SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Blueprint for Clean Air

2016 AQMP WHITE PAPER

SEPTEMBER 2015

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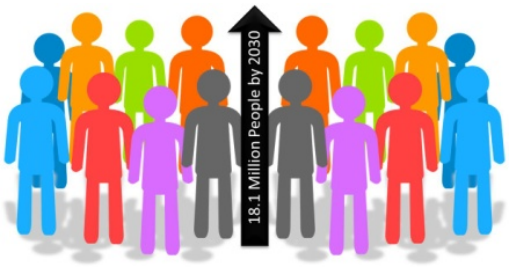
Introduction

The South Coast Air Quality Management District (SCAQMD) is preparing the 2016 Air Quality Management Plan (AQMP) to demonstrate how the region will reduce air pollution emissions to meet federal health-based standards for ground-level ozone and fine particulates (PM2.5). As part of this process, SCAQMD staff in conjunction with stakeholders' input has prepared a series of 10 white papers on key topics to provide a policy framework and better integration of major planning issues regarding air quality, climate, energy, transportation, and business needs. The Blueprint for Clean Air provides background information regarding the 2016 AQMP as well as introductory discussions relevant to the other white papers.

Setting the Scene

Southern California is unique in many ways. The South Coast Air Basin (Basin) is bounded by the Pacific Ocean on the southwest and surrounded by mountains to the north and east. The warm sunny weather associated with persistent high-pressure systems is conducive to the formation of ozone and PM2.5. The pollution levels are exacerbated by frequent low inversion heights and stagnant air conditions. There are also natural, and increasingly, international man-made pollution that contribute to background ozone levels entering the Basin. All these factors act to trap pollutants in the Basin near ground level where people breathe.



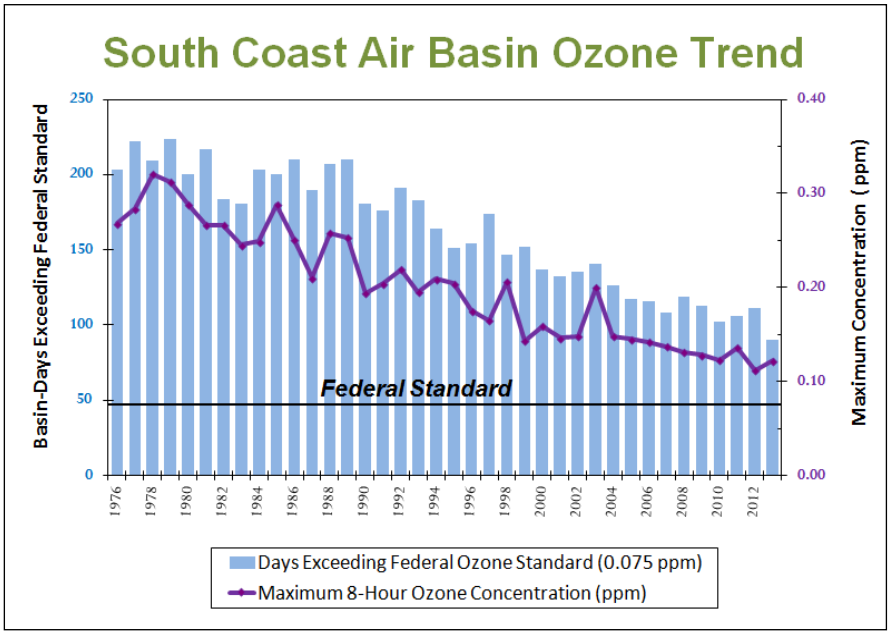
This region contributes significantly to the state-wide and national economy. For example, 40% of all containerized cargo that enters the country comes through the twin ports of Los Angeles and Long Beach. The two San Pedro Bay Ports anticipate cargo volumes will grow to 43 million containers annually by 2035, more than tripling today's levels[1]. As a result, the goods movement sector is an integral part of the Basin's economy. However, goods movement – the transportation of goods by ship, railroad, truck and aircraft – is a major source of regional oxides of nitrogen (NOx) and thus contributes significantly to ozone and PM2.5 levels. The 2012 AQMP emissions inventory for goods movement from port-related sources such as heavy-duty trucks, freight locomotives, cargo handling equipment, commercial harbor craft, and commercial ocean-going vessels was estimated to be 51 tons per day of NOx for the year 2014.[2]

The San Pedro Bay Ports anticipate cargo volumes to grow to 43 million containers annually by 2035: more than tripling from today's levels[1].

