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**Why Small Towns are a Big Deal:
Evaluating the Lasting Impacts of Greensburg, Kansas' Resilience Plan and its Role as a
Model for Small Towns in the face of Climate Change**

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Abstract

Small towns and rural communities face particular geographic and demographic obstacles in responding to and preparing for climate change events, particularly in their capacity to build and maintain resilient and green infrastructure. Physical isolation, lack of investment, high poverty rates, and an aging population increase the vulnerability of these communities. Small towns face particular obstacles as the severity of destructive weather events— like tornadoes, floods, and hurricanes— are exacerbated by climate change. When faced with a disaster, the aforementioned obstacles are only intensified as they face rebuilding. If small towns are to adequately respond to climate change, they will need to assess their risks and vulnerabilities and take stock of the resources available to them. Using the example of Greensburg, Kansas and its infamous 2007 Tornado as a case study, this paper, through analysis of its master plans and interviews with leaders, will investigate the lasting effects of the town’s sustainable rebuilding 17 years later, and its internal and external experience in the impact it has had on towns looking to bolster sustainability and climate resilience.

INTRODUCTION

At 9:45 pm on May 4, 2007, the town of Greensburg, Kansas was leveled by an E5 tornado, the most destructive classification, which hit the town with winds up to 205 miles per hour. In just one hour and five minutes, the tornado destroyed a total of 961 homes and businesses and took the lives of 12 people.¹ Greensburg City Hall and other key community buildings, like the elementary and high schools, fell victim to the severe winds. Overall, 95% of

¹ US Department of Commerce, N. (2015, March 18). Greensburg - five years after EF-5 tornado. National Weather Service. <https://www.weather.gov/ddc/greensburgfiveyear>

Greensburg's built environment was completely destroyed by the tornado. Out of the wreckage, Greensburg decided to strategically use its federal and state emergency funding to "build back green" and use the blank slate that the tornado created to rebuild sustainably in order to "bring Greensburg into the future."² This decision would garner national and international attention to the rural Kansas town, visibility which has continued even 17 years after the tornado. The implementation of this sustainable vision was guided by two key documents: the "Long-Term Community Recovery Plan" by the Federal Emergency Management Administration (FEMA) and the "Greensburg, KS Sustainable Comprehensive Master Plan" by BNIM Architects based out of Kansas City, Missouri. These two documents played a major role in Greensburg's immediate and long-term next steps.

With Kansas' first LEED³ certified municipal buildings, 100% wind energy, and a yearly estimate of \$200,000 saved in fuel and electricity costs, Greensburg became known across the country as "the town that built back green."⁴ With their newfound status as a model for sustainable development, particularly in rural environments, Greensburg officials fielded weekly calls from communities all over the world looking to take similar steps. This attention has continued to the present day. City leaders are consulted by communities around the world grappling with devastating weather events ranging from wildfires to earthquakes — from Australia to Japan. The uniqueness of the situation, from the severity of the tornado, to the various streams of funding, has positioned Greensburg as an example for small towns all over the

² Bob Dixon, Mayor of Greensburg from 2008-2018.

³ LEED—which stands for Leadership in Energy & Environmental Design—is a green building certification program that recognizes best-in-class building strategies and practices.

⁴ Gowen, Annie. "The Town That Built Back Green." Washington Post, 23 Oct. 2020, www.washingtonpost.com/climate-solutions/2020/10/22/greensburg-kansas-wind-power-carbon-emissions/.

world looking to incorporate their own sustainability plans.⁵ However, 2007 is approaching two decades ago, and political and technological landscapes are constantly shifting, this paper investigates the extent to which Greensburg can serve as a model for other small towns and argues that, while Greensburg's sustainability and resilience plans were monumental to much of the city's success, there are many key lessons learned that are less widely discussed, meaning Greensburg may not be able to serve as a directly translatable model.

This paper will serve as an evaluation of the two master plans developed for Greensburg, complemented by a review of the existing literature and supplementary interviews with community leaders of Greensburg's past and present. Additionally, this paper will include first-hand accounts that shed light on the experience of Greensburg's transformation. Through this analysis and interview-based research, I have noted key instances in which recommendations from these master plans were either (1) not adopted, or (2) adopted and played out differently than projected. I have also identified the ways in which cooperation across multiple scales— local, state, and national— aided in the city's rebuilding efforts. Finally, the interviews conducted have brought forth conversations about the future of Greensburg, and what is coming next for this community.

BACKGROUND AND CONTEXT

Climate Change and Extreme Weather Events

According to the United States Environmental Protection Agency (EPA), climate-change related extreme weather events are projected to increase over the next few decades as a result of

⁵White, Stacey Swearingen. "Out of the Rubble and towards a Sustainable Future: The "Greening" of Greensburg, Kansas." *Sustainability*, vol. 2, no. 7, 20 July 2010, pp. 2302–2319, <https://doi.org/10.3390/su2072302>.

global temperature increase.⁶ According to the 2021 Intergovernmental Panel on Climate Change (IPCC)'s Sixth Assessment Report, the global rise in greenhouse gasses has increased the frequency and intensity of extreme weather events.⁷ As greenhouse gasses trap heat in the atmosphere, the warming impacts the water cycle and alters weather patterns– both globally and locally– which makes extreme weather worse.⁸

The changed intensity of weather events can manifest differently depending on the type of event. For example, as evaporation intensifies with rising temperatures, hurricanes hold more water vapor, producing more intense rainfall rates.⁹ Moving away from the coastal United States, droughts are becoming hotter, longer-lasting, and larger.¹⁰ Tornadoes are becoming more intense, and, as a result of climate change, clusters of tornadoes are more likely to form in the occurrence of tornado conditions.¹¹ Climate-friendly infrastructure, like Greensburg's, can alleviate this issue in two ways: 1) it protects the built environment from the impacts of an extreme weather event, and 2) it allows a community to decrease its carbon footprint, creating healthier local conditions and contributing to a global shift away from fossil fuels.

Small Towns and Their Climate Vulnerability

Small towns and rural communities see discrepancies in health and education access, economic investment, and quality infrastructure that can set them back in comparison to their

⁶ "Climate Change Indicators: Weather and Climate." *EPA*, Environmental Protection Agency, 26 July 2023, www.epa.gov/climate-indicators/weather-climate.

