



Proposed Rule 1110.4 Emissions from Emergency Generators

Working Group #1- February 14, 2024

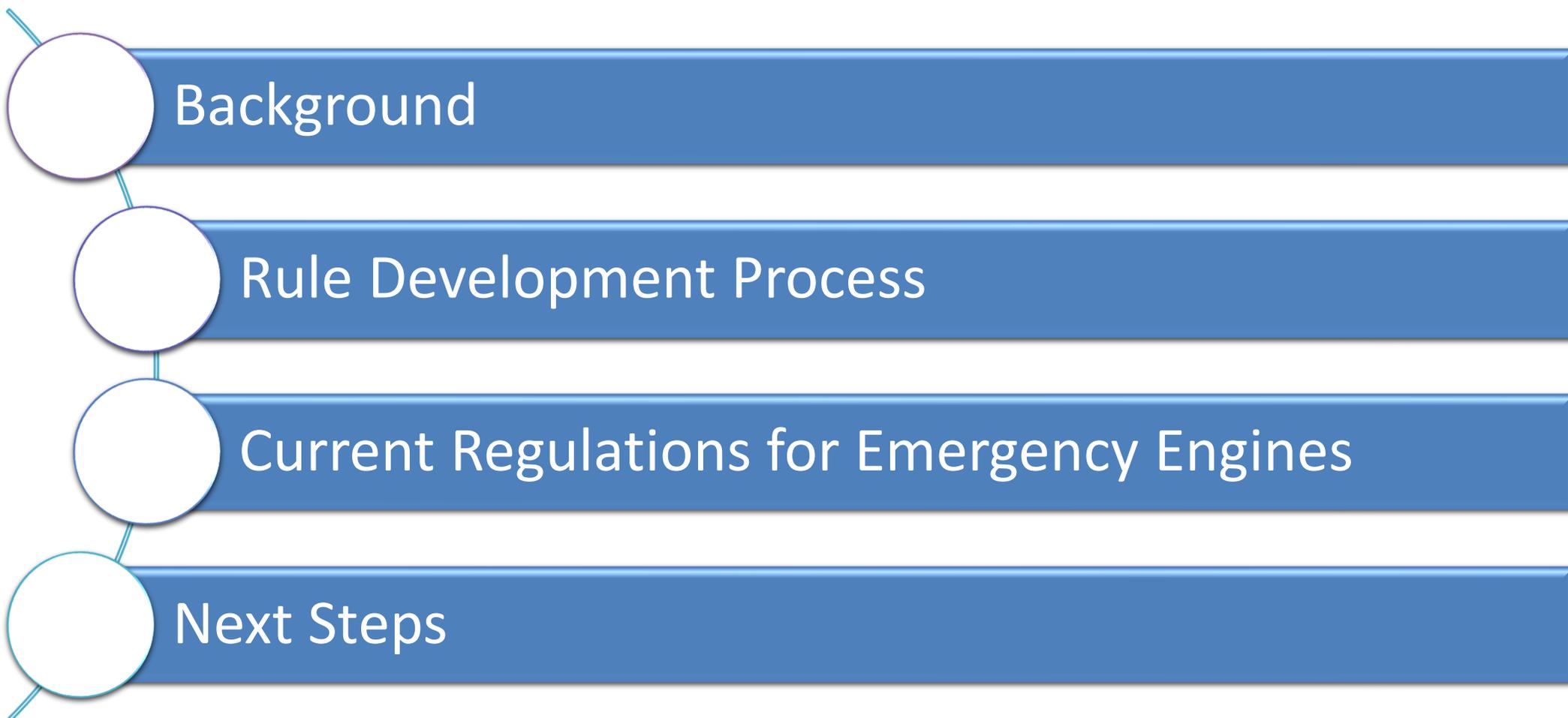
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Working Group Meeting Agenda



Background

Rule Development Process

Current Regulations for Emergency Engines

Next Steps

Working Group Meetings

- Working Group Meetings are a key component of the rule development process
- The Working Group is comprised of affected facilities, community and environmental groups, other agencies, and any other interested parties
- Working Group Meetings will be held throughout the rule development process
- Staff encourages stakeholder comments and participation





Background on South Coast AQMD Emergency Engines

- Engines are robust, and thus are commonly used to generate electricity for emergency backup power
- South Coast AQMD regulations require permits for stationary and portable engines rated over 50 brake horsepower (bhp)
- Based on South Coast AQMD's permitting database, there are over 13,600 permitted emergency engines located at over 9,200 facilities
- Affected facilities include commercial buildings, hospitals, data centers, police facilities, cell towers, and other critical infrastructure

