

# Proposed Amended Rules 1146 & 1146.1 Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters

Working Group Meeting #1  
November 13, 2024

## Zoom Meeting Information

URL: <https://scaqmd.zoom.us/j/91820448856>

Meeting ID: 918 2044 8856

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# Agenda



Background



Rule Development Process



Next Steps



Background

# South Coast Air Quality Management District (South Coast AQMD)

## What is the South Coast AQMD?

- One of 35 air districts established by the LA County Board of Supervisors
- Authority area includes all of Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties

## What are the South Coast AQMD's responsibilities?

- Actively monitor and meet all federal and state air quality standards
- Control emissions from facilities with equipment with a potential to emit various pollutants or toxics
- Permit and inspect nearly 29,000 businesses within the jurisdiction

## What do rules do?

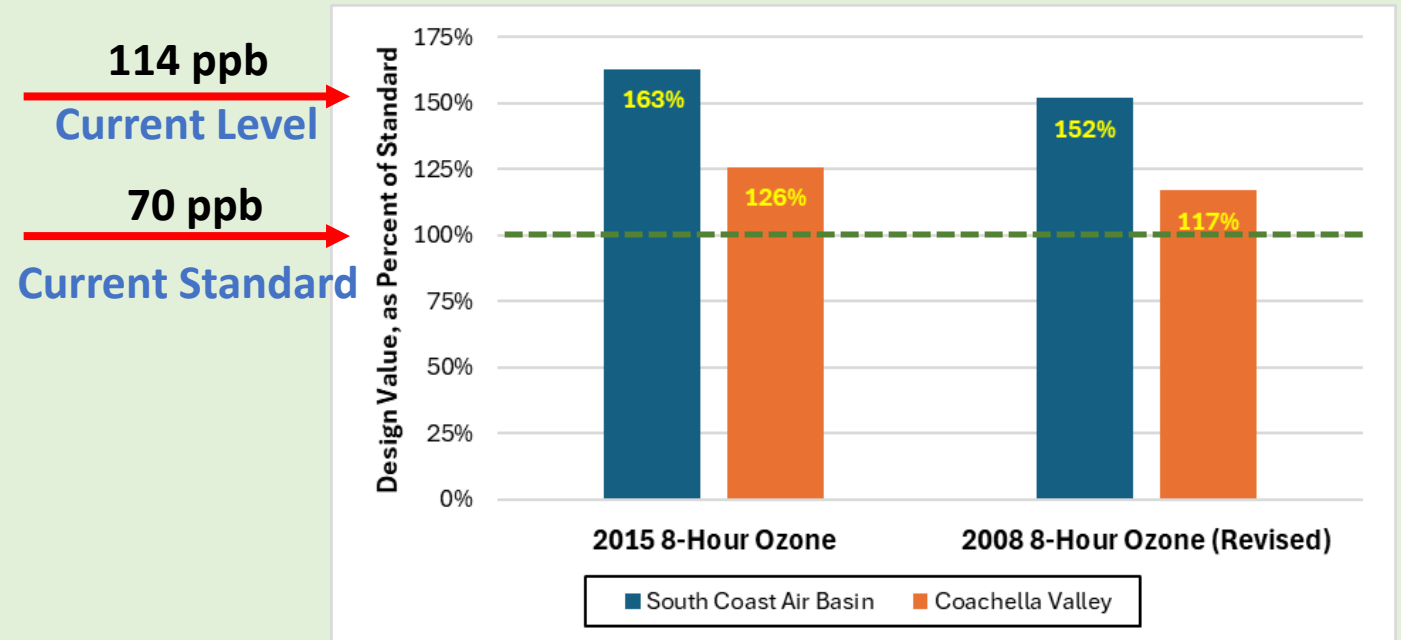
- Implement Control Measures of the Air Quality Management Plan and actions of the South Coast AQMD Governing Board
- Set requirements for facilities to reduce emissions in a cost-effective manner
- Assist in meeting the federal and state air quality standards



# Necessity for Emission Reductions

- U.S. EPA sets federal attainment standards for various criteria air pollutants, including ozone
- Ozone is produced from oxides of nitrogen (NO<sub>x</sub>) and volatile organic compounds (VOCs)
- South Coast Air AQMD is in “extreme nonattainment” for several federal ozone standards

