PUBLIC WORKSHOP FOR

PROPOSED AMENDED RULE 1110.2 – EMISSIONS FROM GASEOUS AND LIQUID-FUELED ENGINES &
PROPOSED AMENDED RULE 1100 – IMPLEMENTATION SCHEDULE FOR NOX FACILITIES

JULY 31, 2019
SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
DIAMOND BAR, CA

1

Background

- 2016 AQMP Resolution for Control Measure CMB-05
  - Achieve five tons per day NOx emission reductions in RECLAIM by 2025
  - Transition NOx RECLAIM to a command-and-control regulatory structure and require Best Available Retrofit Control Technology (BARCT) as soon as practicable
- AB 617
  - Implementation of BARCT – December 31, 2023
- Amendments to Rule 1110.2 are needed to establish NOx BARCT requirements for facilities with engines rated greater than 50 bhp
- PAR 1100 –Implementation Schedule for NOx Facilities, incorporates the implementation schedule for RECLAIM and former RECLAIM facilities with equipment regulated under Rule 1110.2

2

Regulatory History of Rule 1110.2

- Adopted August 1990 – required reductions for NOx and VOC for stationary, non-emergency gaseous- and liquid-fueled ICEs; extended regulation to liquid-fueled and portable ICEs
- June 2005 Amendment:
  - SB 700 eliminated statewide agricultural operations exemption
  - Required BARCT to be applied for agricultural engines
- February 2008 Amendment:
  - Conducted BARCT assessment; lowered emissions limits for stationary, non-emergency engines:
    - 11 ppmvd NOx (@ 15% O2)
    - 30 ppmvd VOC (@ 15% O2)
    - 250 ppmvd CO (@ 15% O2)
  - Increased monitoring requirements to include more frequent emissions testing and development of facility Inspection and Monitoring (I&M) plans

3

Regulatory History of Rule 1110.2

continued

- September 2012 Amendment:
  - Re-established biogas engine emissions limits to meet those for natural gas engines
  - Included accompanying technology assessment
- December 2015 Amendment:
  - Extended the compliance deadline for biogas engines
  - Addressed USEPA concerns related to SIP approvability issues contained in the rule language regarding excess emissions from startup, shutdown, and malfunction (SSM)
- June 2016 Amendment:
  - Extended the compliance deadline for one facility due to economic concerns related to its power purchase agreement

4

Engines Transitioning from RECLAIM

- 21 facilities impacted by the RECLAIM transition
- 76 engines in the RECLAIM universe subject to Rule 1110.2
  - 8 portable diesel engines will be subject to State ATCM phase-out schedule
  - 21 stationary engines already in compliance with BARCT
  - 47 would need to comply with current BARCT limit of 11 ppm* for NOx

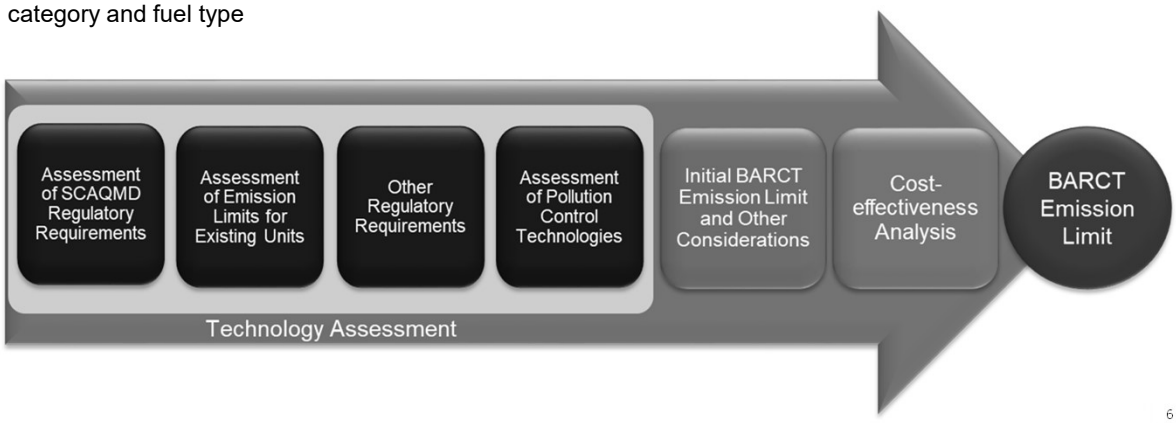
Lean Burn (2-stroke)	Lean Burn (4-stroke)	Rich Burn
Engines Requiring BARCT	Engines Requiring BARCT	Engines Requiring BARCT
11	26	10