⁷ Intergovernmental Panel on Climate Change. "Climate Change 2022: Impacts, Adaptation and Vulnerability." IPCC Sixth Assessment Report, IPCC, 27 Feb. 2022, www.ipcc.ch/report/ar6/wg2/.

⁸ Colbert, Angela. n.d. "Extreme Weather and Climate Change." *Climate Change: Vital Signs of the Planet*. <https://climate.nasa.gov/extreme-weather/>.

⁹ Laboratory, By Angela Colbert Ph.D., NASA's Jet Propulsion. 2022. "A Force of Nature: Hurricanes in a Changing Climate." *Climate Change: Vital Signs of the Planet*, June 16, 2022.

¹⁰ "CASC Drought Research Highlights | U.S. Geological Survey." 2022. June 7, 2022.

¹¹ Henson, Bob, and Bob Henson. 2023. "Climate Change and Tornadoes: Any Connection?" *Yale Climate Connections*. March 31, 2023.

urban counterparts. The most recent estimates from the American Community Survey found that the nonmetropolitan poverty rate was 15.4 percent in 2019, compared to 11.9 percent in metro areas.¹² The United States Environmental Protection Agency (EPA) lists declining downtowns, lack of transportation options, limited planning capacity, and suburban-style lot growth as just a sprinkling of the challenges that small towns and rural areas face in their infrastructural development and maintenance. While urban smart growth is well-defined, small towns and rural areas have less of a clear definition. Small towns each have their own unique geographic, cultural, and environmental factors that need to be considered when making key planning and development decisions. Policies that are appropriate for a large metropolitan city likely wouldn't make sense for a town with a population less than 1,000 people.

In the face of climate change, these economic and social elements are only exacerbated. The intermingling of environmental, economic, and infrastructure factors all contribute to the resilience of a small town. While residents of small towns and rural communities can access the plentiful natural resources that surround them, and enjoy the feeling of recognizing every face at the local post office or diner, the blessing of isolation and small-ness of these spaces can become a curse when faced with a storm, flood, or drought. Adaptation and mitigation efforts require significant planning, but local government structures can be less formalized or lack significant planning capacity in comparison to urban areas. According to the National Climate Assessment, 73% of metropolitan counties have land-use planners, but only 29% of rural counties (not adjacent to a metropolitan county) have one or more planners.

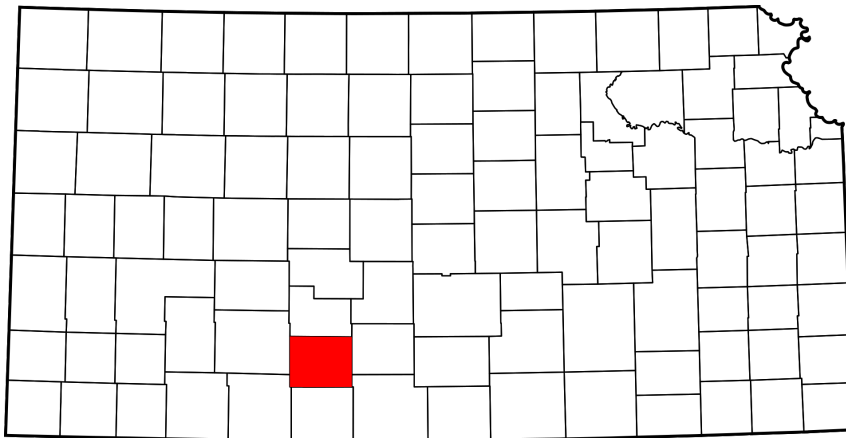
A study done at the University of North Carolina found that “rural populations are especially vulnerable” to heat, with rural populations suffering heat-related illnesses at up to 10

¹²“USDA ERS - Rural Poverty & Well-Being.” n.d.

times the rate of people in urban areas.¹³ One fundamental reason for this is that people in small towns and rural areas are more likely than those in urban areas to work outdoors, in jobs driven by natural resources like logging, agriculture, and raising livestock. Small towns often don't have the resources or investment to implement heat-mitigating infrastructure or programs.¹⁴

Small-town America has already experienced impacts of climate change related weather effects, including crop and livestock loss from drought and flooding, damage to levees and roads from extreme storms, shifts in planting and harvesting times, and large-scale losses from fires and other weather-related disasters. Small towns often have limited locally available funds to cope with climate change. This gap in planning and infrastructure resources will be key to address climate adaptation plans for small towns, both before and after a natural disaster or extreme weather event occurs.

Greensburg, Kansas



*Greensburg is the county seat of Kiowa County, Kansas.*¹⁵

¹³Kovach, Margaret M., Charles E. Konrad, and Christopher M. Fuhrmann. n.d. "Area-Level Risk Factors for Heat-Related Illness in Rural and Urban Locations across North Carolina, USA." *Applied Geography* 60: 175–83.

¹⁴"Smart Growth in Small Towns and Rural Communities." EPA, Environmental Protection Agency, 29 Jan. 2024.

¹⁵ nationalatlas.gov

Greensburg is the county seat of Kiowa County, a rural county in south central Kansas. With a population density of 3.3 people per square mile, its rural classification is characteristic of many counties in the western part of the state.¹⁶ The Kiowa County courthouse (pictured right) in Greensburg was one of the only salvageable buildings after the tornado.¹⁷ Just one week following the tornado, then-Kansas Governor Kathleen Sebelius recommended that Greensburg embrace sustainability as a recovery model.¹⁸ The plan to rebuild Greensburg as the “greenest town in rural America” had support from Greensburg’s then-mayor and city manager. From this early stage, sustainability became a foundation of the recovery process and the city’s future.¹⁹ In the years immediately following, the event that almost wiped Greensburg off the map caused the city’s presence to be even greater, and this fame continues today. The town whose greatest attraction used to be the country’s deepest hand-dug well is now visited for its unique infrastructure and the inspiration of its story.²⁰



¹⁶ Institute for Policy & Social Research, The University of Kansas; State: 35.9 data from the U.S. Census Bureau, Population Estimates, Vintage 2022.

¹⁷ “Kiowa County Courthouse - Renovation.” Tessere, www.glmv.com/work/renovation-restoration-kiowa-county-courthouse/.

¹⁸ “Greensburg, Kansas, Tornado Response - Cleanup | Region 7 | US EPA.” Archive.epa.gov, archive.epa.gov/region07/cleanup/greensburg/web/html/.

