

*Please share your stories about how Open Access to this article benefits you.*

# Out of the Rubble and Towards a Sustainable Future: The “Greening” of Greensburg, Kansas

by Stacey Swearingen White

2010

This is the published version of the article, made available with the permission of the publisher. The original published version can be found at the link below.

White, Stacey S. (2010). Out of the Rubble and Towards a Sustainable Future: The “Greening” of Greensburg, Kansas. *Sustainability* 2:2309-2319.

Published version: <http://dx.doi.org/10.3390/su2072302>

Terms of Use: <http://www2.ku.edu/~scholar/docs/license.shtml>

Article

## Out of the Rubble and Towards a Sustainable Future: The “Greening” of Greensburg, Kansas

Stacey Swearingen White

Urban Planning Department, University of Kansas, 1465 Jayhawk Boulevard, 317 Marvin Hall,  
Lawrence, KS 66045, USA; E-Mail: [sswhite@ku.edu](mailto:sswhite@ku.edu); Tel.: +1-785-864-3530; Fax: +1-785-864-5301.

*Received: 3 June 2010; in revised form: 29 June 2010 / Accepted: 14 July 2010 /*

*Published: 20 July 2010*

---

**Abstract:** Following a devastating tornado there in 2007, the tiny city of Greensburg, Kansas has engaged in a sustainability-oriented recovery process through which it hopes to serve as a model for other communities planning for a sustainable future. This article uses innovation theory to consider how and why the sustainability focus emerged in Greensburg and to explore the potential transferability of those factors to other contexts. An analysis of 535 newspaper articles reveals key factors as: the shared vision of persistent local leaders, the framing of sustainability as an “opportunity” with an energy efficiency focus, community pride and resilience, and a “clean slate” rebuilding effort with substantial available funding. While Greensburg’s future is intimately connected to the specifics of its recent past, the analysis does reveal lessons that other communities can draw from in crafting sustainability plans of their own.

**Keywords:** sustainability; innovation; disaster recovery

---

### 1. Introduction

On the night of May 4 2007, a mile-and-a-half-wide (2.4 kilometer-wide) tornado struck the City of Greensburg, Kansas. The 200 mile-per-hour (320 kilometer-per-hour) winds of this storm leveled or severely damaged approximately 90–95% of the city. Eleven people perished. The school, hospital, municipal buildings, grocery store, water tower, and virtually every home were destroyed. Upon viewing the extent of the devastation, many doubted the future viability of this small city.

Despite the immense challenges, Greensburg has in fact embarked on a recovery process that has garnered national and even international attention for its focus on sustainability. The idea of rebuilding

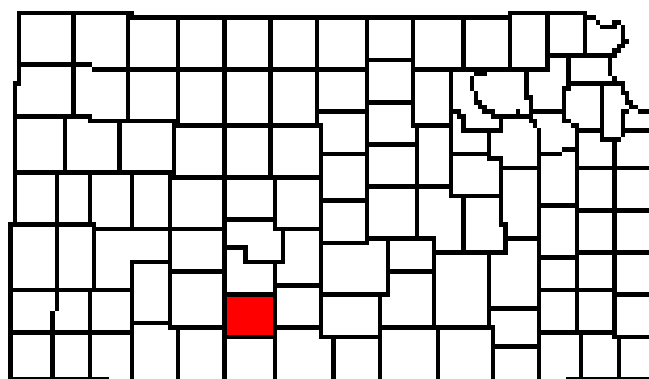
as a “green” Greensburg emerged very quickly after the disaster, and has been a cornerstone of the recovery effort. In addition, the City has suggested that its innovative use of both policy and technology can serve as a model for other communities seeking to implement sustainability principles as they plan for the future.

Examining the implementation of sustainability principles at the community level facilitates an understanding of future planning of this type [1,2]. More specifically, understanding how and why local governments pursue innovative sustainability approaches will help clarify the conditions needed to promote additional efforts in this area [3]. The case of Greensburg provides a useful lens into both of these areas. This paper seeks to understand: (1) How and why did the sustainability innovations emerge in Greensburg; and (2) In what ways might those innovative practices serve as a model for other communities? The sections that follow explain further the community of Greensburg and its recovery process, review the relevant literature that might guide an understanding of innovative local government sustainability practices, describe the approach taken here to analyze the case of Greensburg, and present the findings and lessons of this study.

## 2. Greensburg, Kansas

Greensburg is located in Kiowa County, a rural county in south central Kansas (see Figure 1). The county’s lone stoplight is located in Greensburg, which also serves as the county seat. Prior to the 2007 tornado, Greensburg was experiencing the types of decline common to small, rural U.S. communities. In the four decades preceding the disaster, the City had lost approximately 27.5% of its population. At the time of the disaster, roughly 1,400 people lived there [4]. The remaining population is aging. In 2000, nearly one-fourth of Kiowa County residents were 65 years of age or older. This compares with 13.3% of senior citizens within the state of Kansas population [4].

**Figure 1.** Kiowa County, Kansas.



Despite these trends of decline, Greensburg remains a community that is proud of its heritage and distinct identity. The centerpiece of town is the “Big Well”, the largest hand-dug well in the world, and an attraction that has drawn thousands of visitors each year. Also on display at the Big Well visitor’s center was the “world’s largest pallasite meteorite”, found in the 1940s in a field just outside of town. While the 2007 tornado destroyed the visitor’s center and pushed debris far into the well itself, the 1,000-pound meteor was found intact amidst the wreckage. As the discussion below will illustrate,

the community pride that surrounded these and other facets of Greensburg was a pivotal force in the city's decision to rebuild.

Given the incredible extent of the tornado's damage, media coverage in the first days following May 4 questioned whether the city could possibly recover. Very quickly thereafter, though, discussion turned from *whether* the recovery would happen to *how*. Just one week following the event, Kansas Governor Kathleen Sebelius went on record recommending that Greensburg embrace sustainability as a recovery model. Her idea of rebuilding Greensburg as the "greenest town in rural America" had simultaneous support from Greensburg's mayor and city manager. From this early stage, sustainability became a foundation of the recovery process and the city's future.

