



HCAI Design Guide of Planning for Preparing for Disasters

Power Resilience, Regulatory Compliance, and the Future of Healthcare Infrastructure

Presenters

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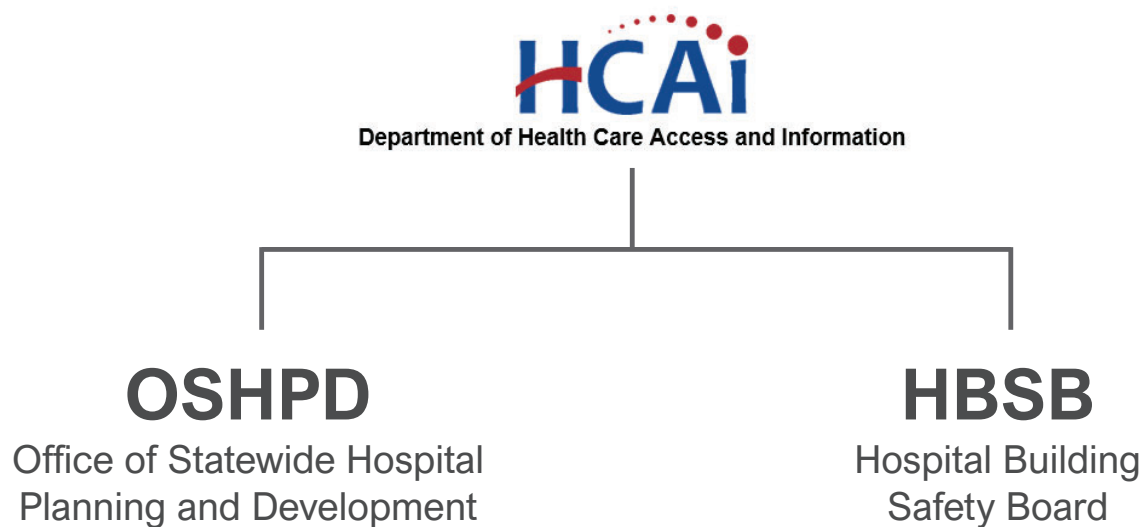


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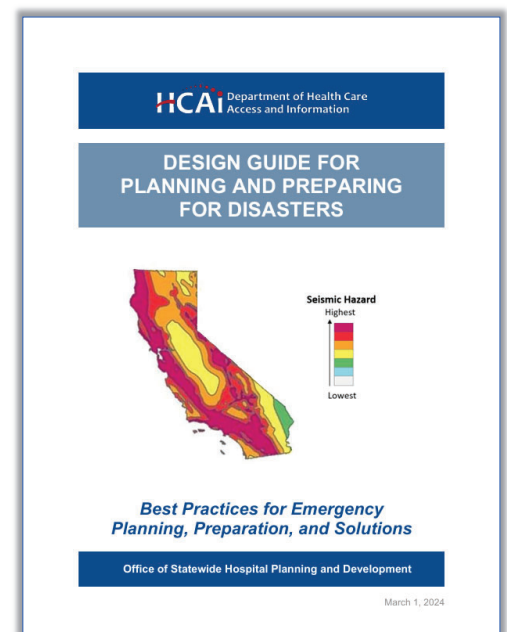
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[Faraday Microgrids](#), Developer/Builders





Why A Guide?

- Facilities managers want to know what they can do to be prepared
- Provide a resource to help evaluate how past events could impact future regulations and design requirements
- Provide a repository of information during crucial times
 - The guide presents various scenarios and design options to aid facilities, staff, and design teams in understanding additions to facilities and planning for future flexibility effectively
- Limit “Anything Goes” policies!
- Best practices for facilities to be better prepared for a disaster



How to Apply the Guide

Alterations

- Planning for the unknown
- Providing flexibility in existing buildings
- What can be done *now*?
- Adapting existing services and system
 - Facility access
 - Utility services
 - Emergency projects

New Facilities

- Planning for the unknown
- Go beyond code minimums during design
- Go beyond the code
- Include potential flexibility for future care types
- Identify options and provide best practices to allow for quick implementation



Who Should be Using the Guide

- Facility Operators
- Architectural and Engineering Design Teams
- Local Agencies, Planners
- Contractors
- Other people involved in planning for future impacts and reacting to situations when they arise



Purpose

At the start of the COVID 19 pandemic, facilities were struggling to find ways to provide safe patient care: safe for the staff as well as the patients.