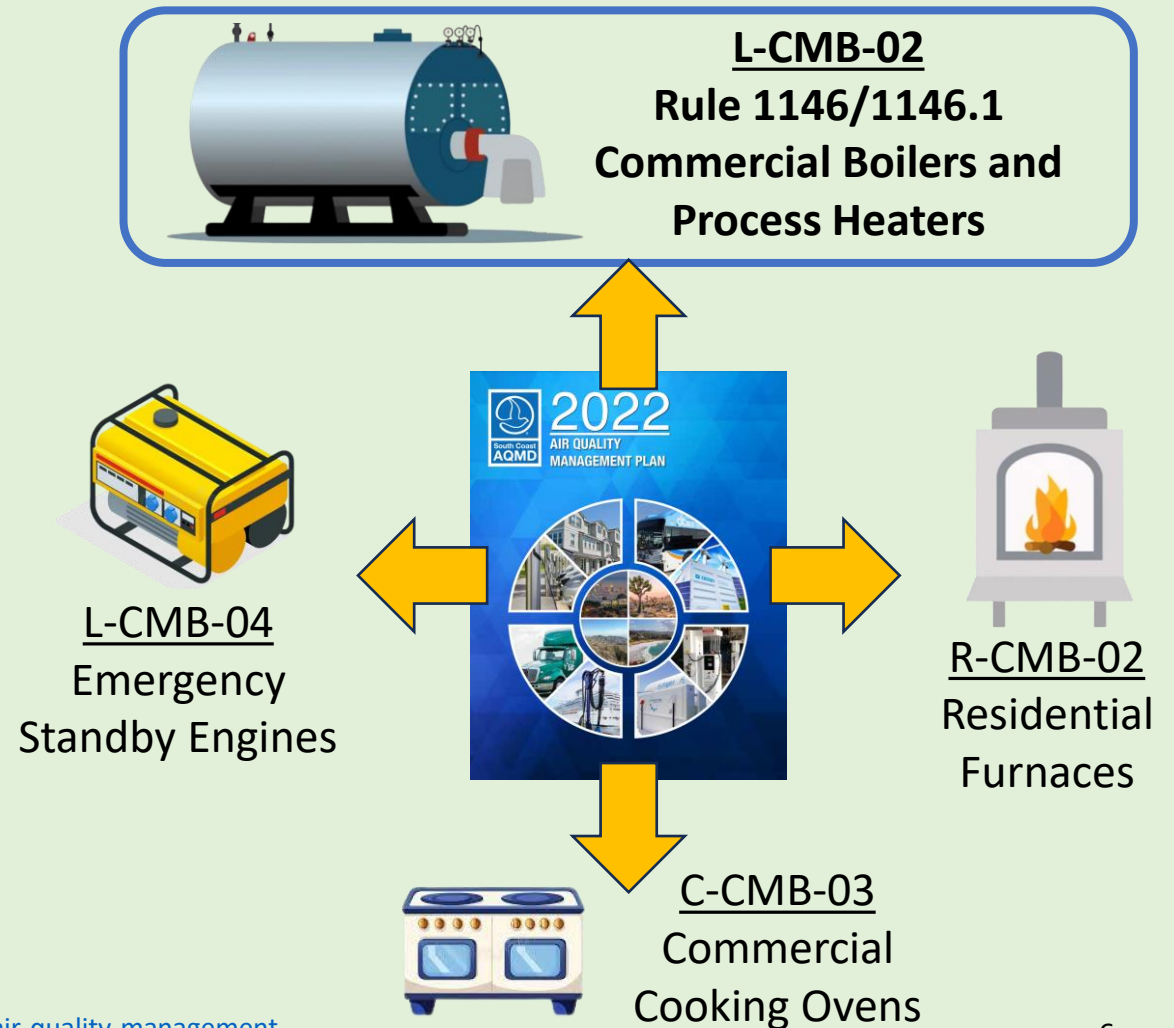
Figure 1. NAAQS Standards vs. Basin Ambient Levels



South Coast AQMD. Data taken from 2022 AQMP.  
<http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2022-air-quality-management-plan/final-2022-aqmp/final-2022-aqmp.pdf?sfvrsn=16>. Modified from Figure 2-1. Page 2-11.