Greensburg's emphasis on rebuilding as a more sustainable city became clearer as the recovery began. As a small city without any planning staff, Greensburg relied on assistance from outside agencies and consultants as it embarked on its planning efforts. The Federal Emergency Management Agency (FEMA) developed the "Long-Term Community Recovery Plan for Greensburg and Kiowa County", in just three months following the tornado. FEMA worked together with a Kansas non-profit group, "Public Square Communities", to identify and prioritize the community's vision for its recovery. The expedited process included focused "citizen action team" meetings and larger community meetings where citizens discussed community assets and offered input on recovery ideas. Attendance at these four community meetings averaged 400 people, nearly 30 percent of the 2007 population and likely a large majority of those remaining in the area following the disaster [5]. As the plan's introduction notes, at its core "is a simple guiding principle—keep the things that have made Greensburg and Kiowa County a good place to live, work, and own a business, and then suggest ways to build upon strengths of the community to make it prosperous, appealing, livable, and sustainable" [5].

The recovery plan itself is a wide-reaching document whose implementation will require "several years" [5]. The plan addresses the numerous aspects of completely rebuilding a community, including cost estimates and anticipated funding gaps. Sustainability is both a focused and an overarching theme. The plan's introduction states: "Sustainable or 'green' development creates livable, inspirational, and enduring places where the quality of life and the long-term quality of the community will be enhanced rather than depleted" [5]. The four main sections of the plan address: Sustainable (Green) Development, Housing, Economy/Business, and Community Facilities/Infrastructure. Although sustainability is directly identified as the foundation of that first section, each subsequent section contains a "sustainable opportunities" sidebar. For example, the Housing section lists the following as sustainable opportunities: (1) recycle debris and spur rebuilding by making lots available to developers; (2) prioritize use of land for energy efficiency and natural/renewable materials development; (3) provide information and resources on types of building and sustainable design; and (4) work with financing agencies to include funding in the development for energy efficient construction [5].

Each of the more than 40 projects recommended in the plan is assigned a "recovery value" (high, moderate, or low) that reflects its anticipated degree of importance in the recovery process. Within the sustainable development section of the plan, establishment of a sustainable development resource office and identification of city-wide energy options (with a focus on renewables) are deemed highest priority projects. The plan makes creation of a "sustainable comprehensive plan" a high priority project under the community facilities and infrastructure section, noting that "a comprehensive

plan based on the principles of sustainability will highlight strategies to develop a ‘model’ green community. The ongoing interest both locally and around the country in helping create a green Greensburg is an opportunity that the sustainable comprehensive plan will capitalize on and nurture” [5].

Several steps taken since the adoption of the Long Term Community Recovery Plan, both by the city as well as individuals and groups, reflect that document’s sustainability emphasis. For example, an area resident, Daniel Wallach, founded a sustainability-focused non-profit organization, Greensburg GreenTown, to provide educational resources and leadership in the rebuilding effort. One of this group’s projects is what it calls the “chain of eco-homes”, an effort to build up to twelve model homes within Greensburg for demonstrating various green building and green living techniques to both residents and visitors. The first such home, the Silo Eco-Home, includes such features as a green roof, solar panel, reclaimed materials, and a design capable of withstanding 200 mile-per-hour (320 kilometer-per-hour) winds (see Figure 2). In a short amount of time this organization has taken on many of the tasks the recovery plan urged through its recommended sustainable development resource office.

**Figure 2.** The Greensburg Eco Silo Home (photo by the author, September 2009).



Further progress towards the recovery plan’s recommendations is evident in the May 2008 “Greensburg Sustainable Comprehensive Plan” developed with the assistance of consultants. Again, sustainability is a common thread throughout this document, which includes not only the typical comprehensive plan sections on land use, housing, transportation, and economic development, but also sections on walkability, energy, and carbon. In its introductory section on vision and goals, the plan suggests that sustainability is in fact a value long-cherished value among citizens of Greensburg and throughout the state: “The root of sustainability is based in common Kansas values. A Kansan thinks in terms of generations and harbors a sincere belief that decisions should build strong communities for our children. ... We understand the natural systems that power a sustainable economy and know what it means to live off, and with, the land” [6].

The comprehensive plan also articulates the importance of Greensburg’s sustainability emphasis serving as a model for other rural communities. While acknowledging that a large-scale disaster

(and subsequent disaster aid) precipitated Greensburg's current approach, the plan further insists that the innovative path the community has chosen make it an ideal laboratory for others to learn both its successes and failures. In other words, Greensburg's future orientation extends well beyond its own modest boundaries.

One early step the Greensburg City Council took towards this desire to set a positive example was passing a resolution in December 2007 that requires all publicly-funded municipal buildings larger than 4,000 square feet to be built to "platinum" certification standards, the highest such certification level available under the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) Program, which rates buildings according to a variety of environmentally-oriented criteria. Here Greensburg became an innovator on a global scale, as it is the first community worldwide to adopt LEED platinum standards for its city buildings. The City's business incubator became the first such platinum-certified city building, with City Hall the second (see Figure 3). Prior to that, in May 2008, Greensburg became the home to the very first LEED platinum building in the State of Kansas when graduate students in architecture at the University of Kansas completed the 5.4.7 Arts Center as a project in their design studio.

**Figure 3.** Greensburg's Nearly-completed LEED Platinum City Hall (photo by the author, September 2009).



The story of Greensburg's sustainability-oriented rebuilding effort is still unfolding. While undoubtedly there are disagreements as to the pace and particulars of this effort, the sustainability focus has been maintained, even through the 2008 election cycle which ushered in a new mayor and new city council members. What remains, then, is to understand further the forces that have prompted and supported this move towards sustainability. Understanding more about how innovation arises and diffuses at the local government level is helpful not only to explaining the story of Greensburg itself but also its potential applicability as a model to other rural and/or small communities. As the future sustainability of such communities hinges on the adoption of new approaches, it is essential to begin to identify conditions that both facilitate and hinder local innovation.