¹⁹ White, Stacey Swearingen. “Out of the Rubble and towards a Sustainable Future: The “Greening” of Greensburg, Kansas.” *Sustainability*, vol. 2, no. 7, 20 July 2010, pp. 2302–2319, <https://doi.org/10.3390/su2072302>.

²⁰ Gowen, Annie. “The Town That Built Back Green.” *Washington Post*, 23 Oct. 2020, www.washingtonpost.com/climate-solutions/2020/10/22/greensburg-kansas-wind-power-carbon-emissions/.

Using a synthesis of current literature, interviews, primary sources like the Greensburg Sustainable Comprehensive Master Plan, Long Term Community Recovery Plan, and primary research (newspaper articles, news broadcasts, documentaries, other pieces of media), this thesis will investigate the vulnerability of rural communities and the lessons that can or cannot be learned from Greensburg.

Federal Emergency Relief Administration (FEMA) and the Community Disaster Resilience Zones (CDRZs) Act

With all of this being said, what resources exist for small towns in the face of climate change? How can they leverage cross-community and cross-regional resources to implement climate-resilient infrastructure before a natural disaster? Where has this been done, and what lessons can be learned from them?

When a community of any size is faced with a disaster or emergency, local government officials review the damage and determine the extent of the incident's impact. The state, Tribal Nation, or territory then submits a request to have the incident declared as a federal disaster.²¹ The President can declare an incident a major disaster if the event has caused damage beyond the combined response capacity of both the state and local governments. In the case of Greensburg, the community sought

The Community Disaster Resilience Zones (CDRZs) Act, written into law by President Joe Biden in Fall 2022, uses FEMA's National Risk Index to identify the most at-risk communities in the U.S. in order to identify resilience zones. The zones that are designated are prioritized for federal support to boost the implementation of resilience and mitigation projects,

²¹ "How FEMA Works." *FEMA.Gov*, www.fema.gov/about/how-fema-works. Accessed 30 Mar. 2024.

in an effort to lessen the financial burden of these crucial projects. The CDRZ Act requires the Federal Emergency Management Agency (FEMA) to use the National Risk Index to identify the 50 US census tracts with the highest hazard risk ratings and to include at least 1 percent of the most at-risk census tracts in each state. In addition to natural hazard exposure, the index includes pillars for social vulnerability and community resilience. In addition, for projects located within those zones, the act authorizes FEMA to use the Disaster Relief Fund (DRF) to increase the share the federal government covers for grants under the Building Resilient Infrastructure and Communities (BRIC) program. This allows the federal contribution to rise from 75 to 90 percent, with state, local, and tribal governments funding the remainder of the grants. Combining data analysis from their composite National Risk Index and Climate and Economic Justice Screening tool, FEMA identified 483 tracts in the first cohort of U.S. Census tracts as CDRZs. The vast majority of these tracts are identified as rural, and span all 50 states. These designated zones will guide the distribution of pre- and post-disaster resources and funding, as well as incentivize private and nonprofit investment in otherwise underserved areas.

Summary

In brief, there are several vulnerabilities and risks that rural communities face and have faced in the past few decades. Rural decline, lack of reliable access to healthcare and transportation, and underrepresented climate risks have placed these communities on the outskirts of broader climate conversations. As the country and world look more closely towards a shift in climate resilience and mitigation, including these communities will be paramount. For a small town looking to implement green infrastructure, Greensburg is likely one of the first towns they would call for advice and support. The extent to which Greensburg can serve as a model and/or translate to a different community will be investigated.

OVERVIEW OF RESEARCH & CONCEPTUAL FRAMEWORK

My paper seeks to answer a few research questions: How did Greensburg, Kansas successfully leverage its state and federal funding, and what makes it such a widespread example of sustainable revitalization? What are the lasting effects of Greensburg's rebuilding? Looking back over the last 17 years, what has worked and what hasn't? What unique factors (population size, geographic spread, town history) allowed such robust civic participation in the plan, and how, if at all, can that process be replicated? Finally, this research will look forward into the future of sustainable infrastructure as it relates to rural communities and natural disasters. In the wake of the much more recent establishment of CDRZs and their access to elevated FEMA funding and specialized collaboration, how can other small towns take advantage of Greensburg's example through both its successes and failures?

This thesis argues that the main model it serves for other cities to look towards is the assessment of the unique assets of a given place. To answer my research questions, I will reference Greensburg's Master Plans and identify what grounded the city's rebuilding efforts. By investigating Greensburg's steps toward rebuilding with both climate mitigation and resilience in mind, I plan to illuminate the methods that made it most successful in achieving its goals, and find the places where the initial plan wasn't appropriate. This all will go towards my main argument, which is that while Greensburg's story is unique and inspiring, it may not be a directly translatable plan for similar towns facing natural disasters. I posit that the most extractable lesson is their community, place-based approach. Given the United States' diverse geography, no single small town can serve as a monolith, especially in the context of environmental hazards. A place-based approach is the most relevant lesson because it encourages small towns and

communities to look internally at what makes the most sense for them, and not what worked somewhere else.

LITERATURE REVIEW

An analysis of the literature, or relative lack thereof, on how small towns and rural areas are uniquely impacted by climate change demonstrates the urgent need for climate resilience and the challenges these spaces face in implementing this change. While, as prefaced earlier in this paper, there exist news articles, policy briefs, and scholarly articles on Greensburg, Kansas, there is little reflection now that 17 years have passed. Thus, there is the unique opportunity to shed light on the city's view on what has changed, succeeded, and left room for improvement in this time. Finally, the Community Disaster Resilience Zones Act being so new, there is a lot of room to assess how small towns in the United States can leverage what it offers.

U.S. Small Towns and Climate Change

Most research on climate change and the built environment in the United States surrounds select big cities, and general urban planning and studies rarely use small or rural towns as a focus of analysis.^{22 23} Small towns in the United States face myriad challenges not just limited to the environment. The geographical and economic diversity of the U.S., especially in small towns, means that each case is different and faces unique challenges. One important factor when looking at the relationship between climate change and any sort of settlement is the distinction between adaptation and mitigation. Adaptation seeks to adjust and alter the built (and

²² Pitt, D., & Bassett, E. (2013). Collaborative planning for clean energy initiatives in small to mid-sized cities. *Journal of the American Planning Association*, 79(1), 1–15. doi:10.1080/01944363.2014.914846

²³Hamin, Elisabeth M., Nicole Gurran, and Ana Mesquita Emlinger. 2014. "Barriers to Municipal Climate Adaptation: Examples from Coastal Massachusetts' Smaller Cities and Towns." *Journal of the American Planning Association* 80 (2): 110–22. <https://doi.org/10.1080/01944363.2014.949590>.

often social and economic) environment to minimize the negative actual or expected climate change impacts on a given place.²⁴ Mitigation seeks to reduce current and future greenhouse gas emissions. A combination of adaptation and mitigation planning is becoming increasingly common.

