



Resilient Community White Paper

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Auroros Resilient Communities: Imagine sustainable communities that blend the charm of a walkable downtown with the satisfaction of clean local power, water, and artisanal food production. Imagine families and friends thriving and immersed in a high quality self-sustaining lifestyle. Imagine a community connected to itself by the understanding that it is eliminating harm to the earth while promoting national resiliency and even survivability. Imagine sharing a sense of purpose and reconnecting with the excitement that built America. The time is now.

Vision: Holistic self-sustaining communities that provide an attractive mutually supporting mix of urban village, residential, agricultural, and commercial/industrial modules. Designed for resilience and security, can operate independent of external power and water utilities, minimize dependence on supply chains and long distance commerce, and produce more energy, food and other commodities than they require. Auroros will build 1,000 resilient communities across the nation.

Background: There is an emerging movement to create sustainable communities, and even “agri-hoods”. Some are developed from scratch as a master plan, others are retrofit projects. They typically are upscale and have simply added green construction materials and swapped the golf course for limited or ornamental agriculture production. These sustainable communities cannot function as stand-alone islands, they rely upon the larger infrastructure and long-distance commerce in numerous ways. Dependence on external electricity and water supplies is a consistent risk.

The United States electrical grid is a vast just-in-time machine that requires constant load balancing; it is not designed to sustain significant disruptions. Although one regional subcomponent can cause a region to fail; there are threats to the entire grid itself. Ice storms and hurricanes are well known threats to regional power supplies, but the United States is not prepared for extreme solar flares causing geomagnetic disturbances outside the operating range of the power network, or intentional cyber, electromagnetic pulse, or physical attacks.

There is emerging awareness of this overall risk and the federal government, state governments, and industry are slowly awakening to it. See: <https://obamawhitehouse.archives.gov/the-press-office/2016/10/13/executive-order-coordinating-efforts-prepare-nation-space-weather-events>. Regardless of their awareness, the vulnerability remains. InfraGard, an FBI-industry partnership, has formed the Electromagnetic Pulse Special Interest Group (EMP-SIG) focused on this issue. This group considers all threats to infrastructure but includes EMP as the worst-case threat. The following paragraph is from their recent book (Powering Through, InfraGard EMP-SIG, 2016, www.empcenter.org).

“As citizens of the United States, our current way of life is dependent on secure and reliable electrical power. If electric power is not available for weeks, months or even a year, then cascading impacts would degrade multiple critical infrastructures -- water supply, wastewater treatments; telecommunications and the internet; food production and delivery; fuel extraction, refining and distribution; financial systems; transportation and traffic controls; emergency services; hospitals and

healthcare; supply chains; and other critical societal processes. Loss of life could be catastrophic. Life itself would change.”

Discussion: Resilient communities differ from sustainable or “green” communities. A sustainable community focuses on limiting environmental impact, and may include consideration for an enhanced quality of life more in touch with land use. Sustainable communities interconnect with the larger economy and are dependent on it and the larger infrastructure grid. For example, they rely on connections to public utilities, electrical power companies, and supplemental supply chains to augment their existence.

Resilient communities incorporate aspects of sustainable communities and add in local survivability. The fundamental purpose for a resilient community is robust human survival and recovery from a large scale or nation-wide catastrophic event. This requires the ability to maintain the operational goals of the community when interaction outside the community is unreliable, unsafe, or not possible. Thus, incorporating local sustainability is an intrinsic requirement.

Every resilient community will be unique but share common characteristics. There must be consideration of its resilient objectives and priorities, or purpose. Solid consideration of sustainable and resilient capability interdependencies must be accomplished in order to avoid costly rework by over-emphasis on one capability before adequate consideration of capability interdependencies. Common oversights include a premature focus on electrical power without calculating the actual loads required by other critical capabilities such as water supply or communications/data center needs, or overlooking a particular category of infrastructure risk.

