Power generation for hospitals

The trend toward electrification places higher pressure on on-site generation to achieve resiliency.

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Hospitals are expected to function 24/7 even during:

- Longer, more frequent grid outages
- Public Safety Power Shutoff (PSPS) events
- Extreme weather events, seismic events, and regional fuel disruptions

This pressure is shifting hospitals toward layered power strategies reinforced by increased clinical dependency on power-intensive technologies, trends to fully electrify operations, and heightened scrutiny of air quality and emissions

This guide is written for **healthcare executives, facilities leaders,** and **capital planning teams** navigating these realities. It focuses on on-site power generation options that support clinical operations during grid disruptions and enables hospitals to evolve their energy continuity strategies responsibly over time.

Why microgrid adoption is now possible for hospitals

The Centers for Medicare & Medicaid Services (CMS) has issued a waiver that enables qualified facilities to use a healthcare microgrid system under new code pathways, but alignment with Authorities Having Jurisdiction (AHJs) remains essential.

This signals a clear shift.

Hospitals are no longer limited to “diesel only” thinking when planning compliant emergency power strategies.

Many of Salas O’Brien’s experts are working with governing bodies and AHJs on these advances.

Microgrid: the organizing concept

In healthcare, a microgrid is not a single technology.

A microgrid is a control framework that allows multiple on-site power sources to operate together, isolate from the grid, and prioritize critical loads.

Microgrids do not replace emergency power systems or eliminate generators. They synchronize and combine energy from generators, batteries, combined heat and power (CHP) systems, fuel cells, and renewables such as solar PV and wind.

The objective is layered resilience — designing a system where each asset performs the role it is best suited to perform. This approach enables:

- Greater operational control
- Phased implementation
- Flexibility as technologies and regulations evolve
- Clinical continuity without compromising compliance

How the pieces work together

Each technology plays a specific role in maintaining reliable power across different timelines.

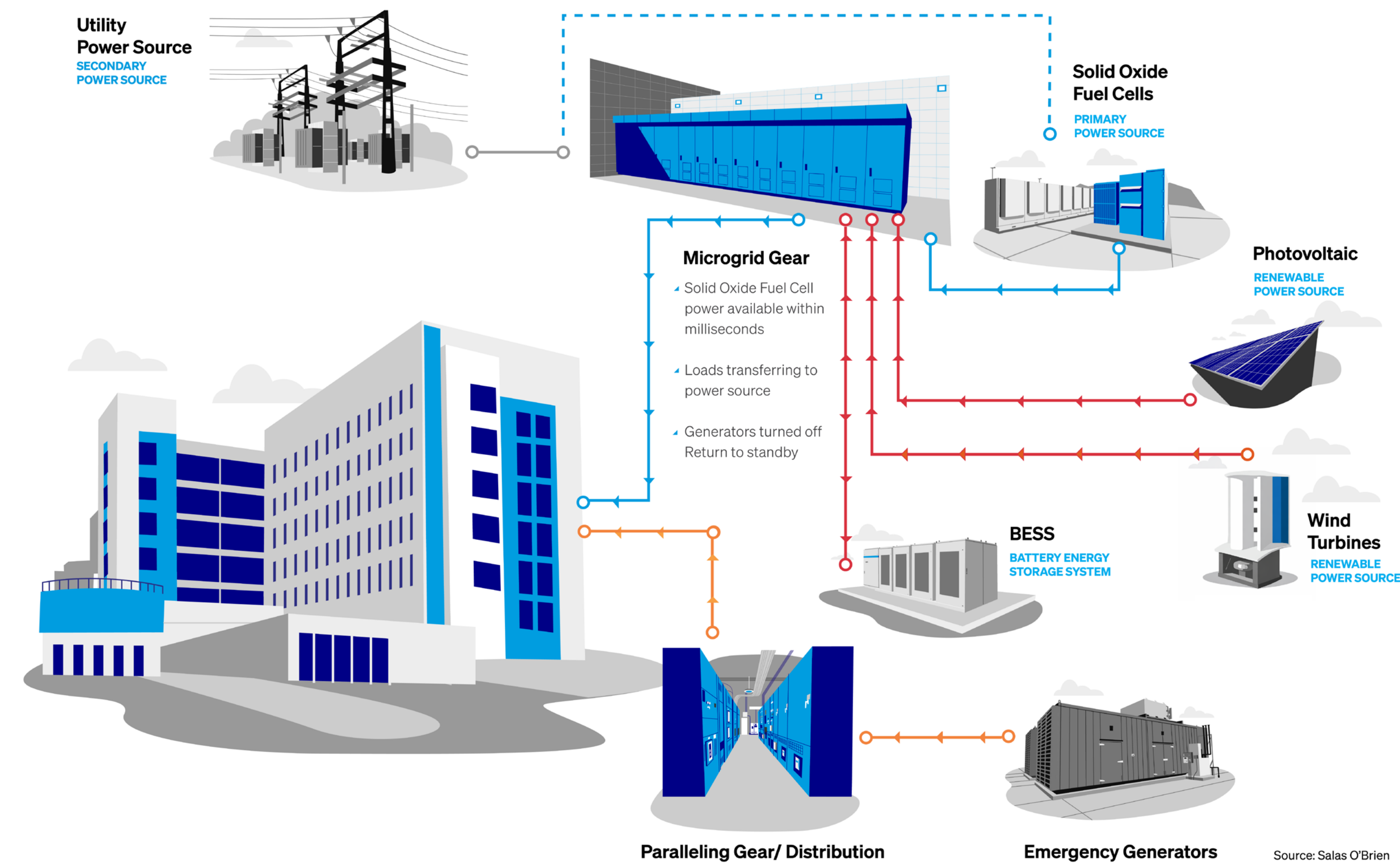
Microgrid controls. Orchestrate assets, manage transitions, and prioritize clinical loads

