November 12, 2019

U.S. EPA
EPA Docket Center
Mail Code 28221T
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Attn: Docket No. ID EPA–HQ–OAR–2015–0072

Re:* Policy Assessment for Review of the National Ambient Air Quality Standards for Particulate Matter, External Review Draft *(Draft PA)

The Institute of Clean Air Companies (ICAC) appreciates the opportunity to offer comments in response to EPA's Policy Assessment for Review of the National Ambient Air Quality Standards for Particulate Matter, External Review Draft *(Draft PA)* (EPA–HQ–OAR–2015-0072).

ICAC is the national trade association of companies that supply air pollution control and monitoring systems, equipment and, services for stationary sources. For 60 years, ICAC member companies have helped to clean the air by developing and installing reliable, cost effective control and monitoring systems. We believe that improved air quality and industrial growth best occur when achievable cost-effective policies are paired with innovative technologies.

Our comments will focus on diesel particulate filters, an existing reliable and cost-effective control technology, to help reduce $PM_{2.5}$ emissions.

Again, ICAC appreciates the opportunity to offer comments on this, and we look forward to answering any further questions should EPA seek additional information.

Sincerely,

Clare Schulzki

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ICAC Executive Director

Background: Proven Control Technologies to Address Increasing $PM_{2.5}$

EPA's *Policy Assessment for Review of the National Ambient Air Quality Standards for Particulate Matter, External Review Draft* concluded that there "is evidence sufficient to conclude that a causal relationship is likely to exist between short-term $PM_{2.5}$ exposure and respiratory effects" (U.S. EPA, 2018, p. 5-155). The same conclusion was reached for long-term exposure (page 3-33, line 34).

What is apparent from EPA's policy assessment is that although there have been dramatic improvements in the reduction of emissions of ammonia, NO_x, SO_2 and VOCs, by contrast the reduction in PM emissions since 2002 (and especially $PM_{2.5}$) has been minimal at best (see **Table 1**). While fires and dust storms can limit the progress in reducing $PM_{2.5}$, some stationary diesel engines can sometimes contribute to local air quality issues.

It is reasonable to conclude that diesel particulate emissions should be controlled whenever there is a demonstrated control strategy for those pollutant emissions. ICAC believes that even short-term exposure to $PM_{2.5}$ must be addressed, and the technology to provide such $PM_{2.5}$ control is both well proven and cost-effective. Throughout the U.S., diesel particulate filters (DPF) have been reliably and cost-effectively controlling the particulate count by over 99%. DPFs have been successfully deployed on emergency back-up, non-emergency back-up, and prime power generators. In California alone, one supplier identified over 1,000 installations on diesel gensets having installed a DPF.

Table 1. Percent Changes in PM and PM Precursor Emissions in the NEI for the Time Periods 1990-2014 and 2002-2014. Source: U.S. EPA's Policy Assessment for Review of the National Ambient Air Quality Standards for Particulate Matter, External Review Draft (September 2019).

Pollutant	Percent Change in Emissions: 1990 to 2014	Percent Change in Emissions: 2002 to 2014	Major Sources
NH_3	-21%	-10%	Agricultural Sources (Fertilizer and Livestock Waste), Fires
NO_X	-50%	-48%	EGUs, Mobile Sources
SO_2	-80%	-69%	EGUs, other Stationary Sources
VOCs	-38%	-15%	Solvents, Fires, Mobile Sources
$PM_{2.5}$	-40%	-4%	Dust, Fires
PM_{10}	-38%	-15%	Dust, Fires

$PM_{2.5}$ Emissions from Stationary Diesel Engines

It is challenging for air quality professionals to address emissions from uncontrolled diesel engines due to the lack of uniform information regarding operating hours, particulate emission rates, and the potential harm from increased exposure to $PM_{2.5}$. NESCAUM previously reported in 2012 that "uncontrolled diesel backup generators operating under the exemption included in EPA's recent proposal could by themselves create hotspots exceeding the national health-based one-hour NO_2 air standard." Increased use of uncontrolled diesel backup engines in economic demand response programs, such as peak shaving, may prevent areas from achieving air quality standards.

