



Proposed Amended Rule 1135

Emissions of Oxides of Nitrogen from Electricity Generating Facilities

Working Group Meeting #3
November 8, 2022

Join Zoom Webinar Meeting: <https://scaqmd.zoom.us/j/94648515982>

Webinar ID: 946 4851 5982

Teleconference Dial-In: 1-669-900-6833

Agenda

The background of the slide is a faded, blue-tinted photograph of a coastal town. In the foreground, there are several buildings, including a prominent large, white, dome-shaped structure. The town is built on a hillside that descends towards the water. The overall scene is hazy and has a soft, atmospheric quality.

Summary of Last Working Group Meeting

Current Status of PBGS Repower Projects

Response to Comment Letter

BARCT Assessment

Clarification on Once-Through-Cooling Units Provision

Next Steps

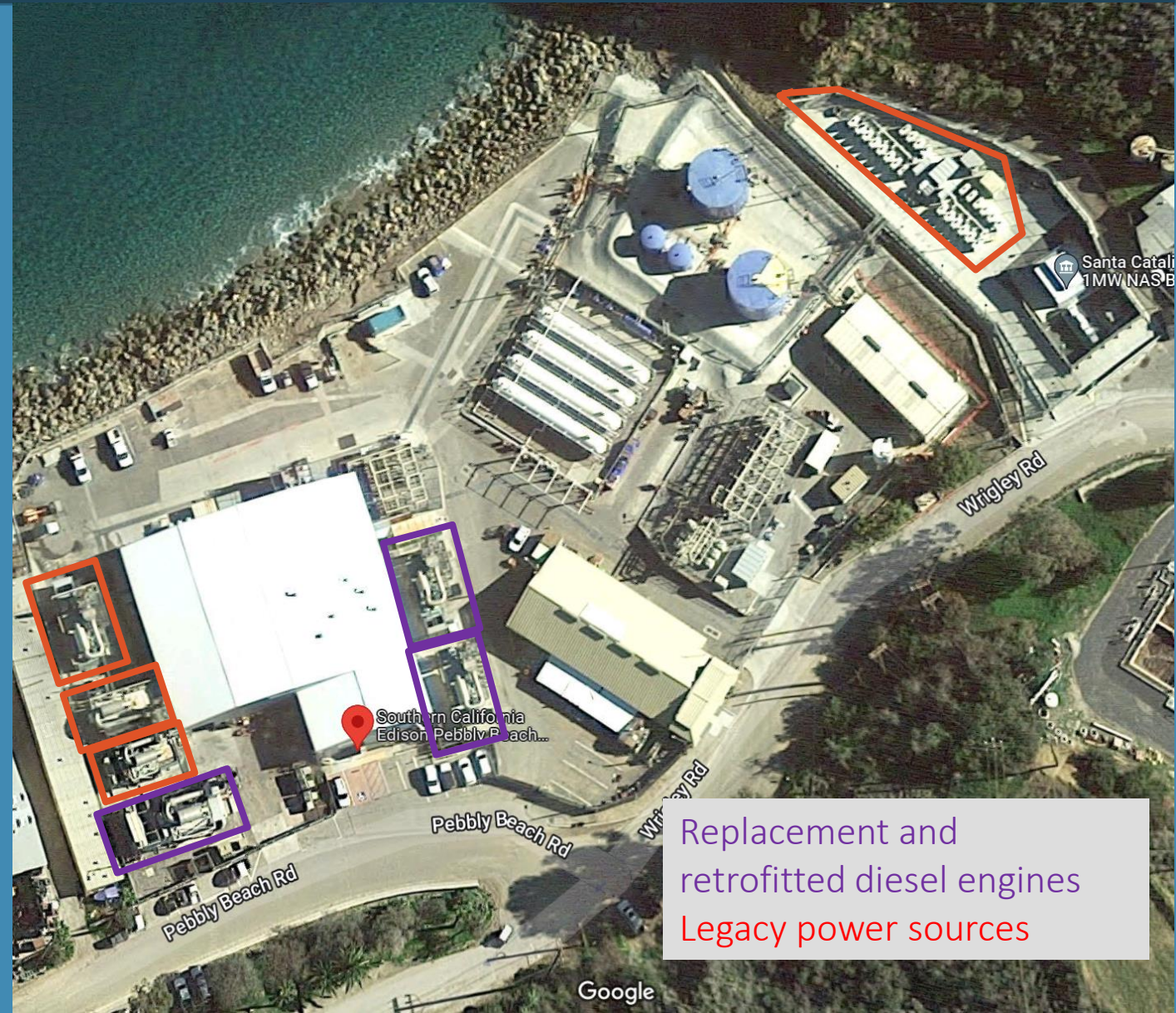
Summary of Last Working Group Meeting

- Working Group Meeting #2 held on August 4, 2022
- Responded to Southern California Edison (SCE) comment letter
 - South Coast AQMD will consider extending deadline to replace Units 8 and 10
 - South Coast AQMD will include applicable costs as well as equipment life in cost-effectiveness calculations
 - BARCT assessment is not strictly limited to existing Pebbly Beach Generating Station (PBGS) footprint
- Discussed Logistics for Assessed Technologies
 - Land availability for expanding PBGS
 - Space available on the existing PBGS footprint for zero emission (ZE) and/or near-zero emission (NZE) technologies
- Discussed updated Best Available Retrofit Control Technology (BARCT) assessment
 - Provided various repower scenarios utilizing ZE and NZE technologies with estimated emission reductions



Current Status of PBGS Repower Projects

- Heat wave in early September increased electricity demand at PBGS
 - New peak load of 6.3 MW
 - South Coast AQMD will take new peak load into consideration in BARCT assessment
- SCE installed a catalyst block for Unit 15 to comply with South Coast AQMD Rule 1470
 - Further testing and potential modifications needed to determine efficacy of catalyst block
- South Coast AQMD met with SCE at PBGS to discuss various repower scenarios determined to be cost-effective



Replacement and retrofitted diesel engines
Legacy power sources

The image shows a large industrial facility, likely a refinery or chemical plant. On the left, a tall, cylindrical distillation column is visible, surrounded by a complex network of metal scaffolding and stairs. To the right, there are several large, horizontal cylindrical tanks and other industrial structures. The sky is clear and blue. A semi-transparent black box is overlaid on the right side of the image, containing the text "Response to Comment Letter".

