



Experts you trust. Excellence you count on.

Session: September 2017

## PowerHour FAQs

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

The power generation industry has witnessed a series of significant changes to the emissions landscape. First, the Clean Air Act was implemented to address harmful emissions from fossil fuels. The National Ambient Air Quality Standards (NAAQS) targets geographical regions afflicted with high concentrations of pollutants. Finally, New Source Performance Standards (NSPS) address new engines and establish the emissions limits that certified engines must meet. This course will examine the impact of NSPS on compression ignition engine certification for EPA non-emergency operation and will answer the question, “What is Tier 4 Final anyway?”

To learn more please join the Cummins PowerHour webinar:

Following this PowerHour participants should be able to:

- Review EPA New Source Performance Standards (NSPS) and engine emission regulations
- Identify appropriate usage of certified and compliant engines.
- Recognize applications requiring EPA non-emergency emission certification to specify products meeting project requirements
- Recognize the potential impact of product misapplication as related to federal and local guidelines.

**Are Clean Air Act (CAA) emission standards for Tier 4 permits different than the standards for Tier 2 emergency diesel generators? I've never seen a CAA permit request that says “A stationary emergency generator set must meet Tier 4.”**

I have seen permits that say “Although the generator set is classified as stationary emergency, it must meet Tier 4.” If that’s what’s required, the engine or generator set manufacturer needs to know ahead of time, to provide the appropriate system. But most permits don’t say “Must be Tier 4.”

There are various ways air permits can be set up, typically stating either a brake-specific emissions level or an annual tonnage limit. A brake-specific emissions level may say “Shall not exceed 6.0 grams per brake horsepower-hour NOx at 100% lad.”

When we see a brake-specific requirement, it’s usually due to a misunderstanding or a mis-translation of the EPA’s guidelines.

[power.cummins.com/training/consulting-specifying-engineers](http://power.cummins.com/training/consulting-specifying-engineers)

What we most often see is an annual tonnage limit. So the permit will say, “No matter how many generator sets you have onsite, the site cannot produce more than 100 tons of NOx in a year.” The generator set manufacturer then calculates, “If that’s the case and we know that we’re going to provide 20 generator sets, we know how much NOx is produced from our engines and we can determine the amount of hours the generator set would be capable of running before hitting that tonnage limit.”

**Municipal clients typically don’t specify tier requirements; they rely on us as consultants to recommend what is required. Any comment on that?**

It’s good that the municipal clients are relying on your expertise. We want to make sure that we’re providing the knowledge you need, through courses such as this Power Hour and other resources. Our objective is to set you up with all of the information required to provide your client with a good recommendation.

The only caveat is that many times the state requirement, city requirement or county requirement is the owner’s responsibility. The EPA mandates that the engine manufacturer provide a certified solution that meets the federal requirements. However, the responsibility for local requirements falls on the owner, not the engine manufacturer. This can be a problem if the owner is unaware of a requirement and if you as the consultant also overlook the requirement. If this happens, you’re going to have to work closely with the owner to resolve the issue.

**Is a generator at a wastewater treatment plant considered an emergency unit?**

Let’s look at the way EPA defines emergency usage. The treatment plant has a primary power source, which is the utility. If you operate the generator set only when the primary source, the utility, fails then the EPA would consider the generator an emergency power source. Just keep in mind that any Tier requirements, NFPA requirements or ISO requirements are separate from the EPA requirements.

**What, if anything, can we provide for cabins in areas with no utility power?**

We run into this situation not only for cabins, but also for other situations such as remote facilities at state parks where utility power is unavailable. The EPA defines emergency power as a generator set that’s running after the primary power source has failed. So in this case, because there is no primary source, the generator set would be classified as a Tier 4 non-road compression ignition engine and would have to meet the Tier 4 standard.

However, for smaller applications such as a cabin, you usually don’t need a 300-kilowatt generator. A 5-, 8- or 10-kilowatt generator is often sufficient and that size engine is regulated differently than high-horsepower equipment. A number of manufacturers offer products for these smaller applications.

**I have a customer with a facility in Puerto Rico. Can we use an emergency standby generator set? Power likely will be out for nine months or more.**

EPA says if there’s a stationary emergency-certified engine onsite, and the power has failed and it’s not coming back, the generator set can be used for an unlimited period of time. However, if there’s not an existing emergency generator set

onsite, I wouldn't recommend going in there now to install a stationary emergency generator set to be use for prime power. You would need to work with the local authorities to understand what the implications would be. Typically in that situation, where you need prime power for an unknown time period, you could use a rental generator or mobile generator that is already certified for non-road and meets those requirements.