### 3. Sustainability and Local Government Innovation

Sustainability is largely entrenched as key facet of good community planning in the United States. Regardless of what terminology best suits it, and regardless of disagreements as to the best methods for achieving it, the idea of planning for resilient, healthy, and environmentally sound futures is one that nearly any community could embrace. Nevertheless, conflicts in balancing ecological, economic, and equity goals are common [7]. As well, sustainability frequently remains an implicit rather than explicit element of planning. Recent research has shown that only certain elements of sustainability are prominently expressed in documents such as master plans. One study, for example, found that comprehensive plans tend to emphasize sustainability with respect to the idea of livable built environments [8]. While communities of all types and throughout the U.S. are implementing a range of policies and techniques that relate to sustainability [9], some places, particularly in the central part of the country, have not yet accepted it as an innovative standard of planning practice [10]. The question of why some communities pursue a sustainability agenda while others do not is an important inquiry.

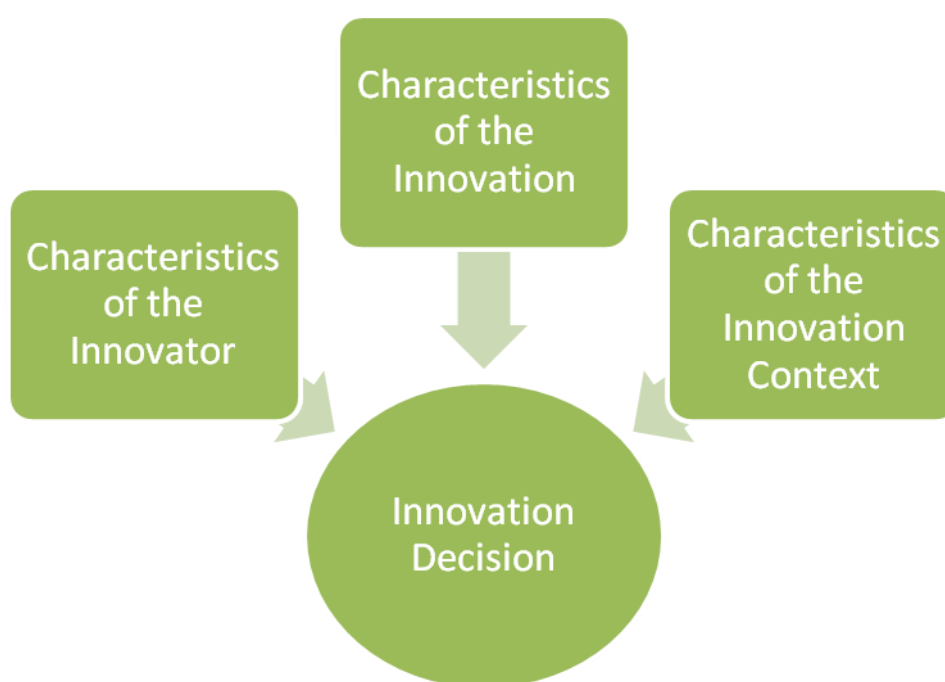
The innovation diffusion literature provides an intriguing lens through which to examine sustainability in planning, as it helps discern how and why innovations arise and spread. The term “innovation” frequently has a positive connotation, but the strictest sense of the word refers simply to adoption of a new practice. Diffusion occurs when that innovation “is communicated through certain channels over time among the members of a social system” [11] With respect to policy and other innovations in government, the bulk of recent research has focused at the state government level. Berry and Berry describe two primary explanatory models for understanding why state governments innovate [12]. The first of these, the internal determinants model, explains innovation and its diffusion as functions of social, political, or economic variables related to the state(s). The second model, the regional diffusion model, focuses on proximity to other innovating entities (e.g., other states) as a primary explanation.

Understanding *local* government innovation may appropriately draw from prior research at the state level, but has not received the same degree of scholarly attention [3,13,14]. One general and highly applicable model that White and Boswell [3] used to examine innovation in stormwater quality programs is Wejnert’s [15] framework, which explains an entity’s decision to innovate as a function of three elements: the characteristics of the innovator, the characteristics of the innovation itself, and the characteristics of the context in which the new practice occurs. This framework is akin to the internal determinants model, but is more comprehensive in that it allows consideration of influence from neighboring entities in its examination of the innovation context. Using it, White and Boswell [3] found that characteristics of the stormwater management innovations, particularly funding and staff needed to carry out the new practices, were especially important. Johnson and White [16] refined this model further in their study of sustainability-oriented innovations in transportation infrastructure among local governments in the Kansas City metropolitan area. This study examined the characteristics of innovations with respect to five features Rogers [11] deems important. These are: (1) relative advantage (is it better than our current practices?); (2) compatibility (does it fit with our current practices?); (3) complexity (is it easy to implement?); (4) trialability (can it be piloted or tested in a small scale?); and (5) observability (can we see it in place elsewhere?). Kansas City area planners and engineers perceived observability and relative advantage to be especially important factors when

considering the adoption of new practices. Tornatzky and Klein's meta-analysis [17] also noted the importance of relative advantage in explaining adoption of innovations, but found compatibility to be similarly important, and complexity as a hindrance to innovation.

The case study presented here makes use of this broad model of Wejnert's [15] while honing it to pay particular attention to findings related to innovation at the local government level. It is anticipated that certain characteristics of the innovator, the innovation, and the innovation environment (context) will emerge as factors that best explain the decision of the City of Greensburg to pursue a sustainability-oriented community rebuilding process. Figure 4 illustrates the model used. As described below, newspaper coverage of the tornado and its aftermath provide the basis of the analysis.

