Informational Note: An example of a set of sources may be several generators that combined serve the entire EES.

Δ **(B) Power Sources for the EES.** Power sources for the EES shall be permitted to be any of those specified in 517.30(B)(1) through (B)(5).

N **(1) Utility Supply Power.** Where utility power is used as the normal source, utility power shall not be used as the alternate source unless permitted elsewhere in this article.

Informational Note: See 517.35 and 517.45 for essential system loads that can be supplied from dual sources of utility supply power.

Δ **(2) Generating Units.**

Δ **(3) Fuel Cell Systems.** Fuel cell systems shall be permitted to serve as the alternate power source for all or part of an EES. [**99:**6.7.1.5.1]

(a) Installation of fuel cells shall comply with the requirements in Parts I through VII of Article 692 for 1000 volts or less and Part VIII for over 1000 volts.

(b) N + 1 units shall be provided where N units have sufficient capacity to supply the demand load of the portion of the system served.

(c) Systems shall be able to assume loads within 10 seconds of loss of normal power source.

(d) Systems shall have a continuing source of fuel supply, together with sufficient on-site fuel storage for the essential system type.

(e) Where life safety and critical portions of the distribution system are present, a connection shall be provided for a portable diesel generator.

Informational Note: See NFPA 853-2020, *Standard for the Installation of Stationary Fuel Cell Power Systems*, for information on installation of stationary fuel cells.

N **(4) Energy Storage Systems.** Energy storage systems shall be permitted to serve as the alternate source for all or part of an EES.

Informational Note: See NFPA 111-2022, *Standard on Stored Electrical Energy Emergency and Standby Power Systems*, for information on the installation of energy storage systems.

N **(5) Health Care Microgrid.** EES shall be permitted to be supplied by a health care microgrid that also supplies nonessential loads. The health care microgrid shall be permitted to share distributed resources with the normal system. Health care microgrid systems shall be designed with sufficient reliability to provide effective facility operation consistent with the facility emergency operations plan. Health care microgrid system components shall not be compromised by failure of the normal source.

Informational Note: See NFPA 99-2021, *Health Care Facilities Code, for information on health care microgrids.*

(C) Location of EES Components. EES 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). [**99:**6.2.4.1]

Δ **(1) Services.** Installation of electrical service distribution equipment shall be located to reduce possible interruption of normal electrical services resulting from natural or manmade causes as well as internal wiring and equipment failures.

(2) Feeders. Feeders shall be located to provide physical separation of the feeders of the alternate source and from the feeders of the normal electrical source to prevent possible simultaneous interruption. [**99:**6.2.4.3]

Informational Note: Facilities in which the normal source of power is supplied by two or more separate central station-fed services experience greater than normal electrical service reliability than those with only a single feed. Such a dual source of normal power consists of two or more electrical services fed from separate generator sets or a utility distribution network that has multiple power input sources and is arranged to provide mechanical and electrical separation so that a fault between the facility and the generating sources is not likely to cause an interruption of more than one of the facility service feeders.

517.31 Requirements for the Essential Electrical System.

(A) Separate Branches. Type 1 essential electrical systems shall be comprised of three separate branches capable of supplying a limited amount of lighting and power service that is considered essential for life safety and effective hospital operation during the time the normal electrical service is interrupted for any reason. The three branches are life safety, critical, and equipment.

The division between the branches shall occur at transfer switches where more than one transfer switch is required. [**99:**6.7.2.3.1]

(B) Transfer Switches. Transfer switches shall be in accordance with one of the following:

(1) The number of transfer switches to be used shall be based on reliability and design. Each branch of the essential electrical system shall have one or more transfer switches.

(2) One transfer switch shall be permitted to serve one or more branches in a facility with a continuous load on the switch of 150 kVA (120 kW) or less. [**99:**6.7.6.2.1.4]

Informational Note No. 1: See NFPA 99-2021, *Health Care Facilities Code*, 6.7.3.1, 6.7.2.2.5, 6.7.2.2.5.15, and 6.7.2.2.7, for more information on transfer switches.

Informational Note No. 2: See Informational Note Figure 517.31(B)(1).

Informational Note No. 3: See Informational Note Figure 517.31(B)(2).

In larger health care facilities, 517.31(B) requires one or more transfer switches to supply each branch of the essential electrical system. In a small health care facility with an essential load not exceeding 150 kilovolt-amperes, the essential electrical system can be served by a single transfer switch that can handle all loads. This is based on the assumption that the alternate source of power is sufficiently large to handle the simultaneous transfer of all systems in the event of a normal power loss.