

Greensburg Webinar Series Q&A

Below are responses to questions that were asked during two U.S. Department of Energy Webinars on Greensburg, Kansas, but were not answered during the live presentations due to time constraints.

Greensburg—America's Model Green Community in Their Own Words November 23, 2009

Full presentation available at: www.buildings.energy.gov/greensburg/webinars.html.

Presenters:

- Bob Dixson, Mayor, City of Greensburg
- Darin Headrick, Superintendent, Greensburg Schools
- Steve Hewitt, City Administrator, City of Greensburg
- Daniel Wallach, Executive Director, Greensburg GreenTown

Participant Questions:

What are the town's goal, mission, and purpose?

Blessed with a unique opportunity
To create a strong community
Devoted to family, fostering business,
Working together for future generations.

What is the current population of Greensburg?

850.

How many of the people from Greensburg prior to the storm have come back and still live there?

A little more than half.

How were concerns of the town's people satisfied?

Public planning meetings.

How were the tough issues dealt with?

Listening and communications.

What was one of the biggest issues you had to deal with?

How do we pay for rebuilding?

What was one of the smallest?

Change. Some people wanted the town to be just the way it was.

What was the biggest driver for people in the town wanting to go green? Was it for the environment?

Energy costs and to be good stewards of the environment.

What role did state agencies play in recovery?

A very active role. From clean up and debris removal to financial assistance for both municipal and residential rebuilding.

Did local contractors play a big role in the rebuilding efforts?

All local contractors were involved in the rebuilding.

Where did the contractors that did the "Green" rebuild, come from, % of local contractors, % from within the state?

With limited local contractors available, most of the green rebuilding was from the outside, especially the municipal buildings.

What about the durability of the new "green" structures with affordability in mind?

It varies. Affordability is an issue and but when you've been through a tornado like that, you're usually very mindful of building more smart in that way. Everyone is doing the best they can within their budget to be as green as possible.

Would the new buildings survive the tornado that destroyed the previous ones?

No, but the damage would be minimized.

The buildings (or at least the images) are devoid of greenery. What is the plan for plantings?

Native trees and plants will be planted.

Have the buildings that have been rebuilt such as the schools, city hall, etc. all been built on their original sites?

Buildings were built to the sustainable master plan and most are not on the original sites. See: <http://www.greensburgks.org/recovery-planning/Greensburg%20Comprehensive%20Master%20Plan%2001-16-08%20DRAFT.pdf>.

Is there any concern with LEED buildings not performing as expected - that energy savings may not be as good as LEED predicts? There have been reports that LEED buildings don't actually reduce energy. How are you ensuring your buildings are in fact using less energy and are truly green buildings?

Energy consumption is being closely monitored but we have not been in the new buildings long enough to have solid data.

There is a lot more to sustainable community design that just LEED certified buildings. Can you please explain other aspects of the sustainable master plan design?

Financial sustainability, maintenance, livable and walkable community, etc. See the Greensburg Sustainable Comprehensive Plan at <http://www.greensburgks.org/recovery-planning/Greensburg%20Comprehensive%20Master%20Plan%2001-16-08%20DRAFT.pdf>.

Is a bike rack a required element of a LEED Certified building?

No, but you get LEED points. Visit the U.S. Green Building Council for more information on LEED building requirements: www.usgbc.org.

Did you change your building code and land use regulations to create incentives for green building and sustainable development? If so who took the lead on this effort?

We made sure that the existing codes were enforced. New green building codes will be incentivized to reward green building.

Were the city and county building codes amended to require new buildings and homes incorporate passive solar design for heating and cooling?

No, but through education and encouragement, this has happened.

Has Greensburg mandated that the residential units being reconstructed privately be built to a green standard? If so what standard is referenced, and how has this been embraced?

No, there is not a mandate.

Where can I find more information on the LEED Platinum Townhomes? What are some of the features that helped achieved the Platinum level?

Visit the Greensburg Sustainable Building Database at <http://greensburg.buildinggreen.com/overview.cfm?projectid=1437> to learn more about the Prairie Pointe Townhomes. Visit the U.S. Green Building Council for more information on LEED Platinum level building requirements: www.usgbc.org.

Can you clarify the size of the hospital? How many beds will there be?

The replacement facility for the Kiowa County Memorial Hospital (KCMH) will be 48,500 square feet and licensed for 15 acute-care beds.

Did FEMA allow you to use the Public Assistance funds to cover the costs of LEED?

No, FEMA only covers 75% of what was there before the tornado.

What public services do you now have within the town?

We are our own utility, street, water, and sewer providers.

Who is the electric utility provider for Greensburg?

We belong to the Kansas Power Pool.

Are many of the residents installing wind and/or solar power systems?

Some are. See the Greensburg Sustainable Building Database at <http://greensburg.buildinggreen.com/index.cfm> for details on specific projects.

Was geothermal considered?

Yes.

Are you using geothermal heat pumps for AC and heating purposes?