**Figure 4.** Innovation Decision Model (Adapted from Wejnert [15], 2002).



#### 4. Study Approach

As a single case study [18], this research may not yield broadly generalizable results about disaster recovery or rural community sustainability. However, the case of Greensburg is unique and important enough to merit exclusive examination through the lens of local level innovation. Because the City has pursued an innovative and extensive sustainability agenda, a focus on it can aid in our understanding of factors that promote and/or inhibit these sorts of far-reaching new practices, particularly in the context of small and/or rural communities.

Document analysis serves as the primary analytic method for the case. The City of Greensburg has been under a tremendous amount of scrutiny in the three years following the tornado, with celebrity visits, international media attention, and a television series all vying for residents' time during a period of unprecedented disruption in their everyday lives. Interview-based research therefore seems less appropriate at this stage, though it will be critical to future analysis of the city's recovery. In the meantime, the intense media attention has yielded copious amounts of information, and reporters serve as de facto interviewers. Thus, in order to understand the dynamics of the sustainability-oriented



recovery process, this study analyzes local media coverage of the tornado and its aftermath. Because newspaper articles include the opinions and reflections of those involved in the recovery process, including both local officials and citizens, they serve as a proxy for interviews.

The study draws on three area newspapers, the *Dodge City Daily Globe* (DCG), the *Hutchinson News* (HN), and the *Wichita Eagle* (WE); all are daily papers that serve southern and western parts of Kansas and that provided extensive coverage of the tornado and its aftermath. While national and even international newspapers covered the Greensburg story, these local papers provided the most consistent and frequent reporting. Each of these newspapers also has on-line coverage, so digital copies of each article were available. Use of search terms such as “Greensburg” and “tornado” helped to locate articles from two full years following the disaster, May 5 2009–May 4 2009. A total of 535 articles provide the basis of the analysis presented here. Additional analysis of the Community Recovery Plan and Comprehensive Plan that were developed in the months following the tornado allow further understanding of the specific elements of the sustainability initiative on which the media was reporting.

Using content analysis techniques [19,20] informed by the sustainability and innovation diffusion literatures, each newspaper article was coded by looking for the most prominent themes relevant to understanding the recovery process and its “green” emphasis. To understand the innovation that has occurred, a goal-oriented coding approach [19,20] focused on coverage related to the three elements of the theoretical model described above: characteristics of the innovator, the innovation itself (including notions of relative advantage, compatibility, complexity, trialability, and observability), and the innovation context. Since characteristics of the innovation related primarily to the sustainability emphasis, I further examined those themes with respect to their relevance to one or more of the “3 E’s” of environment, economy, and equity [8]. This allowed me to consider the extent to which Greensburg’s recovery process is focused on “green” or environmental issues and the extent to which it more holistically considers a sustainable future.

The approach of this case study is thus one of explanation-building [18]. As the goal of this approach is to build an explanation about the case, the main themes that occur in the articles analyzed serve to refine and render more specific the theoretical model explained above. Determining which themes were prominent was simply a matter of ascertaining which received the most frequent mention in the newspaper coverage. Starting with a general expectation that characteristics of the innovator, the innovation, and the innovation context will explain the innovation decision, the specific themes identified render that explanation specific to Greensburg’s experience. The findings reported below reflect the most prominent themes that emerged in the newspaper coverage.

## 5. Findings

The sustainability focus that the City of Greensburg has taken as it rebuilds from the 2007 tornado clearly represents a spectrum of innovation for this small community. Not only has Greensburg adopted practices that are new to it, the sustainability-oriented recovery process contains elements that make the city innovative on state, national, and even international levels. For example, the city’s decision to build its municipal buildings to LEED platinum standards is the first policy of its kind in the U.S. Analysis of the themes that emerged in local newspaper coverage of the disaster recovery

process reveals that certain characteristics of the innovator, the innovation itself and the innovation context are all important in explaining Greensburg's new approaches.

### 5.1. Characteristics of the Innovator

With respect to “who” the innovators are, it is apparent that persons in leadership roles, both at the state and local levels, stepped forward at key times to endorse, to champion, or to move the sustainability initiative along. The perseverance of these individuals is a key to their success to date. As noted before, the Kansas Governor, Kathleen Sebelius, was very quick to go public with the idea of rebuilding Greensburg as an “environmental model community, with renewable power, energy-efficient buildings, and other possibilities” [21]. Ultimately, however, the idea seems to have arisen from multiple places simultaneously. Mayor Lonnie McCollum, for example, quickly urged his constituents to support the idea of greening, and drew the city's first post-tornado building permit with the intention of rebuilding a highly energy efficient home. As he put it, “I don't see this mess, I see what it's going to be. Who wouldn't want to live in a brand new town? Who wouldn't want to have a business in a brand new town?” [22].

City Administrator Steve Hewitt also quickly embraced the sustainability initiative, as did the Schools Superintendent, Darin Headrick. Each emphasized that this approach was future-oriented. As Hewitt put it, “I think it's a responsibility we have to our future generations as we build a better community, so that when the next generation and the generation after that comes, these facilities will be here and be strong” [23]. Headrick stated this sentiment succinctly: “We need to build for the future and not for the now” [21]. These two leaders appear to have played pivotal roles in their endorsement of rebuilding “green” and their persistence in following through with the vision of a sustainable Greensburg. This became especially true after Mayor McCollum resigned less than one month after the tornado, citing exhaustion and an impatience with those who had different views of how the recovery should proceed. The City Council member who became mayor, John Janssen, was also committed to the sustainability emphasis, and thus helped maintain the momentum that other community leaders (spurred on by the endorsement of the Governor) had started.

