



**Proposed Amended Rule 1135**  
Emissions of Oxides of Nitrogen from  
Electricity Generating Facilities  
**Public Workshop and CEQA Scoping Session**  
August 2, 2018

---

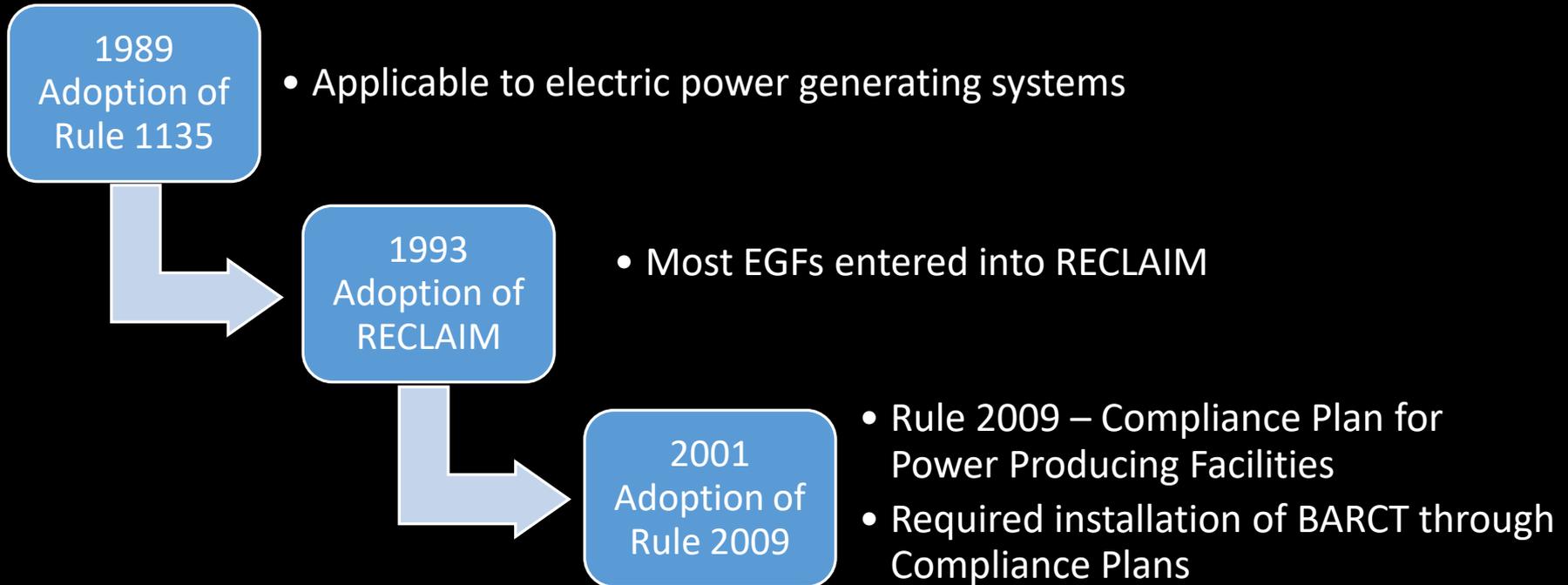


# Regulatory Background

# Background

- 2016 Air Quality Management Plan
  - Control Measure CMB-05 called for further NO<sub>x</sub> reductions from an assessment of the RECLAIM program, including:
    - A 5 ton per day NO<sub>x</sub> reduction to be achieved no later than 2025; and
    - Sunsetting the RECLAIM program and transitioning to a command-and-control regulatory structure that requires Best Available Retrofit Control Technology (BARCT) level controls
- AB 617 (2017)
  - Expedited schedule for implementation of BARCT
    - Implementation schedule to be developed by 1/1/2019
    - Full BARCT implementation by 12/31/2023

# Regulatory Background for Electricity Generating Facilities (EGFs)



# Rule 2009

- Adopted in response to California energy issues and to help stabilize RECLAIM Trading Credit prices in RECLAIM
- Key requirement was submittal of a compliance plan demonstrating that all RECLAIM NO<sub>x</sub> emitting equipment (excluding Rule 219 equipment) will achieve BARCT emission levels
- A case-by-case technical and cost-effectiveness evaluation was performed to determine BARCT
  - Permit information shows that BARCT for the majority of equipment ranges from 5 to 9 ppmv in early 2000's
- EGFs in RECLAIM have installed BARCT controls, retired equipment, or repowered equipment with more efficient equipment
  - Catalina Island electric power generating equipment not included because total output (~ 9 MW) is less than Rule 2009 threshold (50 MW)

