

Auroros Resilient Facilities: Imagine a secure sustainable facility that provides business continuity during a catastrophic crisis that disables and eliminates the competition. Imagine your business survives with an ability to maintain its core business operations and emerges from the crisis with market share control.

Vision: Holistic self-sustaining facilities 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 and other commodities than they require. Auroros will build 1,000 resilient facilities and communities across the nation.

Background: There is an emerging movement to leverage energy independence and corresponding efficiencies and savings. Much of this is tied to the rise of price competitive solar power and onsite microgrids. Some are developed from scratch as a facility or campus master plan, others are retrofit projects. However, these emerging solar and wind-powered facilities remain vulnerable to certain infrastructure threats, remain deeply dependent on the broader offsite infrastructure and have no resilience plan for widespread sustained infrastructure disruption, failure, and disappearance. Dependence on external electricity connections 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 facilities differ from sustainable or “green” facilities. A sustainable facility focuses on limiting environmental impact, and may include consideration for an enhanced workspace quality of more in touch with land use. Sustainable facilities 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 facilities incorporate aspects of sustainable facilities and add in local survivability. The fundamental purpose for a resilient facilities is robust business survival and recovery from a large scale or nation-wide catastrophic event. This requires the ability to maintain the operational goals of the facility when interaction outside the facility is unreliable, unsafe, or not possible. Thus, incorporating local sustainability is an intrinsic requirement.

Every resilient facility 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 facility 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 facility must do that and more, because its design must provide for ongoing continuity after significant or permanent disruption of external infrastructure. A review of strategic, operational, business, and workforce 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 facility 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 Facility or a resilient upgrade.

Resilient Facility 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 to support the workforce. 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 facility’s requirements. The easiest path to readiness is to “practice in real life” by working within a resilient facility.

Professional sports teams understand how to be ready and stay ready. Likewise, facilities across the nation can begin with attention to fundamental resilience workforce skills and preparations, followed by local onsite department level activity, higher levels until each facility and partner facilities can demonstrate readiness. 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 facility 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.

Start now: Join the movement. Contact Auroros for a free intake discussion or to explore investment opportunities: Contact@aurorosinc.com.