

Climate Solutions

The town that built back green

After a tornado demolished Greensburg, Kan., it rebuilt without carbon emissions. Can its lessons help communities and economies rebound from fires, hurricanes and covid-19?



Greensburg, a rural community in southwest Kansas, was decimated by a tornado that killed 12 people and leveled 95

percent of the city on May 4, 2007. The city rebuilt green. It gets 100 percent of its electricity from a small windfarm, all of its buildings are energy efficient, it uses rainwater for irrigation. A focal point of the community is its historic 1887 well, billed as the world's largest hand dug well, that adjoins a rebuilt visitor's center and new playground. (Photo by Larry Schwarm for The Washington Post)

By **Annie Gowen**

Photos by Larry Schwarm for The Washington Post

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GREENSBURG, Kan. — After powerful tornadoes swept through [Nashville](#) earlier this year, killing 25 and leaving a trail of destruction for miles, one of the first calls officials made was to tiny Greensburg, population 900.

A wind-swept farming community in southwestern Kansas, Greensburg rebuilt “green” after an EF5 tornado — the most violent — barreled through at more than 200 miles per hour and nearly wiped it off the map in 2007.

A decade later, Greensburg draws 100 percent of its electricity from a wind farm, making it one of a handful of cities in the United States to be powered solely by renewable energy. It now has an energy-efficient school, a medical center, city hall, library and commons, museum and other buildings that save more than \$200,000 a year in fuel and electricity costs, according to one federal estimate. The

city saves thousands of gallons of water with low-flow toilets and drought-resistance landscaping and, in the evening, its streets glow from LED lighting.

It's exactly the kind of community Democratic presidential candidate Joe Biden [envision](#)s when he talks about the need to conserve energy and [transition away from fossil fuels](#) towards wind, solar and other sources that do not emit the greenhouse gases driving climate change. President Trump has dismissed global warming and [disparaged wind turbines as well as LED lighting](#) and other forms of energy conservation.

Greensburg is no liberal bastion. It sits in Kiowa County, where Trump handily beat Hillary Clinton in 2016, carrying 83 percent of the vote.

But leaders there now are routinely consulted by communities around the world grappling with devastating weather events from [wildfires](#), tsunami, earthquakes and floods — in Australia, China, Japan and Joplin, Mo. In March, the city council member in Nashville wanted to ask what kind of building codes or regulations could make its buildings more tornado-resistant going forward.

Greensburg's efforts have gained new currency in recent months as climate catastrophes have continued to worsen and Americans struggle with a deadly pandemic that has shut down

much of the economy — and begin to rethink what life might look like after a vaccine.



Kiowa County High School in Greensburg, Kan., was rebuilt with recycled wood. It has geothermal heating and a design that maximizes natural daylight, among other features that cut its energy consumption.

Greensburg's journey has not always been easy, residents say, nor did it unfurl perfectly. A fancy rainwater irrigation system for its Main Street has never worked. Wind turbines installed for city and other local buildings were costly to maintain — and one toppled into a field. A business park built to attract companies and clean-energy jobs remains empty.

“There are lessons learned that we can share,” said Bob Dixon, a retired postmaster who served as mayor during much of the rebuilding. “I totally believe that we’re a living laboratory here with a plethora of architectural design and sustainable environmental practices to share.”

Dixon, a Republican, used the “Build Back Better” catchphrase years before Biden and other Democrats embraced it at the presidential convention this summer to tag their plan for [coronavirus](#) recovery, one that includes many climate-friendly initiatives.

Environmentalists around the world are now arguing that this moment is crucial for local governments — whether they’re trying to rebuild a town burned by a wildfire or figuring out ways to revitalize their economies after a pandemic, said Katharine K. Wilkinson, a climate strategist and co-editor of the recent anthology “[All We Can Save: Truth, Courage, and Solutions for the Climate Crisis.](#)”

[New Jersey wants to lead the nation in offshore wind]

“Whether it’s cities like Greensburg or places where extreme weather has hit more recently, or you’re talking about stimulus funds around covid, these are opportunities to rethink the systems we create at a local level, and that’s where a lot of climate solutions happen,” Wilkinson said. “So much of the decision-making and where the rubber hits the road is

at the local and state level — whether we’re thinking of building codes, investment in alternative transportation or choices about the electric grid.”

Since the pandemic began, governments have allocated some coronavirus relief funds to a variety of green initiatives. For example, the European Union committed 30 percent of its stimulus package to climate action; South Korea, France and Italy increased rooftop solar subsidies; and Nigeria allocated \$620 million to solar homes for 5 million families, according to Helen Mountford, the vice president for climate and economics at the World Resources Institute, an environmental research group.

