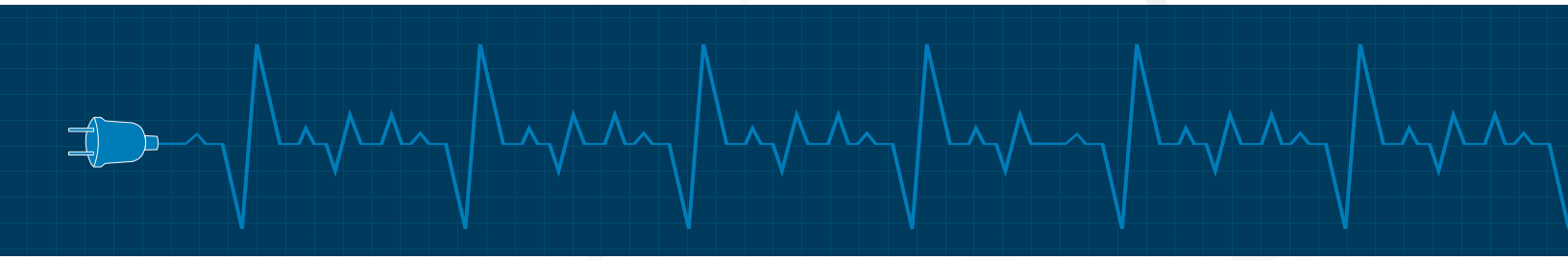
A Comprehensive Guide to Backup Power for Hospitals



PowerSecure



In healthcare, reliable power is non-negotiable. Hospitals depend on consistent and immediate energy sources to safeguard patient care, power life-saving equipment, and maintain critical operations during unexpected and extended outages. However, aging healthcare infrastructure often falls short of meeting these power demands, making reliable backup power solutions a top priority for hospitals nationwide.

From rural local hospitals to sprawling city complexes, this guide explores the importance of compliant backup power for the wide variety of healthcare facilities in the US.

The Critical Role of Backup Power in Hospitals

Hospitals are mission-critical facilities that cannot afford downtime. Backup power systems bridge the gap during outages, enabling life-saving interventions and supporting critical equipment. Unlike basic generators, **hospital backup power** must comply with stringent regulatory requirements to ensure patient safety, avoid system failures, and maintain uninterrupted care.

A single power outage could compromise patient care, interrupt surgeries or disable critical systems. Many hospitals have an aging electrical infrastructure, so assessing whether their backup power systems meet modern standards is essential. Facilities relying on older generators or insufficient fuel reserves risk delays in restoring power, which could potentially endanger lives.



Wellspan York Hospital
York, Pennsylvania

Understanding The Risk

A risk assessment such as the **EPSS All-hazards Risk Assessment** provides a systematic approach to identifying, assessing and mitigating potential risks to a hospital's power systems. By evaluating both natural and human-made disasters, regular assessments can help hospitals identify vulnerabilities in backup power infrastructure, develop contingency plans, ensure compliance and prioritize upgrades needed to protect patient safety.

> *"Whether you're new or seasoned in the healthcare environment, one of the first things you want to ensure is that you're looking at your life safety systems, and that's generally all tied around your electrical distribution. In healthcare, the most important thing is reliability and power to your facilities. Without power, nothing else in healthcare happens."*
>
> **- Rod Allen**, *System Director of Plant Operations for Lee Memorial Health System*



The Requirements of Backup Power Generators for Hospitals

Numerous compliance regulations ensure reliability and safe hospital backup power. These requirements mandate backup systems to provide effective and immediate energy to critical areas while adhering to legal and operational standards. Key regulatory bodies include:

The Joint Commission (TJC)

Hospitals must test their backup power systems monthly to meet accreditation requirements. These tests ensure generators can operate effectively under emergency conditions and provide an opportunity to identify potential issues before they escalate.