Response to Comment Letter

Comment Letter

- South Coast AQMD received a comment letter from The Public Advocates Office (Cal Advocates) at the California Public Utilities Commission (CPUC)
- The comment letter expressed Cal Advocates' perspective that:
 - Prohibition to install new diesel engines should not be revised
 - The facility mass emission limit will reduce the use of old diesel engines and thereby reduce annual emissions
 - South Coast AQMD's existing analysis demonstrates that a 13 tons per year NOx limit is feasible
- Comment letter is available on the proposed rule webpage¹ and will be discussed in the following slides



August 30, 2022

Mr. Michael Krause
Assistant Deputy Executive Officer
Planning, Rule Development and Implementation
South Coast Air Quality Management District (SCAQMD)
21865 Copley Drive, Diamond Bar, CA 91765
Email: MKrause@aqmd.gov

SUBJECT: Rule 1135 – Emissions of Oxides of Nitrogen from Electricity Generating Facilities

Dear Mr. Krause:

The Public Advocates Office (Cal Advocates) at the California Public Utilities Commission (CPUC) appreciates the opportunity to submit comments on the SCAQMD's ongoing effort to reduce and possibly eliminate diesel combustion engines on Santa Catalina Island (Catalina).¹ Cal Advocates operates as an independent branch of the CPUC and intervenes in CPUC proceedings related to utility services including electricity, gas, water, and communications. Our statutory mission is to achieve the lowest possible utility rates for residential and small commercial customers, consistent with the state's goals for safety, reliability, and environmental quality. Cal Advocates has intervened in Southern California Edison Company's (SCE) Application (A.) 21-10-005, which seeks to repower Catalina Island and is currently pending before the CPUC. Cal Advocates' staff attended SCAQMD's May 5 and August 4 2022 meetings on SCAQMD's Rule 1135 governing NOx emissions. Cal Advocates has also met with SCAQMD staff to share our analysis on a clean energy future for Catalina. Cal Advocates supports Rule 1135's current emissions limit and believes that the long-term limit of 13-tons per year is feasible.² We provide these comments in support of SCAQMD's response to SCE's July 15, 2022 letter on Rule 1135.³

The Prohibition on New Diesel Engine Installation

SCE proposes a delay of Rule 1135's prohibition on new diesel engines on Catalina from January 1, 2024 to January 1, 2025. Alternatively, SCE proposes to revise the current prohibition to allow for a Unit 15 replacement if the catalyst block modification fails to bring Unit 15 into compliance with Rule 1470.