Yes. See the Energy topic area for each project listed in the Greensburg Sustainable Building Database at <http://greensburg.buildinggreen.com/index.cfm>.

Can you describe the financing of the wind farm project?

The debt financing for the project was provided by the USDA office and the equity financing was provided by John Deere Renewable.

I understand there are private donations but how much did the federal and state invest?

The project was solely funded and owned by John Deere Company. No outside donations were involved.

How will the turbines withstand future tornados?

Most turbines can withstand up to 100 to 120 mph straight winds. Any object standing in the way of an EF5 tornado like what hit Greensburg is most likely not going to survive, just as most cellular towers and telephone poles would also be destroyed.

Can you also talk about the high-wind mitigation construction practices and materials that you built within the context of the Green construction practices and materials? Were there additional?

There are several things that we have done in our material construction and that the City of Greensburg is also incorporating. The first is Structurally Insulated Panels that we used in our new BTI Wind Energy Building. These are Styrofoam (insulation) panels with particle board attached as a structural surface. These panels have excellent insulation capability and great structural qualities. In fact, they have a much higher wind rating than standard construction practices would incorporate.

Also, Insulated Concrete Forms are being utilized throughout Greensburg. These are also Styrofoam panels but they are filled with concrete. Obviously this makes for a very high wind rating and gives superior insulation qualities. One other unique thing you will see in Greensburg is that several houses are built entirely out of concrete. Greensburg Greentown had one of these built as an example of green building technology. They even dropped a car on top of this house as it was being constructed in order to show how it can withstand the worst of conditions!

Another aspect of the high wind mitigation that we have in the BTI Wind Energy Building is a tornado "safe room", which is a poured and re-bared room that we use as a tornado shelter and doubles as our IT equipment room. Practically every new structure in Greensburg has either a basement with a safe room, an in-ground safe room, or a special above ground safe room.

Greensburg, Kansas: Lessons Learned and Steps Forward

January 12, 2010

Full presentation available at: www.buildings.energy.gov/greensburg/webinars.html.

Presenters:

- Chuck Banks, Principal and Founder, Chuck Banks Associates
- Lynn Billman, Senior Analyst, National Renewable Energy Laboratory
- Haley Estes, Director of Marketing and Business Development, BTI Wind Energy
- John Holton, Architect/Engineer, Integrated Building and Construction Solutions (IBACOS)

Participant Questions:

How are the code officials being trained to address the more technical aspects of the code?

The Greensburg Code Official has taken the Green Building Professional training session given by the Kansas Building Industries Association (KBIA). This is one of the contributions made by KBIA under the memorandum of understanding between KBIA and Greensburg. This session gives a good overview of the National Green Building Standard but not a detailed working knowledge. The code official should not need this detailed knowledge as the careful assessment and certification of a builders' offering is done by a trained Verifier and certification is given by the National Association of Home Builders (NAHB). A Verifier is receiving training now to work in Greensburg and NAHB will cooperate in moderating the costs associated with the certification.

Why is 2x6 framing more energy efficient?

2x6 framing allows 2" more cavity insulation than a 2x4 wall.

Is the goal of net zero energy important in rebuilding for new homes?

This is an excellent goal but it is quite demanding and expensive to implement. The approach that was promoted by the U.S. Department of Energy/National Renewable Energy Laboratory team in Greensburg was to strive for house construction that would yield a 40% energy reduction. It was felt that this was easily attainable within the cost and capability range of most house reconstruction teams. We applauded houses that achieved a 50% reduction level and were overjoyed at the very few that were around the 60% reduction level. In Greensburg this latter class approaches the nominal net zero target of 70% energy use reduction, though the final 10% takes a lot of effort to achieve. Another of our recommendations was to design and site the house with a substantial roof slope facing south so that there would be a good area for the future application of photovoltaic panels should they become economically feasible. So at the extreme end some of the houses in Greensburg approach a net zero package but generally we felt it was much too ambitious a target for the recovery reconstruction of Greensburg.

What types of windows were installed for residential frame type? U-Value? SHGC?

The windows used in Greensburg typically were:

- Wood, clad wood, or vinyl frame
- Double glazed, low-e
- U value in the .30-.35 range
- Because they are view windows where vision outward is important, solar heat gain coefficient (SHGC) is not particularly low, typically around .37.

How did DOE decide to invest this money in Greensburg?

DOE wanted to know what it would take to help a community achieve a green community vision where there was ample opportunity to do things differently, such as following a disaster. Greensburg and New Orleans were chosen as examples, with the expectation that we could learn valuable lessons that could be shared with others.

What other aspects of the town infrastructure were rebuilt to green standards?

The community master plan was specifically designed to be as sustainable as possible, with location of activities within walkable distances; extensive attention to natural features, natural wetlands, and paths; etc. The new downtown landscaping was designed to minimize water use but maximize attractiveness to enhance shopping. The high school Green Club began a new recycling program. Greensburg GreenTown, a local nonprofit organization, assists the community with development of all types of sustainable ideas, including collection and composting of lawn clippings, ecotourism, and education.