South Coast AQMD 2022 Air Quality Management Plan

- The Air Quality Management Plan (AQMP) is a regional blueprint for improving air quality and meeting federal standards for air pollutants
- The 2022 AQMP* specifies actions to reduce air pollution and meet ozone standards by 2037
- The 2022 AQMP identified 48 control measures for oxides of nitrogen (NO_x) and volatile organic compound (VOC) emission reductions, including L-CMB-04 for emergency engines

* <http://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan>



Control Measure L-CMB-04: Emission Reductions from Emergency Standby Engines

Control measure L-CMB-04 for emergency engines has the fourth highest estimated NO_x emission reductions of all stationary control measures in the 2022 AQMP at 2.04 tons per day NO_x reduced

Although fuels such as gasoline, natural gas, and propane are used, most emergency engines are diesel-fueled

Emergency engines typically have long lifespans, meaning older, higher polluting units can be kept in service for decades

Despite operating sporadically, emissions from diesel-fueled emergency engines are significant due to their age and large quantity

Cleaner technologies and lower emission fuels are potential technologies for emission reductions from emergency engines

Summary of Permitted Emergency Engines & Emissions Inventory

Category	Number of Equipment*
All Emergency Engines	13,678
Diesel Engines	12,097
Non-Diesel Engines	1,581

* Data obtained from South Coast AQMD database through January 2024

- Nearly 90 percent of permitted emergency engines are diesel-fueled
- Control Measure L-CMB-04 in the 2022 AQMP includes an emissions inventory for emergency engines
- Staff will include a more refined emission inventory for the Proposed Rule 1110.4 rule development in a future working group meeting
 - The emission inventory in L-CMB-04 is incomplete, as it was based on 2018 Annual Emission Reporting (AER) and not all facilities are required to submit AER reports**

** AERs are required for facilities with an estimated annual emissions of four or more tons of either oxides of sulfur (SOx), VOCs, NOx, Particulate Matter (PM), or 100 tons per year or more of Carbon Monoxide (CO), facilities subject to AB 2588, and facilities subject to California Air Resources Board (CARB) Criteria and Toxics Emission Reporting Regulation



Nonroad Diesel-Fueled Engine Emission Standards

- Emission standards for nonroad diesel-fueled engines are set by U.S. Environmental Protection Agency (U.S. EPA)
- U.S. EPA established progressively more stringent standards over time
- In 2004, Tier 4 standards were adopted that were estimated to result in a 95% reduction in particulate matter (PM) and a 90% reduction in NOx emissions
- Currently, U.S. EPA established and adopted four tiers of emissions standards:
 - Tier 1 (beginning in 1996)
 - Tier 2 (beginning in 2001)
 - Tier 3 (beginning in 2006)
 - Tier 4 (beginning in 2008)

Diesel-Fueled Engine NOx Emissions Comparison

- Tier 0 diesel-fueled engines were generally manufactured prior to 1996 and were not subject to emission standards
- Tier 1 diesel engines emit over twice as much NOx than Tier 3 diesel engines
- Cleaner options such as Tier 4 diesel engines, near-zero emission (NZE) technologies, and zero emission (ZE) technologies are available
 - Tier 4 diesel engines > 75 hp are more than 90% cleaner in NOx emissions than a Tier 1 diesel engine

Summary of U.S. EPA Non-Road Diesel Engine
Emission Limits (g/bhp-hr)

Engine Rating	Tier	Year(s)	NOx
50 ≤ hp < 100	1	1998	6.9
	2	2004	5.3*
	3	2008	3.3*
50 ≤ hp < 75	4F	2013	3.3*
100 ≤ hp < 175	1	1997	6.9
	2	2003	4.6*
	3	2007	2.8*
75 ≤ hp < 175	4F	2012-14	0.3
175 ≤ hp < 300 300 ≤ hp < 600 600 ≤ hp < 750	1	1996	6.9
	2	2003	4.6*
		2001	4.5*
		2002	4.5*
3	2006	2.8*	
175 ≤ hp < 750	4F	2011-14	0.3
hp ≥ 750	1	2000	6.9
	2	2006	4.5*
	4F	2015	0.5

* Based on CARB emission factor for NHMC + NOx

Tier 4 Diesel Engine, NZE Technology, and ZE Technology NOx Emissions Comparison

Comparison of Tier 1, Tier 4 Diesel Engine, and NZE NOx Emission Limits (g/bhp-hr)

- Tier 1 diesel engines rated between 75 hp and 750 hp emit 23 times more NOx than its Tier 4 equivalent and 345 times more NOx than NZE technologies**
- Potential NZE technologies include fuel cells, gas turbines, and linear generators
- Potential ZE technologies include battery energy storage systems, solar photovoltaic cells, and fuel cells

