SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Draft Socioeconomic Impact Assessment for

Proposed Amended Rule 1146 - Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters;
Proposed Amended Rule 1146.1 - Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters;
Proposed Amended Rule 1146.2 - Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers and Process Heaters; and
Proposed Rule 1100 - Implementation Schedule for NOx Facilities

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EXECUTIVE SUMMARY

A socioeconomic analysis was conducted to assess the potential impacts of Proposed Amended Rules (PAR) 1146, 1146.1, and 1146.2 (collectively referred to herein as the PAR 1146 series), and Proposed Rule (PR) 1100 on the four-county region of Los Angeles, Orange, Riverside, and San Bernardino. A summary of the analysis and findings is presented below.

Elements of Proposed Amendments	SCAQMD staff has begun the process of transitioning equipment at NOx Regional Clean Air Incentives Market (RECLAIM) facilities from a facility permit structure to an equipment-based command-and-control regulatory structure per SCAQMD Regulation XI – Source Specific Standards. PAR 1146 series will be amended to transition of equipment from the NOx RECLAIM program to a command-and-control regulatory structure while achieving Best Available Retrofit Control Technology (BARCT). PAR 1146 series would include proposed amendments to Rule 1146 – Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters; Rule 1146.1 – Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters; and Rule 1146.2 – Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers and Process Heaters. In addition, SCAQMD staff has developed PR 1100, an administrative rule which establishes the compliance schedule for facilities exiting the RECLAIM program.
Affected Facilities and Industries	Among the 259 facilities currently in the NOx RECLAIM program, approximately 103 RECLAIM facilities with at least one boiler or heater (a total of 291 permitted units) will be affected by PAR 1146 series and PR 1100. The PAR 1146 series could potentially affect non-RECLAIM facilities which also need to meet the BARCT limits. However, non-RECLAIM facilities, with the exception of the equipment category of thermal fluid heaters, would not need to demonstrate compliance with the lower emission limit until the unit's burner replacement or 15 years after rule amendment, whichever occurs earlier. Of these 103 RECLAIM facilities, 65 are located in Los Angeles County, 20 in Orange County, five in Riverside, and the remaining 13 facilities are in San Bernardino County. The PAR 1146 series would affect a wide variety of operations in many sectors of economy such as manufacturing and non-manufacturing sectors. Among the 103 affected facilities, the sectors affected the most are paper manufacturing (NAICS 322) with approximately 10%, pipeline transportation (NAICS 486) with approximately 9%, food manufacturing (NAICS 311) with approximately 8%, chemical manufacturing (NAICS 325) with approximately 8%, transportation equipment manufacturing (NAICS 336) with approximately 8%, utilities (NAICS 22) with approximately 7%, and textile mills manufacturing (NAICS 313), fabricated metals

	manufacturing (NAICS 332), and petroleum and coal product manufacturing (NAICS 324), and oil and gas extraction each with approximately 6% of the total affected facilities, respectively. The remaining 28% of the affected facilities are spread among a large number of sectors in the economy.
Assumptions of Analysis	The Final Socioeconomic Report for the 2005 RECLAIM amendment fully analyzed the socioeconomic impacts of installing selective catalytic reduction (SCR) units and ultra-low NOx burners (ULNB) (the same type of technologies) that are currently proposed under the PAR 1146 series. However, few of the RECLAIM facilities actually installed the control equipment, achieving required BARCT emission reductions in other ways. Thus, for many of these RECLAIM facilities, they will actually undertake these costs of installation for the first time. Costs of installation and the current socioeconomic conditions have changed since 2005. As a result, staff conservatively analyzed these socioeconomic impacts using, to the extent data is available, current costs under the current socioeconomic conditions. PAR 1146 and 1146.1 would require 65 out of 103 facilities to meet emission limits by the compliance date of 2022. Twenty out of these 103 facilities would be eligible to meet the lower emission limits upon burner replacement or 15 years from date of rule amendment, whichever occurs earlier. The remaining 18 facilities may be subject to a change in Monitoring and Reporting and Recording (MRR) requirements after they exit from the RECLAIM program.[1] Under PAR 1146 (Group I), it was assumed that two facilities would need to meet the NOx limits by SCR retrofits for three units. The average capital cost of a SCR unit is estimated at $1.4 million (including installation and permitting). Each SCR unit is assumed to last for 25 years. It was assumed that each SCR unit is due for a catalyst replacement every nine years. Under PAR 1146 (Group II), it is assumed that 30 facilities would need a SCR retrofit for 52 units with an average capital cost of $564,000 (including installation and permitting). For PAR 1146 (Group III), it is assumed that 36 facilities would need to meet the NOx limits with ULNBs. The average initial costs of retrofitting boilers with ULNBs are estimated at $133,000 (including installation and permitting) per unit for Group III. Each burner is assumed to last for 15 years. The incremental cost of monitoring is assumed to be minimal. PAR 1146 would require the affected owners of Group I, Group II, and Group III units to apply for permit modifications and pay a one-time permit application fee of $8,951, $8,368, and $5,641, respectively. Additional annual recurring costs specific to SCRs in PAR 1146 include operating and

[1] Changes to MRR requirements only apply to non-Title V facilities.

	maintenance (O&M), catalyst replacement (every nine years), electricity, ammonia usage, monitoring,[2] and annual permit renewal fees. According to the 2008 Rule 1146 and 1146.1 staff reports, there are around 1,048 non-RECLAIM units subject to PAR 1146 and 1,063 non-RECLAIM units subject to PAR 1146.1 operating in the District. Due to the uncertainty with the actual time of the burner replacement, the number of affected sources and the associated cost impacts cannot be determined at this time. The additional annual O&M cost for each SCR for Group I and Group II unit is estimated at $7,000 and $2,800, respectively. The cost of electricity is assumed to be $0.13 per Kw/hr,[3] and is estimated at $51,800 and $11,900 for Group I and Group II SCR units, respectively. The annual cost of catalyst replacement is assumed to be $13,900 for Group I and $3,200 for Group II. Based on a 50% annual capacity and 8,760 hours of annual operation, costs of ammonia usage for Group I and Group II units is estimated at $23,100 and $5,300, respectively. Monitoring costs for both Group I and Group II are estimated at $3,300 annually, and permit renewal fees are estimated at $1,800 for SCRs in both groups. The cost savings estimated from the use of FGR is estimated at $14,700 for Group I SCRs, and $3,000 for Group II SCRs. Under PAR 1146.1, it was assumed that 10 affected facilities with 19 units will need to meet the NOx limits by ULNBs to achieve the existing rule limits. The average capital and installation costs of retrofitting boilers with ULNBs is estimated at $61,000 (including installation) per unit. Each burner is assumed to last for 15 years. PAR 1146.1 would require the owners of the affected units to apply for permit modifications and pay a one-time permit application fee of $3,567. Under PAR 1146.2, it was assumed that three facilities will need to need to meet the NOx limits by ULNBs. Due to the lack of information available on the universe of affected sources under PAR 1146.2, and to account for the potential cost impacts of those affected facilities with non-permitted units, staff has included additional ULNB costs for a total of 850 units (estimated based on the equipment data provided from facility responses of initial determination notifications as of April 2018) to account for the non-permitted units that could be impacted by PAR 1146.2. The average capital and installation cost of retrofitting a boiler with a ULNBs is estimated at $32,100 (including installation) within 1146.2. Each burner is assumed to last for 15 years.

[2] Monitoring costs for ammonia slip tests are required quarterly in the first year for units down to 20 mmbtu/hr, and then annually if quarterly tests are passing.

[3] $0.13 per kW/hr is rounded from $0.1268 per kW-hr based on the U.S. Energy Information Administration Electric Power Monthly Reports. Data for the monthly price of electricity for industrial sector in California was used to calculate the annual average for the months of June 2017 – June 2018.

	PR 1100 is an administrative rule and does not impose additional costs to affected facilities, as such, no additional costs or socioeconomic impacts were assumed here.
Compliance Costs	The main requirements of the PAR 1146 series that have cost impacts for affected facilities would include one-time costs and annual recurring costs. The one-time costs would include capital and installation of SCRs, ULNBs, and one-time permit modifications. Annual recurring cost estimates apply to 1146 Group I and Group II SCRs for catalyst replacement, additional electricity, ammonia usage, monitoring (ammonia slip tests), and annual permit renewal. The use of SCR retrofits assumes cost savings based on a reduction in flue-gas recirculation (FGR) use. The average annual cost of the PAR 1146 series is estimated at $5.7 to $6.8 million between 2020 and 2045. Annual costs of installing SCRs and ULNBs would result in about $4.1 million (74%) to $5.4 million (78%) of overall annual compliance costs. The majority of the cost ($2.5 to $3.0 million or 44% and 43% low and high cost estimate, respectively) is expected to be incurred due to PAR 1146 Group II. The average annual costs of compliance for PAR 1146.1 is estimated to be $78,000 to $94,000 and that of PAR 1146.2 is estimated to be $2.0 to 2.5 million. The use of Thermal Fluid Heaters has an estimated average annual cost of $11,000 to $13,000 per unit. The SCRs used in 1146 Group I and Group II have estimated annual recurring costs of $1.5 million (27% and 23% of total annualized costs in low and high cost estimates, respectively), which includes savings from a reduction in FGR use. Annual average recurring costs for SCR equipment by category are shown below in 2018 dollars.

	1146 Group I Annual Costs	**1146 Group II Annual Costs**
Electricity	$51,800	$11,900
Ammonia	$23,100	$5,300
Catalyst	$13,900	$3,200
O&M	$7,000	$2,800
Monitoring	$3,300	$3,300
Annual Permit Renewal	$1,800	$1,800
FGR Savings	$14,700 (savings)	$3,000 (savings)

The majority of the overall annual compliance costs are expected to be incurred by the beverage sector (13%), textile product mills (13%), pipeline transportation (11%), paper manufacturing (10%), and aerospace product and parts manufacturing (7%). The cost-effectiveness of the overall PAR 1146 series is estimated at $16,000 per ton per ton for Discounted Cash Flow (DCF).