5

* Parts per million by volume, corrected to 15% oxygen on a dry basis

BARCT Assessment

BARCT analysis is conducted for each equipment category and fuel type



6

Proposed Rule Language
Proposed Amended Rule 1110.2
EMISSIONS FROM GASEOUS- AND LIQUID-FUELED ENGINES

PAR 1110.2
Purpose (a) and Applicability (b)

- No changes to the purpose and applicability
- Purpose
  - Reduce emissions of Oxides of Nitrogen (NO_x), Volatile Organic Compounds (VOCs), and Carbon Monoxide (CO) from engines
- Applicability
  - All stationary and portable engines over 50 rated brake horsepower (bhp) are subject to this rule
  - Applies to RECLAIM and former RECLAIM facilities

PAR 1110.2

Definitions (c)

- Revised to reflect the transition of equipment from the RECLAIM program to a command-and-control regulatory structure
- Added definitions to differentiate between a FORMER RECLAIM FACILITY, NON-RECLAIM FACILITY, and RECLAIM FACILITY
- Included a definition for SOUTH COAST AQMD for additional clarity

9

PAR 1110.2

Requirements (d)

Highlights

- No changes to NOx, CO, or VOC emission limits
- Creating new subclauses to clarify rule section
- Clarification of averaging time provisions for biogas engines with CEMS
- Adding ammonia slip limits applicable to new and retrofit applications

10

Emissions Limits – (d)(1)

Based on technology assessment, recommendation to maintain existing Rule 1110.2 emissions limits

NOx	VOC[3]	CO
11 ppmv[1]	30 ppmv[2]	250 ppmv[1]

[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
[3] Alternative VOC limits would still apply to engines that currently have them

11

PAR 1110.2

Revisions to Subparagraph (d)(1)(B)

- Creating three new clauses (d)(1)(B)(iii) – (v) to separate individual sections of the rule for additional clarity
- Extending averaging time for compliance determination for engines using non-pipeline quality natural gas that has varying heating values from 6 to 24 hours
  - ❖ Reflects existing permit condition for one engine at a RECLAIM facility
- Establishing an averaging time of 60 minutes for NOx compliance determination for two-stroke engines equipped with an SCR
- Clarifying existing compliance determination for biogas engines

12

PAR 1110.2

Ammonia Slip Requirements – (d)(1)(B)(vii)

- Ammonia emission limit of 5 ppmv*, averaged over 60 minutes
  - Applicable upon startup after *[date of adoption],* new engine installations for lean-burn engines as well as for retrofit applications with Selective Catalytic Reduction (SCR) technology

* @ 15% O2 on a dry basis

13

PAR 1110.2

Averaging Time Provisions for Biogas Engines – (d)(1)(I)

- Current rule language for biogas engines with CEMS
  - ❖ Monthly averaging for the first 4 months after startup if NOx and CO concentration is 10% below rule limits over a 4 month period
  - ❖ Up to 24 hour averaging allowed after 4 months as long as emission levels remain 10% below rule limits over a 4 month period
- Clarification needed for specifying when the longer averaging time applies and how the ongoing requirement is demonstrated and enforced

14

PAR 1110.2

Averaging Time Provisions for Biogas Engines – (d)(1)(I)

continued

- Proposed rule language
  - ❖ Clarifies that monthly averaging can be used upon startup for the first four months of operation only
  - ❖ For using a 24 hour averaging time after the startup period, demonstrate emissions are 10% below rule limits using the 15 minute averaging time for a rolling 4 month time period
  - ❖ Procedures for demonstrating the criteria for using a 24 hour averaging time, including reverting to a 15 minute averaging, will be contained in the facility's Inspection and Monitoring (I&M) Plan
    - ❑ Exceedances of the emissions criteria shall be reported in quarterly reports