It would be inaccurate to place exclusive credit for the Greensburg greening initiative with the city's leadership. Still, the fact that the “innovators” largely did comprise persons who were already in leadership positions—namely the city administrator, schools superintendent, and mayor—meant these were the key players at the forefront of building support for and ongoing momentum towards the innovations the community has pursued. Their persistence and shared vision, combined with their roles as pivotal members of the community, appear to be crucial elements in developing the sustainability vision and moving it forward. As will be described below, their vision was also portrayed as consistent with larger community priorities and values.

### 5.2. Characteristics of the Innovation

The innovation under examination here is the sustainability emphasis Greensburg has taken as it rebuilds. The characteristic of this innovation most evident throughout local newspapers' coverage of the recovery process is that of *opportunity*. In other words, becoming a sustainable community is widely seen as a chance for Greensburg not only to recover from the 2007 tornado but to craft a

brighter future. Interestingly, the media coverage of the tornado's aftermath presents this notion of sustainability as opportunity in a very general sense. For example, off the idea of a "greener" Greensburg (the connection to the city's name is clearly recognized), City Administrator Steve Hewitt notes that residents are largely supportive: "People are embracing the fact we have an opportunity to build a better community" [24]. Whether or not they agree with every aspect of the initiative, community members appear to recognize that the sustainability approach provides them with possibilities for the future that they had not previously considered, even if they simply embrace the concept of opportunity rather than the specific details of achieving it.

With respect to the more specific characteristics of the new sustainability practices, it appears that the environmental aspects of sustainability have received greater attention than the economic or equity aspects. This emphasis is somewhat vague, however, and tends to center on the concept of "greening" Greensburg without much in the way of particulars. Interestingly, the issue that has received the largest amount of media attention by far is that of energy efficiency, a topic that conceivably spans economic as well as equity concerns. Energy efficiency and renewable energy, though, are largely presented as environmentally friendly or "green" without further analysis as to why this is the case. Discussion of mitigating air and water pollutants, for instance, is absent in the newspaper coverage. It is perhaps particularly noteworthy that the topic of climate change does not appear once in the local media's description of these energy efficiency measures.

The media's coverage of the economic aspects of a sustainable Greensburg focuses largely on the fate of the business community and the provision of jobs for residents. Of particular concern to these residents in the weeks following the tornado were questions as to whether essential community services, such as a grocery store, would return, and if not, whether the city could even envision a viable future. With those initial concerns alleviated, discussion has turned to Greensburg's ability to attract low-polluting or otherwise more sustainability-oriented employers. The notion of opportunity is evident here as well, with apparent tension between those who feel the deliberate effort to rebuild sustainably will pay off in the long run and those who feel that the city ought to move faster to secure jobs for its citizens. As Steve Hewitt commented in December 2007: "Affordable housing and jobs are still things that keep me up at night" [25].

The economic aspects of the sustainability initiative blend in many ways with its equity aspects. Affordable housing, for example, has been another key concern in the recovery effort. The tornado caused multiple problems in this regard. First, many residents found that the insured value of their home, based on its assessed value, was not nearly enough to rebuild. In addition, virtually all rental housing was lost in the storm. In this case, it appears that the sustainability initiative is a part of the response to these concerns. Two affordable housing complexes, one for senior citizens, have been built in the last two years. Each emphasizes energy efficiency in both design and with its appliances. The senior housing development, Prairie Pointe, became the first newly constructed LEED platinum affordable housing project in Kansas.

Much sustainability effort at the local government level has had a primarily environmental focus [2]. While efforts in Greensburg do in fact highlight the "greening" of the city, the strong emphasis on energy efficiency and renewable energy is one that seems to bridge economic and equity concerns as well. Rather than portraying these pursuits as reducing pollution or mitigating global climate change, the media simply introduces them as "green" with a bit of attention to their long-term affordability.

Other environmental features of the city's recovery process, such as water conservation and recycling, receive much less media scrutiny.

### 5.3. Characteristics of the Innovation Context

The larger context in which the Greensburg recovery process is taking place may be the most significant to understanding its new emphasis on sustainability. This context includes both pre-disaster and post-disaster elements. Key elements that were in place before the 2007 tornado include the declining Greensburg population tempered by the strong sense of community pride. Key post-disaster elements include the resilience of the residents and the community as a whole, the available funding, and the "blank slate" opportunity for rebuilding that the severity of the tornado provided.

Prior to May 2007, Greensburg could easily have been characterized as a town in decline. As mentioned above, its population had been on a downward trend for decades, and the remaining residents were substantially older than the state average. Nevertheless, the immediate reaction to the tornado was a question of how to rebuild as opposed to whether to do so. As the Kiowa County Seat, Greensburg was a vital, albeit small, element of the rural fabric of south central Kansas. The community pride that surrounded the city's main attractions appears to have been a central part of the determination to bring the city back. One local resident noted: "We do things big here. We have the biggest well, the biggest meteorite and now we've had the biggest tornado. People will want to see it." [26]. Adding the tornado to the list of things that make Greensburg special seems to have helped support the subsequent discussions as to how the sustainability initiative could play a similar role.

Of course, with a disaster along the magnitude of what Greensburg experienced, community pride is likely an insufficient predictor of a successful recovery, let alone a recovery process and long-term future oriented towards sustainability. What media coverage of the months following the disaster made exceptionally clear is that the *resilience* of the community would be a pivotal force in its future. The notion of resilience is perhaps the most dominant theme among all the newspaper articles examined here. While initially an ecological concept, natural and social scientists alike now view resiliency and sustainability as fundamentally connected [27]. As Kansas State Representative Dennis McKinney, himself a Greensburg resident who lost his home in the tornado, wrote in his one-year reflection on the disaster: "The Kiowa County we had a year ago was a testament of the tenacity of our grandparents. The Kiowa County we are building today will be testimony to future generations of our resilience" [28]. Resilience and sustainability appear in fact to be familiar characteristics of Greensburg residents.