Engine Rating	Tier	Year(s)	NOx	% Diff
50 ≤ hp < 175 175 ≤ hp < 750 > 750 hp	1	1997-98 1996 2000	6.9	-
50 ≤ hp < 75	4	2013	3.3*	209%
75 ≤ hp < 750	4	2014	0.3	2300%
> 750 hp	4	2015	0.5	1380%
Near Zero Emission	-	-	0.02**	34500%
Zero Emission	-	-	0	-

* Based on CARB emission factor for NHMC + NOx

** Based on CARB Distributed Generation Certification Regulation standard

Need for Proposed Rule 1110.4

- NOx and VOC emission reductions are needed for South Coast AQMD to come into attainment with federal ozone standards
- L-CMB-04 estimated 2.04 tons per day emission reductions from emergency engines in the 2022 AQMP
- Climate change, natural disasters, and infrastructure strain has resulted in increased operation of emergency engines through Public Safety Power Shutoff (PSPS) events



[Photos of Southern California's Wildfires - The Atlantic](#)



Photos of Southern California's Wildfires - The Atlantic

Public Safety Power Shutoffs

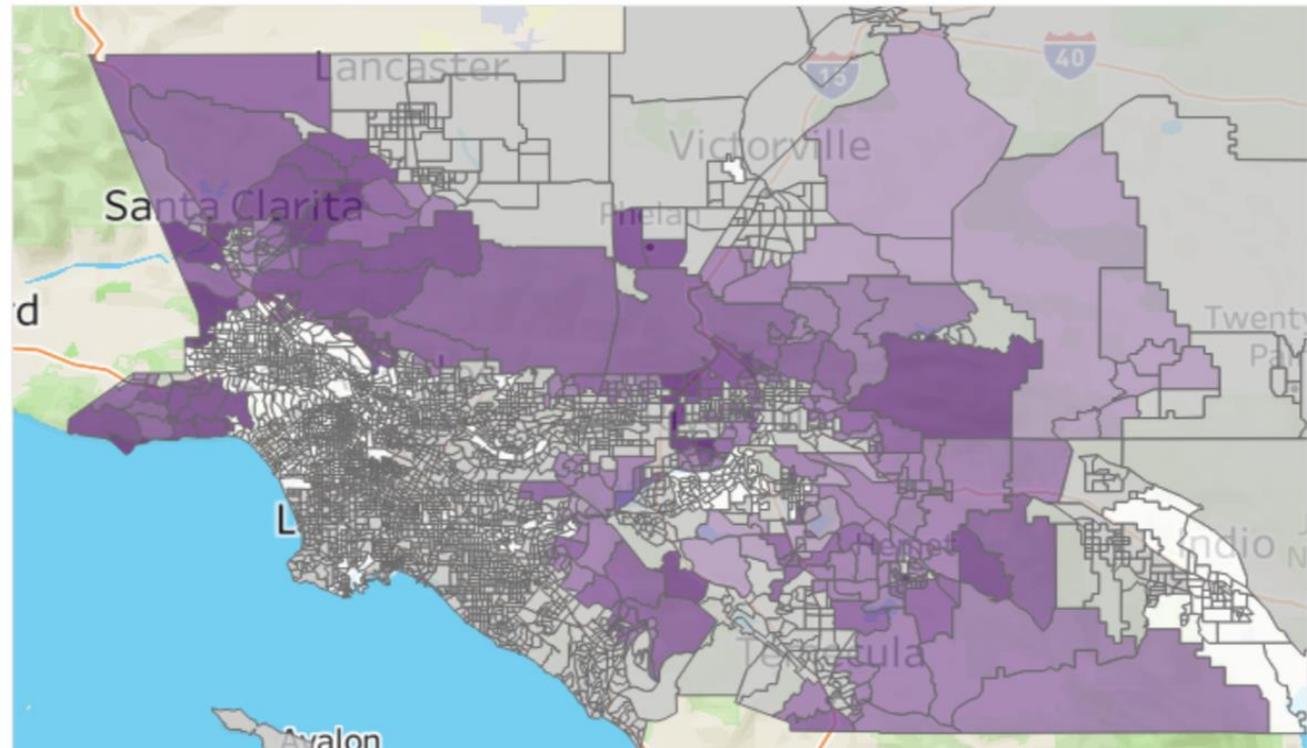
- Over the last decade, California has experienced wildfire events that have resulted in loss of life and in billions of dollars in property and infrastructure damage*
- Wildfires attributed to electrical infrastructure account for nearly half of the most destructive wildfires in California's history*
- As a part of their Wildfire Mitigation Plans, utility companies implemented PSPS events to cut power to electrical lines, reducing the likelihood that electrical infrastructure would cause or contribute to a wildfire