# Public Process

- Four Working Group Meetings
  - January 24, 2018
  - April 26, 2018
  - June 13, 2018
  - July 5, 2018
- Seven site visits
- Nine individual meetings

# Proposed Rule Language

# Overview

- Rule language based on rule concepts with input from stakeholders
- Limits provided in rule from BARCT assessment
  - Special consideration for low-use and units close to proposed NOx limit
- Presentation will highlight key provisions of proposed rule language

# Purpose

## Subdivision (a)

- The rule purpose is to reduce oxides of Nitrogen (NO<sub>x</sub>) from electric power generating units at electricity generating facilities



# Applicability

## Subdivision (b)

- Rule applies to 133 electric power generating units at 34 facilities operated by:
  - CA Independent System Operator (CAISO) market participant
  - Municipality or public electric utility
  - Electric utility on Santa Catalina Island
- Excludes electric power generating units operated by landfills, sewage treatment facilities, refineries
- Excludes cogeneration units which provide useful heat energy and electricity at the same time

# Definitions

## Subdivision (c)

### Removing Obsolete Definitions

- Advanced Combustion Resource
- Alternative Resource
- Approved Alternative or Advanced Combustion Resource
- Alternative Resource or Advanced Combustion Resource Breakdown
- Cogeneration Facility
- Displace
- District-Wide Daily Limits
- Electric Power Generating System
- Replacement Unit
- Start-up or Shutdown
- Useful Thermal Energy

### Adding or Modifying Definitions

- Annual Capacity Factor
- Cogeneration Turbine
- Combined Cycle Gas Turbine
- Duct Burner
- Electricity Generating Facility
- Electric Power Generating Unit
- Internal Combustion Engine
- Landfill
- Municipal or Public Electric Utility
- Petroleum Refinery
- Publicly Owned Treatment Works
- RECLAIM NOx Source
- SCAQMD-Wide Daily Limits
- Shutdown
- Simple Cycle Gas Turbine
- Start-up
- Tuning

# Key Definitions

## Subdivision (c)

- Annual capacity factor – Ratio between measured heat input from fuel consumption and potential heat input if operated continuously over a year
  - Power supplied during emergencies not included in calculation of annual capacity factor
- Electricity Generating Facility (EGF) – Electricity generators owned, operated, or under contract to sell power to CAISO, electric municipality, or electric utility on Catalina Island
  - Excluding landfills, petroleum refineries and publicly owned treatment works
- Electric Power Generating Unit – Boilers, internal combustion engines, and turbines that generate power for distribution
  - Excludes cogeneration turbines and emergency engines

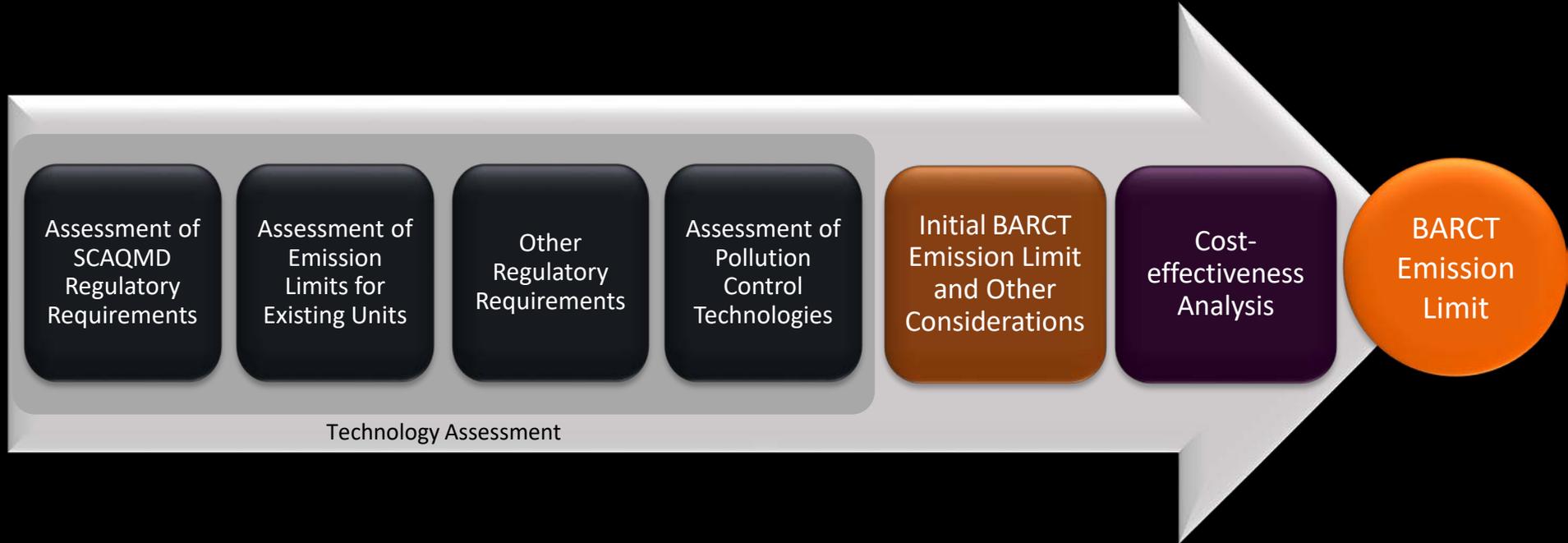
# Provisions for Start-up, Shutdown, and Tuning Subparagraphs (d)(1)(A) and Clause (d)(2)(A)(i)