Of the literature that does exist, there is a common consensus that the largest barriers to climate adaptation and mitigation efforts in small towns is the intermingling of financial, institutional, sociocultural, and informational factors.²⁵ Moser and Eckstrom characterize barriers as arising from deficits of leadership, resources, and values and beliefs based on review of a wide range of municipal adaptation barriers literature. From government to grassroots-level activism, leadership is essential where there is no regulatory mandate or local public demand for action. Lack of resources, staffing, and climate expertise creates significant barriers to adaptation. Inadequate knowledge sharing, poor communication, and unclear responsibilities create additional barriers. Finally, fundamental differences in values and beliefs about the issue of climate change, especially beliefs regarding risk and how it should be managed create an additional barrier to cities addressing climate change.²⁶

A study conducted by the Duke Nicholas Institute for Environmental Policy Solutions found that while nationally, rural voters were less supportive of governmental oversight of the environment than their urban and suburban counterparts, small towns and rural communities in

²⁴United Nations Council on Climate Change. 2020. "Introduction: Adaptation and Resilience." Unfccc.Int. 2020. <https://unfccc.int/topics/adaptation-and-resilience/the-big-picture/introduction>.

²⁵ Fuenfgeld, H. (2010). Institutional challenges to climate risk management in cities. *Current Opinion in Environmental Sustainability*, 2(3), 156–160. doi:10.1016/j.cosust.2010.07.001

²⁶ Moser, S. C., & Eckstrom, J. A. (2010). A framework to diagnose barriers to climate change adaptation. *Proceedings of the National Academy of Sciences*, 107(51), 22026–22031. doi:10.1073/pnas.1007887107

the United States overwhelmingly feel concerned about climate change and environmental issues.

“When focus group participants were asked to describe their emotions associated with climate change, negative emotions dominated. Participants consistently felt worried and concerned, and there was also a significant amount of frustration toward the politicization of the issue. They articulated a sense of loss for animals, habitats, and way of life for farmers; sadness and regret at not taking the environment seriously; feeling overwhelmed at the enormity of the issue and the amount of damage to address; and concern about future generations and uncertainty about what a future under climate change looks like.”

In the above mentioned midwestern focus group, words like “worried,” “sad,” “anxious,” “sure,” “urgency,” and “hopeful” were used to describe sentiments towards climate change.²⁷ Although less than 20 percent of the U.S. population lives in rural communities, according to the U.S. Census Bureau, they live and work across approximately 97 percent of the country’s total land mass.²⁸ Almost all of the nation’s energy and food is produced in rural landscapes, which are rich with natural resources essential for our survival and critical in addressing the climate crisis.

Greensburg, Kansas

Despite small geographic and population size, social, economic, and ethnic homogeneity, Greensburg is a unique study area for several reasons. Unlike most tornado events, where a portion of a town is destroyed, Greensburg’s tornado demolished nearly everything, including the core of the city’s downtown. Available evidence suggests that it is particularly difficult to rebuild a community when a tornado destroys its downtown which serves as the economic and social core of a town (Brock and Paul 2003). Although reconstruction efforts in larger cities such as

²⁷ Bonnie, Rowe, and Diamond. n.d. “Rural Attitudes on Climate Change:” Duke Nicholas Institute. https://nicholasinstitute.duke.edu/sites/default/files/publications/Rural-Attitudes-on-Climate-Change-Midwest_1.pdf

²⁸Nasser, Haya El. 2021. “One in Five Americans Live in Rural Areas.” Census.Gov. October 8, 2021. <https://www.census.gov/library/stories/2017/08/rural-america.html>.

New Orleans and San Francisco have received attention from several hazard researchers, post-disaster recovery of small cities has not been systematically studied, and it can therefore be difficult to find a precedent to look towards.²⁹

So what conditions existed in Greensburg that allowed the town to go so green in such a short period of time? The current literature on Greensburg's transformation points to a few key factors. First, there was a high level of collaboration with the entire community, including city leaders and staff, stakeholders, and citizens of Greensburg.³⁰ Additionally a shared vision of local leaders at the time, the general framing of sustainability as an opportunity for the community, and the substantial disaster relief funding all came together to kickstart the recovery that garnered national and international attention.³¹

Before the Tornado, Greensburg, located in Kiowa County of Kansas, was known best for the "Big Well," the largest hand-dug well in the country, as well as the "world's largest pallasite meteorite." Before the tornado, both attracted hundreds of visitors each year. Seventeen years after the tragic storm, these two roadside attractions are far from the primary reason tourists choose to venture there. A review of several news articles, briefs, and plans surrounding Greensburg's recovery all point to community meetings, FEMA support, and the core goal of "keeping the things that have made Greensburg and Kiowa County a good place to live, work,

²⁹ Saeideh Sobhaninia, Stephen Thomas Buckman, Revisiting and adapting the Kates-Pijawka disaster recovery model: A reconfigured emphasis on anticipation, equity, and resilience, *International Journal of Disaster Risk Reduction*, Volume 69, 2022.

³⁰ Greensburg, et al. "Greensburg, KS Sustainable Comprehensive Master Plan." BNIM, 16 Apr. 2014, www.bnim.com/project/greensburg-ks-sustainable-comprehensive-master-plan#:~:text=Integrating%20a%20high%20level%20of. Accessed 7 Mar. 2024.

³¹ White, Stacey Swearingen. "Out of the Rubble and towards a Sustainable Future: The "Greening" of Greensburg, Kansas." *Sustainability*, vol. 2, no. 7, 20 July 2010, pp. 2302–2319, <https://doi.org/10.3390/su2072302>. Accessed 11 Apr. 2019.

and own a business, and then suggest ways to build upon strengths of the community to make it prosperous, appealing, livable, and sustainable” as the reasons for the city’s subsequent success.³² These factors will be expanded and enriched by interview-based research in the results section.