Another contextual characteristic relates directly to the tornado's enormity. With 90–95% of the city destroyed, Greensburg faced what the media repeatedly described as a "clean slate" in its recovery process. The "opportunity" for a sustainability-oriented recovery meshed nicely with the recognition that Greensburg would be "starting from scratch". Whereas most sustainability initiatives at the local government level must contend with multiple challenges of retrofitting existing built environments with new practices, Greensburg encountered a "blank sheet of paper" on which it could draw an entirely innovative future [29]. Of course, this idea of a new beginning centers primarily on Greensburg's built environment. Other aspects of the City, including its political institutions, remained more or less intact. Nevertheless, the extent of necessary rebuilding appears to have facilitated the new approach.

Finally, and similarly related to the scope of the disaster, the ability to draw funding from many sources to support its rebuilding effort represents a further contextual characteristic of post-tornado Greensburg. One year following the tornado, the Wichita Eagle reported that FEMA assistance had reached \$69 million, with the US Department of Agriculture contributing greater than \$6 million more. Some funds have come as a direct result of the greening initiative. For example, the actor Leonardo DiCaprio contributed \$400,000 towards the completion of the LEED Platinum business incubator, a project he learned of while producing the Planet Green television documentary series on Greensburg's sustainability efforts [30]. Frito Lay Corporation contributed significant additional funds towards this project.

## 6. Discussion

### 6.1. Why Sustainability in Greensburg, Kansas?

The City of Greensburg could have rebuilt in way that replicated its past. Indeed, many communities that recover from disasters do exactly this, with perhaps some modest changes and/or efforts to become more resistant to future damages from similar events. Greensburg, though, has chosen an innovative path with its sustainability focus. To understand how and why the city has pursued these new practices requires consideration of all three sets of characteristics outlined by Wejnert [15] and presented in Figure 4. Figure 5 updates the innovation model to reflect the findings from two years worth of area newspaper coverage of the disaster recovery.

Looking at characteristics of the innovator, the innovation, and the innovation context, elements of each help explain the decision to pursue a sustainability oriented recovery in Greensburg.

While the first public suggestion of rebuilding a “green” Greensburg may have come from the Governor's office, the idea was closely in line with what local community leaders were already beginning to imagine. Attributing the sustainability initiative exclusively to these leaders would be inaccurate; nevertheless, it seems reasonable to propose that without their support, this initiative would have failed to get off the ground. The existence of a shared vision among key community leaders, namely the city administrator, mayor(s) and schools superintendent, along with their persistence in keeping this vision squarely in front of the community, were important parts of the decision to pursue a sustainability oriented recovery process.

Although the data examined here cannot establish why this consensus emerged, it seems likely that these leaders had grappled previously with questions of how to sustain a declining small city like Greensburg. It is possible that they viewed the greening initiative as the most promising prospect to address prior concerns, as well as the current disaster. The characteristic most commonly depicted with respect to the sustainability innovation itself was the *opportunity* this approach provided to help Greensburg not only recover, but thrive. Here opportunity is akin to the notion of relative advantage that Tornatzky and Klein [17] and Johnson and White [16] found as an important predictor of the decision to innovate. Thus, another partial explanation for the innovative approach seen in Greensburg comes in the perceived ways that rebuilding sustainably would allow the community to improve on pre-tornado conditions.

**Figure 5.** Explaining Greensburg’s Sustainability Innovations.

Similarly, the dominant focus on energy efficiency in the sustainability effort, at least as presented in the newspaper coverage analyzed here, may suggest that this approach is particularly compatible with existing concerns and interests in Greensburg. Rebuilding with energy conservation as a focus responds to a pressing worry shared by most Greensburg citizens—that they can afford the cost of a new home. Though newspaper accounts of the recovery process portray energy efficiency, conservation, and renewable sources as “green” and “environmentally-friendly”, the heart of the matter may be that these approaches yield economic benefits that will help Greensburg and its citizens. This again supports Tornatzky and Klein’s [17] finding that innovative approaches that are compatible with existing practices and/or values are more likely to be adopted. While there are many additional aspects of the sustainability initiative outlined in the recovery plan and comprehensive plan, it remains to be seen whether these will capture as much interest as the energy efficiency aspects.

Finally, the unique context out of which the sustainability innovations arose is clearly a huge component of their adoption. The pride and resilience of the citizens of Greensburg appear to have been essential ingredients in ensuring that the city could and would in fact rebuild after such a devastating disaster. These qualities perhaps made the compatibility of the new sustainability emphasis more apparent, particularly among those who recognized recent city trends with respect to a declining and aging population. Because the city had features of which residents could remain proud, the new direction could become another such feature. Here it is possible to see some overlap between the characteristics of the innovation itself and the innovation context. Unlikely as the pairing between rural Kansans and a sustainability agenda may initially seem, as the Sustainable Comprehensive Plan observed, there are numerous shared values between people who consider themselves resilient and an approach that seeks to make communities resilient over generations. As Daniel Wallach, founder of the non-profit Greensburg GreenTown, put it: “Folks in the rural areas have been going ‘green’ for generations, and this is nothing new. It’s about bringing new technologies to the values and lifestyles” [31]. The opportunity of sustainability is thus one that resonates with local mores.

Additional contextual elements are equally significant to the adoption of the sustainability innovation. Perhaps most important of all is the fact that Greensburg, with 90–95% of the city destroyed by the 2007 tornado, truly did have a rare “clean slate” opportunity to remake Greensburg’s built environment. Had only a partial recovery been required, it is conceivable that there might have been more tension between those who favored what remained of the status quo and those who preferred the new approach. The City was also in the unusual position of being able to revisit issues such as land use designations and building requirements in their entirety as opposed to piecemeal.

The funding that accompanied the disaster recovery effort is the last element of the innovation context that merits attention. While the rebuilding process clearly necessitated substantial funds, there were obvious and clearly identifiable sources of money that Greensburg could pursue. Some of these funds were dedicated to rebuilding what previously existed, though even these could be used to improve in areas such as energy efficiency. The city has also succeeded in attracting funds from donors who wished to be part of the greening initiative. In the absence of the tornado, many of these funds would likely have remained out of reach for a small, rural city in Kansas.

