City of Vergas
Energy & Resilience Plan

EMPOWERING SMALL MINNESOTA COMMUNITIES

May 2026

ACKNOWLEDGMENTS

This is a co-publication of the University of Minnesota's Empowering Small Minnesota Communities (ESMC) Program. This effort is made possible thanks to funding by the Minnesota State Legislature. The ESMC is coordinated by UMN partners at the Center for Transportation Studies, the Center for Urban and Regional Affairs, the Humphrey School of Public Affairs, the Minnesota Design Center and UMN Extension Regional Sustainable Development Partnerships.

This project was made possible through collaboration between staff and elected officials from the City of Vergas, Empowering Small Minnesota Communities, West Central Initiative and the University of Minnesota. Special thanks to the wide range of community and regional partners who shared their experiences and made this work possible.

The project team included:

City of Vergas
- Julie Bruhn, City of Vergas Mayor
- Julie Lammers, City of Vergas Clerk-Treasurer

West Central Initiative
- Griffin Peck, Energy and Adaptation Planner
- Mark Kaelke, Community Planner *(formerly)*

University of Minnesota
- Heidi Auel, Central Clean Energy Resource Teams Coordinator
- Jonathan Barcenas, Humphrey School of Public Affairs Graduate Research Assistant
- Dan Handeen, Lecturer, School of Architecture & Research Fellow, Center for Sustainable Building Research
- Garrett Mosiman, Senior Research Fellow, Center for Sustainable Building Research
- Molly Zins, Central Regional Sustainable Development Partnership Executive Director

Special thanks to **Otter Tail Power Company** for their collaboration and providing a baseline assessment to better understand energy use and operational efficiency of city-operated buildings. And special thanks to the **Minnesota Pollution Control Agency** for awarding Vergas the Local Climate Action Grant to support this work.

Small Minnesota communities have a tremendous number of existing assets: beautiful natural areas; essential built environments; economic strengths, and human capabilities to build upon community strengths, meet their challenges, and move toward their aspirations. The ESMC program is a community-centered collaboration with the University of Minnesota to support small communities in becoming well-positioned to benefit from federal, state, and local investments.

This report is available for download at: cityofvergas.com

TABLE OF CONTENTS

		Page
1.	Introduction	4
2.	Objectives of the Plan	4
3.	Methods & Research	6
4.	Community Engagement	10
5.	Survey Questions & Findings	10
6.	Renewable Energy Potential: Opportunities & Actions	12
7.	Conclusion & Next Steps	15
8.	Action Plan	16
9.	Appendices	23

A. Vergas Planning Summaries: CIP, Housing Study, Comp Plan
B. Otter Tail Power Energy Assessment
C. UMN CSBR Building Assessments Report & Recommendations
D. Otter Tail Power Blower Door Testing Results
E. Energy & Resilience Advisory Board
F. Energy & Resilience Community Survey
G. MnSEIA (Minnesota Solar Energy Industries Association)
H. West Central Initiative Solar Assessment
I. Using Vergas Energy & Resilience Plan to Write Grants

INTRODUCTION & INSPIRATION

The 2023 League of Minnesota Cities (LMC) annual conference was a kick start for Vergas to engage in climate associated action. Information was presented at the conference regarding the unprecedented funding opportunities and stories were shared from various communities on impact projects. The information sparked interest and action.

The mayor, Julie Bruhn, presented the opportunities to the City Council to enhance City of Vergas resiliency and sustainability. The Council voted to make a commitment to climate action and granted the Mayor the authority to proceed. With the older municipal building infrastructure, a focus on energy was deemed the most beneficial approach as there would be energy and fiscal efficiencies and savings affecting all residents.

The year that followed entailed identifying resources, establishing contacts, participating in training, networking calls, and investigating funding opportunities. Three grants were submitted and partnerships were formed with Clean Energy Resource Teams (CERTS), UMN Empowering Small Minnesota Communities (ESMC), UMN Regional Sustainable Development Partnerships (RSDP), West Central Initiative (WCI), and Vergas becoming the 149th GreenStep City in Minnesota. Primary goals were to achieve energy efficiencies and clean energy for the City of Vergas municipal buildings and operations. Goals also included engaging in a positive energy initiative with direct benefits to the community fiscally and environmentally and inspiring residential and commercial engagement to ignite interest in energy efficiencies and community sustainability.

Two grants were received, awarded by ESMC & RSDP in May 2024, that had a focus on rural settings; less than 5,000 population. The grants focused on assessing and trending energy usage and having energy audits conducted and building enclosure evaluations. The data would serve to guide planning and action to promote and achieve energy efficiencies and use of clean renewable energy.

It was a journey and learning curve requiring commitment and persistence that resulted in strong partnerships and groundbreaking work in understanding energy in the municipal buildings and moving the community forward toward resiliency and sustainability.

OBJECTIVES OF THE PLAN

The purpose of this plan is to provide the City of Vergas with a clear and actionable framework to address clean energy and resilience opportunities, climate challenges, drawing on recommendations from the ESMC and the Otter Tail Power Company (OTPCO) assessments. This plan reflects Vergas' desire to lead by example, demonstrating that small communities can define and act on their evolving infrastructure, energy and resilience needs.

Planning began with the City's 2019 Capital Improvement Plan (CIP), which laid the groundwork for long-term infrastructure management. Building on this foundation was the 2019 Housing Study and the 2022 Comprehensive Plan. The Housing Study was conducted through a resident survey to assess current and future housing needs. The Comprehensive plan entailed several engagement sessions, facilitated by WCI, which resulted in a vision and plan through 2036. The plan outlined aspects of safeguarding local assets, preserving the natural beauty of the community, and creatively meeting future housing needs was a framing principle across all the studies. Appendix A

In the fall of 2024, a 2 year energy use review was compiled, and building baseline assessments were completed to better understand energy use and operational efficiency of city-operated buildings, conducted by Otter Tail Power Company. Appendix B. With assistance from the Center for Sustainable Building Research (CSBR) at the University of Minnesota, the envelope of each city building was also assessed and evaluated for improvements. CSBR generated a report based on the findings and recommendations were made for each facility. Appendix C. West Central Initiative had begun working with the city thru the municipal solar coop to determine the needs for future critical loads to determine battery backup requirements, and solar energy potential as well as needs for the event center for use as an emergency shelter and resilience hub.

In the spring of 2025, the City applied for and received the Minnesota Pollution Control Agency (MPCA) Climate Impact Implementation grant. This allowed the City to complete weatherization improvements by sealing air leaks and adding insulation on the fire hall, event center, and municipal liquor store, as recommended by CSBR. Refrigeration controls were also installed on the cooling equipment at the liquor store. In addition, blower tests were conducted pre and post the weatherization improvements. Appendix D. Through this process, the City will be able to begin tracking projects and measure efficiency gains over time through the MPCA GreenStep Cities program and B3 Benchmarking. B3 Benchmarking is a tool to track building performance using building and meter information (mn.b3benchmarking.com). This also helps Vergas gain additional recognition through the Minnesota GreenStep Cities program.

The Energy and Resilience plan also aims to protect local infrastructure from the growing risks of extreme weather events due to climate change, and to ensure Vergas remains a safe, healthy place for all residents. Community engagement has been central to shaping this vision. In the Spring 2025, a Community Input Survey, was distributed via the Maple Syrup Fest event, city communications, the City Office, and posted QR codes, where residents shared their perspectives to help guide the energy and resiliency planning.

By aligning community goals with climate preparedness and infrastructure investment, this plan positions Vergas to competitively secure funding and implement sustainable improvements for years to come. During the Spring 2025 community Input Survey, residents had the opportunity to engage with the planning process and express their interest in continued involvement. As part of this effort, individuals were invited to be considered for membership on the Energy & Resilience Advisory Board that will support the implementation of the plan. City ordinance established defining the roles and responsibilities of the new Advisory Board. Appendix E

METHODS & RESEARCH

1. Existing Planning Document Review

The City of Vergas has strategically positioned itself to achieve significant advancements in climate resilience, energy efficiency, and community well-being by building upon three foundational planning documents: the 2019 Capital Improvement Plan (CIP), the 2020 Housing Study, and the 2022 Comprehensive Plan. Appendix A. This report investigates the alignment between these efforts, provides a sequencing framework for implementation, identifies grant funding opportunities, and highlights important technical considerations to optimize system investments to improve energy efficiency and improve City resiliency.

It is critical to recognize that implemented building envelope improvements recommended by the Center for Sustainable Building Research (CSBR) will lower facility energy demands. As a result, mechanical system sizing recommendations from the OTPCO audit may need to be recalibrated. The implementation of the MPCA grant provided funds for the weatherization efforts and blower door testing will further optimize mechanical systems sizing. Improved building shell performance will reduce the overall load of the mechanical heating and cooling systems. This presents opportunities for right-sizing the equipment, saving upfront capital costs, improving system longevity, and achieving better overall building performance and comfort.

2. Energy Audits and Benchmarking

Universal Recommendation:
Across all four buildings, the Center for Sustainable Building Research (CSBR) recommended blower door testing as a high priority. While several clear air leakage pathways were identified through visual inspection and thermal imaging, others likely remain undetected. Blower door tests, especially when combined with thermal imaging or smoke testing, will help the City further identify total air leakage and precisely locate less visible gaps. Appendix D. This diagnostic approach is essential to efficiently prioritize weatherization improvements during the implementation of the MPCA grant. This additional exploration will determine the sequence of investments and reduce wasted effort and cost across the City's building portfolio.

Among the four facilities, the Event Center and Fire Hall have emerged as the most appropriate candidates for Resiliency Hubs, due to their size, layout, accessibility, and role in emergency management operations. The Event Center (1 in the below exhibit) is actively used for large gatherings, but current electrical limitations already exist, as experienced by frequent breaker trips when auxiliary equipment is connected. This would pose a challenge for future electrification and identifying critical loads to be powered by backup power in the event of a power outage. Action taken and completed in upgrading the electrical panel, alongside perimeter insulation and air sealing. The Fire Hall (2 in the below exhibit) has favorable energy performance but suffered from significant air leakage around overhead doors and inadequate attic insulation, both of which impacted its ability to maintain comfort and efficiency during emergencies. These improvement needs have been completed.

The City Office (4 in the below exhibit) is the best-performing building in terms of Energy Use Intensity (EUI), showing tight envelope performance and full reliance on electric mini-split systems. Minimal upgrades are needed here beyond continued monitoring of winter heating performance. Finally, the Liquor Store (3 in the below exhibit), while architecturally sensitive due to its historical value, offers mid-tier performance. It would benefit from targeted air sealing at known leakage points like the elevator shaft and rear entry, but major overhauls are less cost-effective in its current state.

Summary Table of Building Characteristics and Priorities				
Category	**1. Event Center**	**2. Fire Hall**	**3. Liquor Store**	**4. City Office**
Primary Use	Assembly, Kitchen, Community Hub	Emergency Services, Meeting Space	Retail (Liquor + Second-hand)	Office/Admin + Shared w/ Post Office
Square Footage	~7,200 sq ft	~7735 sq ft	~7,840 sq ft	~2170 sq ft

Energy Use Intensity (EUI)	37.1 kBtu/ft²·yr	23.7 kBtu/ft²·yr	32.8 kBtu/ft²·yr	17.8 kBtu/ft²·yr
Resiliency Hub Potential	Yes – primary gathering site	Yes – emergency use	No – mixed-use and structural limits	No – limited capacity
Key Observations	Breaker trips with load; slab heat loss; drafty doors	Overhead door leakage; attic poorly insulated	Penthouse and rear leakage; economizer in place	Excellent performance; no gas; minimal heat loss
Recommended Focus	Upgrade electrical panel; weatherization for slab and doors	Air sealing and attic insulation	Targeted air sealing; preserve historic features	Monitoring and solar feasibility
Upgrade Priority	**High – resiliency and energy**	**High – resiliency and heat loss**	Medium – selective improvements	Low – maintain existing systems

Detailed checklists, energy savings models, and cost estimates for each facility are located in **Appendix C: Building Energy & Retrofit Plans.**

Important Note:

With building envelope recommendations completed, building energy consumption will certainly drop. This means OTPCO's heat pumps and HVAC sizing recommendations will likely **oversize systems** unless recalculated. Right-sizing these systems after envelope improvements will reduce capital costs, maintenance, and operational inefficiencies. **Reassessing mechanical design post-envelope upgrades is critical.**

Table to show Efficiency Work and Potential impact on Mechanical Upgrades		
	Efficiency Work (CSBR)	Potential impact on Mechanical Upgrades (OTPCO)

Fire Hall	Overhead door sealing, attic insulation	Smaller air-to-water heat pump, lower heating load
Event Center	Slab insulation, door air sealing	Downsized HVAC system, improved occupant comfort
Liquor Store	Penthouse air sealing, cooler improvements	Lower refrigeration and HVAC loads
City Office	Already efficient envelope; minor lighting upgrades	Minor HVAC recalibration needed

3. Cross-Document Synergies and Actionable Opportunities

Public Building Retrofits and Renewable Energy Integration

The CSBR findings also highlight opportunities to enhance municipal facilities identified in the CIP and Comp Plan:

Table to Show Energy Upgrade Priority and Alignment with Existing Plans		
	Energy Upgrade Priority	**Alignment with Existing Plans**
Fire Hall	Weatherstrip overhead doors, attic insulation	CIP mentions facility maintenance; Comp Plan supports efficiency retrofits
Event Center	Install heat pumps, insulate slab edges	Identified in both CIP (Long Lake Park upgrades) and Housing Study (public amenities to retain residents)
Liquor Store	Air sealing elevator shaft, LED lighting upgrades	Enhances a major retail anchor in the local economy, reduced cost will increase business profitability.

City Office	Minor LED upgrades, explore solar capacity	CIP improvements combined with resilience goals

4. Community Engagement and Local Leadership

- Distributed a community-wide energy and climate survey in Spring 2025 through the City Office, Maple Syrup Fest, and digital QR codes.
- Collected feedback on energy priorities, barriers, awareness of climate risks, and infrastructure needs.
- Formed a volunteer **Energy and Resilience Advisory Board** made up of residents, local leaders, and city staff to review findings, advise on project phasing, and support implementation.

5. Land Use and Housing Context

- Incorporated data from the 2020 Vergas Housing Study to assess local housing stock, development pressures, and population trends.
- Identified infrastructure gaps, vacant parcels, and the need for services like sewer and water extensions for growth areas.
- Considered the role of senior housing and infill development in future energy planning.

COMMUNITY ENGAGEMENT

Energy & Resilience Advisory Board

The Energy & Resilience Advisory Board (Appendix E) emerged directly from the 2025 Community Resilience & Energy Survey, which revealed broad support for local sustainability, energy affordability, and preparedness efforts. Recognizing this momentum, the City of Vergas established the advisory board to guide both the development and ongoing implementation of the Energy and Resiliency Plan and to help advance the City's progress in the Minnesota GreenStep Cities program.

This structure ensures the plan remains a tool for action and not just a record of intent. It also provides a pathway for transparency, community ownership, and sustained accountability.

Vergas Energy & Resilience Community Survey

The 2025 Community Resilience & Energy Survey was shaped by Vergas City leaders, RSDP, CSBR and CERTS and built upon the outreach foundation laid during the 2022 Comprehensive Plan. The survey was designed to gauge resident concerns about energy affordability,

infrastructure vulnerabilities, and preparedness for extreme weather, while also capturing public interest in renewable energy options and environmental protections.

Distributed online and in print, the survey was promoted through local businesses, city communications, and public events. It drew 91 responses, with input from both full-time residents and non-residents, reflecting Vergas's strong seasonal and regional connections.

However, with roughly 61% of responses coming from non-residents, the need for additional outreach targeting year-round residents is clear. Future engagement strategies might include presence at public events, inserts in utility bills, city newsletter or education sessions at events and gatherings to capture a more comprehensive snapshot of full-time resident needs. These sessions can be facilitated with regional partner organizations.

Survey Summary Appendix F.

The survey (91 responses: 35 (38%) residents, 56 (62%) non-residents) indicates strong community interest in planning for city sustainability and resilience. There was a more engaged older resident demographic with limited youth representation in the survey. Respondents expressed high concern about impacts to water quality and infrastructure, yet many lack backup plans for utility disruptions, revealing a key preparedness gap and opportunity for education and community coordination.

