

Standby Generator Regulatory Update and Generator Application Design Considerations

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Purpose

- Touch on key regulatory issues which impact standby generators used in municipal wastewater and water facilities.
- To equip municipal personnel with knowledge and insight into the many factors to consider when specifying or selecting a standby generator system for water or wastewater applications.



EPA Regulatory Update

- Federal Register, Volume 78, No. 20
- Part IV
- 40 CFR Parts 60 and 63
- EPA-HQ-OAR-2008-0708, FRL-9756-4

- Seriously?



EPA Regulatory Changes

- Has dramatically tightened emissions standards for all generators, with the most stringent limits on engines used for “Prime Power.”
 - Power Plants
 - Remote sites (generator is only source of power).
 - Portable units – Yes, portable units (trailer mounted) must meet the same standards as a stationary unit running 24/7.



Portable Generators

- New portable generators must comply with what the EPA calls Tier 4, the most stringent requirements.
- Budget more \$\$\$\$
- Much more complex controls
- Rental operators report difficult cold weather operation for the first wave of Tier 4 design



Emergency Standby

- Essentially no changes for most standby generators, diesel or natural gas/propane.
- Emergency means only in the event of power loss (unlimited runtime + 100 hours for exercise and maintenance).
- Late changes to the rules allow for limited “Demand Response” use.
- Allowed to enter into a financial arrangement if you do not exceed the 100 hours.
- If time exceeds 100 hours, you must use Tier 4 equipment.



State of Wisconsin *Specials*

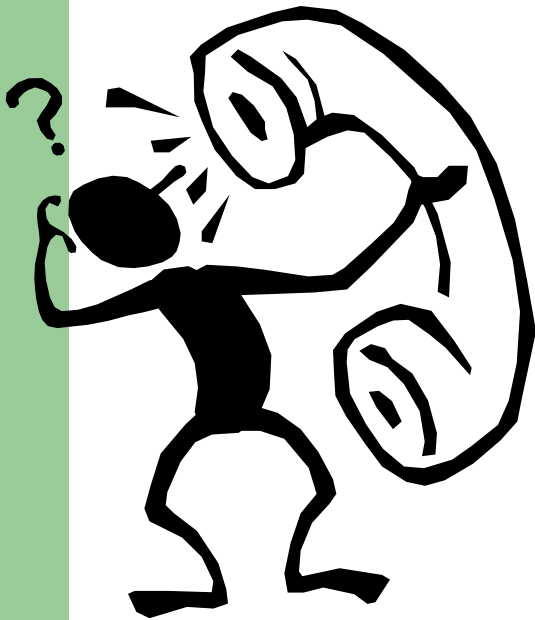
- SPS 310 – Flammable, Combustible, and Hazardous Liquid Codes
 - Covers Diesel Fuel Piping Permitting/Installation
 - “State Code” Tanks for outdoor diesel installations
- SPS 316.701 – Legally required Standby systems
 - Generator at least 10’ from most building types
 - Separate of 20 between the generator and outdoor transformer, metering, service or normal power distribution equipment.



Or...

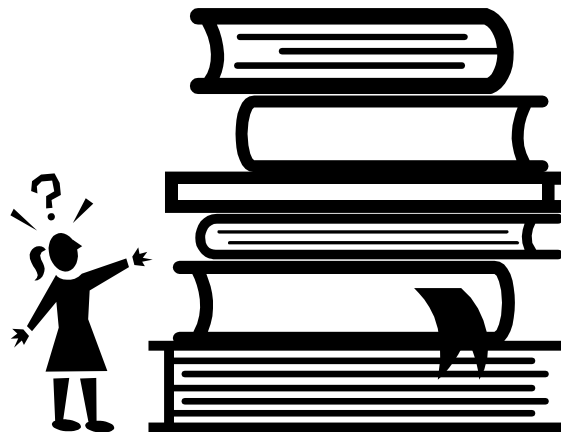
Got a minute?

I have a quick generator question.





- What other regulations do I need to know about? DNR? Any others?



REGULATORY REQUIREMENTS

- Wisconsin Administrative Codes
 - DNR / Commerce – Building, Fuel Storage, Electrical
- NFPA
- NEC
- Utility Company Requirements
- EPA
- UL – Underwriters Laboratories





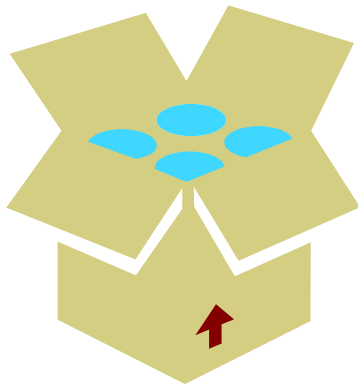
- Location
 - Location
 - Location
-
- Where should it go?



PACKAGING



- Indoor
- Outdoor
- Portable



Indoor

- BUILDING - Consider
 - HVAC
 - ELECTRICAL
 - FUEL STORAGE
- MAINTENANCE
 - EASY ACCESS
 - PROTECTED
- BETTER NEIGHBOR



Outdoor

- Clearances – As noted earlier
- Orientation



Consider the *prevailing winds*

- Enclosure Options
 - Weather, Sound, Walk-in



Portable

- Storage Location
- Tow Vehicle
- Loads to be Served
- Cords and Cord Storage
- Plug Configurations
- Voltage Selector Switch
- Standby Connections



Portable

- Loads to be Served
- Load Center
 - Other planned uses for your generator...



