Proposed Rule 1110.3 – Emissions from Linear Generators
&
Proposed Amended Rule 1110.2 – Emissions from Gaseous- and Liquid-Fueled Engines

Public Workshop- January 25, 2023

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Webinar ID: 945 6345 3689

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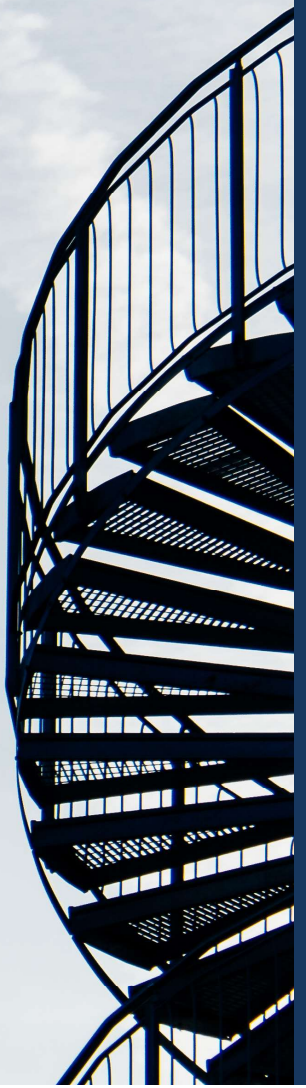


Agenda

- Background
- Proposed Amended Rule 1110.2 (PAR 1110.2)
- Proposed Rule 1110.3 (PR 1110.3)
- Impact Assessments
- Next Steps

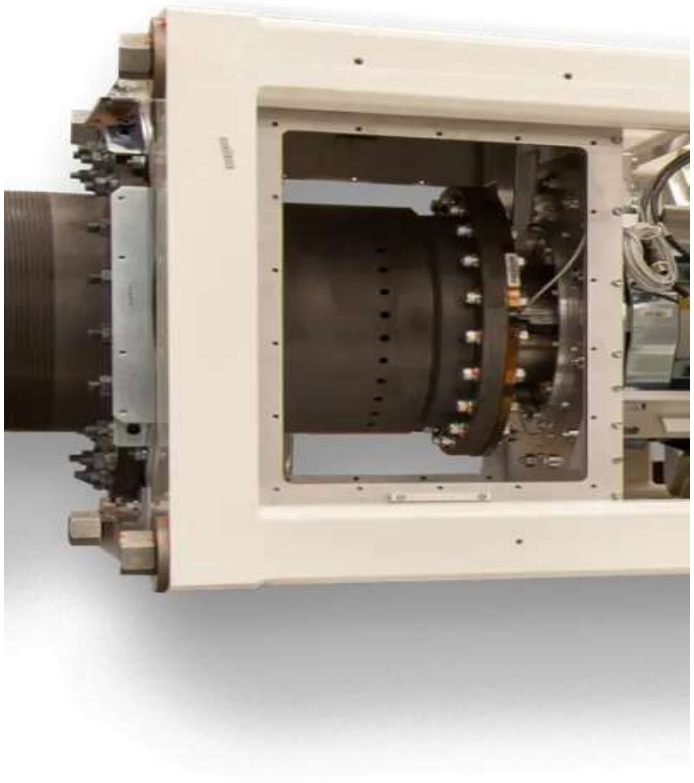
Background

Rule 1110.2 – Emissions from Gaseous- and Liquid-Fueled Engines (Rule 1110.2) is a command-and-control rule which regulates Engines rated over 50 brake horsepower (bhp)

During the 2019 amendment of Rule 1110.2, staff was informed of linear generator technology and established emission standards for linear generators in Rule 1110.2

Due to the unique characteristics of linear generators, South Coast AQMD is proposing a separate rule

Unique Characteristics of Linear Generators



Electricity Production via Electromagnetic Induction

- Magnets are driven through copper coils in a linear motion to produce electricity

Low Emissions Profile

- Lower combustion temperatures results in lower NOx and CO emissions
- Uses an oxidation catalyst to further reduce emissions