While current home temperature discomfort is relatively low, interest in learning about efficiency and resilience suggests proactive outreach could be effective. Heating sources vary (primarily natural gas among residents; electric and propane among non-residents), highlighting the need for targeted weatherization and resilience strategies. A moderate segment of residents is open to reducing energy costs, offering a starting point for pilot programs and peer-led engagement.

Overall, respondents strongly support environmental protection, energy efficiency, and streamlined renewable energy efforts. Planning priorities include: expanding emergency preparedness, protecting natural systems, strengthening infrastructure resilience, engaging youth, and providing accessible, practical education and incentives to build long-term community resilience.

In addition to the survey, there were a number of articles published in the local newspaper (Frazee Forum) and the City Newsletter and presentations and discussions were held at City Council meetings to keep the community informed and provide an opportunity to initiate questions and feedback. Information was framed in a way that resonates with rural community life; not just about data, technology and infrastructure, but about social cohesion, trusted networks, and protecting what makes Vergas a vibrant place to live.

Next Steps: Deepening Engagement and Peer Learning

Moving forward, the Energy & Resilience Advisory Board will play a central role in refining goals, confirming priorities, and tracking implementation progress. To strengthen this work the City, together with the West Central Initiative, are exploring peer learning opportunities that would

give city council members, committee participants, and community partners a first-hand look at what's possible in small but visionary communities and inspire conversations around partnerships, pilot projects, and capacity-building for Vergas.

In the spirit of community leadership and practical innovation, this next phase will ensure that Vergas not only plans for a more resilient future, but actively builds it guided by the voices of its residents, the leadership of its committee, and the creative energy of its regional peers.

RENEWABLE ENERGY POTENTIAL

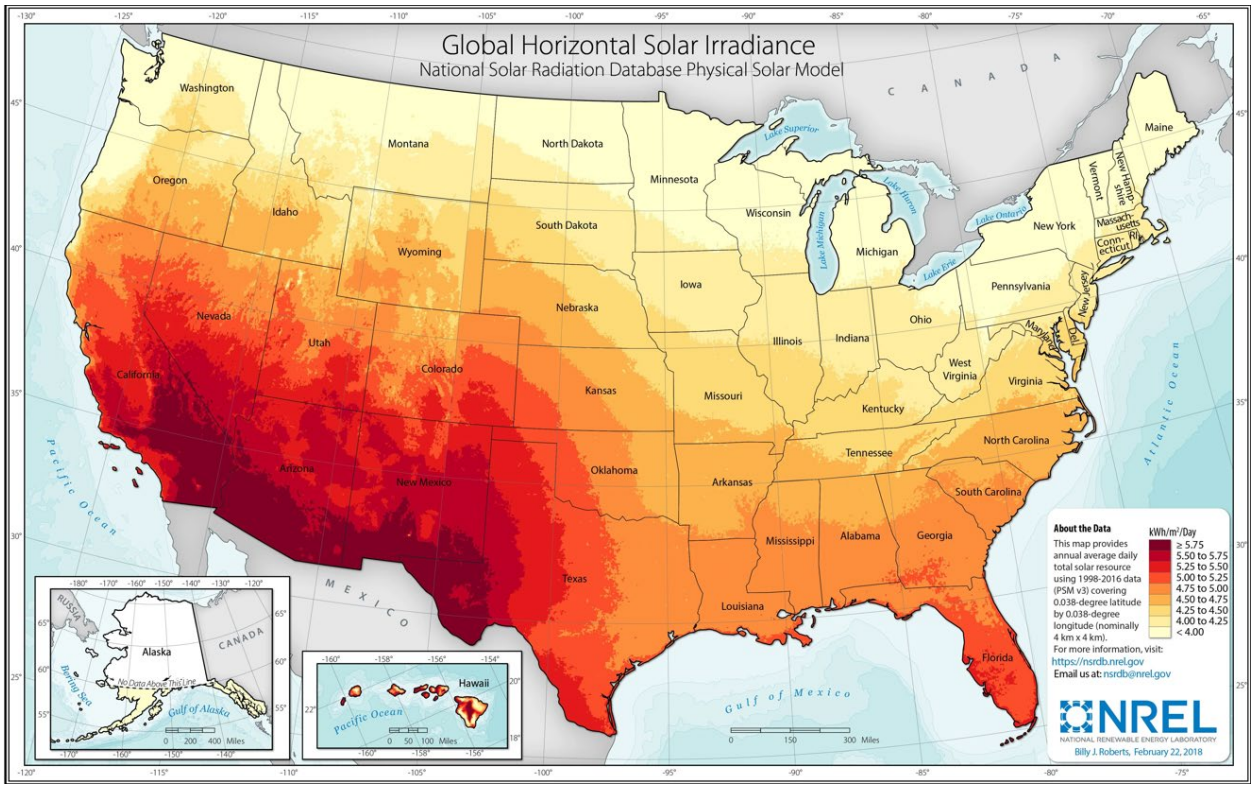
Solar Energy Potential in Minnesota and Opportunities for Vergas

The City of Vergas has taken an important step by conducting a solar site assessment and is implementing an array for the Event Center. The Fire Hall was additionally reviewed as a next step for solar. This proactive move supports the city's broader goals of energy efficiency, sustainability, and long-term cost savings. As Vergas continues to expand solar to the other sites, it is important to prioritize the energy efficiency of the site so that the solar arrays can be properly sized to the load.

Appendix G: MnSEiA (Minnesota Solar Energy Industries Association. Does Solar Work in Minnesota

Solar Energy Potential

According to the National Renewable Energy Laboratory (NREL), Minnesota has strong solar potential despite its northern latitude. Using the *U.S. Annual PV Solar Radiation Map* and Minnesota-specific data from the Minnesota Department of Commerce, the state receives 4.5 to 5.0 kWh/m²/day of solar energy—comparable to areas in Germany, one of the world's solar leaders.



NREL Solar Maps (U.S.): https://www.nrel.gov/gis/solar.html
MN Solar Suitability App: https://solar.maps.umn.edu/

The *University of Minnesota Solar Suitability App* provides parcel-level analysis across the state. In Otter Tail County—including Vergas—many rooftops and open lands are rated as “good” or “excellent” for solar, indicating high solar radiation and several of the Vergas sites have favorable roof tilt/orientation.

This data, based on LiDAR and solar irradiance modeling, shows that even with seasonal variability, Minnesota's solar resources are sufficient to support distributed energy systems. Tools like the MN Solar App not only help identify optimal sites, but also will assist in planning future solar developments by visualizing annual output estimates.

For example, see the West Central Initiative Building and Solar Analysis for the City of Vergas Community and Event Center. Appendix H. When paired with efficient equipment upgrades and net metering policies, this can cover a significant portion of a small commercial or residential energy load.

Minnesota’s solar development is further encouraged by state legislation such as the Solar Energy Standard (requiring 1.5% of investor-owned utilities’ retail electricity sales to come from solar by 2020) and initiatives by Clean Energy Resource Teams (CERTs) to support rural communities.

What This Means for Vergas

Even in northern regions, solar performs reliably due to:

- **Cold Climate Efficiency:** Solar panels operate more efficiently in colder temperatures, improving performance on sunny winter days.
- **Seasonal Production:** While winter has shorter days, summer months make up for this with long daylight hours—ideal for energy generation.
- **Net Metering & Incentives:** Minnesota's policies allow homeowners and businesses to receive credit for excess energy produced, enhancing return on investment.

In Vergas, this means:

- The Event Center's solar assessment is viable and with the gap funding provided by WCI the breakeven point occurs within two years of operation this will lead to lower operating costs. Appendix H
- Other municipal buildings like the Fire Hall, Liquor Store, and City Shop may also be good solar candidates when paired with energy efficiency upgrades.
- Energy benchmarking and retrofits—like those already proposed in the ESMC & OTPCO report—can help ensure solar is deployed cost-effectively by reducing the building's baseline energy demand first.

Solar energy is not only viable in Vergas, it is a smart investment. The Event Center solar assessment, approved and in process of implementation, is a stepping-stone toward broader clean energy adoption. By embracing solar, the community can:

- Reduce energy costs.
- Build environment and climate resilience.
- Establish an energy source as part of emergency management
- Attract sustainability-minded residents and businesses.

Renewable Energy Opportunities & Actions

To support decision-making and implementation, the City utilized the energy and assessment findings and became a Green Step City and evaluated the best practices guide as the means to evaluate each city-operated building for upgrade opportunities. This information helped prioritize current and future projects based on feasibility, impact, and alignment with available funding.

GreenStep Cities program. A voluntary challenge, assistance and recognition program to help communities achieve sustainability and quality of life goals. [*greenstep.pca.state.mn.us*](greenstep.pca.state.mn.us)

Energy Efficiency Opportunities:

- Identified and completed simple retrofits such as LED lighting, occupancy sensors, and weather sealing.
- Evaluated building envelopes for insulation upgrades and air infiltration improvements.

Mechanical System Upgrades:

- Reviewed age, efficiency, and operational performance of existing HVAC systems and water heaters.
- Identified opportunities to transition to air-source or air-to-water heat pumps and phase out aging gas systems.

Solar Readiness and Resilience Potential:

- Assessed rooftops and adjacent areas for solar installation potential.
- Calculated critical electrical loads to inform solar-plus-storage resilience strategies.

To support effective implementation, it is recommended that the Energy and Resilience Advisory Board work on further improvements, utilizing the plan action goals and Green Step Program Best Practices, and prioritize action goals into short (5 years), medium (10 years), and long-term (15 years) phases based on cost, impact, and urgency. This phased approach would help prioritize quick wins while allowing time to plan for larger capital improvements. Aligning each project type with available incentives: Tax Incentives, utility rebates, and GreenStep Cities actions can also maximize financial leverage and improve building conditions.

Additionally, integrating findings into the B3 Benchmarking platform would allow for ongoing performance monitoring and energy tracking across city-owned buildings. This data-driven approach could inform future updates to the Capital Improvement Plan (CIP), support grant applications, and help the City assess the effectiveness of implemented projects over time.

CONCLUSION & NEXT STEPS

The Vergas Energy and Resilience Plan provides a practical, community-driven roadmap for strengthening infrastructure, improving energy performance, and preparing for climate-related risks. Grounded in past planning efforts and informed by technical assessments, grant investments, and community input, the plan positions Vergas to act strategically by protecting local assets, supporting residents, and demonstrating how small communities can lead through thoughtful, phased action. By aligning policy, funding, and implementation, Vergas is building a resilient foundation that will sustain community well-being, environmental stewardship, and economic vitality for years to come.

Key Takeaways & Action Priorities

- Build on existing plans: Leverage the CIP, Housing Study, and Comprehensive Plan as a coordinated framework for energy and resilience investments.
- Implement high-impact facility upgrades: Prioritize weatherization, air sealing, insulation, and blower door testing to reduce energy demand and right-size mechanical systems.
- Develop resilience hubs: Advance the Event Center and Fire Hall as emergency-ready facilities with solar, backup power, improved electrical capacity, and enhanced building performance.

- Strengthen data-driven decision-making: Use B3 Benchmarking, GreenStep Cities, and ongoing audits to track performance and guide investment sequencing.
- Advance clean energy adoption: Further pursue solar development and solar-friendly policies to reduce costs and support long-term energy independence.
- Prepare for extreme weather: Integrate climate projections, infrastructure protection strategies, and emergency planning into capital and operational decisions.
- Engage community leadership: Support the Energy and Resiliency Advisory Board and continue resident engagement to guide implementation and build local ownership.
- Align housing and land use planning: Address growth, daycare needs, senior housing needs, and infrastructure extensions while incorporating energy efficiency and resilience.
- Maximize funding opportunities: Coordinate project timing with state and federal grants, utility programs, and incentives to accelerate implementation.
- Lead by example: Position Vergas as a model for rural communities demonstrating that strategic planning, partnerships, and local leadership can drive meaningful climate and energy action.

ACTION GOALS

City of Vergas Energy & Resilience Action Plan

Energy
Goal: Reduce city operational energy use by 40% from 2025 baseline by 2035 thru renewable energy, energy efficiency and electrification. **Goal: Install at least 1 type of renewable energy technology on every municipal building by 2035. (Solar photovoltaic (PV), Solar Thermal, Battery Storage, Cold Climate Air Source Heat Pumps (CCASHP), Geo Exchange heat pumps, micro Weather Energy Conversion System (WECS), thermal energy storage, low & ultra-low Global Warming Potential (GWP) refrigerants, Electric Vehicle (EV) charging).**
Planning: · **Adopt energy independence goals and objectives in policy.** · **Plan and budget for motor maintenance and upgrades to assure the most energy-efficient, durable, and appropriate equipment is available when upgrades or breakdowns occur.** · **Continue adoption of GreenStep program best practices.**

Policy:

- **Become an EV-ready city and solar ready city. (GSC BP6.5)**
- **Phase in operational changes, equipment changes, including electric vehicles and no-idling practices for city fleet. (GSC BP12.3)**
- **Adopt a renewable energy ordinance that allows, enables and encourages appropriate renewable energy installations. (GSC BP13.3)**
- **Become a solar ready community, including adopting ordinances/zoning language and expedited permit process for residents and businesses to install solar energy systems. (GSC BP 26.7)**

Projects:	**Timeline:**		**Status:**	
Enter and update utility information in B3 benchmarking. (GSC BP1.1)	**5yr**			
Use LED/solar-powered lighting in street, parking lot and park projects. (GSC BP4.5)	**5yr**			***Current status : LED lighting in all municipal buildings & street lighting.***
Install islanding capability and storage for a clean energy system in publicly accessible building to provide back-up power that can sustain function during extreme weather events. (GSC SP23.5) **o Designate a safe shelter with a plan that arranges adequate provisions and back up power sufficient to meet daily run-time requirements as a shelter for 1 week or longer.** **o Create a plan for resilience hub that describes community services provided during disruptions and into recovery after natural hazard events.**	**5yr**			***Current status: Battery hub to be installed in VEC as part of solar installation,***
Replace small combustion engine lawn and garden equipment with electric tools to decrease emissions and costs and increase efficiency. (GSC SP23.1)		**10 yr**		
Install renewable energy technology (i.e. solar PV/Solar Thermal) on all municipal buildings. GSC BP26.5)			**15 yr**	

Resilience				
Goal: Increase community connectedness and civic participation through sustainability, resilience, and civic-focused events, training, engagement, and information. *Host up to 1 event per year.* **Goal: Educate, plan, and prepare for local climate impacts. Specifically address extreme weather events, heat events, and extreme precipitation in city planning *and infrastructure projects. Educate city businesses and residents through timely social media posts on personal planning and preparedness for extreme weather.***				
Planning: **· Inclusive and coordinated decision making; use a city commission or committee to lead, coordinate, report to and engage committee members on the identification and implementation of sustainability best practices.** **· Incorporate climate resilience into city planning, policy, operations, and budgeting process.**				
Policy: **· Incorporate working landscapes into the city by adopting an ordinance for one or more of the following:** **o agriculture and forest protection district** **o local food production district** **o Incubator farms, emerging farmers and land access** **o Prairie designation** **o Pollinator-friendly and natural landscaping to revitalize current turfgrass areas**				***Current status: Have prairie designation in city ordinance***
Projects:				
Increase walking and biking within the community by being recognized as a walk friendly, bicycle friendly or age friendly community. (GSC BP12.1C)	**5yr**			***Current status: Have walking trail from downtown, toLong Lake Park and via bridge along lake.***
Inclusive and coordinated decision making; use of a city commission or committee to lead, coordinate, report to and engage community members on identification and implementation of sustainability best practices. (GSC BP24.1)	**5yr**			***Current status: Have a Energy & Resilience Advisory Board***