# Plan for Emission Reductions

- South Coast AQMD's 2022 Air Quality Management Plan (AQMP)<sup>1</sup> provides a roadmap to achieve the 2015 8-hour federal ozone standard by 2037
- Roadmap categorized by several control measures specific to equipment categories or industries
- Control measure L-CMB-02 requires replacement or retrofit of boilers and process heaters with zero and low NOx technologies



<sup>1</sup> South Coast AQMD. 2022 AQMP. <http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2022-air-quality-management-plan/final-2022-aqmp/final-2022-aqmp.pdf?sfvrsn=16>.

# Control Measure L-CMB-02

- Control Measure L-CMB-02 estimates 0.45 tons NO<sub>x</sub> per day emission reductions
- Zero emission (ZE) and near-zero/low (NZE) NO<sub>x</sub> technology are critical to implement across many control measures
- ZE and NZE technology will assist in achieving the federal ozone standards

**Electric Boilers**



**Near-Zero Burners**



ZE and NZE  
Technologies



**Hydrogen Boilers**

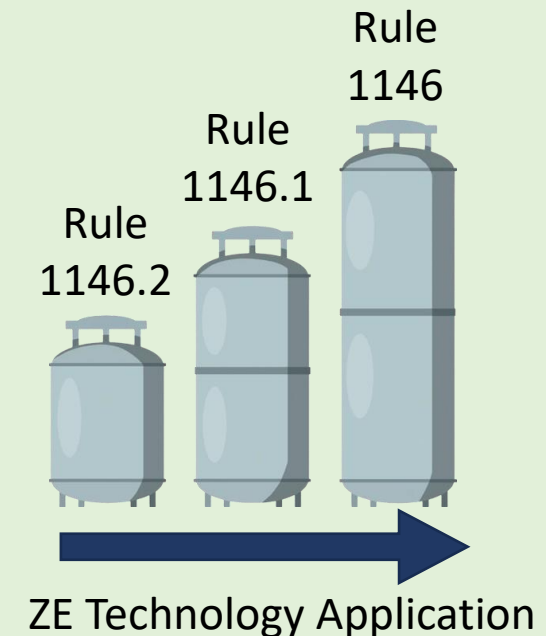


# Rules 1146 and 1146.1 - Background



Rules 1146 and 1146.1 currently regulate boilers and process heaters with a rated heat input capacity of greater than 2 MMBtu/hr

- Rule 1146.2 regulates boilers and process heaters with a rated heat input capacity of less than or equal to 2 MMBtu/hr
- Rule 1146.2 was amended in 2024 to require zero emissions beginning in 2026
- Proposed Amended Rules (PARs) 1146 and 1146.1 seek to assess similar technologies identified in the Rule 1146.2 rule development process as part of the technology assessment





# Rules 1146 and 1146.1 - Emission Limits



Rules 1146 and 1146.1 amended in 2018 to require NOx emission limits between 5-40 ppm @ 3% O2 depending on size and fuel of unit

- Rules 1146 and 1146.1 contain NOx limits based on size, fuel type, and emission limit prior to 2018 amendment
- ZE/NZE technology may correspond to greater emission reductions depending on equipment category
- Greater emission reductions for a given equipment category correlated to NOx concentration limit, number of units, and usage

**Figure 2. Rule 1146<sup>1</sup> Compliance Limits**

Category	NOx Concentration Limit <sup>2</sup>
Group I (Natural Gas)	5 ppm
Group II (Natural Gas)	5 ppm
Group III (Natural Gas)	7 ppm
All Other Units Firing Gaseous Fuel	30 ppm
All Other Units Firing Non-Gaseous Fuel	40 ppm
Thermal Fluid Heaters (Non-Steam)	12 ppm

<sup>1</sup> South Coast AQMD. Rule 1146 Table 1146-1.

<https://www.aqmd.gov/docs/default-source/rule-book/reg-xi/rule-1146.pdf?sfvrsn=4>.