* [Public Safety Power Shutoffs \(ca.gov\)](https://www.ca.gov)

PSPS Durations within South Coast AQMD Jurisdiction

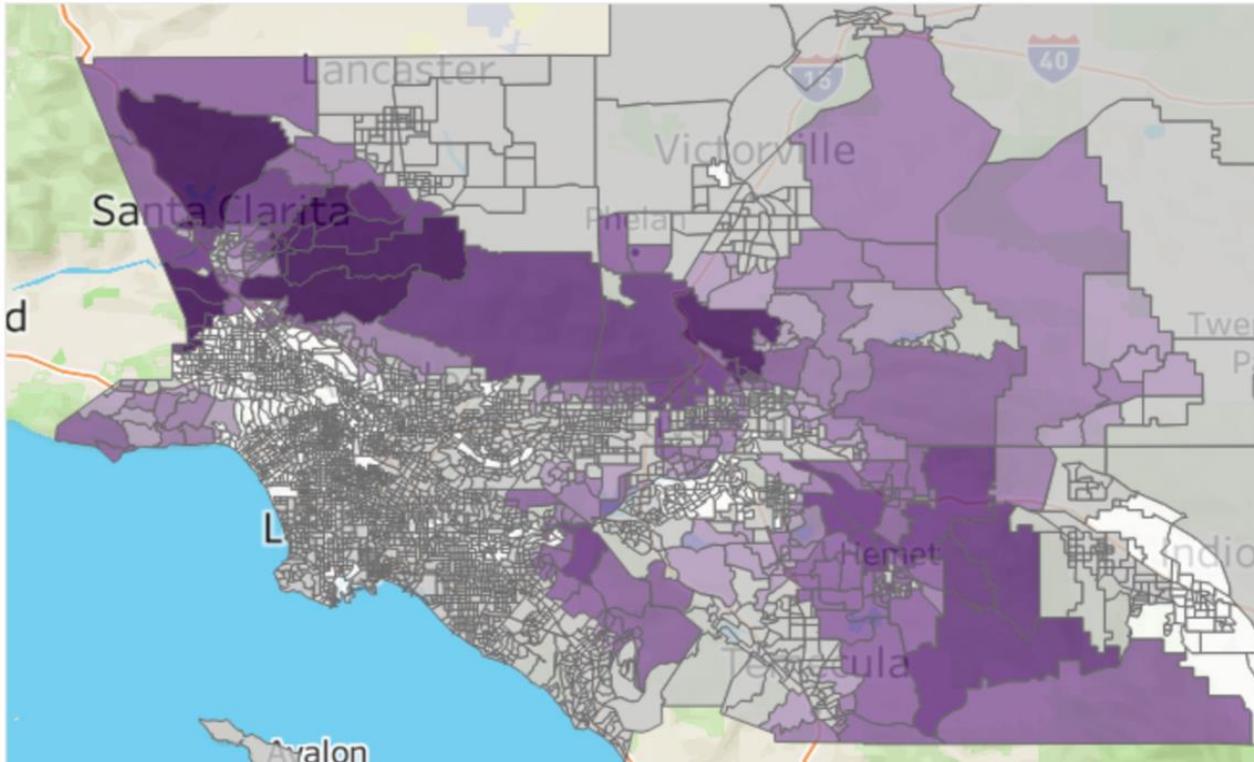
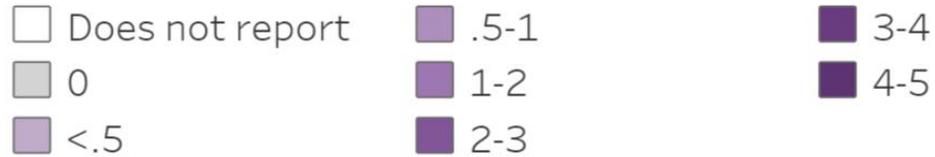
Average duration of Public Safety Power Shutoff (PSPS) outages

- Existing emergency engines are typically permitted to run 20 to 30 hours annually for testing and maintenance
- An average single PSPS event may have a greater duration than annual testing and maintenance hours



