



Technology vs. Codes: Healthcare Microgrids

AHCA

October 17, 2021

Offsets (i.e.
wild wild
west!)

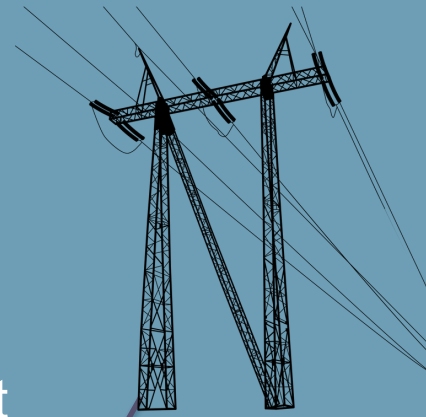


Finance Law

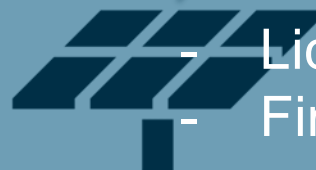
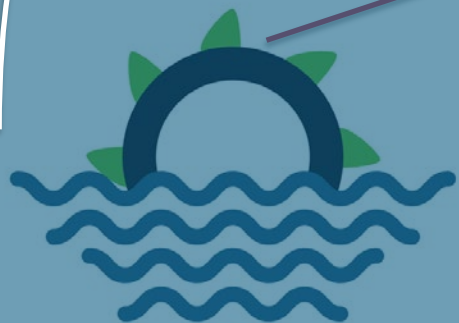
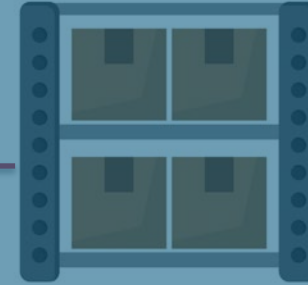
- Tax
- GAAP
- PACE
- Grants & Rebates
- Community Benefit