OSHPD received many calls and questions as to what we were doing to assist.

In addition, people were asking what was going to change in how OSHPD did plan reviews and what code changes were anticipated for future code cycles.

OSHPD assembled people knowledgeable in healthcare regulations, planning, design, and operations. This included professionals, engineers, facility representatives, contractors, and many others that had experience in the many aspects of addressing and reacting to the pandemic and other emergencies.

The Emergency Design Task Force (EDTF) was born.



Emergency Design Task Force

The EDTF was tasked with identifying specific areas of concern for multiple types of events, such as pandemics, but also including wildfires and earthquakes amongst others. They were to look at how these past events could impact future regulations and design requirements.

It was determined that for normal everyday operations, the current regulations are fairly sufficient to meet the basic needs. Minor revisions are coming.



Adaptation

Adaptation

But what about those facilities that wanted to go above and beyond the basic needs?

Most, but not all, options to prepare for future events would most likely fit into this group.

The technology and processes learned would be optional approaches that a facility could decide to incorporate into their existing or proposed buildings. These options could include:

- switchable air volumes
- redundant services
- new technologies

If these were in place now, the facility would have flexibility in deployment in the future.

HCAI | HOSPITAL BUILDING SAFETY BOARD WEBINAR SERIES

2026 Schedule

Design Guide for Planning and Preparing for Disasters

Information at: <https://hcai.ca.gov/facilities/building-safety/resources/building-safety-construction-webinars/>



Session 1 – May 14, 2026

Wildfire and Wildland-Urban Interface Readiness for HealthCare Facilities

A preparedness-focused webinar examining wildfire and wildland-urban interface (WUI) risks, mitigation strategies, and operational planning measures to help healthcare facilities enhance resilience, continuity, and life safety during wildfire events."



Session 2 – June 10, 2026

Designing Hospitals for Wildfire Smoke: HVAC Strategies for Resilience and Readiness

An expert-led webinar exploring HVAC design strategies, filtration technologies, and operational best practices that help healthcare facilities maintain safe indoor air quality and operational continuity during wildfire smoke events.



Session 3 – July 7, 2026

Power Resilience, Regulatory Compliance, and the Future of Healthcare Infrastructure

A forward-looking webinar examining how healthcare organizations can strengthen power resilience, navigate evolving regulatory requirements, and modernize infrastructure systems to support reliable patient care and operational continuity.



Session 4 – TBD

Infection Control – HVAC + Design



Session 5 – TBD

Infection Control – Operations + Hazard Vulnerability Analysis

Agenda

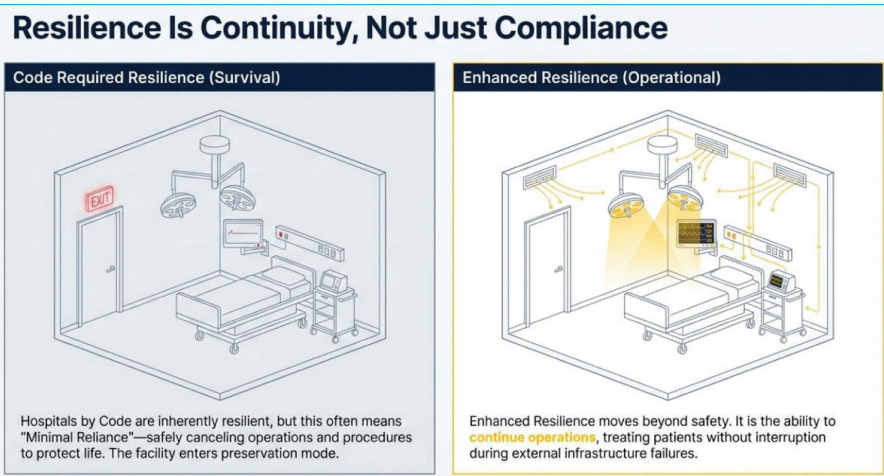
- Defining Resilience
- Emerging Threats
- Solutions & Opportunities
- HCAI Guidance
- Feasibility & Real-World Examples
- Q&A / Next Steps

Definition of Resilience?