Battery Energy Storage (BESS). Instant ride through, power quality support, and seamless transitions for clinical systems

Fuel Cells. Steady backbone generation that reduces reliance on stored fuel and can provide useful thermal energy

Generators (diesel or natural gas). Code required essential power providing contingency coverage

Renewables (where feasible). Low carbon supplemental generation from renewable energy sources.



Source: Salas O’Brien

What happens during a grid outage in a microgrid-enabled hospital?

FIRST SECONDS — STABILIZATION

The microgrid controller detects the disturbance and isolates the hospital from the grid. Battery storage or UPS systems maintain voltage and frequency across the campus during this transition protecting sensitive equipment while other generation assets come online.

FIRST MINUTE — EMERGENCY POWER

Emergency generators begin their automatic startup sequence. Under healthcare codes such as NFPA 110 and CSA Z32, the emergency power system must restore power to life-safety and critical branches within 10 seconds.

EXTENDED OUTAGE — SUSTAINED ISLANDED OPERATIONS

During longer grid disruptions, the microgrid operates independently. Fuel cells can provide steady base generation, batteries smooth out short-term fluctuations, and generators provide deep resilience. Facilities teams can also shed non-critical loads or shift loads to extend fuel availability and maintain clinical operations.

Real-world experience

One of Salas O’Brien’s hospital clients in California learned about an extended outage days after the fact.

The microgrid and on-site power generation we designed had already carried the hospital through the event without the experience of even a flicker.

Curious if you could achieve the same? Reach out to: healthcare@salasobrien.com

Power generation strategies are system decisions.

There is no single right answer for a hospital's power and resilience strategy. This comparison explores the practical advantages and constraints of each option to support layered and evolving approaches.

Comparative matrix of on-site power generation options for hospitals

SOURCE	TYPICAL ROLE IN HOSPITALS	OPERATIONAL CONTINUITY	CARBON PROFILE	KEY ADVANTAGES	KEY CONSTRAINTS
DIESEL GENERATORS	Code-required emergency power	Very high	↑	Universally accepted proven technology	Fuel logistics; air quality; maintenance burden
NATURAL GAS reciprocating generators	Backup or supplemental power	High	↑	No onsite fuel storage; fast start	Emissions, fuel dependency, & maintenance cycle
FUEL CELLS natural gas or RNG	Baseload resilience; critical support	High	—	Scalable, quiet, high effeciency output; zero carbon wiht RNG	Fuel supply dependency; NG increases carbon
FUEL CELLS hydrogen	On-site low-carbon where fuel is available	High	↓	Zero local emissions	Fuel availability; infrastructure maturity
BESS battery energy storage	Ride-through and transition stability	High (short duration)	Not applicable	Instant response; protects clinical continuity	Limited duration; safety planning
SOLAR photovoltaic	Supplemental	Low alone	↓	Reduces grid reliance; zero carbon	Intermittency & placement requirements
WIND TURBINES small	Supplemental	Low alone	↓	Onsite renewable generation; zero carbon	Intermittency; siting contraints; noise
CHP combined heat & power	Resilience; thermal energy	High	Reduced	Continuous operation; steam / hot water	Capital cost; thermal load dependence
NUCLEAR SMR	Future on-site baseload option	Designed for continuous operation	↓	Reliable power with zero carbon	Likely not commercially available until 2035

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What drives hospital power decisions?

Hospital power decisions are shaped by a combination of clinical, regulatory, and operational realities - including cost and protection from downtime.

WHAT DRIVES THE DECISION

Clinical continuity dominates, while code frameworks establish the baseline. Beyond compliance, hospitals prioritize systems that are defensible during inspections, provide reliable fuel during extended outages, and can be deployed within occupied care environments where construction and commissioning must work around ongoing patient care.

WHERE STRATEGIES BREAK DOWN

Generators meet compliance requirements but do little to address extended outages beyond 96 hours. Grid improvements are underway, but slow. Transmission upgrades and utility hardening often lag hospital needs. Decarbonization is frequently treated as a future-only problem, which raises costs and limits options later. When power decisions are pushed to the end of master planning, flexibility shrinks and operational risk increases.

WHAT WORKS IN PRACTICE

Successful programs treat power as clinical infrastructure, planning for layered resilience, phased transition, and early coordination with AHJs and utilities. In some cases, creative funding strategies can help owners realize these benefits sooner. We can help.

How Salas O'Brien can help

We can help you build predictable, defensible, clinically aligned power systems that can operate through uncertainty.

To begin a conversation about resilient on-site power strategy reach out to:

healthcare@salasobrien.com