 for the panels, inverters and installation labor. A 30 percent federal investment tax credit reduced the net cost to \$182,820.

The system does not include batteries to store power. Clark said the cost and maintenance of a room full of large batteries would not be worthwhile for his weekend place.

Clark seldom looks at his electric meter, located on the back of the property past a grove of young olive trees he and his wife planted. To check on his power supply, Clark can eye a bank of 13 solar inverters from Aurora Power and Design of California. If he were monitoring, he would see that his solar array in 2015 produced 72,000 kilowatt hours of electricity more than he consumed at the compound when the power was being generated.

Clark is not off the grid, so he purchased 48,000 kilowatt hours from Bluebonnet that he used when his solar array wasn't generating enough electricity for the property's power needs. Clark banked 26,400 excess kilowatt hours last year that he sold to Bluebonnet for the average annual wholesale rate of 4.6 cents per kilowatt hour, or about \$1,200.

Will solar work on my roof?

Before placing solar panels on the roof of a home, the Solar Electric Power Association recommends you consider these factors:

- The structural condition of the roof. How old is it and what repairs does it need?
- Building codes: There may be roof set-back requirements and fire safety considerations.
- What direction does the roof face and what kind of slope does it have? The majority of solar panels face south.
- Aesthetics: A historic district or building restrictions may limit your solar options.
- Shading: If you cannot eliminate shade, your rooftop system likely won't provide much power.

Source: energy.gov

Clark recently calculated the cumulative value of his solar installation investment based on how much he would have paid for electricity without the solar power and how much he received from Bluebonnet for the excess power sent to the grid.

If the numbers for the past three years hold up, Clark said he could recoup his investment in 30½ years.

Meanwhile, Clark has considered expanding the arrays of solar panels on his rural property. “I would like to justify having panels across the whole pasture and make it a for-profit business,” he said.

But his wife doesn't want to lose the unobstructed views of the grassland and Bluebonnet would have to put in bigger lines to handle that much power, he said.

Plus, Clark noted, a solar system with such a large capacity would require a more complicated commercial contract with the co-op compared with the simple residential agreement he has now. He hasn't pursued the matter with Bluebonnet in quite a while, but said the idea would fit with Bluebonnet's philosophy of having a multitude of power suppliers, including renewable energy.

Clark is enjoying being a part-time resident of the friendly rural neighborhood.

When Bluebonnet needed to cross a neighboring rancher's property to bring power to Clark's property, the neighbor “was very kind about it,” said Clark. “He said the poles were fine but he didn't want buried lines in case he had to dig



Lukas Keapproth photo

The size of Mike Clark's solar installation near Industry generates enough power for his needs and produces extra power that is purchased by Bluebonnet Electric Cooperative. But without storage batteries, Clark is not off the grid. He purchases electricity from the co-op when his solar array isn't producing enough electricity at any given time for the compound's needs.

there. So my lines are buried from the edge of his property.”

That same neighborly attitude led Clark to put an accessible water hydrant on his 20,000-gallon underground cistern. He notified the Industry Volunteer Fire and Rescue Department that it is theirs to use if water is needed to fight fires in the area.

Someday Clark wants to put solar panels on his nearly century-old house in downtown Houston, but a 21-story high-rise proposed for a site across the street would block the sun on his roof.

He took the issue to the City Council, arguing that even in zoning-free Houston there should be consideration of the benefits of renewable energy. No decision has been made yet.

For now, Clark is satisfied that he and his wife can share their solar-powered country compound with their grown children and grandchildren. Even on the cloudiest of days, he said, the big arrays of solar panels produce enough energy for everyone's electric needs.

Why doesn't Bluebonnet offer rebates?

Bluebonnet's revenue comes from its members when they pay their electric bills. Any rebate the co-op offered would have to benefit the member who received the rebate and also benefit or provide value to members who paid for that rebate. Bluebonnet purchases its wholesale power through long-term contracts, so it doesn't have the same economic incentive to offer rebates like city-owned or investor-owned utilities that own and operate expensive power plants. The co-op constantly looks at other utility rebate programs to see how they work and if they can be adapted to work within Bluebonnet's business model.

WIND

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renewable energy,” said Dixie Burgess.

Bluebonnet installed a dual-register kilowatt hour meter next to the Burgesses' backyard utility shed so the couple could see three readings: DEL for all electricity the co-op delivers, REC for the amount of energy received by the power grid from their wind generator and NET for the difference.

