Engineers for Risk Management

Engineers can help plan for and mitigate emergency situations such as damages from wind, water and power outages. We would like to address relevant topics that will assist our Clients and Web Site viewers in understanding the issues and options they have available to them to better survive these events.

Topic 1: Communications and Emergency Power

In the aftermath of Hurricane Sandy, building and property owners in the New York/ New Jersey metropolitan area face the reality of dealing with the likelihood of similar catastrophic events leading to major infrastructure damage and tenant displacement.

While some of the issues presented by a major hurricane or similar natural disaster cannot be handled at the individual building level, there are many precautions that can aid an individual building and its tenants to better cope than an unprepared building.

In our electronically connected information world, one thing more than any which signifies how we feel about a threatening situation is the ability to communicate. No matter how dire a situation may be, the ability to communicate to the outside world and in turn receive communications can not only bring some comfort but also saves lives and help mitigate other issues. In order to receive uninterrupted communications, the devices we use require electricity. Electricity is needed to recharge phone batteries, to power cell towers, and the internet backbones. Electricity also powers the various safety devices in a building including fire and storm water pumps, emergency lighting, etc.

The first thing building operators can implement is a plan for Emergency Communications (this will be covered in a subsequent article) and by direct inference backup electric power that can be crucial in the immediate hours and subsequent days after an event strikes.

In the case of the situation after Superstorm Sandy, it is already conclusive that malfunctioning emergency power systems have been a serious contributor to property damage (with possible injury or loss of life) along with loss of communications. In many buildings that had emergency generators, these were not adequately maintained and failed for a variety of reasons. In some cases, fuel tanks and pumping systems that were located in the basements of buildings were flooded or otherwise water damaged and did not supply the generator with fuel for continued operations. These are the situations where more foresight, maintenance, and in some cases, a redesign of the system is required.

Gas or Diesel Powered Generators:

These generators are in wide spread use and are frequently specified because they can be placed and operated in a variety of locations to serve the building's emergency backup needs.

An existing generator should be checked to confirm that it can adequately handle the emergency loads it will be required to service. With changing times and increased building usage, the first order of business is to verify that the generator is still sized correctly for the loads that are considered essential

to the building's emergency operations and that it can run for the length of time that is considered appropriate for your building type.

The second order is to ensure adequate fuel supplies are on hand to provide for the continuous emergency run time anticipated/required and to confirm, as was made abundantly clear after Sandy, that the generator unit has fuel supplies, operating controls (including transfer switches) and fuel pumps that can withstand sea water and flooding and continue to operate.

Diesel generators, like any car engine, require periodic maintenance to operate correctly. Manufacturer's literature specifies these requirements. Another good source of information is NFPA® 110 Standard for Emergency and Standby Power Systems, published by the National Fire Protection Association. This publication contains valuable information on how to classify a building by its Emergency Power Supply Systems (EPS) needs and what equipment is covered by an EPS system. It goes on to specify how such a system should be designed, and finally what operations and maintenance steps need to be taken.

An excerpt from NFPA 110 of some of the items that a generator should be checked for is as follows:

EPSS Operation and Testing *

	Performed by										
Item*	**Date**										
	Fill in Appropriate Readings										
1. Maintenance schedule											
2. RTM											
3. Power fail											
4. T/D start											
5. Crank time											
6. Transfer											
7. (a) ac voltage											
(b) Hz											
(c) ac amperage											
(d) ac kW											
8. (a) Oil pressure											
(b) dc amperage											

*Representative section of checklist from NFPA 110.

The testing of a generator will require the use of load banks which are portable electrical loads that can put a generator through its paces to simulate various loading conditions that the generator will face under a real emergency condition. The time it takes for the generator to respond and its characteristics when loaded, such as the power output, fuel consumption, etc. can indicate whether the generator is operating per the manufacturer's specifications and if not, provide guidance on what needs to be fixed.

The second critical issue is to ensure that the other components the generator needs to function properly such as transfer switches, fuel pumps and tanks, etc. are also functioning properly and are able to withstand the effects of flooding or other harsh elements that it may be exposed to.

Natural Gas Powered Generators and Battery Power Systems

If your building has access to natural gas lines, this is an attractive option to a diesel or gas powered generator as the fuel is generally considered "uninterruptable" as gas flow is rarely disturbed . However such systems must also be periodically maintained and exercised for optimal performance during emergencies. The NFPA 110 guidelines cover such generators as well.

Battery powered systems are another alternative, especially for individual owners in multifamily dwellings where other options are not allowed by the laws governing coop or condo association. These units can be sized to provide essential power and are charged by the normal utility power for use in an emergency.

Conclusion

Planning for Emergency Power Supply for a building and its tenants is a critical first step in Emergency Preparedness and Risk Mitigation.

Please inquire how RO's Engineers can be a part of your Emergency Management Team and help you be better prepared in the future.