Communicate progress on goals; organize goals and outcome measures from city comprehensive plan, energy and resilience plan and other foundational documents and report to community members the data that shows progress toward meeting goals. (GSC BP 24.2)	**5 yr**			
Public education and action; conduct or support broad sustainability education, building on existing city and community relationships, networks, and events that involve: (GSC BP24.4) **o The entire community, community leaders** **o Homeowners, landlords, tenants** **o Community organizations**	**5 yr**			***Current Status: Lions organization collects plastic bags at city municipal building that are made into benches placed throughout the community. To date, 7 benches placed.***
Conduct or participate in a buy local campaign for community members and local businesses. (GSC BP27.3)		**10 yr**		***Current Status: Vergas Community Club on an ongoing basis does buy local campaign thru events & use of Looney & Holiday Bucks***
Create, assist with and promote local food production/distribution within the city. (GSC BP27.3) **o Farmers market or coop buying club** **o Urban agriculture businesses or community-supported agriculture arrangement between local producers and consumers** **o Community or school garden, orchard, or forest.**		**10 yr**		***Current Status: Vergas serves as a site for the Bridge Community Pantry, which provides temporary food support one time monthly in the community to provide food support for individuals and families facing food insecurities. (second Wed each month)***
Protect water and wastewater treatment facilities to reduce physical damage and sustain future function during extreme weather events. (GSC BP29.7)			**15 yr**	

Improve local energy resilience by installing distributed renewable energy systems and developing microgrids that can improve energy system resiliency. (GSC BP29.8). Install a public sector/municipally owned renewable energy technology. (GSC 26.5)			**15 yr**	
Greenspace and Trees				
Goal: Increase tree canopy in new and planned housing developments. *Plant 10 public trees per year* **Goal: Create plans and policies to support public and private planning of resilient tree species. *Increase the number of trees being planted by residents and businesses to 20 trees per year.*** **Goal: Increase access and use of greenspace and blue space (i.e. lake) by community members and visitors. *Establish additional walking loops or trails that highlight local ecological features.***				
Policy: **· Create an EAB (Emerald Ash Borer) management plan and educate community on best practices** **· Adopt a complete streets/living streets policy that addresses landscaping and stormwater management (GSC BP11.1)** **· Adopt a tree preservation and or/native landscaping ordinance (GSC 16.5)** **· Create Park/City land management practices/standards that maximize at least one of the following:** **o low maintenance turf management; native landscaping, organic or integrated pest management, pollinator/monarch safe policies** **o sources of non-potable water or surface/rain water for irrigation** **· At least 20% of total land area is in protected green infrastructure or that 90% of residents are within 10 minute walk or within 1 mile to park or other public green/blue space. (GSC 18.3)**				
Projects				
Certify as a Tree City USA . (GSC BP16.5)	**5yr**			
Plant and maintain at least 2-3 climate resilient trees for each public tree lost.	**5yr**			
Preserve environmentally sensitive, community valued land by placing a conservation easement on city lands by encouraging/funding private landowners. to place land in conservation easement. (GSC BP10.5)		**10 yr**		

Build city capacity to protect existing trees by one or more of the following: (GSC BP16.6) **o Trained tree specialist** **o Volunteer forestry effort** **o Adopting ESB management plan** **o Participate in Tree Steward Program** **o Engage community in annual restoration or cleanup of natural resources.**		**10 yr**		
Conduct a tree inventory or canopy study of public and private trees. **(GSC BP16.7)**		**10 yr**		
Water				
Goal: **· Plan and prepare for changing precipitation patterns and water availability.** ***(Shorter term: implement green infrastructure rain water capture, and native vegetation inflow and infiltration projects in vulnerable areas in and around Vergas)*** **· Integrate climate projections into water planning and wastewater management.** ***(Long term: lower flood risk for vulnerable areas and avoid damage from extreme events)***				
Planning: **Complete a complete GreenStep Municipal Stormwater management assessment. (GSC BP17.2)**				
Policy: **· Adopt and report on measurable, publicly announce surface water improvements targets for lakes. (GSC BP19.3)** ***-Is completed by local lake associations*** **· Conserve/protect drinking and groundwater resources by creating a waterwise landscaping ordinance and/or guidance on rainwater harvesting and home water softener use.** **(GSC BP2.5)** **· Adopt and implement guidelines or design standards/incentives for at least one of the following: (GSC BP17.5)** ***Have ordinance for 25% of lot to be impervious*** **o Rain Gardens** **o Rainwater harvesting** **o Green alleys or green parking lots** **o Pervious/permeable pavement or pavers** **o Tree trenches/tree boxes** **· Incorporate compost and/or native landscape design.**				

Projects:				
Create/assist a lake improvement district. (GSC BP19.7)	**5yr**			
Improve smart-salting by reducing chloride use in winter maintenance and dust suppressants to prevent permanent surface water and groundwater contamination. (GSC BP17.6)	**5yr**			
Conduct or support a multi-party community conversations, assessments, plans, and actions around improving local water quality and quantity. (GSC BP19.2)	**5yr**			

APPENDIX A: Summary of Existing City of Vergas Planning Documents

2019 Capital Improvement Plan (CIP)

The 2019 CIP prioritized:

- **Street and Utility Improvements**: West Lake Street, East Scharf Avenue, Bennett Road, and Townline Road.
- **Water and Sewer Extensions**: Focused on service expansion into unconnected city parcels.
- **Parks Improvements**: ADA-compliant upgrades at Long Lake Beach and restroom facility replacements.
- **Stormwater Drainage**: Minimal underground systems required; reliance on overland drainage remains effective.

2020 Housing Study

Key findings included:

- **Aging Housing Stock**: Median year built was 1956, but structures are generally well maintained.
- **High Ownership Rates**: 93% owner occupancy.
- **Senior Demographic Concentration**: 54% of the population is aged 55 or older.
- **Growth Potential**: 47 vacant lots ready for residential development; need for more accessible and affordable housing.

2022-2036 Comprehensive Plan

Themes include:

- **Land Use**: Emphasizing compact growth, infill development, and shoreline preservation.
- **Housing**: Support for new energy-efficient housing options.
- **Public Facilities**: Prioritization of upgrades tied to climate resilience.
- **Transportation**: Strong support for regional trail connections and multimodal accessibility.
- **Energy and Sustainability**: Integration of renewable energy, energy conservation, and water management across projects.

The Comprehensive Plan serves as the high-level strategic framework under which CIP and housing initiatives can operate synergistically.

APPENDIX B: Otter Tail Power Building Assessment: Energy Use & Operational Efficiency

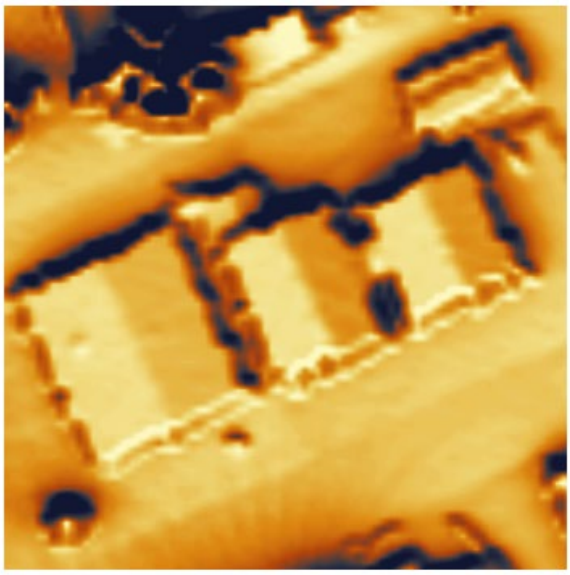
Fire Hall	**120 West Linden Street, Vergas MN 56587**
Array Size: 34 Kw DC	
Site Summary: This building is located just east of the Event Center and features a gable roof structure. To maximize solar gain and increase energy production during evening hours, the west-facing slope is recommended for array placement. Utilizing just one of the two available west-facing slopes, the roof can accommodate a 34 kW DC system, provided there are no obstructions such as vents or rooftop equipment.	

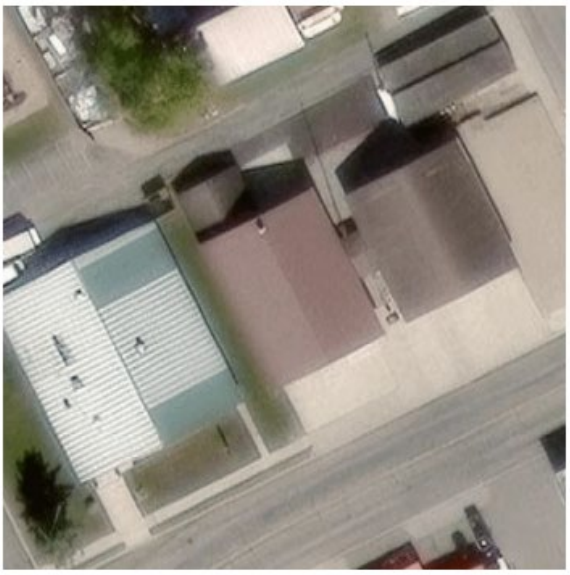
RESULTS

45,295 kWh/Year*

System output may range from 43,321 to 47,886 kWh per year near this location.

Month	Solar Radiation (kWh / m^2 / day)	AC Energy (kWh)
January	2.45	2,297
February	3.60	3,061
March	4.79	4,283
April	5.87	4,830
May	5.82	4,807
June	6.27	4,905
July	6.86	5,429
August	6.14	4,936
September	4.59	3,689
October	3.56	3,105
November	2.37	2,099
December	2.00	1,854
Annual	4.53	45,295



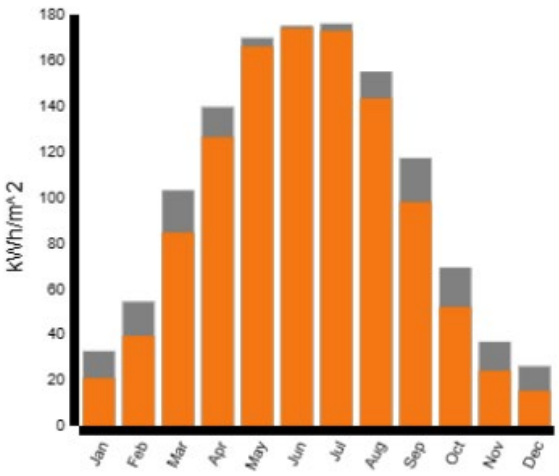


This site is **Good**. It would need a **5.06 kW** system to generate **50%** of average household use. This system would cost approximately **$18,967**. System payback is **13.8 years** after tax credit.

Utility Service Provider:
Otter Tail Power
215 South Cascade Street P.O. Box 496
Fergus Falls, MN 56538
(218) 739-8200
www.otpco.com

Site Details:
Total Annual Insolation: 1106.22 kWh/m^2
Avg Insolation per Day: 3.03 kWh/m^2
Source Data: Spring 2008-Spring 2010

Amount Actual Sun



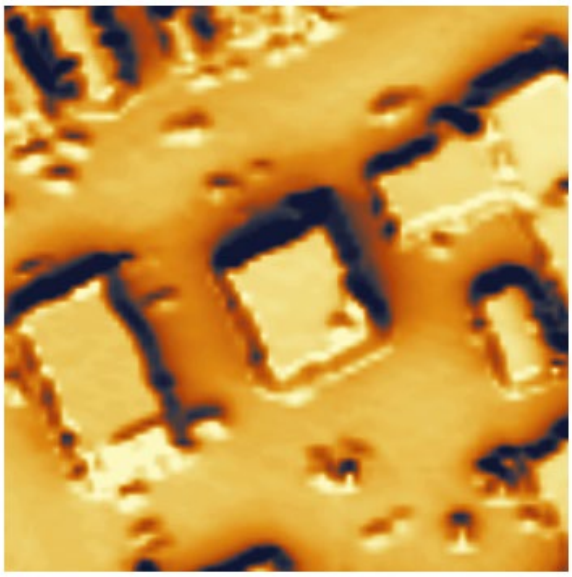
Vergas Off Sale Liquors	**111 West Main Street, Vergas MN 56587**
Array Size: 27 Kw DC	
Site Summary: This building is located west of the City Office and accommodates two tenants. It features a flat roof, and if the structural capacity allows, a ballasted solar mounting system is recommended to avoid penetrations to the roofing membrane.	

RESULTS

35,655 kWh/Year*

System output may range from 34,101 to 37,695 kWh per year near this location.

Month	Solar Radiation (kWh / m^2 / day)	AC Energy (kWh)
January	2.45	1,808
February	3.60	2,409
March	4.79	3,372
April	5.87	3,802
May	5.82	3,784
June	6.27	3,861
July	6.86	4,273
August	6.14	3,886
September	4.59	2,904
October	3.56	2,444
November	2.37	1,652
December	2.00	1,459
Annual	4.53	35,654

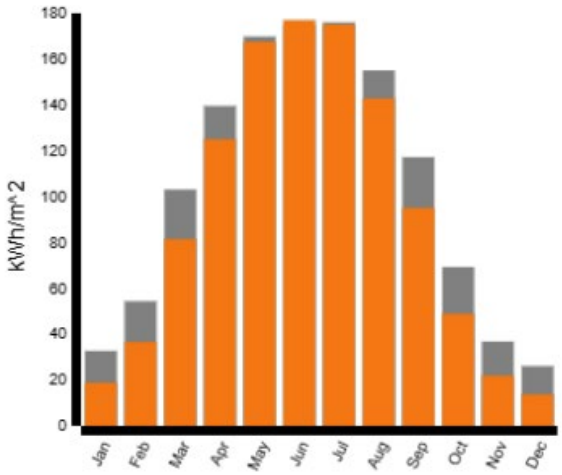


This site is **Fair**. It would need a **5.07 kW** system to generate **50%** of average household use. This system would cost approximately **$19,030**. System payback is **13.8 years** after tax credit.

Utility Service Provider:
Otter Tail Power
215 South Cascade Street P.O. Box 496
Fergus Falls, MN 56538
(218) 739-8200
www.otpco.com

Site Details:
Total Annual Insolation: 1102.34 kWh/m^2
Avg Insolation per Day: 3.02 kWh/m^2
Source Data: Spring 2008-Spring 2010

Amount Actual Sun



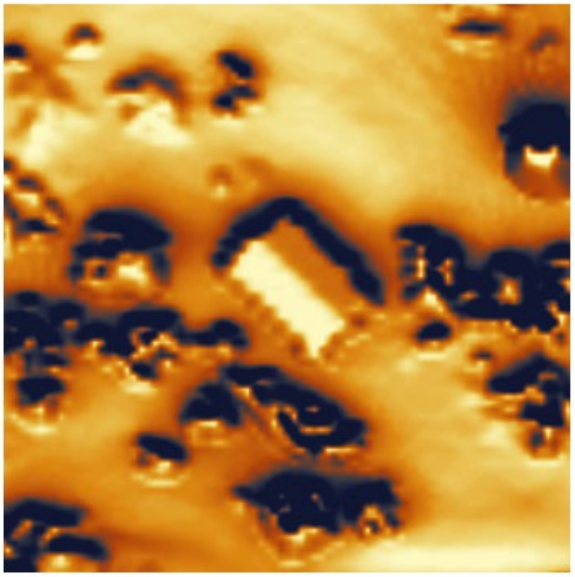
City Shop	311 Glenn St, Vergas MN 56587
Array Size: 20 Kw DC	
Site Summary: This building is situated just south on Pelican Avenue, adjacent to the water tower. The recommended location for the solar array is the west-facing slope of the gable roof. Several trees are in close proximity to both the building and the proposed array site; these should be trimmed or removed to minimize shading and reduce the risk of damage from falling branches or debris.	

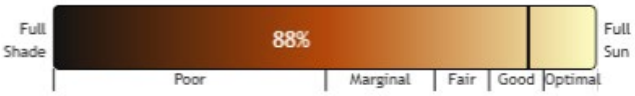
RESULTS

26,637 kWh/Year*

System output may range from 25,475 to 28,160 kWh per year near this location.

Month	Solar Radiation (kWh / m^2 / day)	AC Energy (kWh)
January	2.41	1,342
February	3.55	1,792
March	4.75	2,515
April	5.82	2,844
May	5.76	2,828
June	6.21	2,888
July	6.81	3,207
August	6.09	2,913
September	4.55	2,170
October	3.53	1,827
November	2.35	1,228
December	1.97	1,083
Annual	4.48	26,637



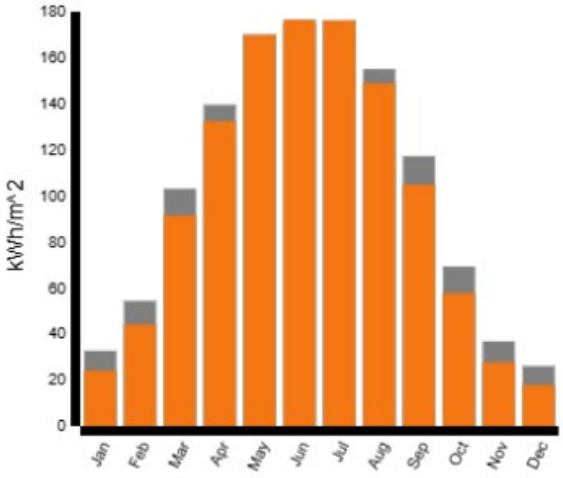


This site is **Good**. It would need a **4.79 kW** system to generate **50%** of average household use. This system would cost approximately **$17,959**. System payback is **13.1 years** after tax credit.