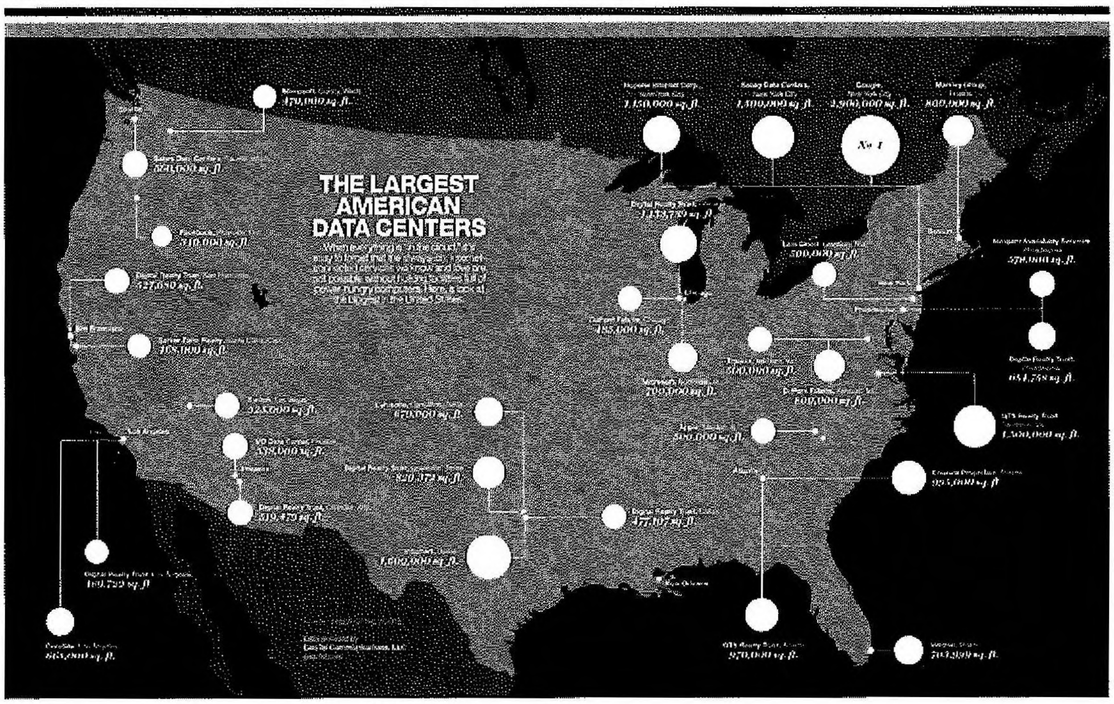
In areas with high concentrations of diesel generators and engines, even temporary operation can have a substantial impact on air quality and cause some regions to fail to achieve their targets. Since these units typically operate during high-demand periods of peak shaving and demand response programs, the impact on air quality may be even greater.

Regulations to Match Available Control Technologies

The demand for back-up power has been steadily increasing, but the regulatory oversight of these operations has not kept up with the available technologies to control emissions from these generators. Many mission critical businesses, such as data centers and medical or financial institutions, cannot be without power – even for seconds. These companies and institutions are increasingly building back-up power as a safety net when the grid suffers an outage or when grid stability or reliability is questioned. There is much less tolerance for businesses to be without power because the disruption can cause manufacturing and other operations to be less economical. The ever-more frequent occurrences of power disruption to businesses is not acceptable and, many businesses are mitigating this risk with local back-up generation. Further, some customers not only want to operate their back-up systems during emergencies, but also want to generate power off the grid as a power savings measure.

The increased demand for distributed generation and back-up emergency power is significantly increasing the global potential to emit PM_{10} and $PM_{2.5}$. One large and emerging application includes data center back-up power, where a typical site will include dozens of diesel engines requiring control. Should all of the back-up generation gensets operate during an emergency, the cumulative $PM_{2.5}$ emissions would be substantial. Since many of these sites are concentrated locally in a few locations throughout the U.S., they could impact air quality issues in those regions. **Figure 1** illustrates that data centers have been located in areas that are increasingly challenged with air quality issues.

Figure 1. The Largest American Data Centers. Source: iiclouds.org.