What does it mean to be resilient?

Code Resilience (The Baseline – Shelter in Place)

Enhanced Resilience (The Goal – Business as Usual)



What does the current code emergency backup look like?

1. CEC 517.33 – Life Safety Branch

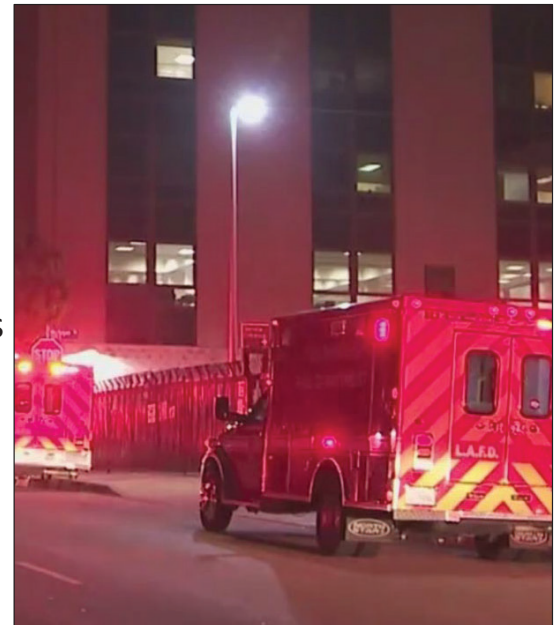
- Egress Lighting – approx. 10% in corridors
- Exit Signs
- Alarms

2. CEC 517.33 – Critical Branch

- Medical Equipment
- Task Illumination and receptacles in patient care areas

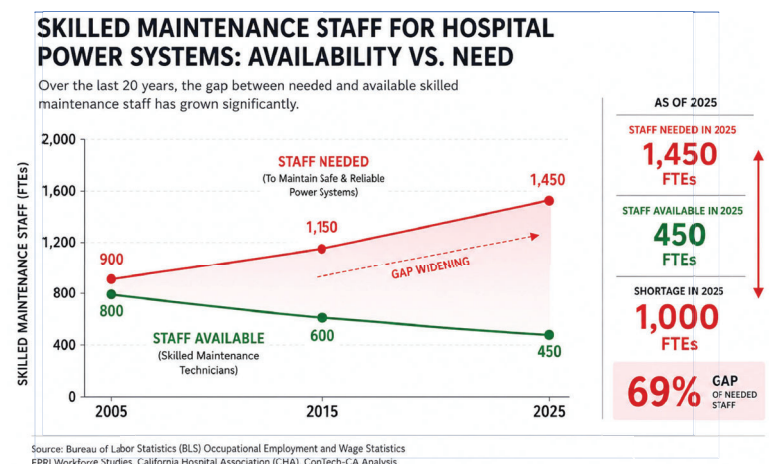
3. CEC 517.35 – Equipment Branch

- Supply and return fans
- Chillers only for surgical and IT equipment
- Stair pressurization equipment
- (1) Elevator per bank



Internal Threats

- Aging equipment
- Deferred maintenance
- Misalignment of design & usage intensity
- Shortage of skilled maintenance staff



External Threats

- **Utility grid**
 - Aging equipment
 - Increasing demand
- **Extreme climatic events**
- **Supply chain limitations**

IndustrialSage  Shows ▾ Industrial and Manufacturing News ▾ Articles



Power Transformer Lead Times Hit Record Highs as U.S. Grid Equipment Shortage Deepens

Grid equipment has replaced capital and permitting as the primary constraint on U.S. industrial expansion.