Utility Law

- FERC
- State



CONTROLLER

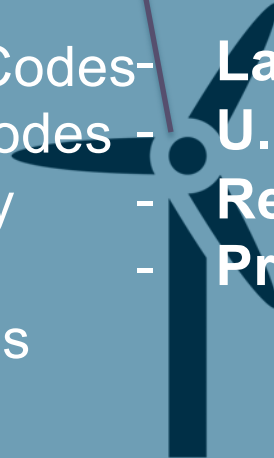


- Building Codes
- Energy Codes
- Air Quality
- Licensing
- Fire Codes

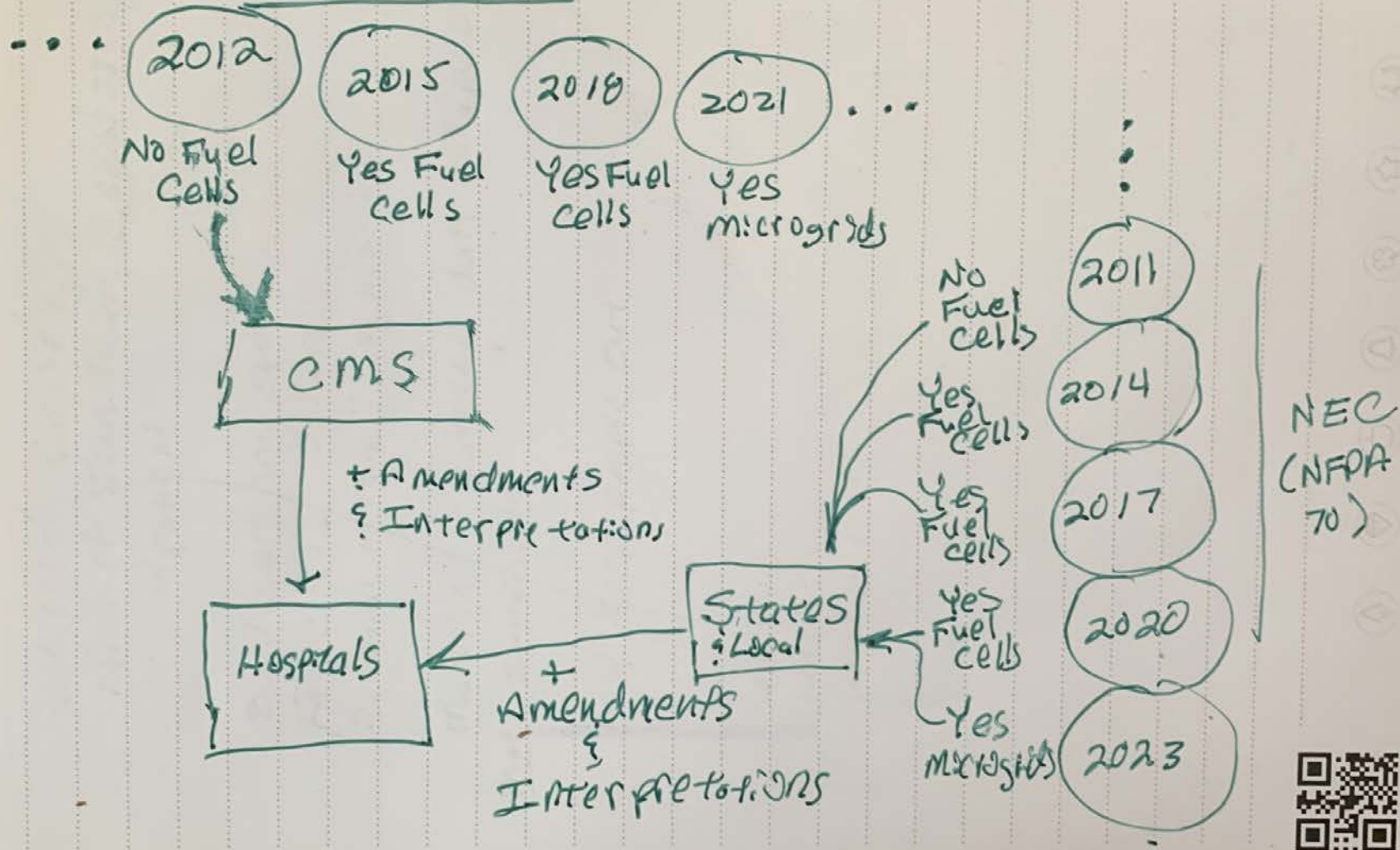
Land Use

U.L.

