UPDATE ON NORTH AMERICAN EMISSIONS REGULATIONS FOR ELECTRIC POWER

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INTRODUCTION

In 2010, a number of changes and proposals influenced U.S. Environmental Protection Agency (EPA) regulations for compression ignition engines in stationary and non-road mobile machinery — the engines used in electric power applications. The three most significant regulatory activities were:

- Proposed changes from the EPA, including the definition of stationary emergency engines and the adjustment of annual, non-emergency running allowances.
- The California Air Resource Board (ARB) adopted the 2006 version of EPA's new source performance standards (NSPS) that apply to stationary engines
- The delay in the adoption of Tier 4 emissions standards for non-road mobile machinery by Environment Canada.

UPDATED EPA TIER 4 REGULATIONS AND PROPOSALS FOR STATIONARY EMERGENCY APPLICATIONS

The EPA has set alternative emissions standards for stationary engines used in emergency applications. Essentially, stationary emergency engines are not required to use aftertreatment due to low hours of operation and extended low load operation which can be incompatible with aftertreatment devices.

Here are the new standards that went into effect on January 1, 2011:

- Stationary emergency engines below 37 bkW must meet the Tier 4 Interim standard in effect since January 1, 2008.
- Stationary emergency engines between 37 and 2237 bkW with a displacement of less than 10 liters per cylinder must meet Tier 2 or Tier 3 standards, depending on the power of the engine.
- Stationary emergency engines greater than 3000 bhp and less than 10 liters per cylinder displacement are required to meet Tier 2 standards.

Even though the EPA has mandated these alternative standards for stationary emergency engines, local regulators may impose stricter limits. In these cases, the engine must be EPA-certified to the stationary emergency standard, and aftertreatment devices may need to be installed to further reduce emissions.

Since the EPA's definition of an emergency engine relates to its use, not its rating, it is possible to have a prime-rated generator set that operates only as an emergency unit. Conversely, generator sets with standby ratings are not necessarily regarded as emergency units.

Under the original definition, emergency engines could not run except during emergency situations — the unplanned loss of the normal source of power — or for standard maintenance and testing. While maintenance and testing were limited to 100 hours per year, engines could run without limit during emergencies.

In an effort to better align the regulation of emergency generator sets with real-world operating practices, Caterpillar and other engine manufacturers requested the EPA to review the allowances for the non-emergency operation of stationary emergency engines. After careful consideration, the EPA issued a final rule that includes proposed adjustments to the allowable non-emergency running hour allowance.

Of the 100 hours per year currently allowed for maintenance and testing of the engine, the EPA recently published a final rule that allows 50 of these hours to be available for other nonemergency operation, such as storm avoidance or facility maintenance. This final rule took effect on August 29, 2011.

However, the EPA did not agree to the industry's proposal that up to 15 hours of this new 50-hour allowance could be used as part of an emergency demand response program. The agency declined to include the allowance, because it is currently being challenged under a similar rule – the March 3, 2011 final rule revising the National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines. The timing for a response from the EPA on this issue is unknown.

Although these recent changes to the NSPS for compression ignition engines do not address all industry concerns, by making it possible for operators to run for a limited number of hours for non-emergency purposes such as storm avoidance or facility maintenance, they would allow a greater proportion of new electric power installations to operate within the EPA definition of emergency and to Tier 2 or Tier 3 levels of technology, rather than Tier 4.

AMENDED ARB REQUIREMENTS FOR EMERGENCY ENGINES

As a member of the Engine Manufacturers' Association, Caterpillar has urged the ARB to align its requirements for emergency engines with those of the EPA. Following public consultation, the ARB adopted the 2006 version of the applicable EPA regulation (40 CFR Part 60 Subpart IIII).

Subsequent to the ARB's rulemaking activities, the EPA revised its regulations, which went into effect August 29, 2011. In general, emergency engines produced in the 2011 model year must meet the regulated limits for the previous Tier. As is the case for EPA regulations, emergency engines greater than 3000 bhp and less than 10 liters per cylinder must now comply with Tier 2 limits rather than Tier 1.

While the ARB has agreed in principle to an alignment with EPA regulations, California regulators have not relaxed the PM limits for engines between 37 and 75 bkW. In this power range, the ARB limit of 0.30 g/kW-hr has always been lower than the EPA's 0.40 g/kW-hr, and the more stringent limit has been preserved.

ENVIRONMENT CANADA'S ADOPTION OF NON-ROAD TIER 4 INTERIM EMISSION STANDARDS

Historically, regulators for Environment Canada have aligned their emissions standards for non-road mobile machinery with the EPA. While engine manufacturers have been able to obtain certifications specific to Canada, regulators there also have recognized EPA certification as being valid in Canada. Stationary engines are unregulated by Environment Canada but may be subject to local requirements.

To align with the EPA's timetable, Canadian regulators had planned to adopt Tier 4 Interim standards for non-road engines greater than 130 bkW on January 1, 2011, but the process has been delayed.

Caterpillar is closely following the approval process at Environment Canada, and it is expected that the delay will extend until first quarter 2012. As a result, products meeting Tier 4 Interim standards will not be required for the Canadian market in 2011, although they will be legally acceptable.

In the meantime, Caterpillar will continue to produce Tier 2 and Tier 3 XQ rental generator sets certified specifically for the Canadian market through 2011. Cat® non-road engines built in model year 2011 that are installed in rental generator sets for the Canadian market will be certified to Canadian standards and will carry Canadian certification labels.

Because it is no longer possible to certify engines built on or after January 1, 2011, to the EPA's Tier 2 or Tier 3 standards, these engines and generator sets may not be reimported into the U.S.

SUMMARY

These adopted and proposed regulatory changes will allow a greater proportion of the stationary electric power market to utilize emergency engines. However, it is important to recognize a number of key points:

- The EPA has published a final rule that allows up to 50 hours of the annual allowance for maintenance and testing to be used or available for other non-emergency operation.
- It is unclear at this time whether the EPA will permit a 15-hour allowance for emergency demand response.
- Although the EPA's final rule allows 50 hours of non-emergency operation, emergency engines still have less operational flexibility than Tier 4-certified non-road engines because their ability to operate outside of emergency situations is limited.
- Emergency engines cannot be upgraded in the field to Tier 4 certified status through the addition of aftertreatment. Although they may be able to achieve Tier 4 regulated limits, they will still be subject to the emergency engine operating limitations.
- Local air boards may mandate tougher emergency standards than the EPA and ARB.

Although the regulatory requirements are becoming more harmonized, customers, end-users and consultants need to communicate proactively to ensure that all parties involved in the planning, purchase and operation of electric power solutions can reach a common understanding and identify the optimal solution for each application.

ABOUT

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