Utility Service Provider:
Otter Tail Power
215 South Cascade Street P.O. Box 496
Fergus Falls, MN 56538
(218) 739-8200
www.otpco.com

Site Details:
Total Annual Insolation: 1168.84 kWh/m^2
Avg Insolation per Day: 3.20 kWh/m^2
Source Data: Spring 2008-Spring 2010

Amount Actual Sun



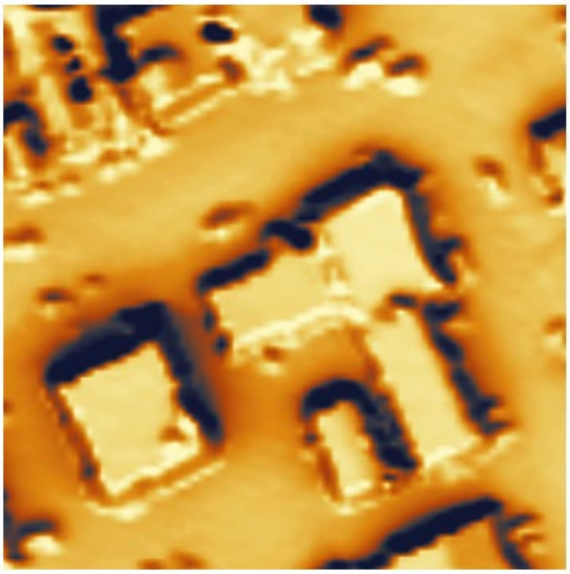
Government Services Center Vergas	123 E Main St, Vergas MN 56587
Array Size:16.5 Kw DC	
Site Summary: This building has the lowest solar potential among all the sites and features only a limited west-facing roof area. As a result, the solar array is positioned on the east-facing slope. The building is shared with the Post Office, presenting an opportunity for a collaborative solar installation with the tenants.	

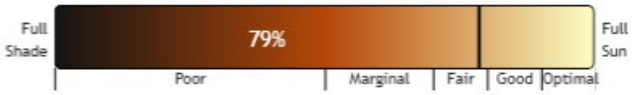
RESULTS

21,758 kWh/Year*

System output may range from 20,810 to 23,003 kWh per year near this location.

Month	Solar Radiation (kWh / m^2 / day)	AC Energy (kWh)
January	2.41	1,096
February	3.55	1,464
March	4.75	2,054
April	5.82	2,323
May	5.76	2,310
June	6.21	2,359
July	6.81	2,619
August	6.09	2,379
September	4.55	1,772
October	3.53	1,492
November	2.35	1,003
December	1.97	885
Annual	4.48	21,756



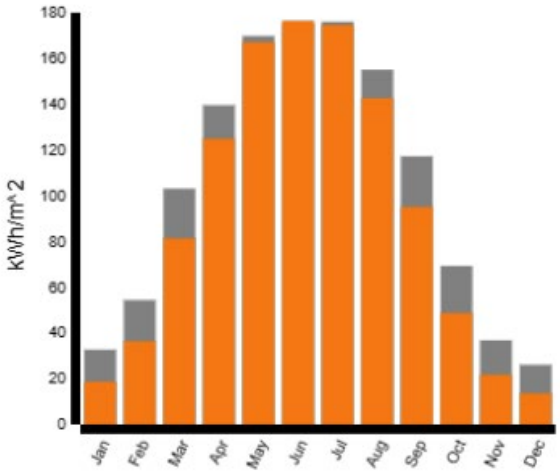


This site is **Fair**. It would need a **5.09 kW** system to generate **50%** of average household use. This system would cost approximately **$19,093**. System payback is **13.9 years** after tax credit.

Utility Service Provider:
Otter Tail Power
215 South Cascade Street P.O. Box 496
Fergus Falls, MN 56538
(218) 739-8200
www.otpco.com

Site Details:
Total Annual Insolation: 1100.30 kWh/m^2
Avg Insolation per Day: 3.01 kWh/m^2
Source Data: Spring 2008-Spring 2010

Amount Actual Sun



APPENDIX C

UMN CENTER FOR SUSTAINABLE BUILDING RESEARCH – CITY OF VERGAS BUILDING ASSESSMENTS & RECOMMENDATIONS

Four buildings owned by the City of Vergas were studied by the Center for Sustainable Building Research (CSBR) in 2024 and 2025 the Fire Hall, City Office, Municipal Off-Sale Liquor Store, and the Event Center.

The intent of the study was to:

1. Examine and document the historical energy use of the buildings (gas and electricity). Energy use is normalized into a whole-building metric of thousand Btu per square foot, per year (kBtu/ft2*yr). This is known as Energy Use Intensity (EUI). This unit enables comparison between buildings in the City's portfolio, and similar buildings in other locations.
2. Identify sources of energy waste that are focused on the building enclosure, since mechanical system substitutions had already been identified in an energy audit done by Otter Tail Power and Frontier Energy.
3. Document costs for recommended upgrades, using contractor bid amounts.
4. Use energy models where possible to predict savings. Note that savings from air leakage reduction are difficult to quantify, especially since the buildings have not received blower door tests and their existing air leakage is therefore unknown.

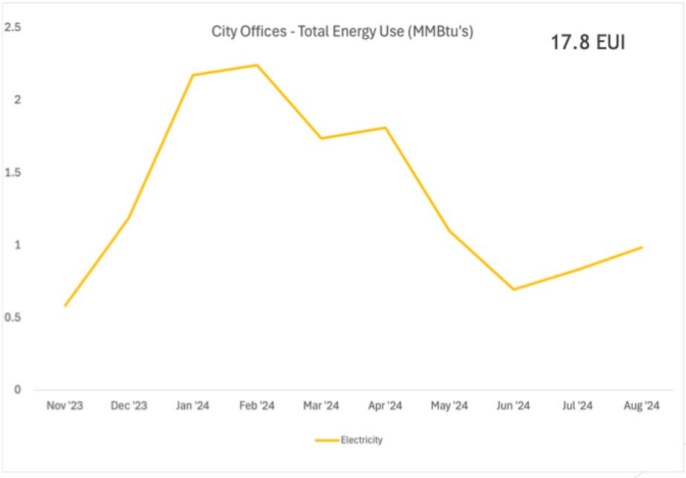
CSBR staff made an initial visit to Vergas on August 20th 2024 to perform a brief survey of the four study buildings and make preliminary observations on enclosure characteristics. The CSBR staff returned Oct 28th, 2024, when colder weather would enable visualization of heat flow through parts of the building enclosure by using a thermal imaging camera. The results of this investigation are as follows:

City Office

Building Overview

The Vergas City Office is a single-story structure with no basement, constructed in 1972. It shares approximately half its footprint with the U.S. Post Office. The facility is entirely electric, utilizing mini-split heat pumps for both heating and cooling, with no natural gas consumption. The Energy Use Intensity (EUI) is 17.8 kBtu/ft²·yr, significantly below the national median for small office buildings and notably efficient relative to comparable local facilities such as the Frazee Fire Hall / City Office (EUI 89.92).

Thermal imaging investigations conducted during the Center for Sustainable Building Research (CSBR) study in fall 2024 revealed no major thermal bypasses or insulation deficiencies. Electricity usage peaks during winter due to decreased efficiency of air-source heat pumps in extremely cold temperatures; however, air conditioning demands remain modest throughout the year.



Identified upgrades are based on visual and thermal imaging surveys. A blower door test is recommended to quantify overall envelope tightness and locate additional air leakage beyond visually confirmed areas.

Recommendations Checklist

Weatherization Efforts:

- No significant thermal bypasses were observed during thermal imaging inspections.
- **Recommendation:** Conduct blower door testing to identify and quantify any hidden sources of air leakage and prioritize improvements accordingly.
- **Estimated Cost:** TBD (dependent on blower door results)

Mechanical Systems Upgrades / Critical Loads:

- Heating and cooling are provided by air-source mini-split heat pumps.
- **Recommendation:** Install smart thermostats to improve temperature control, increase operational efficiency, and reduce energy consumption during winter peak demand.
- **Estimated Cost:** $200–$600 per thermostat (depending on selected model and labor)

Renewable Energy Opportunities:

- The roof appears suitable for a small-scale solar PV system to offset electric usage.
- **Recommendation:** Perform a solar site assessment to evaluate rooftop capacity and payback potential.

Water Environment (Future Category):

- No water environment or stormwater infrastructure recommendations at this time.
- Future integration of greywater reuse or rain garden strategies could be considered if site modifications occur.

Engineering Documentation:

- Future engineering documentation from Energy Conservation Grant (WCI)

Fire Hall

Building Overview

The Vergas Fire Hall consists of two equipment bays constructed at different times, a large meeting room, and several support areas including restrooms and offices. The building is infrequently occupied. Space conditioning relies on a mix of natural gas and electric systems, with ventilation supported by two energy recovery units (ERVs) that help mitigate heat loss during air exchange.

The building's Energy Use Intensity (EUI) is 23.7 kBtu/ft²·yr, significantly lower than the comparable Frazee facility (EUI 89.92). However, several energy inefficiencies were identified during the CSBR study, particularly related to air leakage and insufficient insulation in critical areas.

Weatherization Efforts:

- Air leakage was observed around equipment bay overhead doors (evidenced by dirt streaks, daylight penetration, and thermal imaging).
- The West equipment bay attic is under-insulated, and the attic hatch is not sealed.

- **Recommendations:**

    - Air seal all overhead doors.
    - Insulate attic floor to R-50.
    - Install weatherstripping to seal the attic hatch.

- **Estimated Cost:** $9,200 (labor and materials)

Mechanical Systems Upgrades / Critical Loads:

- Combination of gas-fired heating and electric systems used for conditioning.

- **Recommendation:** Continue preventive maintenance and inspection of ERVs to ensure efficient recovery of heat and minimize winter losses.

Renewable Energy Opportunities:

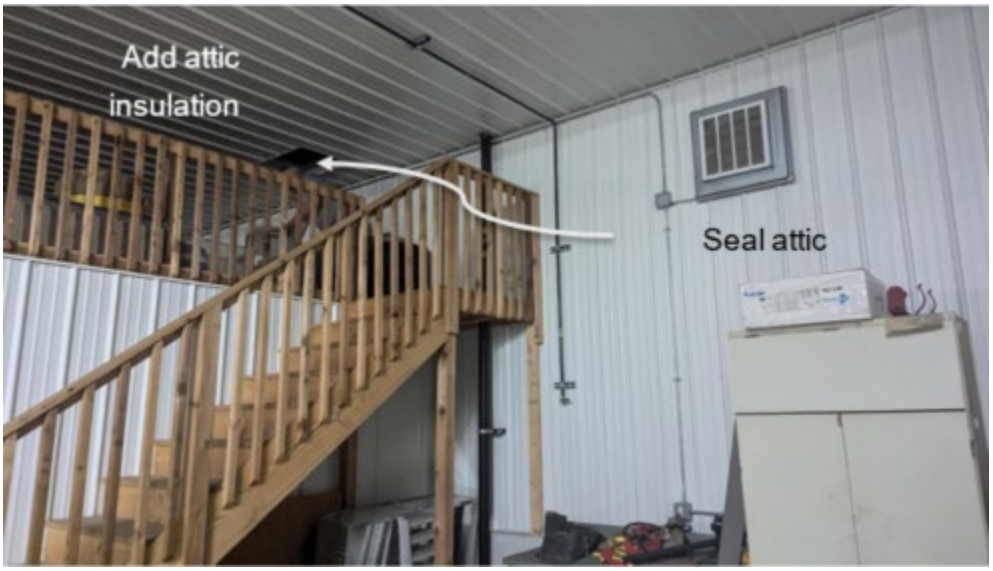
- Consider small-scale solar PV systems for lighting and auxiliary power needs.
- A resilience-oriented battery system could also support emergency operations.

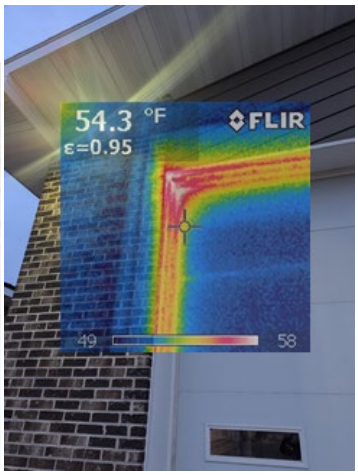
Water Environment (Future Category):

- No specific stormwater or water conservation issues were identified.
- Opportunities may exist to integrate native landscaping or bioswales in future site upgrades to improve drainage and reduce runoff.

Engineering Documentation:

- Future engineering documentation from Energy Conservation Grant (WCI)

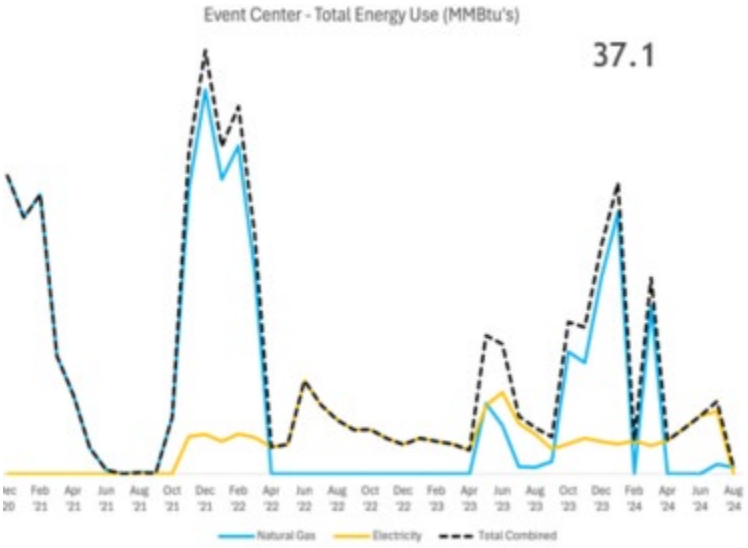




Event Center

Building Overview

The Vergas Event Center, a repurposed former school building, built in1955, spans approximately 7,200 square feet and includes a large assembly hall, commercial kitchen, meeting room, and multiple support spaces such as restrooms. The building relies on natural gas-fired furnaces for heating and standard electric air conditioners for cooling. Warm air is distributed via ducts embedded in the ground below the concrete slab.



The building has an Energy Use Intensity (EUI) of 37.1 kBtu/ft²·yr, which is commendable compared to similar facilities like the Detroit Lakes Community Center (EUI 119.95). While electricity use remains consistent year-round, gas consumption spikes during winter months due to heating needs.

Weatherization Efforts:

- Significant energy loss was identified through the building's **exposed slab edge**, which is exacerbated by under-slab ducting and perimeter heating registers.
- Air leakage was also detected at **five storefront entry doors** via thermal imaging and occupant reports.

- **Recommendations:**
    - Install perimeter insulation at slab edge, extending ~2 feet below grade.
    - Replace or repair weatherstripping on 5 exterior doors.
- **Estimated Cost:** $8,000 (labor and materials)
- **Projected Energy Savings:** 38% reduction in heating energy use

Mechanical Systems Upgrades / Critical Loads:

- Natural gas furnaces and standard air conditioning provide HVAC.
- Ducts are embedded in the slab and may be difficult to upgrade, but air sealing and zoning strategies may enhance performance.
- **Recommendation:** Investigate control upgrades or smart thermostats for improved load management.

Renewable Energy Opportunities:

- The roof has low slope but sufficient surface area for solar.
- A **24 kW solar PV system** could produce approximately 27,000 kWh/year, covering **120%** of historical electric use (not including gas offset).
- **Recommendation:** Explore solar PV installation with optional battery storage for resilience functions.