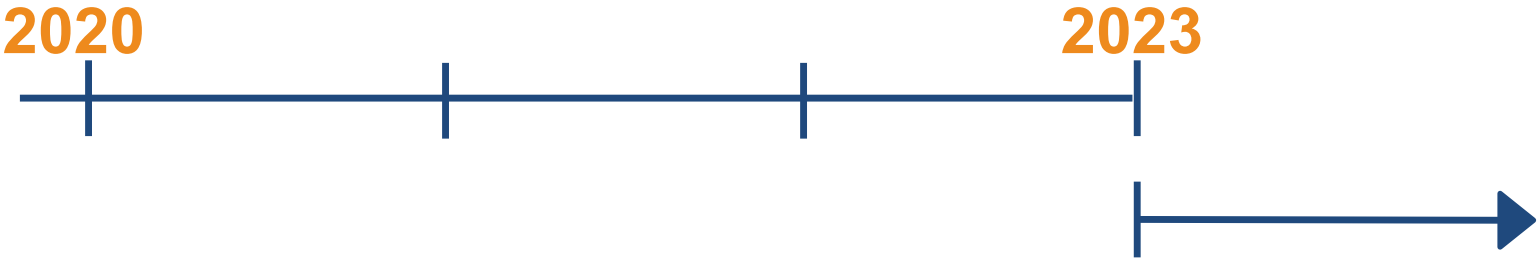
- Reimbursement
- Practice Standards



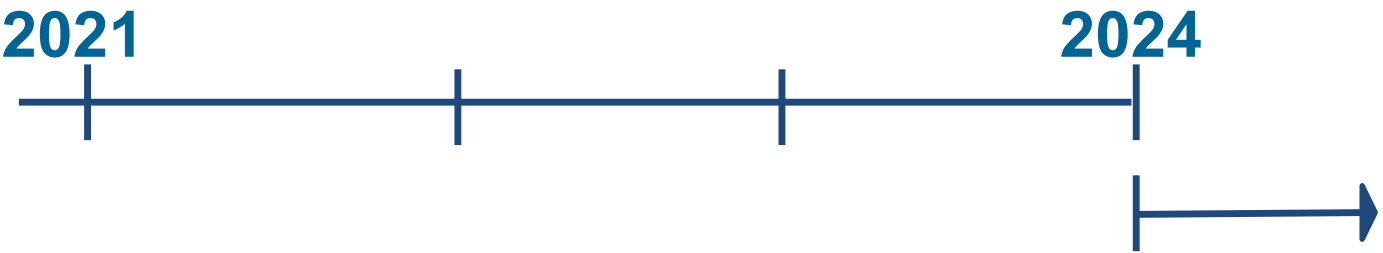
NFPA 99



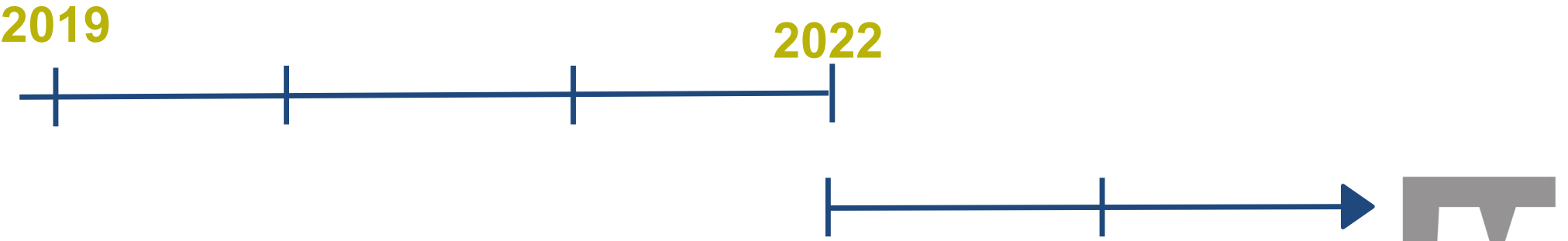
NFPA 70
(install)



NFPA 99
(perform)



NFPA 110
(maintain)



NEC 2023 Public Input

- **517.30 Sources of Power.**
- **(A) Two Independent Power Sources.**
- Essential electrical systems shall have a minimum of the following two independent sources of power: a normal source generally supplying the entire electrical system and one or more alternate sources for use when the normal source is interrupted.
[99:6.7.1.1.2-2]
- **(B) Types of Normal Power Sources.**
- Normal power sources shall be permitted to be any of those specified in 517.30(B)(1) through (B)(4):
 - (1) Utility supply power
 - (2) Generation Units
 - (3) Health Care Microgrid
 - (4) Fuel Cells

