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For Rural Healthcare, Energy Resilience Is Care Continuity

HOW ENERGY AS A SERVICE CAN SUPPORT RESILIENCE, COST PREDICTABILITY, AND CONTINUITY OF CARE

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Why Energy Strategy Belongs in the Rural Healthcare Resilience Plan

In rural healthcare, an outage is not just an inconvenience. It can become a clinical event. Reliable power supports emergency departments, procedure rooms, medication and vaccine refrigeration, HVAC, IT systems, communications, water, and infection control. When those systems are interrupted, the ability to deliver care can be interrupted as well. For critical access hospitals, rural clinics, skilled nursing facilities, and community care hubs, energy resilience is directly tied to patient safety, operational continuity, and community access to care.

Yet rural healthcare leaders often face a difficult reality: the infrastructure needs are real, but the capital and staffing capacity to address them may be limited. Aging buildings, deferred maintenance, generator testing requirements, utility cost volatility, and lean facilities teams all compete with broader financial pressures. Even when modernization is clearly needed, traditional capital-funded projects may be hard to prioritize.

> ***Shift the Conversation from "What Equipment Should We Buy?" to "What Outcomes Do We Need to Protect Care?"***

Energy as a Service (EaaS) offers another option. Through an EaaS model, rural healthcare organizations can pursue energy upgrades through a performance-oriented service agreement rather than a large upfront purchase. Solutions may include efficiency improvements, lighting, controls, battery storage, onsite generation, backup power modernization, monitoring, and ongoing operations and maintenance.

Done well, EaaS helps shift the conversation from "What equipment should we buy?" to "What outcomes do we need to protect care?" For rural healthcare, those outcomes include uptime, cost predictability, reduced maintenance burden, and confidence that critical services can continue when the grid is under stress.

Rural realities matter. GAO has documented that rural hospital closures reduce access to care and can force patients to travel farther for services. At the same time, Chartis has reported growing financial pressure across the rural hospital sector. That combination makes resilience more than an operational concern; it is part of preserving local access to care. (GAO, 2020; Chartis Center for Rural Health, 2026)

Rural Healthcare Is Uniquely Impacted

Rural energy risk is often defined by rare, high-impact events: long outages, difficult restoration logistics, and limited backup resources. Rural outages are not only about frequency; they're about restoration time and resource constraints. The U.S. Energy Information Administration (EIA) tracks reliability using the System Average Interruption Duration Index (SAIDI) and the System Average Interruption Index (SAIFI), and separates "major-event days" from normal operations because a facility's greatest outage risk may come from a few severe events, exactly when rural hospitals have the least margin for failure. (EIA, n.d.) According to EIA's Electric Power Annual 2024, U.S. electricity customers experienced an average of 11 hours of power interruptions in 2024, with major events accounting for 80% of the hours without electricity. While this is a systemwide customer average rather than hospital-specific data, it underscores why rural healthcare facilities should plan for long-duration, high-impact outage scenarios rather than relying on typical outage averages. (EIA, 2025)

For rural hospitals and clinics, the operational consequences are amplified by:

- Fewer backup redundancies
- Older electrical infrastructure and deferred maintenance
- Limited onsite engineering coverage
- Supply chain fragility during regional disasters (fuel delivery, parts, contractor availability)

The U.S. Department of Health and Human Services (HHS), Assistant Secretary for Preparedness and Response (ASPR), Technical Resources, Assistance Center, and Information Exchange (TRACIE) and Federal Emergency Management Agency (FEMA) both provide healthcare-specific guidance for power outages, highlighting the need to identify critical systems, plan for fuel and staffing, and coordinate with community partners. (ASPR, n.d.; FEMA, 2020)

Routine Outages Can Become Clinical Events When They Disrupt:

Emergency Department (ED) and inpatient care (lighting, medical air, suction, imaging)

Operating Room (OR) procedures (sterile HVAC, power quality, uptime)

Vaccine and medication refrigeration

Water, sanitation, and infection control systems

Heating/cooling during extreme temperatures (patient safety, sheltering)

Why Energy Is A Clinical And Financial Issue In Rural Care

Once rural healthcare leaders identify outage risk, the next question is how to reduce the size and cost of the resilience challenge. That starts with understanding the facility's energy use.