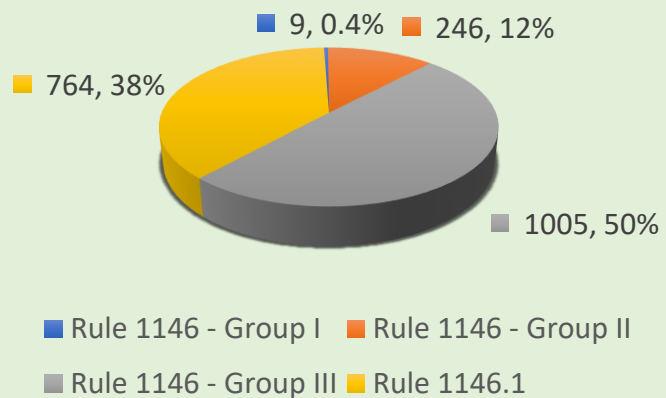
<sup>2</sup> All NOx concentration values corrected to 3% oxygen on a dry basis

# Initial Equipment Universe Distribution

Total Unit Count: 2,024 Units

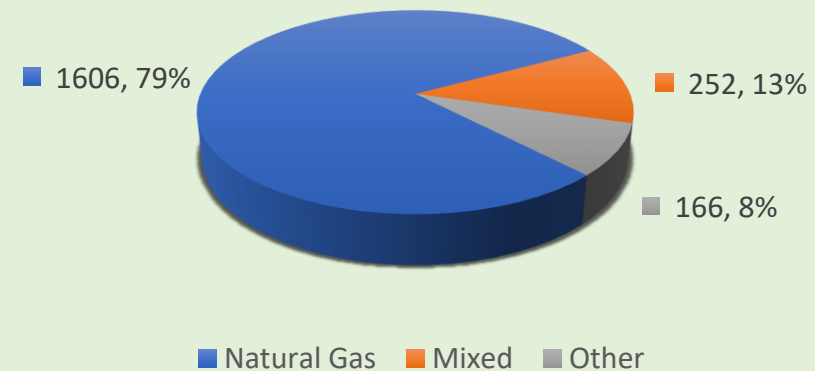
## By Size

Rules 1146 & 1146.1 Size Distribution  
(Unit Count, % of Total)



## By Fuel

Rules 1146 & 1146.1 Fuel Distribution  
(Unit Count, % of Total)



Approximately 50% of all units are mid-sized (5-20 MMBtu/hr)  
Approximately 75% of all units use natural gas

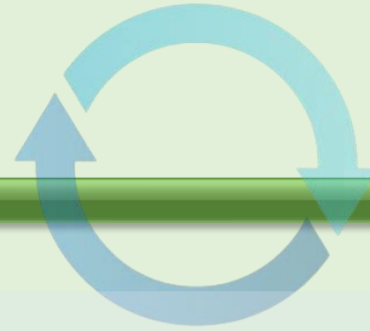
# Rules 1146 and 1146.1 – Current Implementation Timeline



Implementation of both Rules 1146 and 1146.1 is ongoing, with compliance required after a unit replaces a burner or 15 years post-amendment (2033)

2018

- Staff conducted a Best Available Retrofit Control Technology (BARCT) assessment in 2018 for Rules 1146 and 1146.1
- Amendment lowered NOx limits for Group II and Group III from 9 ppm to 5 and 7 ppm, respectively



## Current Status

Units are actively being replaced and retrofitted to meet the NOx limits established by the 2018 amendments

2033

All boilers compliant with the NOx limits established by the 2018 amendments

# Proposed Amended Rules 1146 and 1146.1 – Considerations for Updated BARCT Assessment

Cost-effectiveness threshold updated by the 2022 AQMP from \$59,000 to \$325,000 per ton NOx reduced<sup>1</sup>  
Staff will conduct cost-effectiveness analysis using updated figure

Staff will account for stranded assets in the cost-effectiveness analysis  
(equipment ordered, installed, and other costs associated with  
complying with current Rules 1146 and 1146.1 NOx limits)

Cost-effectiveness analysis may support retrofitting some units with ZE/NZE technology directly,  
rather than meeting current NOx limits as an interim step