- Unique design of equipment does not allow for generalized requirements for start-up, shutdown, and tuning
- NO<sub>x</sub> limits in rule shall not apply during start-up, shutdown, and tuning
- Requirements during those events shall be included in SCAQMD permit

## Requirements for Averaging Times Subparagraphs (d)(1)(B), (d)(1)(C) and Clause (d)(2)(A)(ii) and (d)(2)(A)(iii)

- Averaging times have varied greatly in the past; effort to standardize averaging times
- Modifying averaging time requires software upgrade
- New units shall average NO<sub>x</sub> and ammonia emission limits over a 60 minute rolling average
- Units installed prior to rule adoption shall retain the averaging time requirements specified on SCAQMD permit

# BARCT Assessment



**BARCT analysis is conducted for each equipment category and fuel type**

# Emission Limitations for Boilers and Turbines Paragraph (d)(1), Table I

Equipment Type	NOx (ppmv)	Ammonia Slip (ppmv)	Oxygen Correction (% dry)
Boilers	5.0	5.0	3
Combined Cycle Turbine with or without Duct Burner	2.0	5.0	15
Simple Cycle Turbine	2.5	5.0	15

- Limits reflect BARCT assessment
- Effective Date: January 1, 2024

# Emission Limitations for Internal Combustion Engines Paragraph (d)(2), Table II

Equipment Type	NOx (ppmv)	Ammonia (ppmv)	Carbon Monoxide (ppmv)	Volatile Organic Compounds (ppmv)	Particulate Matter (lbs/MMBtu)	Oxygen Correction (% , dry)
Internal Combustion Engine (Diesel)	45.0	5.0	250	30	0.0076	15

- Limits based on BARCT assessment
- Effective date: January 1, 2024

# Alternative Effective Dates for Catalina Island Subparagraph (d)(2)(B)

- Catalina Island has no access to natural gas
- Retrofitting to Tier IV engines will reduce facility NOx emissions to 39 tons per year
- Alternative effective dates incentivize lower emitting and renewable electricity generating technologies

Facility Emissions (tons per year)	Effective Date
39 (Complying with Table II Emission Limit)	January 1, 2024
26	January 1, 2025
13	January 1, 2026

- Compliance Plan for alternative effective dates due January 1, 2022

# District-Wide Daily Limits

## Paragraphs (d)(3), (d)(4), & (d)(5)

- City of Glendale is only Rule 1135 facility
- Current rule has District-Wide daily limits
- For City of Glendale boilers, retain existing requirements for SCAQMD-wide daily limits on emissions rate and emissions cap and annual limits
  - Necessary for compliance during interim period until emission limits become effective
- Remove all other SCAQMD-wide daily limits
  - Provisions are obsolete for RECLAIM facilities

# Compliance Plans & Municipal Bubble Options Previous Subdivisions (d) and (g)

- Compliance plans and municipal bubble options are removed
- Mass limits for electricity generating systems are replaced by emission concentration limits for electric power generating units

# Measurements Overview

## Subdivision (e)

- Maintain requirements for NOx Continuous Emission Monitoring System on all units
- Current Rule 1135 facility will retain existing Rule 1135 monitoring and recordkeeping
- RECLAIM facilities will retain Rule 2012 monitoring and recordkeeping
- Records demonstrating compliance shall be maintained for five years and made available upon request