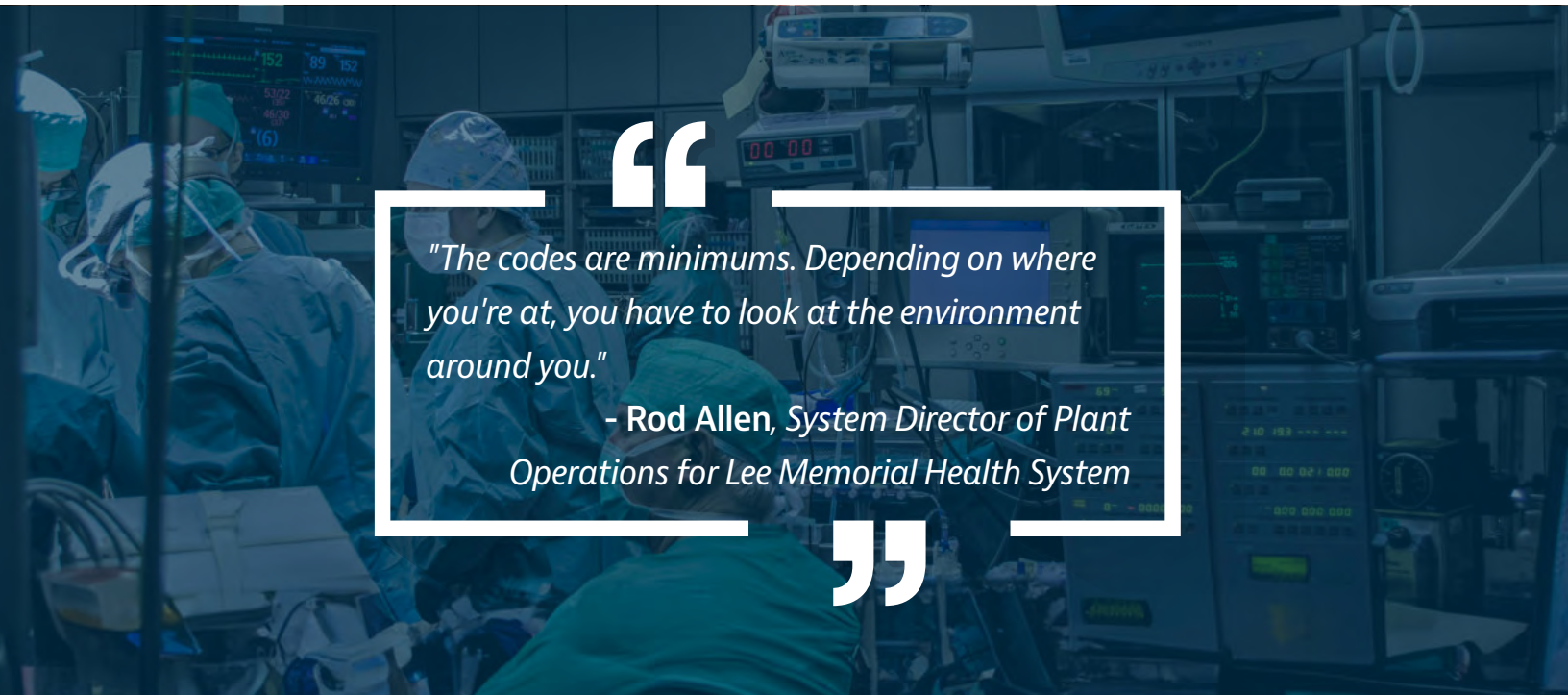
Det Norske Veritas (DNV)

DNV is an accrediting organization that offers an alternative pathway to hospital accreditation while focusing on continuous quality improvement through risk-based assessments. It aligns with ISO 9001 standards and emphasizes operational resilience, including backup power systems.

DNV requires healthcare facilities to assess potential risks to their power systems and ensure compliance with NFPA codes. This includes testing, maintenance, and operational planning for emergencies and backup power systems.

- Hospitals must document contingency plans for power outages and validate their effectiveness through routine drills.
- DNV encourages hospitals to integrate risk management, such as EPSS All-Hazards Risk Assessments, into their emergency preparedness programs to identify vulnerabilities and improve resilience.