Constraints

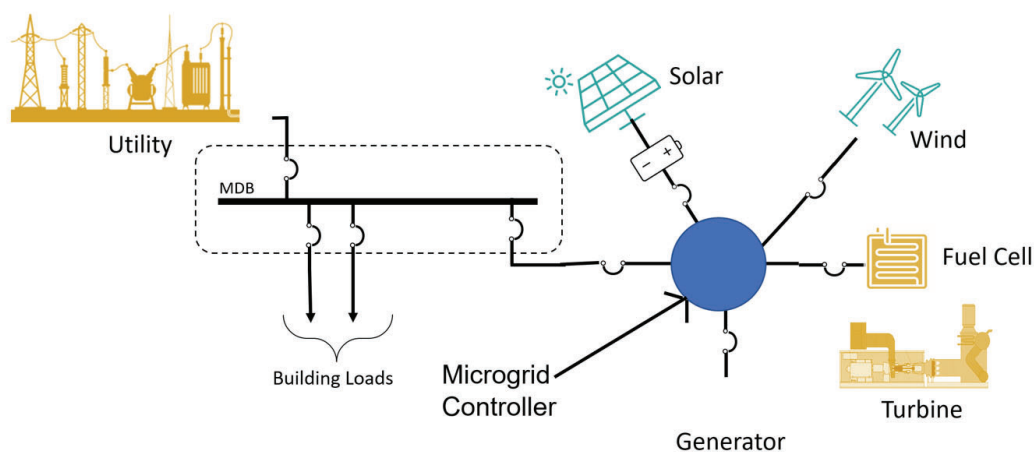
- Cost
- Space to install systems
- Emergency equipment needs to be seismically certified
- ~~"Codes don't allow my solutions"~~
 - (call to action for people to engage with HCAI; Code has been updated to allow)
- Fragmented supply chain
- **Lack of familiarity**

Solutions – what are we going to do?

Options

- On-site resources to supplement the utility
- On-site resources to serve as an emergency power supply system (EPSS)

Healthcare Microgrids



A group of interconnected loads and distributed energy resources (DER's) within clearly defined electrical boundaries that acts as a single controllable entity with respect to the grid.

EVOLVING CODES

- Article 690 (PV's) – 1984
 - Article 705 (Microgrids) - 1997
 - Article 692 (Fuel Cells) - 2002
 - Microgrids As EESS – 2022



RESILIENCE



Island Mode
Capabilities

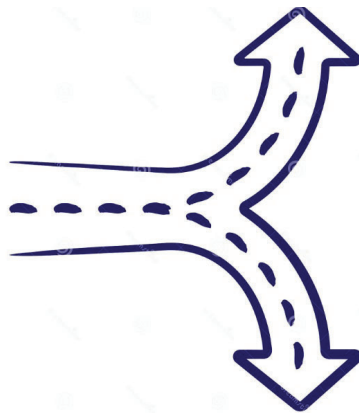
Less impact to
Electric Grid

Multiple Sources

Microgrid as supplement to the utility

CEC 705 – Interconnected Electric Power Production Sources

2 Options for
Microgrids



Microgrid as Essential Electrical System Source – CEC 517.30

Microgrid as supplement to the utility

CEC 705 – Interconnected Electric Power Production Sources

Commissioning Plan (HCAI Advisory Guide A7, Section 5 – Steps 3 and 4) to address.