Hospitals are energy-intensive buildings. ENERGY STAR benchmarking shows that hospital energy use intensity varies widely from less than 100 to more than 1,400 kBtu per square foot across hospitals, indicating that many facilities have both high exposure and real efficiency headroom. (EPA, 2015) DOE's Better Buildings program notes that healthcare accounts for a disproportionate share of commercial energy use, underscoring why energy strategy is now part of core operations. (DOE, n.d.-b)

EaaS is one of the most practical tools for responding, especially for rural organizations with limited capital and bandwidth. Done well, EaaS can convert a complicated bundle of upgrades (efficiency + onsite power + controls + maintenance) into a performance-backed service with predictable payments.

Clinical risk often begins with non-obvious loads, such as HVAC, IT, and refrigeration. Energy planning isn't just "keeping the lights on"; it's protecting care pathways. If energy fails, care pathways fail, so energy strategy belongs on the same dashboard as quality, finance, and emergency preparedness. (FEMA, 2020)

> ***Emergency preparedness isn't optional!***
>
> ***CMS requires emergency planning, policies, communication, and training. If generators are part of the plan, backup power must support operational needs, including HVAC where required.*** ***(CMS, n.d.; ASPR, 2019)***

Outage Duration: Conditions vs Major Events

Exhibit A: Major events accounted for most average outage duration in 2024, underscoring the need to plan for long-duration scenarios.

Average Total: 11 hours

Normal conditions (excluding major events) 2.2 hours	Major events added ~8.8 hours

~ 80% of the annual outage duration came from major events

Source: U.S. Energy Information Administration, Electric Power Annual 2024 / Today in Energy, Dec. 1, 2025. Represents U.S. utility-customer average; not healthcare-specific.

What is Energy as a Service?

EaaS is a contract model in which an energy partner or Energy Services Company (ESCO) designs, finances through a financial partner, installs, operates, and maintains energy improvements. The healthcare organization pays for the service over time, often based on agreed-upon outcomes such as savings, availability, resilience, or performance.

The American Council for an Energy-Efficient Economy (ACEEE) describes service-based models in which customers repay through periodic fees tied directly or indirectly to realized savings, often with the provider taking on performance risk. (ACEEE, 2019)

Many EaaS deals resemble a family of "as-a-service" structures:

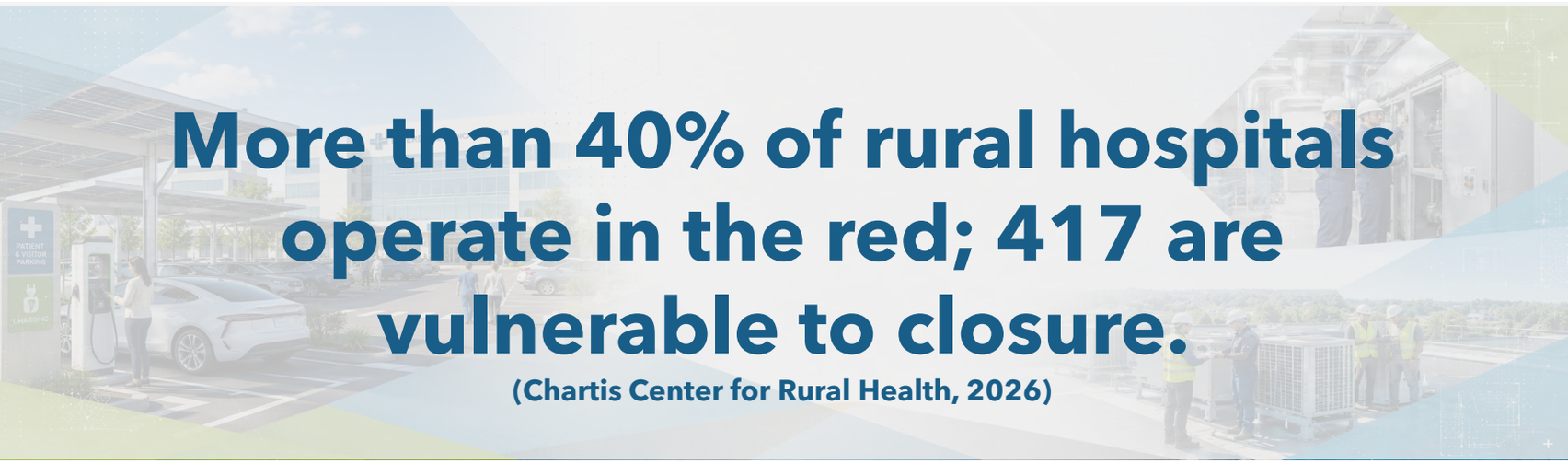
- Energy Service Agreements (ESAs) for efficiency (provider may own equipment during term) (DOE, n.d.-a)
- Power Purchase Agreements (PPAs) for onsite generation (pay per kWh)
- Availability/resilience contracts (pay to keep backup power ready and reliable), so your critical services can keep running during an outage. You are not paying for the electricity you use. You are paying for readiness and performance.