PSPS Events within South Coast AQMD Jurisdiction

Average annual frequency of Public Safety
Power Shutoff (PSPS) outages

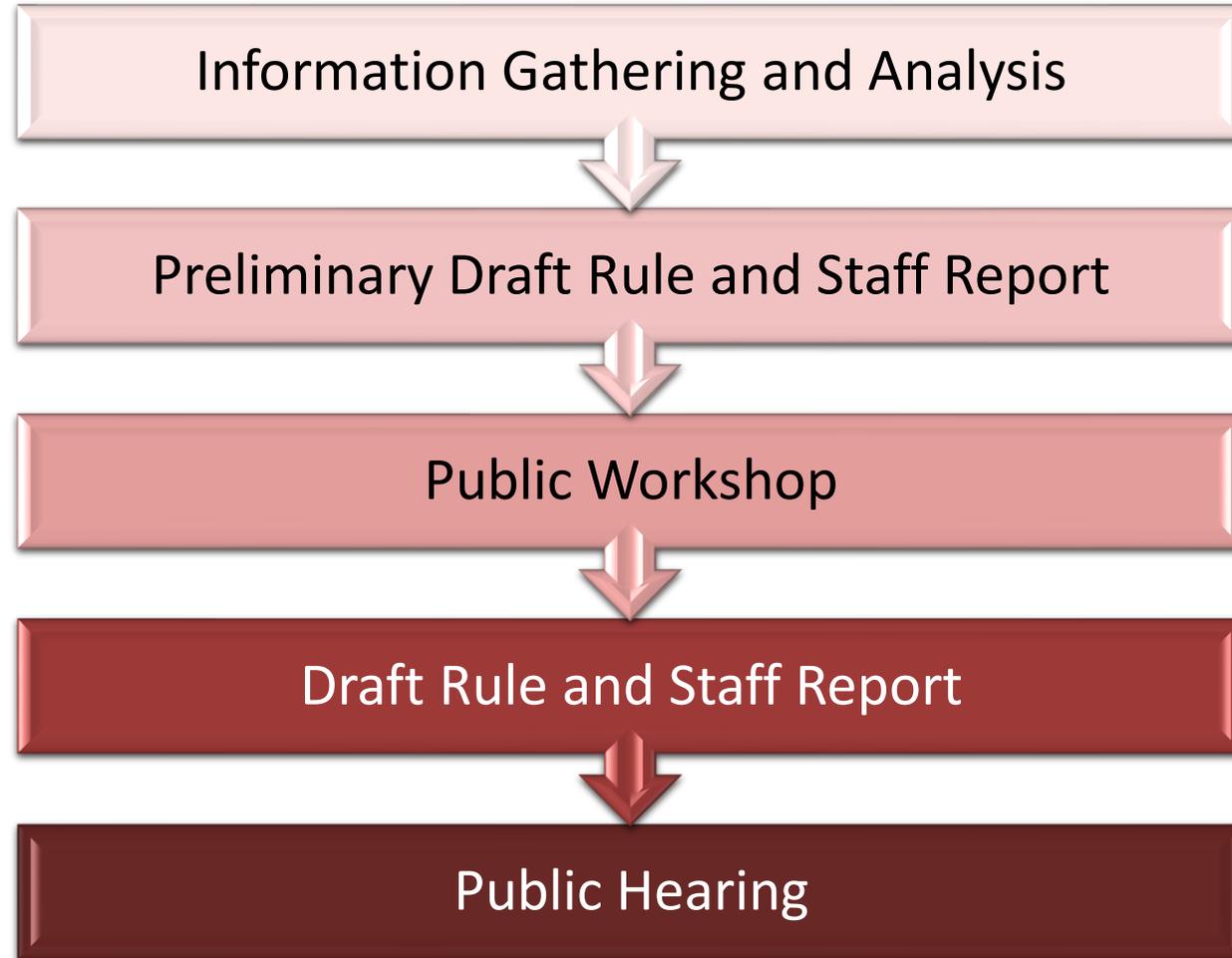


- Since 2018, many regions experienced at least one PSPS event per year while some regions experienced an average of 4-5 PSPS events annually
- The operation of emergency engines has a significant contribution to annual NOx emissions
- Cleaner fuels and technologies are available to reduce NOx emissions from emergency engines