Staff will work closely with  
all stakeholders to meet  
three objectives

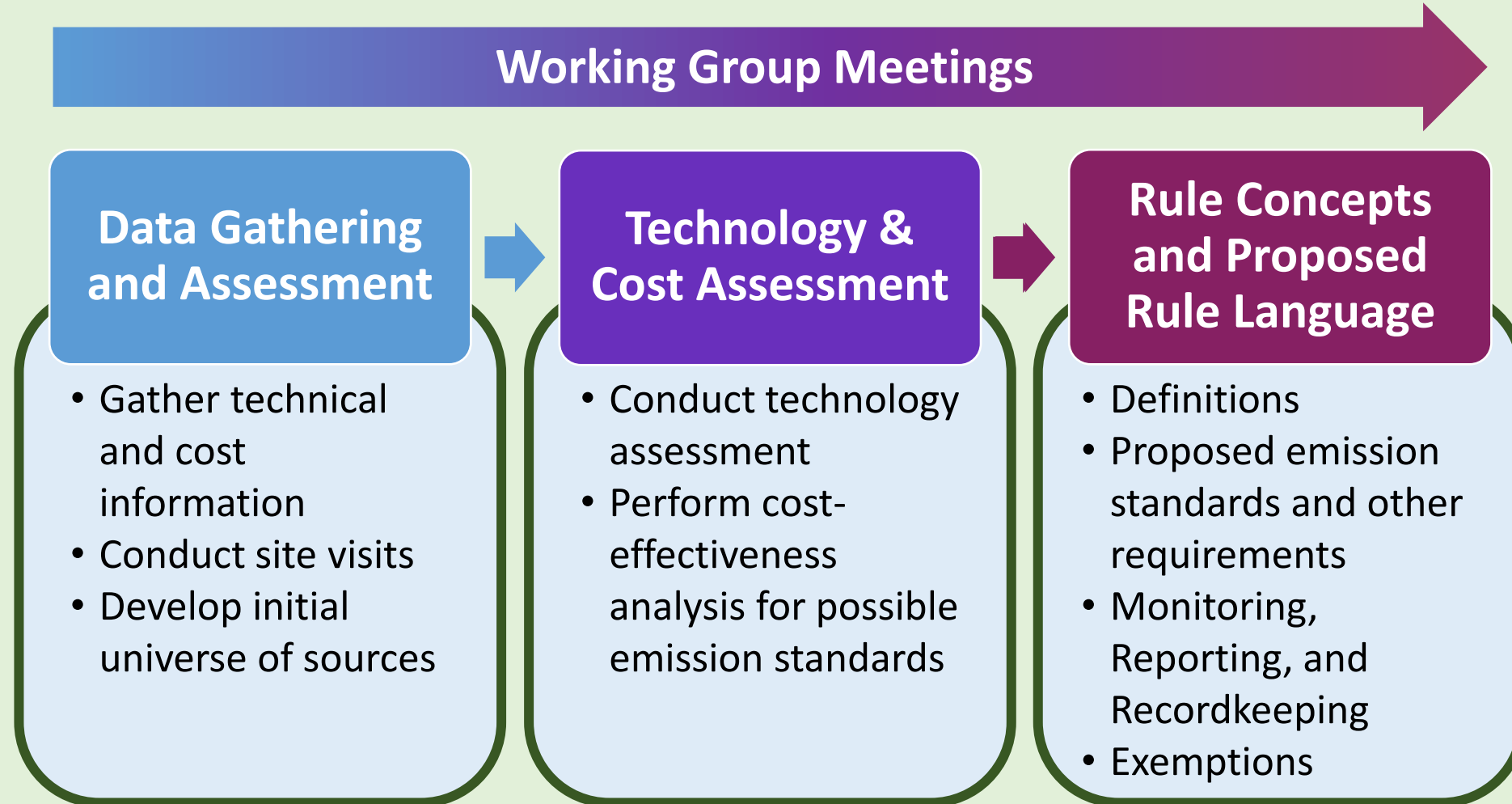
1. Realize the maximum quantity of emission reductions
2. Implement rule requirements expeditiously
3. Ensure rule requirements to be cost-effective

<sup>1</sup> Cost-effectiveness threshold will be adjusted for inflation during the cost-effectiveness analysis