Approach: Design and completion of a resilient community is more akin to establishing a resort island development, remote trading post or expeditionary military logistics station than typical real estate development. Typical real estate development focuses on a single property type (residential, commercial, industrial), does a market study for the viability of selling or leasing space, and starts construction. A resilient community must do that and more, because its design must provide for ongoing mixed-use continuity after significant or permanent disruption of external infrastructure. A review of strategic, operational, business, and population requirements is essential. This then simplifies and disciplines the job of prioritizing and adequately addressing capability interdependencies, and integrated budgeting and scheduling. In essence, a portfolio management approach is required. This approach is akin to integrating enterprise technology portfolios. To address the scale of risk facing the entire electrical grid today, a top down federal solution is not practicable. The solution will happen one community at a time, as they evolve into becoming “loosely-coupled” to the grid, creating a fabric of resilience parallel to the grid. See this video for an excellent overview of our vulnerability by the Electric Infrastructure Security Council: <http://www.eiscouncil.com/Video>.

The below table illustrates the flow of information to be considered when contemplating a Resilient Community or a resilient upgrade.



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Resilient Community Planning Assessment Information		
Strategic Plan	Vision Statement	
	Mission Statement	
	Strategic Goals	
	List of known Strategic Risks and Issues	
Operations	Annual Operational Objectives	
	List of Known risks and issues	
Business Requirements	List of organizational departments	
	Description of business operations per department	
	Performance measures per department	
	Performance measure per business requirement	
	Identify the organization's key business areas (Levels 1, 2)	
	Identify Core Business "Secret Sauce" zones	
	Determine availability of Organization SMEs	
	Identify key Stakeholders (Levels 1, 2)	
	Determine availability of departmental known risks/organization's concerns	
Determine availability of design and as-built documentation		
Resilience Components of Interest	Tier 1 Core Services	Legal Governance
		Societal Fundamentals
		Alternate Electrical Power
		Electrical Power Storage Services
		Passive Solar
		Water
		Food
		Physical Security
		Buildings/Shelter
	Tier 2 Core Services	Communications and Information Technology
		Transportation
		Fuel
		Waste Water
		Housing
		Work/Office/Conference Space
		Emergency Services
		Medical Services
		Agriculture
	Tier 3 Core Services	Contracting and Commerce
		Retail
		Hotel/Restaurant
		Industrial
		Maintenance/Repair
		Disaster Refugee Shelter (tier is dependent on site situation)

Regardless of the resilience components of interest, consideration must be made for legal governance and societal fundamentals. Local government must be prepared and citizens not become overwhelmed. Our civilization has good models to achieve this. Successful sports teams prepare by starting with individuals while having an organizational understanding of how their future roles fit together dynamically. Individuals are trained with certain fundamental skills and decision-making abilities, and they achieve mastery before being added to a team. Small groups of players accomplish plays that are part of the larger team approach. Individual and social readiness and coping frameworks can be tuned to each community’s demographics. The easiest path to readiness is to “practice in real life” by living and working within a resilient community.

Professional sports teams understand how to be ready and stay ready. Likewise, communities across the nation can begin with attention to fundamental individual citizen skills and preparations, followed by household level activity, then street and neighborhood, local businesses, and on up to town, city, and state levels. Without individual preparations and skills, no entire system can succeed. Resilient infrastructure provides the framework for their success.

Vulnerability considerations (“Powering Through”, 2016): Any resilient community must provide protection against known vulnerability. An overview of infrastructure vulnerabilities is provided below.

Equipment at Risk	EMP	Solar Storm	Cyber	Physical Attack	Radio Frequency Weapons
Transformers	R	R	R – Y	R	R
Generator Stations	R	G	R	R	R
SCADA / Industrial Controls	R	R	R	R	R
Utility Control Centers	R	R	R	R	R
Telecommunications including cell phones	R	R	R	Y	Y
Radio Emergency Communications	R	P	Y	Y	Y
Emergency SATCOM Communications	R	P	Y	Y	Y
Internet	R	R	R	Y	Y
GPS	R	P	Y	Y	Y
Transportation	R	Y	Y	Y	Y
Water	R	Y	R – Y	Y	Y

Legend: **Red** = direct permanent effects. **Yellow** = Cascading effects if no backup power. **Pink** = temp. effect (.5- 36 hours) assuming backup power. **Gray** = direct effects uncertain.

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