### *6.2. Implications of Greensburg’s Sustainability Emphasis*

The analysis here suggests that Greensburg’s decision to adopt sustainability innovations can be explained by the interaction of various characteristics, some inherent and others made possible by the storm. What remains is to ponder the second question that guided this study: can Greensburg in fact serve as a model for other rural communities interested in sustainability as a focus of future planning efforts? This idea of being an exemplar in rural sustainability arose less than two weeks after the May 2007 tornado and has been a common theme in the subsequent recovery process. Indeed, the editorial pages of both the Hutchinson and Wichita newspapers have suggested that Greensburg could serve as a model for those larger cities.

Given that innovations are simply new practices [11], and that few communities of any size have adopted the same sorts of initiatives that have been unfolding in Greensburg over the last three years, the potential for diffusion of these innovations is high. A regional diffusion model might even predict that communities near Greensburg are more likely to begin the innovation process [12]. Yet, if one follows Wejnert’s model [15], and considers the factors that seem best to explain how Greensburg’s new practices have come to be, it is less clear that all of these same facilitating factors are in place elsewhere. One possibility, then, is to consider the three model elements and ask the following clarifying questions: what might diffuse and how?

With respect to innovator characteristics, planners can take note of the importance of a consistent and shared vision among leaders throughout an innovation process. While it may be rare to have local leadership in more or less unanimous support of a sustainability initiative, planners would do well to investigate opportunities to advance any type of common vision with respect to the new practices under consideration. It is possible that these sorts of shared visions lie latent in communities. This may well have been the case in Greensburg, where long before the 2007 tornado, leaders and citizens alike had grounds for concern that their community was in decline.

With respect to innovation characteristics, planners interested in promoting sustainability in their communities can reflect on certain aspects of Greensburg’s experience. Most notably, the notion of the

“opportunity” that sustainability presents for Greensburg appears to be an important element of how citizens have perceived the greening initiative there. In Greensburg, at least, the focus on energy efficiency may also be present because these new practices are compatible with local values and visions. In such cases, agreement becomes more likely. Greensburg’s leaders appear to have succeeded in this regard by helping to show that their shared vision was one that resonated as a compatible opportunity for its citizens.

In addition, and more broadly, Greensburg provides for the “observability” of sustainability features that Rogers [11] argues is a key innovation feature and that Johnson and White [16] found to be important to Kansas City area cities seeking to implement new practices with respect to their transportation infrastructure. The ability to see an innovation already in operation elsewhere can be helpful to understanding its advantages and disadvantages prior to deciding to pursue it. Greensburg’s LEED platinum buildings, for instance, may serve as models and information sources for other communities who might otherwise have prohibitive concerns about building costs, design, and so on. This information could be useful to planners in discerning whether innovations will in fact provide relative advantage over existing practices in their own communities.

Lastly, while Greensburg’s innovator and innovation characteristics may be replicable in many other communities, its innovation context characteristics are much more of a mixed bag. Clearly, having a clean slate for sustainable approaches in the built environment is not a condition any community would wish upon itself. It would likely be much harder to implement broad-scale sustainability practices into an existing community fabric, as retrofits are always more challenging. Likewise, much of the external funding that has accompanied Greensburg’s recovery process may be unique to that community. In addition to the obvious disaster aid, many donors have responded to the national attention Greensburg has received. Other communities might not be able to capture that same level of attention and corresponding funding with their own efforts.

On the other hand, the community pride and resilience that appear to have supported Greensburg’s innovative recovery process are characteristics present in many other places. Planners who can recognize and channel a sense of place among citizens of any community may be able to use that to facilitate sustainability innovations. Community landmarks, such as Greensburg’s Big Well, are a likely part of this sense of place; such landmarks may be built or natural [32]. Whatever the special qualities of a community are, they seem to facilitate agreement on the importance of sustaining that community into the future.

It is too soon to determine whether Greensburg will serve as an active model for sustainability innovations elsewhere. Communities that are able to pursue sustainability with dedicated and persistent leadership, to present it as an opportunity that is compatible and provides relative advantage, to leverage necessary funds, and to tap into community pride and a sense of place may find Greensburg’s new practices compatible with their own circumstances. For now, Greensburg continues to chart its own innovative path.

## 7. Conclusions

The case of Greensburg, Kansas and its innovative sustainability initiative is at once unexpected and logical. Perhaps it could be described as a “perfect storm”. The May 2007 tornado forced this



small city to re-imagine itself literally from the ground up. The “green” innovations hearkened back to the city’s name. State and city leadership stepped forward together to embrace the sustainability initiative. These leaders and others helped cast these innovations as compatible with rural Kansas values, the existing community pride, and the path towards a more resilient future. The media came from near and far to cover this story. Funding came in from expected and unexpected sources. All of these characteristics of the innovators, the innovation itself, and the context within which the new practices occurred were pointing consistently in the same direction.

Will Greensburg sustain its sustainability effort? That question also remains unanswerable for the time being. Certainly the City faces challenges beyond its municipal boundaries, such as changing rural demographics throughout the Great Plains. Greensburg’s future as a viable small city in rural Kansas was unclear prior to May 2007, largely as a result of these external challenges. For now, however, those interested in sustainable community futures can take note of what is happening in this most unlikely of locations. Starting from scratch and in a context where planning had previously been informal and irregular, Greensburg has emerged in an unexpected spotlight, one that points to a future vastly different from its past. That its citizens can envision a sustainable community and are willing to work for that future may be one of the most critical aspects of achieving those goals.

