

MILE HIGH DICE – BACK UP POWER

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BACKUP POWER AGENDA

- 2017 Hurricane Season Items of Note
- Mitigation Considerations for your facility
 - Initial References
 - What Do You Desire To Be Energized?
 - Permanent Backup Generator Considerations
 - As-needed Backup Generator Considerations
 - Consider a Transfer Switch
 - Devil in the Details
 - FEMA Power Pack Inventories
 - USACE/ESF #3 Mission Execution
- Attachment 1 – EPFAT IT Related Items
- Attachment 2 – EPFAT Information Paper



BACKUP POWER

2017 HURRICANE SEASON ITEMS OF NOTE

- Temporary Emergency Power challenges in Puerto Rico
 - Initial post-event Continuity of Government Operations was severely impacted
 - Many government officials homes and families also impacted
 - Multiple Puerto Rican Authorities had no real overall lead voice
 - Puerto Rico Electrical Power Authority (PREPA)
 - Puerto Rico Aqueduct and Sewer Authority (PRASA)
 - Puerto Rico Emergency Management Authority (PREMA)
- FEMA uses the Defense Logistics Agency (DLA) to augment their inventory by leasing/renting generators and DLA also can provide bulk fuels from the commercial market.
- DLA leased/rented 1150 +/- generators to support unmet needs in PR after Hurricane Maria. That additional number DID NOT meet all identified unmet power requirements.



BACKUP POWER

2017 HURRICANE SEASON ITEMS OF NOTE (CONT'D)

- USACE/ESF #3 (Emergency Support Function #3 – Public Works and Engineering) was also mission assigned to support refueling, servicing, and maintaining “non-Federal” generators, i.e., the existing backup generators already in place at facilities.
 - Under “normal” temporary emergency power missions we do this for limited numbers of generators
 - However, in PR we supported approximately 450 generators on top of the Federal generator installs
- Restoration of the Electrical Power Grid included electrical power generation, transmission, distribution, and eventually “The Last Mile” of residential/commercial electrical service drops including transformers, meter/service drop installation, and all connections.
 - NOTE: This is not a typical mission set for USACE/ESF #3

BACKUP POWER INITIAL REFERENCES

- Recommend taking the FEMA EMI on-line Independent Study (IS) course IS-815, “A-B-C’s of Temporary Emergency Power” (2 hour +/- basic overview)
- Also strongly recommend EPA “Power Resilience, Guide for Water and Wastewater Utilities (EPA 800-R-15-004)” be consulted.
- USACE STRONGLY encourages facilities owners use the Emergency Power Facility Assessment Tool” (EPFAT) to enter their facility generator requirements, connection materials required, and facility POC data.
 - In any power outage, be it Stafford Act supported or not, this EPFAT based data is available for use by the facility and local/State EMs for local procurement, Emergency Management Assistance Compact (EMAC), or possibly Water & Wastewater Agency Response Network (WARN) support.



BACKUP POWER

WHAT DO YOU DESIRE TO ENERGIZE?

- For any facility, the overall facility electrical load and configuration required.
 - Do you need/want to fully energize facility including and applicable HVAC?
 - “Industrial” type electrical motors in facility?
 - Hard Start or Soft Start?
 - Can the facility electrical loads be segmented <2MW.
 - Commercially available generators >2MW are VERY hard to come by.
 - Or is it a “commercial office” style of facility with no special electrical loads?
 - If for a waste water line, are individual generators required at every pump station, or will you leapfrog one unit along the line to cycle the line?



BACKUP POWER (CONT'D)

PERMANENT BACKUP GENERATOR CONSIDERATIONS

- Fuel
 - Typically diesel
 - Gasoline generators not recommended
 - Most renewable energy options are typically suited for small facility loads and require battery bank energy storage
 - 24 hour operations fuel tank capacity recommended (min)
 - **$0.07 \text{ gal/hr per KW} \times \text{generator KW size} \times 24 \text{ hours} = \text{gal/day}$**
 - **Example: $50 \text{ kW generator} \times 0.07 \text{ gal/kW} \times 24 \text{ hrs} = 84 \text{ gal/day}$**
- Connection should also disconnect facility from the electrical power grid when generator operates
- Maintenance! Maintenance! Maintenance!
- Many facilities just run the engine and do not exercise the generator!
 - Full load test a minimum of once per year. Quarterly better!
- Create cold electrical start procedures and guides for facility users