Accreditation through DNV ensures that hospitals go beyond compliance, adopting a proactive approach to risk mitigation and emergency planning for backup power.



> *"The codes are minimums. Depending on where you're at, you have to look at the environment around you."*
>
> **- Rod Allen**, *System Director of Plant Operations for Lee Memorial Health System*

National Fire Protection Association (NFPA) Regulations

The NFPA sets backup power reliability, safety, and performance standards. Hospitals must comply with the following NFPA codes:

- **NFPA 70**: National Electric Code (NEC) The NEC outlines best practices for installing, operating, and maintaining electrical systems. It requires power restoration within strict time limits:
  - ***Level 1 systems*** for life support and critical loads: Power restoration must occur within 10 seconds.
  - ***Level 2 systems:*** Power restoration must occur within 60 seconds.

- **NFPA 99:** Health Care Facilities Code NFPA 99 classifies backup power systems based on risk levels. For hospitals, backup power typically falls under Category 1, which addresses situations where power failure could result in serious injury or death.

- **NFPA 101:** Life Safety Code NFPA 101 ensures emergency power is available for life support systems and specifies maintenance, fuel capacity, testing, and documentation requirements to ensure long-term reliability.

- **NFPA 110:** Standard for Emergency and Standby Power Systems NFPA 110 outlines installation, maintenance, and performance criteria for emergency power systems. Risk is categorized into:
  - ***Level 1:*** Backup power failures pose a serious risk to life safety.
  - ***Level 2:*** Backup power failures are unlikely to result in injury.



Hospitals must prioritize Level 1 systems to remain compliant and safeguard patient well-being. Failure to comply with these standards could lead to fines, loss of accreditation, or compromised patient safety.

Hospitals must still comply with NFPA standards, CMS regulations, and the requirements of deemed status organizations like the TJC and the DNV to maintain accreditation and federal funding.



The cover plates for the electrical receptacles or the electrical receptacles themselves supplied from the essential electrical system shall have a distinctive color or marking so as to be readily identifiable. ***NFPA National Electrical Code Article 517***

Understanding Your Points of Failure in Healthcare Energy Infrastructure

What happens when healthcare facilities lose grid power? If you are following the minimum requirements , your emergency systems are covered. However, you might need to cancel surgeries. New trauma events need rerouting. Ultimately, patients lose out, and facilities feel those ripple events long after grid power is restored. Energy infrastructure guidelines recognize that a single point of failure can quickly cascade, disrupting care delivery and jeopardizing accreditation. That is why redundancy, modularity, and intelligent system design are foundational requirements, not optional upgrades.

Why Do Healthcare Energy Standards Emphasize Multiple Points of Failure?

Codes and standards governing healthcare facility design require energy systems to account for multiple points of failure. Facility managers need to plan for the unexpected, like equipment outages, fuel disruptions, and unexpected load changes, all without interrupting clinical operations.

Rather than relying on one centralized asset, modern healthcare facilities are increasingly designed around layered energy strategies that distribute risk across multiple systems. This approach enables facilities to isolate issues and continue operating safely during a grid outage.

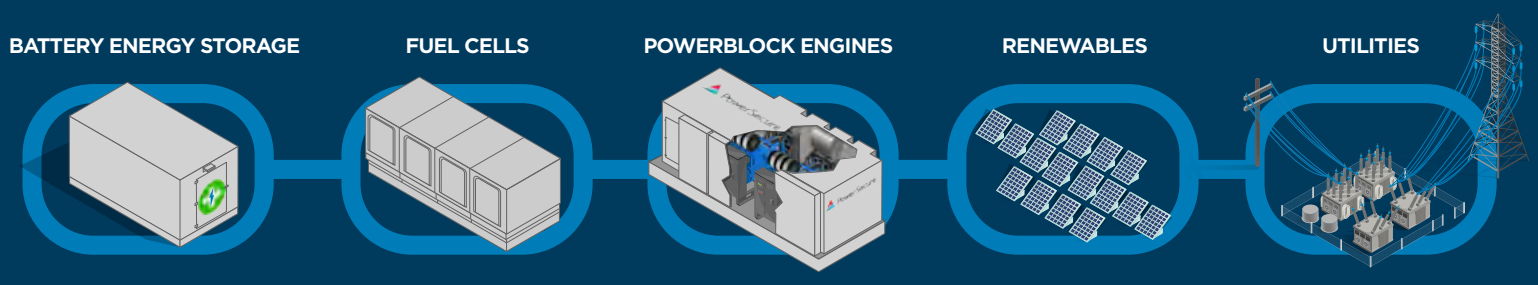
What Multiple Energy Sources Enable Operationally