Rule Development Process



Overview of Rule Development Process



Stakeholder Input



South Coast AQMD's rulemaking process is designed to be collaborative



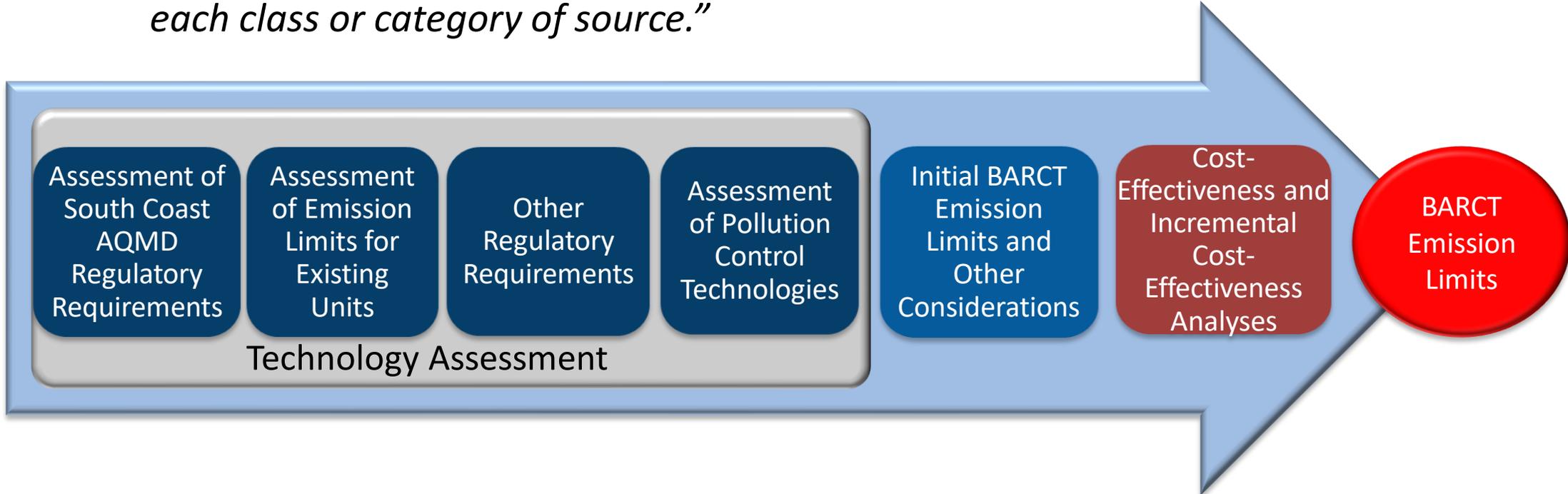
Objective is to build consensus and to work through key issues



All stakeholders are encouraged to participate in the rulemaking process

BARCT Assessment

- Staff is conducting a Best Available Retrofit Control Technology (BARCT) assessment to determine if alternative technologies and/or fuels can reduce emissions from emergency engines
- BARCT is defined in the California Health and Safety Code Section 40406
 - - *“...an emission limitation that is based on the maximum degree of reduction achievable, taking into account environmental, energy, and economic impacts by each class or category of source.”*



Current Regulations for Emergency Engines



The South Coast AQMD has several regulations regarding engines:

- Rule 1110.2 – Emissions from Gaseous- and Liquid-Fueled Engines (Rule 1110.2)
- Rule 1470 – Requirements for Stationary Diesel-Fueled Internal Combustion and Other Compression Ignition Engines (Rule 1470)
- Rule 1472 – Requirements for Facilities with Multiple Stationary Emergency Standby Diesel-Fueled Internal Combustion Engines (Rule 1472)

Rule 1110.2

Rule 1110.2 establishes NO_x, Carbon Monoxide (CO), and VOC emission limits for all stationary and portable engines > 50 brake horsepower

Rule 1110.2 also includes emission testing, monitoring, reporting, and recordkeeping requirements

Subparagraph (i)(1)(B) exempts emergency standby engines, engines used for fire fighting and flood control, and any other emergency engines with a permit limit of 200 hrs/year from NO_x, VOC, and CO emissions limits

Emergency engines are also exempt from emission testing, monitoring, and reporting requirements

Rule 1470 Emission Limits

Summary of Emission Limits for New Stationary Emergency Standby Diesel-Fueled CI Engines* (g/bhp-hr)

Engine Size	Tier	PM	NMHC + NOx	CO
50 ≤ hp < 100 (37 ≤ kW < 75)	3	0.15 0.30**	3.5	3.7
100 ≤ hp < 175 (75 ≤ kW < 130)	3	0.15 0.22**	3.0	3.7
175 ≤ hp < 750 (130 ≤ kW < 560)	3	0.15 0.15**	3.0	2.6
hp ≥ 750 (kW ≥ 560)	2	0.15 0.15**	4.8	2.6

* Greater than 50 meters from a sensitive receptor

** Emergency Standby Diesel Fueled Direct-Drive Fire Pump Engines

hp- Horsepower

kW- Kilowatts

g/bhp-hr – grams per brake horsepower-hour

- Rule 1470 establishes emission limits for new diesel-fueled emergency engines
- Existing emergency engines are not subject to these emission limits
- Rule 1470 also contains fuel requirements for compression ignition (CI) engines to use California Air Resources Board (CARB) diesel fuel or an approved alternative

Rule 1472 Requirements



Any facility with three or more stationary emergency engines within 150 meters of one another, called an Engine Group, may be required to reduce PM emissions



Supplements Rule 1470 by requiring applicable facilities with Engine Groups to calculate their Engine Group Index (EGI)



Facilities with an EGI value greater than 1.0 are required to reduce their PM emissions