Water Environment (Future Category):

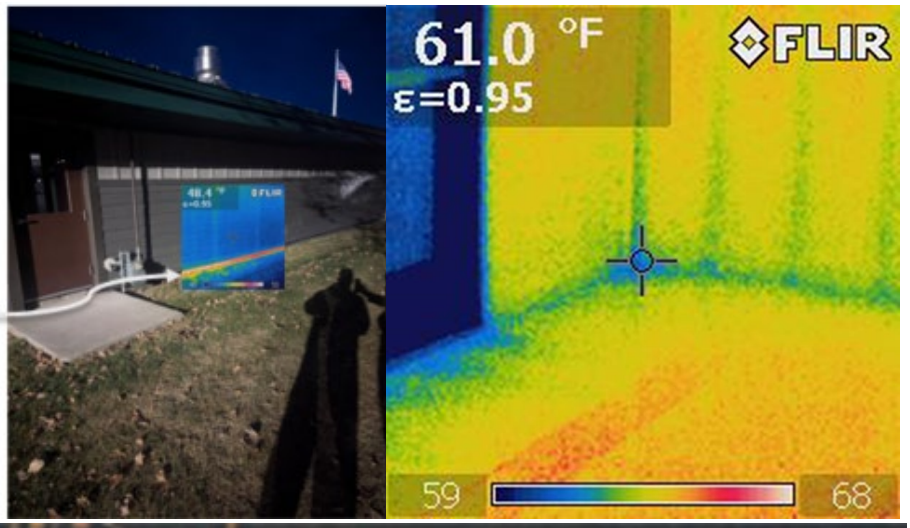
- No stormwater or water system issues were reported.
- Future upgrades could include permeable surfaces or rain gardens for managing runoff from the large roof surface.

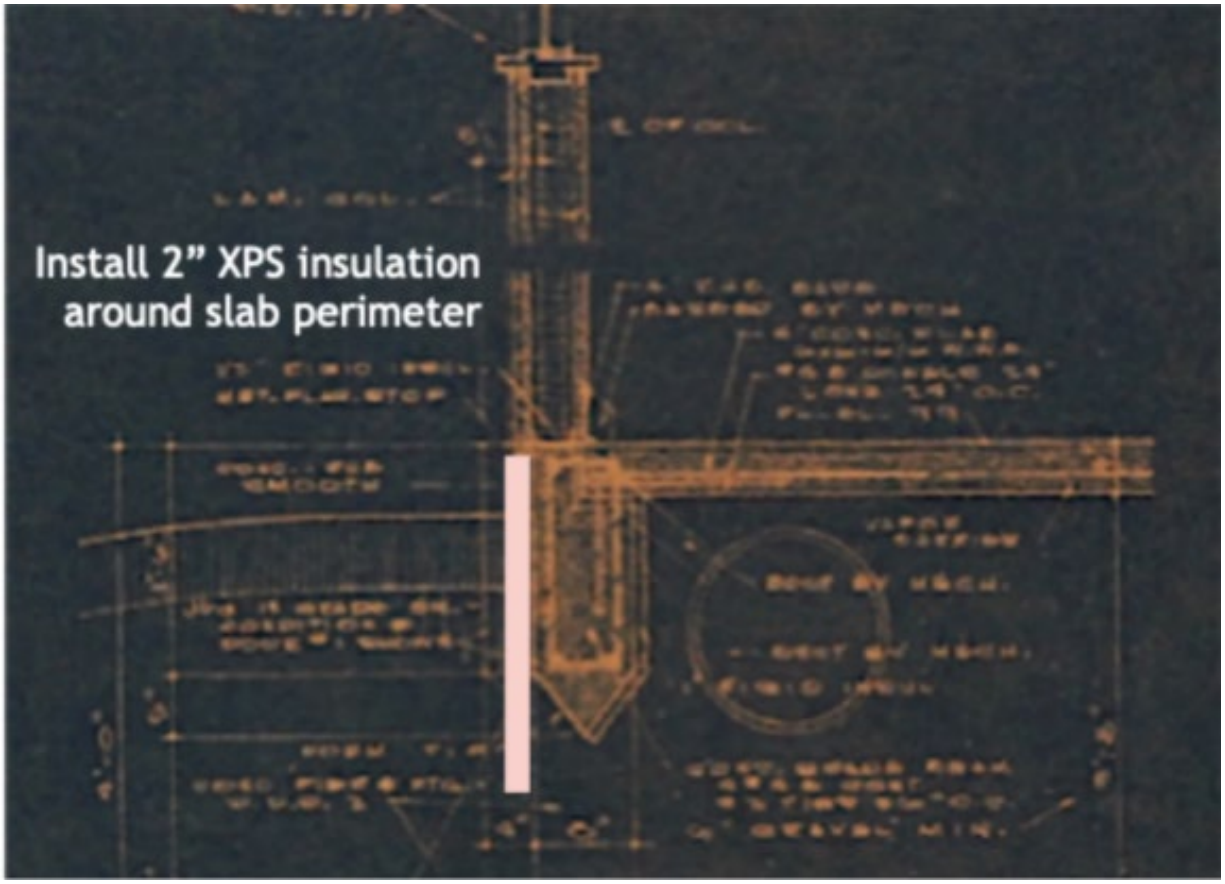
Engineering Documentation:

- Future engineering documentation from Energy Conservation Grant (WCI)

Exposed slab edge

(usually not a big deal, but ductwork is run under the slab on this building!)

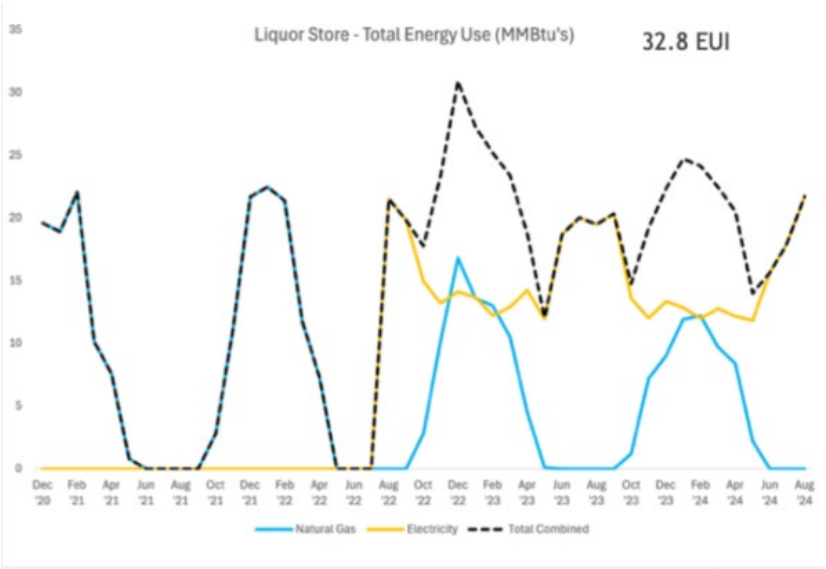




Vergas Municipal Liquor Store

Building Overview

The Vergas Municipal Liquor Store is housed in a historic two-story creamery building, built in 1903 , encompassing approximately 7,840 square feet. The liquor store and storage occupy the first floor, while the second floor is rented out to a clothing retail business. The structure features a mix of interior rigid foam and exterior insulation; however, certain historic architectural features were intentionally left uninsulated to preserve community character.



The building is equipped with winter economizers that use outdoor air to cool the refrigerated cases—an uncommon but energy-efficient feature. The building's Energy Use Intensity (EUI) is 32.8 kBtu/ft²·yr, significantly lower than the nearby Frazee liquor store (EUI 80.97), even accounting for its higher refrigeration load.

Weatherization Efforts:

- Warm air loss through the **abandoned elevator penthouse** was confirmed, with unsealed access doors and insufficient insulation.
- Additional **miscellaneous air leaks** were identified at the rear entry and near the uninsulated electrical panel areas.

- **Recommendations:**

    - Airseal and insulate the elevator penthouse and roof penetration.
    - Airseal rear building leaks and other minor penetrations.
    - Install new weatherstripping on 2 exterior doors.

- **Estimated Cost:** $3,500 (labor and materials)

- **Projected Energy Savings:** 24% reduction in EUI (based on modeled air tightness improvement from 5 ACH@50Pa to 3 ACH@50Pa)

Mechanical Systems Upgrades / Critical Loads:

- Economizers on the coolers are already in use and likely reduce refrigeration loads during the winter.
- **Recommendation:** Ensure economizer controls and sensors are functioning correctly with regular seasonal tune-ups.

Renewable Energy Opportunities:

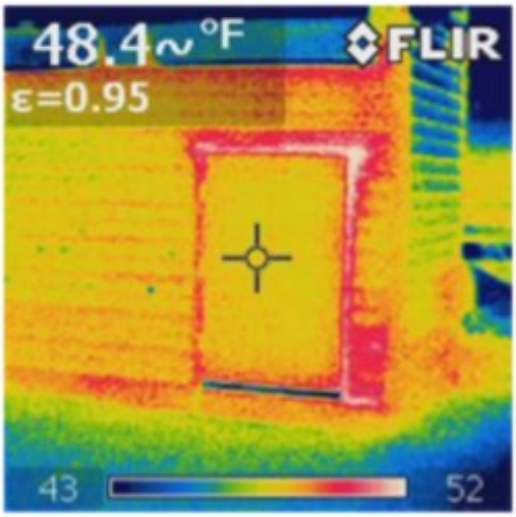
- No solar assessment conducted; architectural and roof design constraints may limit conventional rooftop PV deployment.
- **Recommendation:** Explore non-intrusive solar options such as parking canopy solar arrays or participation in community solar.

Water Environment (Future Category):

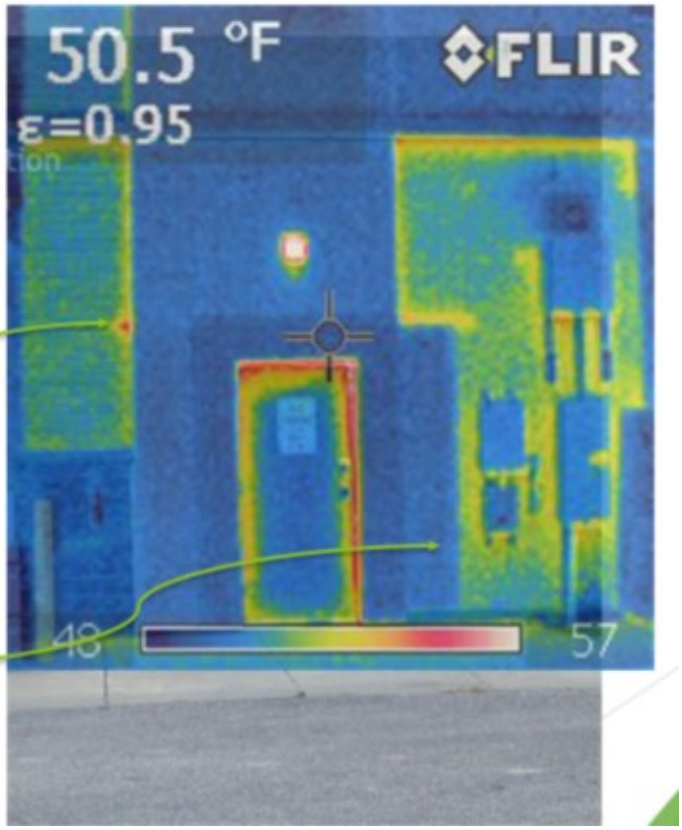
- No known water-related issues, though future opportunities could include improved drainage around the penthouse area and near back-of-house loading zones.

Engineering Documentation:

- Future engineering documentation from Energy Conservation Grant (WCI)



Old elevator shaft penthouse acts as chimney that sucks warm air out of the building. Seal it up.



Air leak

Old door opening (insulated better than section next to it)

APPENDIX D: Otter Tail Power Blower Door Tests

Weatherization Analysis Blower Door Testing Results

Customer Info:

City of Vergas

Building Info:

Name:	Event Center
***Square Feet:**	7,084
***Wall Height:**	10’ average
Cubic Volume:	70,480

Blower Door Test Data:

	Initial Date: 6/24/2025	**Final Date:** 11/24/25
***CFM50:**	5,563@40.3Pa = 6,400CFM50	5,297@45.2Pa = 5,656CFM50
ACH50:	5.4	4.8
EqLA: in^2	660.8	584.0
ELA: in^2	351.4	310.5
Areas of Concern:	• Confirm air barrier in ceiling. • Major air infiltration on the west entrance door frame and door. • Confirm building envelope insulation and air barrier.	NA

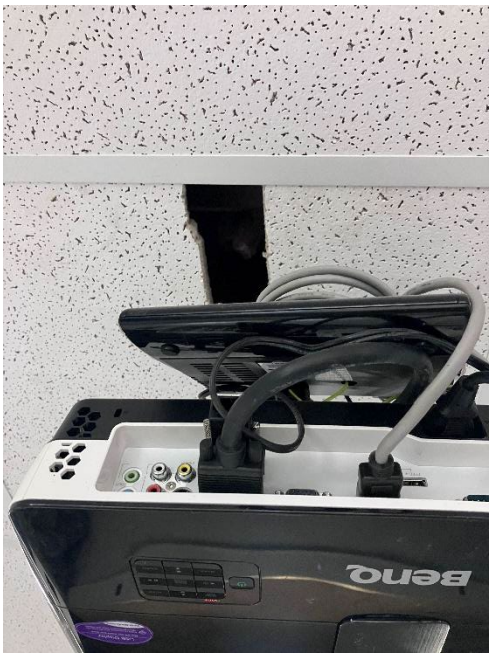
Measures Performed:	NA	Per Contactor Estimate: ● Replace part or all of the weatherstripping on 5 doors ● Install perimeter insulation

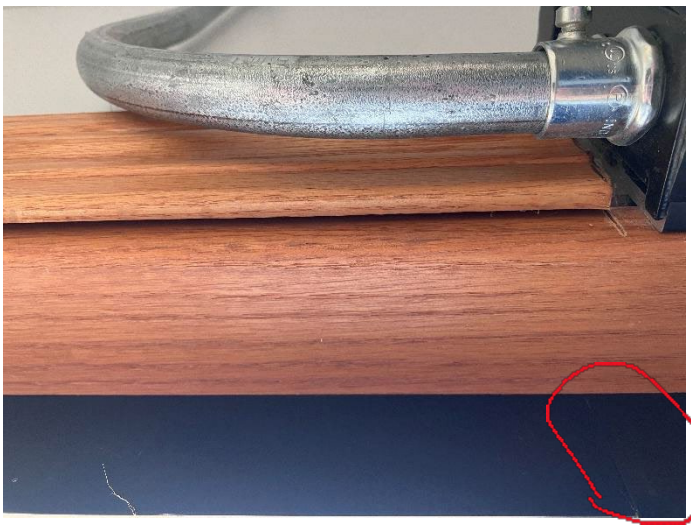
*TEC Calc Entered Data

Notes: Door in main event hall northeast corner service door used for blower door testing.