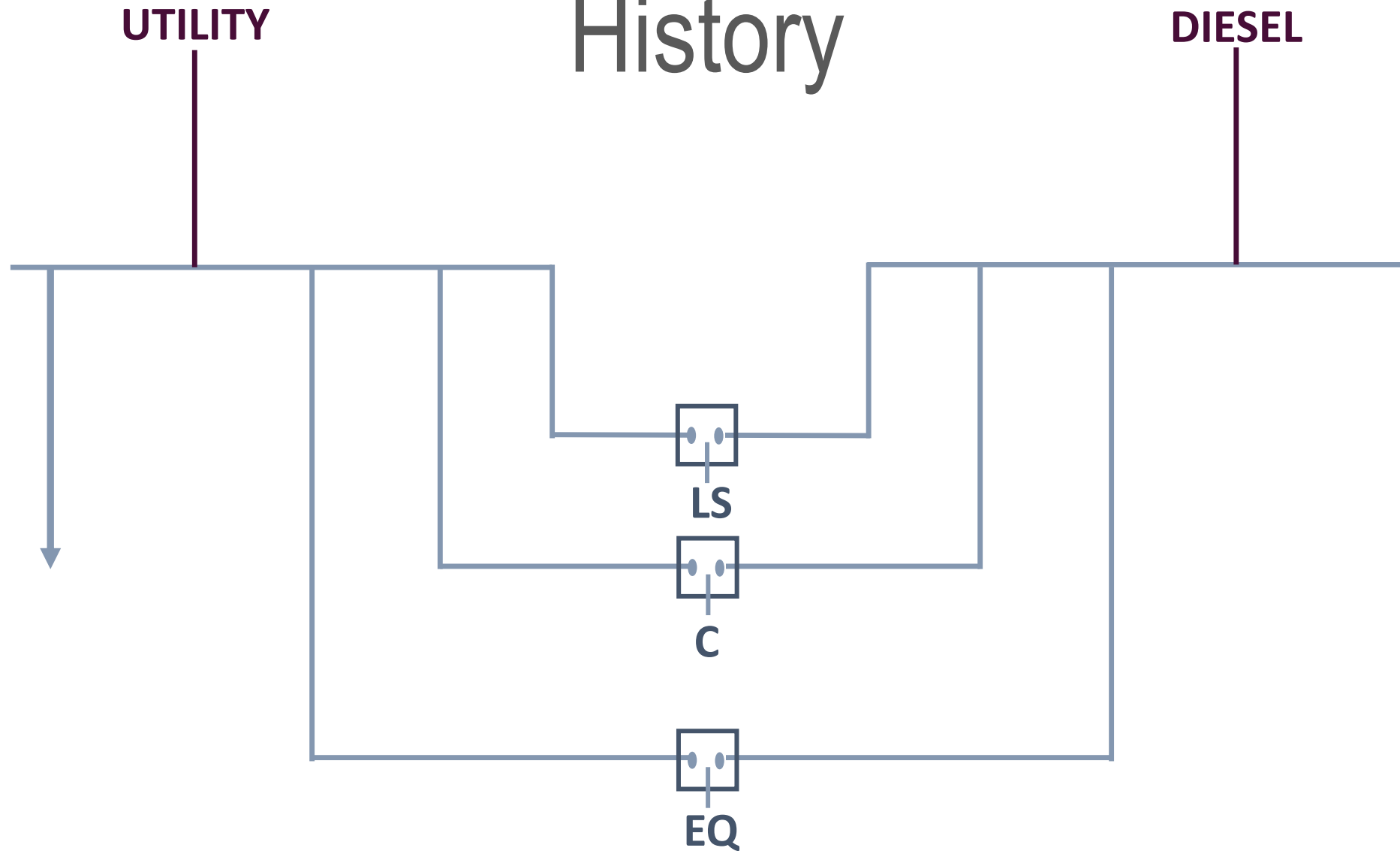


NEC 2023 Public Input

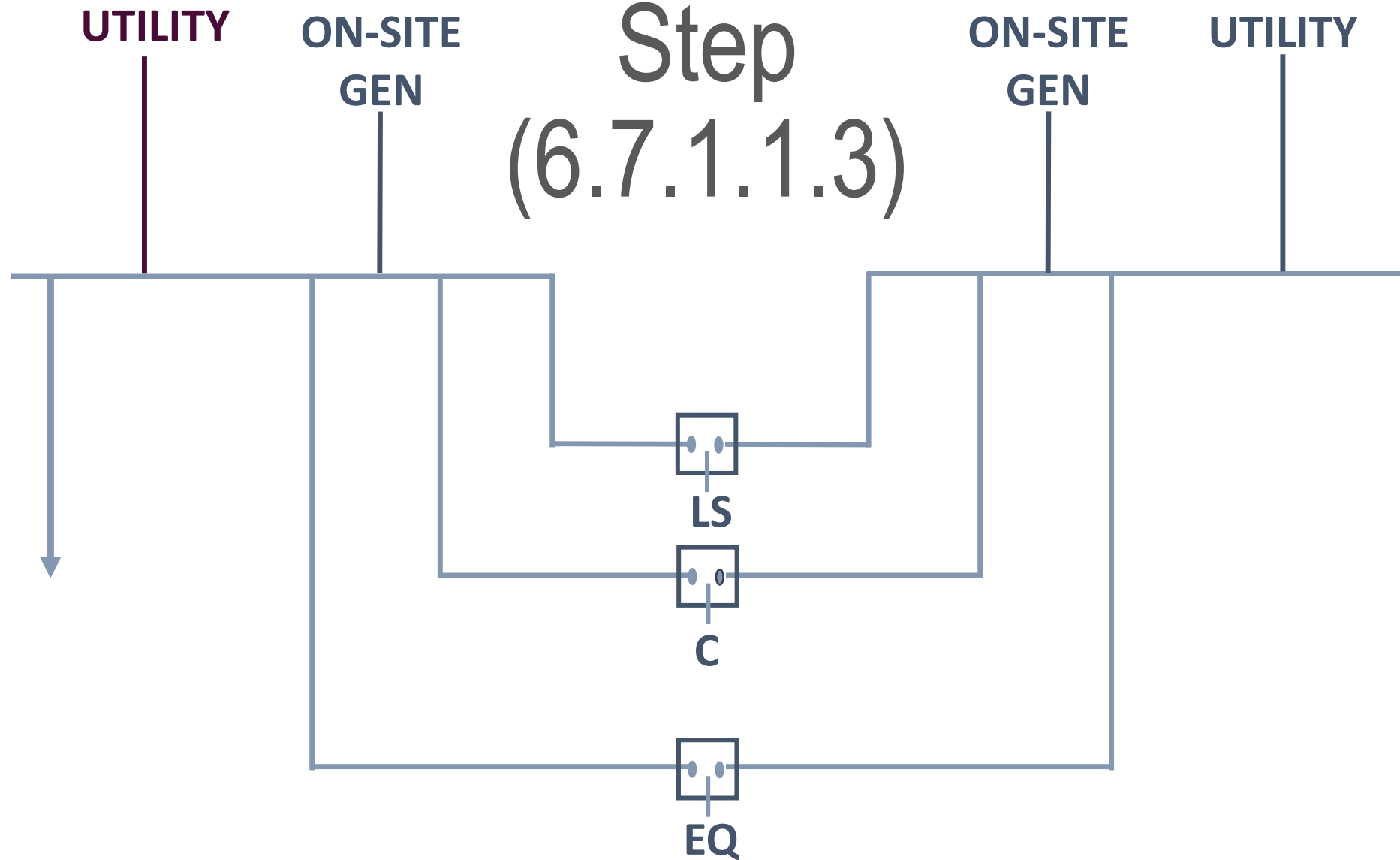
- **(CB) Types of Alternate Power Sources.**
- Alternate power sources shall be permitted to be any of those specified in 517.30(C)(1) through (C)(5):
- (1) Utility-Supply Power
- If utility Power is used as the normal source it shall not be permitted to be used as the alternate source unless permitted elsewhere in Article 517.
- Informational Note: See 517.35 and 517.45 where essential system loads can be supplied from dual sources of utility supply power.
- **(21) Generating Units.**
- **(32) Fuel Cell Systems**
- **(43) Energy Storage Systems. . . .**
- **(5) Health Care Microgrid.**
- (A) If health care microgrid power is used as the normal source it is not permitted to be used as the alternate source.
- (B) Essential electrical systems shall be permitted to be supplied by a health care microgrid that also supplies non-essential loads. The health care microgrid is permitted to share distributed resources with the normal system. Healthcare microgrid systems shall be designed with sufficient reliability to provide effective facility operation consistent with the facility emergency operations plan. Healthcare microgrid system components shall not be compromised by failure of the normal source.
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- Informational Note: See NFPA 99, 2021 Health Care Facilities Code for information on health care microgrids,