“We love to watch that meter, especially on a windy day,” said Dixie Burgess.

The existing utility pole was used and a 380-foot line was buried from the wind generator to the pole. An inverter was bought to change the generator's DC current output into AC current.

The difficult part of the installation process was figuring out how to build a strong and secure pad for the generator's tower. The concrete pad had to hold 6,200 pounds of weight.

The highest back corner of the Burgesses' yard was selected for the tower. There was just enough room between trees there for the tower to be laid on the ground before it was erected.

“Our biggest dilemma was how to construct the pad to make sure this thing wouldn't fall over and was solid enough,” Dixie Burgess said. “We did all the research and talked to all kinds of people, including engineers and the Texas A&M University Energy Institute.”

Local contractor Julio Flores was hired to work with construction companies and machine shops. He learned how to climb the tower and now does the annual inspection and servicing of the generator.

Dennis Schumacher, a mechanical engineer in Brenham, did design work on the project.

The 11-by-11-foot pad anchoring the tower is 8 feet thick, with five 8-foot steel poles under it. Wing anchors on each corner of the pad also stabilize the wind generator.

The pad was fitted with large brass hinges so the tower could be lowered if it ever needs to be repaired or protected from a hurricane. (The tower is built to sustain 120 mph winds, said Ken Burgess.)

Another challenge was assembling and erecting the tower and its blade components. No one in the area had experience with such a tall wind generator, the Burgesses said.

They called the Minnesota manufacturer of the turbine, Jacobs Wind Electric Co., and were referred to Renewal Natural Energies, of Staples, Minn.

Chad and Tessa Haugen, husband-wife owners of that company, took on the job after the Burgesses offered to fly them to Texas. The Haugens spent three days putting the unit together and working with Alliance Crane Service of Brenham to lift the tower into place.

“It was not an easy lift,” said Chad Haugen, who works across the Midwest. He said he was “a little bit surprised” to get a call from Texas.

Tessa Haugen “was the one who really liked to climb,” Dixie Burgess said.

“She does,” said Chad Haugen, who noted that his wife was a rock climber when they first met.



The Burgesses' wind turbine, which soars 100 feet tall, saves the couple up to a third of what they previously paid for power at their 4,800-square-foot home.

Sarah Beal photo

How do wind turbines work?

A wind turbine works like a fan, but in reverse: instead of using electricity to make wind, like a fan, wind turbines use wind to make electricity. The wind turns the turbine's blades, which spin a shaft connected to a generator to make electricity.

Source: energy.gov

How do I get started with a turbine?

The basic steps for installing a small wind turbine on your property are:

1. Determine whether the wind resource in your area makes a small wind system economical.
2. Determine your household electricity needs by looking at monthly or yearly electricity usage.
3. Find out whether local zoning ordinances will allow wind turbine installations.
4. Purchase and install a wind turbine sized to the needs of your household.

Source: energy.gov

With the slow and careful lift accomplished, both of the Haugens climbed the tower ladder with safety gear. They spent about 20 minutes atop the rig to fix and lubricate the gearbox.

Now, after 18 months of listening to the turbine spin with what Dixie Burgess describes as a “nice hum in the background,” the Burgesses said they are happy with the results of their investment.

The entire project, including shipping and labor, came to about \$68,000 after the 30 percent federal tax credit for renewable energy.

In 2015, the couple used 40,830 kilowatt hours of electricity, a 25 percent savings over 2014 when the wind generator began operating only in the last two weeks of the year. In 2016, Dixie Burgess expects a savings of 30 to 35 percent, up from 2015 when her adult son lived in their home in upstairs rooms that are now closed off.

So far they've returned about 1,800 kilowatt hours of power to the grid, Dixie Burgess said. Summer months bring lower winds and the fall and winter offer higher winds.

Meanwhile, the Burgesses are trying to save additional energy in other ways. They upgraded the air-conditioning system in their 4,800-square-foot house and installed double-paned windows filled with argon gas.

They plan to add a solar energy installation in 2017 to supplement the wind power.

Dixie Burgess said their 100-foot generator can be spotted from the Bluebonnet Eco Home, the cooperative's green innovation model house just a couple of miles away on a Brenham hilltop.

“They have binoculars up there and sometimes point us out to visitors,” she said. “It's an exciting thing that we were pioneers here with this size wind generator and now others can learn from us and do it.” ■