15

PAR 1110.2

Compliance (e)

Highlights

- Modifying provisions for CEMS to include facilities exiting RECLAIM
- Providing reference to Rule 1100 Implementation Schedule for NOx Facilities

16

CEMS Requirements – Comparison

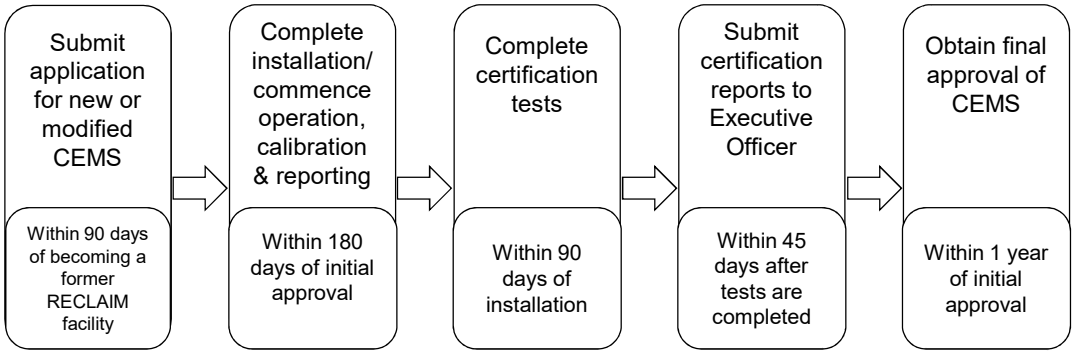
	Rule 1110.2	RECLAIM
Applicability	Engines ≥ 1000 bhp	Major NOx sources require CEMS – engines ≥ 1,000 bhp and operating > 2,190 hours per year
Facility-wide condition	❑ Combined rating ≥ 1500 bhp at the same location ❑ Combined fuel usage ≥ 16 x 10^9 BTUs per year (HHV)	N/A
Notable Exemptions	❑ Standby engines limited by permit conditions to only operate when other primary engines are not operable ❑ Engines limited by permit conditions to operate less than 1,000 hours per year or a fuel usage of less than 8 x 10^9 Btus per year (HHV of all fuels used)	Large NOx source – engines rated: ❑ ≥ 1,000 bhp and operating < 2,190 hours per year

17

PAR 1110.2

Monitoring Requirement Changes – (e)(3)(C)

Applicability to RECLAIM engines that would require CEMS
- Non-exempt engines classified as a large RECLAIM source without CEMS and rated greater than 1,000 bhp
- Non-exempt engines greater than 500 bhp but less than 1,000 bhp and an aggregate rating greater than 1,500 bhp



18

PAR 1110.2

Compliance for RECLAIM and Former RECLAIM Facilities – (e)(10)

- Implementation schedule for RECLAIM and former RECLAIM facilities is specified in Rule 1100 – Implementation Schedule for NOx Facilities
- This paragraph includes a reference Rule 1100 for the compliance deadlines for RECLAIM and former RECLAIM facilities in meeting the applicable NOx emission limits

* Parts per million by volume, corrected to 15% oxygen on a dry basis

19

PAR 1110.2

Monitoring, Testing, Recordkeeping and Reporting (f)

Highlights

- Added compliance determination for ammonia limits
- Clarified testing frequency for source testing requirement
- Modified recordkeeping for RECLAIM and former RECLAIM process units

20

PAR 1110.2

Ammonia Compliance Determination (CEMS) – (f)(1)(A)(iii)

- For engines equipped with SCRs
- Compliance determination using:
  - ❖ Ammonia source testing pursuant to clause (f)(1)(C)(iii); or
  - ❖ Certified ammonia CEMS (protocol currently under development)

21

PAR 1110.2

Source Testing Frequency – (f)(1)(C)(i)