	<table><tr><th>Proposed Amendments</th><th>DCF ($/ton)</th></tr><tr><td>Rule 1146-Group I</td><td>$26,000</td></tr><tr><td>Rule 1146-Group II</td><td>$40,000</td></tr><tr><td>Rule 1146-Group III</td><td>$14,000</td></tr><tr><td>Rule 1146.1</td><td>$19,000</td></tr><tr><td>Rule 1146.2</td><td>$7,000</td></tr><tr><td>Thermal Fluid Heaters</td><td>$17,000</td></tr><tr><td>Total</td><td>$16,000</td></tr></table>
Jobs and Other Socioeconomic Impacts	Based on the above assumptions, the compliance cost of the PAR 1146 series, and the application of the Regional Economic Models, Inc. (REMI) model, it is projected that an average of 42 to 56 jobs will be forgone annually, on average, between 2020 and 2045. The projected jobs loss impacts represent about 0.0034% of the total employment in the four-county region. The sectors of textile mills and textile product mills (NAICS 313, 314), retail trade (NAICS 44-45), and food services (NAICS 722) are projected to incur a portion of compliance costs and thus experience some jobs forgone. The reduction in disposable income would dampen the demand for goods and services in the local economy, thus resulting in a small number of jobs forgone projected in sectors such as construction (NAICS 23) and wholesale trade (NAICS 42). The remainder of the projected reduction in employment would be across all major sectors of the economy from secondary and induced impacts of the PAR 1146 series.
Competitiveness	It is projected that the manufacturing sector, where most of the affected facilities belong, would experience a rise in its relative cost of services and its delivered price by 0.001 % in 2035. While these changes are relatively small, it should be noted that the delivered price change is a change in the index of all prices in the manufacturing sector. Delivered prices that a facility may charge for specific goods or services may increase at a greater rate than this, allowing incurred cost to be passed through to downstream industries and end-users. The rest of the sectors would experience minor increases in the relative cost of production and relative delivered price with respect to their counterparts in the rest of the U.S.
Impacts of CEQA Alternatives	There are five CEQA alternatives associated with the PAR 1146 and 1146.1. Alternative A, the no project alternative, means that the current version of Rules 1146, 1146.1, and 1146.2 would remain in effect. Under Alternative B (less stringent), the compliance deadline for meeting the NOx emissions limits would be extended by one year. Under Alternative C (more stringent), the NOx emission limits would remain the same as the proposed project, but facilities would need to meet 100 percent compliance by January 1, 2021. Under Alternative D, the Group I units would need to meet 9 ppm or (0.011 lb/MMBtu) instead of 5 ppm (0.0062 lb/MMBtu) and as a result they are expected to meet the NOx limits by ULNBs instead of SCRs. Alternative D would also require PAR 1146 Group II units to meet 9 ppm (or 0.011 lb/MMBtu) instead of the proposed 5 ppm for Group II units with a NOx

	limit greater than 12 ppm or 7 ppm (or 0.00085 lb/MMBtu) for fire-tube boilers currently meeting a NOx limit less than or equal to 12 ppm. PAR 1146 Group III and 1146.1 units would be required to meet 9 ppm (or 0.011 lb/MMBtu) instead of the proposed 7 ppm (or 0.00085 lb/MMBtu) for fire-tube boilers. The NOx emission limit for thermal fluid heaters would also remain at 30 ppm (or 0.037 lb/MMBtu) instead of 12 ppm (0.015 lb/MMBtu). With Alternative E, the provisions are the same as Alternative D for PAR 1146 Group I, II, III, 1146.1, and thermal fluid heaters, except for three units in PAR 1146 Group I, which would be required to meet 5 ppm using SCR retrofits. Average annual compliance costs for the CEQA alternatives range from $2.6 to $4.1 million (high-end 4 %) between 2020 and 2045. The cost-effectiveness of the PAR 1146 and 1146.1 and CEQA Alternatives range from $13,000 to $16,000 per ton of NOx reductions. Average annual jobs forgone for the CEQA alternatives range from 30 to 63 between 2020 and 2045.
Potential NOx RTC Market Impacts	If PAR 1146, 1146.1, and 1146.2 are adopted, 22 additional facilities are expected to receive an initial determination notification because, according to staff's evaluation, all of their permitted RECLAIM NOx source equipment will be subject to these rules once the proposed amendments are adopted. The 22 RECLAIM facilities will need to begin complying with the PAR 1146 series while in RECLAIM and through the transition out of RECLAIM. Staff has committed to delay issuing a final determination notification to any facilities to exit them from RECLAIM until New Source Review (NSR) issues are resolved. These 22 affected facilities currently account for only about 0.6% of annual NOx emissions and 0.8% of NOx RECLAIM trading credit (RTC) holdings in the NOx RECLAIM universe. As such, staff concludes that these facilities' compliance with Rule 2002(f)(10) would have a very small impact, if any, on the demand and supply of NOx RTC market. Specifically, while the transition of the 22 facilities out of the NOx RECLAIM program could potentially assert upward pressure on the discrete-year NOx RTC prices, it is unlikely to result in large price fluctuations in the NOx RTC market, nor is the transition expected to significantly affect the remaining NOx RECLAIM facilities that are not yet ready to exit the market-based program.

INTRODUCTION

As a result of control measure CMB-05 from the SCAQMD's 2016 Air Quality Management Plan (AQMP) and Assembly Bills (AB) 617 and 398, SCAQMD staff has been directed by the Governing Board to begin the process of transitioning equipment at NOx RECLAIM facilities from a facility permit structure to an equipment-based command-and-control regulatory structure per SCAQMD Regulation XI – Source Specific Standards.

The PAR 1146 series in combination with PR 1100 will transition affected units at NOx RECLAIM facilities to a command-and-control regulatory structure. The PAR 1146 series would: 1) expand the applicability to include units that were not previously required to comply with Rules 1146/1146.1 because they were in the NOx RECLAIM program; 2) require RECLAIM facilities to submit a permit application for each unit that does not currently meet the NOx concentration limits in Rules 1146/1146.1; 3) require the affected equipment to meet the applicable NOx concentration limit for all Rule 1146/1146.1 units for a minimum of 75 percent of the total heat input by January 1, 2021 and 100 percent of the total heat input by January 1, 2022; 4) require RECLAIM facilities replacing Rule 1146/1146.1 units to submit a permit application for the unit(s) being replaced and replace existing unit(s) by January 1, 2023; 5) require RECLAIM facilities with Rule 1146.2 units to meet the rule's NOx emission limits by December 31, 2023 if a more stringent BARCT limit as determined by a technology assessment is not applicable; 6) limit ammonia emissions on units with applicable air pollution control equipment and require quarterly source testing for the first 12 months of operation and annually thereafter when four consecutive quarterly source tests demonstrate compliance, or in lieu of source testing, an ammonia Continuous Emission Monitoring System (CEMS) under an approved SCAQMD; and 7) require certain units at non-RECLAIM facilities to meet new NOx emission limits according to the compliance schedules specified in Rules 1146 and 1146.1

In addition, SCAQMD staff has developed Proposed Rule (PR 1100), an administrative rule which establishes the compliance schedule for the PAR 1146 series facilities exiting the RECLAIM program. The compliance schedule for PAR 1146 and 1146.1 will be a two-year period depending on the equipment size and number of affected units at each facility. Implementation of the proposed project is estimated to reduce NOx emissions by 0.27 ton per day by January 1, 2023.

LEGISLATIVE MANDATES

The socioeconomic impact assessments at SCAQMD have evolved over time to reflect the benefits and costs of regulations. The legal mandates directly related to the assessment of the proposed rule include the SCAQMD Governing Board resolutions and various sections of the California Health & Safety Code (H&SC).

SCAQMD Governing Board Resolutions

On March 17, 1989 the SCAQMD Governing Board adopted a resolution that calls for an economic analysis of regulatory impacts that includes the following elements:

- Affected industries
- Range of probable costs
- Cost effectiveness of control alternatives
- Public health benefits

Health & Safety Code Requirements

The state legislature adopted legislation that reinforces and expands the Governing Board resolutions for socioeconomic impact assessments. H&SC Sections 40440.8(a) and (b), which became effective on January 1, 1991, require that a socioeconomic analysis be prepared for any proposed rule or rule amendment that "will significantly affect air quality or emissions limitations." Specifically, the scope of the analysis should include:

- Type of affected industries
- Impact on employment and the regional economy
- Range of probable costs, including those to industry
- Availability and cost effectiveness of alternatives to the rule
- Emission reduction potential
- Necessity of adopting, amending or repealing the rule in order to attain state and federal ambient air quality standards

H&SC Section 40728.5, which became effective on January 1, 1992, requires the SCAQMD Governing Board to actively consider the socioeconomic impacts of regulations and make a good faith effort to minimize adverse socioeconomic impacts. It also expands Socioeconomic Impacts Assessments to include small business impacts, specifically:

- Type of industries or business affected, including small businesses
- Range of probable costs, including costs to industry or business, including small business

Finally, H&SC Section 40920.6, which became effective on January 1, 1996, requires that incremental cost effectiveness be performed for a proposed rule or amendment that imposes Best Available Retrofit Control Technology or “all feasible measures” requirements relating to ozone, carbon monoxide (CO), oxides of sulfur (SOx), oxides of nitrogen (NOx), and their precursors. Incremental cost effectiveness is defined as the difference in costs divided by the difference in emission reductions between a control alternative and the next more stringent control alternative.

The necessity analysis and the analysis of control alternatives and their incremental cost-effectiveness are presented in the Staff Report prepared for the proposed amendments.

REGULATORY HISTORY

Rule 1146, which was originally adopted in September 1988, established a 40 ppm NOx emission limit for units with an annual heat input greater than 90,000 therms. Since the original adoption, the rule has been amended four times. The January 1989 amendments lowered the NOx emission limit to 30 ppm for units with rated heat input greater or equal to 40 million Btu/hr. The costs

associated with this amendment included the retrofitting cost of boilers and heaters with Selective Catalytic Reduction (SCR) and Flue Gas Recirculation (FGR). The total annualized cost of this amendment was estimated at $44,500 to $445,400. The January 1989 amendment were estimated to reduce 0.5 ton of NOx per day with an average cost-effectiveness of $19,377 per ton of NOx reduced.