- 705.10** Provide direction for Identification of Power sources
- 705.12(B)** Code compliant busbars rating - warning labels is applied
- 705.20(F)** Marking at disconnect
- 705.30 (B)** OCPD Ratings. Confirm code compliant
- 705.30 (D)** Confirm disconnect is suitable for backfeed
- 705.32** Ground-Fault Protection of Equipment – confirm provided
- *705.40** Loss of Primary Source – Demonstrate proper function
- *700.45** Multiphase – de-energization upon loss or imbalance of voltage demonstration
- 705.70** Microgrid Interconnection Devices – confirm field label and listed

*Requires witness testing

Microgrid as Essential Electrical System Source – CEC

OSHPD CAN 3-517.30(B.1)(4) – The requirements to meet "sufficient reliability" status for health care microgrids utilized as EES shall include, but not be limited to, the following:

- Special Seismic Certification
- Comply with NFPA standards for the sources utilized (i.e. NFPA 111 for batteries NFPA 853 for fuel cells etc.)
- Classified at type 10 Class X, Level 1 per NFPA 99 6.7.1.2.1
- Sequence of Operation and Commissioning required

***NOTE ALL CODE CHANGES ARE PERMISSIVE ONLY – NO NEW REQUIREMENTS**

DEPARTMENT OF HEALTH & HUMAN SERVICES
Centers for Medicare & Medicaid Services
7500 Security Boulevard, Mail Stop C2-21-16
Baltimore, Maryland 21244-1850



Center for Clinical Standards and Quality

Ref: QSO-23-11-LSC

DATE: March 31, 2023

TO: State Survey Agency Directors

FROM: Directors, Quality, Safety & Oversight Group (QSOG) and Survey & Operations Group (SOG)

SUBJECT: Categorical Waiver – Health Care Microgrid Systems (HCMSs)

Memorandum Summary

- Various CMS regulations governing certain providers and certified suppliers require compliance with the 2012 edition of the National Fire Protection Association (NFPA) Health Care Facilities Code (NFPA 99).
- 2012 edition of NFPA 99 requires emergency power for an essential electric system (EES) to be supplied by a generator or battery system.
- 2021 edition of the NFPA 99 permits emergency power for an EES to be supplied by sources other than a generator or battery system, including a health care microgrid system (HCMS)
- HCMSs are small-scale electrical grids where the sources of electricity can be provided by clean energy technologies (e.g., fuel cells, solar, wind, energy storage, etc.).
- Except as noted below, CMS is issuing a categorical waiver permitting new and existing health care facilities subject to CMS requirements to utilize alternate sources of power other than a generator set or battery system only if in accordance with the 2021 edition of the NFPA 99, 2023 edition of the National Electric Code (NFPA 70), and associated references.