In practice, rural healthcare often benefits from bundling: efficiency, controls, backup modernization, onsite generation, storage, microgrid controls, and operations and maintenance (O&M).

Five Outcomes To Demand From EaaS

EaaS should be evaluated by the outcomes it delivers, not by the equipment included in the package. For rural healthcare, those outcomes are practical: keep care running, preserve capital, reduce maintenance burden, improve cost predictability, and support community resilience. Solar, storage, backup generation, controls, indoor air quality improvements, and O&M services are not standalone goals; they are tools that should be combined only where they support measurable care-continuity and financial objectives.

This outcomes-based view is especially important for rural hospitals and clinics because capital, staffing, and outage-response resources are often limited. A strong EaaS program should define what critical loads must remain available, what performance commitments are required, who is responsible for maintenance and monitoring, and how savings or uptime will be measured. When structured well, EaaS can help rural providers modernize infrastructure while keeping the focus where it belongs: reliable care, predictable cost, and community access.



More than 40% of rural hospitals operate in the red; 417 are vulnerable to closure.

(Chartis Center for Rural Health, 2026)

Exhibit B: EaaS is best understood as contracting for energy outcomes, such as uptime, cost savings, and operational performance, rather than purchasing individual assets. Instead of buying equipment, customers procure a performance-guarantee portfolio that may include generation, storage, controls, and ongoing support.

What An EaaS Project Includes

1: Reduce the load you must back up

- Recommissioning (fixing control sequences)
- HVAC optimization and VFDs
- Lighting retrofits and controls
- Envelope improvements where feasible

Hospitals show wide variance in energy performance, which is why efficiency is often the first and highest-confidence component. (EPA, 2015)

2: Prioritize and shape loads before adding supply

- Load shedding priorities (clinical vs non-clinical)
- Temperature setbacks for non-occupied zones during outages
- Generator testing integrated with clinical operations

3: Add onsite distributed energy resources

- Solar PV (when feasible)
- Battery storage (ride-through + peak + resilience)
- Combined heat and power (CHP) (where there is a strong thermal load and gas reliability)
- Modernized backup generation and switchgear

NREL emphasizes defining resilience objectives and designing accordingly, rather than starting with a favorite technology. (NREL, 2019)

4: Controls, monitoring, and cybersecurity

Microgrids and building controls are connected systems. The National Institute of Standards and Technology (NIST) Operational Technology (OT) security guidance explicitly includes building automation systems, which is directly relevant when your energy systems become more software-defined. (NIST, 2023)

The most resilient load is the one you do not need to back up.