The May 1994 amendments added a tune-up procedure for natural-draft combustion units. The procedure had no cost or emission reductions associated with it because it had already been commonly used by operators of natural-draft units. In June 2000, Rule 1146 was amended to exempt one facility that exceeded the 90,000 therm fuel usage threshold from the NOx emission limit provided certain conditions were met. The amendment provided relief to the subject facility.

The rule amendments in November 2000 lowered the NOx limit from 40 to 30 ppm for units with rated heat input less than 40 million Btu/hr and burning gaseous fuel only, added annual testing requirement, and required fuel flow meters for all units. The total annualized cost of the proposed amendments was estimated at $790,900. The amendments resulted in a reduction of 91 tons of NOx emissions per year with a cost-effectiveness of $7,000 per ton of NOx reduced.

The September 2008 amendments lowered NOx emission limits from boilers, steam generators, and process heaters. Specifically, the amendments lowered NOx limits from 30 to 25 ppm for any units fired on landfill gas and 15 ppm for any units fired on digester gas. For units burning gaseous fuel other than digester and landfill gases, the amendments required NOx limits of 5 ppm for Group I (75 million Btu/hr or greater) units and 9 ppm for the Group II (at least 20 but less than 75 million Btu/hr) and Group III (from 5 to less than 20 million Btu/hr except atmospheric units) units, respectively. Atmospheric units were required to meet a 12 ppm NOx limit. It was expected that the amendments to reduce 1.2 tons per day of NOx emissions by 2015 will be achieved with an overall cost-effectiveness of $21,750 per ton of NOx reduced.

The PAR 1146 series will be amended to transition of equipment from the NOx RECLAIM program to a command-and-control regulatory structure while achieving BARCT. The Final Socioeconomic Report for the 2005 RECLAIM fully analyzed the socioeconomic impacts of installing SCRs and ULNBs; the same type of technologies which will be used to comply with the amendments currently proposed for the PAR 1146 series. However, few of the RECLAIM facilities actually installed the control equipment, achieving required BARCT emission reductions in other ways. Thus, for many of these RECLAIM facilities, they will actually undertake these costs of installation for the first time. Costs of installation have changed since 2005. As a result, staff will now analyze these economic impacts using, to the extent data is available, currents costs under current socioeconomic conditions.

The Final Socioeconomic Report for the 2016 AQMP fully analyzed the socioeconomic impacts for the 2016 AQMP, including the entire RECLAIM Transition project. CMB-05- *Further NOx Reductions from RECLAIM Assessment*, was presented in the Final Socioeconomic Report where the potential cost of reducing five tons per day NOx emissions were estimated and the associated regional economic impacts projected. Specifically, the costs presented were scaled from a thorough BARCT assessment conducted as part of the 2015 NOx RECLAIM Amendments, and the analysis conservatively assumed that the estimated cost per ton of NOx emission reduction

would be 50% higher ($17,000 to $28,000) than the cost-per-ton estimate of installing all BARCT control equipment identified in the 2015 NOx RECLAIM Amendments. That analysis is consistent with applicable Governing Board resolutions and statutory requirements.

Proposed Amendments to Rule 1146, 1146.1, 1146.2, and Proposed Rule 1100

The proposed amendments will affect Rule 1146 – Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters; Rule 1146.1 – Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters; and Rule 1146.2 – Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers and Process Heaters.

Rule 1146 applies to boilers, steam generators, and process heaters of equal to or greater than 5 million BTUs per hour of rated heat input capacity used in all industrial, institutional, and commercial operations and currently exempts boilers used by electric utilities to generate electricity (electricity generating facilities, or EGFs), boilers and process heaters with a rated heat input capacity greater than 40 million BTUs per hour that are used in petroleum refineries, sulfur reaction plant boilers, and units operated at RECLAIM facilities pertaining to NOx emissions only. The proposed amendments to Rule 1146 would exempt units that are, or will be, covered by a rule for an industry-specific category and subject to an applicable NOx emission limit. PAR 1146 will exempt any unit at a RECLAIM or former RECLAIM facility covered in an industry-specific category as defined in PR 1100. Currently, this includes energy generating boilers at electricity generating facilities (EGFs) and refinery boilers with applicable NOx limits specified in the corresponding rule. Additionally, PAR 1146 will exempt units at municipal sanitation service facilities when a sector specific REG XI rule specifying the applicable NOx emission limits for these units is adopted.

Rule 1146.1 applies to boilers, steam generators, and process heaters that are greater than 2 million BTUs per hour and less than 5 million BTUs per hour of rated heat input capacity used in any industrial, institutional or commercial operation. PAR 1146.1 will exempt any unit at a RECLAIM or former RECLAIM facility covered in an industry-specific category as defined in PR 1100 and units at municipal sanitation service facilities when a sector specific REG XI rule is adopted.

Rule 1146.2 applies to large water heaters and small boilers and process heaters with a rated heat input capacity up to and including 2,000,000 BTUs per hour. There are both manufacturer and end-user requirements contained in the rule. PAR 1146.2 will exempt units at any RECLAIM or former RECLAIM facility that are subject to a NOx emission limit in a different rule for an industry-specific category as defined in PR 1100.

PR 1100 would establish the implementation schedule for Regulation XX NOx RECLAIM facilities that are transitioning to a command-and-control regulatory structure. PR 1100 would apply to units that would be subject to the emission requirements of PARs 1146 and 1146.1. Definitions for a Rule 1146 unit and a Rule 1146.1 unit are included in PR 1100 that make reference to the definition of boiler and process heater contained in both Rule 1146 and Rule 1146.1. In addition, a definition for Industry-Specific Category has been specified that would list the types of RECLAIM facilities that would not be subject to the requirements of PR 1100.

AFFECTED INDUSTRIES

Among the 259 facilities currently in the NOx RECLAIM program, approximately 103 RECLAIM facilities with at least one boiler or heater (a total of 291 permitted units) will be affected by PAR 1146 series and PR 1100. Of these 103 affected facilities, 65 are located in Los Angeles County, 20 in Orange County, five in Riverside, and the remaining 13 facilities are in San Bernardino County.

PAR 1146 and 1146.1 would require 65 out of 103 facilities to meet the emission limits for 148 pieces equipment by the compliance date of 2022 unless equipment is replaced. Twenty out of these 103 facilities that comply with the applicable RECLAIM BARCT limit of 12 ppm would not need to demonstrate compliance with the compliance dates specified in Rule 1100 until the unit's burner replacement or 15 years after rule amendment, whichever occurs earlier. The remaining 18 facilities would be subject to Monitoring, Reporting, and Recording (MRR) requirements of the PAR 1146 series which imposes no additional costs. Figure 1 identifies the industry sectors, as classified by the NAICS, and the number of respective units subject to PAR 1146 series and PR 1100.

The PAR 1146 series could potentially affect non-RECLAIM facilities which also need to meet the BARCT limits. However, non-RECLAIM facilities, with the exception of the equipment category of thermal fluid heaters,[4] would not need to demonstrate compliance with the lower emission limit until the unit's burner replacement or 15 years after rule amendment, whichever occurs earlier. According to the 2008 Rule 1146 and 1146.1 staff reports, there are around 1,048 non-RECLAIM units subject to PAR 1146 and 1,063 non-RECLAIM units subject to PAR 1146.1 operating in the District. Due to the uncertainty with the actual time of the burner replacement, the number of affected sources and the associated cost impacts cannot be determined at this time. For thermal fluid heaters, due to the lack of distinction in their permits that set them apart from other process heaters, the number of thermal fluid heaters cannot be quantified in the non-RECLAIM universe. However, thermal fluid heaters make up for a very small portion of the RECLAIM facilities (<4%) and the number of retrofits associated with thermal fluid heaters in the non-RECLAIM universe are assumed to be nominal.

Figure 1 and Table 1 present the industry classification and number of affected facilities by industry types. Among the 103 affected facilities, the sectors affected the most are paper manufacturing (NAICS 322) with approximately 10%, textile miles manufacturing (NAICS 313) with approximately 9%, pipeline transportation (NAICS 486) with approximately 9%, transportation equipment manufacturing (NAICS 336), chemical manufacturing (NAICS 325) with approximately 8%, food manufacturing (NAICS 311) with approximately 8%, utilities (NAICS 22) with approximately 7%, and petroleum and coal product manufacturing with approximately 6% of the total affected facilities, respectively. The remaining 26% of the affected facilities are spread among a large number of sectors in the economy.

[4] Cost estimates are presented later in this report for Thermal Fluid Heaters category

Figure 1: Distribution of Affected Facilities by Industries

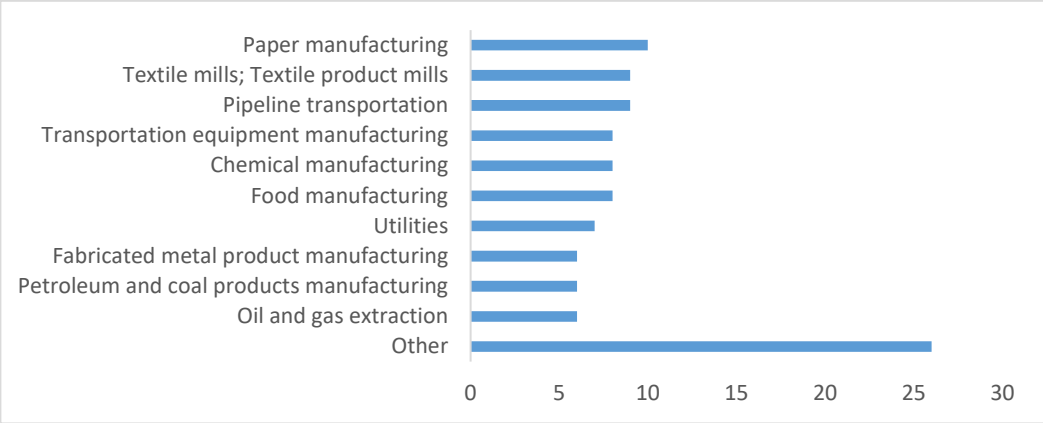


Table 1: Potentially Affected Facilities by Industry

Industry	NAICS	Number of Facilities
Accommodation	**721**	1
Real estate	**531**	1
Miscellaneous manufacturing	**339**	1
Nonmetallic mineral product manufacturing	**327**	1
Administrative and support services	**561**	1
Amusement, gambling, and recreation	**713**	1
Monetary authorities - central bank; Credit intermediation and related activities; Funds, trusts, & other financial vehicles	**521-522, 525**	1
Scenic and sightseeing transportation; Support activities for transportation	**487-488**	1
Professional, scientific, and technical services	**54**	1
Retail trade	**44-45**	2
Plastics and rubber product manufacturing	**326**	2
Beverage and tobacco product manufacturing	**312**	2
Personal and laundry services	**812**	3
Primary metal manufacturing	**331**	4
Computer and electronic product manufacturing	**334**	4
Oil and gas extraction	**211**	6
Petroleum and coal products manufacturing	**324**	6
Fabricated metal product manufacturing	**332**	6
Utilities	**22**	7
Food manufacturing	**311**	8
Chemical manufacturing	**325**	8
Other transportation equipment manufacturing	**3364-3369**	8
Pipeline transportation	**486**	9
Textile mills; Textile product mills	**313-314**	9
Paper manufacturing	**322**	10
Total		**103**