Community Disaster Resilience Zones (CDRZs) Act

The Urban Institute analyzed the data from the initial round of CDRZs, and found that, overall, CDRZs are significantly more rural (41.9 percent) than the rest of the country (19.1 percent). With that, the CDRZs outside of the Midwest are home to, on average, more people of color than the rest of their region. Broadband internet access also lags in CDRZs, where households have access at a rate 5 percent lower than the national average. This analysis confirms that, while rural areas make up a significant proportion of CDRZs, they are diverse places that have consistently higher levels of social and economic vulnerability. The overwhelming majority being rural points to a unique set of needs that small towns and rural areas face.³³ The opportunity that access to this funding offers is immense. By having access to funding and cross-regional support to implement infrastructure projects, communities that otherwise would not have the means or knowledge can now take steps toward proactive, rather than reactive, climate change mitigation.

³² US Environmental Protection Agency. 2007. “Long Term Community Recovery Plan: Greensburg + Kiowa County, Kansas.” Epa.Gov. 2007.

https://archive.epa.gov/region07/cleanup/greensburg/web/pdf/gb_lter_plan_final_hires070815.pdf.

³³“Who Lives in the Community Disaster Resilience Zones? | Urban Institute.” Wwww.urban.org, 10 Nov. 2023, www.urban.org/urban-wire/who-lives-community-disaster-resilience-zones. Accessed 7 Mar. 2024.

DATA AND METHODS

One of the key scholarly publications on Greensburg, “Out of the Rubble and Towards a Sustainable Future: The “Greening” of Greensburg, Kansas” written in 2010 (only three years post-tornado) said this in regards to Greensburg as a subject of study:

“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.”

The above quote is the rationale for pursuing this project at this particular moment in time. It has been invaluable to interview community leaders the lasting effects of the town’s sustainable rebuilding 17 years later, and the impact it has had on towns looking to bolster sustainability and climate resilience. While Greensburg’s rebuilding has been well-documented by scholars like White in the years following the 2007 tornado, there is little interview-based literature on the lasting impacts of those decisions, the outcomes of the resilience plans, and what in the two plans did not pan out as envisioned.

The purpose of this paper is to evaluate Greensburg, Kansas’ resilience plan as a case study for resilience plans in small towns in the United States. A deeper review of the existing literature surrounding Greensburg and its resilience plan, content analysis of the plan itself, and synthesis of the key steps paired with interviews and current quantitative and qualitative data from the city will ensure that there is added nuance to Greensburg’s continuously unfolding story as an example of green rebuilding. While the city’s circumstances in 2007 and subsequent rebuilding are well documented, the modern day results are less so. Learning from Greensburg’s forward-thinking strategy and evaluating the results will help communities looking to prevent

damage from natural disasters. Creating an evaluation framework for Greensburg's Master Plan will be augmented by interviews with city officials, planners, and other stakeholders, both from 2007 and the present day to identify the lasting impacts and lessons learned since the implementation of their recovery plan, and the ways in which it evolved over time since the initial disaster.

Greensburg is an ideal case study because it serves as a control for sustainable infrastructure projects in small towns. It is also appropriate to use case study methodology because of the uniqueness of Greensburg. Rarely is there a real-world example of a community being essentially rebuilt from the ground up, but funded from the top down. In a similar vein, because Greensburg is often looked at as a sort of monolith for sustainable infrastructure in small towns in the United States, knowing what lessons have been learned since the initial implementation will be particularly useful as the most recent knowledge sharing of Greensburg's resilience plan.

One effective way of analyzing case studies is by looking at the case as it develops over time and observing the causal relationships at play.³⁴ This method, known as "process tracing," will be a particularly useful methodology in evaluating the development of Greensburg over the past 17 years. It is likely that my findings will support its initial success and perhaps shed light on the less publicized shortcomings or areas of improvement in the city's resilience plan. The interviewees and their relation to Greensburg will be summarized in a table at the end of this section. Additionally, there will be an appendix for a list of sample interview questions and a sample email I used for reaching out to interviewees.

³⁴ Alexander George, "Case Studies and Theory Development: The Method of Structured, Focused Comparison," in *Diplomacy: New Approaches in History, Theory, and Policy*, ed. Paul G. Lauren (New York: Free Press, 1979), 43–68

In order to identify interviewees, I first contacted the current local city officials, starting with Stacy Barnes, the current City Administrator of Greensburg. From there, I interviewed current Mayor Matt Christenson. Mayor Christenson and Ms. Barnes were both born and raised in Greensburg and were young adults at the time of the tornado. From their interviews, I was directed to several important resources, including the still-operating nonprofit Greensburg GreenTown, which was formed to provide resources and support throughout the rebuilding process.³⁵ I was also directed to Former Mayor Bob Dixson, who served as mayor from 2008 to 2018. All three interviewees were born and raised in Greensburg. Each interview was transcribed, qualitatively coded, and analyzed to fill in the gaps my research question aims to investigate.

Some potential limitations to the case study method, particularly for Greensburg, is also a reason why I selected it: its uniqueness. Greensburg’s circumstances were tragic, and ideally other towns will not have to rebuild entirely the way Greensburg did. Thus, ensuring that the evaluation framework of the two master plans extracts the most translatable lessons from Greensburg will be key to ensuring a balance to the city’s example and the uniqueness of each small town facing a natural disaster.

Name	Role Description
Stacy Barnes	City Administrator, Greensburg (present)
Matt Christenson	City Mayor, Greensburg (present)
Bob Dixson	City Mayor, Greensburg (2008-2018)

³⁵ “Rebuilding It Better: Greensburg, Kansas.” *U.S. Department of Energy: Energy Efficiency and Renewable Energy*, Apr. 2012, www.nrel.gov/buildings/assets/pdfs/53539.pdf.

FINDINGS

The following findings are divided into three sections: Community Experience, Housing Education Campaigns, and Lessons Learned. These core sections, derived from my findings in the two master plans and augmented by interviews and an analysis of the literature and primary source documents, will be followed by a synthesis of this information for towns looking at Greensburg as a model, and how the successes and lessons learned could translate. Dividing the sections allows for an in-depth exploration of how each theme relates to Greensburg's rebuilding and long-term success. Through this analysis, I aim to develop an understanding of how these various dimensions of Greensburg's experience interact with each other, and the role Greensburg serves in the present as a model city.

