Emissions and Air Permitting Requirements for Standby Generator Sets

PowerHour webinar series for consulting engineers

Experts you trust.
Excellence you count on.

May 25th 1PM CST / 11 AM PST
(1 PDH issued by Cummins Inc.)

Welcome!

Cummins PowerHour webinar series is designed to help our engineer partners to…

- Keep up to date on products, technology, and codes and standards development
- Interact with Cummins experts and gain access to ongoing technical support
- Participate at your convenience, live or on-demand
- Earn Professional Development Hours (PDH)

Technical tips:

- Audio is available through teleconference or Zoom application.
- Attendees are in “listen only” mode throughout the event.
- Use the Zoom Q&A Panel to submit questions, comments, and feedback throughout the event. Time is allotted at the end of the PowerHour to address Q&A.
- If the audio connection is lost, disconnected or experiences intermittent connectivity issues, please check your audio connection through the "Join Audio" or "Audio Connectivity" button at the bottom left of the Zoom application.
- Report technical issues using the Zoom Q&A Panel.

Disclaimer

The views and opinions expressed in this course shall not be considered the official position of any regulatory organization and shall not be considered to be, nor be relied upon as, a Formal Interpretation.

Participants are encouraged to refer to the entire text of all referenced documents. In addition, when it doubt, reach out to the Authority Having Jurisdiction.

Meet your panelists

Cummins instructors:

Michael Sanford
Product Strategy and Sales Enablement Leader
Cummins Inc.

Brian Pumphrey
Director of Sales Application Engineering Wester USA
Cummins Inc.

Scott Thomas
Director of Sales Application Engineering – Southern USA
Cummins Inc.

Mandy Memari
Emissions Compliance Leader
Cummins Inc.

Cummins facilitator:

Chad Hale
Technical Marketing Specialist
Cummins Inc.

Your local Cummins contacts

- WA, OR, AK: Dennis Tarr(dennis.tarr@cummins.com)
- CA, HI: Brian Pumphrey (brian.pumphrey@cummins.com)
- CA: Donald Sosa (donald.sosa@cummins.com)
- AZ, ID, NM, NV: Carl Knapp (carl.knapp@cummins.com)
- CO, MT, ND, UT, WY: Christopher Scott (christopher.l.scott@cummins.com)
- NE, SD, KS: Earnest Glaser (earnest.a.glaser@cummins.com)
- OK, AR: Wes Ruebman(wes.ruebman@cummins.com)
- TX: Scott Thomas (m.scott.thomas@cummins.com)
- DE, MN, ND, OH, WI, WV: Michael Munson (michael.s.munson@cummins.com)
- Northern IL, MI, IA :JohnKilinskis(john.a.kilinskis@cummins.com)
- IL, IN, KY, MO: Jeff Yates (jeffrey.yates@cummins.com)
- TN, GA: Mariano Rojas (mariano.rojas@cummins.com)
- LA, MS, AL: Trina Casbon(trina.casbon@cummins.com)
- NC, SC, VA: Bill Morris (william.morris@cummins.com)
- FL: Bob Kelly (robert.kelly@cummins.com)
- MA, ME, NH, RI, VT: Jim Howard (james.howard@cummins.com)
- CT, MD, NJ, NY :CharlesAttisani(charles.attisani@cummins.com)
- PA, MD: Brian Cathcart(brian.cathcart@cummins.com)
- Canada: Ian Lindquist (ian.lindquist@cummins.com)

Course Objectives

Emissions and Air Permitting Requirements for Standby Generator Sets

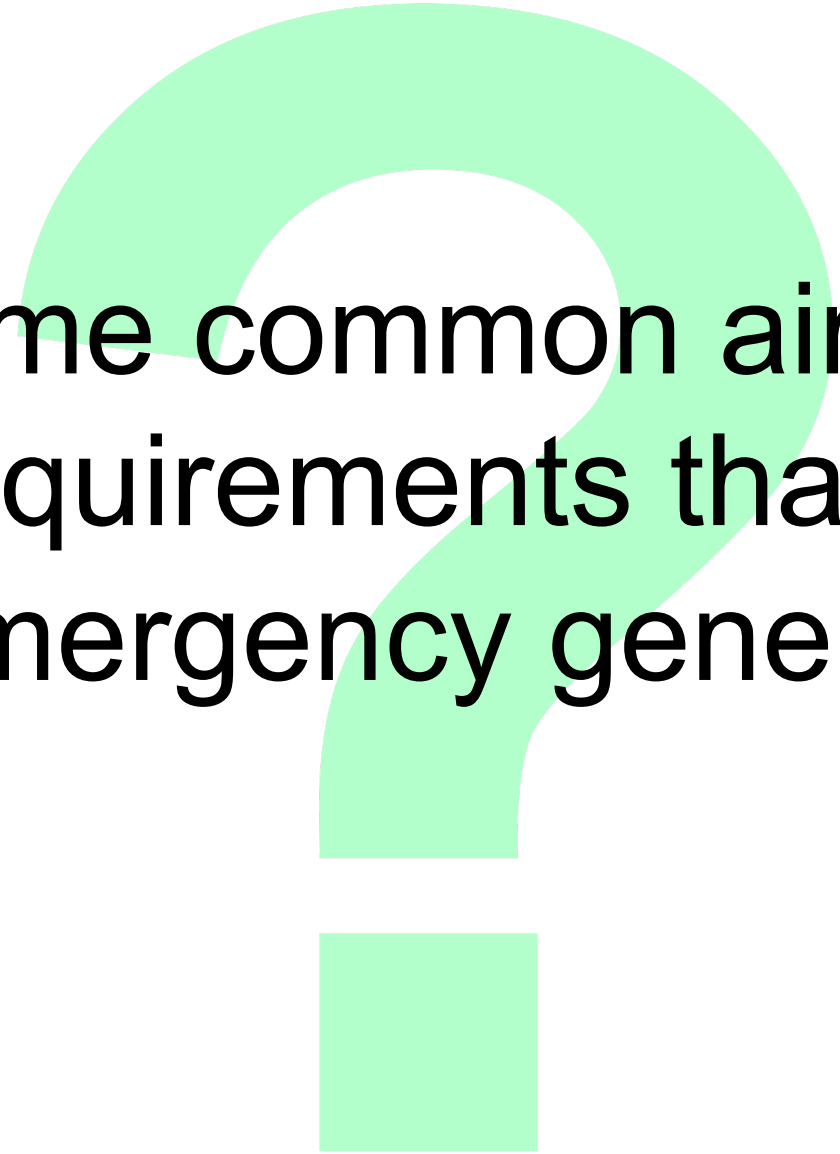
Air permitting for standby generator sets can vary wildly from site to site and when misunderstood can have a major impact on project success. Although EPA regulations have stabilized and are thought to be well understood, ever-increasing local requirements are changing the criticality of air permitting for engine-driven generator sets.

This course will provide a brief overview of regulated emissions constituents and their formation in order to provide a foundational understanding of engine emissions. Next, the EPA's New Source Performance Standards (NSPS) will be reviewed as it relates to both compression ignited (diesel) and spark ignited (natural gas or propane) engine equipped generator sets. Participants will gain an awareness of common pitfalls related to emissions permitting and will be introduced to various strategies employed to meet local emissions regulations.

After completing this course, participants will be able to:

- Recognize commonly regulated exhaust emissions constituents.
- Describe EPA emissions requirements for diesel and gaseous standby generator sets.
- Identify common requirements for permitting engine-driven generator sets.

What are some common air quality permitting requirements that apply to stationary emergency generator sets?



Exhaust Emissions Formation

$C_xH_YS_Z$

+

O_2+N_2

=

$CO_2+H_2O+O_2+N_2$

+

$NO_x+HC+CO+SO_x+C$

Fuel

Air

Major Exhaust Constituents

Trace Exhaust Components

Exhaust Emissions Formation

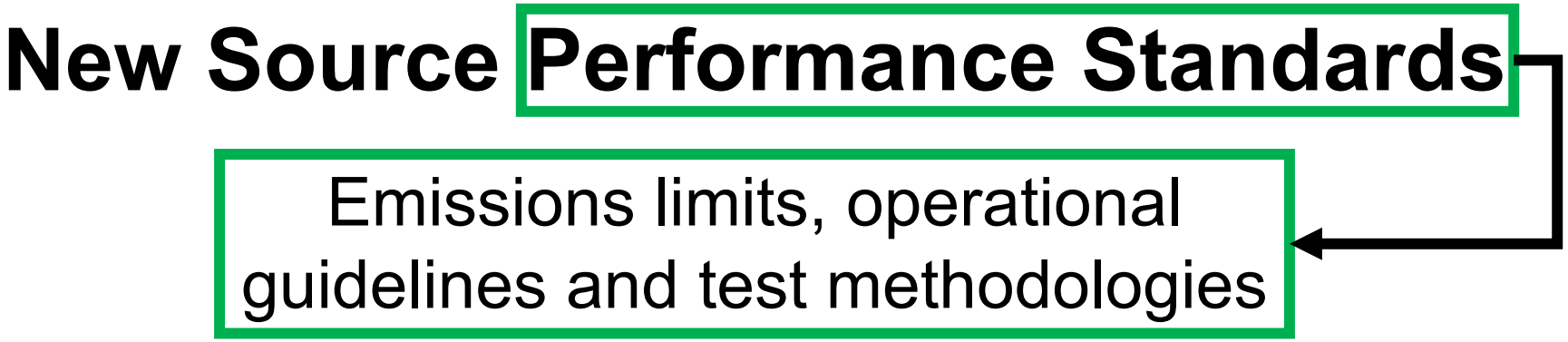
	What is it?	How is it formed?	CI	SI
NO_x	Oxides of nitrogen (NO and NO_2)	Forms at high in-cylinder temperatures, most prominent during high engine load.	✓	✓
HC	Over 100 different types of hydrocarbons	Product of incomplete combustion, most prominent during low engine load.	✓	✓
NMHC	Non-methane hydrocarbons, subset of total hydrocarbons	Product of incomplete combustion, dependent on fuel composition.	✓	✓
VOC	Volatile organic compounds	Primarily hydrocarbons but may include other compounds.		✓
PM	Anything that is trapped on or condenses onto a filter	Most prominent during low load operation.	✓	
CO	Carbon monoxide	Product of imperfect combustion, most prominent during low engine load.	✓	✓
SO_x	Oxides of sulfur (SO and SO_2)	Product of combustion process when sulfur is present. Increases linearly with fuel consumption.	✓	✓

New Source Performance Standards (NSPS) for Compression-Ignited and Spark-Ignited engines

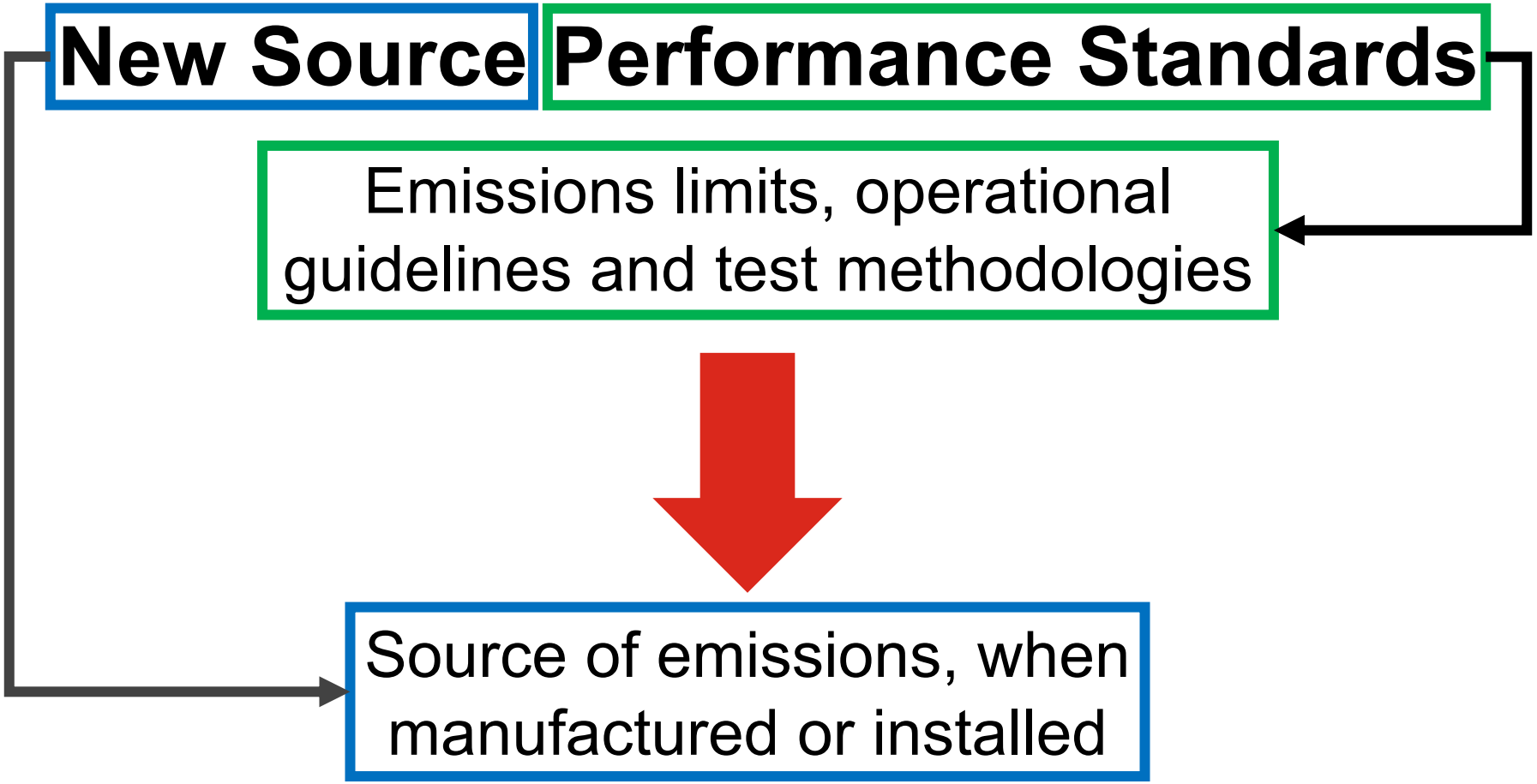
What is NSPS?

New Source Performance Standards

What is NSPS?