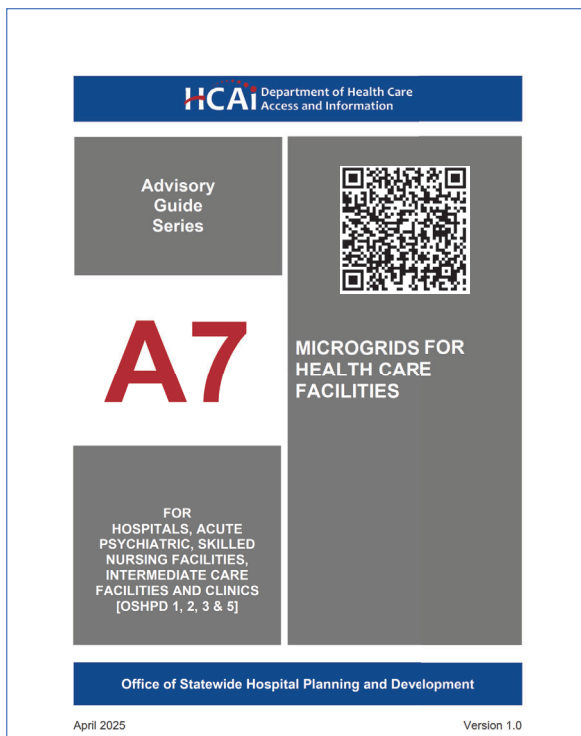


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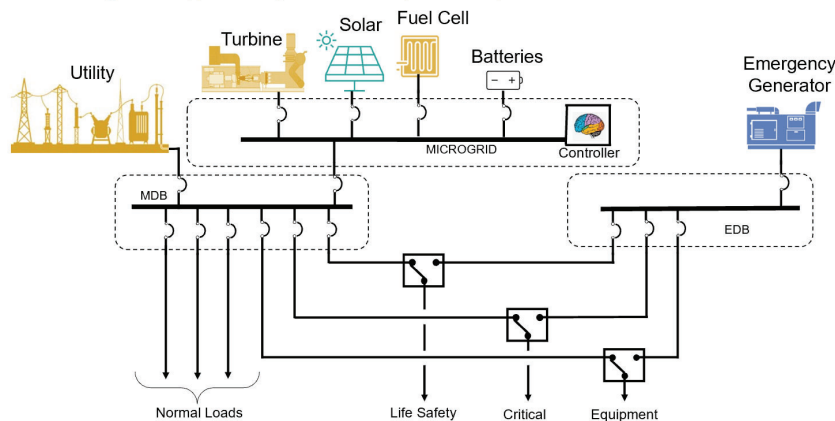
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Requirements/Codes/Standards - Applicable Codes Matrix		Microgrid Power Source					
		Solar (PV's)	Wind	Fuel Cells	CHP	Energy Storage	Gas Turbine
Codes/ Requirements							
1	CARB - California Air Resources Board - Air Quality Requirements	no	no	no	yes	no	yes
2	CPUC - California Public Utility Commission (Rule 21)	yes	yes	yes	yes	yes	yes
3	OSHPD CAN 2-0 Local Approval	yes	yes	yes	yes	yes	yes
4	CBCS - California Standards Building Code (Title 24)						
4a	CBC - California Building Code	yes	yes	yes	yes	yes	yes
4b	CFC - California Fire Code						
4b-1	1207 Electrical Energy Storage Systems	no	no	no	no	yes	no
4b-2	1205 Solar Photovoltaics Power Systems	yes	no	no	no	no	no
4b-3	1206 Stationary Fuel Cell Power Systems	no	no	yes	no	no	no
4c	CEC - California Electrical Code						
4c-1	517 Healthcare Facilities	Only if in OSHPD building and/or serving as alternate source					
4c-2	690 Solar Photovoltaic (PV) Systems	yes	no	no	no	no	no
4c-3	692 Fuel Cell Systems	no	no	yes	no	no	no
4c-4	694 Wind Electric Systems	no	yes	no	no	no	no
4c-5	700 Emergency Power	Only if in OSHPD building and/or serving as alternate source					
4c-6	705 Interconnected Electric Power Production Sources	yes	yes	yes	yes	yes	yes
4d	CMC - California Mechanical Code						
4d-1	407 - Outdoor Air Intakes	no	no	no	yes	no	yes
5	NFPA - Guides and Standards						
5a	NFPA 30 - Flammable and Combustible Liquids Code	no	no	yes	yes	no	yes
5b	NFPA 37 - Stationary Combustion Engines and Gas Turbines	no	no	no	yes	no	yes
5c	NFPA 54 - National Fuel Gas Code	no	no	yes	yes	no	yes
5d	NFPA 58 - Liquid Petroleum Gas Code	no	no	yes	yes	no	yes
5e	NFPA 59A - Production/ Storage/ Handling of Liquefied Natural Gas LNG	no	no	yes	yes	no	yes
5f	NFPA 99 - Healthcare Facilities Code	yes	yes	yes	yes	yes	yes
5g	NFPA 101 - Life Safety Code	yes	yes	yes	yes	yes	yes
5h	NFPA 110 - Emergency and Standby Power	no	no	yes	yes	no	yes
5i	NFPA 111 - Stored Electrical Energy Emergency and Standby Power Systems	no	no	no	no	yes	no
5j	NFPA 400 - Hazardous Materials Code	no	no	yes	yes	yes	yes
5k	NFPA 853 - Installation of Stationary Fuel Cell Power Systems	no	no	yes	no	no	no
5l	NFPA 855 - Standard for the Installation of Stationary Energy Storage Systems	no	no	no	no	yes	no
6	Advisory Guide A9 - Sitework Under OSHPD Jurisdiction	yes	yes	yes	yes	yes	yes