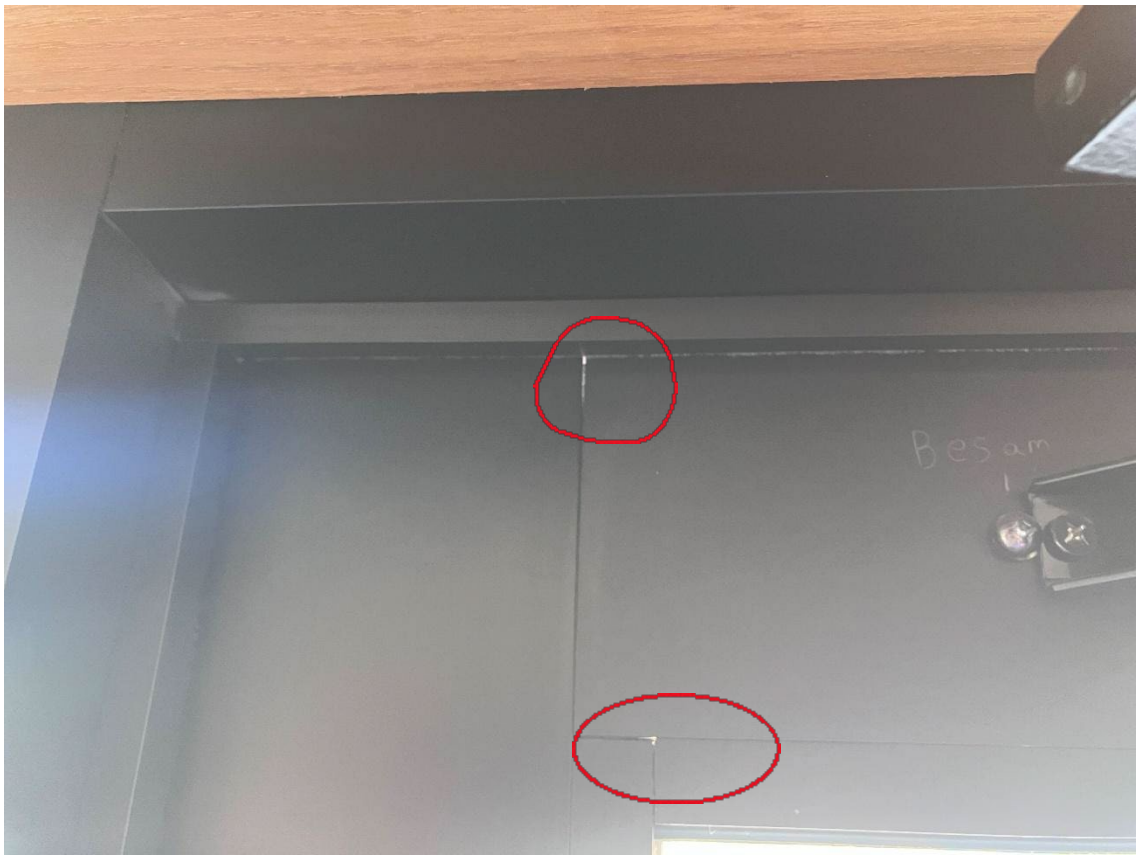
Areas of Concern at Initial Date (1st Blower Door Test)

Two layers of drop ceiling along with fiberglass batt insulation are the known visible materials for ceiling insulation. Confirm an air barrier and ceiling insulation of approximately R40 to R50.





Major air infiltration through this west entrance door frame.



Light showing within seems of west entrance door.

Analysis of Results at Final Date (2nd Blower Door Test)

The weatherization efforts made to the Event Center are supported by the 2nd blower door test results. The reduction in the CFM50 measurement of 6,400 to 5,656 results in lower air infiltration rates within the building. The improvements reduced the Effective Leakage Area (ELA) by 40.9 square inches, the size of a 4" X 10" hole within the building

Cost savings for heating and cooling from the improvement will be minimal due to the small increase of the thermal resistance (R-value) to the building as a whole. However, the combination of replacement of weatherstripping and installation of perimeter insulation will help make the building more comfortable for the occupants.

How do I calculate the leakage area?

Once the leakage rate for a building has been measured, it is useful to estimate the cumulative size (in square inches) of all leaks or holes in the building's air barrier. The estimated leakage area provides us with a way to visualize the physical size of the measured holes in the building. This can be particularly important when explaining the results of a test to a building owner. Leakage area calculations are also used in infiltration models to estimate the building's natural air change rate (i.e. the air change rate under natural weather conditions).

TEC's airtightness test analysis software calculates two separate leakage areas, based on differing assumptions about the physical shape of the hole. These leakage area calculations are compatible with the two most commonly used infiltration models. Energy analysis or rating software that require the user to input airtightness test results typically specify one of these two leakage areas.

The Equivalent Leakage Area (EqLA) is defined by Canadian researchers at the Canadian National Research Council as the area of a sharp edged orifice (a sharp round hole cut in a thin plate) that would leak the same amount of air as the building does at a pressure of 10 Pascals. The EqLA is used in the AIM infiltration model.

Effective Leakage Area (ELA) was developed by Lawrence Berkeley Laboratory (LBL) and is used in their infiltration model. The Effective Leakage Area is defined as the area of a special nozzle-shaped hole (similar to the inlet of your blower door fan) that would leak the same amount of air as the building does at a pressure of 4 Pascals.

Importantly, when using leakage area calculations to demonstrate physical changes in building airtightness, we recommend using the Canadian EqLA measurement. Typically, EqLA more closely approximates physical changes in building airtightness. For example, if you performed a blower door test, and then opened a window to create a 25 square inch hole and repeated the test, the estimated EqLA for the building will have increased by approximately 25 square inches from the initial test result. The EqLA is also easier to measure, especially in windy weather, because the measurement is taken at a higher building pressure than the ELA.

Source: The Energy Conservatory www.energyconservatory.com

Weatherization Analysis Blower Door Testing Results

Customer Info:

City of Vergas

Building Info:

Name:	Fire Hall
***Square Feet:**	8,713
***Wall Height:**	10’
Cubic Volume:	87,136

Blower Door Test Data:

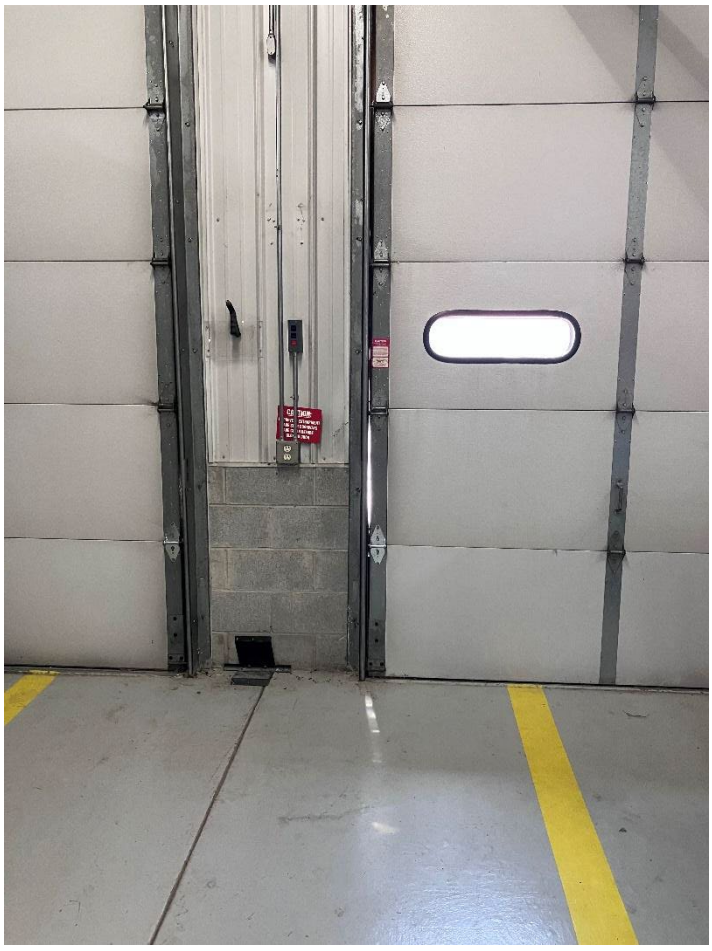
	Initial Date: 6/24/2025	**Final Date:** 11/24/2025
***CFM50:**	4,761 @50.1Pa	4,380 @50Pa
ACH50:	3.3	3.0
EqLA:	491.5	452.2
ELA:	261.4	240.5
Areas of Concern:	● Confirm air barrier in ceiling. ● Major air infiltration on the South Bay, all three east overhead garage door frames. ● Minor leakage at attic hatches.	NA
Measures Performed:	NA	Per Contactor Estimate: ● Air seal around (4) 14’X12’ doors ● Insulate attic to R50 ● Air seal attic hatch

*TEC Calc Entered Data

Notes: Door in North Bay, south service door used for blower door testing.

Areas of Concern at Initial Date (1st Blower Door Test)

The overhead garage doors in the south bay were significantly draftier than those in the north bay.



All three pictures are of the northernmost door in the south bay, showing each side of door.

Attic access had minor air leakage

Analysis of Results at Final Date (2nd Blower Door Test)

The age and construction style of the Fire Hall building prove to be advantages for building performance. Other than the seven large overhead doors, the building has limited openings (no windows) or penetrations found within the thermal envelope.

The initial reading ACH50 (air changes per hour at 50Pa) of 3.3 is an impressive reading, comparable to new construction standards, improvements to building performance will be difficult to achieve. The results of the air sealings measures on the (4) overhead doors and attic hatch reducing the ACH50 down to only 3.0 may seem insignificant, however keep in mind that the building in general was already well air sealed in other areas and this amount of reduction tied to only these specific two areas is an excellent result.

APPENDIX E

Vergas Community Energy and Resilience Advisory Board

I. Purpose

The purpose of the advisory board is to assist in creating and advancing the Energy and Resilience Plan, and to provide recommendations on policies and initiatives.

II. Objectives

1. Assist in creating and advancing the Energy and Resilience Plan.
2. Provide recommendations on policies and initiatives.
3. Engage the community through education and outreach.
4. Monitor progress and adapt strategies as needed.

III. Membership

The Board shall consist of five members, with three members from the resident population of the city to be appointed by the Mayor with the approval of the City Council. The appointees shall be appointed to serve staggered terms of three years, except as noted below, commencing on January 1 of the year of appointment. Upon the expiration of a term, the appointee shall continue in office until reappointed or a successor is appointed. Absences from any three meetings in a year, unless excused in advance by the Chair, constitute a vacancy. In the event of any vacancy, the Mayor, with the approval of the City Council, shall appoint a person to complete the unexpired term.

IV. Meetings & Structure

- (1) At the first regular meeting, the Board shall elect a Chairperson, a Vice-Chairperson, and a Secretary from among its appointed members, each for a term of one year. The Board may create and fill other offices as it may determine.

- (2) The Board shall hold a meeting at the call of the Chair. Special meetings may be called at any time by the Chairperson or, in the Chairperson's absence, by the Vice-Chairperson.

- (3) Written minutes of meetings shall be kept and filed with the City Clerk before the next regularly scheduled City Council meeting but shall be subject to approval at the next Board meeting.

- (4) No expenditures by the Board shall be made unless and until authorized for the purpose by the City Council.

V. Responsibilities

The Board will consult with the City Council and the Planning Commission and shall be advisory to the City Council in matters relating to climate action planning. The Board may meet with various groups to discuss issues related to climate activities. The Board will provide periodic updates to the City Council.

Approved by Vergas City Council June 9, 2025

APPENDIX F

Community Survey Administration, Questions & Analysis

Survey Outreach: Vergas Community Resilience & Energy Survey

Help shape Vergas' future! Your feedback will inform local energy and climate initiatives.

Purpose: This survey aims to gather feedback from Vergas residents and visitors about concerns regarding extreme weather, infrastructure, environmental impacts and energy use. Your input will help the City of Vergas plan for environmental and energy initiatives over the next five years, ensuring we address community needs and improve resilience.

How It Will Be Used: Responses will inform city planning decisions, including infrastructure improvements, emergency preparedness, and potential energy initiatives. Data will be analyzed separately for city residents and non-city residents to understand differing needs.

You could win! If you'd like to be entered into a drawing to win one of four maple syrup jugs, please include your name and email address or phone number at the end of the survey.

Survey Administration:

The survey was made available via distribution of paper, hard copies at community events and in an online survey tool format. The online survey link and QR code was shared widely at community events and in City communications.

- Maple Syrup Festival – April 12, 2025 (QR codes & paper copies available)
- Throughout April 2025 at City Hall, online, and community locations (churches, coffee shops, local businesses, etc.)
- Sent out via water bills April 2025
- City newsletter in April 2025
- May Spring Youth Event - May 10, 2025

Survey Questions:

1. Residency Status *(Check one)*

☐ Vergas Resident ☐ Non-Resident

2. Age

☐ Under 18 ☐ 19 - 40 ☐ 41- 60 ☐ 61 and over

3. What types of extreme weather are you concerned about impacting Vergas in the next 5 years? *(Check all that apply)*

☐ Lake water quality ☐ Flooding ☐ Wildfires ☐ Extreme heat
☐ Infrastructure/services (drinking water, heating, electricity, roads) ☐ Not concerned

4. Do you have a backup plan for utility disruptions (electricity, water, heating)?

☐ Yes ☐ No ☐ Not sure ☐ I'd like to learn more about it

5. Has your home or business experienced uncomfortably high or low temperatures recently?

☐ Yes ☐ No ☐ I'd like to learn more about it

6. How do you heat your home? *(Check all that apply)*

☐ Natural Gas ☐ Propane ☐ Electricity ☐ Wood/Pellet Stove
☐ Geothermal ☐ Solar ☐ Other:
_____

7. Would you like to learn about reducing heating/cooling/electricity costs?

☐ 1 (Not interested) ☐ 2 ☐ 3 (Neutral) ☐ 4 ☐ 5 (Very interested)

☐ I'd like to learn more about it

8. Do you support the following in Vergas? *(Scale 1-5: 1 = Not supportive, 5 = Strongly supportive)*

Energy efficiency & environment protection initiatives:
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ I'd like to learn more about it

Solar energy installations:

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ I'd like to learn more about it

Streamlining permits for renewable energy & efficiency upgrades:

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ I'd like to learn more about it

Ordinances that protect the natural environment (e.g., water conservation, green space, pollution control (fertilizers)):

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ I'd like to learn more about it

9. If you are interested in getting involved with the Vergas Community Resilience & Energy initiatives, please include your name and email or phone number here:

_____

10. Additional Comments (Optional)

_____

_____

_____

11. Enter your name and email address or phone number to be entered into a drawing to win one of four maple syrup jugs:

_____

Survey Analysis

Overview

The survey collected 91 responses with strong resident participation (35 residents, 56 non-residents), providing a solid foundation for community-focused planning, but more efforts could be led to reach more residents of Vergas. The resident demographic skews older, with 82.4% over age 40 and 58.2% over 61, indicating an established, eventually engaged older community. A significant non-resident engagement suggests regional collaboration opportunities.

Question-by-Question Analysis

Q1-2: Residency Status & Age

The survey reveals a mature, engaged community with strong event participation but limited young adult representation. This demographic profile has significant implications for program design, communication strategies, and long-term sustainability planning. The older resident base brings stability and event engagement but requires accessible programming approaches and succession planning to ensure initiative continuity. To address the underrepresentation of younger generations, targeted youth engagement strategies should be implemented.

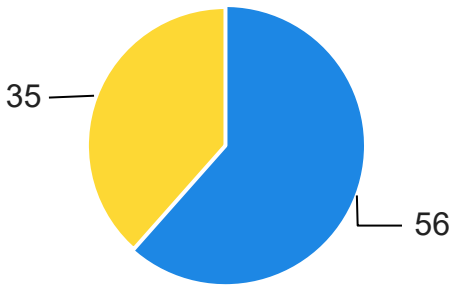
These may include creating a youth advisory committee, partnering with local schools and colleges, hosting youth-focused events or workshops, and leveraging social media platforms like Instagram or TikTok to reach younger audiences. Gamified participation opportunities and public recognition of youth voices can also foster a sense of belonging and investment in community resilience efforts. Building pathways for youth involvement now will ensure continuity, innovation, and intergenerational collaboration in Vergas' long-term planning.