A [recent report](#) on sustainable recovery from the International Energy Agency showed that investments in solar and energy efficiency enhancements could deliver twice as many jobs as the same level of investment in coal or gas in the coming years, she noted.



LEFT: Main and Grant streets the day after an EF5 tornado tore through Greensburg on May 4, 2007, destroying about 95 percent of the community. RIGHT: Main and Grant streets in August 2008.

Residents in Greensburg were finishing supper after a long workweek the night of May 4, 2007, when the National Weather Service began warning of a large storm system bearing up from the Southwest with a potential for deadly tornadic activity. As it neared, the town's sirens blared and the air crackled from the change in barometric pressure.

Dixson and his wife, Ann, had just watched a movie and hustled down to the basement with their dog and cat, crouching between a desk and a dresser draped over with a rug. As the storm bore down, they could hear what they thought was hail hitting the house — it turned out to be debris — and the terrible creaking sound of the beams of their 1912 Victorian home being torn apart by the winds. It might have lasted 10 to 15 minutes, he said.

When the storm passed, the couple emerged to the open air — their home, consisting of two stories and a roof, was gone. Dazed residents set about trying to rescue those trapped in the rubble in near pitch-black, their only illumination coming from occasional flashes of lightning. More than 90 percent of the buildings and trees had been swept away in a matter of minutes. Twelve people died.

Amid the chaos of rescue and recovery, town leaders began contemplating early on how to rebuild — and the idea of building back in a sustainable way emerged almost immediately, they said in interviews with *The Post*.



LEFT: Debris in Greensburg on May 5, 2007. RIGHT: A destroyed building in Greensburg on May 5, 2007. After the tornado, city leaders decided they would rebuild in a sustainable way. Greensburg is one of a handful of American communities that gets all of its electricity from renewable sources.

Just a few days after the tornado, Steve Hewitt, the city manager at the time, said that he sat down with John Janssen, then the city council president, and other leaders in the City Hall parking lot to decide the future of Greensburg. They quickly reached a conclusion: They should rebuild with smarter, energy efficient buildings. A few days later, when then-Gov. Kathleen Sebelius (D) came to review the damage, she asked them about their plans.

“She said, ‘It sounds like you’re going to build it green,’” Hewitt recalled. “Then we walked out to a press conference and Governor Sebelius said we were going to put the green in Greensburg. We were already talking about it, but she helped brand it and gave energy to what we were trying to do.”

A new storm — of attention — followed, as well as more than \$120 million in disaster relief funds from the state, Federal Emergency Management Agency and U.S. Agriculture

Department, as well as advisory help from the U.S. Energy Department's National Renewable Energy Laboratory (NREL) in Golden, Colo.

City leaders worked to build community consensus around the concept — and persuade homeowners to also embrace green as they rebuilt their homes. But it wasn't always easy to convince some in the rugged farm community where conservative politics predominate. A local rancher rode around town with a bumper sticker on his Chevy Suburban that read: "May you ecological bastards freeze to death in the dark."

"We tried to approach it in a practical way, not tree-hugger green, but economic green," Janssen said. "Ramming stuff down people's throats — especially in this part of the world — doesn't work."

They held meetings in a temporary red-striped tent set up downtown, where townspeople commented on the rebuilding plan. And [they stressed the practical savings](#) of installing energy-efficient windows and insulation in new homes. According to a recent NREL estimate, energy costs for a 2,000-square-foot home with standard construction in Greensburg are about \$1,820 annually. Adding more insulation, an energy-efficient furnace, LED lighting and a small solar panel system would save 70 percent of the energy use and reduce energy costs to \$1,260 in the first year, which

includes the additional mortgage costs for the upgrades.

[Capturing the energy of the deep blue sea]

By the end of 2007, Greensburg became the first city in the country to require all municipal buildings over 4,000 square feet to be certified LEED (Leadership in Energy and Environmental Design) platinum by the U.S. Green Building Council, a nonprofit organization. That means the buildings meet certain standards for saving energy, reducing the greenhouse gas emissions that are linked to global warming.

More than a decade later, the town has about 400 modest, newly rebuilt homes — many of them with white-pillared front porches — centered in a small downtown where the key buildings are clustered among a few walkable blocks. There's the city hall, hospital, courthouse, a commons building with a media center and library and school, all built with green construction features like angled windows that make the most of winter sun, cisterns to collect rainwater for irrigation and geothermal heating and cooling systems.