Figure 1. Applicable Requirements/Codes/Standards Matrix for Health Care Microgrid Implementation

OSHPD-1 (Hospital) Single Line Diagram

Microgrid as Supplementary Normal Power (Article 705)



Basis of Design for this example – The proposed design is to install a microgrid as supplementary normal power source(s) at an existing or new hospital. The concept is to install DERs that are configured as a microgrid and that produce energy 24/7 to offset utility costs and provide the capability of transitioning to island mode to provide power during a utility outage. DERs for this example include a gas turbine, a solar photovoltaic (PV) system, a fuel cell, and storage batteries. The code mandated EES power requirements will be met by either new or existing emergency generator(s) and an essential electrical distribution system that meets CEC Article 517 requirements for a Type 1 EES.

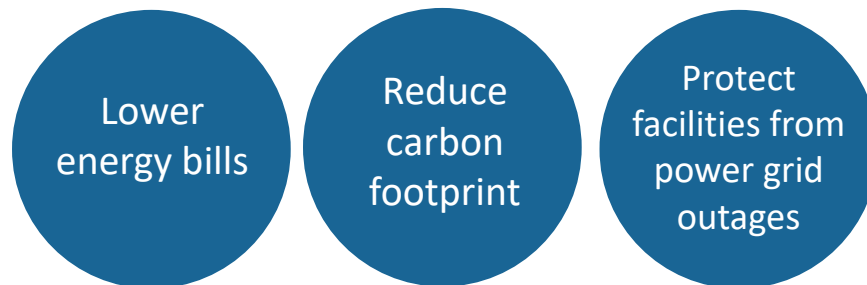
Healthcare Facilities - All shapes and Sizes

Not all healthcare facilities types are alike – different power densities and power requirements

- OSHPD 1 – Acute Care Hospitals
- OSHPD 2 – Skilled Nursing Facilities
- OSHPD 3 – Clinics and Surgery Centers
- OSHPD 4 – Correctional Treatment Facilities
- OSHPD 5 – Acute Psych Hospitals

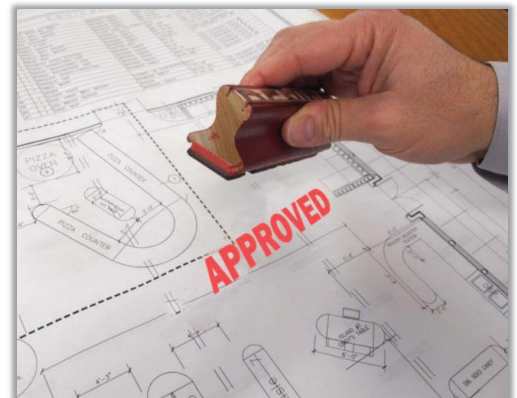
Permitting of Microgrids has been Achievable at Healthcare Facilities

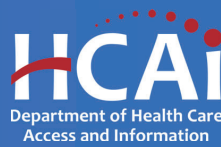
- Dozens of projects have been installed with DER's
- Under current codes, Microgrids can be configured/installed to:



Permitting of Microgrids as EESS is Allowed by Current Codes

- All products used will need to have UL listing
- DER's and distribution equipment will need to have Special Seismic Certification
- Commissioning is required
- On-Site storage of "fuel" is required
 - 72 hrs for hospitals
 - 6 hrs (96 hrs in CA) for Skilled Nursing Facilities (SNFs)
 - 90 min for clinics (Special Seismic Certification is not required)





Microgrid Demonstration Projects



Kaiser Ontario



KAISER PERMANENTE
SAN MARCOS CAMPUS



- ▲ New central plant
- ▲ New hospital
 - 430,000 SF
 - 168 beds
 - LEED platinum



Conclusion

- **Is it allowed by the Code?**
- **Is it fiscally viable to deliver additional resilience?**
- **Call to action?**
- **Questions & next steps**