Key Planning Points:

- Design programs with accessibility for older adults (large print, convenient times, multiple formats)
- Develop youth engagement strategies to build long-term program sustainability
- Leverage high event engagement for volunteer leadership and program champions
- Partner with existing senior organizations and established community groups

Residency Status

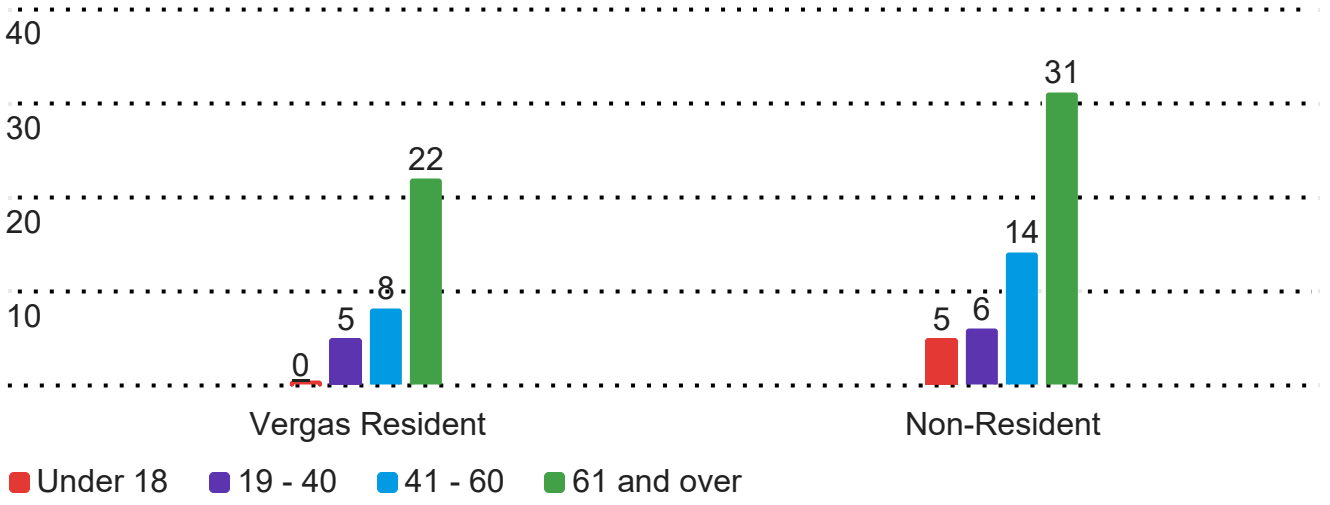
91 Responses



Non-Resident Vergas Resident

Age

91 Responses



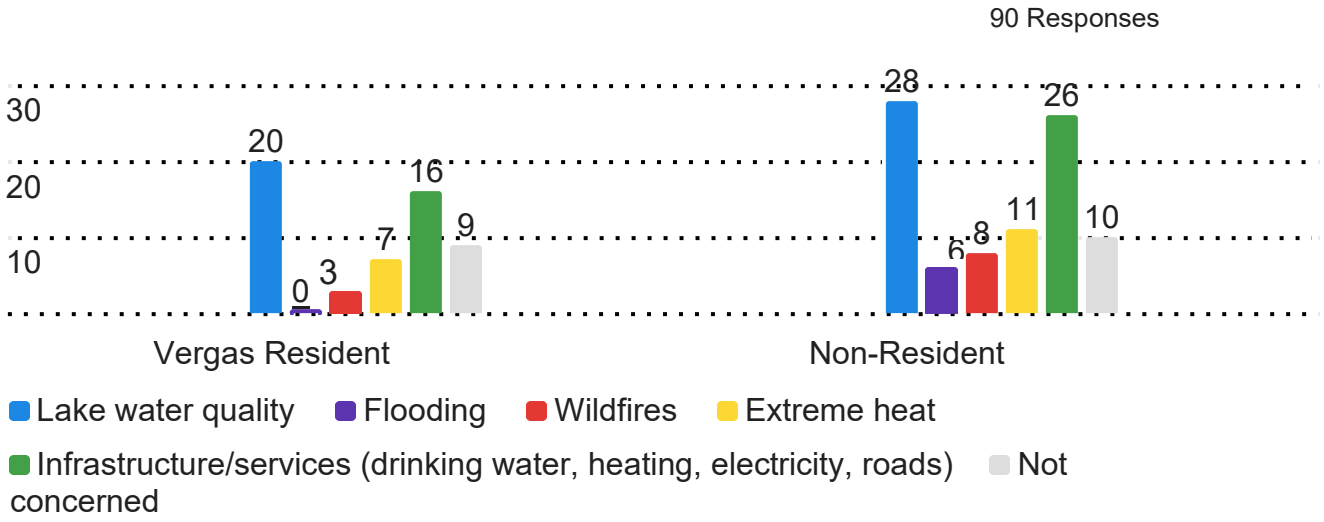
Q3: What types of extreme weather are you concerned about impacting Vergas in the next 5 years? *(Check all that apply)*

The majority of respondents (75% residents and 82% non-residents) were concerned about the impacts of extreme weather events in the next five years. The most significant concerns included the impacts on water quality (57.1% residents and 50.9% non- residents) and infrastructure/services (drinking water, heating, electricity, roads) 45.7% residents and 47.3% non-residents). The majority responses from both residents and non-residents indicate a general awareness and appreciation for the potential impacts on the community's fragile natural resources, critical infrastructure and vital community services.

Key Planning Points:

- Identify the most likely hazards: extreme heat, flooding, drought, severe storms, winter extremes, wildfire smoke.
- Use local and regional climate projections, not just historical data.
- Map vulnerable areas: floodplains, low-lying neighborhoods, heat-island zones, aging infrastructure.
- Use nature-based solutions: green infrastructure, wetlands, urban tree canopy, permeable surfaces.
- Maintain and restore natural areas that buffer floods, heat, and erosion.
- Develop simple, consistent messaging for emergencies before they happen.
- Use multiple channels: text alerts, social media, local radio, community bulletin boards.
- Plan for heat emergencies (cooling centers, hydration access, outreach to seniors and outdoor workers).
- Ensure shelters and emergency services can operate during prolonged or overlapping events.
- Update emergency operations plans to reflect more frequent and intense events.

What types of extreme weather are you concerned about impacting Vergas in the next 5 years?

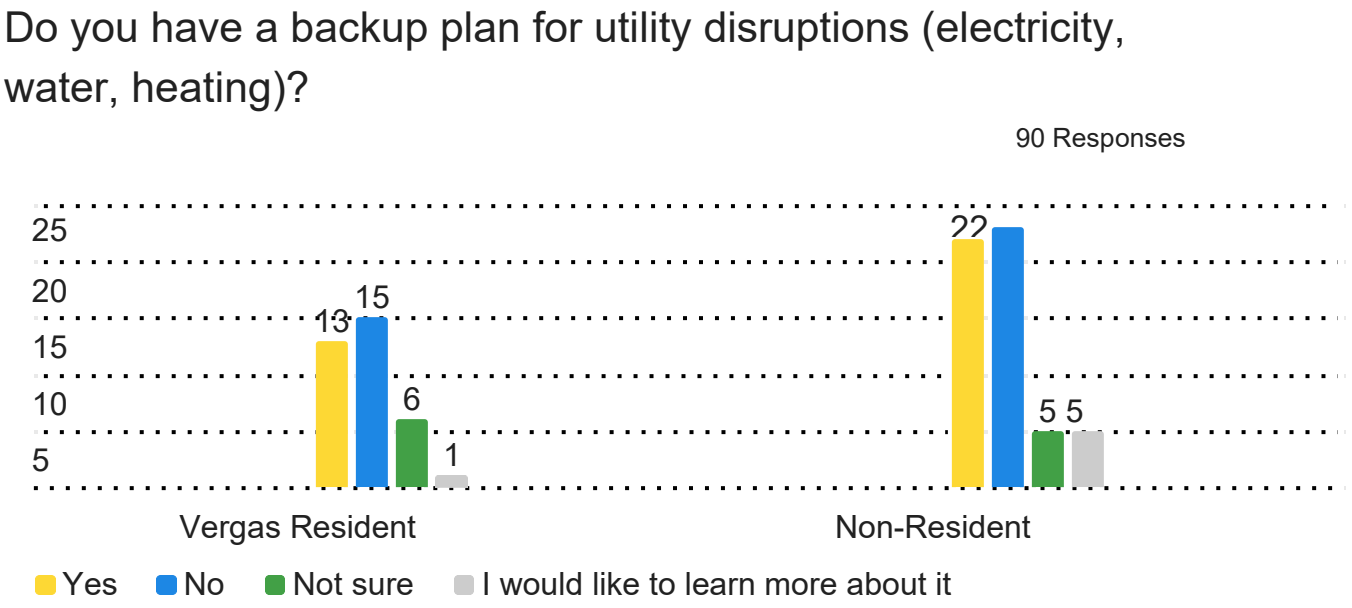


Q4: Do you have a backup plan for utility disruptions (electricity, water, heating)?

A critical disconnect exists between residents' second highest concern (infrastructure disruptions) and their actual preparedness level, with over half unsure or not having utility disruption backup plans. This gap indicates both vulnerability and risk to lack of emergency preparedness where education and resource development.offers an immediate opportunity for high-impact programming to remedy this and create an opportunity for more engagement.

Key Planning Points:

- Launch emergency preparedness education as highest priority initiative
- Develop community-wide backup power and heating strategies
- Create neighborhood-level mutual aid networks for emergencies
- Partner with utilities on system resilience and outage communication
- Establish community emergency shelters with backup systems (event center and Firehall)

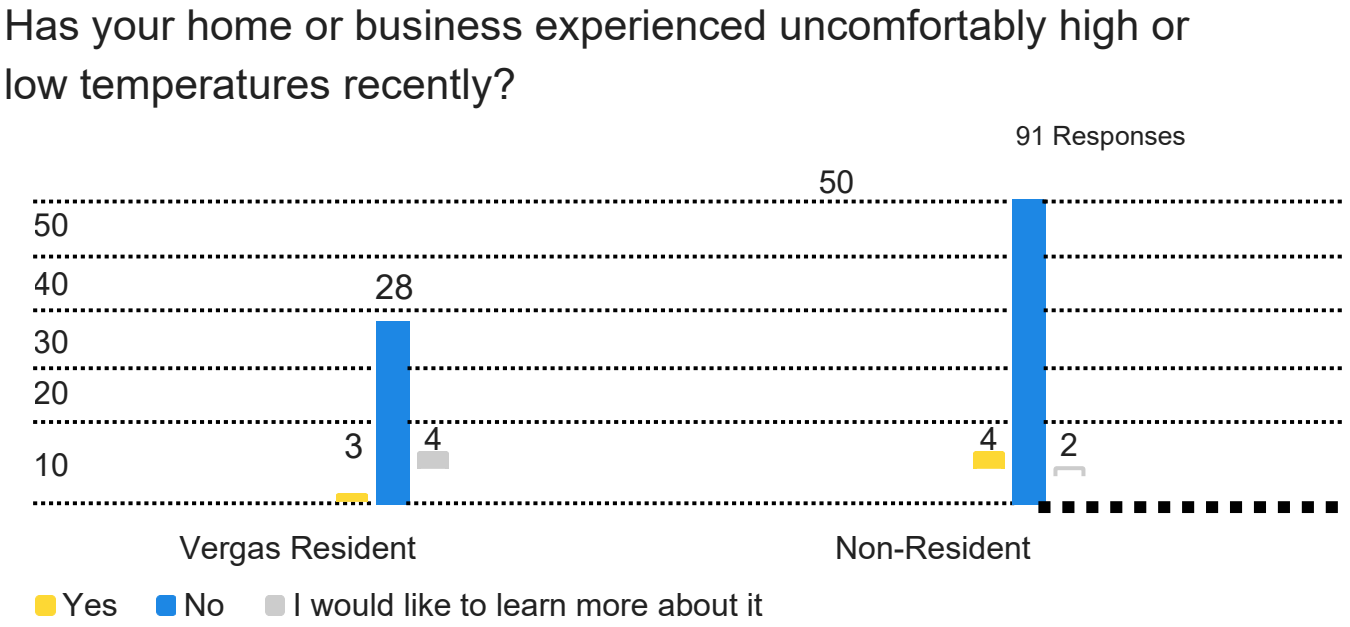


Q5: Has your home or business experienced uncomfortably high or low temperatures recently?

Only 9.7% of Vergas residents reported experiencing uncomfortably high or low home temperatures recently, while an additional 12.9% expressed interest in learning more about the issue. Among non-residents, 7.4% reported discomfort, with 3.7% open to learning more. Although current discomfort levels appear low, the interest in learning more, particularly among residents, highlights an opportunity for proactive outreach and education. This suggests that while thermal discomfort may not yet be widespread, preparedness, energy efficiency, and climate adaptation efforts remain relevant and should target awareness, prevention, and future-proofing homes against more extreme conditions.

Key Planning Points:

- Offer voluntary energy assessments and educational resources on home temperature control
- Develop early outreach and support tools before discomfort becomes more common
- Target interested residents with workshops on weatherization, HVAC options, and insulation
- Collaborate with local contractors and utilities to prepare for scalable efficiency programs
- Track seasonal changes and follow up to monitor if concerns grow during extreme weather events

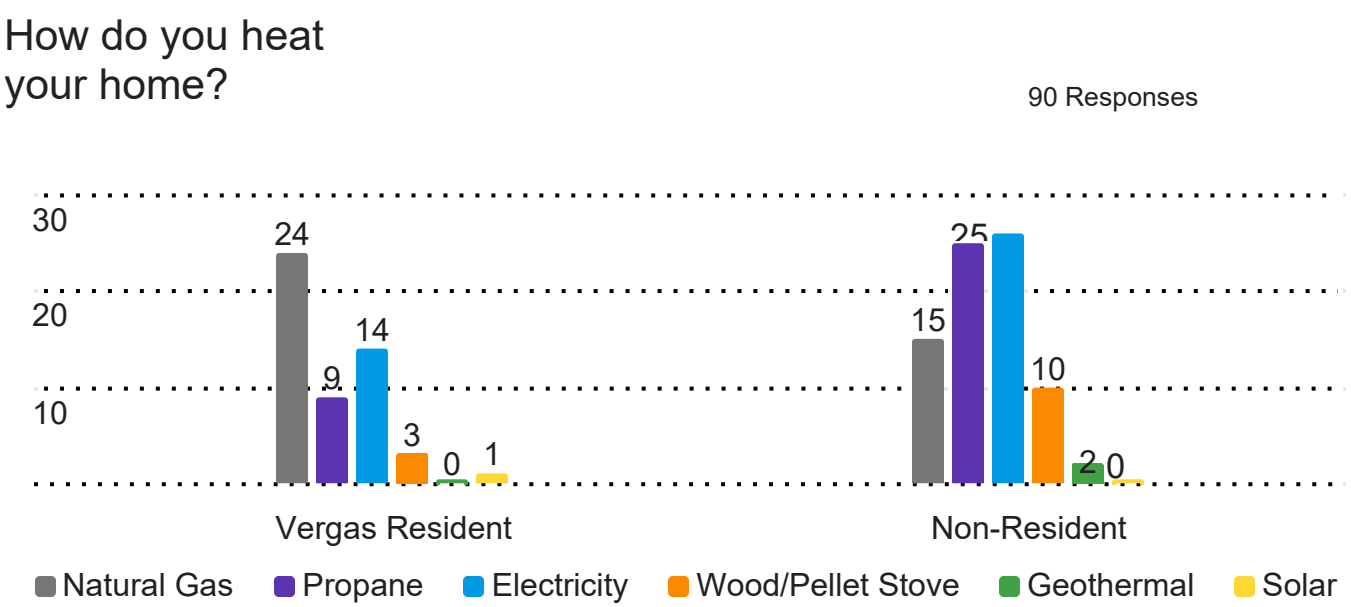


Q6: How do you heat your home? *(Check all that apply)*

Almost 69% of Vergas residents indicated that natural gas is their primary source of heat with 40% indicating that they also use electrical heating sources. The largest percentage of non-residents (47.3) selected electric as their primary source of heat with 45.5% indicating they also use propane.

Key Planning Points:

- Map where natural gas–heated vs. electric-heated homes are concentrated.
- Identify housing types most at risk (older homes, rentals, manufactured housing).
- Identify buildings that can serve as warm-up centers with backup power.
- Coordinate with utilities on restoration priority during cold snaps.
- Encourage weatherization and efficiency upgrades to reduce heating demand.
- Support insulation, air sealing, and window improvements — especially in electric-heated homes.
- Consider incentives for backup heating or resilience upgrades where appropriate.