¹ See SCAQMD January 7, 2022 Meeting Materials, p.3.

² In this case, "emissions limits" is in reference to the annual NOx caps of 50 tons by 2024, 45 tons by 2025, and 13 tons by 2026 or 2029 using the 3-year extension provision.

³ See SCAQMD Staff response here: <http://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1135/par-1135-2022-wgm-2-final.pdf?sfvrsn=14>.

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¹ <http://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1135/par-1135-sce-comment-20220715.pdf?sfvrsn=6>

Cal Advocates Comment Letter – Prohibition on New Diesel Engines

Comment

- Prohibition to install new diesel engines should not be revised
- The facility mass emission limit will reduce the use of and thereby reduce the annual emissions of old engines
- SCE could achieve lower annual emissions than South Coast AQMD's baseline case by maximizing use of Units 8 and 10
- Replacing Units 8 and 10 and retiring Unit 15 could reliably serve about 90% of forecasted load in 2025

Response

- South Coast AQMD agrees that the prohibition to install new diesel engines after January 1, 2024, should not be revised for all diesel engines at PBGS
- However, South Coast AQMD will consider extending the deadline for Units 8 and 10
- Replacing Units 8 and 10 along with a combination of other ZE and/or NZE technologies will provide adequate power generation capacity for the repower of Santa Catalina Island

Cal Advocates Comment Letter – Feasibility of a 13-ton NOx Limit

Comment

- South Coast AQMD's existing analysis demonstrates that a 13 tons per year NOx limit is feasible
- SCE's Feasibility Study identified enough sites on Santa Catalina Island to accommodate a 60% renewable scenario
 - Cal Advocates estimates that a 60% renewable scenario would require nine to 10 MW of solar, which would require between 26 and 30 acres
- South Coast AQMD's BARCT assessment is not limited to the existing footprint of PBGS

Response

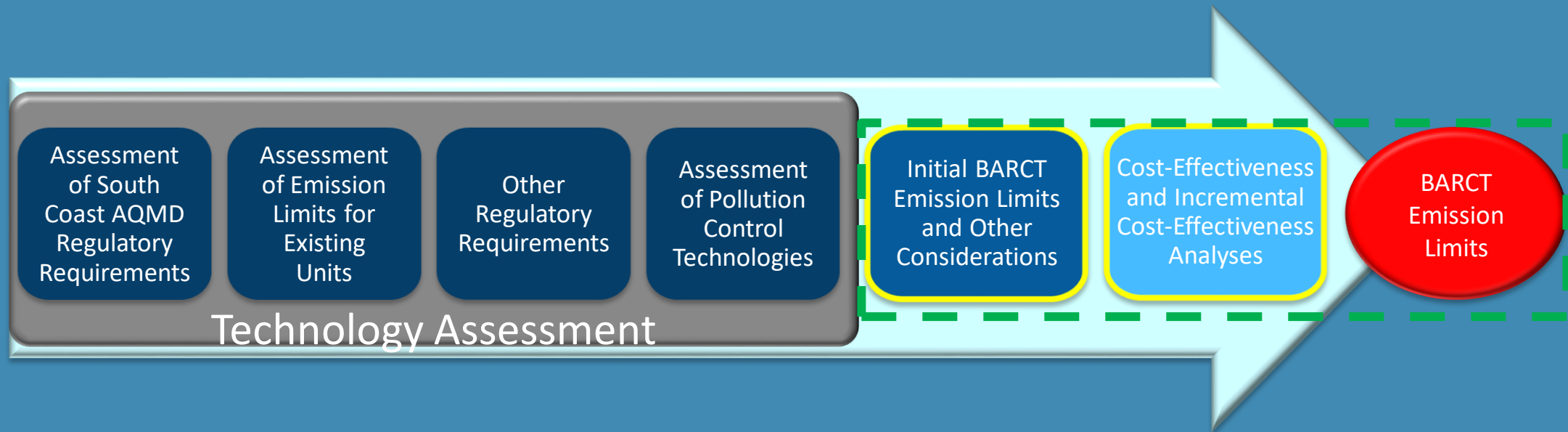
- South Coast AQMD appreciates Cal Advocates' support of the repower feasibility analysis of Santa Catalina Island