# Measurements for Current Rule 1135 Facility Paragraphs (e)(1) through (e)(5)

- Current Rule 1135 facility will retain existing Rule 1135 monitoring and recordkeeping
  - Retain Continuous Emission Monitoring System
- Replace Remote Terminal Unit with data acquisition system
- Continue to comply with “CEMS Requirements for Electricity Generating Facilities”
  - Minor changes to document title and CEMS requirements
- Eliminate monthly reporting
  - Records demonstrating compliance shall be maintained for five years and made available upon request

# Measurements for RECLAIM Facilities Paragraph (e)(6)

- Comply with SCAQMD Rule 2012 – Requirements for Monitoring, Reporting, and Recordkeeping for Oxides of Nitrogen Emissions
  - Exclude requirements in Rule 2012 for reporting
- Retains monitoring and recordkeeping requirements but minimizes reporting requirements



# Use of Liquid Petroleum Fuel

## Subdivision (f)

- Provisions retained limiting use of liquid petroleum to force majeure natural gas curtailment
- Add provision which prohibits new diesel electric power generating units
- Catalina Island is exempt from these provisions because the island has no access to natural gas

# Electric Generating Units Close to Proposed Limits Paragraphs (g)(1), (g)(2), and (g)(4)

- Units close proposed limits not cost-effective to reduce to proposed limit
- Units will be required to retain NOx concentration limits in permit

Equipment Type	Exemption Paragraph	Permit Concentration Limit	Proposed Rule Limit
Combined Cycle Turbine	(g)(1)	2.5 ppmv @ 15% O2	2.0 ppmv @ 15% O2
Boiler	(g)(2)	7.0 @ ppmv15% O2	5.0 @ ppmv15% O2
Diesel Internal Combustion Engine	(g)(4)	51 @ 15% ppmv O2	45.0 @ 15% ppmv O2

# Once-Through-Cooling Boilers

## Paragraph (g)(3)

- Coordinate compliance date for PAR 1135 NOx concentration limit with compliance dates in Clean Water Act
- Avoids stranded costs of adding pollution controls for interim period of time but will hold to current schedule in Clean Water Act
- All but two boilers subject to Once-Through-Cooling will be repowered by 2024. The last two boilers will be repowered in 2029 to maintain grid reliability

# Low-Use Electric Power Generating Units

## Paragraph (g)(5)

- Many electric power generating units are operated sporadically to support renewables
  - Low-use units are not cost-effective to install additional control equipment
- Low-Use Exemption Thresholds
  - Exempt turbines from NO<sub>x</sub> concentration limit in the rule that:
    - Operate less than 25% of annual capacity factor in one year
    - Operate less than 10% averaged over three consecutive years
  - Exempt boilers from NO<sub>x</sub> concentration limit in the rule that:
    - Operate less than 2.5% of annual capacity factor in one year
    - Operate less than 1% averaged over three consecutive years

# Low-Use Electric Power Generating Units

## Paragraph (g)(5) *(continued)*

- Annual capacity factor is the ratio between measured heat input from fuel consumption and potential heat input if operated continuously over a year
  - Power supplied during emergencies not included in calculation of annual capacity factor
- Must retain NO<sub>x</sub> and NH<sub>3</sub> limits, averaging times, and start-up, shutdown, and tuning requirements in current permit to qualify for exemption
- Must apply for a permit condition limiting annual capacity factor
- Must report annual capacity factor annually to establish continued compliance
- If low-use threshold exceeded, unit shall not exceed proposed NO<sub>x</sub> concentration limits within three years of exceedance

# Internal Combustion Engines on Catalina Paragraph (g)(6)

- Engines on Catalina Island not subject to diesel fuel restrictions of subdivision (f)
  - No access to natural gas on island

# Cost-Effectiveness and Emission Reductions

# Cost-Effectiveness

- Threshold is \$50,000/ton NOx reduced
  - Established in 2016 AQMP
- Calculated using Discounted Cash Flow Method
  - Cost Effectiveness = Present Value / Emissions Reduction Over Equipment Life
  - Present Value = Capital Cost + (Annual Operating Costs \* Present Value Formula)
    - Present Value Formula incorporates nominal interest rate

