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Comment from the Diesel Technology Forum

Additional submitted attachment is included below.

February 11, 2021

California Energy Commission
Submitted electronically

RE: Comments concerning “Workshop to Discuss Research into Clean Energy Alternatives to Diesel Backup Generator Systems”
Docket No. 19-ERDD-01

On behalf of the Diesel Technology Forum, we submit this information to provide the California Energy Commission, the California Air Resources Board, the California Public Utilities Commission and others with background information concerning the capabilities of new diesel technology and the essential role it plays in providing emergency backup power in California. The latest generation of near-zero diesel emission technologies and fuel are available to power standby generators including those that backstop renewable sources of power.

Our comments focus on the following:

1. The attributes of diesel generators in support of public health and safety,
2. Availability of fuel during emergencies,
3. The emissions standards required of emergency backup units and mobile units that may operate in emergency conditions,
4. Retrofit capabilities for diesel generators,
5. The advantages of operating diesel units fueled with 100% renewable diesel fuel, and
6. The importance of integrating clean diesel generators into sustainable microgrid installations.

The Diesel Technology Forum (Forum) represents manufacturers of diesel engines, vehicles, and equipment including mobile and stationary generators, along with component manufacturers and fuel and biofuel producers. The Forum collects and commissions research that attests to the environmental and economic importance of diesel technology and serves to advocate these benefits broadly.¹

Diesel Generators Underpin Public Health and Safety

Diesel backup generators have played a principal role in supporting public health and safety for decades across California. While alternatives to diesel units exist and zero-emissions solutions

¹ <https://www.dieselforum.org/about/about-the-forum>

for select applications are becoming more viable, diesel technology remains as an important solution to provide mission critical power during power outages of any duration. Diesel generators may be sized to meet any demand while diesel fuel and diesel units are mobile and may be delivered to almost any location, including remote communities. These units can provide long duration uninterrupted power. Diesel generators are durable and maintain an impressive record for providing reliable service when most needed. Diesel is one of only a few solutions that can provide full electrical load within seconds of an outage – a necessary attribute for critical facilities like health centers that rely on uninterrupted sources of power. Diesel generators are often the preferred technology to provide black start capabilities at conventional sources of prime power generation. The latest generation near-zero Tier 4 emissions solutions are available in diesel generators to provide backup power. While a wide variety of technologies and fuel types are available today, diesel technology remains the most flexible, reliable and cost-effective solution to deliver mission critical power during outages and emergencies. Cost-effective diesel generators continue to be integrated into sustainable microgrids to couple the benefits of zero-emissions renewable power with the proven and durational reliability of diesel. While last in a microgrid's loading order, diesel gensets provide the backbone of the microgrid with their ability to reliably provide long duration capacity in the absence of renewable generation and after the microgrid's energy storage capacity (typically 4 hours or less) has been depleted.

Fuel Availability During an Emergency

One of the unique attributes of diesel backup generators is their ability to operate continuously during an emergency when provided with access to fuel. During the recent public workshop held on January 21, 2021, to consider alternatives to diesel generators, anecdotal evidence was presented concerning the lack of diesel fuel availability during power outages. No evidence was presented concerning the prohibition of natural gas deliveries by fire authorities to communities impacted by the Zogg fire in Napa and Sonoma Counties in 2020, while deliveries of diesel were allowed through. Assertions of diesel fuel supply and delivery problems presented during the workshop were anecdotal and without factual evidence. The California Energy Commission, as the governing agency concerning energy and energy assurance policy, should have precise command over any documented fuel supply issues in California and must either produce data that supports such claims, or discredit those assertions about diesel fuel supply issues in the consideration of the use of diesel generators as part of future strategy to mitigate outages from public safety power shutoff events or natural disasters.

