



# Proposed Amended Rule 1110.2

Emissions from Gaseous- and Liquid- fueled Engines and

# Proposed Amended Rule 1100

Implementation Schedule for NO<sub>x</sub> Facilities



## WORKING GROUP MEETING NO. 4

Date – April 24, 2019  
 South Coast AQMD Headquarters – Room GB

## Agenda

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- Review of Working Group Meeting #3
- Status of Rule Development
- Proposed Emission Limits
- Proposed Reductions
- Cost-Effectiveness
- Rule Language Concepts
- Next Steps and Proposed Schedule

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# Summary of Working Group Meeting #3

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## Summary of Working Group Meeting #3

- Reviewed survey questionnaire
- Revised engine universe
- Discussed site visits
- Reviewed comment letters
- Current regulatory limits – BARCT approach
  - At South Coast AQMD
  - Federal Tier 4
  - State ATCM
- CEMS applicability
- Radio transmission towers

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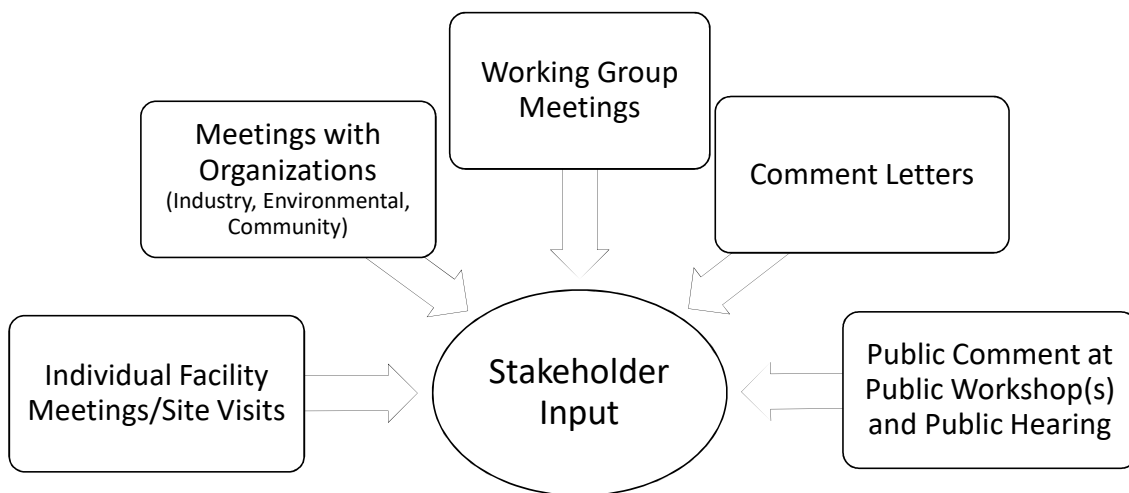
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# Status of Rule Development

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## Status of Rule Development

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## Summary of Assessment Activities

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- Reviewed South Coast AQMD Rules 1110.2 and 1470 and applicability to RECLAIM equipment
- Surveyed emission limits in other jurisdictions for similar equipment
- Conducted site visits
- Meetings with technology vendors on exhaust emissions controls
- Solicited cost information for replacement and retrofit options
- Reviewed comment letters
- Met and conferred with stakeholders

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## Revised Engine Universe

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Engine Type	Total Count	Meeting 11 ppmv <sup>1</sup> NOx
Lean-Burn Engines (2-Stroke)	11	0
Lean-Burn Engines (4-Stroke)	34	8
Engines Subject to ATCM	8	0
Rich Burn Engines	23	13
Total	76	21

- 8 Lean-Burn engines have permitted limits at or below 50 ppmv
- Remaining 10 of 23 Rich-Burn engines are expected to achieve compliance with 11 ppmv<sup>1</sup> NOx through tuning or minor catalyst changes

<sup>1</sup> Parts per million by volume, corrected to 15% oxygen on a dry basis and averaged over 15 minutes