- Facilities will be required to conduct source tests once every two years
- Frequency may be reduced to once every three years if engine operated less than 2,000 hours since last source test
- Added language that must conduct source test “within the same calendar month of the previous source test”

22

PAR 1110.2

Ammonia Emissions Source Testing – (f)(1)(C)(iii)

- Added provision that requires source testing for engines with selective catalytic reduction pollution control equipment with no certified ammonia CEMS
- Requires
  - Quarterly testing for first 12 month of operation
  - After initial four tests, testing every calendar year in the same month as previous test
  - If the engine has not operated within 3 months of the date of a required source test, testing shall be conducted when engine resumes operation for longer than either 7 consecutive days or 15 cumulative days of operation (existing requirements for NOx and CO)

23

PAR 1110.2

I&M Plans for Biogas Engines – (f)(1)(D)(i)(I)

- Facilities with biogas engines with CEMS that use a longer averaging time for compliance must:
  - Submit an Inspection and Monitoring plan
  - Inspection and Monitoring plan to include procedures for demonstrating compliance

24

PAR 1110.2

Recordkeeping Modifications – (f)(1)(E) & (f)(2)

- Affects stationary and portable engines designated as a process unit under RECLAIM
- Switch from maintaining a quarterly engine operating log to a monthly log
- Transition to monthly log starting in the month that facility becomes a former RECLAIM facility

25

PAR 1110.2

Test Methods (g)

- Addition of ammonia testing method – South Coast AQMD Method 207.1

26

PAR 1110.2

Exemptions (i)

Highlights

- Modified exemption for engines at remote, 2-way transmission towers
- Engines covered by other rules that are under development

27

PAR 1110.2

Remote Radio Transmission Towers – (i)(1)(M)

- Provide specific exemption to remote two-way radio transmission towers from complying with rule emission limits which meets following criteria:
  - ❖ no utility, electricity, or natural gas is available within a ½ mile radius
  - ❖ a manufacturer's rating of 100 bhp or less
  - ❖ fired exclusively on diesel #2, compressed natural gas, or liquefied petroleum gas.
- Remove exemption for equipment located only at Santa Rosa Peak in Riverside county as it would be covered under new proposed exemption above

28

PAR 1110.2

Other Exemptions – (i)(1)(N)

- Provide exemption to engines operated at facilities affected by industry-specific rules developed as part of the RECLAIM transition
  - ❖ e.g. engines operated at electricity generating facilities and at refineries

29

PAR 1110.2

Attachment 1 – I&M Plan

- Modifying section to include biogas option for using longer averaging times
  - ❖ procedures for demonstrating that the NOx emissions below 9.9 ppmv* and/or CO emissions below 225 ppmv* for CO (if CO is selected for averaging) over a four month period
  - ❖ procedures to show ongoing compliance with a 24-hour fixed interval averaging time, if the requirements in previous paragraph are met
  - ❖ procedures to revert back to a 15 minute averaging time if NOx and/or CO emissions respectively exceed 9.9 ppmv* and/or 225 ppmv*

* Parts per million by volume, corrected to 15% oxygen on a dry basis

30

Proposed Rule Language
Proposed Amended Rule 1100
IMPLEMENTATION SCHEDULE FOR NOx FACILITIES

31

PAR 1100
Definitions (c)

- Rule 1100 will now include Rule 1110.2 in its applicability for owners or operators of RECLAIM or former RECLAIM facilities
- New definitions will also be included that pertain to equipment covered under Rule 1110.2
  - ❖ COMPRESSOR GAS ENGINE
  - ❖ ENGINE
  - ❖ LOCATION
  - ❖ PORTABLE ENGINE
  - ❖ STATIONARY ENGINE
  - ❖ SOUTH COAST AQMD

32

PAR 1100

Rule 1110.2 Implementation Schedule (d)