The average PM reduction is approximately 35 percent, but the actual PM reduction required varies depending on engine size, operating hours, PM emission factor, and distance to the nearest sensitive receptor

Emission Limits for Existing Units

Existing permitted emergency engines are not subject to current emission requirements in Rule 1110.2 and Rule 1470, but are subject to Best Available Control Technology (BACT) requirements under certain circumstances

BACT requirements would apply under any of the following scenarios:

- New equipment is installed
- Existing stationary permitted equipment is relocated
- Existing permitted equipment is modified such that there is an emission increase

Current South Coast AQMD BACT requirements are:

- Tier 3 emission limits for CI engines rated $50 \leq \text{hp} < 750$
- Tier 2 emission limits for CI engines rated ≥ 750 hp
- Tier 4F emission limits at Major Polluting Facilities* for CI engines rated ≥ 1000 hp
- Spark Ignition (SI) Engines (g/bhp-hr): $\text{NO}_x = 1.5$ and $\text{CO} = 2.0$, which is between Tier 3 and Tier 4 CI engine limits

*As defined in South Coast AQMD Rule 1302 – Definitions

Other Requirements for Existing Emergency Engines

Other
Regulatory
Requirements

Staff reviewed federal, state, and local air district regulations and found that the regulations evaluated exempt existing emergency engines from emission limits



Federal Requirements for New Emergency Engines



- Title 40 Code of Federal Regulations (CFR) Part 60 Subpart IIII (adopted 7/11/2006) requires manufacturers of 2007 and newer compression ignition engines (>50 HP) to meet applicable emission standards
- Title 40 CFR Part 60 Subpart JJJJ (adopted 1/18/2008) requires manufacturers of 2009 and new spark ignited engines (>25 HP) to meet applicable emission standards

Summary of U.S. EPA Emergency
Engine Emission Limits (g/bhp-hr)

Engine Rating	Tier	NOx	CO	PM
CI $50 \leq \text{hp} < 100$	3	3.3*	3.7	0.3
CI $100 \leq \text{hp} < 175$	3	2.8*	3.7	0.2
CI $175 \leq \text{hp} < 750$	3	2.8*	2.6	0.15
CI $\text{hp} \geq 750$	2	4.5*	2.6	0.15
SI $> 25 \text{ hp}$	2	1.9*	3.3	-

* Based on CARB emission factor for NHMC + NOx

State Requirements for New Emergency Engines



Summary of CARB ATCM Emission Limits
For CI Engines (g/bhp-hr)

Engine Rating	Tier	NOx	CO	PM
50 ≤ hp < 100	3	3.3*	3.7	0.15
100 ≤ hp < 175 175 ≤ hp < 750	3	2.8*	3.7 2.6	0.15
750 +	2	4.5*	2.6	0.15

* Based on CARB emission factor for NHMC + NOx

- California Air Resources Board (CARB) § 93115.6 Airborne Toxic Control Measure (ATCM) for Stationary CI Engines – Emergency Standby Diesel-Fueled CI Engine (≥ 50 bhp) Operating Requirements and Emission Standards
 - Tier 3 emission standard for CI engines rated 50 ≥ hp > 100
 - Tier 3 emission standard for CI engines rated 100 ≥ hp > 750
 - Tier 2 emission standard for CI engines rated hp ≥ 750
 - SI engines are exempt

BAAQMD Requirements for New Emergency Engines



- Bay Area Air Quality Management District (BAAQMD) BACT Guideline (adopted 12/22/2020) – Stationary Emergency CI Engines
 - Tier 3 emission standard for CI engines rated $50 \geq \text{hp} > 750$
 - Tier 2 emission standard for CI engines rated $750 \geq \text{hp} > 1000$
 - Tier 4 emission standard for CI engines rated $\text{hp} \geq 1000$

Summary of BAAQMD BACT Emission Limits for
Emergency Engines (g/bhp-hr)

Engine Rating	Tier	NOx	CO	PM
CI $50 \leq \text{hp} < 100$	3	3.3*	3.7	0.15
CI $100 \leq \text{hp} < 175$ CI $175 \leq \text{hp} < 750$	3	2.8*	3.7 2.6	0.15
CI $750 \leq \text{hp} < 1000$	2	4.5*	2.6	0.15
CI $\text{hp} \geq 1000$	4	0.5	2.6	0.02
SI ≥ 50	-	1.0	2.75	-

* Based on CARB emission factor for NHMC + NOx

SMAQMD and SJVACPD Requirements for New Emergency Engines

Other Regulatory Requirements



- Sacramento Metropolitan Air Quality Management District (SMAQMD) BACT Determination 330 (updated 9/6/23) established Tier 4 as BACT for minor and major source Emergency Standby Diesel-Fueled CI Engines ≥ 50 HP