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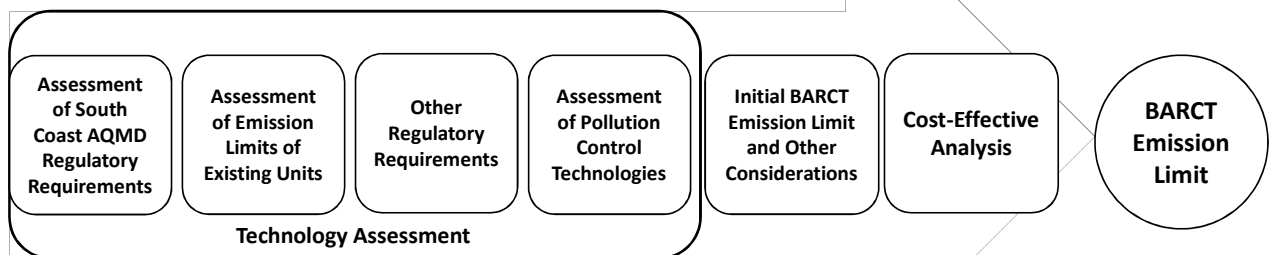
# Proposed Emission Limits

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## BARCT Assessment

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**BARCT analysis conducted for each equipment category**



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<p><b><i>CURRENT TECHNOLOGY ASSESSMENT</i></b></p> <ul style="list-style-type: none"><li>• Selective Catalytic Reduction (SCR) for lean-burn engines</li><li>• Non-Selective Catalytic Reduction (NSCR), 3-way catalysts for rich-burn engines</li></ul> <p>Both technologies are commercially available</p>	
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<p><b>TECOGEN</b></p> <ul style="list-style-type: none"><li>• Retrofit technology</li><li>• Installed in limited use within the South Coast AQMD</li><li>• Applied to natural gas engines</li><li>• 100 – 150 bhp application</li><li>• Can meet more stringent Distributed Generation (DG) emission limits</li></ul> <p><i>Development is on-going</i></p>	
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## Emission Limits

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### **ETAGEN**

- Technology for new installations; no retrofit application
- Non-traditional combustion design; considered as a new, non-emergency electrical generator
- Potential installation – later in 2019
- Can meet more stringent Distributed Generation (DG) emission limits

*Development is on-going*

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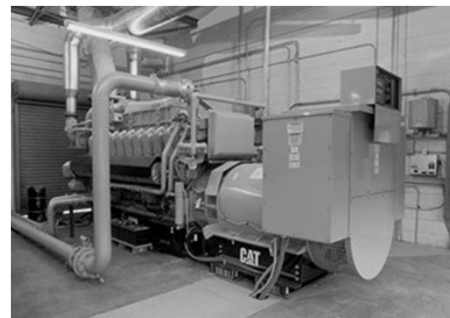
## Emission Limits

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### ***INITIAL PROPOSAL***

Require RECLAIM engines to comply with:

- Current Rule 1110.2 NO<sub>x</sub> limit of 11 ppmv (@ 15% O<sub>2</sub>)
- Demonstrated technology exists for rich-burn and lean-burn engines to achieve compliance
- Some exceptions (next slides)



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# Emission Limits

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## PORTABLE ENGINES SUBJECT TO ATCM

- Propose to include phase out schedule in the rule
- Issue compliance advisory for Tier 1 portable engines



Engine Certification	Engines rated 50 to 750 bhp		Engines Rated >750 bhp
	Large Fleet	Small Fleet	
Tier 1	1/1/2020	1/1/2020	1/1/2022
Tier 2 built prior to 1/1/2009	1/1/2022	1/1/2023	1/1/2025
Tier 2 built on or after 1/1/2009	NA	NA	1/1/2027
Tier 3 built prior to 1/1/2009	1/1/2025	1/1/2029	NA
Tier 3 built on or before 1/1/2009	1/1/2027	1/1/2029	NA
Tier 1,2, and 3 flexibility engines	December 31 of the year 17 years after the date of manufacture. This provision shall not apply to any engine operation before date of this regulation.		