Multi-fuel Capabilities

- Ability to run on natural gas, biogas, hydrogen, ammonia, and LPG

Parametric Monitoring

- Monitors fuel flow, air-to-fuel ratio, and oxidation catalyst

Overview of PAR 1110.2 & PR 1110.3

PAR 1110.2

- Define Linear Generator
- Remove emission limits and provisions for linear generators
- Add exemption for linear generators

PR 1110.3

- Define Linear Generator
- Establish emission limits
- Include monitoring, reporting, & recordkeeping requirements
- Exempt emergency, lab, and R&D Units

Proposed Amended Rule 1110.2

Proposed Amended Rule 1110.2
Subdivision (c)- Definitions

- Added definition of Linear Generator:

> (13) LINEAR GENERATOR means any power generation technology that uses a thermochemical reaction to create linear motion that is directly converted into electricity.

- Modified definition of Engine to exempt linear generators from Rule 1110.2:

> (7) ENGINE is any spark- or compression-ignited internal combustion engine, including engines used for control of VOC's, but not including Linear Generators or engines used for self-propulsion.

Proposed Amended Rule 1110.2
Subdivision (d)- Emission Limits

TABLE IV EMISSION STANDARDS FOR NEW ELECTRICAL GENERATION DEVICES		
Pollutant	**Emission Standard (lbs/MW-hr)[1]**	~~**Concentration Limit[3] (ppmvd)[4]**~~
NOx	0.070	~~2.5~~
CO	0.20	~~12~~
VOC	0.10[2]	~~10~~

1 The averaging time of the emission standard for VOC is the sampling time required by the test method.

2 Mass emissions of VOC shall becalculated usinga ratio of 16.04 pounds of VOC per lb-mole of carbon.

3 ~~Concentration limit is calculated using a 40% engine efficiency and no applied thermal credit.~~

4 ~~Parts per million by volume, corrected to 15% oxygen on a dry basis.~~

Removed applicable concentration limits for linear generators from Table IV

Proposed Amended Rule 1110.2
Subdivision (d)- Requirements

~~(vii) Owners and operators of new engines installed prior to January 1, 2024 with no ammonia emissions from add-on control equipment and where NOx emissions meet the concentration limit of Table IV at all times may elect to apply for and comply with the concentration limits of Table IV, expressed in ppmvd, except an alternative VOC concentration limit that is equal to or less than 25 ppmvd may be complied with. The Executive Officer shall accumulate daily VOC emissions in excess of the concentration limit of Table IV based on the permitted VOC limits from each such engine and shall not approve any additional permit for such engine that will cause the total accumulated daily VOC emissions to exceed 45 lbs per day. Any new installation on or after January 1, 2024 shall comply with the VOC concentration limit in Table IV in ppmvd.~~

- Clause (d)(1)(L)(vii) capped the number of linear generators with 25 ppmv VOC limit
- Provision will be removed because Rule 1110.2 will no longer be applicable to linear generators

Proposed Amended Rule 1110.2
Subdivision (f) – Monitoring, Testing, Recordkeeping and Reporting

(i) I&M Plan. The operator shall:

(I) Submit to the Executive Officer for written approval an I&M plan. One plan application is required for each facility that does not have a NOx and CO CEMS for each engine. The I&M plan shall include all items listed in Attachment 1. ~~The owner or operator may request an alternative item(s) in Attachment 1 that is determined by the Executive Officer to be equivalent in meeting the same objectives.~~

Subclause (f)(1)(D)(i)(I) requires submittal of an Inspection & Monitoring (I&M) Plan

Rule 1110.2 amendment in 2019 provided I&M Plan flexibility due to the unique characteristics of linear generators

Subclause (f)(1)(D)(i)(I) will be updated to remove this provision, as it was an allowance added specifically for linear generator operators

Proposed Amended Rule 1110.2
Subdivision (i)- Exemptions

- Amended paragraph (i)(3) to clarify that the exemption for landfills and POTWs only applies to Engines as defined under PAR 1110.2
- PAR 1110.2 definition for engines excludes linear generators
- PR 1110.3 will apply to linear generators, regardless of location

(i) (3) The provisions of this rule shall not apply to enginesunits located at landfills or publicly owned treatment works that are subject to a NOx emission limit in a Regulation XI rule adopted or amended after November 1, 2019.