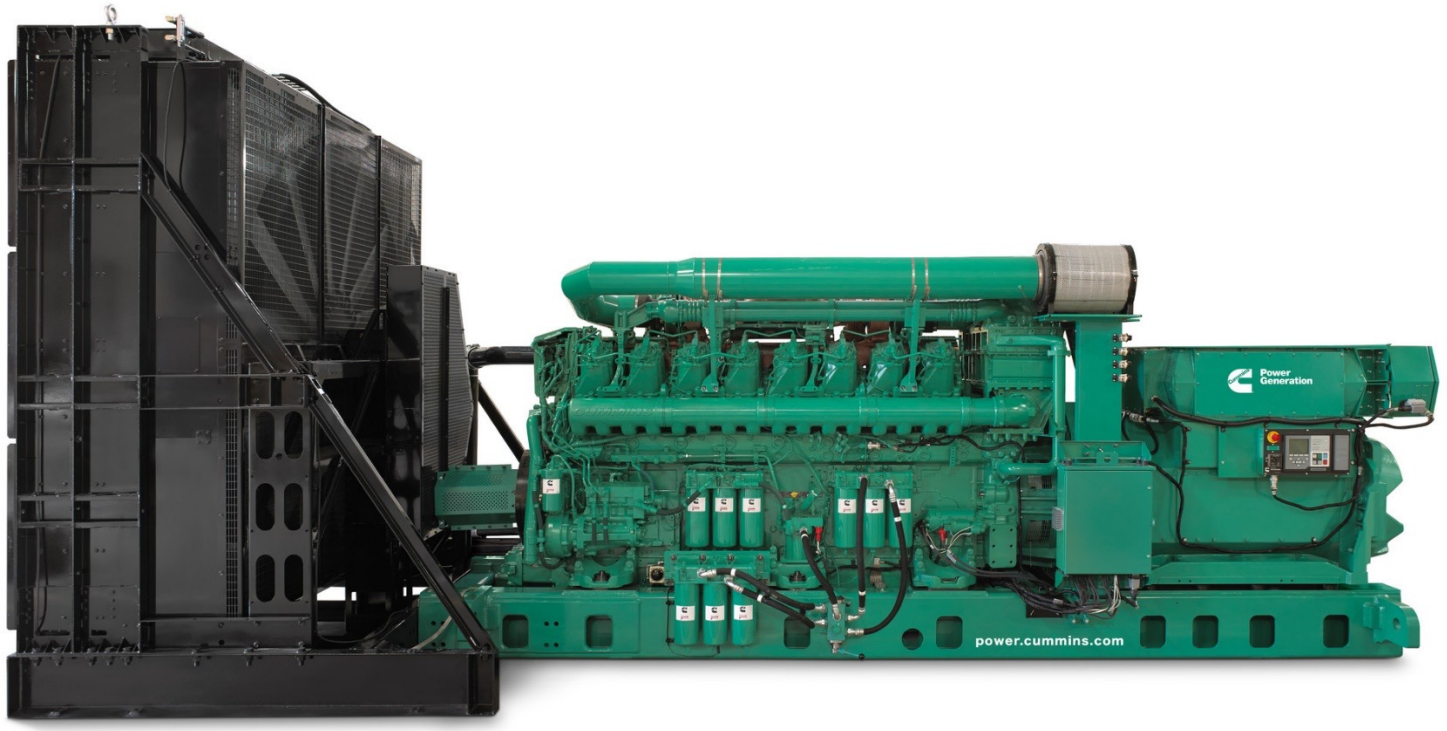

New Source Performance Standards
Emissions limits, operational guidelines and test methodologies

What is NSPS?


New Source Performance Standards
Emissions limits, operational guidelines and test methodologies
Source of emissions, when manufactured or installed

Requirements for EPA Certified Engines

- Engines are certified, not generator sets.



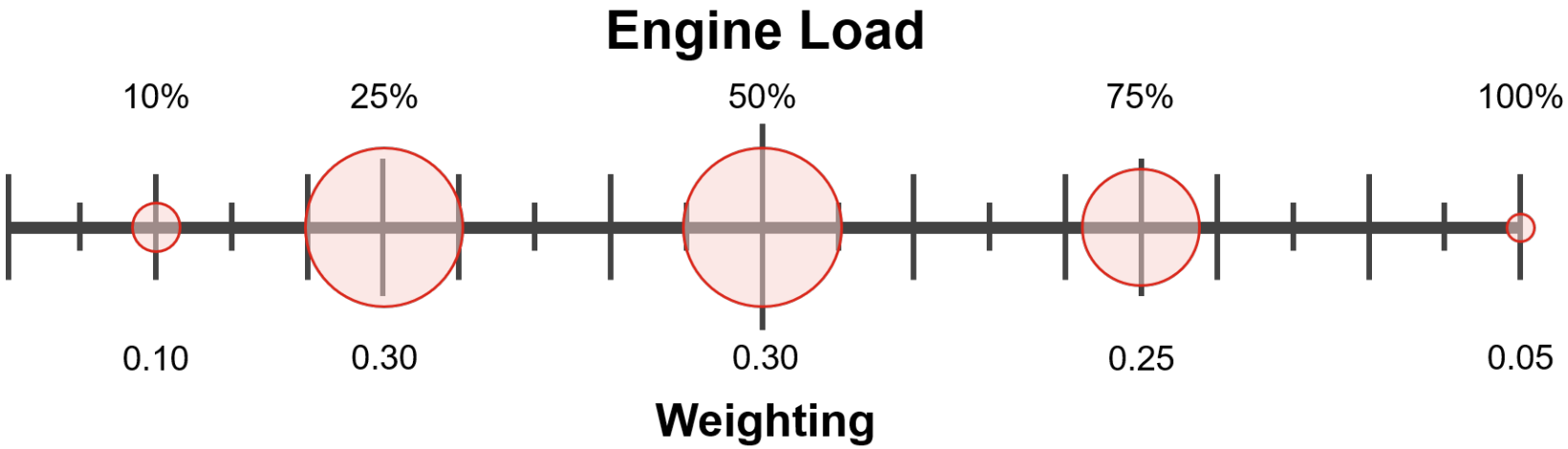
Requirements for EPA Certified Engines

- Engines are certified, not generator sets.
- Engines are required to meet emissions levels based on their date of manufacture, usage and brake horsepower rating.

kW	(hp)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
0-7	0-10	(7.5) / 8.0 / 0.40												
8-18	11-24	(7.5) / 6.6 / 0.40												
19-36	25-48	(7.5) / 5.5 / 0.30			(4.7) / 5.5 / 0.03 **Emergency: Stay at previous tier**									
37-55	49-74	*Optional T4i 0.30 PM*			(4.7) / 5.0 / 0.03 **Emergency: Stay at previous tier**									
56-129	75-173	Tier 3		3.4 / 0.19 / 5.0 / 0.02 **Tier 3**			0.40 / 0.19 / 5.0 / 0.02 **Tier 3**							
130-560	174-751	Tier 3	2.0 / 0.19 / 3.5 / 0.02 **Tier 3**			0.40 / 0.19 / 3.5 / 0.02 **Tier 3**								
> 560	> 751	Tier 2	3.5 / 0.40 / 3.5 / 0.10 **Tier 2** *0.67 / 0.40 / 3.5 / 0.10 (a)*				3.5 / 0.19 / 3.5 / 0.04 **Tier 2** *0.67 / 0.19 / 3.5 / 0.03 (b)*							
		T2	T3	Tier 4 Interim			Tier 4 Final							

Requirements for EPA Certified Engines

- Engines are certified, not generator sets.
- Engines are required to meet emissions levels based on their date of manufacture, usage and brake horsepower rating.
- Emissions levels are evaluated on a standardized test cycle including engine load and pollutant weighting following a specific test method in a test-cell environment.



Requirements for EPA Certified Engines

- Engines are certified, not generator sets.
- Engines are required to meet emissions levels based on their date of manufacture, usage and brake horsepower rating.
- Emissions levels are evaluated on a standardized test cycle including engine load and pollutant weighting following a specific test method in a test-cell environment.
- Engines and emissions control devices must be certified as a complete solution by the engine manufacture (field upfit or third-party installations cannot meet certification requirements).

Stationary and Nonroad Engines

Stationary

- On site for at least 12 consecutive months.
- Unable to be mounted on a trailer or be mobilized.

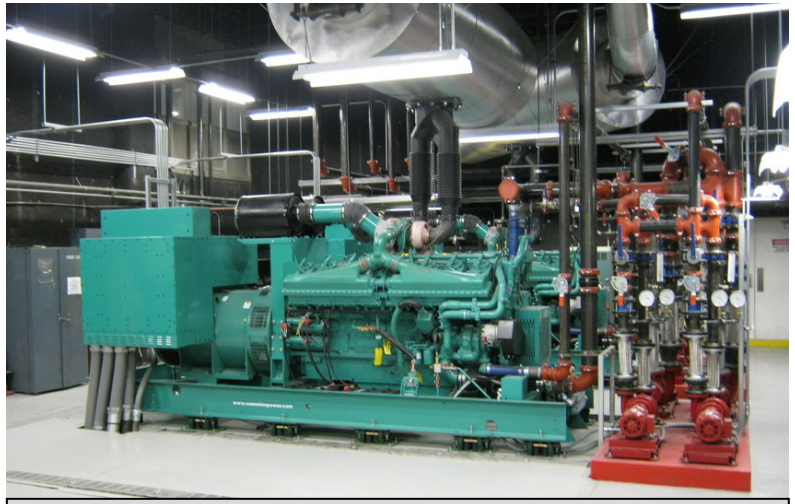
Nonroad

- No movement or operation restrictions.
- Must comply most stringent emissions requirements.

Stationary Emergency Operation

- Emergency standby (safe evacuation, life support)
- Legally required standby (fire–fighting operations)
- Optional standby (could cause an economic loss)

Standby power system including seven C2000 D6 (2000 kWe) generator sets.



Standby system including two DQGAA (1250 kWe) and one DQGAB (1500 kWe).

Stationary Emergency Operation

- Unlimited use during emergencies.

Stationary Emergency Operation

- Unlimited use during emergencies.
- Up to 100 hours per year allowed for:
  - Maintenance and testing

Stationary Emergency Operation

- Unlimited use during emergencies.
- Up to 100 hours per year allowed for:
  - Maintenance and testing
  - Up to 50 hours per year for non-emergency operation (restrictions apply)

Stationary Emergency Operation

- Unlimited use during emergencies.
- Up to 100 hours per year allowed for:
  - Maintenance and testing
  - Up to 50 hours per year for non-emergency operation (restrictions apply)
  - Emergency Demand Response (EDR) allowance vacated in May 2015

Stationary Emergency Operation

- Unlimited use during emergencies.
- Up to 100 hours per year allowed for:
  - Maintenance and testing
  - Up to 50 hours per year for non-emergency operation (restrictions apply)
  - Emergency Demand Response (EDR) allowance vacated in May 2015

Spec Note Generator set manufacturer shall provide documentation demonstrating compliance with applicable limits of U.S. EPA New Source Performance Standards for stationary emergency engines.

Stationary Non-Emergency Operation

Remote mining site including two DQGAS (1500 kWe) generator sets.

Combined heat and power project producing steam with one C2000 N5C (2000 kWe) generator set.

Stationary Non-Emergency Operation

- Demand Response
- Peak shaving (reduce or flatten peak electricity use)
- Rate curtailment (favorable energy rates)
- Interruptible rate programs (favorable energy rates)
- Continuous base load (constant power to utility grid)
- Co-generation, combined heat and power (capture and use waste heat)
- Prime power generator set (to be used as a primary source of power)

Stationary Non-Emergency Operation

- Demand Response
- Peak shaving (reduce or flatten peak electricity use)
- Rate curtailment (favorable energy rates)
- Interruptible rate programs (favorable energy rates)
- Continuous base load (constant power to utility grid)
- Co-generation, combined heat and power (capture and use waste heat)
- Prime power generator set (to be used as a primary source of power)

Spec Note Generator set manufacturer shall provide documentation demonstrating compliance with applicable limits of U.S. EPA New Source Performance Standards for stationary non-emergency engines.

Concept Check

The EPA designates certification requirements for _____ based on _____ and _____.

a) Generator Sets, Electrical Output, NEC Load Type
b) Engines, Brake Power, Usage
c) Power production equipment, Alternator rating, ISO 8528 rating

Concept Check

The EPA designates certification requirements for _____ based on _____ and _____.