- San Joaquin Valley Air Pollution Control District (SJVAPCD) BACT Guideline 3.1.1 (updated 4/29/22) established Tier 4 as BACT for Emergency Diesel-Fired CI Engines > 50 bhp

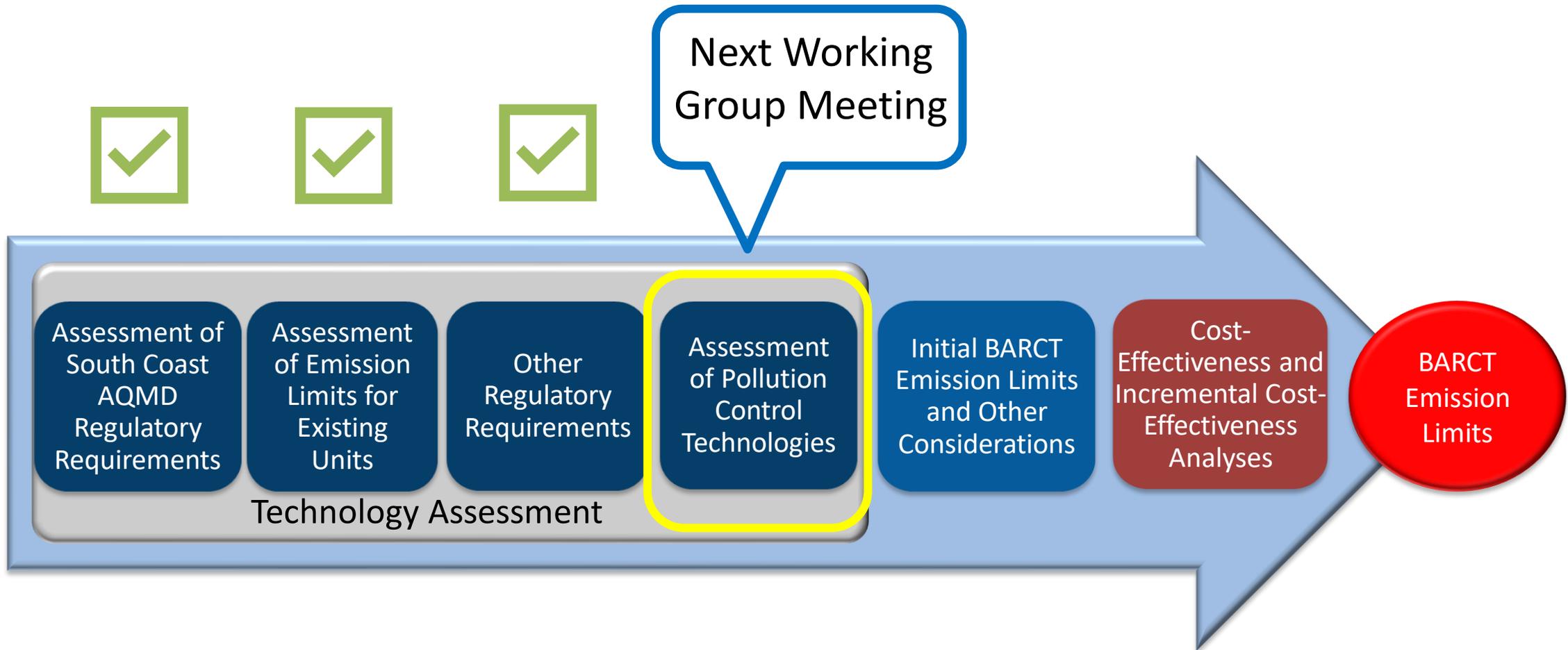
Summary of BACT Emission Limits for Emergency Engines (g/bhp-hr)

Engine Rating	Tier	NOx	CO	PM
CI $50 \leq \text{hp} < 75$	4	3.3*	3.7	0.022
CI $75 \leq \text{hp} < 175$ CI $175 \leq \text{hp} < 750$	4	0.3	3.7 2.6	0.015
CI 750 +	4	0.5	2.6	0.022
Spark-Ignited < 500 hp ≥ 500 hp	-	1.0 0.5	2.0 2.0/1.5**	-

* Based on CARB emission factor for NHMC + NOx

** Applicable to SMAQMD only

BARCT Assessment Summary



Next Steps

Staff will continue with BARCT assessment
for emergency engines

Next Working Group Meeting TBD

Public Hearing TBD

Future Working Group Meetings

- Progress will be outlined and shared in future Working Group Meetings
 - For Proposed Rule 1110.4 rulemaking documents, visit:
[Proposed Rule 1110.4 Page](#)
 - To receive e-mail notifications regarding Proposed Rule 1110.4, sign up at:
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