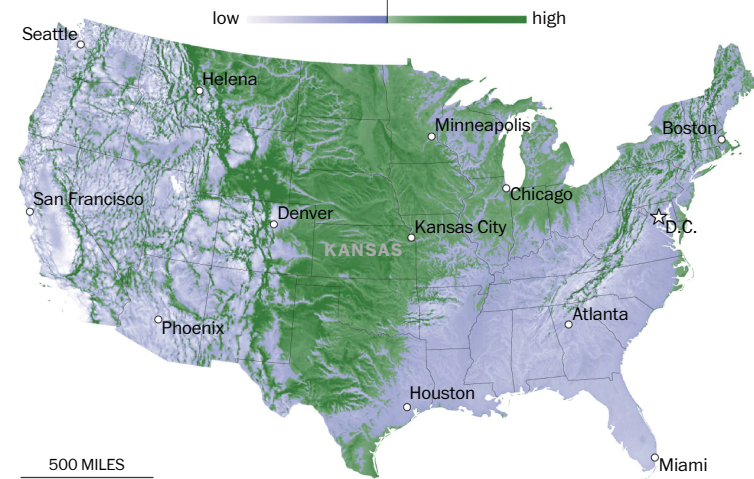
LEFT: Volunteers from the New York Fire Department on Sept. 6, 2008, helped to build a new municipal facility that was designed with energy conservation in mind. RIGHT: Volunteer workers build a house in August 2008.

The 132,000-square-foot school for kindergarten through 12th grade, for example, has low-flow toilets and waterless urinals, a rainwater capture system for irrigation, lockers made of recycled plastic and cabinets of pressed wheat. Some of the wood trim is from cypress salvaged after Hurricane Katrina.

A block of retail shops downtown — built by a nonprofit group funded by private donations — includes a post office, antique store, the Last Tangle salon and the Crazy Mule restaurant. On the corner, the \$3.3 million SunChips Business Incubator — Frito-Lay was a principal donor — has offices for start-ups, and spawned a jewelry store and a yoga/art studio that have moved out into bigger spaces.

The city's rebirth garnered international attention — and inspired a Planet Green series produced by actor and environmentalist Leonardo DiCaprio, who also donated \$275,000 to help build the town's business incubator.

Annual Average Wind Speed
Areas with winds faster than 6.5 meters per second are considered **commercially viable for wind farms**

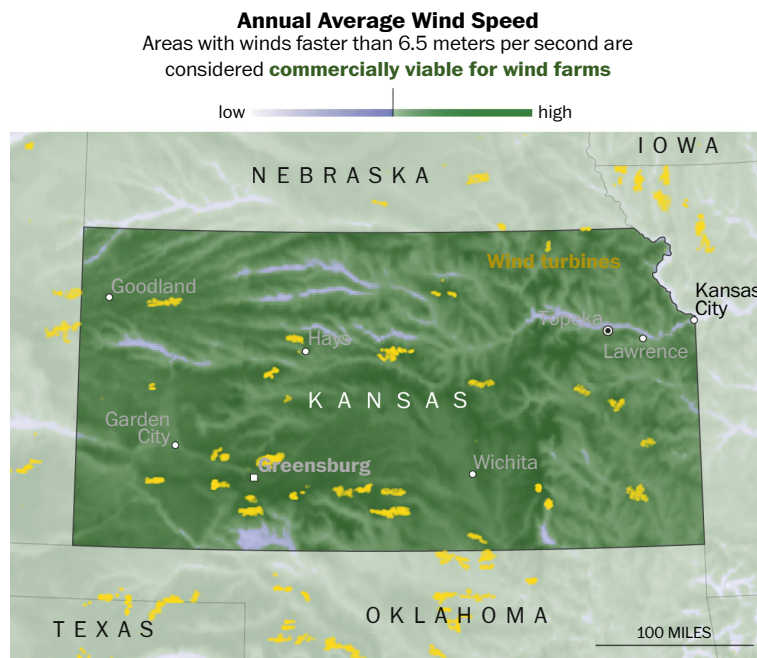


The city was able to halve its carbon footprint by shifting to 100 percent wind energy from a 10-turbine wind farm south of town that is owned and operated by Exelon Corp. The turbines, which began operating in 2010, are capable of producing 12.5 megawatts of electricity, enough to power about 4,000 homes, according to Exelon.

The energy generated by the turbines goes into the Kansas Power Pool, which provides power to several municipalities and ensures Greensburg still has electricity on days when the air is still. The city uses wind energy that has been certified by the Environmental Protection Agency, according to Stacy Barnes, Greensburg's city administrator.

An NREL study from 2011 showed that 13 of the city's "smart" buildings save about a combined \$200,000 a year in utility costs, and the homes consume about 40 percent less energy on average than before the tornado.