### Exemptions

For portable, diesel-fueled:

- (A) operated exclusively outside of California or only within OCS
- (B) emergency-use
- (C) low-use (< 200 hours per calendar year)

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# Emission Limits

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## HARMONIZE RULE 1110.2 WITH RULES 219 AND 222 FOR REMOTE TRANSMISSION TOWERS

- May 2013 – Governing Board amended Rules 219 and 222 providing permit exemption for remote two-way transmission towers
- No utility, electricity, or natural gas available within 1/2 mile radius
- Engines rated less than 100 bhp
- Fueled on #2 diesel, CNG, or LPG
- Proposed language to clarify that these engines are not required to meet the emission limits in Rule 1110.2 (d)

Engine Manufacturer	No. of Engines	Model No.	Engine Rating (bhp)	Fuel Type	NOx (ppmv)
Cummins	2	4BT3.3 G5	69	Diesel	219
John Deere	16	4024HF285B	80	Diesel	213
Generac	1	68GLPN 7075	107 <sup>1</sup>	LPG	73
Total	19				



<sup>1</sup> Derated to under 100 bhp

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# Anticipated NOx Reductions

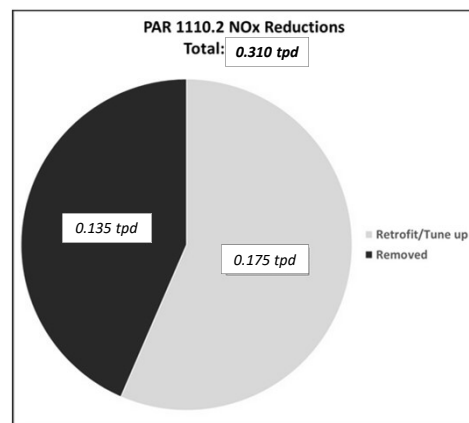
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## Proposed Reductions

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Total Anticipated Reduction –  
0.310 tons per day of NOx

- Equipment to be removed and/or replaced – 0.135 tpd
- Retrofit and/or tune-up – 0.175 tons tpd



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# Cost-Effectiveness Analysis

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## Cost-Effectiveness Analysis

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- Cost-Effectiveness is based on Present Worth Value calculation
- Factors and assumptions include:
  - Total Installed Cost
  - Annual Costs
  - Assumes a 4% interest rate
  - 25-year equipment life
  - Emission reductions

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## Cost-Effectiveness Analysis

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### PRESENT WORTH VALUE & COST-EFFECTIVENESS CALCULATIONS

- $PWV = TIC + 15.622 \times AC$
- $CE = PWV / (ER \times 365 \times 25 \text{ years})$

PWV = Present Worth Value (\$)

TIC = Total Installed Cost (\$)

AC = Annual Cost (\$)

CE = Cost-Effectiveness (\$/ton)

ER = Emission Reduction (ton/yr)

Note: the Uniform Series Present Worth factor at 4% interest for 25 years is **15.622**

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## Cost-Effectiveness Analysis

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- Data collected from vendors and facilities
  - SCR installation
  - Catalyst cost
  - Total engine replacement
  - Service cost
  - New CEMS costs
- Data also collected using past evaluations and adjusted using Marshall & Swift Index inflation factor



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## Cost-Effectiveness Analysis

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- Preliminary Cost-Effectiveness data to be presented at the next Working Group meeting
- Staff continues to collect cost data and welcomes submission of project costs or estimates for new engine installations and retrofits completed in the last ten years



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## Rule Language Concepts

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## Rule Language Concepts

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Include definitions of RECLAIM and non-RECLAIM facilities consistent with other rules

Remove requirements for engines designated as process units under RECLAIM

Remove references to Rule 2012 and Regulation XX as applicable



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## Rule Language Concepts

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Implementation schedule under Rule 1100

Consideration of situations where engines operate in emergency situations (i.e. wildfires, natural disasters, etc.)


Clarify exemption for remote radio transmission towers



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Stakeholder Input	27
<ul style="list-style-type: none"><li>• Welcome any additional comments</li><li>• Available for site visits</li></ul>	
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<h1>Schedule</h1>	
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<b>Next Steps and Proposed Rule Schedule</b>	<b>29</b>
	
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<b>Contacts</b>	
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## Staff Contacts

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Please contact the following South Coast AQMD staff members with any questions or comments

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