Ancient History

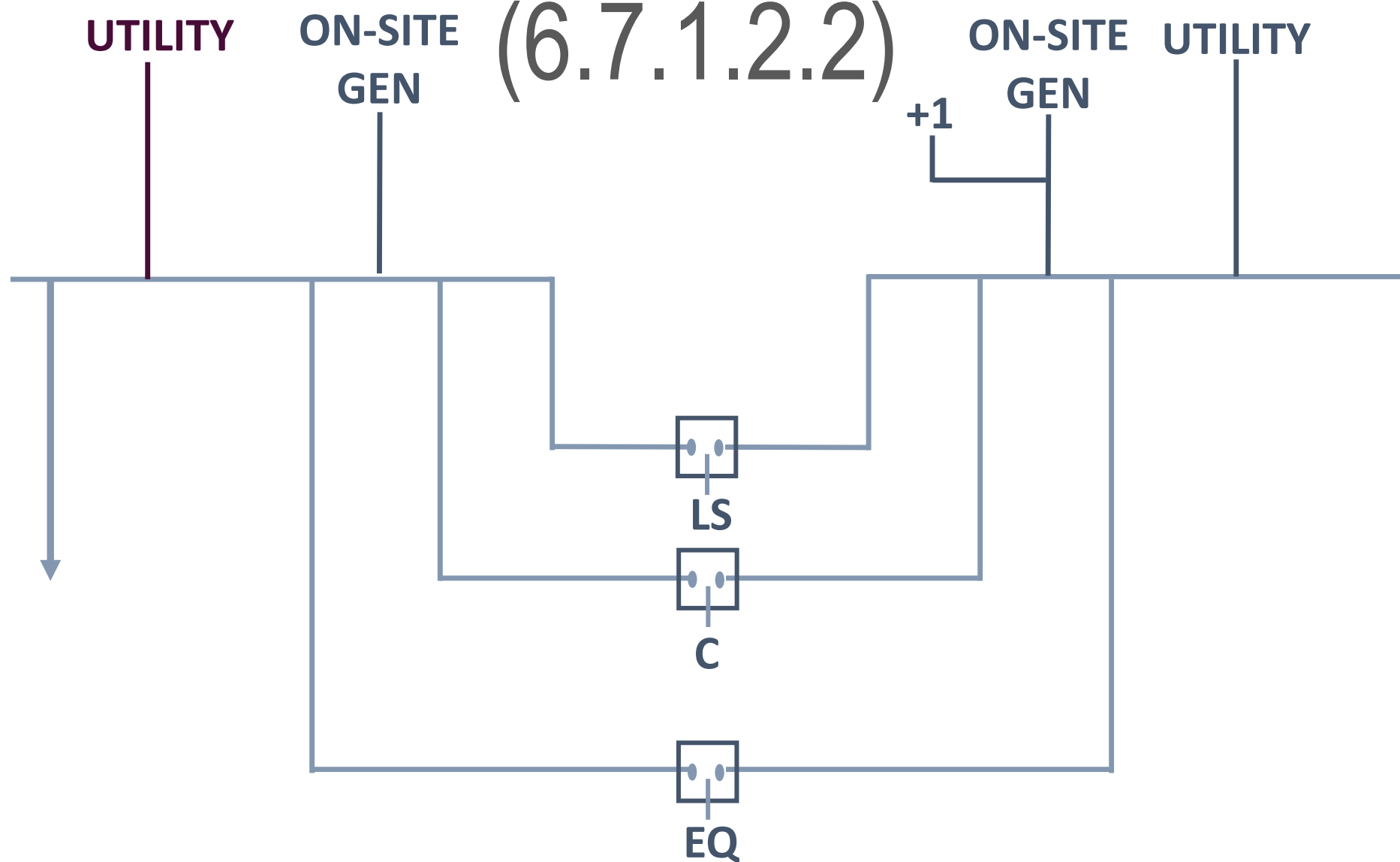


Next Step (6.7.1.1.3)