Small Businesses

SCAQMD defines a "small business" in Rule 102, for purposes of fees, as one which employs 10 or fewer persons and which earns less than $500,000 in gross annual receipts. SCAQMD also defines "small business" for the purpose of qualifying for access to services from SCAQMD's Small Business Assistance Office as a business with an annual receipt of $5 million or less, or with 100 or fewer employees. In addition to SCAQMDs definition of a small business, the federal Clean Air Act Amendments (CAAA) of 1990 and the federal Small Business Administration (SBA) also provide definitions of a small business.

The California Health and Safety Code § 42323 classifies a business as a "small business stationary source" if it: (1) is owned or operated by a person who employs 100 or fewer individuals, (2) is a small business as defined under the federal Small Business Act (15 U.S.C. Sec. 631, et seq.), and (3) emits less than 10 tons per year of any single pollutant and less than 20 tons per year of all pollutants. The SBA definitions of small businesses vary by six-digit North American Industrial Classification System (NAICS) codes. In general terms, a small business must have no more than 500 employees for most manufacturing industries, and no more than $7 million in average annual receipts for most nonmanufacturing industries.[5] A business with fewer than 500 employees is considered a small business by SBA.

Information on sales and employees for the 103 affected facilities were available in the 2018 Dun and Bradstreet Enterprise Database. Under SCAQMD's stringent definition of small business, there are 18 small businesses affected by the PAR 1146 series. There are 69 small businesses under the small business definition for the purpose of qualifying for access to services from SCAQMD's Small Business Assistance Office. Using the SBA definition of small business, 95 of the facilities are considered small businesses. Under the California Health and Safety Code § 42323 definition of small business, 40 of the facilities are classified as small businesses.

COMPLIANCE COST

The main requirements of the PAR 1146 series that have cost impacts for affected facilities would include one-time costs and annual recurring costs. The one-time costs would include capital and installation of SCRs, ULNBs, and one-time permit modifications. Annual recurring cost estimates include annual operating and maintenance (O&M) costs of SCRs, catalysts replacement, additional electricity, and ammonia usage.

The average annual cost of the PAR 1146 series is estimated at $5.7 to $6.8 million between 2020 and 2045 across all groups in the PAR 1146 series. SCR capital and recurring costs are estimated at $3.0 to $3.5 million (annualized capital and installation costs plus recurring costs of O&M, electricity, ammonia and catalyst, and monitoring and annual permit renewal) across facilities in PAR 1146 Group I and II. ULNB installations have an estimated annual compliance cost of $2.0 to $2.1 million. PAR 1146 Group II incurs the majority of the compliance cost with $2.5 to $3.0 million or 61% in both low and high cost estimates. The average annual compliance costs of PAR 1146.1 is estimated at $78,000 to $94,000 and that of PAR 1146.2 is estimated at $2.0 to $2.6

[5] The latest SBA definition of small businesses by industry can be found at http://www.sba.gov/content/table-small-business-size-standards.

million. The use of thermal fluid heaters has an estimated average annual compliance cost of $11,000 to $13,000.

The majority of the overall annual compliance costs is expected to be incurred by the food and beverage sector (16%), textile product mills (13%), pipeline transportation by (11%), paper manufacturing (10%), utility sector (8%), and air craft and transportation manufacturing (7%).

Staff has used the following sources to estimate costs of capital, installation, operating and maintenance of SCRs and ULNBs:

1) Final Staff Report for Proposed Amended Rule 1146 - Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters, September 5, 2008,
2) Final Staff Report for Proposed Amended Rule 1146.1 - Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters, September 5, 2008
3) Final Socioeconomic Report for Proposed Amended Rule 1146 - Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters, September 5, 2008,
4) Final Staff Report to Proposed Amended Rule 1146.2 - Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers and Process Heaters May 5, 2006.
5) Vendors cost estimates[6]

PAR 1146

Under PAR 1146, it was assumed that 32 facilities would meet the NOx limits by SCR retrofits for 55 units.[7] The average capital cost of a SCR unit is estimated at $1.4 million and $564,000 (including installation and permitting) for SCRs in Group I and Group II, respectively. Each SCR unit is assumed to last for 25 years. One-time permitting costs are estimated at $8,951 and $8,368 for Group I and Group II SCRs, respectively. Additional annual costs of PAR 1146 would include incremental operating and maintenance, catalyst replacement (every five years), incremental electricity (at $0.13 per Kw/hr), and ammonia usage for the applicable SCR units based on 50% annual capacity and 8,760 hours of annual operation. Monitoring costs in the first year require quarterly ammonia testing for units down to 20 mmbtu/hr, and then annually after the first year. SCR units have an estimated recurring cost of $86,000 and $25,000 (including savings from FGR) from Group I and Group II, respectively.

[6] The following nine vendors and manufacturers (in alphabetical order) were contacted requesting cost information for ultra-low NOx burners and SCR systems: Alzeta, California Boiler, Heat Transfer Solutions, McGill AirClean, McKenna Boiler, Nationwide Boiler, Parker Boiler, RF MacDonald, Superior Boiler. The cost information used in this analysis was based on the cost estimates provided by five out of the nine vendors.

[7] For the cost and job impacts analysis herein, staff used the initial conservative assumption of 55 SCR units by 32 facilities.

Under PAR 1146, it was also assumed that 69 units among 36 facilities would meet the NOx limits by ULNBs for Group III natural gas units. According to a recent vendors' cost estimate, the average capital and installation costs of retrofitting boilers with ULNBs are estimated at $133,500 per unit (including installation and initial permitting). Each burner is assumed to last for 15 years. PAR 1146 would require the affected owners of Group III units to apply for permit modifications and pay a one-time permit application fee of $5,641.

The total average annual cost of PAR 1146 is estimated at $3.6 to $4.3 million across all affected facilities.

PAR 1146.1

Under PAR 1146.1, it was assumed that ten affected facilities would meet the NOx limits by ULNBs for 19 units. According to a recent vendors' cost estimate, the average capital and installation costs of retrofitting boilers with ULNBs is estimated at $57,000 (including installation) per unit. Each burner is assumed to last for 15 years. In addition, PAR 1146.1 would require the owners of the affected units to apply for permit modifications and pay a one-time permit application fee of $3,567.

The annualized total cost of PAR 1146.1 is estimated at $78,000 to $94,000.

PAR 1146.2

Rule 1146.2 applies to large water heaters and small boilers and process heaters with a rated heat input capacity up to and including 2,000,000 BTUs per hour. There are both manufacturer and end-user requirements contained in the rule.

Rule 1146.2 units are exempt from SCAQMD permitting requirements per Rule 219 (Equipment Not Requiring a Written Permit Pursuant to Regulation II). Only a small portion of the Rule 1146.2 units are permitted due to unique circumstances, such as operators obtaining a lower emission factor for calculating the unit's potential to emit (PTE). Based on SCAQMD permit database, four of the permitted Rule 1146.2 RECLAIM units would be required to meet the NOx limits.

Due to the lack of information available on the universe of affected sources under PAR 1146.2, and to account for the potential cost impacts of those affected facilities with non-permitted units, staff has included additional ULNB costs for a total of 850 units (estimated based on the equipment data provided from facility responses of initial determination notifications as of April 2018) to account for the non-permitted units that could be impacted by the PAR 1146.2. The average capital and installation cost of retrofitting a boiler with a ULNBs is estimated at $32,100 (including installation and permitting). Each burner is assumed to last for 15 years. No additional annual operating and maintenance costs were assumed. The total average annual cost of PAR 1146.2 is estimated at $2.0 to $2.6 million.

As presented in Table 2, PAR 1146 and PAR 1146.2 contribute to about $4.2 million (61%) and $2.5 million (37%) of the total annual costs, respectively.

PAR 1100

PR 1100 is an administrative rule and does not impose additional costs to affected facilities, as such, no additional costs or socioeconomic impacts were assumed here.