Community Experience

Rebuilding

Disaster recovery encompasses a host of steps that include both short-term and long term activities.³⁶ Activities like debris cleanup, temporary housing, and basic necessities fall under the short-term category. In the case of Greensburg, temporary mobile homes were put up within a month of the tornado in the neighboring town of Pratt and later in Greensburg. More than two dozen public and private organizations, such as the Kansas National Guard, the Kansas Highway Patrol, FEMA, the Salvation Army, USDA Forest Service, and various county agencies began clean-up operations soon after the tornado. Tornado survivors, neighboring farmers, and people from nearby towns also helped in clearing streets. It took more than five months to clear nearly all of the debris.

³⁶ Mileti, D. S. (1999). *Disasters by design: A reassessment of natural hazards in the United States*. Washington, D.C.: Joseph Henry Press.

While the Federal Emergency Management Agency (FEMA) and United States Department of Agriculture (USDA), among other state and national level agencies, provided a wealth of funding, technical assistance, and resources to Greensburg in the aftermath of the tornado, Greensburg and its people were not helpless. “Everything was not handed to us,” says City Administrator Stacy Barnes. Community leaders and community members all played a role in the rebuilding process, from the immediate aftermath of contacting and connecting people, to the long-term recovery planning that is still unfolding.

Barnes is one of many current city officials who grew up and stayed in Greensburg, pre- and post-tornado. In our interview, she reflected on the conditions leading up to the tornado, and the effects it had in the following years. “Greensburg was definitely facing rural decline,” she said. “After the tornado, the population began to stabilize. Many people moved back, some never returned.” She continued to say that, all in all, population is just one statistic people use to gauge community health. “There is so much more to a community.”

And the community was indeed a major contributor to Greensburg’s swift and successful rebuilding. Current Greensburg Mayor Matt Christenson reflected on the immediate experience following the tornado. In the beginning, the city relied heavily on town hall meetings held under “The Big Tent” where community gatherings like church services, town halls, and community meals all occurred. In the beginning, these town halls were advertised primarily through word of mouth— a method that, at the time, was aided by the tight-knit nature of the Greensburg population, especially in 2007, when not everyone had smartphones and internet and cellular access was spotty. “Communication actually was one of our biggest obstacles, especially for the first few months after the tornado just because the entire town scattered... where were they going to live when their homes and businesses weren't there?” said Mayor Christenson.

Public Square Process

Kathleen Sebelius, Governor of Kansas at the time of the tornado, urged the community and federal officials to utilize the “Public Square” process to guide long-term planning that was inclusive and reflective of Greensburg’s citizens. The “Public Square” process is a comprehensive development approach that focuses on asset-based solutions, citizen input, and partnerships with business and community leaders. The Public Square scheme used in FEMA’s Long Term Community Recovery Plan can be seen below.

PUBLIC SQUARE

Government	Education
Business	Health and Community Services

In the FEMA Long-Term Recovery Plan, the Public Square approach was meant to move through four phases in a few years: 1) One-on-one interviews to identify community assets, 2) A Community Conversation with citizens generating long-term development ideas, 3) A Vision Retreat with citizen-nominated leaders producing community goals, and 4) Citizen-driven Action

Teams implementing community goals, coordinated by a Public Square steering committee. Greensburg and Kiowa County residents formed the Public Square sectors and met weekly with an average attendance of approximately 25 people. The first several meetings focused on identification of Community Issues, Opportunities, and Vision Statements for the key areas addressed in the plan.

National and International Attention

“If you characterize Greenberg's rebuilding, the focus on sustainability is probably again, one that's got a lot of attention, but also, there's kind of it's hard to escape,” said Mayor Christenson of the day to day experience living in Greensburg. Garnering national and international attention, Greensburg became no stranger to the cameras and spotlight. “[Former President George W.] Bush visited twice,” said Barnes. At that time, The White House had been seeking much more aggressive and engaged reactions to disasters since Hurricane Katrina, an event that some argue Bush was never able to politically recover from.³⁷³⁸

³⁷Dharapak, Charles. “Bush tours town wiped away by tornado,” Associated Press, 9 May 2007.

³⁸ Bruce Alpert, NOLA.com | Times-Picayune. “George W. Bush Never Recovered Politically from Katrina.” NOLA.Com, 28 Aug. 2015.



Marine One over the tornado damage in Greensburg, taken May 9, 2007. Charles Dharapak, Associated Press.

Bush’s visit propelled the city toward national attention, and his initial visit was not the last time he would come to Greensburg. “He spoke at our high school’s graduation ceremony,” said Barnes. A year after the tornado, Bush addressed the 18-student graduating class of Greensburg High School.³⁹ George W. Bush was not the only public figure that expressed an interest in Greensburg’s story. Actor and environmental activist Leonardo DiCaprio produced a Discovery Channel television series about it, and reporters arrived from around the world to tell a story of Greensburg’s phoenix-like rebirth.⁴⁰ Broadcast on the Discovery Channel, “Greensburg” ran twenty episodes between 2008 and 2010, and covered a range of topics from the high school class president elections to the opening of Greensburg’s hospital

³⁹Ferraro, Thomas. “Bush salutes Kansas town that recovered from tornado,” Reuters, 4 May 2008.

⁴⁰ “Greensburg Season 3 : Programs : Planet Green : Discovery Press Web.” Press.discovery.com, press.discovery.com/us/pg/programs/greensburg/. Accessed 7 Mar. 2024.

Both City Administrator Barnes and Mayor Christenson spoke of the “fatigue” that existed, and continues to exist, in retelling their story, especially for the cameras. When speaking about his experiences with the national attention, former Mayor Bob Dixon recalls, “The attention was fantastic. I was able to meet a lot of great people and go to a lot of places to share Greensburg’s story.” All can agree that Greensburg is much more than the tornado that happened to them, and that they would much rather be remembered for what they did with their situation than the situation itself. “We don’t want to be known as that tornado town,” said Dixon. “We want to be a town known for our forward thinking community members and desire to provide for future generations. Thinking about future generations was a major value reflected not only in my interviews, but was pervasive throughout the Long-Term Community Recovery Plan and Sustainable Master Plan.