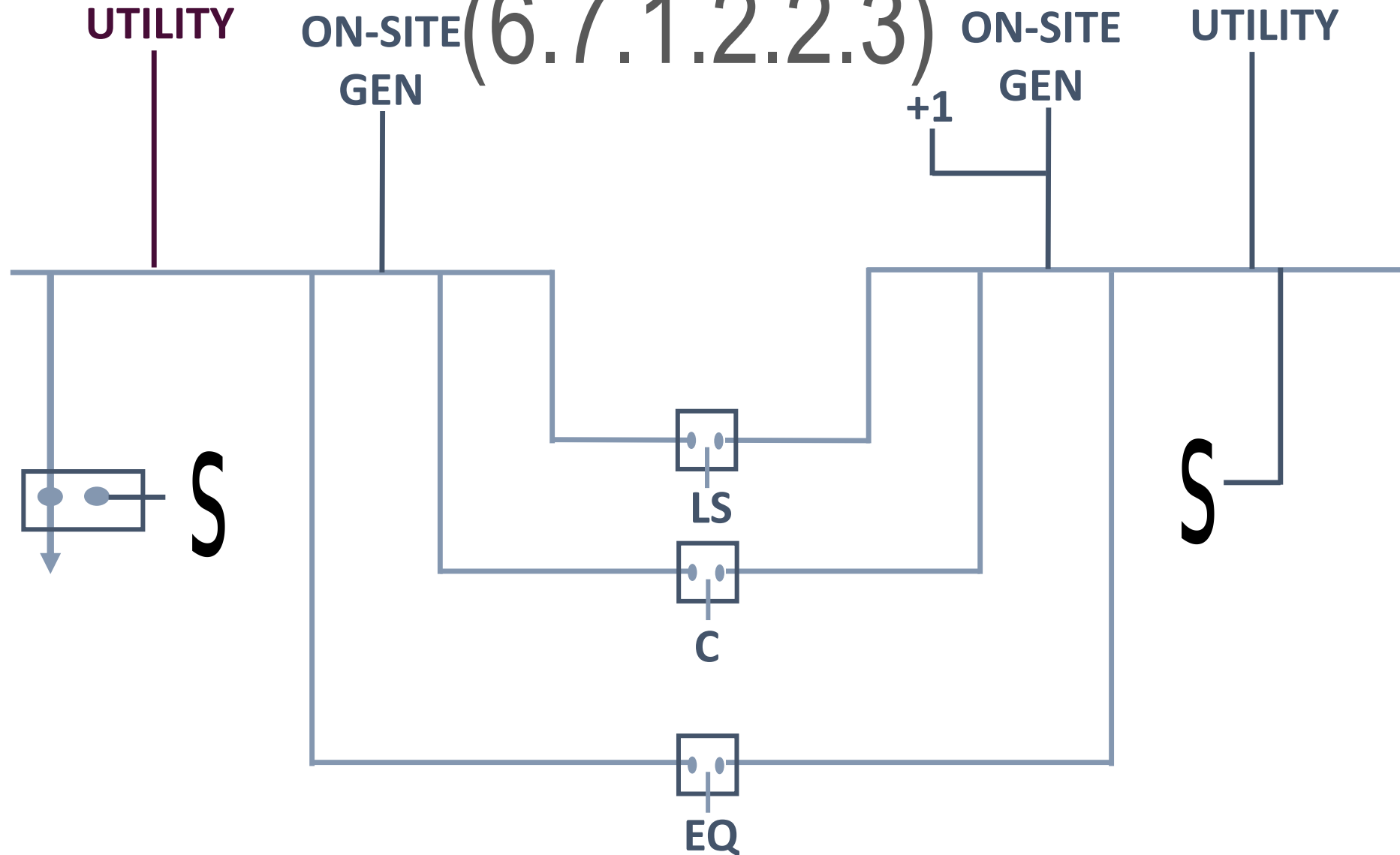
Next Next Step

(6.7.1.2.2)



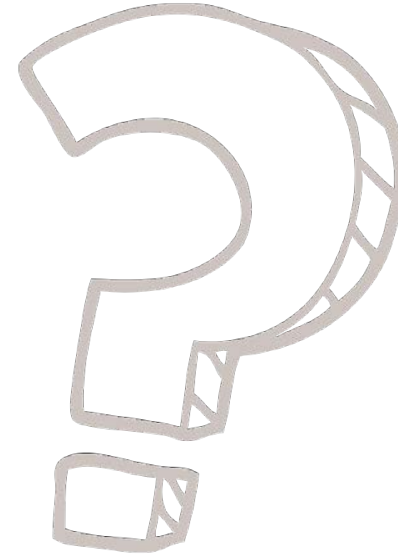
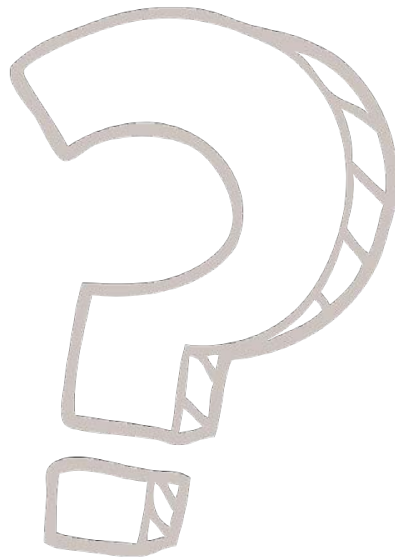
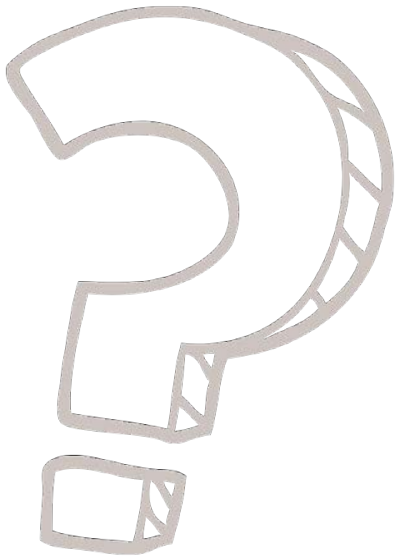
Next Next Next Step

(6.7.1.2.2.3)



What is “Normal” Power?

- Utility ? NO
- Something that runs most of the time ? NO



Kaiser Richmond, CA - MICROGRID





What is “Normal” Power?

- Utility ? NO
- Something that runs most of the time ? NO
- **Source that serves some loads that do not need redundant power sources**



Power Sources re Loads Served

Normal Loads

- Only 1 power source
- MAY have multiple sources

vs.



Essential Loads

- Min. 2 power sources ++
- L&S will NOT suffer 10 seconds w/out power
- Some on-site capacity





Is the source PART
of the system?



3.3.52* Essential Electrical System.

~~A system comprised of alternate power sources and all connected distribution systems and ancillary equipment, designed~~ A distribution system designed to ensure continuity of electrical power to designated areas and functions of a health care facility during disruption of normal power sources, and also to minimize disruption within the internal wiring system upon loss of one of the on-site or off-site sources with reliability and capacity sufficient to provide effective facility operation consistent with the facility's emergency operations plan . (ELS)

3.3.122 Nonessential Electrical Loads.

Those electrical loads of a health care facility that do not require multiple power sources.