With multiple energy sources, healthcare facilities gain the resilience they need for operational flexibility.

With a diversified and redundant energy architecture, facilities can:

- Take on new or higher acuity cases without worrying about energy constraints.
- Maintain surgical, imaging, and treatment schedules during outages or peak demand events.
- Expand services and add equipment without overloading existing infrastructure.

This flexibility directly supports long-term growth strategies.



Fan Wall Modularity and Reducing Risk at the Component Level

Fan wall modularity is a clear example of how healthcare facilities can reduce single points of failure at the equipment level. Instead of relying on a single large fan or motor, fan walls use multiple smaller units that operate together.

If one module fails, the system continues to function at a reduced but acceptable capacity. Maintenance can often be performed without shutting down the entire system, which is especially valuable in clinical environments where downtime is not an option.

This modular approach aligns with healthcare reliability standards while also improving maintainability and lifecycle performance.

PowerBlock vs Big Block: A Practical Look at Failure Risk

Similarly, differences between designs like PowerSecure's PowerBlock® and big block generation systems often come down to how risk is distributed.

Big block systems concentrate capacity into a small number of assets. While powerful, they create fewer but more impactful points of failure. If a major component goes offline, facilities lose a significant portion of capacity at once.

PowerBlock architectures distribute capacity across multiple smaller units. This design increases the number of components but reduces the impact of any single failure. Capacity loss is incremental rather than catastrophic, allowing facilities to stay operational while addressing issues.

For healthcare facilities, this distinction matters because continuity of care depends on graceful degradation rather than all-or-nothing performance.

The Cost Value of Staying Compliant Over Time

Compliance with healthcare energy mandates is often viewed purely as a cost. In practice, resilient and redundant energy systems can create measurable financial value.

Facilities that maintain compliance and uptime can:

- Keep more beds filled consistently over time.
- Avoid canceled procedures and rescheduled cases.
- Increase throughput without adding staff or expanding square footage.

Over the long term, these operational gains can offset infrastructure investments while reducing risk exposure. Designing systems that support patient care, operational confidence, and long-term growth is key to healthcare backup power.

Generators and Fuel Sources for Hospital Backup Power

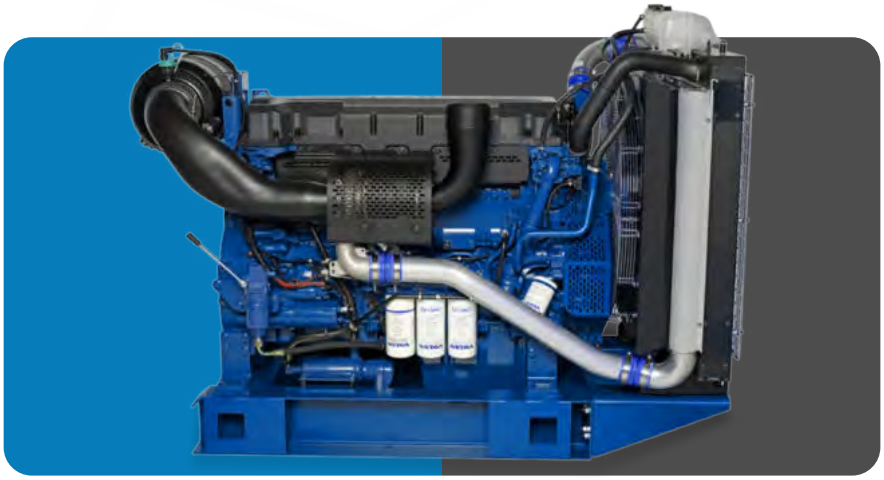
Backup generators for hospitals vary depending on size, energy demands, and risk levels. Solutions typically include:

Generator Types

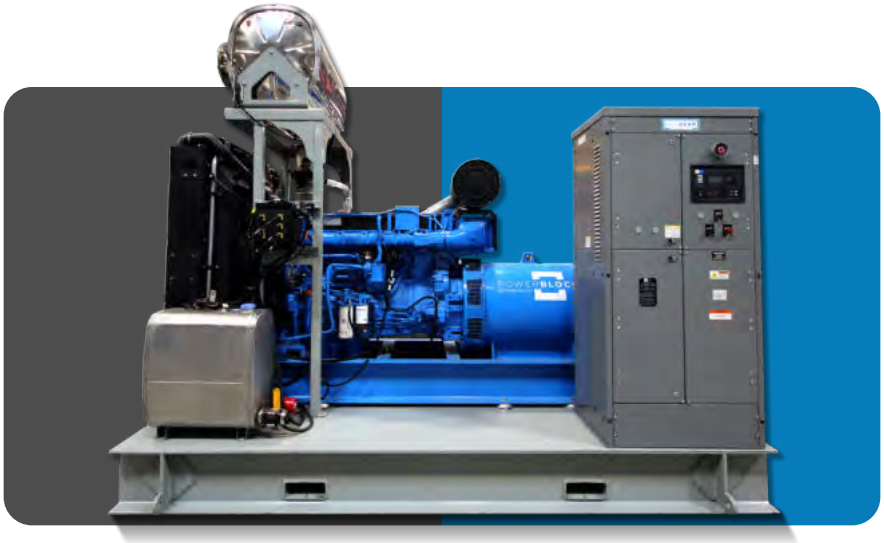
Diesel Generators

Reliable and widely used for hospital backup power, diesel generators offer high energy output and quick startup times. However, they differ in emission standards:

- **Tier 2 Diesel Generators:** These generators meet earlier emissions standards, offering reliable performance but producing higher nitrogen oxides (NOx) and particulate matter (PM). They are often found in aging infrastructure and may require upgrades to meet modern sustainability goals.



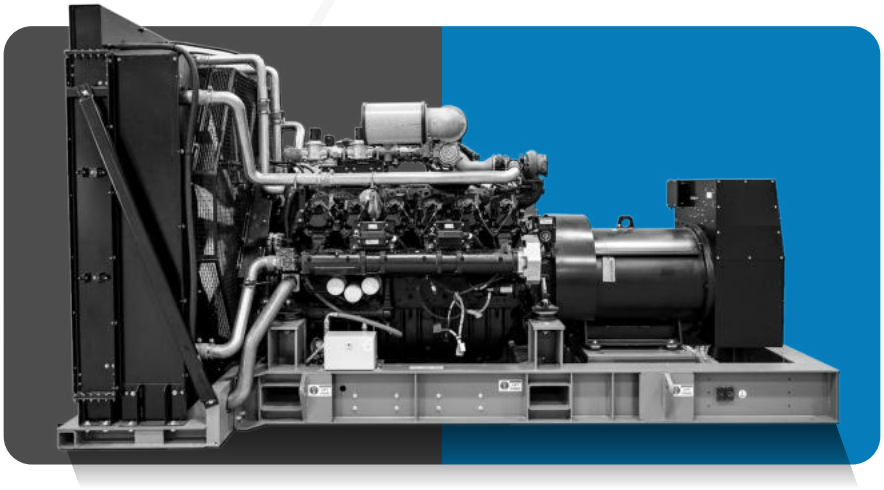
- **Tier 4 Final Diesel Certified Generators:** These generators meet the strictest Environmental Protection Agency (EPA) standards, significantly reducing NOx and PM emissions. Equipped with advanced filtration and exhaust systems, Tier 4 generators provide cleaner power and may allow facilities to participate in utility incentive programs to reduce overall energy cost.



