

Keeping the Power On

Survey shows EES systems highly reliable

By Jonathan Flannery, CHFM, FASHE, MHSA, ASHE senior associate director of advocacy

ASHE has conducted three surveys regarding the effectiveness of essential electrical systems (EESs) over the past few years—one focused on facilities affected by a single natural disaster, Hurricane Sandy.

Another more recent survey focused on utility outages experienced by hospitals across the nation, and a follow-up survey was sent to garner more information. The results of the surveys show that EESs are highly reliable and that most hospitals have their generators and fuel storage above the design flood plain. In light of Hurricane Sandy and other flooding events that have raised concerns about hospital emergency preparedness, this data tells an interesting story about the reliability of hospital EESs.

A key take away from these surveys is that regardless of whether power is affected by large-scale natural disasters or small-scale abnormal events such as unplanned utility outages, hospital facility staff and their detailed approach to emergency preparedness, training, and routine maintenance and operations provide reliable essential utility systems. These efforts help our nation's hospitals provide healing to those in need and provide essential lifesaving utilities to thousands of patients every day.

ASHE distributed the most recent survey in July to 1,558 professional active members via e-mail and received 258 responses for a return rate of 16.5 percent. The survey included questions about utility outages and EES performance during a three-year time period of July 1, 2011, through June 30, 2014.

About 75 percent of respondents had four or fewer generators within their EES, while only 1.5 percent had 20 or more generators servicing their EES. One facility had 51 generators supporting the EES. Our survey also found that about 60 percent of EESs included loads that exceeded code requirements.

The survey found that, on average, health care facilities experience about one utility outage per year. For the 370 power outages documented through the survey, the EES worked properly—transferring power within the proper timeframe, starting up successfully, and providing power throughout the outage—the vast majority of the time. The start-up reliability of EESs was 98.65 percent (five failed to start-up properly). The duration reliability was 97.57 percent (four failures occurred after start-up).

Nine unanticipated EES failures were reported in the survey: five were attributed to a failure of the automatic transfer switch (ATS), one was attributed to a failed hose, one to a coolant leak, one to overheating of a single generator, and one to a failure of the turbo in one of the generators. Of these nine EES failures, seven caused partial EES outages while two caused complete outages. Both of the complete facility EES outages were caused by ATS failures. Of the seven partial EES outages, three were due to ATS failures, three were

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continued on page 15





Essential electrical systems (EESs) survey: Distributed to ASHE professional active members with 258 responses. The follow-up EESs survey received 54 responses.

Hurricane Sandy survey: Distributed to ASHE members and nonmembers in area affected by Hurricane Sandy.



UTILITY OUTAGES

The EES survey asked respondents about the number of power outages their facilities have experienced within the three-year period.

86

Facilities experienced no outages in a three-year period

43

Facilities experienced 6 or more outages

14

Facilities experienced 12 or more outages

31

Total outages—the highest number reported by a single facility.

NUMBER OF GENERATORS

The EES survey shows the number of generators at the facilities surveyed.

47

Facilities had one generator

70

Facilities had two generators

49

Facilities had three generators

27

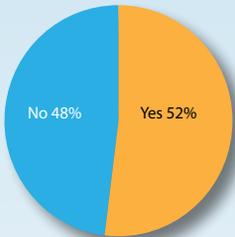
Facilities had four generators

4

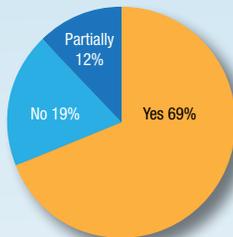
Facilities had more than 20 generators

EES OPERATIONS

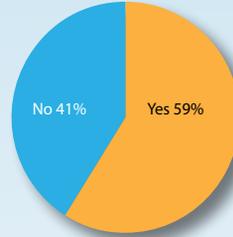
The EES survey included the following data on whether facility EES were paralleled, had remote monitoring capability, included items not required by codes, or participated in peak shaving programs.



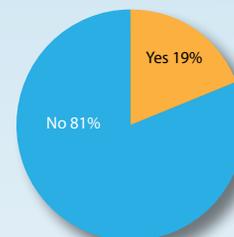
Paralleled



Remote Monitoring



Non-Required Load

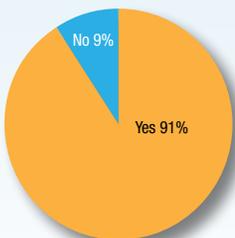


Peak Shaving

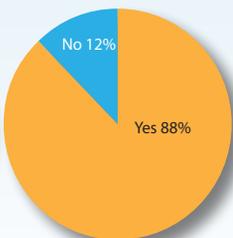
FLOOD PLAIN AND EMERGENCY EQUIPMENT

Both the EES survey and the Hurricane Sandy survey showed that most facilities keep generators, auxiliary equipment, and fuel above the flood plain.