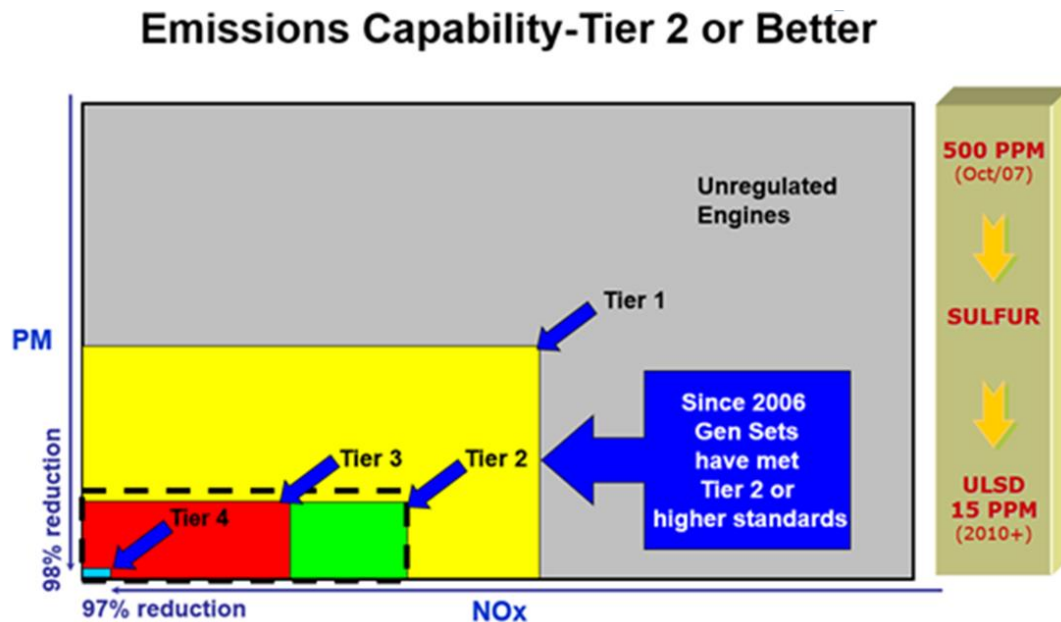
We encourage the owners and operators of diesel standby generators to work with dedicated fuel providers to gain ready access to sources of diesel fuel when needed during prolonged outages.

Emissions Requirements of Diesel Generators

There are different emissions standards required of diesel generators that operate either exclusively as sources of emergency backup power or non-emergency units that provide temporary backup power.

Diesel Emergency Generators

Generators manufactured and installed on or after 2006 that are designed to operate exclusively as emergency units are required to meet stringent minimum emission standards. Generators that provide up to 560 kW of mechanical power must meet, at a minimum, the Tier 3 emissions standard established jointly by U.S. Environmental Protection Agency and the California Air Resources Board. Emergency units that provide in excess of 560 kW of mechanical power must meet the Tier 2 emissions standards. The chart below demonstrates the emission reduction requirements for both emissions of oxides of nitrogen (NO_x) and particulate matter greater than 2.5 microns (PM 2.5).



Federal rules regarding the operation of these emergency units allow for the operation as needed during an emergency. Federal rules limit the operation of these generators to under 50 hours per year during non-emergency situations to allow for periodic testing of the equipment. These rules are in place to ensure that units designated as an emergency backup generator do not provide prime power.

In addition to federal standards, local standards pertaining to emission performance and use of emergency backup units may apply that are more stringent than the federal requirements.

Non-Emergency Mobile Diesel Generators Deployed in Emergency Response

Mobile diesel generators not designed to provide emergency backup power may be deployed as an emergency generator when called on during a state of emergency. These units meet a specific emissions standard pertaining to the year of manufacture. Non-emergency mobile diesel generators manufactured beginning in 2012 must meet the Tier 4 emissions standard.

While Tier 4 is the current standard, there remains a significant fleet of units manufactured to meet previous standards that are available for use today. This pre-Tier 4 fleet remains in high demand for disaster response and to address select widespread emergencies. These units may be called on to provide emergency power as was done in August 2020 in response to Gov. Newsom's emergency proclamation stemming from the unusually high heat weather event that strained the ability of California's grid to meet demand. Through the Portable Equipment Registration Program (PERP) managed by the California Air Resources Board, non-emergency mobile diesel generators may be procured from in and out-of-state suppliers to provide an extra source of emergency backup power. These units, of varying emission standards, may operate as emergency backup power without restrictions that apply to the operators of this equipment by individual air districts.

While Tier 4 is the requirement for manufacturers beginning in 2012, we encourage facility owners, operators and entities looking to acquire backup generators, and other stakeholders, to work with generator manufacturers and dealers to learn of market availability and supply of these units in advance of future emergency conditions.