Table 2: Total and Average Annual Cost of the PAR 1146 Series by Types of Amendments

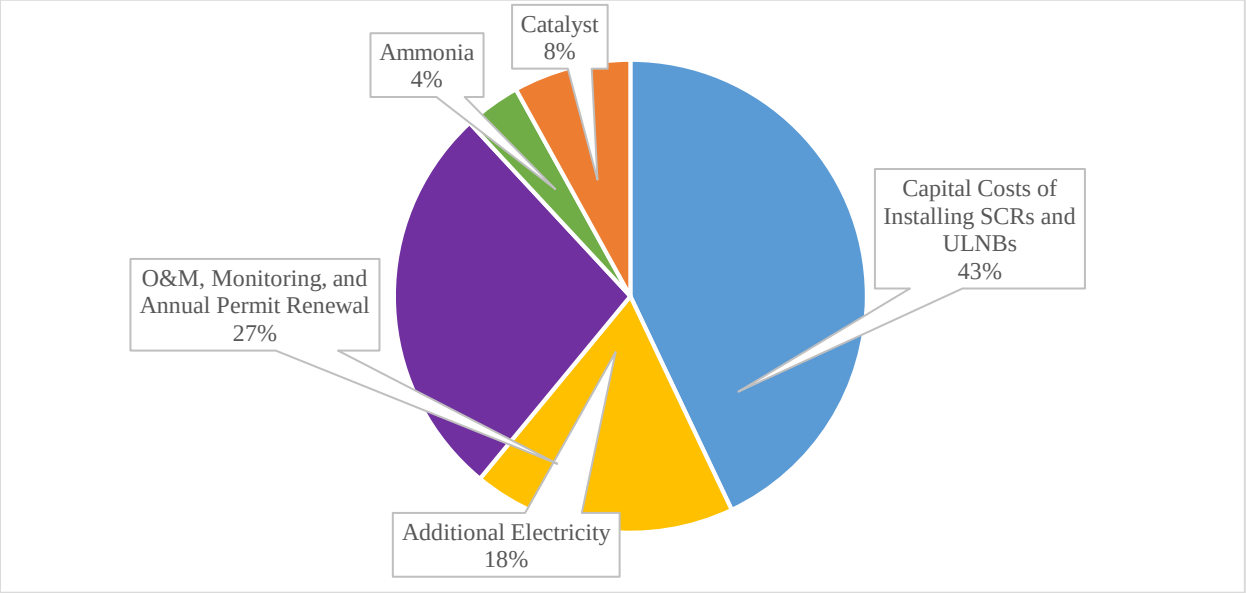
	Present Worth Value (2020)		Annual Average (2020-2045)	
Proposed Amendments	**1% Discount Rate**	**4% Discount Rate**	**1% Real Interest Rate**	**4% Real Interest Rate**
Rule 1146-Group I	$14,782,000	$10,755,000	$427,000	$494,000
Rule 1146-Group II	$75,019,000	$56,375,000	$2,488,000	$2,946,000
Rule 1146-Group III	$8,823,000	$8,012,000	$619,000	$749,000
Total PAR 1146	**$98,624,000**	**$75,142,000**	**$3,534,000**	**$4,189,000**
Rule 1146.1	$1,112,000	$1,009,000	$78,000	$94,000
Rule 1146.2	$28,313,000	$28,305,000	$2,042,000	$2,546,000
Thermal Fluid Heaters	$156,000	$142,000	$11,000	$13,000
Total	**$128,205,000**	**$104,598,000**	**$5,665,000**	**$6,843,000**

Table 3 and Figure 2 represent the distribution of the overall costs by selected cost categories. The majority of costs of the PAR 1146 series ($4.2 to $5.4 million or 74% to 78%, respectively) stem from the installation of SCRs and ULNBs. The additional costs of electricity are estimated at $0.7 million annually, and O&M, monitoring, and annual permit renewal are a combined $0.4 million annually. Ammonia and catalyst replacement are estimated at about $0.3 Million and $0.2 million, respectively.

Table 3: Total and Average Annual Cost of the PAR 1146 Series by Cost Categories

	Present Worth Value (2020)		Annual Average (2020-2045)	
Equipment Type	**1% Discount Rate**	**4% Discount Rate**	**1% Real Interest Rate**	**4% Real Interest Rate**
SCR	$32,184,045	$29,227,170	$1,420,421	$1,944,670
FGR Savings	-$7,473,845	-$4,916,605	-$192,374	-$192,374
ULNB	$38,403,704	$37,468,087	$2,749,238	$3,402,724
Electricity	$28,491,435	$18,742,847	$735,396	$735,396
O&M	$6,032,763	$3,968,602	$157,450	$157,450
Ammonia	$12,709,500	$8,360,836	$328,048	$328,048
Catalyst	$7,643,075	$5,027,932	$197,277	$197,277
Monitoring (including NH_3 testing)	$6,598,984	$4,341,085	$174,167	$174,167
Annual Permit Renewal	$3,614,924	$2,378,047	$95,409	$95,409
Total	**$128,205,000**	**$104,598,000**	**$5,665,000**	**$6,843,000**

Figure 2: Annual Estimated Costs of the PAR 1146 Series by Cost Categories



Cost-Effectiveness

As presented in Table 4, the cost-effectiveness of the PAR 1146 series is estimated to range from $7,000 to $40,000 by rule/group based on the Discount Cash Flow (DCF) method. DCF utilizes the present value, or a stream of all present and future costs discounted to and summed up in the same initial year, and cost-effectiveness is calculated as a function of present value costs versus emissions reduced during the life of the equipment. The cost-effectiveness of the overall PAR 1146 series is estimated at $16,000, and $19,000.

Table 4: Cost-Effectiveness[8]

Proposed Amendment	DCF ($/ton)
Rule 1146-Group I	$26,000
Rule 1146-Group II	$40,000
Rule 1146-Group III	$14,000
Rule 1146.1	$19,000
Rule 1146.2	$7,000
Thermal Fluid Heaters	$17,000
Total	**$16,000**

Table 5 presents the total and average annual compliance costs of the PAR 1146 series by industry types. The majority of the overall annual compliance costs is expected to be incurred by the

[8] The cost-effectiveness values presented in this analysis differ slightly from that of the SCAQMD Staff report for PAR 1146. The analysis used in this Draft SIA assumes a staggered implementation costs from 2020 to 2023 where 75% of capital costs are assumed in the first year, 20% in the second year, and 5% in the final year of implementation. Cost effectiveness calculations will differ as a function of using DCF costs rather than static costs in the numerator of the equation: *Cost Effectiveness = (cost)/(annual emission reduction potential*years of life of equipment)*

beverage manufacturing sector (13%), textile product mills (12%), pipeline transportation (11%), paper manufacturing (10%), utility sector (8%), and aerospace products (7%).

Table 5: Projected Total and Average Annual Compliance Costs by Industry for Affected Facilities (2018 Dollars)

		Present Worth Value		Annual Average (2020-2045)	
Industry that Typically Uses the Equipment	**NAICS Codes**	**1% Discount Rate**	**4% Discount Rate**	**1% Real Interest Rate**	**4% Real Interest Rate**
Oil and gas extraction	211	$5,687,000	$4,925,000	$332,000	$402,000
Petroleum and coal products manufacturing	324	$720,000	$677,000	$51,000	$62,000
Pipeline transportation	486	$14,321,000	$11,733,000	$642,000	$776,000
Amusement, gambling, and recreation industries	713	$1,194,000	$1,124,000	$85,000	$104,000
Electric power generation, transmission, and distribution	2211	$6,775,000	$5,505,000	$299,000	$360,000
Water, sewage, and other systems	2213	$3,387,000	$2,753,000	$149,000	$180,000
Dairy product manufacturing	3115	$2,476,000	$1,891,000	$75,000	$90,000
Animal slaughtering and processing	3116	$2,476,000	$1,891,000	$75,000	$90,000
Bakeries and tortilla manufacturing	3118	$597,000	$562,000	$42,000	$52,000
Beverage manufacturing	3121	$17,013,000	$13,667,000	$739,000	$884,000
Pulp, paper, and paperboard mills	3221	$15,157,000	$11,902,000	$561,000	$674,000
Converted paper product manufacturing	3222	$2,476,000	$1,891,000	$75,000	$90,000
Basic chemical manufacturing	3251	$5,242,000	$4,055,000	$170,000	$205,000
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	3252	$398,000	$375,000	$28,000	$35,000
Pharmaceutical and medicine manufacturing	3254	$2,476,000	$1,891,000	$75,000	$90,000
Plastics product manufacturing	3261	$4,298,000	$3,614,000	$224,000	$270,000
Clay product and refractory manufacturing	3271	$199,000	$187,000	$14,000	$17,000
Alumina and aluminum production and processing	3313	$398,000	$375,000	$28,000	$35,000
Forging and stamping	3321	$2,476,000	$1,891,000	$75,000	$90,000
Boiler, tank, and shipping container manufacturing	3324	$2,476,000	$1,891,000	$75,000	$90,000
Coating, engraving, heat treating, and allied activities	3328	$199,000	$187,000	$14,000	$17,000
Other fabricated metal product manufacturing	3329	$3,876,000	$3,213,000	$184,000	$223,000
Semiconductor and other electronic component manufacturing	3344	$5,095,000	$4,363,000	$280,000	$339,000
Aerospace product and parts manufacturing	3364	$6,885,000	$6,044,000	$397,000	$483,000
Other miscellaneous manufacturing	3399	$398,000	$375,000	$28,000	$35,000
Computer systems design and related services	5415	$398,000	$375,000	$28,000	$35,000
Drycleaning and laundry services	8123	$3,073,000	$2,453,000	$117,000	$142,000
Textile mills and textile product mills	313, 314	$16,706,000	$13,538,000	$710,000	$858,000
Retail trade	44-45	$796,000	$749,000	$56,000	$69,000
Monetary authorities, credit intermediation, and related activities	521, 522	$91,000	$86,000	$6,000	$8,000
Office administrative services; Facilities support services	5611, 5612	$442,000	$416,000	$31,000	$38,000
TOTAL		**$128,205,000**	**$104,598,000**	**$5,665,000**	**$6,843,000**

JOBS AND OTHER SOCIOECONOMIC IMPACTS

The REMI model (PI+ v2.2) was used to assess the total socioeconomic impacts of a policy change (i.e., the proposed rule). The model links the economic activities in the counties of Los Angeles, Orange, Riverside, and San Bernardino, and for each county, it is comprised of five interrelated blocks: (1) output and demand, (2) labor and capital, (3) population and labor force, (4) wages, prices and costs, and (5) market shares.[9]

The assessment herein is performed relative to a baseline ("business as usual") where the proposed amendments would not be implemented. The proposed amendments would create a policy scenario under which the affected facilities would incur an average annual compliance costs totaling $5.7 to $6.8 million to comply with other requirements of the PAR 1146 series. Direct effects of the proposed amendments have to be estimated and used as inputs to the REMI model in order for the model to assess secondary and induced impacts for all the actors in the four-county economy on an annual basis and across a user-defined horizon (2020 to 2045). Direct effects of the proposed amendments include additional costs to the affected entities and additional sales, by local vendors, of equipment, devices, or services that would meet the proposed requirements.