# Rule Development Process

# Overview of Rule Development Process



# Stakeholder Participation

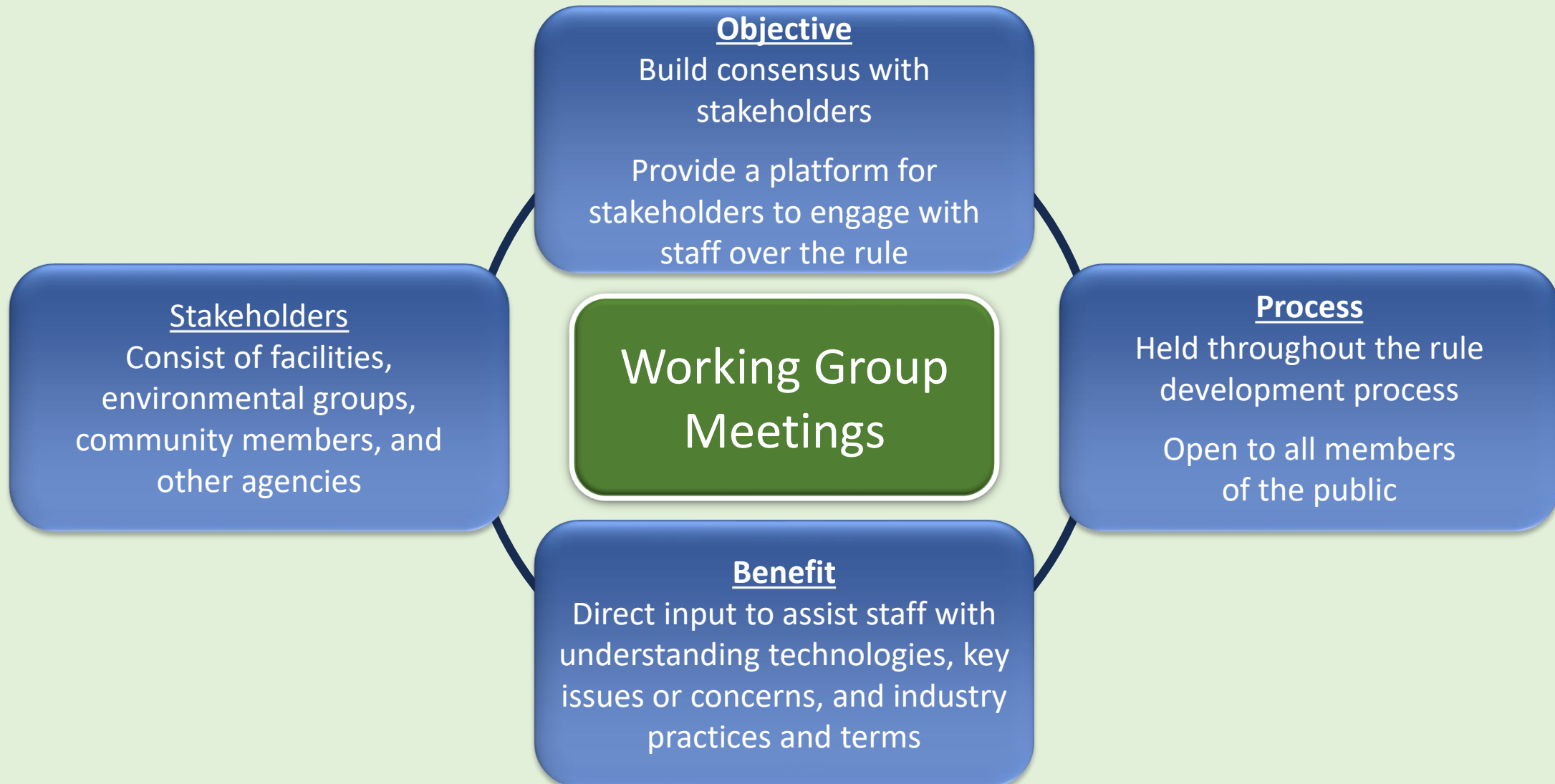
- Stakeholders have several opportunities to provide input throughout the rule development process
- Stakeholder engagement early in the process is encouraged to facilitate an accurate and effective rule development
- Participation allows staff to engage directly with stakeholders to discuss issues and understand concerns