Multi-Scale Cooperation and Funding

Both the FEMA Long-Term Recovery Plan and the BNIM Sustainable Comprehensive Master Plan centered on local voices.⁴¹ The BNIM plan, assembled by architects out of Kansas City, partnered with local organizations as well as federal entities, including FEMA. Some project partners include: Greensburg Greentown (local community-led nonprofit), FEMA, Kansas Communities (state level nonprofit), Kansas Energy Office, Kansas Housing Resource Corporation, Kansas Small Business Development Center, National Renewable Energy Laboratories, U.S. Department of Agriculture (USDA) Rural Development, and the U.S. Environmental Protection Agency. The National Renewable Energy Laboratory (NREL) still maintains close ties with Greensburg, and plays an active role in upcoming initiatives that will be mentioned in later sections.

⁴¹“Greensburg, KS Sustainable Comprehensive Master Plan.” BNIM, 16 Apr. 2014.

At the time of the implementation of elements of BNIM's plan, Bob Dixson was serving as mayor of Greensburg. As he remembers it, "at the time of the tornado, those who were left in town all became part of the process. Community meetings, church services, gatherings... it all happened under the big tent." In my conversations with community leaders, but especially Dixson, it was clear that the community felt an overwhelming sense of ownership for whatever plan ultimately was to be adopted. "It ended up being our plan, not some boilerplate that someone else came up with," said Dixson. The level to which the community was involved in the planning process is paramount, and the synergy that existed amongst the citizens is due to a few key factors, said Dixson. "Our population was and is small," he said. "When we would have these meetings, we were really able to get on the same page."

Additionally, the experience of the tornado and its destruction served as a collective motivator to implement more sustainable and resilient design. My conversations with Dixson revealed a lot about the spirit of the decision-making process. "Ultimately, it came down to our future," he said. To him, sustainability is being good stewards of the natural environment and its resources. In order to do that, however, Greensburg needed to be smart not only about their innovative sustainability ideas, but also about how to build something that could last. As he put it, "rural america has buildings that have been around for generations. We wanted to build something that would last, not just quickly assemble a building that may not be viable 60 years from now."

Housing Education Campaigns

In order to ensure resilient and energy efficient buildings throughout Greensburg, the master plans employed by Greensburg placed a heavy emphasis on LEED Platinum certification

for municipal buildings. When the resolution was passed to have all city-owned buildings over 4,000 square feet to LEED Platinum Standards, it was the first of its kind in the United States.⁴² However, Greensburg didn't want to stop there. The tornado had a particularly devastating effect on Greensburg's housing stock, and the city wanted to ensure that the sustainable vision was top of mind for residents looking to rebuild their homes. BNIM architects identified Greensburg's housing situation as "perhaps the most difficult rebuilding challenge.. And the most important component for attracting old and new residents to the area."⁴³

In the interim following the tornado, many families scattered to neighboring towns or stayed in trailer housing provided by FEMA. When I asked Mayor Christenson exactly where these people went, he responded: "the answer that is just anywhere in everywhere... if you are a homeowner and had a good home insurance policy, you know, maybe they would pay to put you in a hotel until your house is rebuilt, or short term. My parents themselves, they lived with my grandmother in Kingman for a couple months, which is an hour away. There are a large number of people who ended up purchasing or leasing an RV or a trailer and place it on their farmland." If he had to put a number to it, Mayor Christenson estimated that, in the first few months following the tornado, people were living anywhere within a 60 to 70 mile radius of Greensburg.

By April 2008, 133 new housing permits had been granted by the city's housing permit office. The NREL was on the ground in Greensburg providing specific advice regarding energy efficiency in housing, and, in coordination with the city government, distributed educational materials at Greensburg's housing permit office. This, says current Mayor Matt Christenson, was

⁴²"Rebuilding and Resiliency with LEED in Greensburg, Kansas." U.S. Green Building Council, www.usgbc.org/articles/rebuilding-and-resiliency-lead-greensburg-kansas. Accessed 4 Apr. 2024.

⁴³"Greensburg, KS Sustainable Comprehensive Master Plan." BNIM, 16 Apr. 2014.

one of their most successful approaches. When I asked him about how private residences fit into Greensburg’s sustainability plan, he explained, “the city didn’t enforce energy on building codes, it just happened that way.”

Much of this, he went on to explain, was due to the collective agreement they had come to towards the beginning of the process, but people did have their hesitations with what it meant to build a home in an energy efficient way. With that, taking an “education, not enforcement” approach was key: “We partnered with other outside organizations like the National Renewable Energy Laboratory to help educate our citizens and business owners, on how they might be able to incorporate sustainability practices into their own rebuilds after the tornado, and particularly just kind of how that might impact their pocketbook going forward,” said Mayor Christenson.

In my conversation with Mayor Christenson about their educational approach, he was clear that showing the citizens of Greensburg the ways in which sustainable features like higher efficiency heating and cooling systems, extra insulation, or solar panels could actually pay off in the long term for private residents. For Greensburg citizens, who tend to grow up, live, and stay in Greensburg, this type of upfront investment with long term payout made a lot of sense. The model provided by BNIM and the NREL corroborates this, and a detailed breakdown of the numbers they presented to citizens can be found below.

Energy Savings	
For a typical 2,000 sq.ft. home with high efficiency upgrades	
Savings on Monthly Utility Bill	\$76.58
Increase in Monthly Mortgage Payment	\$34.25
Net Monthly Savings	\$42.33

As mentioned above, this education campaign was done through a joint effort with the city administrators at the time and the NREL. The NREL came up several times during my conversations with Mayor Christenson, and the NREL is the federal entity with perhaps the most involvement still in Greensburg today, working on a potential solar farm and electric vehicle chargers in the coming years.

Lessons Learned

Unique Political Circumstances

One of the questions I asked every interviewee was “Do you think Greensburg’s experience is translatable to another town going through a similar situation today?” To this question, I got some mixed answers that ultimately came to the same conclusion: not necessarily. As mentioned above, federal level preparedness played a huge role, and the urgency from the White House to address Greensburg’s damage was no coincidence in the wake of Hurricane Katrina. “There was certainly an awareness and a demand to minimize the effects of natural disaster swiftly,” said Dixon.