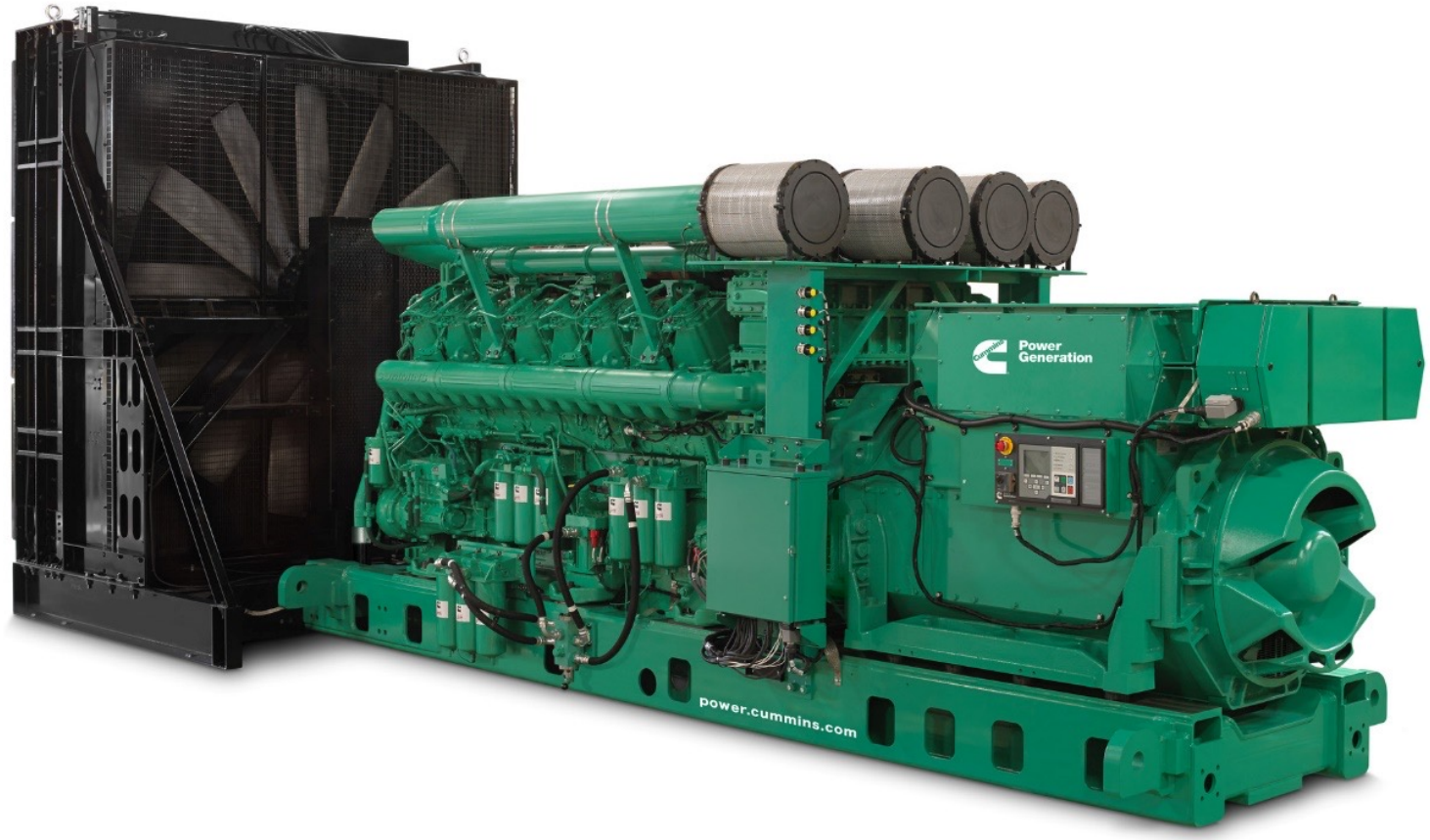
a) Generator Sets, Electrical Output, NEC Load Type

b) Engines, Brake Power, Usage

c) Power production equipment, Alternator rating, ISO 8528 rating

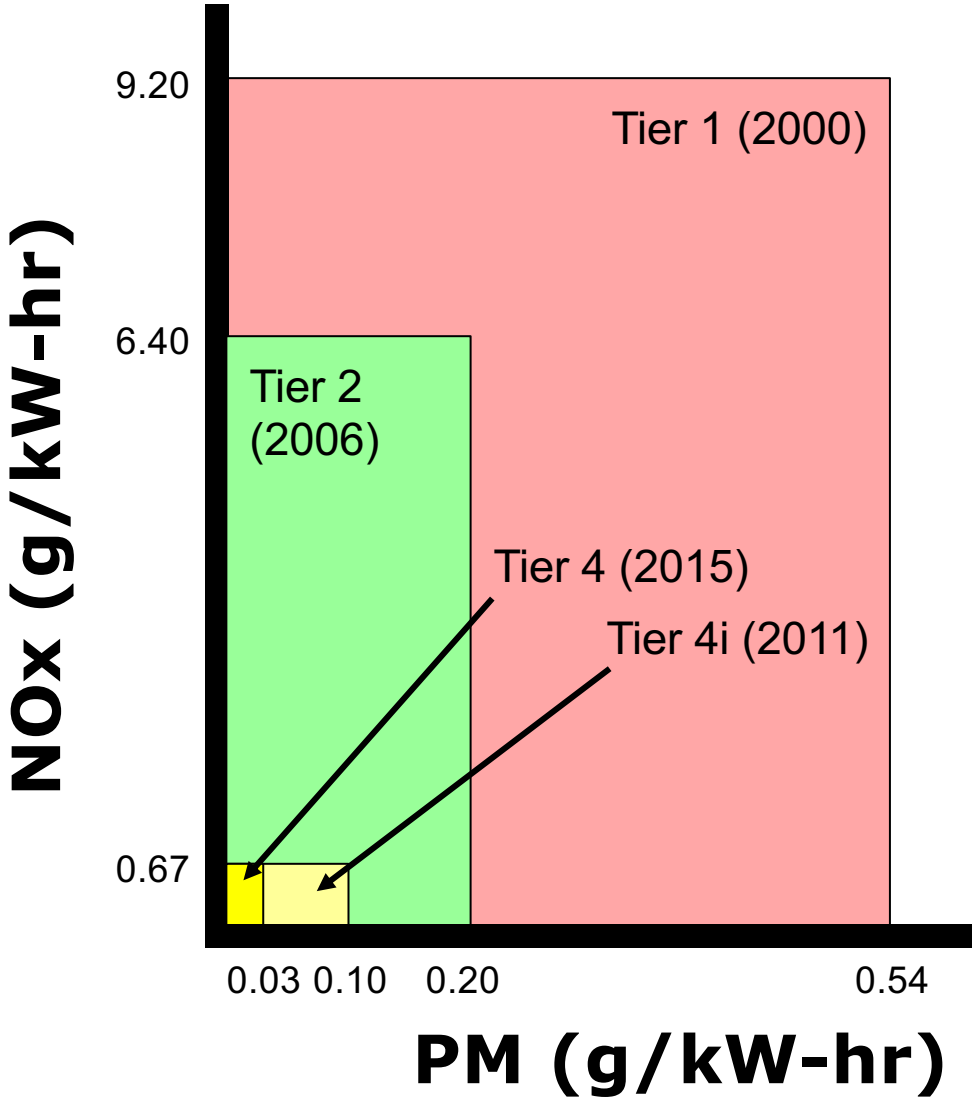
New Source Performance Standards (NSPS) for Stationary CI engines

Title 40, Part 60: Subpart IIII



Evolution of NSPS CI Engine Regulations

EPA Non-Road / Stationary Non-Emergency Engines >751 HP



EPA NSPS for CI Engines

Regulated Emissions Levels

kW	(hp)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
0-7	0-10	(7.5) / 8.0 / 0.40												
8-18	11-24	(7.5) / 6.6 / 0.40												
19-36	25-48	(7.5) / 5.5 / 0.30			(4.7) / 5.5 / 0.03 **Emergency: Stay at previous tier**									
37-55	49-74	*Optional T4i 0.30 PM*			(4.7) / 5.0 / 0.03 **Emergency: Stay at previous tier**									
56-129	75-173	Tier 3		3.4 / 0.19 / 5.0 / 0.02 **Tier 3**			0.40 / 0.19 / 5.0 / 0.02 **Tier 3**							
130-560	174-751	Tier 3	2.0 / 0.19 / 3.5 / 0.02 **Tier 3**			0.40 / 0.19 / 3.5 / 0.02 **Tier 3**								
> 560	> 751	Tier 2	3.5 / 0.40 / 3.5 / 0.10 **Tier 2** *0.67 / 0.40 / 3.5 / 0.10 (a)*				3.5 / 0.19 / 3.5 / 0.04 **Tier 2** *0.67 / 0.19 / 3.5 / 0.03 (b)*							
		T2	T3	Tier 4 Interim			Tier 4 Final							

(a) Applies to non-emergency power gen engines > 900kW (> 1207hp).

(b) Applies to non-emergency power gen engines > 560kW (> 751hp).

Emergency engine tier levels shown in **RED**

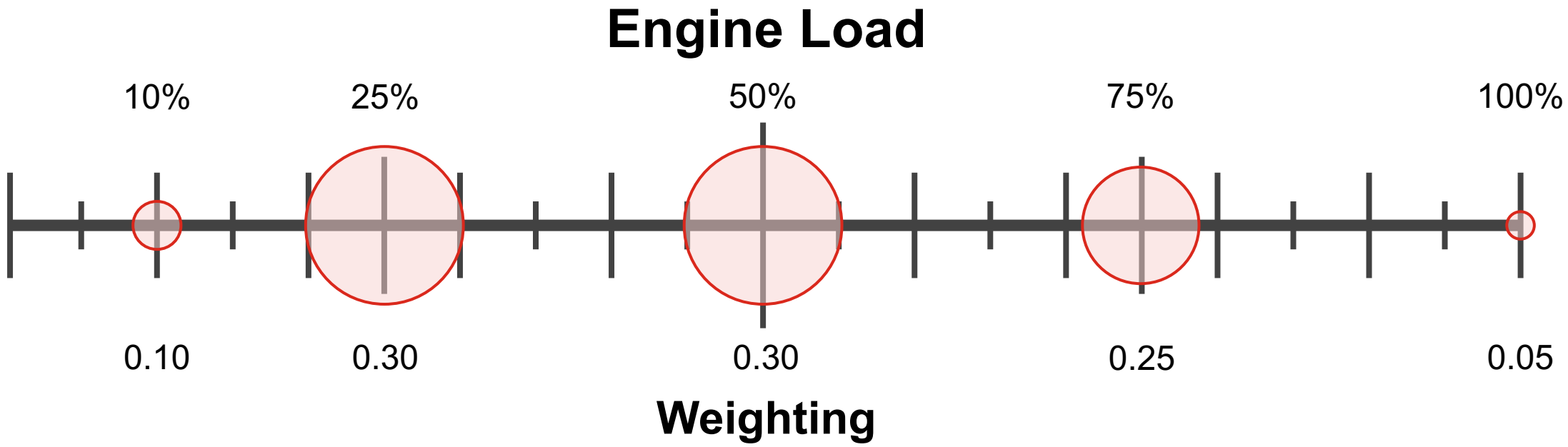
NOx / NMHC / CO / PM (g/kW-hr)

(NOx+NMHC) / CO / PM (g/kW-hr)

Certified product follows ISO 8178 D2 - 5 Mode Test Cycle for constant speed engines

EPA NSPS for CI Engines

Pollutant and Engine Load Weighting



EPA NSPS for CI Engines

Mandatory Manufacturer Certification

CI Engines including exhaust aftertreatment must be certified as a complete solution by engine manufacturer.

- Stationary Emergency (e.g. Tier 2)

EPA NSPS for CI Engines

Mandatory Manufacturer Certification

CI Engines including exhaust aftertreatment must be certified as a complete solution by engine manufacturer.

- Stationary Emergency (e.g. Tier 2)

CI Engines certified Stationary Emergency may be upfit with aftertreatment provided by the engine manufacturer or third-party to meet targeted emissions levels.

- Stationary Emergency certified with third-party provided aftertreatment meeting Stationary Non-Emergency limits (e.g. Tier 4)

EPA NSPS for CI Engines

Mandatory Manufacturer Certification

CI Engines including exhaust aftertreatment must be certified as a complete solution by engine manufacturer.

- Stationary Emergency (e.g. Tier 2)

CI Engines certified Stationary Emergency may be upfit with aftertreatment provided by the engine manufacturer or third-party to meet targeted emissions levels.

- Stationary Emergency certified with third-party provided aftertreatment meeting Stationary Non-Emergency limits (e.g. Tier 4)

CI Engine may only operate as certified by engine manufacturer (e.g. Stationary Emergency).

EPA NSPS for CI Engines

Mandatory Manufacturer Certification

CI Engines including exhaust aftertreatment must be certified as a complete solution by engine manufacturer.

- Stationary Emergency (e.g. Tier 2)

CI Engines certified Stationary Emergency may be upfit with aftertreatment provided by the engine manufacturer or third-party to meet targeted emissions levels.

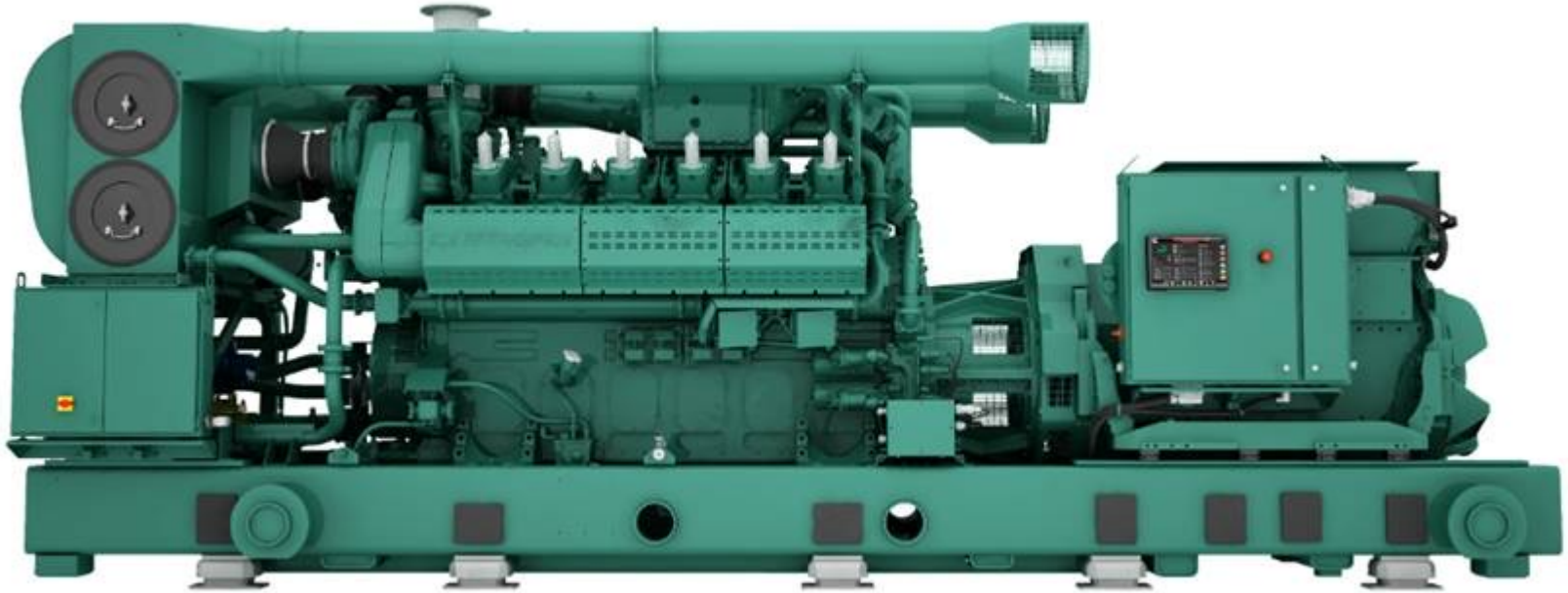
- Stationary Emergency certified with third-party provided aftertreatment meeting Stationary Non-Emergency limits (e.g. Tier 4)

CI Engine may only operate as certified by engine manufacturer (e.g. Stationary Emergency).