# Estimated Emissions Inventory and Reductions

- **Baseline Emissions**
  - Determined by using reported fuel consumption and permit emission limit
- **PAR 1135 Emissions**
  - Determined by using reported fuel consumption and proposed emission limit
- **Emission Reductions = Baseline Emissions - PAR 1135 Emissions**

# Cost Estimates for Gas Turbines and Utility Boilers

- Retrofit costs determined using U.S. EPA's Air Pollution Control Cost Estimation Spreadsheet for Selective Catalytic Reduction<sup>1</sup>
  - Methodology based on U.S. EPA Clean Air Markets Division Integrated Planning Model
  - Size and costs of SCR based on size, fuel burned, NOx removal efficiency, reagent consumption rate, and catalyst costs
  - Capital costs annualized over 25 years at 4% interest rate
  - Annual MW output based on 2016 annual reported emissions
  - Values reported in 2015 dollars
- Stakeholders are welcome to provide staff with their own costs and cost effectiveness calculations

<sup>1</sup>[https://www.epa.gov/sites/production/files/2017-12/documents/scrcostmanualchapter7thedition\\_2016revisions2017.pdf](https://www.epa.gov/sites/production/files/2017-12/documents/scrcostmanualchapter7thedition_2016revisions2017.pdf)

# Summary of Cost-Effectiveness

## Boilers

- 21 of 24 (88%) already shutting down
- Remaining 3 have average cost-effectiveness ~ \$50,000/ton NOx reduced

## Turbines – Combined Cycle and Duct Burners

- 19 of 28 (68%) already meet proposed BARCT limit; 3 units at 2.5 ppmv
- Remaining are low-use (operating less than 10% of annual capacity factor)

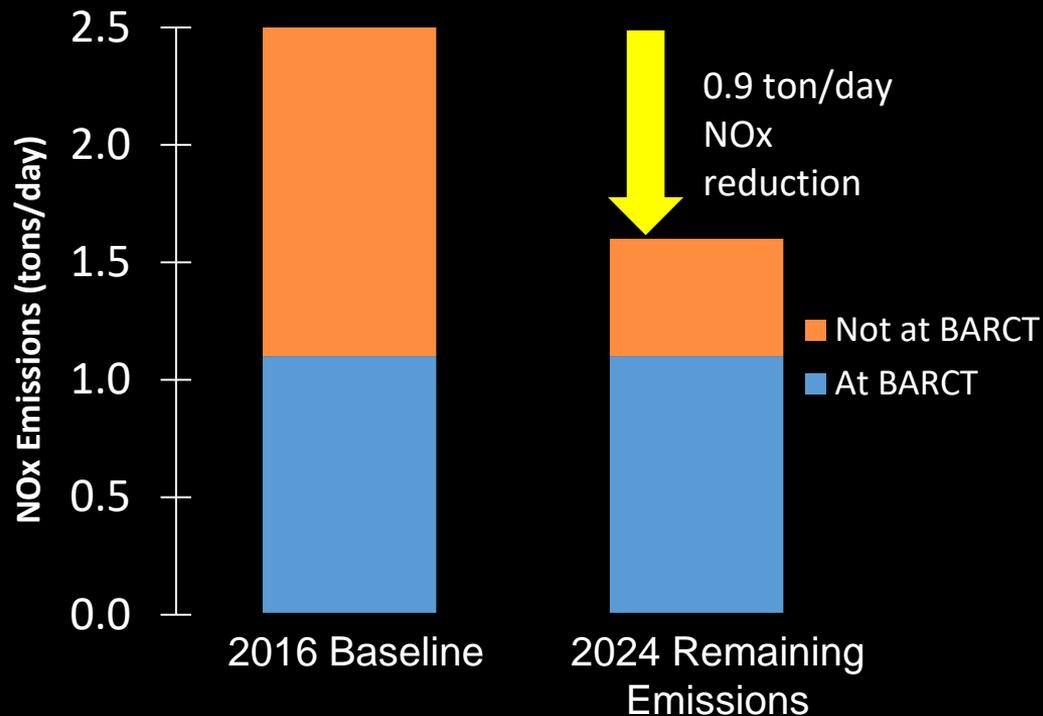
## Turbines – Simple Cycle

- 45 of 75 (60%) already meet proposed BARCT limit
- Remaining are low-use (operating less than 10% of annual capacity factor)

## Internal Combustion Engine (Diesel)

- Unique to Catalina Island
- Average cost-effectiveness is approximately \$27,000/ton NOx reduced