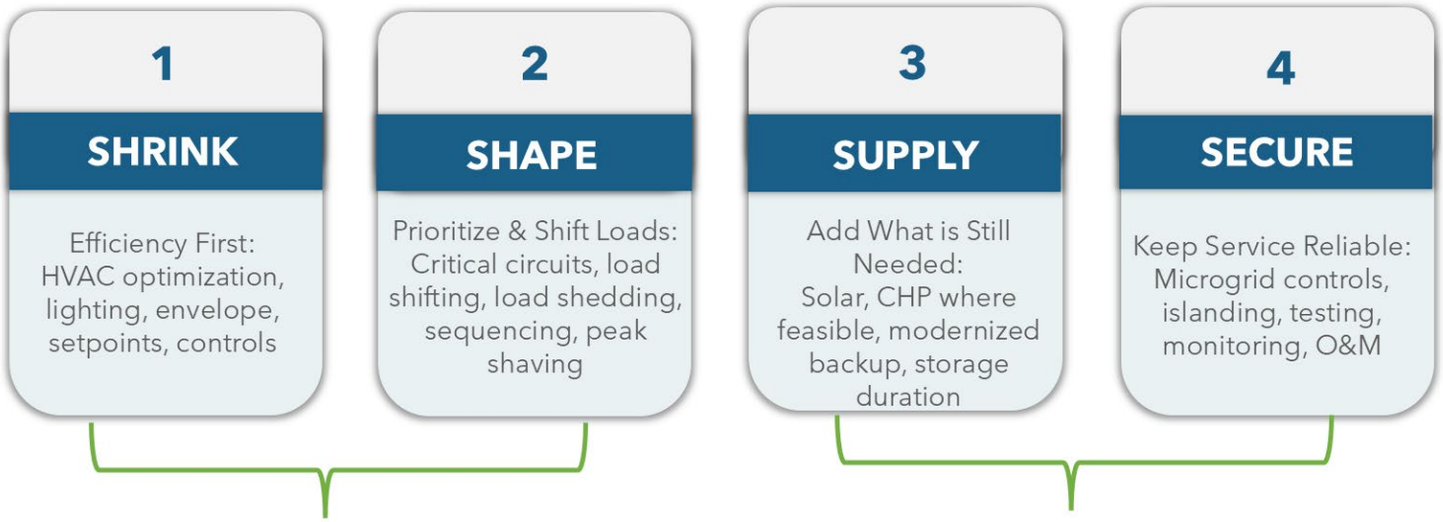
Shrink, Shape, Supply, and Secure

EaaS isn't a single technology; it's an engineered service built from four buckets

Hospitals should approach energy resilience by starting with clinical need, not equipment selection. The goal is not to back up every square foot of a facility equally; it is to identify the services that must continue during an outage and the electrical, mechanical, IT, and environmental systems that support them. That distinction is especially important for rural healthcare organizations, where capital is limited, facilities teams are lean, and prolonged outages can quickly become care-continuity events.

The Shrink, Shape, Supply, and Secure model provides a practical sequence. First, reduce avoidable energy use. Then prioritize and manage loads based on clinical importance. Next, size generation, storage, and backup systems around the remaining need. Finally, secure performance through controls, monitoring, testing, cybersecurity, and O&M. Following this order helps hospitals avoid overbuilding, reduce cost, and focus resilience investments on the loads that matter most to patient care.

Exhibit C: Efficiency and controls reduce the size (and cost) of the resilience problem. The cheapest resilience is the resilience you don't need; reduce and prioritize loads before adding supply.



Three Pathways To Modernize Rural Healthcare Energy Systems

Exhibit D: EaaS shifts more performance and maintenance responsibility to the provider but requires stronger contract discipline. EaaS is not "better" than EPC or capex by default, but it can be uniquely well-suited to rural constraints when structured with clear performance and exit options.

Dimension	Traditional Capex / Owner Purchase	EPC/ESPC (Performance Contract)	EaaS (Service Model)
Upfront Capital	High	Low-to-moderate (often financed)	Low-to-none
Who owns assets during the term	Owner	Usually owner	Often provider (varies)
Performance guarantee	Depends	Typically, energy savings guarantee *(EPA, n.d.-b)*	Often savings & uptime (contracted)
O&M burden	Owner	Shared/varies	The provider often takes primary responsibility
Best for	Strong capex & facilities staff	Efficiency-heavy retrofits	Bundled efficiency & resilience & controls & limited staff
Key risk	Deferred maintenance, staff burden	M&V complexity, scope creep	Contract lock-in, interoperability, vendor dependence

The right choice depends on capital constraints, risk tolerance, and internal O&M capacity.