3.3.122 Nonflammable



3.3.149 Alternate Power Sources .

~~One or more generator sets, or battery systems where permitted, intended to provide power during the interruption of the normal electrical service; or the public utility electrical service intended to provide power during interruption of service normally provided by the generating facilities on the premises~~ A system of one or more off-site or one or more on-site power generation or storage components intended to provide power to nonessential loads and the essential electrical system . (ELS)

3.3.150 Pressure.



6.2.4 Location of ~~Essential~~ Electrical System Components.

6.2.4.1

~~Essential~~ ~~electrical~~ Electrical system components shall be located to minimize interruptions caused by natural forces common to the area (e.g., storms, floods, earthquakes, or hazards created by adjoining structures or activities).

6.2.4.2

Installations of electrical services sources shall be located to reduce possible interruption of ~~normal~~ electrical services systems resulting from ~~similar causes as well as~~ natural forces and to reduce possible disruption of ~~normal~~ electrical service systems due to internal wiring and equipment failures.

6.2.4.3

Feeders and associated raceways serving essential electrical system transfer equipment shall be located ~~to provide such that physical separation is provided between each~~ of the electrical system ~~feeders of the alternate source and from the feeders of the normal electrical source~~ to prevent possible simultaneous interruption.



6.7* Essential Electrical Systems.

6.7.1 Sources.

6.7.1.1* Design Considerations.

FR-947 [Hide Deleted](#)

~~Dual sources of normal power shall not constitute an alternate power source as described in this chapter~~ Essential electrical system loads shall be supplied by a minimum of two independent sources or sets of sources and sets of feeders designed to ensure sufficient reliability to provide effective facility operation consistent with the facility's emergency operations plan .

6.7.1.1.1

Current-sensing devices, phase and ground, shall be selected to minimize the extent of interruption to the electrical system due to abnormal current caused by overload or short circuits, or both.

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6.7.1.1.2

Essential electrical systems shall have a minimum of ~~the following two independent sources of power: a normal source generally supplying the entire electrical system and one or more alternate sources for use when the normal source is interrupted~~ two independent sources or sets of sources .

6.7.1.1.2.1

At least one source shall be on-site and sized to supply the entire essential electrical system.

6.7.1.1.2.2

The additional source(s) shall be permitted to be either on-site or off-site.

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6.7.1.1.3

~~Where the normal source of power consists of generating units on the premises, the alternate source shall be either another generating set or an external utility service.~~



6.7.1.2.2 Use for Essential Electrical System.

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6.7.1.2.2.1

The ~~alternate~~ power source supplying the essential electrical system shall be either reserved exclusively for such service or ~~normally~~ used for other purposes of peak demand control, internal voltage control, load relief for the external utility, cogeneration, or other approved uses.

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6.7.1.2.2.2*

~~An essential electrical system(s) shall~~ Each independent source or sets of sources supplying the essential electrical system shall be designed to meet the maximum demand likely to be produced by the connected load and be consistent with the facility's emergency operations plan ~~with any single power source of the system out of service~~.

6.7.1.2.2.3*

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(A)

~~Optional loads~~ Sources supplying the essential electrical system shall be permitted to ~~be served by the essential electrical system generating equipment supply optional loads~~.

(B)

Optional loads shall be served by their own transfer means, such that they will not be transferred onto the generating equipment if the transfer would overload the equipment and will be shed prior to a generating equipment overload.

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(C)

~~Use of the generating equipment to serve optional loads shall not constitute "other purposes" as described in 6.7.1.2.2.1 and, therefore, shall not require multiple generator sets.~~



6.7.1.2.4* Capacity and Rating.

The ~~generator set(s) shall~~ essential electrical system source or sets of sources shall have the capacity and rating to meet the maximum demand likely to be produced by the connected load ~~of the essential electrical system(s)~~ and be consistent with the facility's emergency operations plan.

FR-954 [Hide De](#)

6.7.1.2.5 Load Pickup.

The ~~energy converters~~ source or set of sources shall have the required capacity and response to pick up and carry the load within the time specified in ~~Table 4.1(b)~~ Table 6.11.1(b) of ~~NFPA 110~~ after loss of primary power upon failure of the other source or set of sources.

6.7.1.2.6 Heating, Cooling, and Ventilating

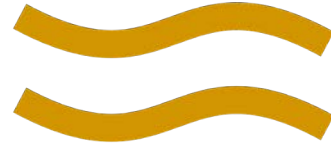


NFPA 99 - 2021

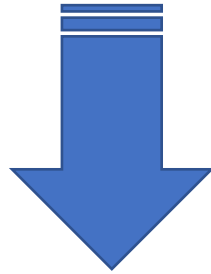
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MICROGRIDS



ENERGY CODES



Prescriptive



Performance





Walt Vernon, PE
Principal

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