# Emission Reductions



- Initial inventory in 1986 was 25.6 tons per day of NOx
- EGFs emitted 2.5 tons per day of NOx in 2016\*
  - 1.1 tons per day from equipment at or below BARCT
- PAR 1135 will reduce about 0.9 tons per day
  - 0.8 tons per day from boilers
  - 0.1 tons per day from internal combustion engines

\* Based on 2016 fuel usage and permit limits

# California Environmental Quality Act (CEQA)

- PAR 1135 is a project subject to CEQA
- Decision to prepare 30-day Draft Subsequent Environmental Assessment (SEA) to the March 2017 Final Program Environmental Impact Report (EIR) for the 2016 Air Quality Management Plan (AQMP)
  - PAR 1135 contains changes that are revisions to the previous project approved by the SCAQMD Governing Board in March 2017 Final Program EIR
  - CEQA Guidelines Section 15162 (b) allows preparation of a SEA based on project changes or new information available after adoption of the March 2017 Final Program EIR
  - No significant impacts are expected with PAR 1135
  - No CEQA scoping meeting is required to be held
  - Analysis of alternatives and mitigation measures are not required
  - Will contain project description (Chapter 1) and environmental checklist (Chapter 2) to evaluate the revised project's impacts on 17 topic areas
  - Will be released for 30-day public review period in August 2018
- Final SEA
  - Will include responses to Draft SEA comment letters and any necessary modifications to Draft SEA
  - Governing Board must certify Final SEA

# Scope of Socioeconomic Impact Assessment

# Legal Requirements

## California Health & Safety Code Sections 40440.8(a) and (b)

- Socioeconomic Impact Assessment considers:
  - Type of affected industries, including small businesses
  - Impact on employment and the regional economy
  - Range of probable costs, including costs to industry or business
  - Availability and cost effectiveness of alternatives
  - Emission reduction potential
  - Necessity of adopting, amending, or repealing rule/regulation to attain state and federal ambient air quality standards
  - Socioeconomic impacts of CEQA Alternatives, when applicable
- Governing Board shall:
  - Actively consider socioeconomic impacts
  - Make a good faith effort to minimize adverse socioeconomic impacts

# Cost Considerations

- One-time compliance costs
  - Capital cost of new equipment
    - Replacement of five diesel internal combustion engine
    - Repowering three boilers with one or more natural gas turbines
    - Retrofitting four simple cycle turbines with new catalysts
  - Permitting
- Recurring costs
  - Not expected to increase due to rule implementation of PAR 1135
- Opportunity costs for facilities exiting RECLAIM
  - Lost revenues for facilities with excess RTC holdings
  - Cost savings for facilities with insufficient RTC holdings

# Key Assumptions

- Analysis horizon – 2019-2035
- Implementation schedule of PAR 1135
- Equipment life – 25 years
- Discount rate – 1% to 4%
- Cost-effectiveness threshold – \$50,000/ton

# Tentative Schedule

August 16, 2018	Written Comments Due
August 17, 2018	Stationary Source Committee
September 7, 2018	Set Hearing
October 5, 2018	Public Hearing

# Contacts

## PAR 1135

Michael Morris

[mmorris@aqmd.gov](mailto:mmorris@aqmd.gov)

(909) 396-3282

Uyen-Uyen Vo

[uvo@aqmd.gov](mailto:uvo@aqmd.gov)

(909) 396-2238

## General Questions

Susan Nakamura

[snakamura@aqmd.gov](mailto:snakamura@aqmd.gov)

(909) 396-3105

## RECLAIM Questions

Tracy Goss, P.E.

[tgoss@aqmd.gov](mailto:tgoss@aqmd.gov)

(909) 396-3106

Kevin Orellana

[korellana@aqmd.gov](mailto:korellana@aqmd.gov)

(909) 396-3492

Gary Quinn, P.E.

[gquinn@aqmd.gov](mailto:gquinn@aqmd.gov)

(909) 396-3121

## CEQA

Barbara Radlein

[bradlein@aqmd.gov](mailto:bradlein@aqmd.gov)

(909) 396-2716

Ryan Banuelos

[rbanuelos@aqmd.gov](mailto:rbanuelos@aqmd.gov)

(909) 396-3479

## Socioeconomic

Shah Dabirian

[sdabirian@aqmd.gov](mailto:sdabirian@aqmd.gov)

(909) 396-3076

Ryan Finseth

[rfinseth@aqmd.gov](mailto:rfinseth@aqmd.gov)

(909) 396-3575