While compliance expenditures may increase the cost of doing business for affected facilities, the purchase of additional SCRs and ULNBs combined with spending on operating and maintenance, may increase sales in other sectors. Table 6 lists the industry sectors modeled in REMI that would either incur cost or benefit from the compliance expenditures.[10]

[9] Within each county, producers are made up of 156 private non-farm industries, three government sectors, and a farm sector. Trade flows are captured between sectors as well as across the four counties and the rest of U.S. Market shares of industries are dependent upon their product prices, access to production inputs, and local infrastructure. The demographic/migration component has 160 ages/gender/race/ethnicity cohorts and captures population changes in births, deaths, and migration. (For details, please refer to REMI online documentation at http://www.remi.com/products/pi.)

[10] It is worth mentioning that improved public health due to reduced air pollution emissions may also result in a positive effect on worker productivity and other economic factors; however, public health benefit assessment requires the modeling of air quality improvements. Therefore, it is conducted for AQMPs and not for individual rules or rule amendments.

Table 6: Industries Incurring *vs.* Benefitting from Compliance Costs/Spending

Source of Compliance Costs	REMI Industries Incurring Compliance Costs (3 or 4-digit NAICS)	REMI Industries Benefitting from Compliance Spending (NAICS)
SCR and Ultra-Low NOx Burners	211 Oil and gas extraction 324 Petroleum and coal products manufacturing 486 Pipeline transportation 713 Amusement, gambling, and recreation industries 2211 Electric power generation, transmission, and distribution 2213 Water, sewage, and other systems 3115 Dairy product manufacturing 3116 Animal slaughtering and processing 3118 Bakeries and tortilla manufacturing 3121 Beverage manufacturing 3221 Pulp, paper, and paperboard mills 3222 Converted paper product manufacturing 3251 Basic chemical manufacturing 3252 Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing 3254 Pharmaceutical and medicine manufacturing 3261 Plastics product manufacturing 3271 Clay product and refractory manufacturing 3313 Alumina and aluminum production and processing 3321 Forging and stamping 3324 Boiler, tank, and shipping container manufacturing 3328 Coating, engraving, heat treating, and allied activities 3329 Other fabricated metal product manufacturing 3344 Semiconductor and other electronic component manufacturing 3364 Aerospace product and parts manufacturing 3399 Other miscellaneous manufacturing 5415 Computer systems design and related services 8123 Dry cleaning and laundry services 313, 314 Textile mills and textile product mills 44-45 Retail trade 521, 522 Monetary authorities, credit intermediation, and related activities 5611, 5612 Office administrative services; Facilities support services	*One-time-Capital:* Machinery Manufacturing (333414)
Catalyst		Machinery Manufacturing
SCR (Maintenance)		*Recurring Cost:* Professional, Scientific, and Technical Services (541)
Permit Modifications/Permit Renewal		*One-time-Capital:* Public Administration (92)[11]
Monitoring		*Recurring Cost:* Professional, Scientific, and Technical Services (541)
Utilities (Electricity)		*Recurring Cost:* Utilities (221)
Ammonia		*Recurring Cost:* Chemical Manufacturing (325)

[11] Instead of using the default "local government spending" policy variable in REMI, staff elected to use a "custom local government spending" policy variable that it considers to more accurately reflect the SCAQMD spending portfolio. This custom policy variable has a lower proportion of local government spending going into the construction industry and proportionately allocates the difference to local government and professional services sectors. The simulation using this custom policy variable results in a prediction of a lower net job gain than would have been found with the default policy variable. This follows the approach taken in the Socioeconomic Impact Assessment of the PAR Regulation III Fees from June 2017.

As discussed earlier, the total average (2020 to 2045) annual compliance costs for affected facilities by the PAR 1146 series was estimated to range from $5.7 to $6.8 million per year, depending on the real interest rate assumed (1% to 4%).

PAR 1146 series is expected to result in approximately 42 to 66 jobs forgone annually, on average between 2020 and 2045, depending on the real interest rate assumed (1% to 4%). The projected jobs loss impacts represent about 0.005 percent of the total employment in the four-county region.

As presented in Table 7, in 2021, 161 additional jobs could be created in the overall economy. This is mainly due to additional purchase and spending on installation of SCRs and ULNBs provided by the industries of machinery industry, and construction, and professional and technical services sectors. As the cost of doing business kicks in and is maintained, and the positive impact of spending gradually subsides, jobs forgone are expected to begin.

Although the manufacturing sector (NAICS 31-33) would bear the majority of the estimated total compliance costs of the PAR 1146 series, the industry job impact is projected to be relatively small (annual average of 11 jobs foregone between 2020 and 2045). This is because other businesses in the manufacturing sector, specifically in the machinery manufacturing and fabricated metals industry, are expected to benefit from the increased sale of various types of control equipment (SCRs and ULNBs), thus offsetting the direct effect of compliance costs incurred by other manufacturing facilities. In earlier years, the sector of machinery, construction and professional and technical services (NAICS 541) are projected to gain jobs on an annual average from additional demand for equipment installation and maintenance made by the affected facilities.

The remainder of the projected reduction in employment would be across all major sectors of the economy from secondary and induced impacts of the proposed amendments. In earlier years positive job impacts from the expenditures made by the affected facilities would more than offset the jobs forgone from the additional cost of doing business. Jobs foregone in the later years are due to additional costs of doing business by affected facilities.

The sectors of pipeline transportation (486), textile mills and products (NAICS 313), transportation equipment (NAICS 336), food services (NAICS 311), are projected to incur portion of compliance costs and thus experience a minor share of jobs forgone. As the cost of doing business kicks in and is maintained, and positive impact of spending gradually subsides, jobs foregone are expected to begin. The reduction in disposable income would dampen the demand for goods and services in the local economy, thus resulting in a small number of jobs forgone projected in sectors such as construction (NAICS 23), retail trade (NAICS 44-45), wholesale (NAICS 42), and accommodation and food services (NAICS 72).