The image shows an industrial facility, likely a refinery or chemical plant. On the left, a tall, cylindrical vertical tower is visible, surrounded by a complex network of metal scaffolding and walkways. To the right, there are several large, horizontal cylindrical tanks and other industrial equipment. The sky is clear and blue. A semi-transparent black rectangular box is overlaid on the right side of the image, containing the text "BARCT Assessment" in white, bold, sans-serif font.

BARCT Assessment

BARCT Assessment

- California Health and Safety Code, Section 40406 defines BARCT as “...an emission limitation that is based on the maximum degree of reduction achievable, taking into account environmental, energy, and economic impacts by each class or category of source.”
- BARCT levels must adhere to California Health and Safety Code, Section 40920.6
 - Cost-effectiveness and incremental cost-effectiveness must be determined for each progressively more stringent potential control option



Overview of BARCT Assessment

Cost-effectiveness analysis is conducted on the initial BARCT emission limit and alternative scenarios if the initial BARCT limit is not cost-effective

Cost-effectiveness is the net cost (capital costs plus annual operating costs) divided by emission reductions (tons)

South Coast AQMD used the 2022 Draft Air Quality Management Plan (AQMP) cost-effectiveness threshold of \$59,000 per ton of NO_x reduced as guidance for establishing the proposed BARCT emission limit

Incremental cost-effectiveness analysis is conducted when there is more than one control option which would achieve the emission reduction objective

Initial BARCT NOx Emission Limit

Based on technology assessment, South Coast AQMD determined the following initial BARCT NOx emission limit¹:

	30% ZE, 65% NZE
Santa Catalina Island Baseline Emissions² (Tons/Year)	71.3
NOx Emission Reductions (Tons/Year)	69.78
Initial BARCT NOx Emission Limit for Electricity Generating Units on Santa Catalina Island (Tons/Year)	1.52

¹ Initial BARCT limit will require land acquisition outside of the existing PBGS footprint

² Baseline NOx emissions determined by an average of Annual Emission Reports (AERs) emission data from 2017, 2019, and 2021

Cost-Effectiveness Calculation

- Cost-effectiveness is the amount of dollars required to reduce one ton of NO_x
- Proposed cost-effectiveness threshold in Draft 2022 AQMP is \$59,000 per ton NO_x reduced
- **Cost-Effectiveness =**

$$\frac{(\text{Annualized Capital Cost} + \text{Annual O\&M}) - \text{Existing Annual O\&M}}{\text{Estimated Annual Emissions Reductions}}$$

- Annualized capital cost incorporates a Capital Recovery Factor of 4% over the life of the equipment
- Existing annual operation and maintenance (O&M) costs are subtracted from the cost of the repower scenario
- Cost estimates continue to be refined, as discussions with vendors and SCE are ongoing

Capital and Annual Operating Costs Included

Capital Costs

Equipment

Installation

Demolition

Engineering Assessments

Labor

Commissioning and Testing

Annual Operating Costs

Maintenance and Parts

Emissions and Performance Testing

Employee and Service Costs

Insurance and Permitting

Fuel Costs (including shipping)