COMPLIANCE ≠ CERTIFICATION

New Source Performance Standards (NSPS) for Stationary SI engines

Title 40, Part 60: Subpart JJJJ



EPA NSPS for SI Engines

Regulated Emissions Levels

Mandatory or Voluntary			HP	NOx/CO/VOC (g/bhp-hr) (NOx + HC) / CO (g/bhp-hr) 2015	2016	2017	2018	2019	2020	2021
NG / LPG: Non-emergency										
V	NG	RB	26-99	1048 or for on- site ver. use 1048.101(c) for in- field test						
			>100	1.0 / 2.0 / 0.7						
V	NG	LB	26-99	1048 or for on- site ver. use 1048.101(c) for in- field test						
			>100	1.0 / 2.0 / 0.7						
V	LPG	LB	26-99	1048 or for on- site ver. use 1048.101(c) for in- field test						
			>100	1.0 / 2.0 / 0.7						
M	LPG	RB	>25	1048 cert: (2.7)/4.4						
Natural Gas / LPG: Emergency										
V	NG & LB LPG		26-129	90.103 phase 1 class II cert: (10) / 387						
			> 130	2.0 / 4.0 / 1.0						
M	LPG RB		26-129	90.103 phase 1 class II cert: (10) / 387						
			> 130	1048 full cert: 2.0 / 4.0 / 1.0						
Landfill / Digester Gas										
V	All LB & RB		All	2.0 / 5.0 / 1.0						

Notes

1. Gasoline engine requirements are same as those for RB LPG.
2. All new engines ≤ 25 hp must be certified to Part 90 on July 1, 2008.
3. Engines ≤ 40 hp that are ≤ 1000 cc may instead comply with Part 90.
4. Emergency engines limited to 100 hours per year for maintenance and testing.
5. O/O of new non-emergancy LB SI engines ≥250hp at a major source complying with 40 CFR 63 ZZZZ Table 2a do not have to comply with CO emissions of above table

EPA NSPS for SI Engines

Regulated Emissions Levels

Mandatory or Voluntary			HP	NOx/CO/VOC (g/bhp-hr) (NOx + HC) / CO (g/bhp-hr) 2015	2016	2017	2018	2019	2020	2021
NG / LPG: Non-emergency										
V	NG	RB	26-99	1048 or for on- site ver. use 1048.101(c) for in- field test						
			>100	1.0 / 2.0 / 0.7						
V	NG	LB	26-99	1048 or for on- site ver. use 1048.101(c) for in- field test						
			>100	1.0 / 2.0 / 0.7						
	LPG	LB	26-99	1048 or for on- site ver. use 1048.101(c) for in- field test						
			>100	1.0 / 2.0 / 0.7						
M	LPG	RB	>25	1048 cert: (2.7)/4.4						
Natural Gas / LPG: Emergency										
V	NG & LB LPG		26-129	90.103 phase 1 class II cert: (10) / 387						
			> 130	2.0 / 4.0 / 1.0						
M	LPG RB		26-129	90.103 phase 1 class II cert: (10) / 387						
			> 130	1048 full cert: 2.0 / 4.0 / 1.0						
Landfill / Digester Gas										
V	All LB & RB		All	2.0 / 5.0 / 1.0						

Notes
1. Gasoline engine requirements are same as those for RB LPG.
2. All new engines ≤ 25 hp must be certified to Part 90 on July 1, 2008.
3. Engines ≤ 40 hp that are ≤ 1000 cc may instead comply with Part 90.
4. Emergency engines limited to 100 hours per year for maintenance and testing.
5. O/O of new non-emergancy LB SI engines ≥250hp at a major source complying with 40 CFR 63 ZZZZ Table 2a do not have to comply with CO emissions of above table

EPA NSPS for SI Engines

Certification Summary

- Mandatory factory certification of rich burn propane engines
- Optional factory certification of all natural gas engines and lean burn propane engines
- If not factory certified, the owner/operator must perform certain tasks:

Engine Power	Maintenance plan and records, maintain/operate engine in a way to minimize emissions	Initial performance testing within 1 year of engine startup	Subsequent performance testing every 8,760 hours or 3 years, whichever comes first
< 100 hp	✓		
100-500 hp	✓	✓	
> 500 hp	✓	✓	✓

Air Permitting for Standby Generator Sets

"State and local agencies are not prevented from providing additional regulations beyond these regulations and such agencies may institute additional testing requirements independent of EPA related actions."

Response to Public Comments on Proposed Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

Air Permitting for Standby Generator Sets

"State and local agencies are not prevented from providing additional regulations beyond these regulations and such agencies may institute additional testing requirements independent of EPA related actions."

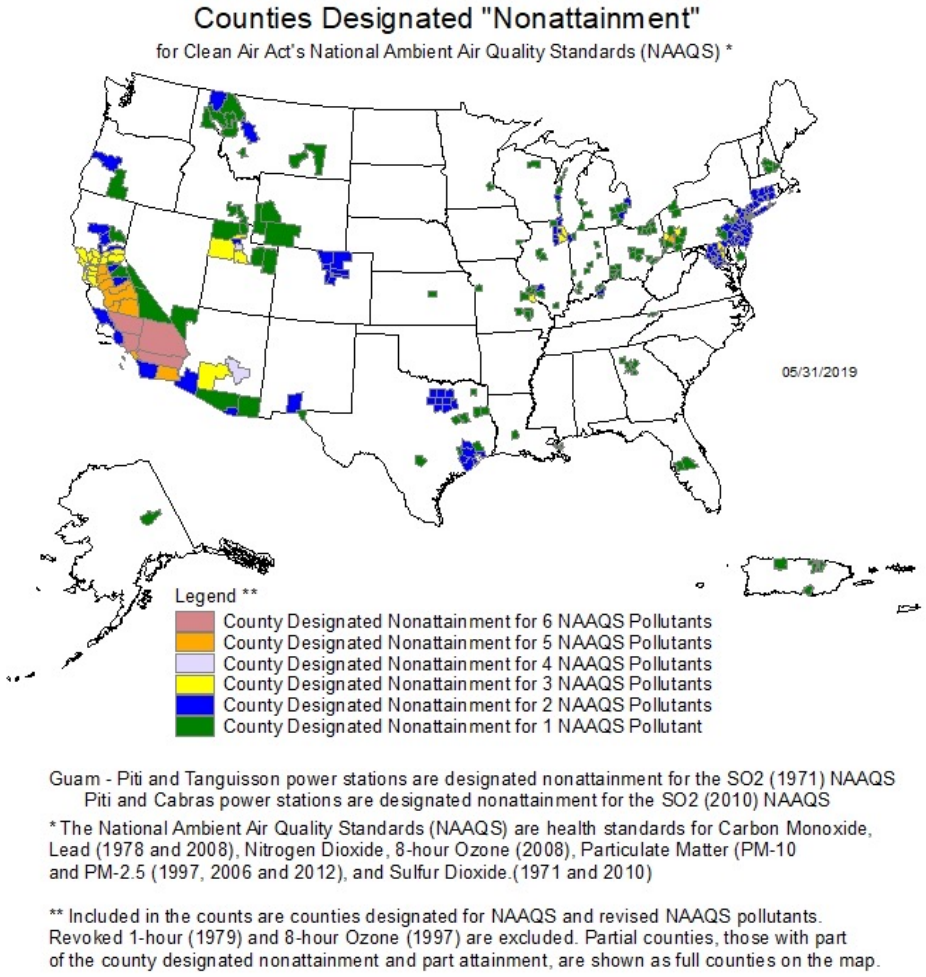
Response to Public Comments on Proposed Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

Air permitting for standby generator sets **can vary wildly from site to site** and when misunderstood can have a **major impact on project success**. Although EPA regulations have stabilized and are thought to be well understood, **ever-increasing local requirements are changing the criticality of air permitting** for engine-driven generator sets.

Air Permitting for Standby Generator Sets

National Ambient Air Quality Standards (NAAQS)

- Identifies pollutants that are harmful to human health.
- Establishes criteria pollutant limits for geographical areas:
  - CO, Pb, NO_2, O_3, PM and SO_2



Source: https://www3.epa.gov/airquality/greenbook/mapnpoll.html

Air Permitting for Standby Generator Sets

State / City / County Requirements

[redacted]

a. Emissions testing for each selected emergency engine-generator set shall consist of three one-hour test runs under load. The average of the three runs shall be reported as the short-term emission rate for that emergency engine-generator set.

b. Testing shall be conducted while operating at greater than ninety percent of the engine-generator set's standby rated capacity, unless multiple load band testing is approved by DEQ.

Air Permitting for Standby Generator Sets

State / City / County Requirements

[redacted]

a. Emissions testing for each selected emergency engine-generator set shall consist of three one-hour test runs under load. The average of the three runs shall be reported as the short-term emission rate for that emergency engine-generator set.

b. Testing shall be conducted while operating at greater than ninety percent of the engine-generator set's standby rated capacity, unless multiple load band testing is approved by DEQ.

Air Permitting for Standby Generator Sets

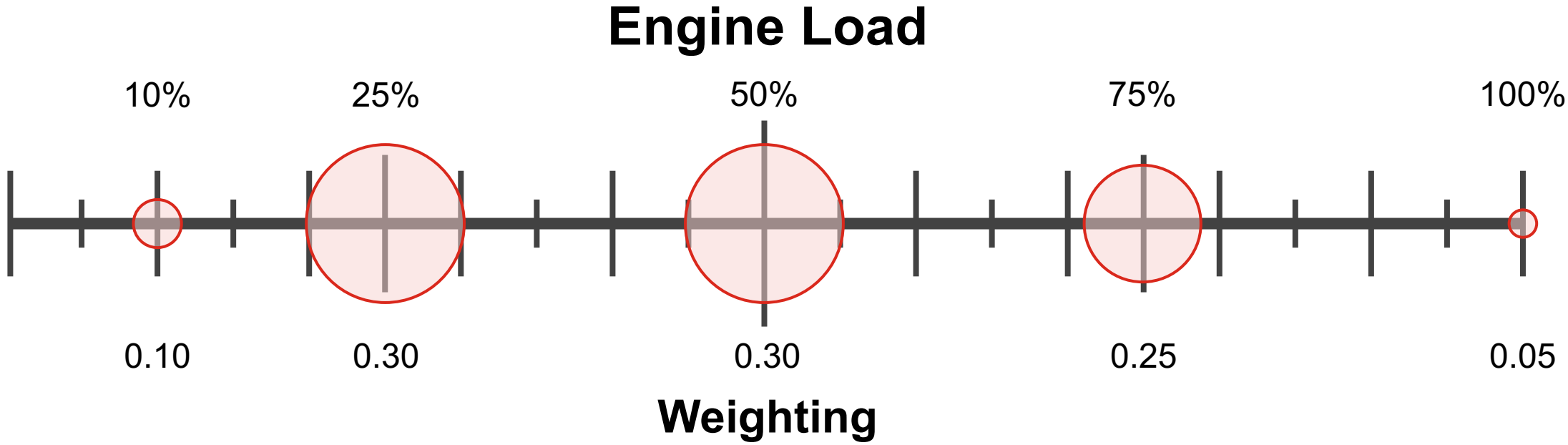
State / City / County Requirements

a. Emissions testing for each selected emergency engine-generator set shall consist of three one-hour test runs under load. The average of the three runs shall be reported as the short-term emission rate for that emergency engine-generator set.

b. Testing shall be conducted while operating at greater than ninety percent of the engine-generator set's standby rated capacity, unless multiple load band testing is approved by DEQ.

Air Permitting for Standby Generator Sets

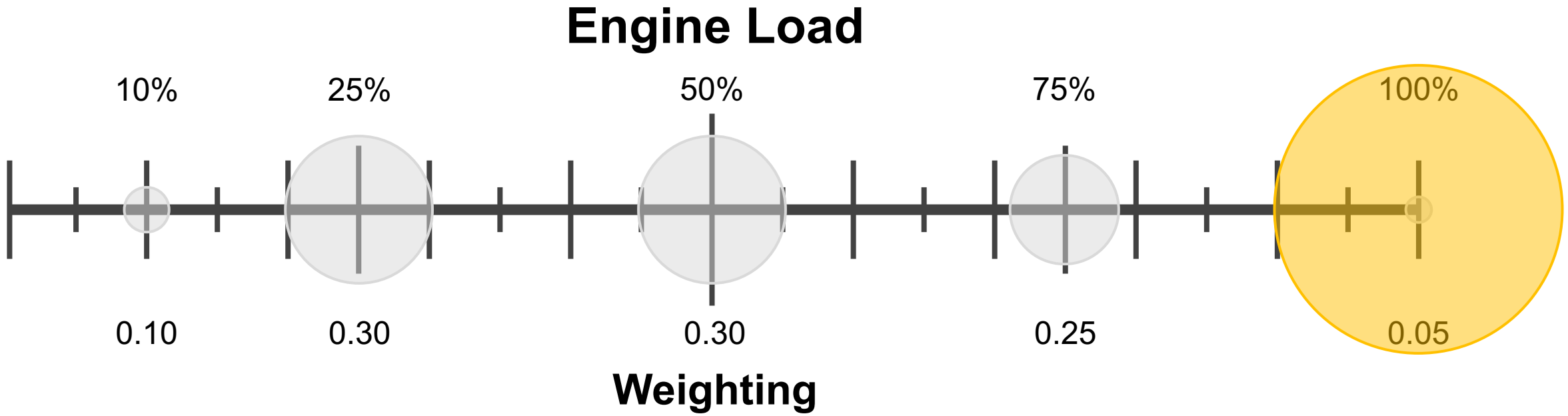
State / City / County Requirements



b. Testing shall be conducted while operating at greater than ninety percent of the engine-generator set's standby rated capacity, unless multiple load band testing is approved by DEQ.

Air Permitting for Standby Generator Sets

State / City / County Requirements



b. Testing shall be conducted while operating at greater than ninety percent of the engine-generator set's standby rated capacity, unless multiple load band testing is approved by DEQ.

Air Permitting for Standby Generator Sets

State / City / County Requirements

a. Emissions testing for each selected emergency engine-generator set shall consist of three one-hour test runs under load. The average of the three runs shall be reported as the short-term emission rate for that emergency engine-generator set.

b. Testing shall be conducted while operating at greater than ninety percent of the engine-generator set's standby rated capacity, unless multiple load band testing is approved by DEQ.

Spec Note Generator set manufacturer shall provide documentation demonstrating compliance with specific emissions level requirement and applicable test methodology.