Staff is seeking opportunities for site visits, technology demonstrations, and discussions over the proposed amended rules



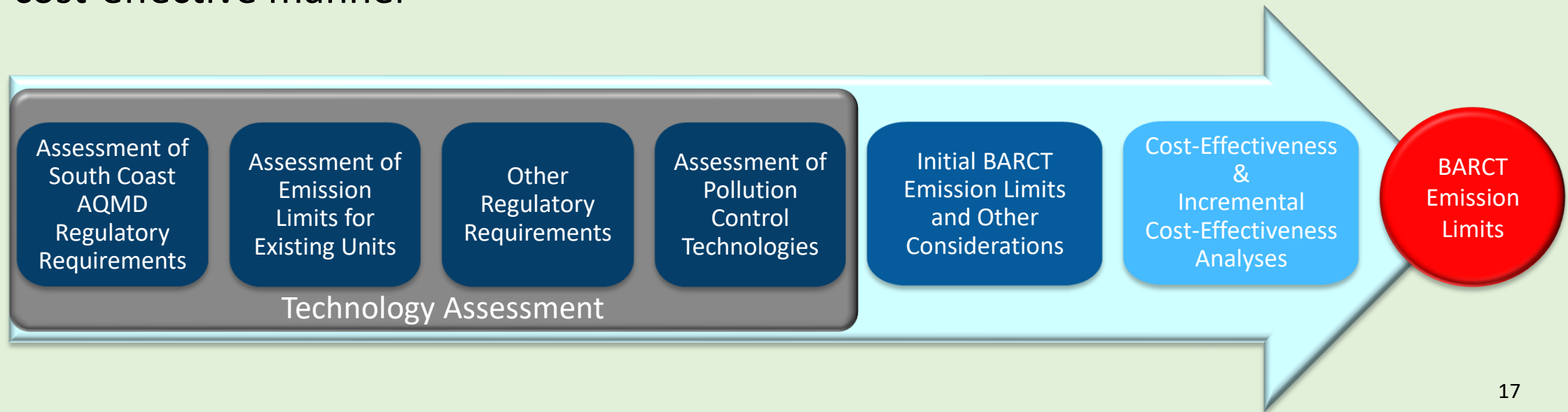


# Working Group Meetings



# BARCT Assessment Process

- BARCT assessment will be conducted for each class and category of equipment in Rules 1146 and 1146.1
- Technology assessment informs initial BARCT limits, which will then undergo cost-effectiveness analyses
- BARCT analysis aims to achieve the greatest amount of emission reductions in a cost-effective manner



# Proposed Universe

BARCT assessment requires a full review of each class and category of equipment

## By Size

- Rule 1146 Group I:  $\geq 75$  MMBtu/hr
- Rule 1146 Group II: 20-75 MMBtu/hr
- Rule 1146 Group III: 5-20 MMBtu/hr
- Rule 1146.1: 2-5 MMBtu/hr

## By Fuel

- Non-gaseous fuel
- Natural Gas
- Landfill gas<sup>1</sup>
- Digester gas<sup>1</sup>
- Mixed<sup>2</sup>
- Other<sup>2</sup>

<sup>1</sup> Since the 2018 amendment, units fired by landfill gas at landfills or digester gas at Publicly Owned Treatment Works facilities are now regulated by Rule 1150.3 and Rule 1179.1, respectively

<sup>2</sup> Units fired by mixed fuels or other fuels will be further classified in a future Working Group meeting



Next Steps

# Next Steps



## Begin Technology Assessment

- Hold discussions with facilities and vendors
- Conduct technology assessment for NOx control technology



## Conduct Cost-Effectiveness Analyses

- Assess emission benefit and cost of implementation
- Compare incremental benefits and costs between technologies



## Hold Additional Working Groups

- Open to the public
- Designed to provide forum for discussion, questions, and next steps



## Public Process Timeline

- Public Hearing: Q1 2026 (tentative)

# Keep Connected

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## Proposed Rules Page

<https://www.aqmd.gov/home/rules-compliance/rules/scaqmd-rule-book/proposed-rules/rule-1146-1146-1>

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