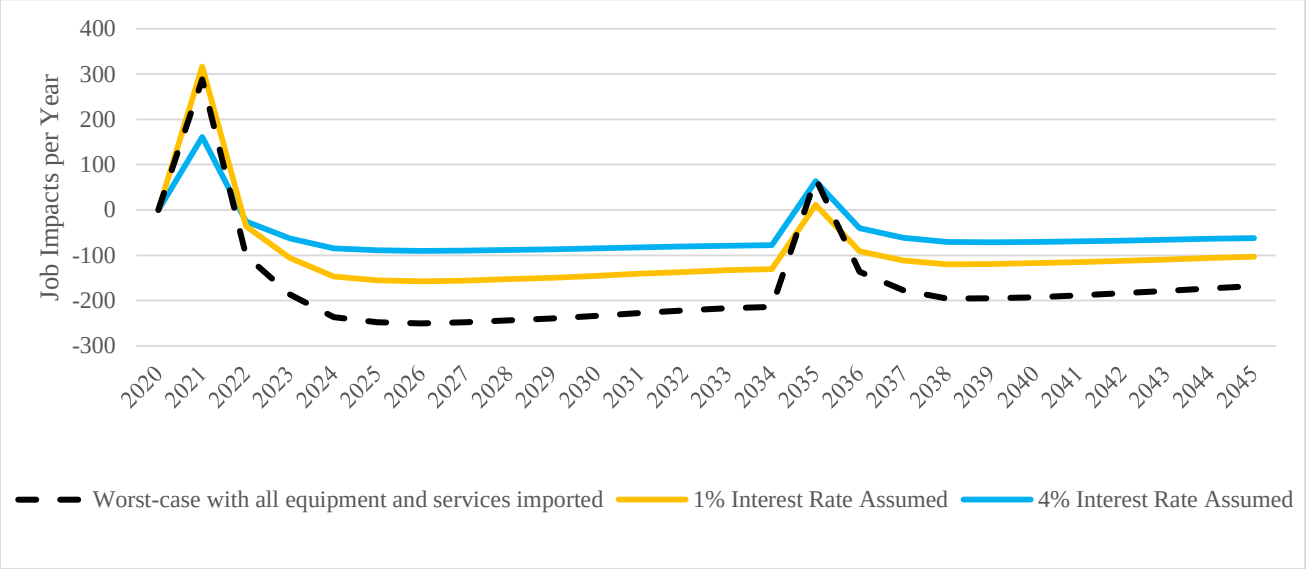
Table 7: Job Impacts of PAR 1146 Series

Industries (NAICS)	2020*	2021	2025	2035	2045	Average Annual Jobs (2020-2045)	Average Annual Baseline Jobs (2020-2045)	% Change from Baseline Jobs
Oil and gas extraction (211)	0	0	-1	0	-1	-1	23,173	-0.0023%
Construction (23)	0	59	-15	63	-2	0	473,605	0.0003%
Other fabricated metal product manufacturing (3329)	0	0	-1	0	0	-1	14,134	0.0000%
Semiconductor and other electronic component manufacturing (3344)	0	0	-2	-2	-1	-1	29,681	-0.0055%
Beverage manufacturing (3121)	0	0	0	0	0	0	12,733	0.0000%
Textile mills and textile product mills (313, 314)	0	-2	-8	-10	-9	-9	13,518	-0.0572%
Apparel, leather and allied product manufacturing (315, 316)	0	0	-1	-1	0	-1	48,486	0.0000%
Wholesale trade (42)	0	6	-4	1	-2	-2	480,708	0.0000%
Retail trade (44-45)	0	7	-11	1	-7	-7	987,522	0.0000%
Truck transportation (484)	0	1	-1	0	-1	-1	108,849	0.0000%
Transit and ground passenger transportation (485)	0	1	-1	0	0	0	102,695	0.0000%
Pipeline transportation (486)	0	0	-1	-1	-1	-1	906	-0.0655%
Warehousing and storage (493)	0	1	-1	0	-1	-1	97,789	0.0000%
Monetary authorities, credit intermediation, and related activities (521, 522)	0	2	-1	1	-1	0	142,004	0.0000%
Securities, commodity contracts, funds, trusts and other financial investments and related activities (523, 525)	0	3	-1	1	-1	-1	281,709	0.0000%
Real estate (531)	0	4	-2	1	-2	-2	575,156	0.0000%
Legal services (5411)	0	1	-1	0	0	0	100,616	0.0000%
Accounting, tax preparation, bookkeeping, and payroll services (5412)	0	1	-1	0	0	0	216,371	0.0000%
Architectural, engineering, and related services (5413)	0	2	-1	1	-1	0	99,116	0.0000%
Computer systems design and related services (5415)	0	1	-1	-1	-2	-1	170,809	0.0000%
Management, scientific, and technical consulting services (5416)	0	2	0	1	0	0	136,561	0.0000%
Management of companies and enterprises (55)	0	1	-2	-1	-1	-1	121,218	0.0000%
Employment services (5613)	0	2	-2	0	-1	-1	351,183	0.0000%
Business support services; Investigation and security services; Other support services (5614, 5616, 5619)	0	1	-2	0	-1	-1	204,921	0.0000%
Services to buildings and dwellings (5617)	0	2	-1	0	-1	-1	169,813	0.0000%
Educational services; private (61)	0	2	-1	0	-1	-1	269,688	0.0000%
Offices of health practitioners (6211-6213)	0	4	-2	2	-2	-1	422,799	0.0000%
Outpatient, laboratory, and other ambulatory care services (6214, 6215, 6219)	0	1	0	0	-1	0	132,045	0.0000%
Hospitals; private (622)	0	1	-1	0	-1	-1	183,718	0.0000%
Nursing and residential care facilities (623)	0	1	-1	0	-1	-1	162,318	0.0000%
Individual and family services; Community and vocational rehabilitation services (6241-6243)	0	2	-1	1	-1	-1	391,043	0.0000%
Child day care services (6244)	0	1	0	0	-1	0	119,285	0.0000%
Accommodation (721)	0	1	-1	0	-1	0	104,874	0.0000%
Food services and drinking places (722)	0	5	-4	0	-4	-3	729,280	0.0000%
Personal care services (8121)	0	1	-2	0	-1	-2	234,699	0.0000%
Drycleaning and laundry services (8123)	0	0	-1	-1	0	-1	47,502	0.0000%
Other personal services (8129)	0	0	-1	0	0	0	127,056	0.0000%
State and Local Government (NA)	0	12	-4	3	-4	-3	909,568	0.0000%
Total	**0**	**161**	**-89**	**63**	**-62**	**-56**	**11,272,189**	**-0.0034%**

*There are no job impacts in 2020 since the PAR 1146 series implementation dates start from 2021. However, one of the CEQA Alternatives (Alternative C) assumed that affected facilities would install SCRs and ULNBs in 2020. For the purpose of consistency in comparing the CEQA Alternatives with the proposed amendments, average annual costs and associated job impacts were presented from 2020 to 2045.

Figure 3 presents a trend of job gain and losses over the 2020 to 2045 time frame. The upticks in positive jobs in 2021 and 2036 are due to additional spending on installation of ULNBs replacements. In addition, staff has analyzed an alternative scenario (worst case) where the affected facilities would not purchase any control or service from providers within the Basin. This scenario would result in an average of 68 jobs forgone annually.

Figure 3: Projected Regional Job Impact, 2020-2045



Competitiveness

The additional cost brought on by the PAR 1146 series would increase the cost of services rendered by the affected industries in the region. The magnitude of the impact depends on the size and diversification of, and infrastructure in a local economy as well as interactions among industries. A large, diversified, and resourceful economy would absorb the impact described above with relative ease.

Changes in production/service costs would affect prices of goods produced locally. The relative delivered price of a good is based on its production cost and the transportation cost of delivering the good to where it is consumed or used. The average price of a good at the place of use reflects prices of the good produced locally and imported elsewhere.

It is projected that the manufacturing sector, where most of the affected facilities belong, would experience a rise in its relative cost of services and its delivered price by 0.001% in 2035, respectively. While these changes are relatively small, it should be noted that the delivered price change is a change in the index of all prices in the manufacturing sector. Delivered prices that a facility may charge for specific goods or services may increase at a greater rate than this, allowing incurred cost to passed through to downstream industries and end-users.

CEQA ALTERNATIVES

There are five CEQA alternatives associated with the proposed amendments to the PAR 1146 series. Alternative A, the no project alternative, means that the current version of Rules 1146, 1146.1, and 1146.2 would remain in effect. Under Alternative B (less stringent, starting at 2022), the compliance deadline for meeting the NOx emissions limits would be extended by one year. Under Alternative C (more stringent), the NOx emission limits would remain the same as the proposed project, but facilities would need to meet 100 percent compliance by January 1, 2021.

Under Alternative D, the Group I units would need to meet 9 ppm or (0.011 lb/MMBtu) instead of 5 ppm (0.0062 lb/MMBtu) and as a result they are expected to meet the limits by ULNBs versus SCRs. Alternative D would also require PAR 1146 Group II units to meet 9 ppm (or 0.011 lb/MMBtu) instead of the proposed 5 ppm for Group II units with a NOx limit greater than 12 ppm or 7 ppm (or 0.00085 lb/MMBtu) for fire-tube boilers currently meeting a NOx limit less than or equal to 12 ppm. PAR 1146 Group III and 1146.1 units would be required to meet 9 ppm (or 0.011 lb/MMBtu) instead of the proposed 7 ppm (or 0.00085 lb/MMBtu) for fire-tube boilers. The NOx emission limit for thermal fluid heaters would also remain at 30 ppm (or 0.037 lb/MMBtu) instead of 12 ppm (0.015 lb/MMBtu). With Alternative E, the provisions are the same as Alternative D for PAR 1146 Group II, III, 1146.1, and thermal fluid heaters, except for PAR 1146 Group I, which would be required to meet 5 ppm using SCR retrofits.

Average annual compliance costs for the CEQA alternatives range from $4.1 to $5.0 million between 2020 and 2045, as shown in Table 8. The cost-effectiveness of the PAR 1146 series and CEQA Alternatives range from $13,000 to $15,000 per ton of NOx reductions. Jobs forgone for the CEQA alternatives range from 30 to 63 between 2020 and 2045.

Alternative B and Alternative C have the same cost-effectiveness and both would achieve the same emission reductions. Even though Alternative C has later compliance dates the cost-effectiveness evaluation is time neutral. Alternative D has the lower average annual cost and jobs forgone than the proposed amendments because under this alternative no SCRs are required. Alternative E uses ULNB to achieve most of the NOx reductions, and PAR 1146 Group I uses SCRs for 3 units in this alternative. The cost savings that apply to the use of FGR mitigates the cost impact for the SCR facilities, and renders Alternative E as slightly more cost-effective compared with Alternative D.

Table 8: Cost and Job Impacts of CEQA Alternatives (in millions of dollars)

Alternatives	Average Annual (2020-2045)		
	Cost	Cost-Effectiveness $/ton (NOx)	Jobs
Proposed Amendments	$5,601,000	$13,000	-55
Alternative A—No Project	$0.00	N/A	N/A
Alternative B—(Less Stringent) (Implementation in 2022)	$4,118,000	$13,000	-56
Alternative C—(More Stringent) (100% implementation in 2021)	$4,466,000	$13,000	-63
Alternative D—No SCR (Less Stringent)	$2,641,000	$15,000	-40
Alternative E—Lower Limits, 3 SCRs Group I (More Stringent)	$3,243,000	$13,000	-30

UPDATED COST IMPACTS ASSESSMENT FOR COMPLIANCE WITH RULE 2002

Potential Impacts for NOx RECLAIM Facilities Ready to Exit

Rule 2002(f)(10) prohibits a RECLAIM facility from selling any future compliance year RTCs upon receipt of a final determination notification that it is ready to exit the NOx RECLAIM program. If PAR 1146, 1146.1, and 1146.2 are adopted, 22 facilities are expected to receive an initial determination notification because, according to staff's evaluation, all of their permitted RECLAIM NOx source equipment will be subject to these rules once adopted.[12] Final determination notifications will not be issued, however, until New Source Review (NSR) issues are resolved. In addition, staff has amended Rules 2001 and 2002 that will allow a facility to remain in RECLAIM to allow time for the SCAQMD to address NSR and permitting for the transition from RECLAIM to a command-and-control regulatory structure.

All 22 facilities were allocated NOx RTCs (no cost or fee when RTCs were allocated) at the outset of the NOx RECLAIM program. The initial allocations for the 22 facilities amounted to approximately 1.821 tons per day (TPD). Due to past adjustments including reductions in allocations or "shaves," and more importantly, the sale of these initial allocations as infinite-year block (IYB) RTCs to other NOx RECLAIM facilities and brokers/investors, the total NOx RTCs

[12] An earlier version of the PARs 1146, 1146.1 and 1146.2, and PR 1100 Draft Socioeconomic Impact Assessment considered the impact of 62 facilities potential exit from RECLAIM. These 62 facilities included 26 PAR 1146 series facilities and 36 facilities expected to receive an initial determination notification as a result of the adoption of PAR 2001 and PAR 2002. Four PAR 1146 facilities have been removed from the analysis due to facility shutdown. We have also excluded all 36 PAR 2001 and 2002 facilities from the analysis to focus only on the effects of the adoption of the PAR 1146 series.

currently held by these 22 facilities is 0.174 TPD for compliance years 2019 and later.[13] At the same time, total NOx emissions from these same facilities have declined to 0.120 TPD in 2016.