**DEF quality sensors are now required for vintage engines (2017 or earlier) in a Tier 4 configuration. Is this applicable for all fuel types, including pipeline natural gas, which may be a spark-ignited unit?**

The DEF quality requirement is for Tier 4 compression ignition engines. Tier 4 only covers non-road compression ignition engines. Spark-ignited engines fall into a different category with different rules. Keep in mind that, unlike compression ignition engines, spark-ignited engines fueled by natural gas do not mandate certification by the engine manufacturer. The responsibility can and sometimes is passed to the owner and operator.

If you're working on a project involving non-emergency operation of a spark-ignited engine, presumably a lean burn or rich burn natural gas engine, you need to work with the generator set manufacturer to be sure you're getting the appropriate product and the manufacturer is providing the accessories and options necessary to meet the legal requirements.

As for fuels, EPA certification from the engine manufacturer is categorized based on the way combustion starts in the engine—is it spark-ignited or compression ignition? That's the determining factor. The fuel type for compression ignition engines is ultra-low sulfur diesel with less than 15 parts per million sulfur.

**What about DEF storage temperature requirements? How long it can be stored before it starts to degrade? Is there a time limit on fuel as well?**

We prefer to see DEF stored at temperatures above 12° F, in a tank with an immersion heater or heat tape, or in a room where the ambient temperature is maintained above 12°F. DEF is very sensitive to temperature swings. So keeping it stabilized at a constant temperature is best. Wide temperature swings, for example, storing it outside above ground, will impact the DEF's lifespan. As for how long DEF can be stored before it degrades, that depends on the quality of the DEF to begin with. A year of storage is fairly common, but it does depend on the initial quality.

The same applies for diesel fuel. The useable life of the fuel depends on the quality of the fuel and the storage conditions. A good quality fuel that is stored properly is typically good for a year to 16 months. Poor quality fuel won't last as long. High quality fuel with a good maintenance program can last significantly longer.

**Do we need to provide continuous 110-volt power to the after-treatment system even when the generator set is not running?**

Generally the answer is yes, but it depends upon the manufacturer. Typically a constant power supply is required for the after-treatment system or at least the control system—usually just a couple of amps. A circuit breaker under 20 amps at 120V is often necessary to maintain the DEF system. Most DEF systems constantly circulate the DEF to maintain the temperature and make sure the DEF isn't just sitting. You need to consult with the manufacturer to understand what's being provided and what the requirements are for their system.

### **Can you run a non-certified engine that meets emissions standards? What about natural gas engines?**

First, can you run a non-certified engine if it meets emissions standards? This would be what we'd refer to as a compliant solution. For example, you could take a stationary emergency-certified engine that meets the Tier 2 emissions levels, install it in the field and then add an after-treatment system from another company or retrofit an after-treatment solution from the engine manufacturer. As a result, the combination of the Tier 2 engine and the after-treatment system meets the Tier 4 emissions levels. But... because the system was not certified, packaged and supplied as a complete system, per the EPA it cannot be legally operated in a non-emergency situation. That's our interpretation of the EPA's stance. You may want to consult with your local authorities. They may have a different view.

As for natural gas engines, note that spark-ignited engines must meet different requirements for both stationary emergency and stationary non-emergency, and they can be certified either way. We do sometimes see natural gas proposed as an alternative to a diesel system with the Tier 4 after-treatment system, but it's important to get quotes on both.

### **How do used engines or used generator sets fit into the EPA's Tier requirements? Are they subject to allowed usage at time of manufacture?**

After the EPA implemented the NSPS (New Source Performance Standards) for new equipment, they began to look at ways to deal with the old engines in the field that weren't anywhere close to meeting today's emissions standards. There was a mandate that by 2013

those older engines or used engines had to be retrofitted to meet specific target emissions levels. This program is known as RICE NESHAP (National Emissions Standards for Hazardous Air Pollutants for stationary Reciprocating Internal Combustion Engines). If they could meet those requirements, EPA allowed them to operate per their original certification. All those retrofits should have been done by now because the deadline was 2013. If you run into a RICE NESHAP job I highly recommend you work with the engine manufacturer, and perhaps even an environmental lawyer, to understand the implications of retrofitting that system.

### **What is the relationship between Tier ratings and prime, standby or continuous-rated generator sets?**

The short answer is, there isn't a direct relationship. You can have a generator set that is rated for continuous operation—that's 8,760 hours a year, with 100% load—but as long as you only use that generator set when the utility fails, the EPA would say that qualifies as stationary emergency, so you'd only have to meet the Tier 2 requirements, or maybe Tier 3 depending on the size of the engine.

On the other hand, you can have a system that can operate any time, with non-emergency or non-road certification, but if you only operate it when the utility failed, EPA would view that as emergency operation. So the Tier ratings are not linked directly to the prime, standby or continuous usage ratings.