- Final compliance date for stationary engines at RECLAIM and former RECLAIM facilities will be December 31, 2023, consistent with the implementation deadline of AB 617
- For compressor gas 2-stroke or 4-stroke lean-burn engines, compliance to emission limits listed in Rule 1110.2 (d)(1) to be 24 months after a permit to construct is issued or 36 months after a permit to construct is issued if the application is submitted by July 21, 2021
- Portable engines required to meet the emission limits in Rule 1110.2 (d)(2), which defer to the emission limits and compliance schedule in the State ATCM

33

Cost-Effectiveness

34

Cost-Effectiveness

- Cost-effectiveness is a cost-benefit analysis comparing relative costs and outcomes
- Measured in cost per ton of pollutant reduced
- Based on present worth value calculation
- Analysis includes:
  - Total Installed Cost
  - Annual Costs
  - Assumes a 4% interest rate
  - 25-year equipment life
  - Emission reductions

35

Cost-Effectiveness Factors

- Equipment cost data collected from facilities and vendors
- Factors considered in the calculation of costs
  - SCR installation cost
  - Catalyst cost
  - Total engine replacement
  - Operations and maintenance costs
  - CEMS – new and retrofit costs
- Factors considered in the calculation of NOx reduction potential
  - Annual NOx emissions data taken from reported 2016 – 2017 RECLAIM data as baseline emissions (Except SoCal Gas – Aliso Canyon used 2014 data)
  - Major Sources used last source test data for initial NOx concentration value
  - Other sources used permitted values for initial NOx concentration value
  - Final NOx concentration value set at 11 ppmv[1]

[1] Parts per million by volume, corrected to 15% oxygen on a dry basis and averaged over 15 minutes

36

Cost-Effectiveness Calculation

PRESENT WORTH VALUE & COST-EFFECTIVENESS CALCULATIONS

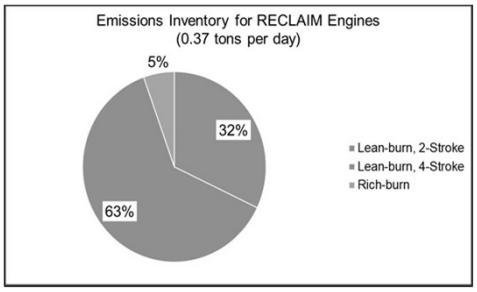
- PWV = TIC + PW_f x AC
- CE = PWV / (ER x 365 x 25 years)

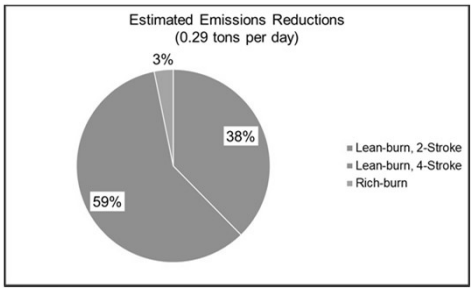
PWV	=	Present Worth Value ($)
TIC	=	Total Installed Cost ($)
PW_f	=	Present Worth factor at 4% interest for 25 years is **15.622**
AC	=	Annual Cost ($)
CE	=	Cost-Effectiveness ($/ton)
ER	=	Emission Reduction (ton/yr)

37

NOx Emissions Reductions by Engine Category

Category	ton/day
Lean-burn, 2-Stroke	0.11
Lean-burn, 4-Stroke	0.17
Rich-Burn	0.01
Total	0.29





38

Cost-Effectiveness Summary

Category	No. of Engines	$/ton NOx
Lean-burn, 2-Stroke	11	28,100
Lean-burn, 4-Stroke	26	35,500
Rich-burn	10	71,400
Total	47	33,800

- Overall cost-effectiveness is calculated to be $33,800 per ton of NOx reduced
- CEMS requirements for rich-burn engines driving cost-effectiveness for this category
  - ❖ Minimal emissions reduction potential
  - ❖ RECLAIM vs Rule 1110.2 CEMS requirements differ
  - ❖ Rule 1110.2 has a 1,500 hp facility aggregate requirement affecting engines between 500 – 999 bhp