BACKUP POWER (CONT'D)

AS-NEEDED BACKUP GENERATOR CONSIDERATIONS

- Typically commercially rented/leased generators are diesel fueled
- Do you want to pay a retainer to ensure availability, or take availability chances upon need?
- Providers can typically assess the facility needs for you
- Will the provider install/refuel/service/maintain?
 - Facility owner may likely be responsible to provide fuel
- Are electrical hook up materials (conductor, lugs, grounding, etc.) included?
- Ensure installer disconnects facility from electrical grid
- 24-hr operations fuel tank capacity recommended (min)
- Create cold electrical start procedures and guides for facility users

- Service/Maintenance Notes: full filters (oil, air, fuel) and oil change after 240 operating hours whether a rental/lease or permanently installed unit (normal industry standard)



BACKUP POWER (CONT'D) CONSIDER A TRANSFER SWITCH

- Auto-transfer switch can typically be a component of a permanent backup generator IF facility use warrants this.
- Manual transfer switch **STRONGLY** recommended especially for as-needed generators. Why?
 - Electrical grid disconnection should be part of the transfer switch installation.
 - Simplifies generator connection materials and technical expertise requirements and standardizes generator placement location.
 - Shorter conductor lengths required
 - Ground rod built into installation
 - Does not require facility electrical panel disassembly, or transformer disassembly, to connect generator conductors to facility electrical system.



BACKUP POWER (CONT'D)

DEVIL IN THE DETAIL FACTORS

- Facility location and local environmental regulations may drive type of generator and when it can be operated
 - New generation of Type IV generator engines meet CA emission standards for non-emergency operations
 - However these require an additional fluid to be added to generator service/refuel intervals (DEF – Diesel Emission Fluid)
 - NOTE: Type IV engines are fairly readily available in units 200-250 kW and smaller. Current availability for >200-250 kW may be manufacturer specific.
- Diesel powered permanent generators will require fuel additive to limit potential algae growth in fuel. If fuel left untreated it will clog fuel system.



BACKUP POWER (CONT'D)

DEVIL IN THE DETAIL FACTORS (CONT'D)

- Does your agency/facility have a link or LNO with local EM organization?
 - Do you know the process to request a resource from Local/County/State if you do it outside WARN?
 - NOTE: Suring Sandy many utilities had no existing relationship with their local EMs and hence did not know the resource request process.
- Is there a Business EOC?



FEDERAL GENERATOR SUPPORT FEMA POWER PACK INVENTORIES

kW Size	Range Band	Pack
15 – 50kW	15-60kW	10
100kW	61-100kW	6
200kW	101-200kW	7
400kW	201-400kW	4
700kW	401-704kW	2
>1mW	705kW - >1mW	1
Total per pack		30

CONUS Locations: 4 x 30 Pack (120 generators/site)

Frederick, MD; Atlanta, GA; Ft. Worth, TX; Tracy, CA

OCONUS Locations: 3 x 30 Pack (90 generators/site)

Puerto Rico; Hawaii; Guam



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FEDERAL GENERATOR SUPPORT USACE/ESF #3 MISSION EXECUTION

- If, at the State/Tribes request, FEMA mission assigns USACE/ESF #3 to execute the temporary emergency power mission It is a turn-key mission. USACE, via their contractor, will haul, install, fuel, service, maintain, and de-install generators. USACE will also have the 249th Eng Batt assess facilities for generator needs and materials required to physically install the generator.
- USACE STRONGLY encourages facilities owners use the Emergency Power Facility Assessment Tool” (EPFAT) to enter their facility generator Requirements, connection materials required, and facility POC data.
 - In a power outage, Stafford Act supported or not, this data is available for use by the facility and local/State EMs if EMAC or WARN assistance is required.



Questions ? ? ?



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ATTACHMENT 1

EPFAT - IT RELATED ITEMS

- The EPFAT URL is: <https://epfat.usace.army.mil>
- NOTE: The user's computer may also need to have "DoD Certificates" loaded on it before it will allow them access to that website.
- Those DoD web certificates can be accessed, downloaded and installed on the user's computer from the following URL:
https://iasecontent.disa.mil/pki-pke/InstallRoot_5.2x32_NonAdmin.msi