Hazardous Materials Handling/Treatment

Land Lease Cost

Obtaining Costs and Cost-Effectiveness Assumptions

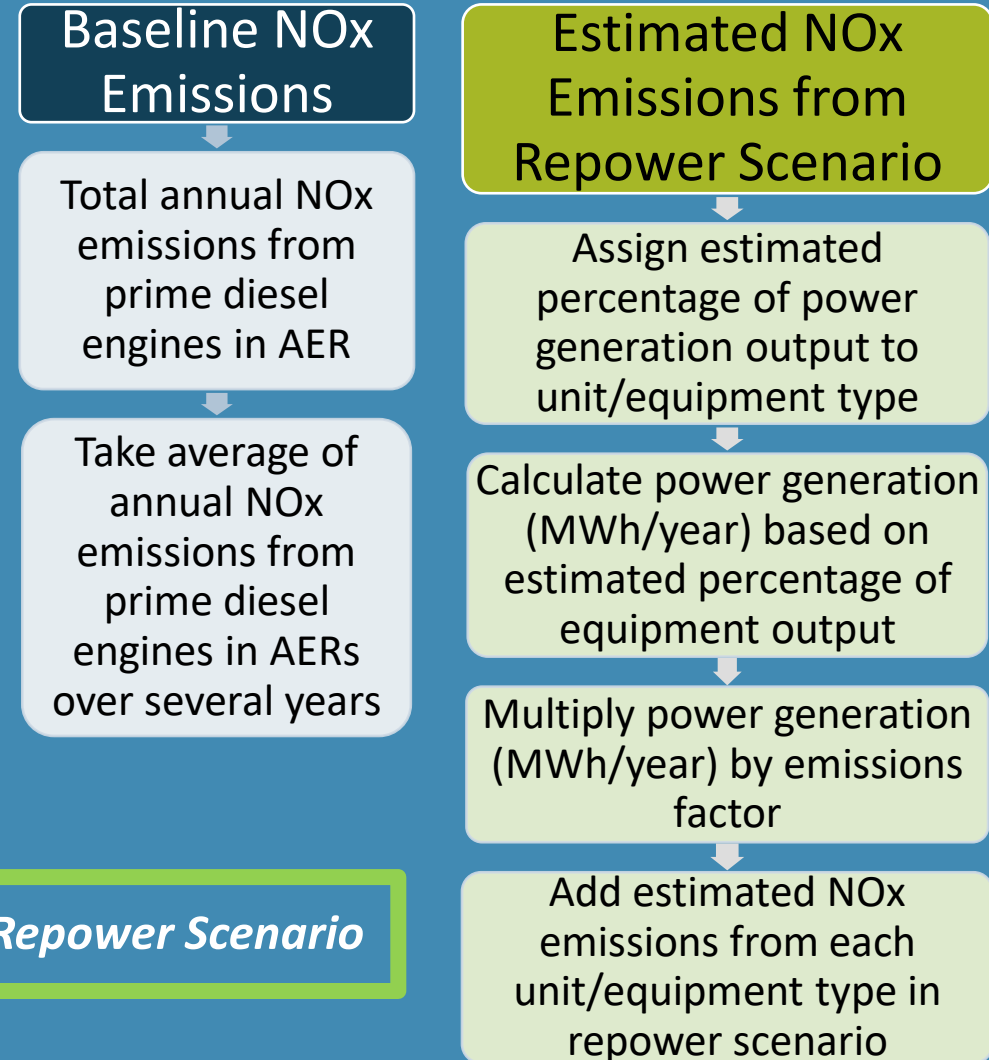
- Cost estimates were provided by SCE and various vendors
- Cost-Effectiveness Assumptions:
 - Equipment life of 20 years or 25 years depending on equipment type
 - No stranded asset costs
 - Newest diesel engine is over 25 years old
 - Microturbines were provided by the South Coast AQMD
 - Costs reported in 2022 dollars
- Stakeholders are welcome to provide South Coast AQMD with their own costs and cost-effectiveness calculations
- All repower scenarios evaluated by South Coast AQMD include three diesel engines to provide redundancy: Unit 15 (retrofitted), Unit 8 (replacement), and Unit 10 (replacement)



Estimated Emission Reductions

- Baseline NOx emissions determined by an average of AERs emission data from 2017, 2019, and 2021*
- Estimated NOx emissions determined by assigning power generation percentage, calculating the power generation, and multiplying by an emission factor for each unit/equipment type
- Estimated Emission Reductions:

Baseline NOx Emissions – Estimated NOx Emissions from Repower Scenario



* AER for 2018 (no data available) and 2020 (data not representative due to COVID) were not included in the average