What To Demand Contractually

1) Resilience & reliability

EaaS can contract for resilience outcomes such as:

- Critical load served (kW) during outages
- Ride-through duration (hours/days) with defined assumptions
- Automatic islanding capability (microgrid operation)
- Black start (ability to start your onsite power system when the grid is down) and restoration sequencing
- Power quality for imaging/IT loads
- Testing cadence and reporting

The National Renewable Energy Laboratory (NREL's) microgrid conceptual design guidance emphasizes a structured process: define loads, assess risk scenarios, model solutions, and validate controls and operations. FEMA's guide emphasizes improving facility resilience to outages through planning and system design. (NREL, 2019; FEMA, 2020) Also important: CMS survey and code interpretations are increasingly acknowledging microgrid approaches in the healthcare context (e.g., references to healthcare microgrid systems in relation to National Fire Protection Association (NFPA) 99 editions). (CMS, 2023)

2) Financial predictability

Rural hospitals under financial stress can struggle to justify large capex even when ROI is strong. GAO documents the access consequences of rural hospital closures, while industry analyses highlight operating margin stress. (GAO, 2020; Chartis Center for Rural Health, 2026)

EaaS can help by:

- Shifting capex into a service payment
- Smoothing costs into predictable budgets
- Enabling bundled measures so "fast payback" efficiency helps support resilience assets

3) O&M and monitoring

With lean teams, outsourced monitoring and maintenance can be as valuable as the equipment.

EaaS often includes:

- 24/7 monitoring and alarms
- Preventive maintenance schedules
- Compliance documentation support (testing logs, performance reports)
- Parts and service response commitments

4) Sustainability & compliance

Efficiency reduces emissions and operating costs simultaneously. DOE Better Buildings reports healthcare partners have saved substantial dollars since 2011 and notes the sector's outsized energy footprint. (DOE, n.d.-b) Because hospitals use so much energy, even small improvements can materially reduce operating costs, and high baseline demand means you need more backup capacity to sustain critical services during outages.

EaaS can also incorporate cleaner onsite generation, storage, and demand response, while maintaining clinical reliability requirements.

5) Patient & community benefit

When the hospital stays online, the community retains:

- A place for triage and stabilization
- A warming/cooling center during temperature extremes
- Continuity for dialysis coordination, oxygen-dependent patients, and home health support

Archetypes and the Critical-Load "Minimum Viable Microgrid"

Start with what must stay on, then build outward.

Exhibit E: The smallest viable resilience package is often storage + controls + targeted circuits, not a full campus rebuild. The best rural EaaS scopes are "clinical load first" and avoid overbuilding.

Rural Healthcare Archetype	Critical Loads to Keep On	Right-Sized Resilience Package	Why This is Often Enough	Scale Later Only if Needed
Critical access hospital	ED, med-gas support, nurse stations, med refrigeration, core IT, selected lighting	Battery, controls, targeted critical-load panel, modernized generator tie-in	Fast ride-through, cleaner transfers, lower fuel dependence, no need to island every wing	Add solar or expand circuits after proving performance
Rural clinic / FQHC	Vaccines, diagnostics, exam rooms, broadband, small HVAC zone, lighting	Battery, controls, selective circuits	Often, the lowest-cost path to continuity without a full site rebuild	Add solar when the daytime load profile supports it
Long-term care / skilled nursing	Life-safety systems, med carts, kitchen essentials, corridor lighting, cooling zones	Battery, controls, backup, modernization, load shedding	Protects vulnerable residents while focusing capital on the highest-risk loads	Expand duration only where the outage history justifies it
Community hospital campus	Surgery support, pharmacy, imaging support loads, IT backbone, air handling for key areas	Targeted storage, controls, and generation on essential feeders	Resilience improves most when the clinical circuits are prioritized instead of rebuilding the full campus	Broader microgrid buildout should follow phased operational results

Use Cases: Right-Sizing EaaS for Different Rural Healthcare Settings

The table above shows the planning logic. The examples below translate that logic into common rural healthcare settings.

Archetype 1: Critical access hospital (single campus)

Typical pain points: aging switchgear, generator testing burden, HVAC reliability, peak demand charges, and limited capital.

EaaS package idea:

- HVAC controls optimization & recommissioning
- LED & lighting controls
- Battery storage for ride-through & peak shaving
- Solar, where site conditions allow
- Microgrid controller to prioritize ED/OR/MED/refrigeration/IT
- Generator modernization and testing plan

Archetype 2: Rural clinic network (multiple small sites)

Typical pain points: uneven building conditions, small staff, refrigeration issues, and IT vulnerabilities.