Do you think a normal community, that didn't have this kind of disaster, could implement some of the changes Greensburg did?

Yes, of course. Cities all over America have instituted programs to reduce use of gasoline and diesel; expand the use of solar panels; upgrade building codes; implement new types of policies to promote green technology use; or develop sustainability communities in a portion of their cities built by one developer. See <http://www.nrel.gov/docs/fy08osti/42774.pdf>, or http://www.nrel.gov/director/pdfs/singapore_2008-1105.pdf, or <http://www.sustainable.org/>.

Did you look at the impact of carbon on Greensburg before the tornado and now? For example, was there a big reduction in greenhouse gases?

Reducing greenhouse gases per se was not high on the list for the people of Greensburg. They related more to the overall concept of keeping the land and community as self-sustaining as possible, and caring for the land, water, and air. However, NREL worked with BNIM of Kansas City, the company that helped the city with their community master plan, and ran some figures. The estimate was 10,876 tons of CO₂ per year before the tornado, and if all the energy recommendations were adopted, the estimate for the future was about half that at 5,354 tons of CO₂ per year.

Were ground source heat pumps more cost effective than PV?

NREL did not run an exact comparison between PV and ground source heat pumps because the costs of ground source heat pumps are hard to estimate (dependent on terrain, depth of wells, experience level of contractor, size of project, etc). Greensburg GreenTown may have information on actual ground source heat pumps installed in Greensburg. Contact them at 620-723-2790 or info@greensburggreentown.org. For PV, see <http://www1.eere.energy.gov/buildings/greensburg/publications.html> under Case Study Appendix D for an analysis of solar options. For a large PV system for the school, total installed cost estimates ranged from \$0.13 / kwh to \$0.16 / kwh.

How did you prioritize NREL's work at Greensburg - what was most important for you to address?

Most important was planning, which included assessment of their per-tornado energy use and post-tornado expectations for energy use in terms of population and types of activities. Planning also included an assessment of renewable resources (solar, wind, biomass, geothermal). Lastly, planning included working with the entire community plan, because energy is integral to

everything in a community. NREL tried to develop comprehensive and quantitative plans and goals, but sometimes actual events and decisions in the community had to be made without adequate time for analysis and planning. So in those circumstances, NREL adjusted, and worked closely with the city leaders with whatever information and insights we could offer or recommend. Most important after planning is constructing new buildings to the highest possible energy efficiency levels. Next comes trying to supply as much electricity as possible from a renewable resource. Along the way NREL also looked at all aspects of transportation; vehicles and fuels used and available in town, compared with what could be used that would reduce usage of fossil fuels for transportation.

Is there a backup energy provider to the wind systems?

The wind systems (wind farm and soon-to-be hospital and school) are tied into the electrical grid. When the wind blows, electricity is added to the grid. When the wind doesn't blow and the building or municipal utility need electricity, they draw electricity from the grid. Greensburg is a member of the Kansas Power Pool. The other generating sources for Kansas Power Pool are heavily renewable, including wind and hydropower.

How does one go about scheduling a visit by the Renew Van?

Contact Richard Shin, RnE2EW Science Consultant, 303-275-3066 or richard_shin@nrel.gov. Also visit the Web site: <http://www.nrel.gov/education/>.

How did the community project influence employment, both short term and long term work development?

The decision to develop the town as a model of sustainability has given the town a theme around which to differentiate itself from other similar Midwest farming communities. It has attracted interest from several significant "green" companies. Unfortunately, the economic downturn beginning in 2008 has caused these companies to delay their expansion plans, so Greensburg has not seen those benefits yet. The largest company in Greensburg, BTI Equipment which owns the Greensburg and three other John Deere dealerships, started a new wind division selling and servicing Endurance wind turbines, that has brought a few extra jobs to Greensburg and quite a few new jobs to partnering dealerships around North America. In addition, one person has received training in energy auditing, which is important for evaluating the energy efficiency of new and retrofitted homes.

Is there a Web site for New Orleans information?

Visit http://www.nrel.gov/applying_technologies/activities.html. In the box entitled Comprehensive Energy Solutions, click on the tab labeled "New Orleans".

Is the goal of near net-zero-energy important in rebuilding new homes?

Setting a goal of near net-zero-energy for building a new home is a very ambitious and noteworthy goal. Whether it is "important" depends on your value system and your finances. A near net-zero-energy home by definition includes enough renewable electricity or heat generation to offset all or nearly all the energy your home uses from the grid or delivered oil or natural gas—solar photovoltaic panels, small wind turbine if your lot or land is large enough, wood burning stoves, etc. A home that uses energy very efficiently (such as using 30% to 50% less energy than a similar code built to today's energy code standards such as IECC2009) should be your first goal. That is the best green "bang for the buck." Then, if you can afford it or your area has a good financial incentive through your state or your utility, talk to local contractors to see what you can do about adding a renewable electricity or heat source.