Retrofit Capabilities

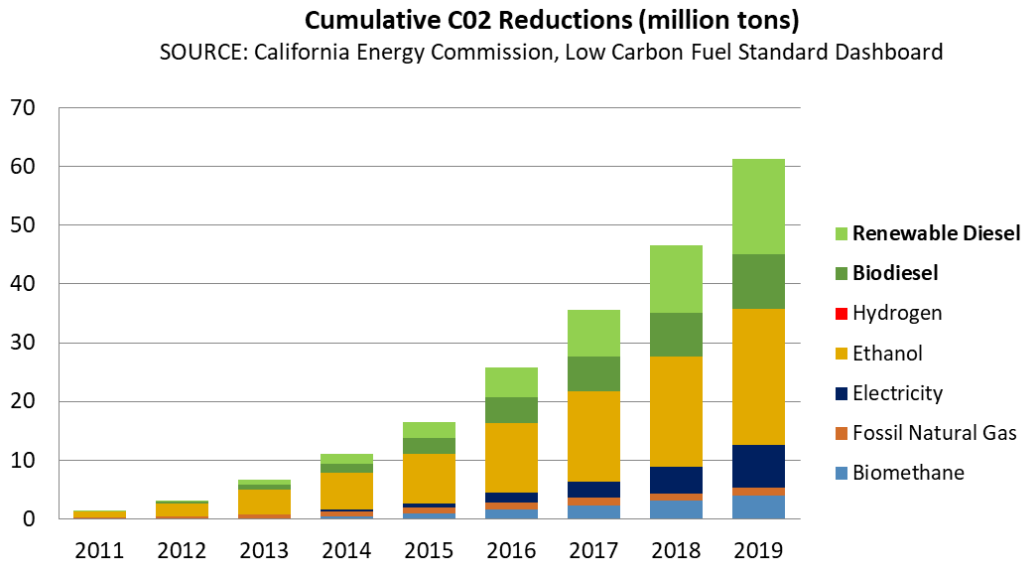
Older diesel generators manufactured before emission controls were required or manufactured to meet pre-Tier 4 standards may be retrofitted with certain emission control technologies to improve the emissions performance. The installation of diesel particulate filters in older units may be possible to achieve near-zero fine particle emissions (PM). Unlike natural gas technologies, the installation of selective catalytic reduction (SCR) systems to achieve near-zero emissions performance for emissions of oxides of nitrogen (NOx) is typically not feasible. The California Air Resources Board may approve of the installation of approved retrofit solutions where possible. However, diesel generators deployed with verified retrofit solutions are compliant with emissions standards established by the Air Resources Board, but are not certified solutions. The Air Resources Board maintains a list of verified retrofit solutions for stationary and mobile diesel engines.²

Benefits of Advanced Biofuels to Deliver Greenhouse Gas and Criteria Pollutant Emission Reductions

One of the fastest growing solutions to reduce greenhouse gas emissions from mobile sources in California is the use of renewable diesel fuel. More greenhouse gas emissions have been eliminated by the use of renewable diesel fuel, sometimes referred to as hydrotreated vegetable oil (HVO) and technically categorized as 100 percent renewable diesel fuel (ASTM, D 975 spec, CARB Diesel), through the Low Carbon Fuels Standard (LCFS), than that generated by the electrification of cars, trucks and buses. Renewable diesel can reduce greenhouse gas emissions

² <https://ww2.arb.ca.gov/our-work/programs/verification-procedure-warranty-and-use-compliance-requirements-use-strategies-4>
<https://ww2.arb.ca.gov/verification-procedure-currently-verified>

by over 80% when compared to diesel #2. Since the LCFS program was implemented in 2011, renewable diesel fuel is the second leading fuel reducing greenhouse gas emissions behind ethanol and exceeding the benefits of electrified cars, buses and trucks by more than 2:1.



Both stationary and mobile diesel generators are capable of operating on this fuel, which is a drop in alternative to Diesel #2 (petroleum diesel) and again, is CARB certified.

One hundred percent renewable diesel fuel is derived from waste agricultural products and animal fats, to yield a fuel that meets the same chemical and engineering specifications as petroleum diesel fuel (ASTM D 975). As such, renewable diesel fuel may be used as a 100 percent replacement fuel to petroleum fuel and may use the same existing fuel delivery infrastructure (pipelines, storage and fueling tanks) as petroleum diesel fuel.

We would like to specifically highlight the fact that renewable diesel fuel is distinct from biodiesel fuel. Both fuels can be derived from the same feedstock (waste vegetable residues and animal fats) but a different chemical process is used to derive biodiesel that meets its own engineering specification (ASTM D 6751). Many diesel engine manufacturers approve engines, old and new, to operate on blends of biodiesel up to 20 percent biodiesel and 80 percent petroleum diesel fuel (B20). Some new diesel engines are approved to operate on blends of biodiesel up to B30.

