Backup Power/Generator Supply

The concept of resilience, when applied to facilities, calls for consideration of how the facility will function during and after a disaster. Code-mandated emergency power systems are not required to operate a station's key functions. As such, stations may require additional emergency power to operate during and after an emergency. Fossil fuel powered generators are reliable and typically used for building power generation in case of an outage. This measure focuses on these types of back-up power generators specifically.

Relation to Adaptation and Resiliency

Backup power/generators are essential for critical operations and equipment needed during emergency events and increasing redundancy.

Benefits

Backup energy equipment, such as a diesel-based generator or any other fossil fuel-based generator, quickly stabilizes a station's electrical loads and enable the continuous operation of critical equipment (loads).

Limiting Factors (Constraints)

Fossil fuel-based generators has negative impacts on air quality and the environment. Criteria air and greenhouse gas pollution levels depend on fuel and equipment type. These generators can also lead to a low level of disturbance in their surroundings due to the noise levels they emit (though these conditions vary according to the specifications and size of the machine). In addition, before installing this type of solution for backup power in case of failure, it is necessary to evaluate the place where the equipment is planned to be installed, since the minimum space and air flow must be guaranteed for the correct cooling of the equipment as indicated each manufacturer and national regulations.

Design & Preliminary Costs

o Original Equipment Manufacturer (OEM) recommendations and environmental law require space and air flow design criteria to ensure proper equipment cooling and staff safety.

o Design considerations include harmonic contamination the generator will be subjected to, the peak load that the generator can feed, the maximum period of failure for the equipment being fed by the generator, and the calculation and installation of an inertia block

o Consider the chosen generation location prior to installation. If on a high structure, the corresponding structural calculation must be considered for the type of load that the generator will carry.

Preliminary costs range between $200 and $500 per KW plus required civil adaptations (e.g. the inertia block) depending on location (Source: The estimation of this value comes from the average cost from the most recognized manufacturers including CAT and Cummins).

Permits & Approvals

- Complete MDE Form 42: Application for Emergency Generators
- And/or for diesel-fired emergency generator set rated at 500 brake horsepower or greater certified by the US EPA, complete MDE Diesel-Fired Emergency Generator application under Air Quality General Permits to Construct Application Forms

Implementation

May be immediately implemented once the necessary infrastructure is available, such as the transfer panels, conduits, and feeders. Consideration should be given to the quantity of fuel that will be needed to guarantee operations of critical equipment in case of an emergency. A fuel storage location will need to be identified that can hold the amount necessary, the location of the corresponding fuel tank(s), and the methods of containment in the event of a fuel spill. It is also worth considering the type of automatic transfer that will be used to power the load.

Maintenance Requirements

The level and frequency of maintenance is specified and recommended by each manufacturer. However, regular generator maintenance routines should include tasks such as: checking fluids, changing oil and filters, and checking battery levels. In addition, maintenance should include the periodic start-up of the machine for a period 15 minutes or longer, or as recommended by the manufacturer. This ensures the movement of fuel and avoids a buildup of sediment in the machine.

Useful Life

Depending on manufacturer, operating time of the equipment and the percentage of load of its nominal capacity, and maintenance, generators can usually last around 25 to 30 years depending on the manufacturer.

References/Specifications

o National Electric Code (NEC) – National Fire Protection Agency (NFPA) 70 2014 *(Subscription required for access)*

o International Building Code (IBC) 2015, https://codes.iccsafe.org/content/IBC2015

o NFPA 110 (standard for emergency and standby power systems) *(Subscription required for access)*

o Federal Emergency Management Agency (FEMA) P-1019, https://www.fema.gov/media-library-data/1424214818421-60725708b37ee7c1dd72a8fc84a8e498/FEMAP-1019_Final_02-06-2015.pdf