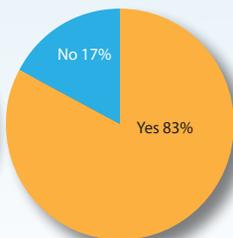
EES Survey



Generator Above

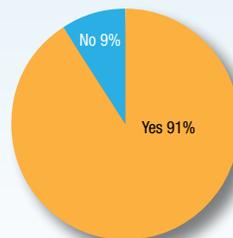


Aux Equipment Above

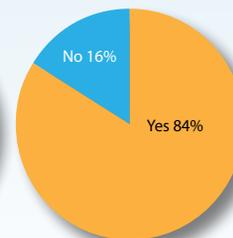


Fuel Storage Above

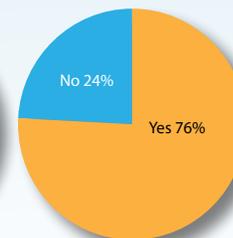
Sandy Survey



Generator Above



Aux Equipment Above

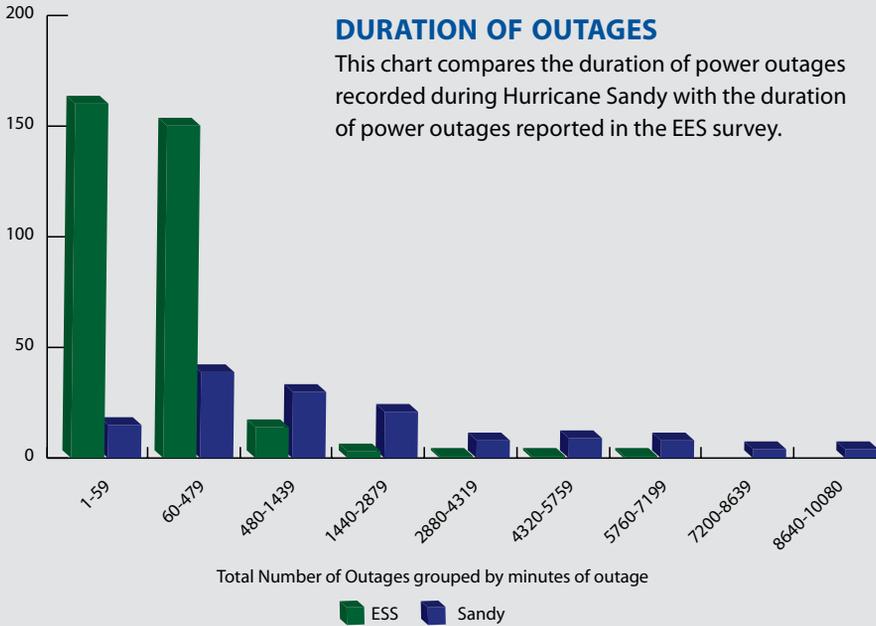


Fuel Storage Above

RELIABILITY

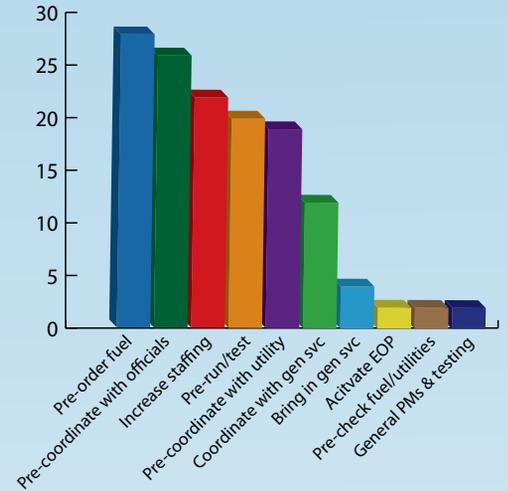
This table shows the reliability of EESs as reported by both the EES survey and the Hurricane Sandy survey.

	EES	Sandy
Total Reported Power Outages	370	172
Successful EES Startups	365	162
Failed Startups	5 (1.35%)	10 (5.8%)



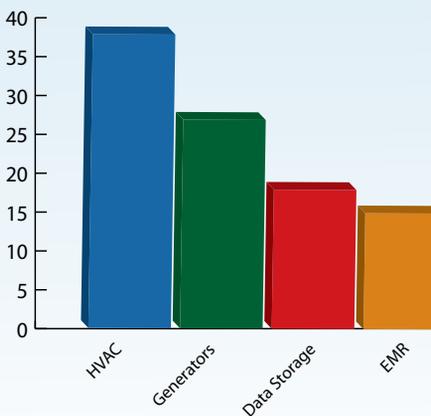
PRE-STAGING ACTIVITIES

When severe weather is expected, such as a hurricane or flood, what specific pre-staging of resources do you implement?