## References

1. Godschalk, D.R. Land use planning challenges: Coping with conflicts in visions of sustainable development and livable communities. *J. Am. Plann. Assoc.* **2004**, *70*, 5-13.
2. Portney, K.E. *Taking Sustainable Cities Seriously: Economic Development, the Environment, and Quality of Life in American Cities*; MIT Press: Cambridge, MA, USA, 2003.
3. White, S.S.; Boswell, M.R. Stormwater quality and local government innovation. *J. Am. Plann. Assoc.* **2007**, *73*, 185-210.
4. University of Kansas Institute for Policy and Social Research. *Kansas Statistical Abstract 2008*, 43rd ed.; Available online: <http://www.ipsr.ku.edu/ksdata/ksah/KSA43.pdf> (accessed on 1 October 2009).
5. Greensburg and Kiowa County, Kansas. *Long Term Community Recovery Plan*; Chambers County TEXAS: Austin, TX, USA, 2007; Available online: [http://www.greensburgks.org/recovery-planning/long-term-community-recovery-plan/GB\\_LTCR\\_PLAN\\_Final\\_HiRes.070815.pdf](http://www.greensburgks.org/recovery-planning/long-term-community-recovery-plan/GB_LTCR_PLAN_Final_HiRes.070815.pdf) (accessed on 15 August 2009).
6. *Greensburg Sustainable Comprehensive Plan*; Available online: <http://www.greensburgks.org/recovery-planning/Greensburg%20Comprehensive%20Master%20Plan%2001-16-08%20DRAFT.pdf> (accessed on 15 August 2009).
7. Campbell, S. Green cities, growing cities, just cities? Urban planning and the contradictions of sustainable development. *J. Am. Plann. Assoc.* **1996**, *62*, 296-312.
8. Berke, P.E.; Conroy, M.M. Are we planning for sustainable development? An evaluation of 30 comprehensive plans. *J. Am. Plann. Assoc.* **2000**, *66*, 21-33.
9. Jepson, E.J., Jr. The adoption of sustainable development policies and techniques in U.S. cities: How wide, how deep, and what role for planners? *J. Plann. Edc. Res.* **2004**, *23*, 229-241.

10. Conroy, M.M. Moving the middle ahead: Challenges and opportunities of sustainability in Indiana, Kentucky, and Ohio. *J. Plann. Edc. Res.* **2006**, *26*, 18-27.
11. Rogers, E.M. *Diffusion of Innovations*, 5th ed.; Free Press: New York, NY, USA, 2003.
12. Berry, F.S.; Berry, W.D. Innovation and Diffusion Models in Policy Research. In *Theories of the Policy Process*; Sabatier, P.A., Ed.; Westview Press: Boulder, CO, USA, 1999; pp. 169-200.
13. Franzel, J.M. Urban government innovation: Identifying current innovations and factors that contribute to their adoption. *Rev. Policy. Res.* **2008**, *25*, 253-277.
14. Shipman, C.R.; Volden, C. Bottom-up federalism: The diffusion of antismoking policies from U.S. cities to states. *Am. J. Pol. Sci.* **2006**, *50*, 835-843.
15. Wejnert, B. Integrating models of diffusion of innovations: A conceptual framework. *Annu. Rev. Soctol.* **2002**, *28*, 297-326.
16. Johnson, B.J.; White, S.S. Promoting sustainability through transportation infrastructure? Innovation and Inertia in the Kansas City metropolitan area. *J. Urban Plan. Develop.* 2010, in press.
17. Tornatzky, L.G.; Klein, K.J. Innovation characteristics and innovation adoption implementation: A meta-analysis of findings. *IEEE Trans. Eng. Manage.* **1982**, *29*, 28-45.
18. Yin, R.K. *Case Study Research: Design and Methods*, 2nd ed.; Sage Publications: Thousand Oaks, CA, USA, 1994.
19. Robson, C. *Real World Research: A Resource for Social Scientists and Practitioner-Researchers*; Blackwell Publishers: Oxford, UK, 1993.
20. Patton, M.Q. *Qualitative Evaluation and Research Methods*, 2nd ed.; Sage Publications: Newbury Park, CA, USA, 1990.
21. Kessinger, S. "Green" burg talk surfaces in Topeka. *The Hutchinson News*, 12 May 2007.
22. Hanna, J. Mayor Focuses on Town's Renewal. *The Hutchinson News*, 9 May 2007.
23. Greensburg Plans to Rebuild to Highest "Green" Standards. *Dodge City Daily Globe*, 20 December 2007.
24. Mann, F. Restless to Rebuild. *The Wichita Eagle*, 21 September 2007.
25. Hall, E. Lighting the Way. *The Hutchinson News*, 23 December 2007.
26. Hall, E. More than 50 Business Owners Say They'll Stay. *The Hutchinson News*, 16 May 2007.
27. Levin, S.A.; Barrett, S.; Aniyar, S.; Baumol, W.; Bliss, C.; Bolin, B.; Dasgupta, P.; Ehrlich, P.; Folke, C.; Gren, I.M.; Holling, C.S.; Jansson, A.; Jansson, B.O.; Martin, D.; Maler, K.G.; Perrings, C.; Sheshinsky, E. Resilience in Natural and Socioeconomic Systems. *Environ. Develop. Econ.* **1998**, *3*, 221-262.
28. McKinney, D. Attitude, Partners Made Recovery Possible. *The Dodge City Daily Globe*, 3 May 2008.
29. Starting over: Greensburg Could Be Model for Innovative Concepts. *The Hutchinson News*, 15 May 2007.
30. Mann, F.A. Greener Greensburg: An Environmental Experiment Grows on Kansas Prairie. *The Wichita Eagle*, 3 May 2009.
31. Rebuilding Greensburg as "Green" Challenging. *The Hutchinson News*, 30 July 2007.

32. Beatley, T.; Manning, K. *The Ecology of Place: Planning for Environment, Economy, and Community*; Island Press: Washington, DC, USA, 1997.

© 2010 by the authors; licensee MDPI, Basel, Switzerland. This article is an Open Access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/3.0/>).