EaaS package idea:

- Standardized controls & remote monitoring across sites
- Small storage for refrigeration/IT ride-through
- Efficiency bundles (lighting, heat pumps where feasible)
- Coordinated procurement and reporting

Archetype 3: Long-term care / skilled nursing

Typical pain points: HVAC continuity, resident safety, staffing constraints.

EaaS package idea:

- HVAC resilience (thermal strategy & backup power for key zones)
- Load management & generator coordination
- Indoor air quality and ventilation reliability planning aligned with outage guidance (FEMA, 2020)

Archetype 4: EMS/dispatch & community resilience hub

Typical pain points: communications uptime, fuel logistics, and serving as a public shelter.

EaaS package idea:

- Dedicated critical comms and power conditioning
- Islanding plan for multi-day operation
- Backup power for communications and dispatch equipment
- Storage or generation sized for priority circuits

ECONOMICS & CONTRACTING

Measurement & Verification (M&V)

If payments depend on savings, define:

- Baseline period (e.g., 24–36 months)
- Adjustment factors (weather, occupancy, service line changes)
- What counts as savings (kWh, kW demand, fuel, maintenance, avoided rentals)
- Independent verification and audit rights

EPA's ESPC overview underscores the centrality of guaranteed savings and performance accountability. (EPA, n.d.-b)

Service Level Agreements (SLAs) / uptime guarantees (resilience is a service, so specify it)

For rural healthcare, a serious EaaS contract should define:

- Critical circuits and kW served
- Minimum runtime under defined scenarios
- Response time for faults
- Maintenance/testing schedule
- Penalties or remedies for non-performance

Use FEMA and ASPR TRACIE outage-planning guidance as your "requirements backbone" to translate planning needs into contract specifications. (ASPR, n.d.; FEMA, 2020)

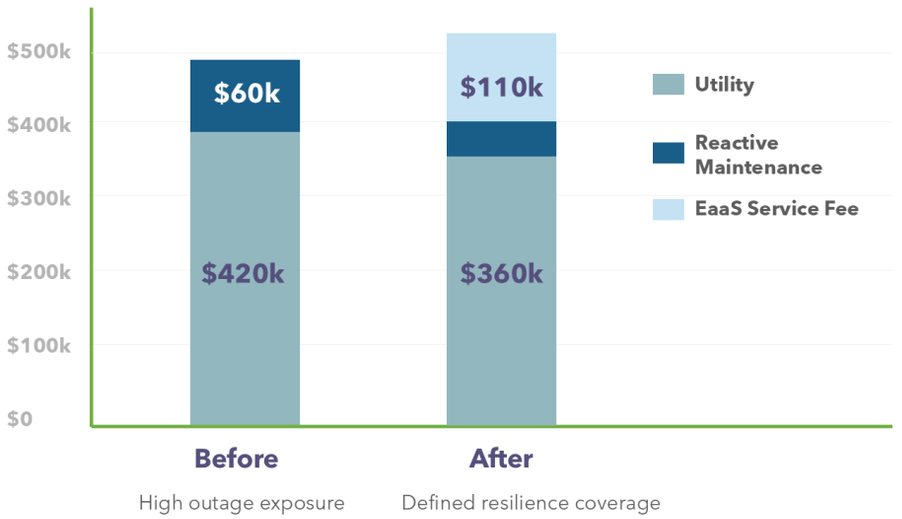
Pricing structures (common)

- Fixed service fee (bundled, predictable)
- Shared savings (provider paid from verified savings)
- Availability payment (pay for guaranteed capacity and uptime)
- Hybrid (often best: efficiency supports resilience economics)

In performance-based models, pricing is structured to align payments with the value delivered. The U.S. EPA notes that energy savings performance contracting is designed to deliver savings "at least equal to the amount of the payments needed to finance the improvement(s)," and may use a "shared savings" approach. Likewise, FERC explains that capacity markets pay not for energy produced, but for "the ability to produce power when needed," a useful parallel to EaaS contracts that pay for guaranteed uptime and standby capability. (EPA, n.d.-b; FERC, 2025)

Annual Cost & Outage Risk Exposure

Exhibit F: EaaS can reduce utility costs and reactive maintenance while adding a service fee that buys defined resilience outcomes (coverage, uptime, response time). The economic case is often risk-adjusted: fewer emergency rentals, fewer spoiled medications, fewer canceled procedures, and less crisis labor.