Air Permitting for Standby Generator Sets

Site Air Permitting Requirements

Permits are written to limit genset operation to keep site emissions within the limit

- Running hours and/or fuel consumption may be specified to make sure that genset operation stays within permitted limits

Air Permitting for Standby Generator Sets

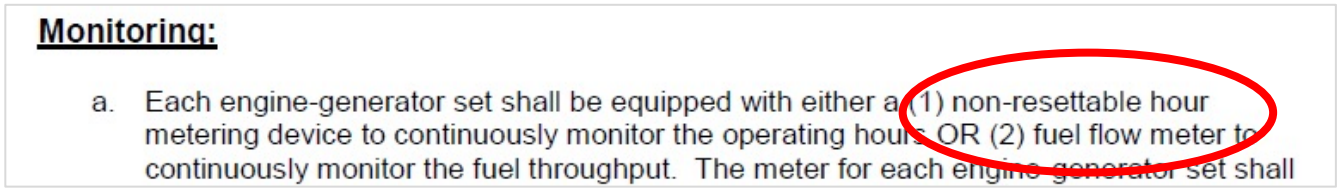
Site Air Permitting Requirements

Permits are written to limit genset operation to keep site emissions within the limit

- Running hours and/or fuel consumption may be specified to make sure that genset operation stays within permitted limits

Permit may require monitoring of run time or fuel consumption to demonstrate compliance

- Run hour monitoring typically assumes all generator sets are always operating at 100% of rated load
- Fuel consumption monitoring gives a more accurate representation of load profile and emissions and may allow for more flexibility in operation



Monitoring:

a. Each engine-generator set shall be equipped with either a (1) non-resettable hour metering device to continuously monitor the operating hours OR (2) fuel flow meter to continuously monitor the fuel throughput. The meter for each engine-generator set shall

Air Permitting for Standby Generator Sets

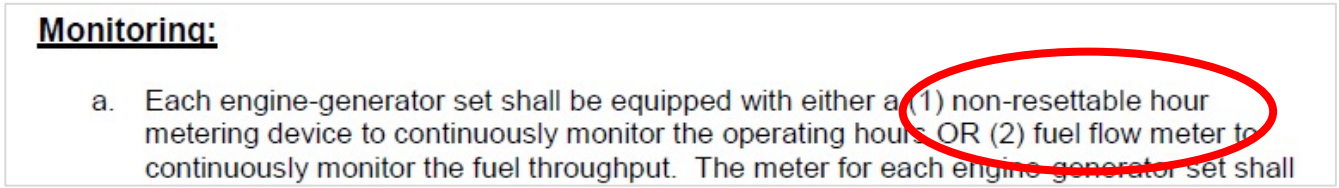
Site Air Permitting Requirements

Permits are written to limit genset operation to keep site emissions within the limit

- Running hours and/or fuel consumption may be specified to make sure that genset operation stays within permitted limits

Permit may require monitoring of run time or fuel consumption to demonstrate compliance

- Run hour monitoring typically assumes all generator sets are always operating at 100% of rated load
- Fuel consumption monitoring gives a more accurate representation of load profile and emissions and may allow for more flexibility in operation



Monitoring:

a. Each engine-generator set shall be equipped with either a (1) non-resettable hour metering device to continuously monitor the operating hours OR (2) fuel flow meter to continuously monitor the fuel throughput. The meter for each engine-generator set shall

"Exceedance of operating limits may be considered credible evidence of the exceedance of emission limits"

Air Permitting for Standby Generator Sets

Best Available Controls Technology (BACT)

"Emission limitation based on the maximum degree of emission reduction (**considering energy, environmental, and economic impacts**) achievable through application of production processes and available methods, systems and techniques." – EPA NSR Fact Sheet

Air Permitting for Standby Generator Sets

Best Available Controls Technology (BACT)

"Emission limitation based on the maximum degree of emission reduction (**considering energy, environmental, and economic impacts**) achievable through application of production processes and available methods, systems and techniques." – EPA NSR Fact Sheet

- Local air quality boards have discretion in defining **BACT**
  - Exhaust aftertreatment may be considered not available due to its economic impact

Air Permitting for Standby Generator Sets

Best Available Controls Technology (BACT)

"Emission limitation based on the maximum degree of emission reduction (**considering energy, environmental, and economic impacts**) achievable through application of production processes and available methods, systems and techniques." – EPA NSR Fact Sheet

- Local air quality boards have discretion in defining **BACT**
  - Exhaust aftertreatment may be considered not available due to its economic impact
- 6 g/hp-hr NOx at 100% generator set rated load is becoming a common BACT target
  - This target is typically considered "**Guaranteed**" or "**Maximum Potential to Emit**"
  - Most generator set manufacturer data sheets present **Nominal** values
  - Consult generator set manufacturer for potential to emit values

Air Permitting for Standby Generator Sets

Site Air Permit Example

Project Considerations:

Site requires 25 generator sets

Max NOx to be allowed = 80 tons per year

Performance Data	1/4 Standby	1/2 Standby	3/4 Standby	Full Standby
BHP @ 1800 RPM (60 Hz)	1145	2185	3225	4308
Fuel Consumption L/Hr (US Gal/Hr)	254 (67)	443 (117)	602 (159)	787 (208)
Exhaust Gas Flow m³/min (CFM)	282 (9963)	45 (15921)	55 (19592)	662 (23369)
Exhaust Gas Temperature °C (°F)	331 (628)	354 (670)	377 (711)	443 (830)
Exhaust Emission Data				
HC (Total Unburned Hydrocarbons)	0.3 (114)	0.18 (76)	0.1 (48)	0.07 (33)
NOx (Oxides of Nitrogen as NO_2)	3.4 (1290)	3.3 (1350)	4.2 (1900)	5.2 (2440)

Air Permitting for Standby Generator Sets

Site Air Permit Example

Project Considerations:

Site requires 25 generator sets

Max NOx to be allowed = 80 tons per year

Performance Data	1/4 Standby	1/2 Standby	3/4 Standby	Full Standby
BHP @ 1800 RPM (60 Hz)	1145	2185	3225	4308
Fuel Consumption L/Hr (US Gal/Hr)	254 (67)	443 (117)	602 (159)	787 (208)
Exhaust Gas Flow m³/min (CFM)	282 (9963)	45 (15921)	55 (19592)	662 (23369)
Exhaust Gas Temperature °C (°F)	331 (628)	354 (670)	377 (711)	443 (830)
Exhaust Emission Data				
HC (Total Unburned Hydrocarbons)	0.3 (114)	0.18 (76)	0.1 (48)	0.07 (33)
NOx (Oxides of Nitrogen as NO_2)	3.4 (1290)	3.3 (1350)	4.2 (1900)	5.2 (2440)

g/hp-hr Nominal

Air Permitting for Standby Generator Sets

Site Air Permit Example

Project Considerations:

Site requires 25 generator sets

Max NOx to be allowed = 80 tons per year

Each generator set has a potential to emit 6.7 g/hp-hr at full standby load

Performance Data	1/4 Standby	1/2 Standby	3/4 Standby	Full Standby
BHP @ 1800 RPM (60 Hz)	1145	2185	3225	4308
Fuel Consumption L/Hr (US Gal/Hr)	254 (67)	443 (117)	602 (159)	787 (208)
Exhaust Gas Flow m³/min (CFM)	282 (9963)	45 (15921)	55 (19592)	662 (23369)
Exhaust Gas Temperature °C (°F)	331 (628)	354 (670)	377 (711)	443 (830)
Exhaust Emission Data				
HC (Total Unburned Hydrocarbons)	0.3 (114)	0.18 (76)	0.1 (48)	0.07 (33)
NOx (Oxides of Nitrogen as NO_2)	3.4 (1290)	3.3 (1350)	4.2 (1900)	5.2 (2440)

g/hp-hr Nominal

Note: Use Potential to Emit value

Air Permitting for Standby Generator Sets

Site Air Permit Example

Project Considerations:

Site requires 25 generator sets

Max NOx to be allowed = 80 tons per year

Each generator set has a potential to emit 6.7 g/hp-hr at full standby load

Performance Data	1/4 Standby	1/2 Standby	3/4 Standby	Full Standby
BHP @ 1800 RPM (60 Hz)	1145	2185	3225	4308
Fuel Consumption L/Hr (US Gal/Hr)	254 (67)	443 (117)	602 (159)	787 (208)
Exhaust Gas Flow m³/min (CFM)	282 (9963)	45 (15921)	55 (19592)	662 (23369)
Exhaust Gas Temperature °C (°F)	331 (628)	354 (670)	377 (711)	443 (830)
Exhaust Emission Data				
HC (Total Unburned Hydrocarbons)	0.3 (114)	0.18 (76)	0.1 (48)	0.07 (33)
NOx (Oxides of Nitrogen as NO_2)	3.4 (1290)	3.3 (1350)	4.2 (1900)	5.2 (2440)

g/hp-hr Nominal

Note: Use Potential to Emit value

Resulting permit allowance:

- To meet 80 tons per year generator set operation is limited to 100 hours per year
- 25 generators running for 100 hours at full standby rating consume 520,000 gallons of fuel per year
- Permit would limit operation to 100 hours of operation or 520,000 gallons of fuel per year

Air Permitting for Standby Generator Sets

Application of Exhaust Aftertreatment

Project Considerations:

- Hyperscale project requires 100 X 3MW generator sets when fully built
- Built in 5 phases of 20 gens each
- Max NOx allowed = **80 tons per year**
- Permit written for 50 hours per year
- Each generator set has a potential to emit 1.6 tons per year

Air Permitting for Standby Generator Sets

Application of Exhaust Aftertreatment

Project Considerations:

- Hyperscale project requires 100 X 3MW generator sets when fully built
- Built in 5 phases of 20 gens each
- Max NOx allowed = **80 tons per year**
- Permit written for 50 hours per year
- Each generator set has a potential to emit 1.6 tons per year

- **Phase 1**
  - 20 gens – Total NOx emissions = 32 tons per year
- **Phases 1 & 2**
  - 40 gens – Total NOx emissions = 64 tons per year

Air Permitting for Standby Generator Sets

Application of Exhaust Aftertreatment

Project Considerations:

- Hyperscale project requires 100 X 3MW generator sets when fully built
- Built in 5 phases of 20 gens each
- Max NOx allowed = **80 tons per year**
- Permit written for 50 hours per year
- Each generator set has a potential to emit 1.6 tons per year

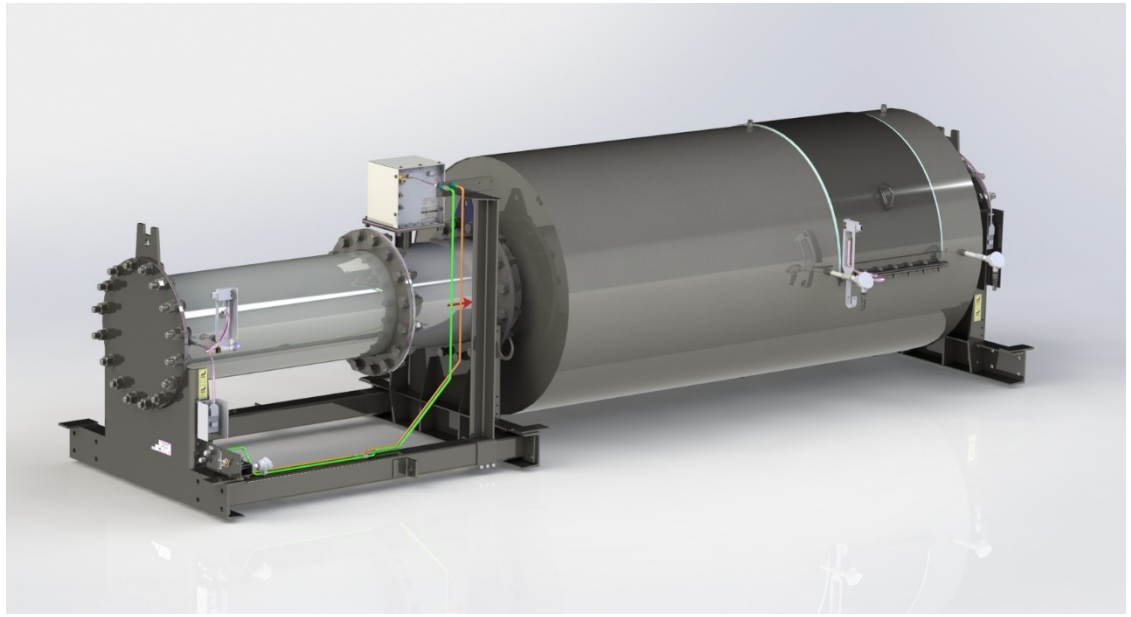
- **Phase 1**
  - 20 gens – Total NOx emissions = 32 tons per year
- **Phases 1 & 2**
  - 40 gens – Total NOx emissions = 64 tons per year
- **Phase 1 through 3**
  - 60 gens – Total NOx emissions = 96 tons per year

Expansion after the second phase would not have been permitted

Air Permitting for Standby Generator Sets

Application of Exhaust Aftertreatment

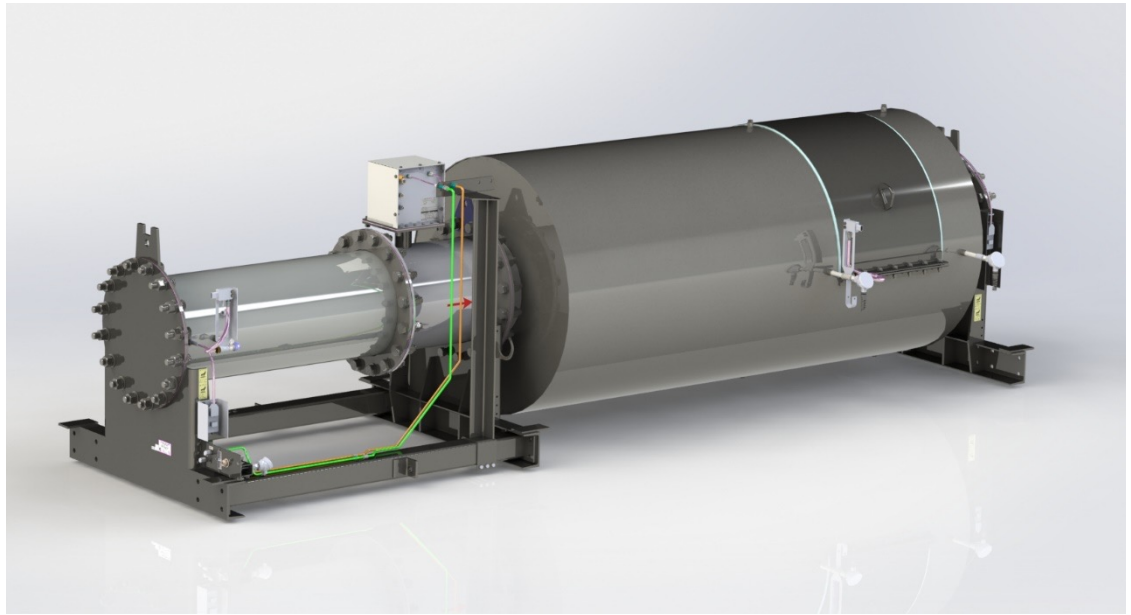
Selective Catalytic Reduction (SCR) can
reduce NOx by up to 90%