Proposed Rule 1110.3

Proposed Rule 1110.3
Purpose (a) and Applicability (b)

Purpose

- The purpose of PR 1110.3 is to reduce emissions of Oxides of Nitrogen (NOx), Volatile Organic Compounds (VOCs), and Carbon Monoxide (CO) from linear generators

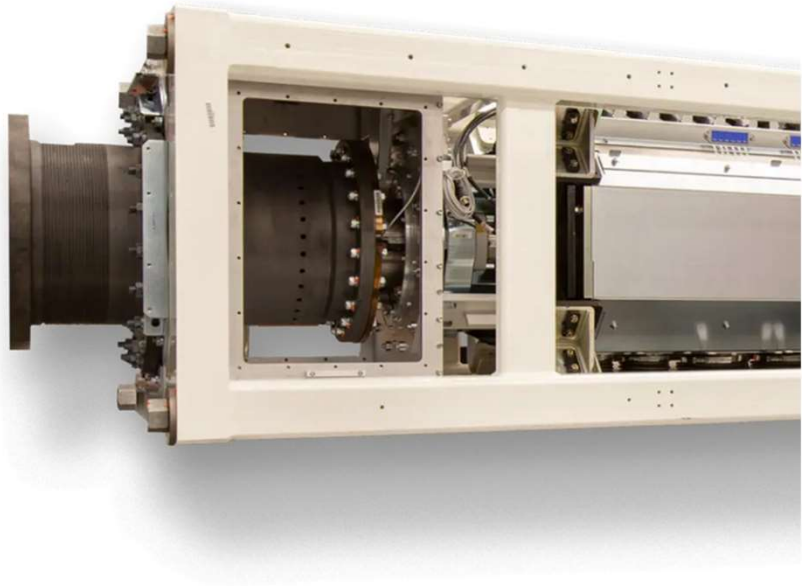
Applicability

- Applies to all linear generators, both portable and stationary, regardless of size and fuel type

Based on discussions with stakeholders, staff anticipates wide adoption of this technology, as well as expansion of the technology into various applications using different fuel types

Proposed Rule 1110.3
Subdivision (c)- Definitions

(7) LINEAR GENERATOR means any power generation technology that uses a thermochemical reaction to create linear motion that is directly converted into electricity.



- Staff worked with stakeholders to create a definition that distinguishes linear generator technology from generators that utilize traditional internal combustion engines

Proposed Rule 1110.3
Subdivision (d)- Emission Limits

Table 1: Concentration Limits for Linear Generators

Units with a Permit to Operate Issued on and after *[Date of Adoption]*			
Fuel Type	**NO_x (ppmv)[1]**	**CO (ppmv)[1]**	**VOC (ppmv)[2]**
Natural Gas, Propane Gas, Hydrogen Gas, Landfill Gas, and Digester Gas	2.5	12	10

[1] Parts per million by volume, corrected to 15% oxygen on a dry basis and averaged over 15 minutes.
[2] Parts per million by volume, measured as carbon, corrected to 15% oxygen on a dry basis, and averaged over the sampling time required by the test method.

- Upon rule adoption, all newly permitted units will be subject to concentration limits in Table 1
- Emission limits are based on achievability, backed by source test data, and mirror the requirements in Rule 1110.2
- Units having a breakdown that results in emissions in excess of Table 1 are required to shutdown by the end of an operating cycle or within 24 hours of the breakdown, whichever is sooner

Proposed Rule 1110.3
Subdivision (e)- Maintenance Requirements

- Maintenance required per manufacturer's recommendations as specified in the operating and maintenance manual
- A copy of the manufacturer's operating and maintenance manual shall be kept and made available to South Coast AQMD upon request

Proposed Rule 1110.3
Subdivision (f)- Source Testing

- PR 1110.3 will retain the source test frequency and procedures as currently required by Rule 1110.2
  - At least once every two years or every 8,760 operating hours, whichever occurs first
  - Source test frequency may be reduced to once every three years if the unit has operated less than 2,000 hours since the last source test
- Periodic source testing needed to confirm equipment is meeting emission limits
- Evaluating the possibility of reduced source testing frequency, if sufficient data is provided to substantiate the robustness of the parametric monitoring system