Reliability of Control Technologies

DPFs have proven to be extremely reliable and robust. In 2002, the California Air Resources Board (CARB) established an in-use compliance verification procedure, whereby after 300 filters have been sold in the California market, the technology provider must submit a test protocol to verify compliance with CARB standards of in-use filters.[1] Several suppliers of these filters have documented meeting these criteria, and several others are in the process of certifying to this standard as well. This rigorous reliability standard ensures the genset operator can expect reliable particulate control performance. For greater assurance, systems have been developed for active regeneration to further increase the reliability of the DPF.

EPA conducted tests on diesel particulate filters and in 2015 published the results.[2] The study confirmed the excellent capabilities of DPFs to control diesel particulate. Overall, the DPFs resulted in significant PM mass removal (80–99 %), while the diesel oxidation catalyst resulted in statistically insignificant reductions (0–25 %). Both black carbon and elemental carbon removal followed a similar trend. Particle number concentrations were also significantly reduced when using DPFs, with a greater than 97 % reduction in particle concentrations.

Table 2 illustrates the typical performance of a DPF on a 350 kW Caterpillar engine using ultra low sulfur diesel (ULSD) fuel.[3] After 500 hours, the testing by University of California, Riverside, Bourns College of Engineering - Center for Environmental Research and Technology (CE-CERT) shows no degradation of performance and a consistent 93% mass reduction in diesel particulate. For the small engine used in the test, there would have been 1 lb of $PM_{2.5}$ emitted every 7 hours of operation. Multiply this by the many thousands of engines that could all be operating during an emergency or demand response condition, and the emissions from these uncontrolled engines may create localized unhealthy air. Applying a DPF to these engines would control these emissions.

Table 2. Overall Test Summary of Triplicates, Weighted by ISO 8178 g/ehp-h. Source: Shah, et al.

Test	THC	CO	NOx	NO2	CO2	PM2.5 CFR	PM2.5 ISO
Baseline	0.079	1.043	6.76	0.234	566.6	0.1508	0.1537
ZeroHr	0.006	0.080	6.54	1.448	560.9	0.0100	0.0099
167Hr							
500Hr	0.007	0.097	6.71	1.237	556.3	0.0105	0.0106
1000Hr							

[1] Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines. California Air Resources Board. California Code of Regulations. 16 May 2002.
[2] "Emissions removal efficiency from diesel gensets using aftermarket PM controls", Tiffany L. B. Yelverton, Amara L. Holder, Jelica Pavlovic. Received: 27 October 2014 / Accepted: 6 January 2015. Springer-Verlag Berlin Heidelberg. 2015. U.S. EPA.
[3] Shah SD, Cocker DR, Miller JW, Norbeck JM (2004) Emission rates of particulate matter and elemental and organic carbon from in-use diesel engines. Environ Sci Technol 38(9):2544–2550. doi:10.1021/es0350583

Cost-Effective Control Technologies

DPF technology has greatly advanced in reliability and cost-effectiveness. **Table 3** provides a generic pricing of a standard DPF for a variety of engine sizes based on industry pricing from ICAC member companies. As the engine output increases, the cost for PM control per power output (kW) is dramatically reduced. For example, a standard DPF for an engine output of 250 kW would cost between $40-52 per kW, while an engine output of 3000 kW would only cost $30-33 per kW.

Table 3. Typical Price Ranges for DPF. Source: Industry pricing data from ICAC members.

Engine Output (kW)	Equipment Price
250	$10,000 - $13,000
500	$15,000 - $18,000
1500	$50,000 - $60,000
2000	$60,000 - $70,000
3000	$90,000 - $100,000

Recommendation

ICAC believes that the technology to control diesel particulate emissions from diesel-fired gensets and back-up generators is well demonstrated and cost-effective for many engine types and applications. ICAC recommends that EPA consider the use of controls on back-up and prime power engines, especially in densely populated areas where even short-term exposure to elevated $PM_{2.5}$ may contribute to significant health risks.

DPF technology can safely and prudently permit the use of diesel-fired backup generators in economic or demand response programs to cost-effectively enhance the progress that states are making to address electric sector emissions.