Hospitals can further reduce their environmental impact by using Hydrotreated Vegetable Oil (HVO) as a diesel alternative. HVO is a renewable, low-carbon fuel that improves emissions performance without compromising generator reliability.

Natural Gas Generators

An efficient option for hospitals with existing gas infrastructure. These generators provide cleaner energy but depend on a consistent gas supply, which may be vulnerable during natural disasters or infrastructure disruptions.



Advanced Microgrids

Custom-built solutions combining multiple energy sources (diesel, natural gas, or renewable energy). Advanced microgrids offer flexibility, enhanced reliability, and compliance with sustainability goals.



How Many Generators Does a Hospital Need?

The number of backup generators required depends on a hospital's size, layout, and energy needs. Critical areas such as ICUs, operating rooms, and life support systems must be prioritized to ensure uninterrupted power.

> *"A single generator represents a single point of failure."*
> **- George Baker** *Retired Sr. System Engineer, Wellspan Healthcare Webcast: Aging Infrastructure*

Hospitals should work with experienced providers to assess their energy demands and design systems that meet regulatory and operational requirements. Planning should also account for future expansion, ensuring the system remains scalable and adaptable.

PowerSecure: Ensuring Compliance and Reliability

PowerSecure specializes in providing compliant, resilient backup power solutions for hospitals, including advanced microgrids and custom-built generator systems. With a track record of supporting healthcare facilities across the country, PowerSecure ensures hospitals maintain resilient and compliant energy sources.

24/7 Monitoring and a Dedicated Customer Care Network

PowerSecure's robust monitoring and premier customer care teams continuously monitor the health and function of your microgrid to provide real-time updates and performance insights, ensuring optimal functionality. Our PowerControl® platform and US-based monitoring team work 24/7 to provide proactive maintenance, ensure seamless transitions and easy energy market participation (where available). Should you need support, our premiere customer care team and extensive nationwide maintenance network provide rapid response to support and optimize your solution long after installation.

Tailored Solutions That Fit Your Mission

No two healthcare facilities are alike, and PowerSecure embraces that with modular, scalable energy solutions tailored to each organization's unique needs. Whether you are looking for a turnkey solution or a partner to support installation, PowerSecure collaborates closely with healthcare leaders to design systems that align with their mission and operational priorities. From renewable fuels and battery storage to natural gas and Tier 4 engines, their flexible options help meet emissions goals without compromising reliability. This tailored-fit approach ensures you have the materials and support to fulfill your mission.

Case Studies

- **WellSpan York Hospital Microgrid:** An advanced microgrid system that enhances reliability while reducing energy costs. This system demonstrates how integrated solutions can address both operational and financial challenges.
- **Reid Health:** The installation of a Tier 4 final EPA certified Microgrid by PowerSecure at Reid Health represents a significant stride in enhancing the facility's energy resilience and sustainability.
- **Veterans Integrated Service Network 7:** PowerSecure upgraded five VA facilities with new HVAC, electrical, and water-saving systems, all tailored for each site and minimal disruption.



CASE STUDY
Reid Health Microgrid

Reid Health first opened in 1905 to provide healthcare options in Richmond, Indiana for patients that previously had access only to treatment in their homes. Today Reid Hospital and Health System, a Level III Trauma Center, continues to provide nationally recognized quality and technology with a personal touch to communities in the area.

Take the Next Step in Power Reliability for Hospitals

Aging infrastructure and growing energy demands make compliant backup power essential for hospitals. PowerSecure offers customized solutions to prepare healthcare facilities for emergencies and comply with industry regulations. By investing in robust backup power systems, hospitals can protect patient care, reduce operational risks and align with sustainability goals.

Contact us today to learn more about PowerSecure's hospital backup power solutions.

Empower Your Hospital with Reliable Backup Power



HEADQUARTERS
4068 Stirrup Creek Drive
Durham, NC 27703
919-556-3056
info@powersecure.com

HR INQUIRIES
919-556-3056
careers@powersecure.com