Urgency from leadership very much existed on the state level as well. “We got lucky,” said Dixon. Dennis McKinney, a Kiowa County native and the Speaker of the House at the time of the tornado, lost his home in the storm. He was able to push the conversation in the capitol, and serve as a direct liaison. “It was the little things,” said Dixon. One of his most vivid memories of the immediate aftermath was the scrambling of residents to find their car titles. Almost immediately, then-Representative McKinney came to Greensburg with photocopies of all the missing titles from the state record so residents could present them to insurance

⁴⁴“Greensburg, KS Sustainable Comprehensive Master Plan.” BNIM, 16 Apr. 2014, www.bnim.com/project/greensburg-ks-sustainable-comprehensive-master-plan#:~:text=Integrating%20a%20high%20level%20of.

companies. Throughout my interviews, no interviewee attributed luck to the success of the rebuilding, but there were several specific circumstances that allowed for more visibility, funding, and technical support. With that being said, there were some visions that to this day are considered too ambitious.⁴⁵

Business Park



Former Mayor Bob Dixson pictured next to the Greensburg Business Park (Frank Morris).

When asking each interviewee what they thought the key lessons learned from the rebuilding process was, each of them brought up the Business Park. The Greensburg Business Park sits on 60 acres at the east end of town. “We have trouble keeping businesses,” said Stacy Barnes. “The purpose of the business park... the intent was good, but we’ve never been able to keep solid business,” said former Mayor Bob Dixson. Timing was a big factor, said Dixson. Because the 2008 recession hit less than a year after the storm, the economic side of things “didn’t always pan out.” For a city that was already facing rural decline, the rebuilding served as a new opportunity, but didn’t make the root symptoms of rural decline go away. While the business park still lies largely vacant, there are new plans in the works.

⁴⁵ Morris, F. (2017, May 15). 10 years after devastating tornado, Greensburg, Kansas, struggles to move forward. KCUR.

Mayor Matt Christenson told me about two key prospects: a solar energy company and electric vehicle (EV) charging stations. The City of Greensburg is currently working with the NREL to apply for grants to implement this infrastructure. Greensburg is located right off Highway 54, and because of its placement, could serve as a key connector and charging point for long distance car travel. Implementing EV charging technology is not only becoming increasingly common in any small town located proximate to a highway, but could be especially fitting for Greensburg's ethos as a bastion for sustainability. As of 2024, graduate students at Kansas State University are working on a feasibility study to evaluate the economic impact of a solar energy company bringing more jobs and workers to the area.

CONCLUSION

In the past 17 years, Greensburg has been contacted by towns all over the country and world who have faced similar destruction from natural disasters. While there are factors support Greensburg can provide, a cookie-cutter template of how to rebuild is not one of them.

Unlikely as the pairing between rural Kansans and a sustainability agenda may initially seem, as the adopted sustainability plans and interviews showed, there are numerous shared values between people who consider themselves resilient and an approach that seeks to make communities resilient over generations. For a town that was already facing the impacts of rural decline, community-centered planning and collaboration across various scales has ensured Greensburg's success even after the initial media boom nearly two decades ago.

With that being said, reflection on the lasting outcomes of these decisions has revealed the importance of place-specific, pragmatic planning cannot be emphasized enough. While having a blank slate allowed much space for imagination and trying new things, there were parts

of both FEMA and BNIM's sustainable master plans that were never realized, and some elements that were incorporated that did not pan out the way leaders envisioned. This is why, as City Administrator Stacy Barnes states: "Every community is different. Make the best decisions you can with the information you have about your unique town."

Greensburg, Kansas is unique in so many ways, but it is not a foolproof example of how sustainability should be approached everywhere. It is a town that faced a horrible disaster, that had no choice to rebuild in order to continue on as a community. The ways in which they approached rebuilding has touched corners of the world that much of Greensburg's population may never see. At the end of the day, the town is defined not by its population or even its tragic tornado, but by the people who make up the community. Similarly, towns looking to rebuild or implement sustainable infrastructure, especially those that are eligible for increased funding under the Community Disaster Resilience Zones Act, should take stock of the unique population, geography, and conditions of their community to understand the best ways to adapt to, and decrease their impact on, climate change.

APPENDIX

Sample Interview Questions

1. What is your role for the city?
2. How long have you been involved with the city?
3. How would you characterize Greensburg's rebuilding?
4. How has Greensburg served as an example for other communities facing similar circumstances?
5. What are some of the key lessons learned from your rebuilding process?
6. What in Greensburg's Master Plans worked best in the long term for the city? What didn't work as well?
7. What is the experience of living in the same city with an entirely different built form?
8. How did the city work with the state and federal government? What do those relationships look like today?
9. How has Greensburg adapted to the changing needs of the city?
10. What is the relationship between the media and Greensburg, how has it informed the lived experience of Greensburg residents?
11. What do you make of Greensburg's popularity following the rebuilding process?
12. Anything else you would like to add?

Sample Interview Request

Dear _____,

My name is Alyssa Wieggers, and I am a fourth-year undergraduate at the University of Chicago studying Environmental and Urban Studies, and minoring in Architecture. More importantly, I am a native Kansan!

I am in the process of writing my honors undergraduate thesis tentatively entitled: Why Small Towns are a Big Deal: Activating the Sustainability Potential of Small Towns in the US in The Face of Climate Change (UChicago Institutional Review Board - IRB24-0252). As I was doing my preliminary research, I came across Greensburg and was immediately drawn to your city as a possible topic or case study. I'm hoping to shed some light on the lasting effects of your city's rebuilding and resilience efforts now that nearly 17 years have passed. I'm interested to see how your city's plan could serve as a model for other towns--- particularly small towns-- that are looking to implement some of their own resilience and mitigation projects.

Would you or someone in the office be available for a zoom call in the next week or so to discuss the rebuilding process and its lasting effects? The interview will be structured around a series of questions I will provide to you ahead of time. The questions will be strictly related to Greensburg's rebuilding process, city administration from 2007-present day, and the role of different stakeholders. An interview session should not last more than **1 hour**.

My hope with my thesis is to shed light on the wonderful work that small towns are doing, and the great potential they have for sustainable infrastructure. I am also passionate about people from small towns and rural areas being deserving of participation in sustainability movements. Please let me know if you're available to chat soon, and/or if there are resources you think would be useful in crafting a unique paper about your city and its progress.

Thanks so much for reading and have a wonderful day!

Sincerely,
Alyssa J. Wieggers
ajwieggers@uchicago.edu

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