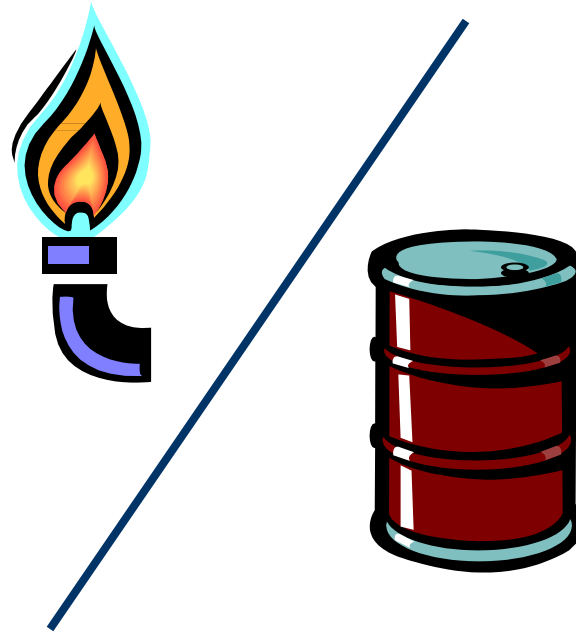


- What's the best fuel to use?
- Any recommendations?



FUEL

- Diesel
- Natural Gas
- LP
- Bi-fuel (NG/Diesel)



DIESEL

- Wisconsin Requirements for Fuel System
- Fuel Conditioning
- Exercise
- Impact of Recent EPA Requirements
- Sizing considerations



NATURAL GAS and LP

- Typically 125 KW and Below
- More easily (less cost) to make Tier 4 compliant
- Trailer mounted option (LP)
- Fuel Availability Considerations
- LP Back-up Option
 - Vaporizer may be required for low temp operation



BI-FUEL

- Natural Gas/Diesel Units Available
 - Starts on diesel, switches to blend
 - Must still consider reliability of NG supply
 - Significantly lower cost than NG units of certain sizes





- I was thinking about using the one that we have down at the garage...
do you think it will work?



PRODUCT GRADE



- Used/Surplus
- Residential/Commercial
- Industrial

USED/SURPLUS

- Age and Run Hours
- Availability of Parts and Service
- Design Life of Project vs. Equipment Life
- Cost of Testing and Refurbishment
- Evaluation of Risk/Benefit



RESIDENTIAL/ COMMERCIAL

- Construction Differences
- Fuel Options
- Generator/ATS Monitoring Contacts
- ATS Options
- Service and Support



INDUSTRIAL

- Product quality
- Service and Support
- Long Term Parts Availability





- So I have a couple of 20-horse motors.
Will a 30 kW be big enough?



It depends . . .



SIZING CONSIDERATIONS

- Motor and Load Types
- Motor Starter Types
- Load Control Strategies



MOTOR AND LOAD TYPES

- Motor Starting Code Letter
- Submersible Centrifugal Pumps
- High Inertia Loads
- VFD/AFD Applications
- Constant Torque vs. Variable Torque
- Single Phase Loading



MOTOR STARTER TYPES

- Across the Line
- Soft Start/Reduced Voltage
- VFD/AFD



LOAD CONTROL STRATEGIES

- Identify Critical Loads
- Load Shedding through Plant PLC
- Hard-wired Control





- What sort of transfer switch will I need?
- Do I even need one?

TRANSFER SWITCHES

- Manual
- Automatic
 - Paralleling
 - Distributed Generation



MANUAL TRANSFER SWITCH

- Chosen for Smaller Applications
- Double Throw Switch - No fuses or breakers
- Combined with a Utility Main Breaker with a 'SUSE' Label
- Mechanically Interlocked Circuit Breakers
- Kirk-Key Interlocked



AUTOMATIC TRANSFER SWITCH

- Unattended Operation
- Permanent/Fixed or Portable Generator Installations
- Adjustable Control Parameters
- Metering and Event Logging
- Packaged with Generator for best price
- Enclosure Options - Indoor/Outdoor/MCC



AUTOMATIC TRANSFER SWITCH

- Combined Main Disconnect/ATS
- 3-pole or 4-pole
- Open or Closed Transition
- Paralleling available



PARALLELING GEAR and DISTRIBUTED GENERATION

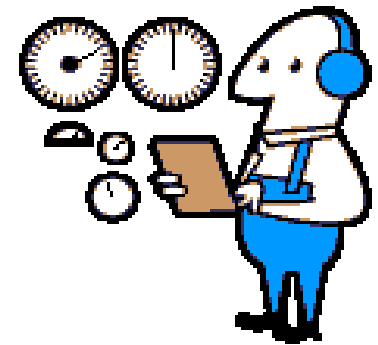
- Special service rate may apply
- May be used to “export” energy to utility to ease peak demand
- Bio-gas generators in Wastewater Treatment Plants



MONITORING/MAINTENANCE

- Monitoring Options

- Local Basic/Status Lights (going away with more complex engine controls)
- Digital
- Remote Annunciation
- Dry Contact to SCADA
- Network SCADA Interface
- Remote Wireless Monitoring



MONITORING/MAINTENANCE

- Exercising
 - Manual/Automatic
 - Load/No-Load
 - Monthly/Weekly





- If you have an hour or so, we can sit down and find the answers to your generator questions...



CONCLUSIONS



- Each project has unique requirements, including user preferences and existing systems.
- It's important to evaluate options with feedback from Owner/Operator/Engineer.

Conclusions



- Water and wastewater applications have particular requirements for back-up generator systems.
- For the most cost effective option that meets the overall project requirements, recognize the myriad of regulatory, design and economic factors affecting generator selection.



- Any questions?

See www.me-pe.com
for a copy of this presentation.



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