Cost-Effectiveness Analysis

The initial BARCT NOx emission limit was determined to be cost-effective

	All Tier IV Final Diesel Engines	50% NZE	50% ZE ^{1,2}	30% ZE ¹ , 50% NZE	95% NZE	30% ZE ¹ , 65% NZE	95% ZE ^{1,2}
Net Annual Costs (includes annualized capital and O&M costs)	\$2,296,000	\$3,166,000	\$9,274,000	\$(637,000)	\$3,678,000	\$(859,000)	\$6,183,000
NOx Emission Reductions (Tons/Year)	54.66	62.70	63.21	67.39	69.48	69.78	70.45
Cost-Effectiveness (\$/Ton of NOx Reduced)	\$42,000	\$51,000	\$147,000	\$(9,000)	\$53,000	\$(12,000)	\$88,000

¹ Requires the acquisition of land outside of the PBGS existing footprint

² Does not include costs associated with new hydrogen fuel storage, except for land lease costs

Incremental Cost-Effectiveness Analysis

- California Health and Safety Code, Section 40920.6 requires an incremental cost-effectiveness analysis for BARCT rules when there is more than one control option which would achieve the emission reduction objective
- Incremental Cost-Effectiveness =**

$$\frac{C_{alt} - C_{proposed}}{E_{alt} - E_{proposed}}$$

Where:

- $C_{proposed}$ is the present worth value of the proposed control option;
- $E_{proposed}$ are the emission reductions of the proposed control option;
- C_{alt} is the present worth value of the alternative control option; and
- E_{alt} are the emission reductions of the alternative control option

- The initial BARCT NOx emission limit was determined to be incrementally cost-effective

	All Tier IV Final Diesel Engines versus 50% NZE	50% NZE versus 50% ZE	50% ZE versus 30% ZE, 50% NZE	30% ZE, 50% NZE versus 95% NZE	95% NZE versus 30% ZE, 65% NZE	30% ZE, 65% NZE versus 95% ZE
Incremental Cost-Effectiveness	\$108,000	\$11,977,000	\$(2,371,000)	\$2,065,000	\$(15,126,000)	\$10,511,000

Incremental Cost-Effectiveness Analysis (cont.)

- All tier IV final diesel engines repower scenario was compared against each ZE and/or NZE technology based repower scenario
- The initial BARCT NOx limit was determined to be incrementally cost-effective

	All Tier IV Final Diesel Engines versus 50% NZE	All Tier IV Final Diesel Engines versus 50% ZE	All Tier IV Final Diesel Engines versus 30% ZE, 50% NZE	All Tier IV Final Diesel Engines versus 95% NZE	All Tier IV Final Diesel Engines versus 30% ZE, 65% NZE	All Tier IV Final Diesel Engines versus 95% ZE
Incremental Cost-Effectiveness	\$108,000	\$816,000	\$(230,000)	\$93,000	\$(209,000)	\$246,000

Proposed BARCT NOx Emission Limit

- South Coast AQMD is proposing the following BARCT limit¹:

**Electricity Generating
Units on Santa Catalina
Island**

1.52 tons of NOx per year

- South Coast AQMD is proposing to retain the current Rule 1135 BARCT implementation date of January 1, 2026, with an option for three-year extension



¹ Proposed BARCT limit will require land acquisition outside of the existing PBGS footprint

Continued Efforts to Finalize BARCT NOx Emission Limit

- South Coast AQMD is continuing to refine cost information
 - Stakeholders are encouraged to provide additional and more detailed costs
- SCE will conduct grid stability analyses to see if the proposed BARCT limit could lead to power disruptions due to fluctuations in frequency, voltage, and demand
- SCE grid stability analyses could impact the units needed to repower PBGS and the proposed BARCT limit
- South Coast AQMD is following SCE efforts to acquire land outside of PBGS footprint for power generation, power storage, and fuel storage



The image shows an industrial facility, likely a power plant or refinery, under a clear blue sky. On the left, a tall, cylindrical cooling tower is visible, surrounded by a complex network of metal scaffolding and walkways. To the right, there are several large, horizontal cylindrical tanks and other industrial structures. The overall scene is a detailed view of industrial infrastructure.