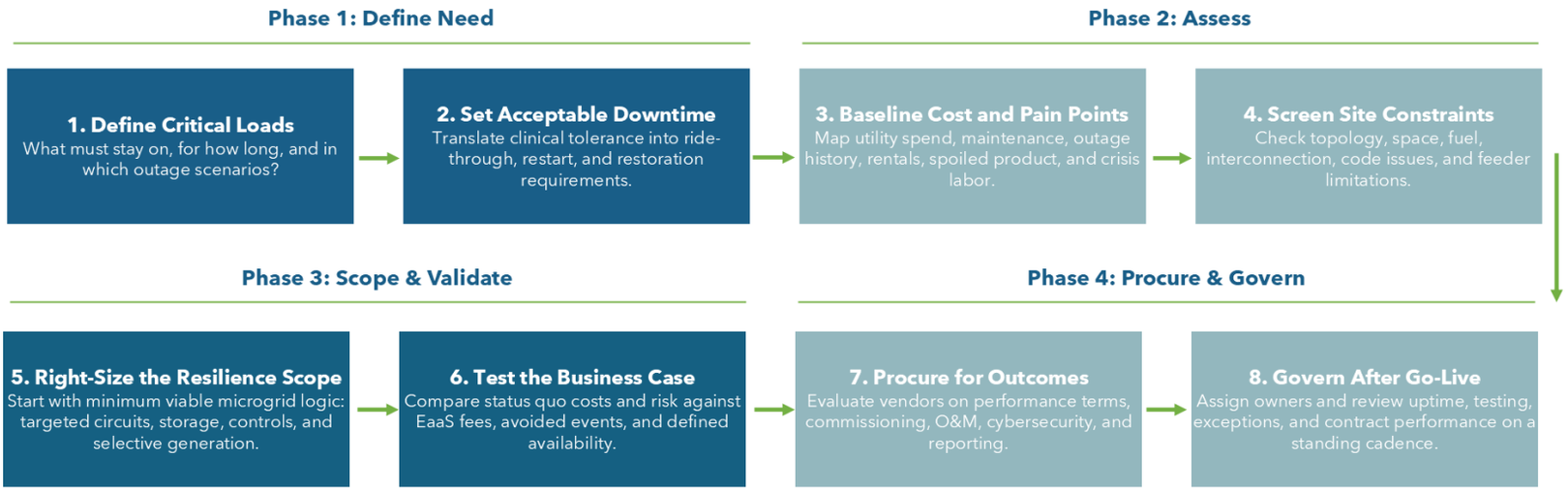


Illustrative scenario only; actual economics vary by facility, utility tariff, scope, incentives, and contract structure.

Evaluate EaaS In 8 Steps

Move from clinical priorities to technical scope, then to economics, procurement, and governance.

Exhibit G: A repeatable process that works for a CAH, clinic network, or LTC facility. The first decision is not vendor selection; it's defining critical loads and acceptable downtime.



This order helps avoid overbuilding and weak contracts.

Conclusion and Action Plan

Next 30 Days

1. Build a one-page critical load list and downtime tolerance map.
2. Convene a 60-minute cross-functional meeting (CFO, Facilities, IT, Clinical, Compliance).
3. Pull 24 months of utility bills and any interval data.
4. Inventory generators, ATS, switchgear age/condition, and last test outcomes.
5. Choose your procurement lane (capex, EPC/ESPC, EaaS) and draft an evaluation rubric.
6. Shortlist partners and request concept proposals that include resilience SLAs and M&V plans.
7. Identify complementary funding sources and assign someone to verify current eligibility.

Final key takeaway: Rural healthcare organizations do not need to solve every infrastructure challenge at once. But they do need to know which clinical loads must remain available, for how long, and under what outage conditions. Energy resilience is not a facilities side project; it is part of the care-continuity plan. EaaS can be one credible pathway when the contract is built around measurable outcomes, operational accountability, and governance.

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