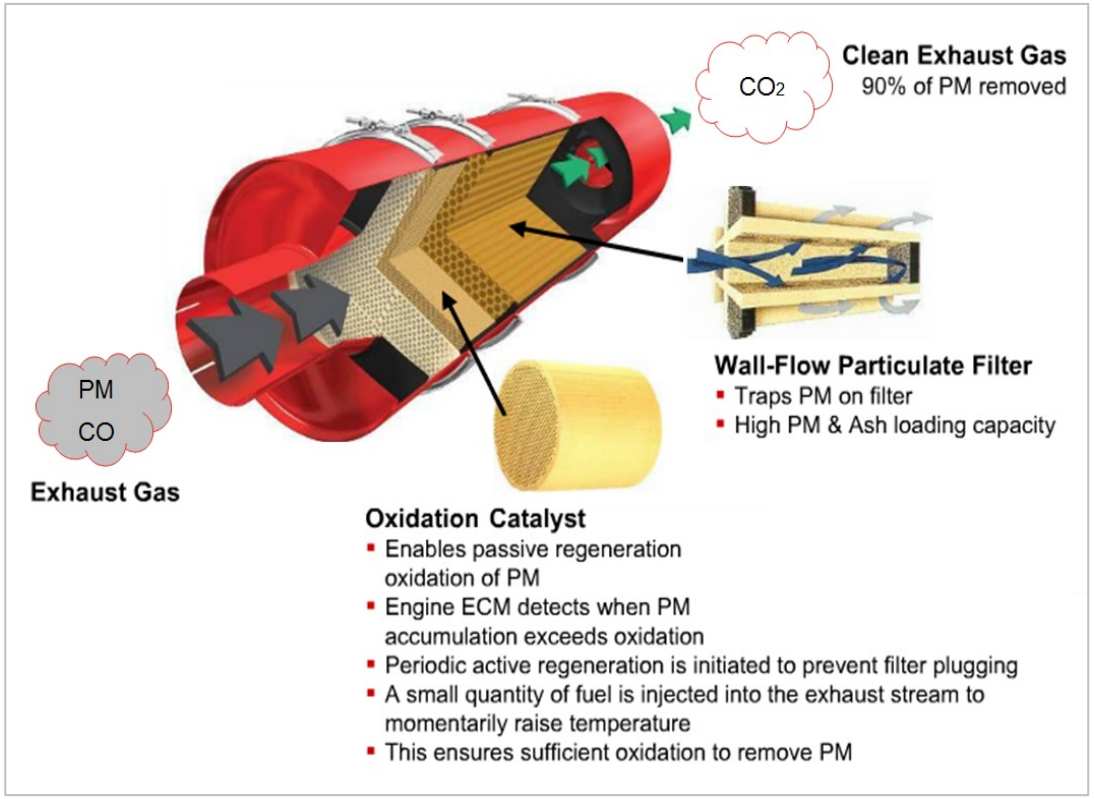
Air Permitting for Standby Generator Sets

Application of Exhaust Aftertreatment

Selective Catalytic Reduction (SCR) can reduce NOx by up to 90%



Diesel Particulate Filter (DPF) can reduce Particulate Matter



Air Permitting for Standby Generator Sets

Application of Exhaust Aftertreatment

Project Considerations:

- Hyperscale project requires 100 X 3MW generator sets when fully built
- Built in 5 phases of 20 gens each
- Max NOx allowed = **80 tons per year**
- Permit written for 50 hours per year
- Each generator set has a potential to emit 1.6 tons per year

- **Phase 1**
  - 20 gens – Total NOx emissions = 32 tons per year
- **Phases 1 & 2**
  - 40 gens – Total NOx emissions = 64 tons per year
- **Phase 1 through 3**
  - 60 gens – Total NOx emissions = 96 tons per year

Expansion after the second phase would not have been permitted

Air Permitting for Standby Generator Sets

Application of Exhaust Aftertreatment

Project Considerations:

- Hyperscale project requires 100 X 3MW generator sets when fully built
- Built in 5 phases of 20 gens each
- Max NOx allowed = **80 tons per year**
- Permit written for 50 hours per year
- Each generator set has a potential to emit 1.6 tons per year

- **Phase 1**
  - 20 gens – Total NOx emissions = 32 tons per year
- **Phases 1 & 2**
  - 40 gens – Total NOx emissions = 64 tons per year

➢ **90% SCRs added to phase 3, 4 and 5 gens**
➢ **Limits NOx to 3.2 tons/year for 20 gens**

Air Permitting for Standby Generator Sets

Application of Exhaust Aftertreatment

Project Considerations:

- Hyperscale project requires 100 X 3MW generator sets when fully built
- Built in 5 phases of 20 gens each
- Max NOx allowed = **80 tons per year**
- Permit written for 50 hours per year
- Each generator set has a potential to emit 1.6 tons per year

- **Phase 1**
  - 20 gens – Total NOx emissions = 32 tons per year
- **Phases 1 & 2**
  - 40 gens – Total NOx emissions = 64 tons per year

➢ **90% SCRs added to phase 3, 4 and 5 gens**
➢ **Limits NOx to 3.2 tons/year for 20 gens**

- **Phase 1 through 3**
  - 60 gens – Total NOx emissions = 67.2 tons per year
- **Phase 1 through 4**
  - 80 gens – Total NOx emissions = 70.4 tons per year
- **Phase 1 through 5**
  - 100 gens – Total NOx emissions = 73.6 tons per year

Air Permitting for Standby Generator Sets

On-Site Testing Considerations

- Non-standard equipment may be needed to secure air-permit / conduct on-site testing:
  - Fuel flow meter(s)
  - Pollutant monitor(s)
  - Exhaust sample port(s)
  - Load banks
- Test methodology and permit data must be approved by equipment manufacturer.
- Applicable environmental correction factors allowable by AHJ must be identified.
- Costs and time associated with on-site testing requirements must be considered.
- Review air permit requirements early in the project in order to accommodate lead times.
- Leverage experience of third-party testing companies and engine manufacturers.
- Review implications of failing on-site test including penalties and project delays.
- Permitted emissions values may need to be “guaranteed” by the engine manufacturer.

Air Permitting for Standby Generator Sets

On-Site Testing Considerations

- Non-standard equipment may be needed to secure air-permit / conduct on-site testing:
  - Fuel flow meter(s)
  - Pollutant monitor(s)
  - Exhaust sample port(s)
  - Load banks
- Test methodology and permit data must be approved by equipment manufacturer.
- Applicable environmental correction factors allowable by AHJ must be identified.
- Costs and time associated with on-site testing requirements must be considered.
- Review air permit requirements early in the project in order to accommodate lead times.
- Leverage experience of third-party testing companies and engine manufacturers.
- Review implications of failing on-site test including penalties and project delays.
- Permitted emissions values may need to be “guaranteed” by the engine manufacturer.

Air Permitting for Standby Generator Sets

On-Site Testing Considerations

- Non-standard equipment may be needed to secure air-permit / conduct on-site testing:
  - Fuel flow meter(s)
  - Pollutant monitor(s)
  - Exhaust sample port(s)
  - Load banks
- Test methodology and permit data must be approved by equipment manufacturer.
- Applicable environmental correction factors allowable by AHJ must be identified.
- Costs and time associated with on-site testing requirements must be considered.
- Review air permit requirements early in the project in order to accommodate lead times.
- Leverage experience of third-party testing companies and engine manufacturers.
- Review implications of failing on-site test including penalties and project delays.
- Permitted emissions values may need to be “guaranteed” by the engine manufacturer.

Air Permitting for Standby Generator Sets

On-Site Testing Considerations

- Non-standard equipment may be needed to secure air-permit / conduct on-site testing:
  - Fuel flow meter(s)
  - Pollutant monitor(s)
  - Exhaust sample port(s)
  - Load banks
- Test methodology and permit data must be approved by equipment manufacturer.
- Applicable environmental correction factors allowable by AHJ must be identified.
- Costs and time associated with on-site testing requirements must be considered.
- Review air permit requirements early in the project in order to accommodate lead times.
- Leverage experience of third-party testing companies and engine manufacturers.
- Review implications of failing on-site test including penalties and project delays.
- Permitted emissions values may need to be “guaranteed” by the engine manufacturer.

Air Permitting for Standby Generator Sets

On-Site Testing Considerations

- Non-standard equipment may be needed to secure air-permit / conduct on-site testing:
  - Fuel flow meter(s)
  - Pollutant monitor(s)
  - Exhaust sample port(s)
  - Load banks
- Test methodology and permit data must be approved by equipment manufacturer.
- Applicable environmental correction factors allowable by AHJ must be identified.
- Costs and time associated with on-site testing requirements must be considered.
- Review air permit requirements early in the project in order to accommodate lead times.
- Leverage experience of third-party testing companies and engine manufacturers.
- Review implications of failing on-site test including penalties and project delays.
- Permitted emissions values may need to be “guaranteed” by the engine manufacturer.

Air Permitting for Standby Generator Sets

On-Site Testing Considerations

- Non-standard equipment may be needed to secure air-permit / conduct on-site testing:
  - Fuel flow meter(s)
  - Pollutant monitor(s)
  - Exhaust sample port(s)
  - Load banks
- Test methodology and permit data must be approved by equipment manufacturer.
- Applicable environmental correction factors allowable by AHJ must be identified.
- Costs and time associated with on-site testing requirements must be considered.
- Review air permit requirements early in the project in order to accommodate lead times.
- Leverage experience of third-party testing companies and engine manufacturers.
- Review implications of failing on-site test including penalties and project delays.
- Permitted emissions values may need to be “guaranteed” by the engine manufacturer.

Air Permitting for Standby Generator Sets

On-Site Testing Considerations

- Non-standard equipment may be needed to secure air-permit / conduct on-site testing:
  - Fuel flow meter(s)
  - Pollutant monitor(s)
  - Exhaust sample port(s)
  - Load banks
- Test methodology and permit data must be approved by equipment manufacturer.
- Applicable environmental correction factors allowable by AHJ must be identified.
- Costs and time associated with on-site testing requirements must be considered.
- Review air permit requirements early in the project in order to accommodate lead times.
- Leverage experience of third-party testing companies and engine manufacturers.
- Review implications of failing on-site test including penalties and project delays.
- Permitted emissions values may need to be “guaranteed” by the engine manufacturer.

Air Permitting for Standby Generator Sets

On-Site Testing Considerations

- Non-standard equipment may be needed to secure air-permit / conduct on-site testing:
  - Fuel flow meter(s)
  - Pollutant monitor(s)
  - Exhaust sample port(s)
  - Load banks
- Test methodology and permit data must be approved by equipment manufacturer
- Applicable environmental correction factors allowable by AHJ must be identified.
- Costs and time associated with on-site testing requirements must be considered.
- Review air permit requirements early in the project in order to accommodate lead times.
- Leverage experience of third-party testing companies and engine manufacturers.
- Review implications of failing on-site test including penalties and project delays.
- Permitted emissions values may need to be "guaranteed" by the engine manufacturer.

CONSULT THE ENGINE MANUFACTURER

Concept Check

Facility owners with stationary engines installed on-site are obligated to meet which of the following:

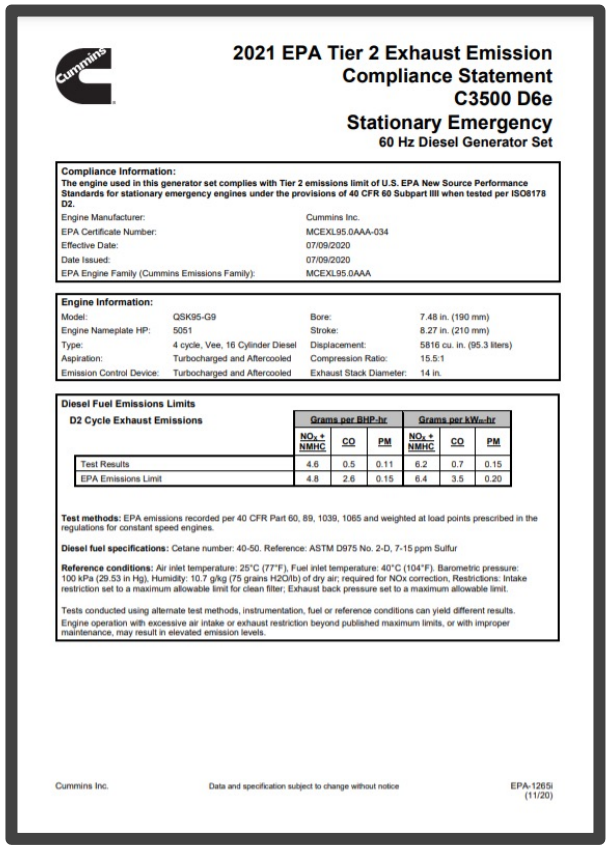
a) EPA guidelines for engine operation, as applicable
b) State guidelines for engine operation, as applicable
c) Local air permitting requirements, as applicable
d) All of the above

Concept Check

Facility owners with stationary engines installed on-site are obligated to meet which of the following:

a) EPA guidelines for engine operation, as applicable
b) State guidelines for engine operation, as applicable
c) Local air permitting requirements, as applicable
d) All of the above

Compliance Documentation



2021 EPA Tier 2 Exhaust Emission Compliance Statement
C3500 D6e
Stationary Emergency
60 Hz Diesel Generator Set

Compliance Information:
The engine used in this generator set complies with Tier 2 emissions limit of U.S. EPA New Source Performance Standards for stationary emergency engines under the provisions of 40 CFR 60 Subpart IIII when tested per ISO8178 D2.