Renewable diesel fuel may be used as 100 percent replacement to petroleum diesel fuel and may reduce greenhouse gas emissions by upwards of 80 percent. Research indicates that the use of renewable diesel fuel also contributes to the reduction of criteria pollutants. The benefits of fuel switching may be more pronounced when used in engines that do not operate with any emission control technologies or meet a lower emissions standard. NOx may be reduced by 13 percent and PM may be reduced by 29 percent when switching from petroleum-based diesel fuel to renewable diesel fuel when used in engines that do not come with diesel particulate filters or

SCR catalysts, according to research commissioned jointly by the Bay Area Air Quality Management District and the South Coast Air Quality Management District.³

Diesel as a Cost-Effective Emergency Backup Power Solution

We understand that there are many fuel and technology types available in the marketplace today to provide emergency backup power. Fuel cells, natural gas gensets, wind, solar and battery backup solutions are capable to provide mission critical power along with diesel solutions. By and large, these alternatives have higher acquisition costs, much larger space requirements that may exclude them from many applications and frequently higher total cost of ownership. Additionally, the intermittent nature of some of these resources combined with durational limitations dictate that many of these resources in mission critical applications be paired with diesel gensets.

The chart below provides a rubric by which to compare diesel, along with Tier 4 diesel units, against other alternatives. Across many important attributes of emergency backup power solutions, diesel is often the preferred solution necessary to provide mission critical power. The chart below was confirmed by several diesel generator manufacturers, including renewable backup up technology providers, concerning the ability of existing solutions to provide 1,500 kW of mechanical energy through backup power to a health center in Los Angeles, CA. While certain zero-emissions and renewable power solutions may have lower fuel costs or lower storage needs, diesel generators come with lower acquisition costs, minimal space requirements and often lower total cost of operations.

	Energy Resources	Capital Expense	Annual O&M	Annual Fuel Cost	TCO	Storage	Life Safety Dispatchable	Space Requirement
Utility + Diesel T2 [Baseline]	1500 kW Diesel T2 Generator Set	\$ XX	\$ YY	\$ ZZ	\$ XYZ	24	Yes	XY
Utility + Diesel T4	1500 kW Diesel T4 Generator Set	X 2	X 1.5	X 1	X 3	24	Yes	X 1.25
Utility + NG	1540 kW NG Generator Set	X 2.3	X 1	X 0.25	X 4	∞	No	X 1.25
Utility + Solar + Storage	1500 kW Solar + 1500 kW/3000 kWh ESS	X 13	X 0.9	N/A	X 13	12	Yes	X 200
Utility + Storage (8 hr.)	1500 kW/12MWh ESS	X 12.5	X 1.2	N/A	X 14	8	Yes	X 8

Diesel Provides Cost-Effective Solutions to Backstop Sustainable Microgrids

Diesel backup units are also integrated into sustainable microgrid or hybrid microgrid solutions. The integration of these units is a cost-effective strategy to provide critical power when renewables, including wind and solar, are off-line and when the duration of the outage exceeds battery storage capacity. Recently, the City of Camarillo, CA, determined that the integration of diesel backup generators into five municipal owned sustainable microgrids were a cost-effective approach to provide needed power while also reducing emissions. Specifically, the City

³ <https://www.gladstein.org/wp-content/uploads/2018/05/Final-Report-August-2017.pdf>

determined that combining solar, battery storage and diesel generation into a microgrid will provide a resilient system that can handle the more frequent shorter-term outages lasting 1-2 hours in duration than on solar and battery alone. The diesel generator will be used only when needed for longer term emergency outages. This hybrid system nearly eliminates carbon emissions, only generating emissions when the diesel unit is called on to provide power when batteries are depleted. This solution is also generating cost savings for the City as well.⁴

Conclusion

We thank the Commission and other agencies and stakeholders for the privilege of submitting these comments concerning the current state of diesel backup units, fuel availability and the benefits of low carbon renewable diesel fuel. It is our goal that the information submitted provides a proper baseline understanding of the emissions performance and retrofit capabilities of diesel generators providing emergency backup power including those deployed in 2020 to provide backup power at the substation level in preparation for public safety power shutoff events. The use of renewable diesel fuel contributes to further emissions reduction performance while reducing greenhouse gas emissions by over 80 percent.

We request that the California Energy Commission provide a fact-based understanding concerning the widespread availability of diesel fuel during outages to better inform facility owners and operators relying on backup generators. As the agencies participating in this workshop consider strategies to incorporate future clean sources of backup power, we encourage the consideration for the inclusion of diesel units as a source of backup power to those clean systems that rely on renewables coupled with battery backup storage. As the City of Camarillo, CA, has found, the inclusion of diesel backup units integrated into clean microgrids is a cost-effective and necessary solution to deliver the mission of keeping the lights on as a primary objective for community continuity.

Respectfully submitted,



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⁴ https://www.cityofcamarillo.org/Feasibility_Study.pdf