If these 22 facilities receive final determination notifications in 2018, they will not be able to sell their NOx RTCs for compliance year 2019 and onwards. For the purpose of this analysis, it is assumed that none of the 22 facilities would acquire additional NOx RTCs or sell their current NOx RTC holdings of 0.174 TPD before receiving a final determination notification. However, it is foreseeable that at least some of these NOx RTC holdings may be sold or transferred before they are frozen due to receipt of final determination notifications. In addition, staff has committed to not issuing any final determination notifications until NSR issues are resolved. Lastly, as they pertain to SCAQMD, RTCs are not property rights. It is known to all market participants that purchasing RTCs beyond the current compliance year is accompanied by known investment risks that are embedded within the RECLAIM programs. The risk factors include, but may not be limited to, programmatic allocation shaves, potential RTC trade freezes, and the eventual sunset of either RECLAIM program.

Since there were no costs associated with the initially allocated NOx RTCs for a RECLAIM facility, the facilities would not incur financial losses as a result of complying with Rule 2002(f)(10) if their frozen future compliance year NOx RTC holdings are at or below their respective adjusted initial allocations. However, it was estimated that, out of the total 0.174 TPD of future compliance year NOx RTCs currently held by the 22 facilities, at least 0.021 TPD were acquired by some of the affected facilities in addition to their initial allocations, either through purchases with positive prices or transfers at no cost. If these facilities continue to stay in the NOx RECLAIM program and their NOx emissions remain between 5% above and below their 2016 levels,[14] then 0.056 - 0.017 TPD of these additionally acquired RTCs were estimated to be used for compliance purposes, with the remaining 0.004 - 0.015 TPD being potential surplus RTCs available for sale or transfer. Applying the most recent 12-month rolling average NOx RTC price for compliance year 2017 of $2,530 per ton,[15] the total value of all potential surplus RTCs would be approximately $3,700 - $13,900 in RECLAIM compliance year 2019 and all subsequent RECLAIM compliance years. These facilities can elect to transfer or sell these RTCs prior to receiving a final determination notification. If the facility is holding these RTCs at or after the issuance of a final determination notification they will not be able to sell, use, or transfer the RTCs.

In addition, 6 - 7 out of the 22 facilities are estimated to have insufficient NOx RTC holdings if they were to continue to stay in the NOx RECLAIM program and their NOx emissions remain between 5% above and below their 2016 levels. By exiting the NOx RECLAIM program, these facilities would avoid the need to acquire about 0.012 - 0.015 TPD of NOx RTCs which, if valued

[13] According to the NOx RTC holdings data as of July 31, 2018 and excluding any transactions that may have occurred after this date.

[14] In order to estimate the number of RTCs needed for compliance in future years, it is necessary to project the emissions levels of all affected facilities. We analyze three scenarios; 1) emissions are 5% below 2016 levels; 2) emissions remain at 2016 levels; and 3) emissions are 5% above 2016 levels.

[15] 12-month rolling average of Compliance Year 2017 NOx RTCs, as calculated from July 2017 to July 2018. See Table I of "Twelve-Month and Three-Month Rolling Average Price of Compliance Years 2017 and 2018 NOx and SOx RTCs," available at: http://www.aqmd.gov/docs/default-source/reclaim/nox-rolling-average-reports/nox-and-sox-rtcs-rolling-avg-price-cy-2017-18---jul-2018.pdf

at $2,530 per ton, would imply potential total cost-savings worth approximately $10,900 - $13,900 in RECLAIM compliance year 2019 and for all subsequent RECLAIM compliance years.[16]

The dollar figures for the potential costs and savings for facilities exiting RECLAIM are highly sensitive to the assumed RTC price of $2,530 per ton. In general, RTC prices are highly variable, with prices typically decreasing as their expiration dates approach and during the 60 days after expiration during which they can be traded. This general trend has been repeated every year since 1994 except for compliance years 2000 and 2001 (during the California energy crisis). Prices for NOx RTCs that expired in calendar year 2017 also followed this general trend. The general declining trend of RTC prices nearing and just past expiration indicates there was an adequate supply to meet RTC demand during the final reconciliation period following the end of the compliance years. Further uncertainty has been introduced due to the SCAQMD Governing Board's decision to transition to a command-and-control regulatory structure.

Potential NOx RTC Market Impacts

Since the SCAQMD Governing Board's March 2017 adoption of the 2016 AQMP, which includes the sunset of NOx RECLAIM, the number of NOx IYB trades has decreased significantly. The IYB price has also declined rapidly, from a 12-month rolling average of $380,057 per ton in January 2017 to $20,103 per ton in July 2018, which largely reflects the remaining years of the NOx RECLAIM program life that is expected by the market participants. However, the short-term price impact of facility exit on the discrete-year RTC market may not go hand-in-hand with the overall impact of the NOx RECLAIM program transition on the IYB market, as evidenced by the surge in discrete-year NOx RTC prices in 2017.

The analysis below will focus on the potential impacts to the discrete-year NOx RTC market due to compliance with Rule 2002. The potential exit of the 22 facilities from the NOx RECLAIM program could possibly affect the demand and supply in the NOx RTC market for compliance year 2019 and beyond, as well as the future prevailing NOx RTC prices. Therefore, the remaining NOx RECLAIM facilities may be indirectly impacted as a result.

Table 9 reports the potentially foregone market demand and supply for three different NOx emission scenarios. The first scenario assumes future NOx emissions of the 22 facilities would be 5% below their respective 2016 levels; the second scenario assumes the same emission levels as in 2016; and the third scenario assumes their future NOx emissions would be 5% above their respective 2016 levels. These scenarios are consistent with the variations of overall NOx emissions from the RECLAIM universe, which had a maximum year-over-year difference of approximately 5% during the period of 2011 - 2016.

The foregone market demand, as estimated by the shortage of a facility's future compliance year NOx RTC holdings for NOx emissions reconciliation, would be about 0.012 - 0.015 TPD. At the same time, the potential foregone market supply from all facilities with potential surplus RTC holdings is estimated at 0.063 - 0.072 TPD, or about 317% - 507% greater than the estimated foregone market demand. However, some of these facilities with potential surplus NOx RTCs

[16] Cost savings vary based on the projected emissions in compliance year 2019. The range in cost savings presented represents 5% below/above 2016 emission levels.

have never sold or transferred NOx RTCs to another NOx RECLAIM facility since the NOx RECLAIM program began in 1994. Therefore, it is reasonable to assume that they will not participate in the market even if they continue to stay in the NOx RECLAIM program. When estimated by the potential surplus NOx RTC holdings from only the facilities with a historical record of NOx RTC sales and/or transfers, the foregone market supply is estimated to be lower at 0.062 - 0.070 TPD, or about 309% - 494% greater than the estimated foregone market demand.

Additionally, when compared to the 7.00 TPD of discrete-year NOx RTCs traded in calendar year 2017, the estimated net foregone market supply of 0.048 - 0.060 TPD represents 0.6% - 0.8% of the total traded volume.[17]

Given the analysis above and the fact that the 22 facilities currently account for 0.6% of annual NOx emissions and 0.8% of the NOx RTC holdings in the NOx RECLAIM universe in compliance year 2019, the simultaneous transition of the 22 facilities out of the NOx RECLAIM program would have a very small impact, if any, on the demand and supply of NOx RTC market. Specifically, while the transition of the 22 facilities could potentially assert upward pressure on the discrete-year NOx RTC prices, it is unlikely to result in large price fluctuations in the NOx RTC market, nor is the transition expected to significantly affect the remaining NOx RECLAIM facilities that are not yet ready to exit.

There are currently procedures in place to intervene if the NOx RTC price becomes excessively high. Rule 2002(f)(1)(H) specifies that in the event that the NOx RTC price exceeds $22,500 per ton based on the 12-month rolling average, or exceeds $35,000 per ton based on the 3-month rolling average calculated pursuant to subparagraph (f)(1)(E), the Executive Officer will report the determination to the Governing Board. If the Governing Board finds that the 12-month rolling average RTC price exceeds $22,500 per ton or the 3-month rolling average RTC price exceeds $35,000 per ton, then the Non-tradable/Non-usable NOx RTCs, as specified in subparagraphs (f)(1)(B) and (f)(1)(C) valid for the period in which the RTC price is found to have exceeded the applicable threshold, shall be converted to Tradable/Usable NOx RTCs upon Governing Board concurrence.

[17] In calendar year 2017, a total of 2,556 tons of discrete year NOx RTCs were traded (2556 tons/365 days = 7.00 TPD). See page ES-2 of "Annual RECLAIM Audit Report for 2016 Compliance Year," available at http://www.aqmd.gov/docs/default-source/reclaim/reclaim-annual-report/2016-reclaim-report.pdf. Notice, however, that some of the RTCs might have been traded more than once in the same year.

Table 9: Potential Impacts on NOx RTC Market Demand and Supply

		NOx Emission Scenarios for Future Compliance Years		
		5% Below 2016 NOx Emissions	***Same as 2016 NOx Emissions***	***5% Above 2016 NOx Emissions***
A	**Foregone Market Demand**	0.012	0.013	0.015
B	**Foregone Market Supply** *– From All Facilities with Surplus RTC Holdings*	0.072	0.067	0.063
C	**Net Foregone Market Supply** (= *B* - *A*)	0.060	0.054	0.048
	Percent Difference: ***(Supply – Demand)/Demand*** (= *C* / *A*)	507%	402%	317%
D	**Foregone Market Supply** *– From Facilities with Surplus RTC Holdings & Historical Record of RTC Sales/Transfers*	0.070	0.066	0.062
E	**Net Foregone Market Supply** (= *D* - *A*)	0.058	0.052	0.047
	Percent Difference: ***(Supply – Demand)/Demand*** (= *E* / *A*)	494%	392%	309%

Note: The supply and demand of NOx RTCs are expressed in TPD and rounded to the nearest thousandth. Percent differences are rounded to the nearest integer.

It is possible that the vast majority of facilities will opt to remain in RECLAIM following the adoption of the PAR 1146 series. The decision to remain in RECLAIM coincides with more favorable NSR provisions and those facilities with surplus RTCs may wish to remain in order to sell excess credits. Conversely, those facilities with insufficient RTC holdings have incentive to opt out of RECLAIM and forego acquiring the necessary RTCs to comply with RECLAIM requirements. Under this scenario, the adoption of the PAR 1146 series could potentially result in a net cost savings as it pertains to the RTCs currently held by RECLAIM facilities.

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