Engine Manufacturer:	Cummins Inc.
EPA Certificate Number:	MCEXL95.0AAA-034
Effective Date:	07/09/2020
Date Issued:	07/09/2020
EPA Engine Family (Cummins Emissions Family):	MCEXL95.0AAA

Engine Information:

Model:	QSK95-G9	Bore:	7.48 in. (190 mm)
Engine Nameplate HP:	5051	Stroke:	8.27 in. (210 mm)
Type:	4 cycle, Vee, 16 Cylinder Diesel	Displacement:	5816 cu. in. (95.3 liters)
Aspiration:	Turbocharged and Aftercooled	Compression Ratio:	15.5:1
Emission Control Device:	Turbocharged and Aftercooled	Exhaust Stack Diameter:	14 in.

Diesel Fuel Emissions Limits

D2 Cycle Exhaust Emissions

	Grams per BHP-hr			Grams per kW_m-hr		
	NO_x + NMHC	CO	PM	NO_x + NMHC	CO	PM
Test Results	4.6	0.5	0.11	6.2	0.7	0.15
EPA Emissions Limit	4.8	2.6	0.15	6.4	3.5	0.20

Test methods: EPA emissions recorded per 40 CFR Part 60, 89, 1039, 1065 and weighted at load points prescribed in the regulations for constant speed engines.

Diesel fuel specifications: Cetane number: 40-50. Reference: ASTM D975 No. 2-D, 7-15 ppm Sulfur

Reference conditions: Air inlet temperature: 25°C (77°F), Fuel inlet temperature: 40°C (104°F). Barometric pressure: 100 kPa (29.53 in Hg), Humidity: 10.7 g/kg (75 grains H2O/lb) of dry air; required for NOx correction, Restrictions: Intake restriction set to a maximum allowable limit for clean filter; Exhaust back pressure set to a maximum allowable limit.

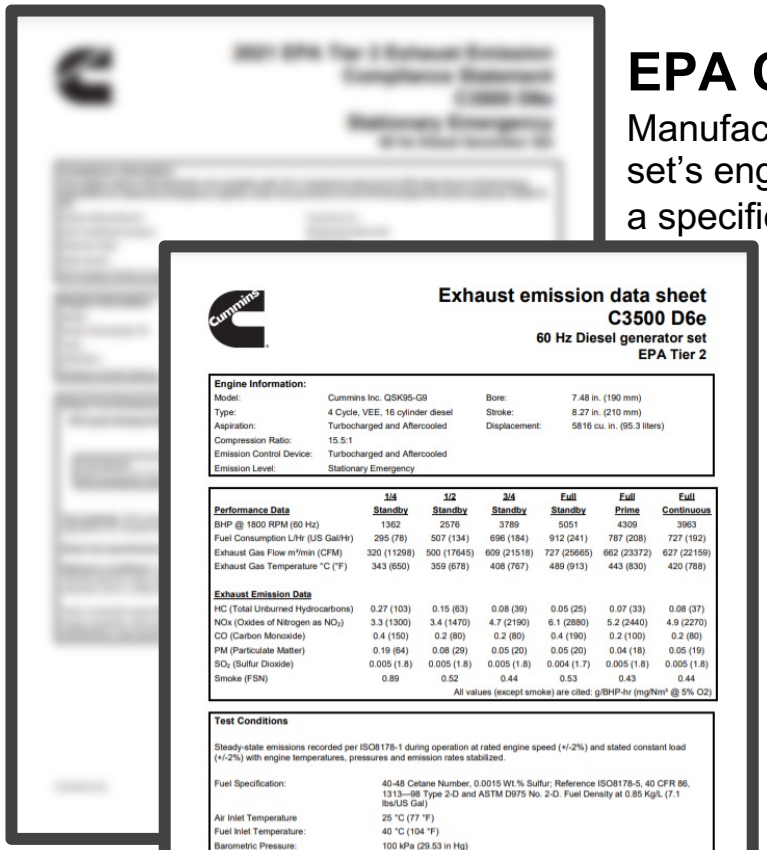
Tests conducted using alternate test methods, instrumentation, fuel or reference conditions can yield different results. Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may result in elevated emission levels.

Cummins Inc. Data and specification subject to change without notice EPA-1265i (11/20)

EPA Compliance Statement

Manufacturer statement certifying the generator set's engine compliance with EPA regulations for a specific model year

Compliance Documentation



EPA Compliance Statement

Manufacturer statement certifying the generator set's engine compliance with EPA regulations for a specific model year

Exhaust emission data sheet
C3500 D6e
60 Hz Diesel generator set
EPA Tier 2

Engine Information:

Model:	Cummins Inc. QSK95-G9	Bore:	7.48 in. (190 mm)
Type:	4 Cycle, VEE, 16 cylinder diesel	Stroke:	8.27 in. (210 mm)
Aspiration:	Turbocharged and Aftercooled	Displacement:	5816 cu. in. (95.3 liters)
Compression Ratio:	15.5:1		
Emission Control Device:	Turbocharged and Aftercooled		
Emission Level:	Stationary Emergency		

Performance Data	1/4 Standby	1/2 Standby	3/4 Standby	Full Standby	Full Prime	Full Continuous
BHP @ 1800 RPM (60 Hz)	1362	2576	3789	5051	4309	3963
Fuel Consumption L/Hr (US Gal/Hr)	295 (78)	507 (134)	696 (184)	912 (241)	787 (208)	727 (192)
Exhaust Gas Flow m³/min (CFM)	320 (11298)	500 (17645)	609 (21518)	727 (25665)	662 (23372)	627 (22159)
Exhaust Gas Temperature °C (°F)	343 (650)	359 (678)	408 (767)	489 (913)	443 (830)	420 (788)
Exhaust Emission Data						
HC (Total Unburned Hydrocarbons)	0.27 (103)	0.15 (63)	0.08 (39)	0.05 (25)	0.07 (33)	0.08 (37)
NOx (Oxides of Nitrogen as NO_2)	3.3 (1300)	3.4 (1470)	4.7 (2190)	6.1 (2880)	5.2 (2440)	4.9 (2270)
CO (Carbon Monoxide)	0.4 (150)	0.2 (80)	0.2 (80)	0.4 (190)	0.2 (100)	0.2 (80)
PM (Particulate Matter)	0.19 (64)	0.08 (29)	0.05 (20)	0.05 (20)	0.04 (18)	0.05 (19)
SO_2 (Sulfur Dioxide)	0.005 (1.8)	0.005 (1.8)	0.005 (1.8)	0.004 (1.7)	0.005 (1.8)	0.005 (1.8)
Smoke (FSN)	0.89	0.52	0.44	0.53	0.43	0.44

All values (except smoke) are cited: g/BHP-hr (mg/Nm³ @ 5% O2)

Test Conditions

Steady-state emissions recorded per ISO8178-1 during operation at rated engine speed (+/-2%) and stated constant load (+/-2%) with engine temperatures, pressures and emission rates stabilized.

Fuel Specification:	40-48 Cetane Number, 0.0015 Wt.% Sulfur; Reference ISO8178-5, 40 CFR 86, 1313—98 Type 2-D and ASTM D975 No. 2-D. Fuel Density at 0.85 Kg/L (7.1 lbs/US Gal)
Air Inlet Temperature	25 °C (77 °F)
Fuel Inlet Temperature:	40 °C (104 °F)
Barometric Pressure:	100 kPa (29.53 in Hg)
Humidity:	NOx measurement corrected to 10.7 g/kg (75 grains H_2O/lb) of dry air
Intake Restriction:	Set to 20 in of H_2O as measured from compressor inlet
Exhaust Back Pressure:	Set to 1.5 in Hg
Note:	mg/m³ values are measured dry, corrected to 5% O_2 and normalized to standard temperature and pressure (0°C, 101.325 kPa)

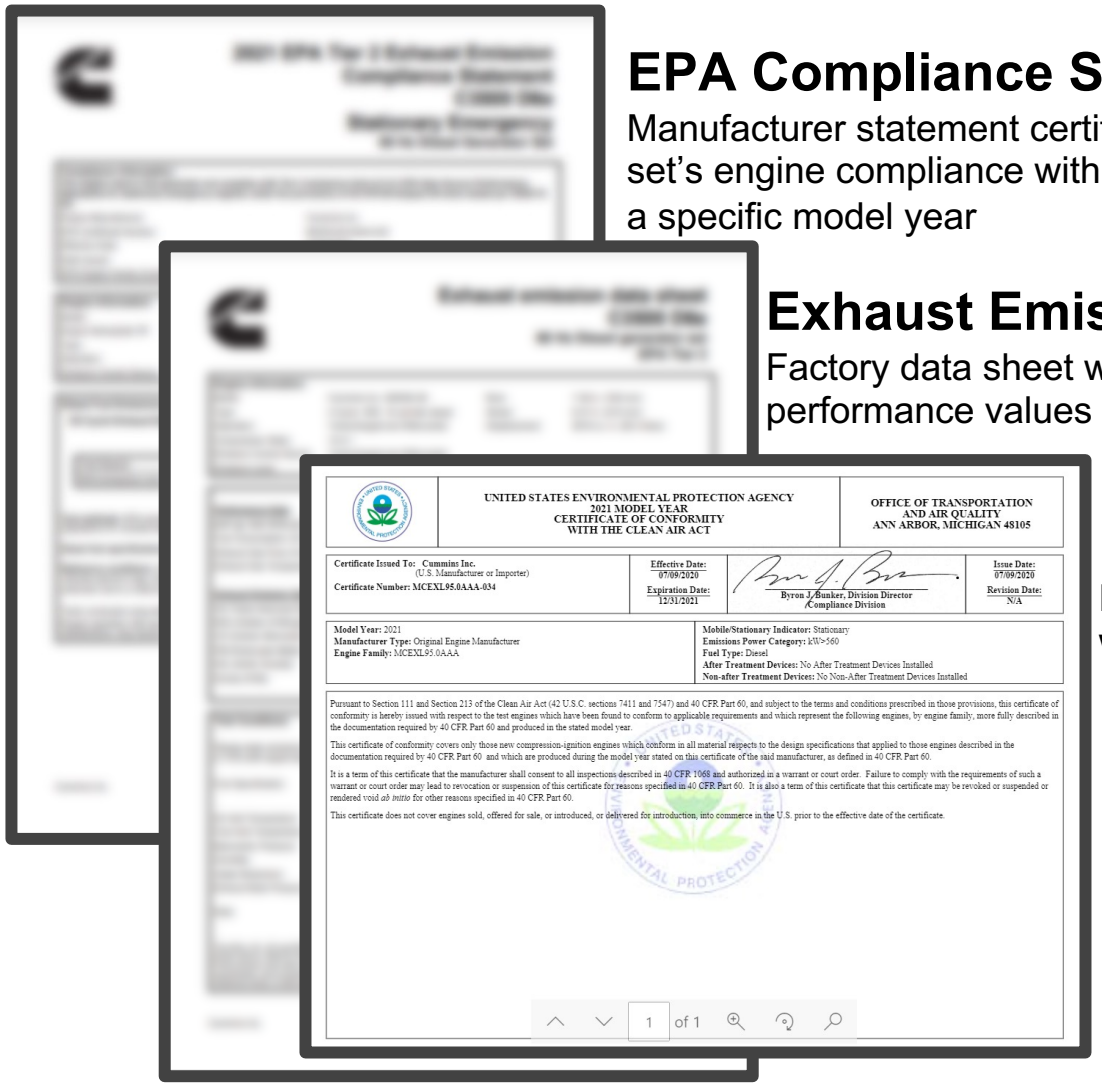
The NOx, HC, CO and PM emission data tabulated here are representative of test data taken from a single engine under the test conditions shown above. Data for the other components are estimated. These data are subjected to instrumentation and engine-to-engine variability. Field emission test data are not guaranteed to these levels. Actual field test results may vary due to test site conditions, installation, fuel specification, test procedures and instrumentation. Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may results in elevated emission levels.

Cummins Inc. Data and specification subject to change without notice EDS-1202c (1/18)

Exhaust Emission Data Sheet

Factory data sheet with recorded emissions and performance values at different load levels.

Compliance Documentation



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2021 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION
AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: Cummins Inc.
(U.S. Manufacturer or Importer)
Certificate Number: MCEXL95.0AAA-034

Effective Date: 07/09/2020
Expiration Date: 12/31/2021

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 07/09/2020
Revision Date: N/A

Model Year: 2021
Manufacturer Type: Original Engine Manufacturer
Engine Family: MCEXL95.0AAA

Mobile/Stationary Indicator: Stationary
Emissions Power Category: kW>560
Fuel Type: Diesel
After Treatment Devices: No After Treatment Devices Installed
Non-after Treatment Devices: No Non-After Treatment Devices Installed

Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Part 60, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60.