Harnessing the wind that nearly obliterated it and using it to power a revived Greensburg was logical for the city. Wind is the largest source of renewable energy in the United States, supplying more than 7 percent of the nation's electricity last year. And in 2019, Kansas generated 41 percent of its electricity from wind power, second only to Iowa, according to the American Wind Energy Association.



Not everything the town has tried has worked. Some of the buildings, including the school and the hospital, used to have their own smaller wind turbines to use along with solar panels, but the turbines proved costly to maintain. The hospital took its down after one toppled over, officials said. Luckily, no one was injured.

"You can build the greenest buildings in the world but if you can't afford to live with them, that's not sustainable," Dixon said. "You have to look at long-term maintenance also."

When he speaks to other cities, Dixon always cautions them to make sure design experts are familiar with the microclimate of the area.

In Greensburg, an architectural firm and irrigation designer created a rainwater irrigation system for Main Street, which has planters with purple sage and other drought-resistant plants. Conserving water is a must for the town because it sits on the edge of the sprawling Ogallala Aquifer, which supports supplies fresh water to eight states and is being depleted at roughly 10 times the rate of its natural recharge, experts say.

But the city didn't get enough rain to keep the system circulating, Dixon said, and so it got clogged with mud and leaves.

Another challenge for Greensburg is how new construction can be more expensive than older buildings, pricing some out of the market.

Homes for sale range from \$89,000 to \$250,000.

When Tim Kyle, 47, decided he wanted to start a small vodka distillery in 2017 not far from his father's farm in Greensburg, he couldn't afford anything in the city, he said. He eventually found a vacant 1905 bank building in Kinsley, about a half-hour away.

Still, he supports the path the city has taken.

"Everyone around here is about conserving and not using an excessive amount of water and electricity," Kyle said. "They just don't necessarily agree with all the hoopla that comes along with it. People assume you're a community of hippies or some nonsense. No, it's the responsible way to build now."



LEFT: The 5.4.7 Arts Center, the first building to be certified LEED Platinum, is under construction in May 2008. Greensburg became the first city in the country to require all its municipal buildings to be LEED-certified. RIGHT: The 5.4.7 Arts Center, which got its name from May 4, 2007.

One recent sunny fall day outside the Kiowa County Commons — the municipal building that houses Greensburg's library and has

become a gathering spot — koi circled lazily in the recirculating rainwater pond. Inside, groups of young people were eating ice cream from the town's soda shop, the centerpiece of which is the restored fountain from the old beloved pharmacy, Hunter Drug Store, which had been damaged in the tornado.

Upstairs, in the town's nonprofit media center — founded as a technology learning hub for locals — Grant Neuhold, the center's creative director, is struggling to schedule enough videographers to live-stream the local high school sports, which have gone online during the pandemic. He'd like to hire someone, he said, but it's hard to persuade them to move to a small town on the prairie. "I've given up," he said.

Despite acclaim from outsiders for its climate-conscious efforts, Greensburg's biggest struggle post-tornado has been attracting new companies and residents, officials and townspeople say. A business park that they hoped would attract new employers is still vacant. The population, 1,400 residents before the tornado, has rebounded to about 900.

In some ways, they're just like any other small community at a time when rural areas around the country are seeing their populations decline.



Greensburg Wind Farm along Highway 183. The turbines produce enough energy to power all the buildings in the city, and then some. In 2019, Kansas generated 41 percent of its electricity from wind power, according to the American Wind Energy Association.

In 2012, the state established rural opportunity zones in 77 counties — including Kiowa County — trying to lure new residents with state income tax waivers and a \$15,000 debt-forgiveness program for student loans over five years. All but two of the counties, including Kiowa, still lost population, according to a study done by the Kansas Department of Commerce earlier this year.

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Now, Neuhold and Barnes are trying to put together a website to attract more residents to town, toting its small-town values and amenities — and to capitalize

on what may be a profound shift in American life as more and more Americans work remotely during the pandemic. One in 6 workers don't plan on returning to the office after the pandemic is over, according to a recent survey by Harvard Business School.

Greensburg's fame as the town that built back green may have given residents "unrealistic" expectations about companies eventually moving to the area and creating hundreds of jobs, said Barnes, who is Dixson's daughter.

"Something more realistic for our community would be five to 10 jobs. That would be a big win. That would be sustainable growth for us," Barnes said. "Nothing's perfect. But we're still here. We're still working. We're not done."

About this project

Maps show wind speed at 80-meters and data is from the National Renewable Energy Lab. Wind turbine locations are from the U.S. Geological Service. Maps by Meghan Kelly for the Washington Post.