39

Scope of Socioeconomic Impact Assessment

40

Applicable Legal Requirements for PARs 1110.2 & 1100

California Health and Safety Code Section 40440.8

- Requires socioeconomic impact assessment for proposed rule or rule amendment which "will significantly affect air quality or emissions limitations"
- Socioeconomic impact assessment shall consider:
  - Type of affected industries, including small businesses
  - Impact on employment and regional economy
  - Range of probable costs, including costs to industry or business
  - Availability and cost effectiveness of alternatives
  - Socioeconomic impacts of CEQA alternatives

41

Cost Considerations

- One-time compliance costs
  - One-time cost of new equipment *(e.g. SCR retrofits or replacement, including cost of equipment plus installation)*
  - Permitting *(one-time)*
  - Monitoring *(e.g. installation of CEMS)*
- Recurring costs
  - Cost of operations *(e.g. electrical cost to operate SCR)*
  - Permitting & fees *(e.g. annual renewals)*
  - Monitoring *(e.g. annual calibration and maintenance of CEMS)*
  - Reporting & recordkeeping *(e.g. CEMS data)*
- Staff is looking for input on these and/or other costs

42

Proposed Key Assumptions

- Analysis horizon: 2020 to 2045
- Equipment/consumables life:
  - ❖ SCR system 25 years
  - ❖ Ammonia/catalyst replacement 3 years
- Cost-effectiveness threshold: $50,000/ton NOx
- Capital and recurring costs are annualized and input into a regional economic model to assess job impacts

43

California Environmental Quality Act (CEQA)

44

CEQA Background

- Purpose
  - ❖ Inform governmental decision-makers and public about potential significant environmental effects of projects
  - ❖ Identify ways to avoid or reduce adverse impacts
  - ❖ Require feasible alternatives and mitigation measures to prevent significant environmental damage
  - ❖ Disclose to the public why a project was approved
- Applies to projects undertaken by a public agency – e.g. South Coast AQMD adoption of rules
  - ❖ Required to comply with CEQA when approving a project
  - ❖ Required for discretionary approvals
- South Coast AQMD as lead agency
  - ❖ Oversight and legal responsibility for appropriate CEQA document preparation, circulation, response to comments, and approval/certification

45

PARs 1110.2 & 1100 – CEQA Applicability

- PARs 1110.2 and 1100 subject to CEQA
- PAR 1110.2 contains changes and new information relative to air quality and hazards and hazardous materials not previously analyzed in the March 2017 Final Program Environmental Impact Report (EIR) for the 2016 AQMP
- Decision to prepare a Draft Subsequent Environmental Assessment (SEA) to the March 2017 Final Program EIR for the 2016 AQMP pursuant to CEQA Guidelines Section 15162(a)
- CEQA scoping meeting required pursuant to Public Resources Code Section 21083.9(a)(2)

46

CEQA Steps

- Draft SEA released for 46-day public review and comment period from July 26, 2019 to September 10, 2019:
  - Less than significant impacts to air quality
  - Potentially significant adverse impacts of hazards and hazardous materials from use of ammonia in SCR
  - Includes alternatives and mitigation measures
- Final SEA to include:
  - Response to comments raised at Public Workshop/CEQA Scoping and on the Draft SEA
  - Any modifications due to any changes since the release of the Draft SEA
  - Findings, a Mitigation Monitoring and Reporting Plan, and a Statement of Overriding Considerations
- PARs 1110.2 and 1100, Staff Report, Socioeconomic Impact Assessment, and CEQA documents to be presented to the Governing Board for consideration, certification of Final SEA, and project approval

47

Remaining Key Issues

Continuing to work on key issues with stakeholders

- SoCalGas has expressed concern with emission limits and implementation schedule for compressor gas engines
- A hospital has requested a one-hour averaging time instead of 15-minutes to address transient emissions
- Achievability of emission limits for larger, remote diesel engines
- Extension of startup and overhaul provisions
- Addressing CEMS aggregate applicability for RECLAIM engines

48

Schedule and Contacts

49

Updated Schedule

- ❑ August 2019 — Working Group Meeting
- ❑ August 14, 2019 — End of Comment Period
- ❑ September 6, 2019 — Set Hearing
- ❑ October 4, 2019 — Public Hearing

50

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51