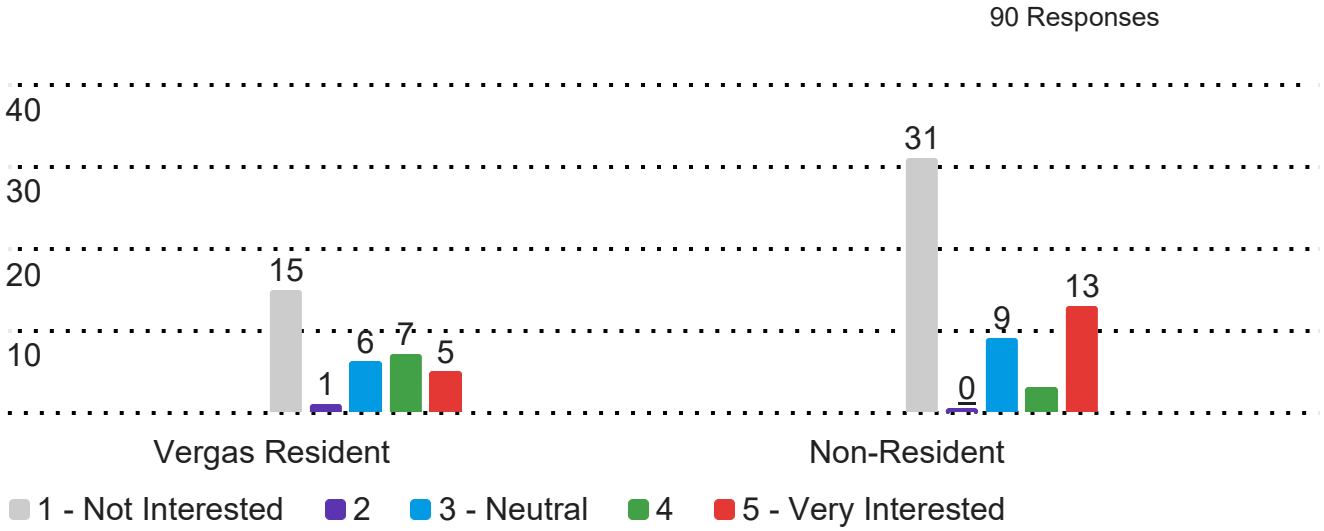
Q7: Would you like to learn about reducing heating/cooling/electricity costs?

Among Vergas residents, 47% (16 of 34) reported low or no interest in learning about reducing heating, cooling, or electricity costs, with 15 not interested and 1 slightly not interested. However, 35% (12 residents) indicated neutral to strong interest, including 6 neutral, 7 slightly interested, and 5 very interested. While overall enthusiasm is moderate, this engaged segment presents a clear opportunity to build momentum. By focusing on residents who are already curious or open to learning, the city can lay the groundwork for broader adoption of energy efficiency practices over time.

Key Planning Points:

- Target outreach to the 35% of residents showing potential interest with personalized, easy-to-understand materials
  Use peer examples and community champions to demonstrate real-life savings and comfort improvements
- Offer small-scale pilot programs (e.g., home energy checkups or rebates) to activate the “curious middle”
- Pair cost-saving messaging with broader resilience goals to increase relevance
- Monitor shifts in interest over time, especially during seasonal utility cost spikes

Would you like to learn about reducing heating/cooling/electricity costs?



Q8: Do you support the following in Vergas? *(Scale 1-5: 1 = Not supportive, 5 = Strongly supportive)*

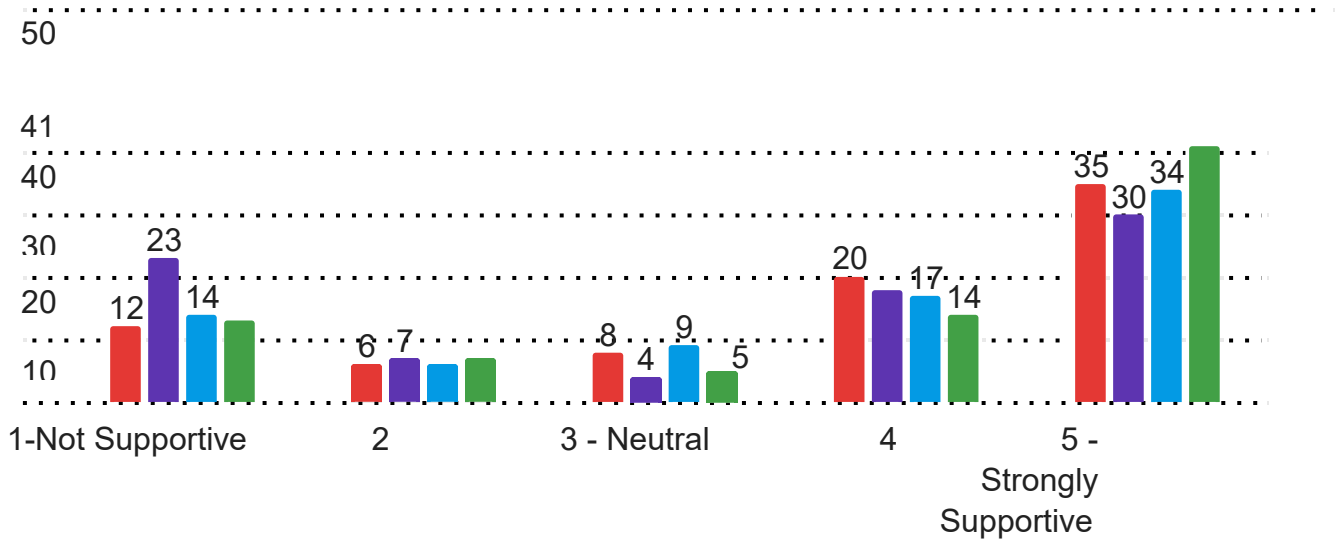
The majority of survey participants reported being in favor of ordinances that protect the natural environment (e.g., water conservation, green space, pollution control), streamlining permits for renewable energy & efficiency upgrades, and energy efficiency & environment protection initiatives.

Key Planning Points:

- Tie ordinances to local priorities: water quality, flooding, tree loss, energy costs, reliability, or public health.
- Be explicit about what issues the City is trying to solve (e.g., runoff into a local lake, high winter heating bills).
- Avoid abstract language if it risks resistance; focus on stewardship, resilience, and cost savings.
- Align environmental protections with existing comprehensive plans and state requirements.
- Provide plain-language guidance for developers, contractors, and homeowners.
- Offer templates, checklists, or example projects.

Do you support the following in Vergas? (Scale 1-5: 1=Not Supportive, 5=Strongly Supportive

82 Responses



Energy efficiency & Environment protection initiatives:

Solar energy installations:

Streamlining permits for renewable energy & efficiency upgrades:

Ordinances that protect the natural environment (e.g., water conservation, green space, pollution control (fertilizers))

APPENDIX G

MnSEIA

Minnesota Solar Energy Industries Association

We Move Minnesota Solar + Storage Forward

Does Solar Energy Work in Minnesota?

When you think of solar energy, you may first think of sunny places like California. But did you know that Minnesota ranks 16th in the nation for installed solar capacity? Despite our infamous winters, the Land of 10,000 Lakes is a great place for solar and produces plenty of it.

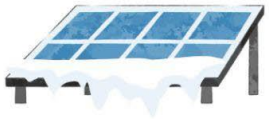
Q: Does Solar Work in Cold Weather and Climates?

A: Yes! Minnesota's cold and snowy weather does not prevent solar panels from using the sun's rays to produce energy. In fact, colder temperatures actually help improve the solar system's efficiency. Hot temperatures can overheat the systems, lowering their efficiency and capturing less energy. Solar exists in cold climates around the world - from Canada and Alaska to Norway and Germany!

Q: Will Snowfall Prevent Solar Production?

A: No! In general, snowfall will not stop solar energy production. When a light snowfall occurs, sun rays can penetrate through the snow onto the panels. During cold clear days, the extra layer of snow on the panels actually acts as a mirror. It reflects sunlight onto the panels and leads to increased energy production.

The tilted angle of most panels allows snow to easily slide off and requires little maintenance. When a heavy snowfall occurs, gently brushing off the panels is helpful to keep producing energy.



Q: What Happens to Solar Production on Short Winter Days?

A: During winter, Minnesota experiences reduced hours of sunlight a day. Although this does decrease the amount of time a solar panel is working at full efficiency, the amount of sunlight available in Minnesota is more than enough to make it worth the while. Adding energy storage will make the solar array even more efficient. Batteries store excess energy from when it's sunny to deploy later at night or when it's cloudy.

Q: Why is This Important?

A: Solar is an important industry in Minnesota and misconceptions hurt local businesses and workers. There's plenty of sunshine in Minnesota to provide clean energy across the state; creating family-sustaining jobs, making our grid more resilient to winter storms, and more.

5,000 jobs
Solar Installer is the fastest growing job in the U.S

1.7 GWs
Of solar - Enough to power over 230k homes!

$2.5 BN
Solar investment in the state

#16 in the U.S
For installed solar capacity

www.MnSEIA.org

APPENDIX H

City of Vergas Building and Solar Analysis Griffin Peck, West Central Initiative

Building Analysis

City of Vergas Community and Event Center: 23,200 kWh/ year

City of Vergas Community and Event Center: Cost: $3,662 ($1,700 Energy KWH charges)

Rate Analysis

City of Vergas Community and Event Center Rate

Schedule: General Service: Summer: $0.04644

Winter: $0.05272 Average rate with monthly

energy adjustments: $0.07619 **Solar Analysis**

24 kWDC / 19 kWAC Nameplate

Capacity Total Cost: $66,000

Incentives

Otter Tail Power POP

Rebate: $33,250 IRS

30% ITC Base credit:

$19,800

IRS 10% ITC Made in America Adder: $6,600

(Planned) WCI Gap

Grant: $4,146 Total Incentives:

$63,796

Balance after incentives: ($2,204)

Annual Energy Savings:

$2,200 Cashflow Positive:

12 months.

Vergas Community Event Center Solar Array Cashflow									
	Energy		Incentive	Tax Savings (Elective Pay IRA)			Finance	Cash Flow	Benefit
Year	Export Payment	Electric Bill Savings	Ottertail Incentive	Federal Tax Credit (30%)	10% Made in America Adder	Gap Funding	WCI Muni Solar Loan	Annual Cash Flow	Cumulative Investment
2025			33,250	19,800	6,600	$ 4,146	$ (66,000)	$ (2,204)	
2026	$ 1,369	$ 835						$ 2,204	$ (0)
2027	$ 1,362	$ 830						$ 2,192	$ 2,191
2028	$ 1,374	$ 838						$ 2,212	$ 4,404
2029	$ 1,387	$ 846						$ 2,233	$ 6,636
2030	$ 1,400	$ 854						$ 2,253	$ 8,890
2031	$ 1,413	$ 861						$ 2,274	$ 11,164
2032	$ 1,426	$ 869						$ 2,295	$ 13,459
2033	$ 1,439	$ 877						$ 2,316	$ 15,775
2034	$ 1,452	$ 885						$ 2,337	$ 18,112
2035	$ 1,465	$ 893						$ 2,358	$ 20,470
2036	$ 1,478	$ 901						$ 2,380	$ 22,850
2037	$ 1,492	$ 909						$ 2,401	$ 25,251
2038	$ 1,505	$ 918						$ 2,422	$ 27,673
2039	$ 1,518	$ 926						$ 2,444	$ 30,117
2040	$ 1,532	$ 934						$ 2,466	$ 32,583
2041	$ 1,545	$ 942						$ 2,488	$ 35,071
2042	$ 1,559	$ 951						$ 2,510	$ 37,580
2043	$ 1,573	$ 959						$ 2,532	$ 40,112
2044	$ 1,586	$ 967						$ 2,554	$ 42,666
2045	$ 1,600	$ 976						$ 2,576	$ 45,242
2046	$ 1,614	$ 984						$ 2,598	$ 47,840
2047	$ 1,628	$ 993						$ 2,621	$ 50,461
2048	$ 1,642	$ 1,001						$ 2,643	$ 53,104
2049	$ 1,656	$ 1,010						$ 2,666	$ 55,770
2050	$ 1,670	$ 1,018						$ 2,688	$ 58,459
2051	$ 1,684	$ 1,027						$ 2,711	$ 61,170
2052	$ 1,698	$ 1,036						$ 2,734	$ 63,904
2053	$ 1,713	$ 1,044						$ 2,757	$ 66,661
2054	$ 1,727	$ 1,053						$ 2,780	$ 69,441
2055	$ 1,741	$ 1,062						$ 2,803	$ 72,244

On Site Energy Value Composition				
Year	Module Rating	Energy Production	kWh Cost	Energy Value
1	100%	10,955	0.07619	$ 835
2	98%	10,736	0.07733	$ 830
3	97.45%	10,676	0.07849	$ 838
4	96.90%	10,615	0.07967	$ 846
5	96.35%	10,555	0.08087	$ 854
6	95.80%	10,495	0.08208	$ 861
7	95.25%	10,435	0.08331	$ 869
8	94.70%	10,374	0.08456	$ 877
9	94.15%	10,314	0.08583	$ 885
10	93.60%	10,254	0.08711	$ 893
11	93.05%	10,194	0.08842	$ 901
12	92.50%	10,133	0.08975	$ 909
13	91.95%	10,073	0.09109	$ 918
14	91.40%	10,013	0.09246	$ 926
15	90.85%	9,953	0.09385	$ 934
16	90.30%	9,892	0.09526	$ 942
17	89.75%	9,832	0.09668	$ 951
18	89.20%	9,772	0.09813	$ 959
19	88.65%	9,712	0.09961	$ 967
20	88.10%	9,651	0.10110	$ 976
21	87.55%	9,591	0.10262	$ 984
22	87%	9,531	0.10416	$ 993
23	86.45%	9,471	0.10572	$ 1,001
24	85.90%	9,410	0.10730	$ 1,010
25	85.35%	9,350	0.10891	$ 1,018
26	84.80%	9,290	0.11055	$ 1,027
27	84.25%	9,230	0.11221	$ 1,036
28	83.70%	9,169	0.11389	$ 1,044
29	83.15%	9,109	0.11560	$ 1,053
30	82.60%	9,049	0.11733	$ 1,062

Export Energy Value Composition				
Year	Module Rating	Energy Production	kWh Cost	Energy Value
1	100%	16,433	0.08330	$ 1,369
2	98%	16,104	0.08455	$ 1,362
3	97.45%	16,014	0.08582	$ 1,374
4	96.90%	15,924	0.08711	$ 1,387
5	96.35%	15,833	0.08841	$ 1,400
6	95.80%	15,743	0.08974	$ 1,413
7	95.25%	15,652	0.09108	$ 1,426
8	94.70%	15,562	0.09245	$ 1,439
9	94.15%	15,472	0.09384	$ 1,452
10	93.60%	15,381	0.09524	$ 1,465
11	93.05%	15,291	0.09667	$ 1,478
12	92.50%	15,201	0.09812	$ 1,492
13	91.95%	15,110	0.09959	$ 1,505
14	91.40%	15,020	0.10109	$ 1,518
15	90.85%	14,929	0.10261	$ 1,532
16	90.30%	14,839	0.10414	$ 1,545
17	89.75%	14,749	0.10571	$ 1,559
18	89.20%	14,658	0.10729	$ 1,573
19	88.65%	14,568	0.10890	$ 1,586
20	88.10%	14,477	0.11053	$ 1,600
21	87.55%	14,387	0.11219	$ 1,614
22	87%	14,297	0.11388	$ 1,628
23	86.45%	14,206	0.11558	$ 1,642
24	85.90%	14,116	0.11732	$ 1,656
25	85.35%	14,026	0.11908	$ 1,670
26	84.80%	13,935	0.12086	$ 1,684
27	84.25%	13,845	0.12268	$ 1,698
28	83.70%	13,754	0.12452	$ 1,713
29	83.15%	13,664	0.12638	$ 1,727
30	82.60%	13,574	0.12828	$ 1,741

APPENDIX I

Using the Vergas Energy & Resilience Plan to Write Grants

This Energy & Resilience Plan can help Vergas' government, citizens, and businesses secure funding for projects. Use data and insights from plans (CIP, Housing study, and Comprehensive Plan) and stories (e.g., [Event]) to craft compelling applications for (Local/State/Federal) grants.

Using an existing city plan is one of the most effective ways to research, justify, and build strong grant applications. Funders want to see that projects are not one-off ideas—they're grounded in community priorities, data, and long-term strategy.

Use the Vergas Energy & Resilience Plan to serve as the primary evidence base to:

- Demonstrate community need and alignment
- Show stakeholder engagement and legitimacy
- Identify ready-to-implement projects
- Provide data, maps, and policy language for proposals
- Connect funding requests to measurable outcomes

The goal is to translate plan priorities into fundable projects with clear scope, partners, budgets, and impact.

Key Grant Development Steps:

1) Identify relevant priority areas

2) Match plan priorities to funding opportunities

3) Extract supporting evidence from the plan

4) Define a grant-ready project

5) Identify partners named in the plan

6) Translate goals into measurable outcomes

7) Use plan alignment as the core narrative

8) Build a reusable grant framework