Overview of PR 1110.3 Source Testing Procedures

Approved Contractor and Test Methods (f)(2)	Source Test Protocol Submittal & Requirements (f)(3)	Source Test Protocol Approval (f)(4)	Previously Approved Protocols (f)(5)	Source Test Date Notification (f)(6)	Source Test Accessibility (f)(7)	Source Test Operating Conditions (f)(8) & (f)(9)

Proposed Rule 1110.3
Paragraph (f)(2)- Source Testing Methods

Source tests required to be conducted using a Laboratory Approval Program approved contractor according to the test methods specified in Table 2

Table 2: Testing Methods

Pollutant	Method
NOx	South Coast AQMD Method 100.1
CO	South Coast AQMD Method 100.1
VOC	South Coast AQMD Method 25.1* or Method 25.3*

*Excluding ethane and methane

Proposed Rule 1110.3
Paragraph (g)(1)- Monitoring

Maintain the following systems and equipment used for emissions monitoring and PR 1110.3 compliance:

- Non-resettable totalizing time meter
- Calibrated electric meter
- Parametric monitoring system

Required daily monitoring and recording of:

- Fuel flow rate
- Elapsed time meter operating hours
- Air-to-Fuel ratio controller (AFRC) system faults, alarms, and any other related emission control malfunctions
- Operating hours since the last source test

Proposed Rule 1110.3
Paragraph (g)(2)- Recordkeeping

PR 1110.3 mirrors Rule 1110.2 records retention requirement of 5 years

Maintain Monthly Records of:	Maintenance Records
• Megawatt-hours of electricity produced • AFRC system faults, alarms, and any other related emission control malfunctions • Total hours of operation, fuel type, fuel consumption, and hours of operation since prior source test, consistent with Rule 1110.2 required monthly records	• Provides compliance verification mechanism for Subdivision (e) – Maintenance Requirements

Proposed Rule 1110.3
Paragraph (g)(3)- Reporting

- Reporting requirements are consistent with Rule 1110.2
- Breakdowns resulting in excess emissions are required to be reported within 1 hour
- Submit breakdown report within 7 days after breakdown is corrected, but no later than 30 days from the initial breakdown, unless an extension is approved
- Submit source test reports within 60 days of the test

Proposed Rule 1110.3
Subdivision (h)-Exemptions

Emission limits specified under subdivision (d) do not apply to:

Laboratory units used for testing and research purposes

- Applies to prototype or developmental units
- Allows for innovation and improvements to technology

Pursuant to Rule 441, Units operated for the purposes of performance verification and testing of such units

- Applies to units being operated in real-world applications to test and verify compliance and durability

Source test requirements under subdivision (f) do not apply to:

Emergency standby units, units used for fire-fighting and flood control, and any other emergency unit approved by the Executive Officer

- Must have permit conditions that limit operation to 200 hours or less per year

PAR 1110.2 & PR 1110.3
Impact Assessments

Costs, Emission Reductions, Cost-Effectiveness, Incremental Cost-Effectiveness, and Socioeconomic Assessment

Costs

- The provisions in PR 1110.3 and PAR 1110.2 are not expected to impose any additional costs

Emission Reductions

- Negligible emission reductions expected

Cost-Effectiveness and Incremental Cost-Effectiveness

- Cost-effectiveness and incremental cost-effectiveness analyses not applicable to PR 1110.3 and PAR 1110.2 because no new BARCT requirements are included

Socioeconomic Assessment

- PR 1110.3 and PAR 1110.2 do not impose any additional costs to the affected facilities and does not result in any adverse socioeconomic impacts

California Environmental Quality Act (CEQA)

The South Coast AQMD, as lead agency, is reviewing the PR 1110.3 and PAR 1110.2 project to determine if it will result in any potential adverse environmental impacts

Appropriate CEQA documentation will be prepared based on the analysis

Next Steps


Individual Stakeholder Meetings
Ongoing
Public Workshop Comments Deadline
February 8, 2023
Stationary Source Committee
February 17, 2023
Set Hearing
March 3, 2023
Public Hearing
April 7, 2023

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