Clarification on Once-Through-Cooling Units Provision

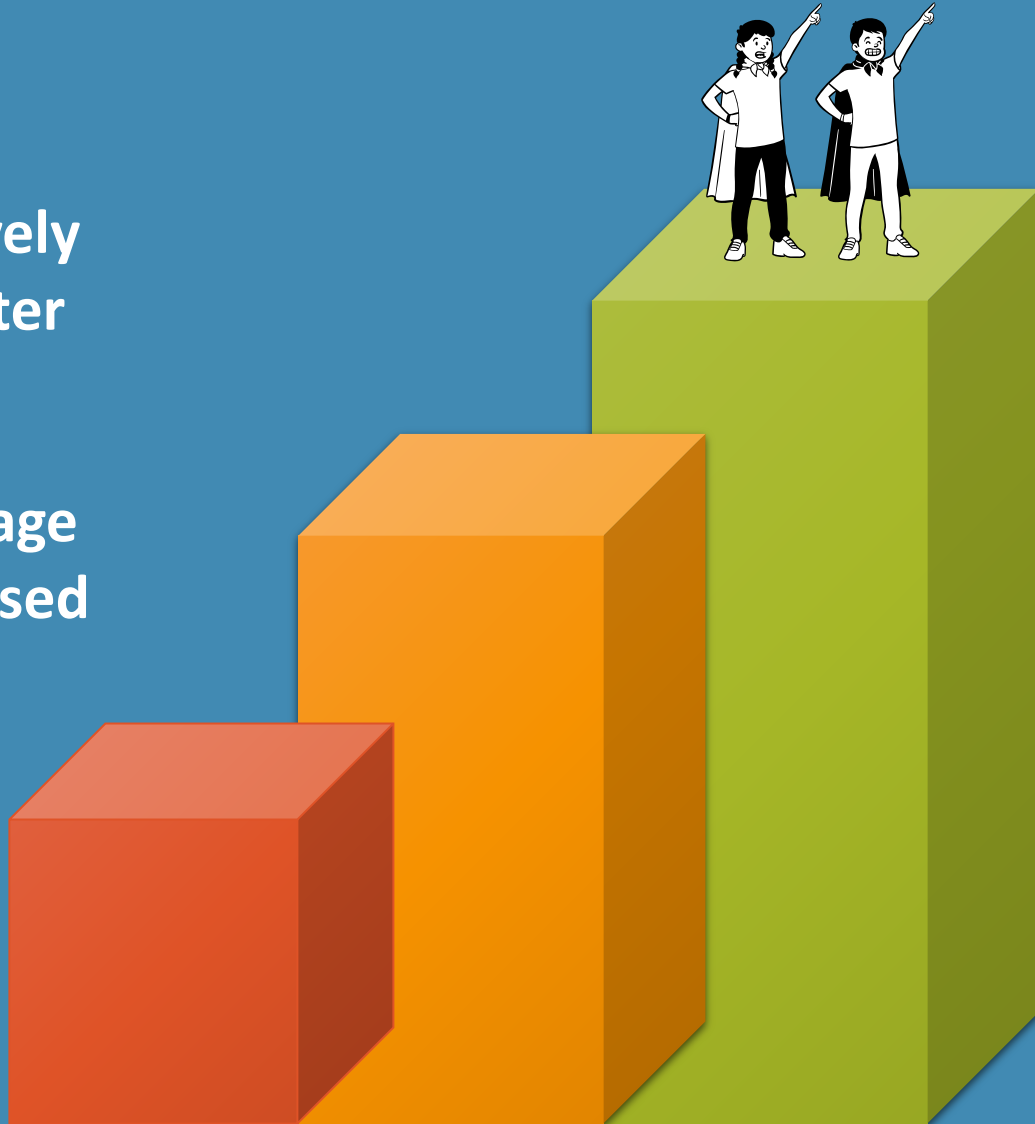
Clarification on Once-Through-Cooling (OTC) Units Provision

- South Coast AQMD Rule 1135, paragraph (g)(2) provides an exemption for OTC units from complying with Rule 1135 emission limits for boilers and gas turbines in 2024 until December 31, 2029
- Exemption only applies to OTC units listed under the OTC Policy
- Therefore, units associated with OTC units (e.g. combined cycle turbines) do not qualify for the exemption because they are not listed under the OTC Policy



Next Steps

- 3** Public Hearing tentatively scheduled for 2nd quarter 2023
- 2** Preliminary rule language anticipated to be released January 2023
- 1** Ongoing meetings with stakeholders



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[PAR 1135 Proposed Rules
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