This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

1 of 1

EPA Compliance Statement

Manufacturer statement certifying the generator set's engine compliance with EPA regulations for a specific model year

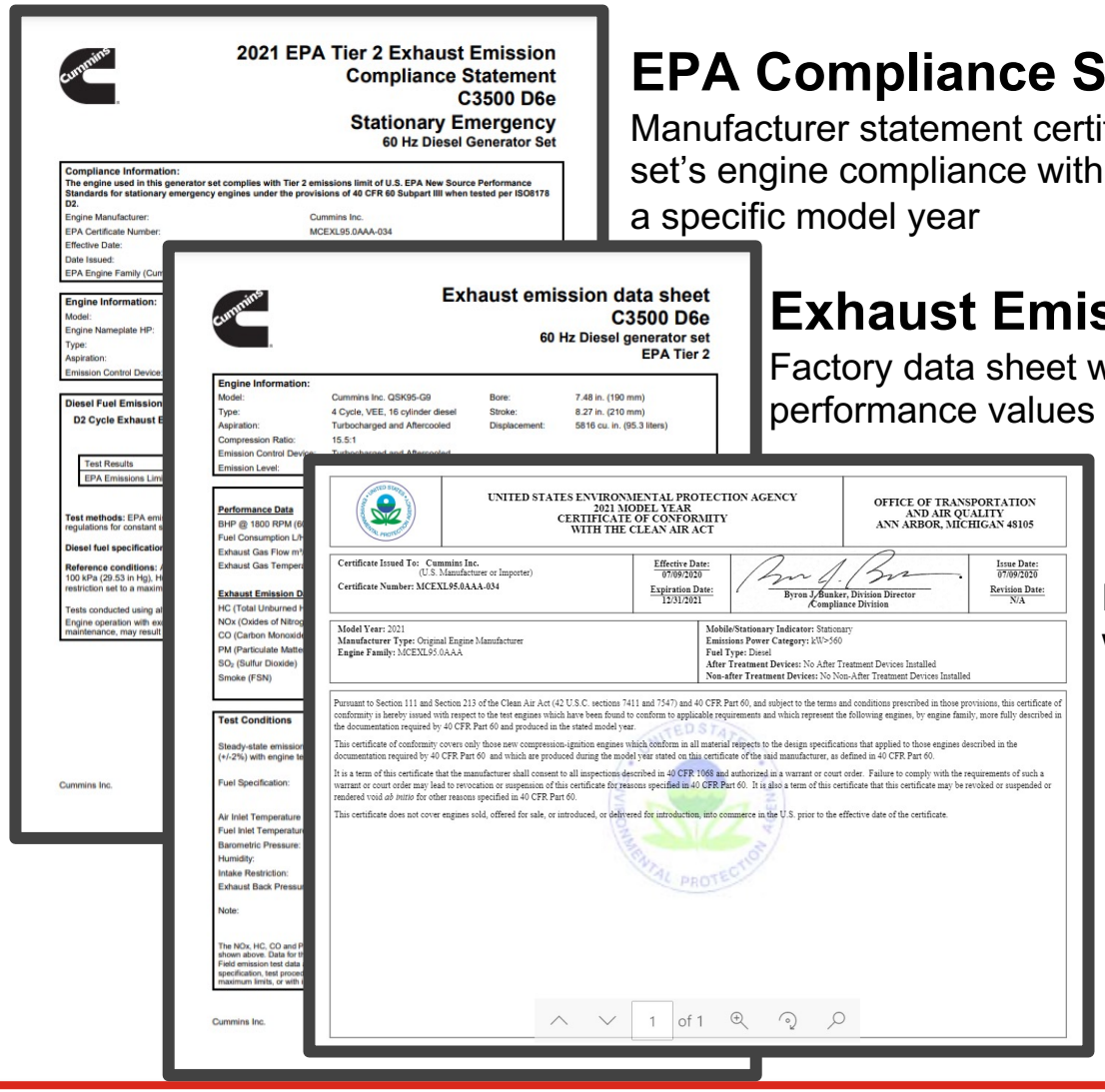
Exhaust Emission Data Sheet

Factory data sheet with recorded emissions and performance values at different load levels.

EPA Certificate of Conformity

EPA statement certifying conformity of the engine with EPA regulations for a specific model year.

Compliance Documentation



EPA Compliance Statement

Manufacturer statement certifying the generator set's engine compliance with EPA regulations for a specific model year

Exhaust Emission Data Sheet

Factory data sheet with recorded emissions and performance values at different load levels.

EPA Certificate of Conformity

EPA statement certifying conformity of the engine with EPA regulations for a specific model year.

Spec Note Generator set manufacturer shall provide documentation of engine EPA certification including EPA Family name and generator set model.

Course Summary

Emissions and Air Permitting Requirements for Standby Generator Sets

- Recognize commonly regulated exhaust emissions constituents.
- Describe EPA emissions requirements for diesel and gaseous standby generator sets.
- Identify common requirements for permitting engine-driven generator sets.

Specify:

- Generator set shall include engine which complies with U.S. EPA New Source Performance Standards (NSPS) for **Stationary Emergency** engines under the provisions of [40 CFR Part 60 Subpart IIII or 40 CFR Part 60 Subpart JJJJ] when tested per ISO 8178 D2.
- Engine shall meet emissions limits as defined for **Stationary Emergency** engines in [40 CFR Part 60 Subpart IIII or 40 CFR Part 60 Subpart JJJJ] when tested per ISO 8178 D2.

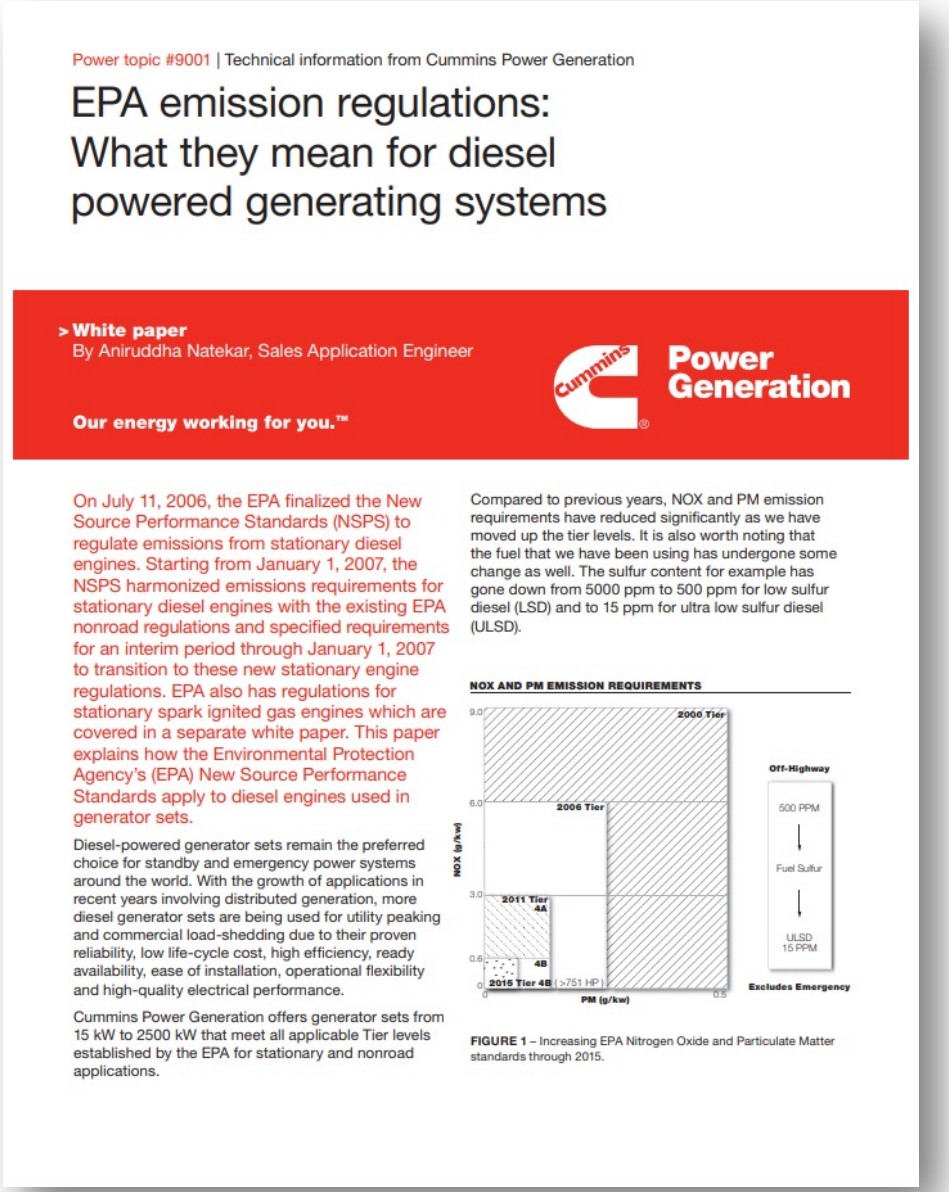
Additional Resources

Cummins White Papers

- EPA Emission Regulations: What they mean for diesel powered generating systems
- The Impact of Tier 4 Emission Regulations on the Power Generation Industry
- Understanding RICE NESHAP regulations and their impact on stationary diesel generator sets
- Understanding EPA NSPS Emissions Regulations For Stationary Spark Ignited Engines

Cummins PowerHour On-Demand Webinars

- Emissions Requirements for Compression Ignition Engines in EPA Non-Emergency Operation



Power topic #9001 | Technical information from Cummins Power Generation

EPA emission regulations: What they mean for diesel powered generating systems

> White paper
By Aniruddha Natekar, Sales Application Engineer

Our energy working for you.™

Power Generation

On July 11, 2006, the EPA finalized the New Source Performance Standards (NSPS) to regulate emissions from stationary diesel engines. Starting from January 1, 2007, the NSPS harmonized emissions requirements for stationary diesel engines with the existing EPA nonroad regulations and specified requirements for an interim period through January 1, 2007 to transition to these new stationary engine regulations. EPA also has regulations for stationary spark ignited gas engines which are covered in a separate white paper. This paper explains how the Environmental Protection Agency's (EPA) New Source Performance Standards apply to diesel engines used in generator sets.

Diesel-powered generator sets remain the preferred choice for standby and emergency power systems around the world. With the growth of applications in recent years involving distributed generation, more diesel generator sets are being used for utility peaking and commercial load-shedding due to their proven reliability, low life-cycle cost, high efficiency, ready availability, ease of installation, operational flexibility and high-quality electrical performance.

Cummins Power Generation offers generator sets from 15 kW to 2500 kW that meet all applicable Tier levels established by the EPA for stationary and nonroad applications.

Compared to previous years, NOX and PM emission requirements have reduced significantly as we have moved up the tier levels. It is also worth noting that the fuel that we have been using has undergone some change as well. The sulfur content for example has gone down from 5000 ppm to 500 ppm for low sulfur diesel (LSD) and to 15 ppm for ultra low sulfur diesel (ULSD).

NOX AND PM EMISSION REQUIREMENTS

FIGURE 1 – Increasing EPA Nitrogen Oxide and Particulate Matter standards through 2015.

Q&A

Please type your questions, comments and feedback in the **Zoom Q&A** window.

PDH certificate, copy of the presentation, and link to the recording will be provided in a follow up email within a 1-2 business days.

Please complete the brief survey upon exiting the webinar!

Michael Sanford
Product Strategy and Sales Enablement Leader
Cummins Inc.

Brian Pumphrey
Director of Sales Application Engineering Wester USA
Cummins Inc.

Scott Thomas
Director of Sales Application Engineering – Southern USA
Cummins Inc.

Mandy Memari
Emissions Compliance Leader
Cummins Inc.

Closing

Watch out for a follow-up email including:

- A link to the webinar recording and copy of the presentation
- A certificate issuing one professional development hour (1 PDH)

Visit powersuite.cummins.com for:

- Sizing and specification development tools
- PowerHour webinar recordings, presentations and FAQ
- Additional Cummins continuing education programs

Visit cummins.com/energy-iq and sign-up for communications to:

- Receive energy insights
- Read about energy technologies and trends

Upcoming PowerHour Webinars:

05/27/21 - ASHE Lunch and Learn Webinar: NFPA 110 Testing and Service Requirements for Standby Power Systems

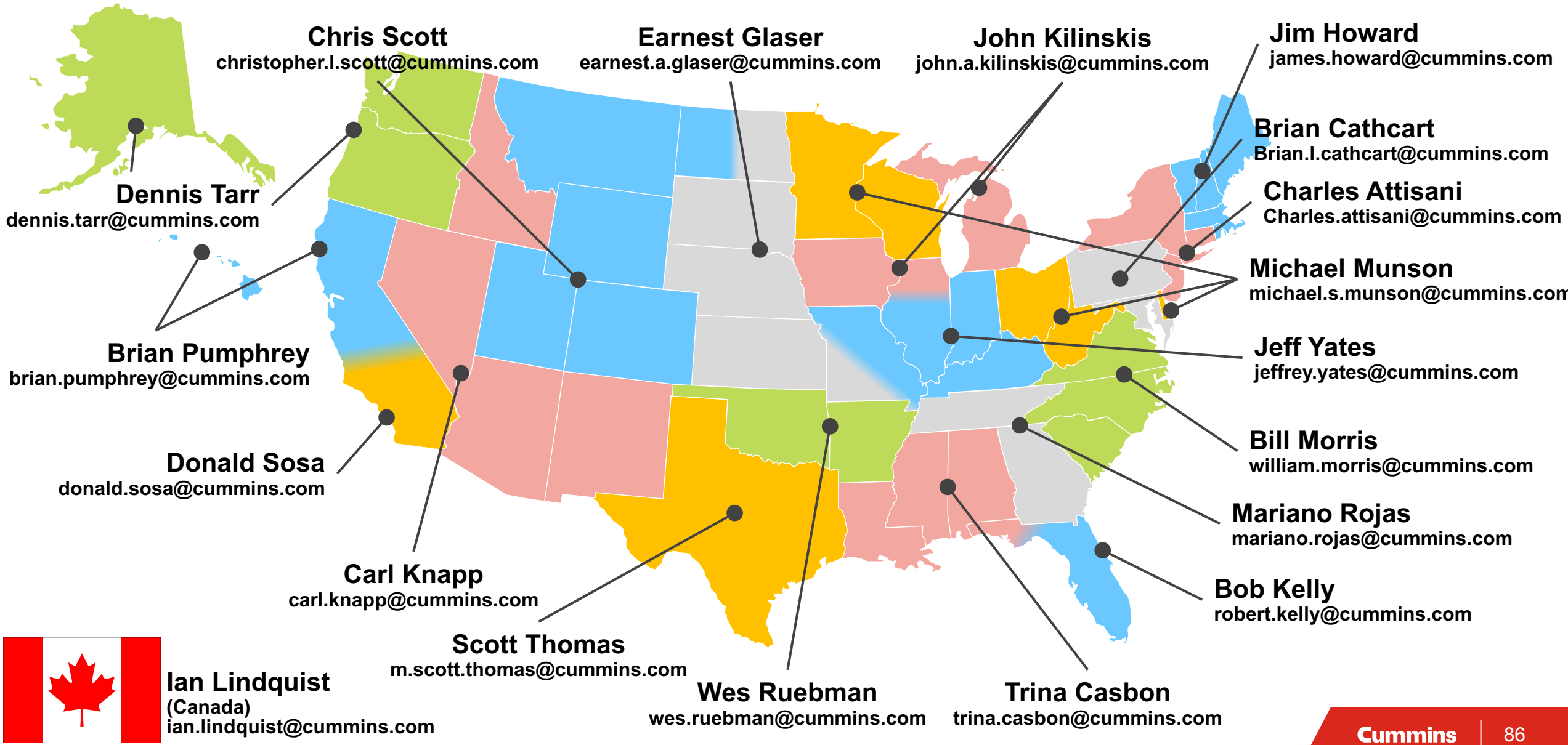
07/01/21 - Ask the Experts Session

07/29/21 - Considerations for Generator Set Selection

08/26/2021 - Transfer Switches: What to Specify and Why

Please contact Michael Sanford if you have any questions related to the PowerHour webinar (michael.sanford@cummins.com)

Your Local Cummins Sales Application Engineers




Cummins