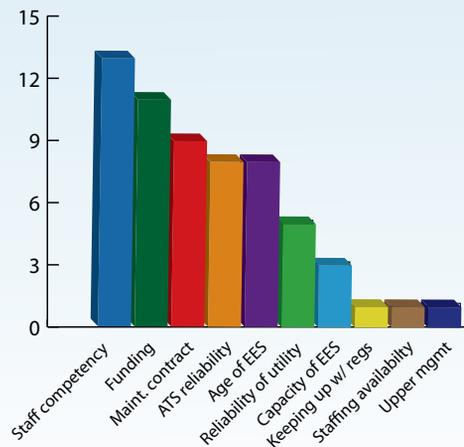
REMOTE MONITORING

Is remote monitoring by hospital staff or third party vendors taking place for any of the following systems in your hospital?



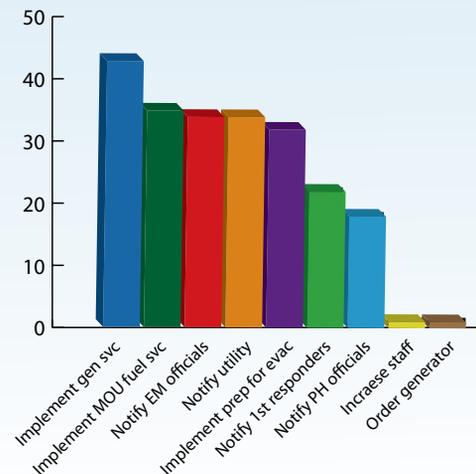
CHALLENGES

Select up to three of the biggest challenges you face in maintaining backup power systems for your hospital.



PROTOCOLS DURING POWER OUTAGES

If your backup power for your health care facility is threatened for any reason or had failed due to lack of fuel, mechanical problems, etc., which of the following protocols do you have in place?



caused by cooling system failures, and one was due to a turbo failure.

A follow-up survey with additional questions on preparation was sent to 128 respondents of the EES survey, and that follow-up survey received 54 responses. The follow-up survey found that when severe weather like a hurricane or flood is expected, 52 percent of respondents pre-order fuel, 48 percent pre-coordinate with officials, and 41 percent increase staffing. In addition, 70 percent said they had remote monitoring by hospital staff or third party vendors for HVAC systems, while 50 percent said they remote monitor generators.

Comparing the data from the EES and follow-up survey to the data from the previous survey after Hurricane Sandy, we can see just how important it is for facilities to make EESs and generator testing a high priority. Hospitals experience an average of one utility outage a year, and the likelihood natural disasters occurring is ever increasing. As the Hurricane Sandy survey shows, long-term utility outages are a real possibility during a natural disaster. Considering these factors, it is clear that having a robust and ready EES is vital to the health and wellbeing of our patients.

The survey completed after Superstorm Sandy got responses from 390 health care facilities. Unlike the most recent survey, the earlier survey was sent to both ASHE and non-ASHE members and was limited to hospitals within the storm's path.

Of the 390 respondents, 138 said their facility lost normal utility power, ranging from a loss of less than one hour (experienced by 10 percent of facilities) to an outage of 168 hours (experienced by 1 percent of facilities). Of the 138 facilities that lost normal utility power, 13 reported that critical equipment did not transfer to emergency backup power within the 10-second period required by codes, and 24 others reported a problem with the backup power system before normal power was restored. Nine of these unanticipated outages were due to fuel system failures, while four were due to failures of cooling systems. Sixteen of the

24 unanticipated outages lasted for less than one hour, while four lasted longer than 96 hours.

Yet, despite these issues, not one of the 138 facilities surveyed required an evacuation due to loss of power. This shows the importance of detailed emergency management planning. Even when backup systems didn't work as expected, the hospitals successfully managed the situation and provided the needed care for their patients, remaining a viable resource to the

communities they serve during a desperate time.

Both surveys show that hospital systems are generally well prepared for emergency events involving power loss. Consider your own facility's experience with EES and power outages and use the charts and graphics in this article to see how your facility stacks up.

To let us know more about your experience with power systems, contact us at ashe@aha.org and put EES in the subject line. 



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