In North America, in our standby market, we typically see EPA stationary emergency paired with ISO standby, because that's the most logical pairing. But again, they aren't necessarily linked. I'd definitely say work with your generator set manufacturer to understand what system would be best at meeting the requirement for that application.

**Please comment on the EPA level requirement for engines that are 750 horsepower and below?**

This webinar focused on high-horsepower engines above 750 HP because that's what we use for our typical healthcare and data center applications. The requirements for smaller engines are very similar. From the manufacturer's point of view, they consider everything Tier 2. Smaller engines usually have to meet Tier 3 emissions levels, but most manufacturers are able to reach Tier 3 levels with in-engine or on-engine technology, so the application requirements are the same as their Tier 2 counterparts. Generally you do not need after-treatment to meet Tier 3 emissions levels.

**If a client requires generator power for seven days when there's a utility service failure, would you recommend specifying an emergency generator set or a continuous system?**

There are a couple of things to consider. If the client is only going to power up the generator set when the utility fails, the EPA would classify that application as stationary emergency. But if you're saying the client expects multiple long-term outages, in an area where the grid service is unreliable, you may want to look at an ISO rating that's more consistent with the actual operation. In this situation, it's not uncommon to see an EPA-rated stationary emergency generator set with an ISO prime rating. It still may be possible to use an ISO standby rating, so it's best to work closely with the manufacturer to understand what they would recommend.

**Are the EPA standards for emergency engines the same for generator set engines versus fire pump engines? Are the hours of operation limited to 50 hours per year for both?**

No, it's my understanding that fire pump applications have slightly different emissions requirements. From Cummins standpoint, many of the engines we use for power generation are also used for industrial applications, fire pumps, locomotives and other applications. The EPA views each of these uses differently and sets the emissions levels accordingly. This is true of Cummins on-road and off-highway engines as well.

When you're specifying different uses of engines, make sure you understand what the EPA requires as well as what your local authority expects, and that you include all of these requirements in your specifications, so the manufacturer can supply the appropriate product.

**What's the approximate kilowatt range for exhaust heaters for a 2,000-kilowatt application?**

It really depends on the manufacturer. Various manufacturers can provide different solutions, so depending on your specific application, a compliant system might be sized differently than a certified system, especially if it will not be used for non-road or non-emergency operation. This is another case where you should work with the manufacturer to find a product that responds to your specific concerns.

## **For a given brake horsepower rating, what improvements make the emergency engine a Tier 3 versus a Tier 2 engine?**

It's important to understand that any manufacturer within a given usage category and power category is required to meet different emission level requirements—one power category may only have to meet Tier 2 and another power category may have to meet Tier 3 to be legal for stationary emergency operation. The methods used by most manufacturers to meet Tier 1, 2 or 3 emissions levels are in-cylinder or on-engine—such as exhaust gas recirculation, variable geometry turbos, wastegated turbos, combustion chamber design or cylinder head design.

There's nothing intrinsically better about a Tier 3 engine versus a Tier 2 engine. I certainly would not recommend putting "Must be Tier 3-certified" in the specifications. Focus on the actual application. If you actually need lower emissions levels that's one thing, but by specifying a Tier level you're not going to drive a better product. In fact, what you may end up doing is driving toward the wrong product. So, whether it's a stationary emergency or stationary non-emergency application, Tier 3 versus Tier 2, it's not that Tier 3 is going to be a better product. It's a different product to intended to meet different emissions levels.

## **Can I supply a Tier 4 generator set but not install some of the SCR DEF systems until in the future? Would it be acceptable to operate if you meet Tier 2, and only install the additional equipment if necessary in the future? The idea being to future-proof the design?**

One of the points I stressed in the presentation is that the engine and after-treatment system are certified together. The EPA views this combination as a single product. The engine and the after-treatment system can't be separated. Often they are serialized together to track the after-treatment system with the engine. So no, you can't install the after-treatment systems at a later date. Also, the engine may require real-time feedback from the after-treatment system, so it may not be able to operate without it. You would have to plan for future non-emergency operation upfront.

Visit us at [powersuite.cummins.com](http://powersuite.cummins.com) for previous webinar recordings, PDF presentations, frequently asked questions, sizing tools, FAQ documents, and other Cummins Continuing Education programs. Contact your local Cummins support team member if you need any further assistance.

**Disclaimer:** *The views and opinions expressed in this course or FAQ 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.*



[power.cummins.com](http://power.cummins.com)

**Cummins Inc.**  
Box 3005  
Columbus, IN 47202-3005  
U.S.A.

Cummins is a registered trademark of Cummins Inc.

Bulletin 5544093 6/18  
©2018 Cummins Inc.