The Basin's air is much cleaner today than it was 20 years ago. Air pollution has improved despite significant long-term growth of the population, the regional economy, and vehicle miles traveled. The number of days exceeding standards has greatly declined, the area of the Basin experiencing exceedances has

[1] SCAG, Regional Transportation Plan 2012-2035, Goods Movement Appendix, pg. 7, April 2012.
[2] Final 2012 Air Quality Management Plan, Appendix IV-A, pp IV-A-39, December 2012.

diminished, and the percentage of the population exposed to exceedances has decreased. This progress is due to decades of programs and regulations at the local, state and federal levels designed to significantly reduce emissions. However, significant challenges remain and much more must be done to meet the current ozone standard of 75 parts per billion (ppb) by 2032, and the previous ozone standard of 80 ppb by 2024. Given, the approximately 17 million people in our region, the over 11 million vehicles serving them and the nation, the presence of the goods movement and other industries, and the natural factors described above result in the Basin still having some of the worst air quality in the nation. The region fails to meet federal health-based standards for ground-level ozone on more than 90 days each year.



Health Benefits of Clean Air

Air pollution has serious health repercussions. Exposure to fine particulate pollution and ozone causes myriad health impacts, particularly to the respiratory and cardiovascular systems. Exposure to fine particulates and ozone aggravates asthma attacks and can amplify other lung ailments such as emphysema and chronic obstructive pulmonary disease. A broad body of scientific research has also linked PM2.5 exposure to cardiovascular diseases.[3] According to the most recent calculations from the California Air Resources Board (CARB), exposure to current levels of PM2.5 is responsible for an estimated 4,300 cardiopulmonary-related deaths per year in the South Coast Air Basin.[4] Improving our air quality will save lives. In addition, University of

[3] U.S. EPA. Integrated Science Assessment for Particulate Matter (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-08/139F, 2009; See: http://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=216546.

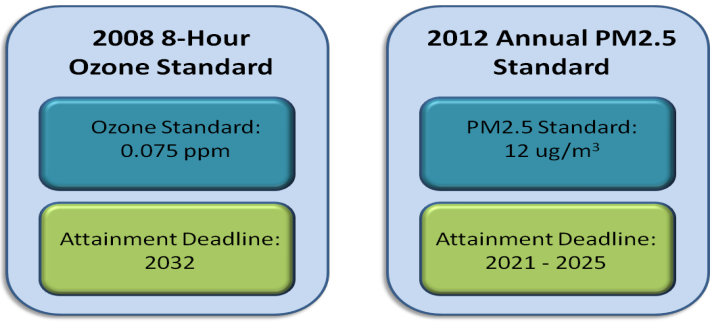
[4] "Estimated cardiopulmonary mortality by air basin associated with PM2.5 exposure." California Air Resources Board, Health and Exposure Branch. February 3, 2015.

Southern California (USC) scientists responsible for the landmark Children's Health Study found that lung growth improved as air pollution declined for children aged 11 to 15 in five communities in the Basin.[5]

Ongoing medical research continues to indicate that the health effects of air pollution have been previously underestimated. As a result, the U.S. Environmental Protection Agency (U.S. EPA) has lowered air quality standards for the PM2.5 standard and is planning to do the same this year for the ozone air quality standard. The U.S. EPA has proposed to lower the ozone standard to a level between 65-70 ppb, which would need to be met by 2037.

The 2016 AQMP

The 2016 AQMP will represent a regional blueprint for achieving the federal air quality standards and thus, healthful air. It will focus on demonstrating attainment of the NAAQS for 8-hour ozone levels (0.075 parts per million or ppm, set in 2008) and the annual PM2.5 standard (12 $\mu g/m^3$ set in 2012). It will also update previous plans for additional ozone and PM2.5 NAAQS that have not yet been met. In general, the AQMP is updated every three to four years. However, the air quality planning process for the AQMP is continuous and each iteration is an update of the previous plan.



2008 8-hour Ozone Standard

On March 12, 2008, U.S. EPA revised its national ambient air quality standards for ground-level ozone to a level of 0.075 ppm from the previous standard of 0.08 ppm, set in 1997. Under U.S. EPA's implementation rule released in May 2012, the Basin was classified as Extreme non-attainment and as such, the U.S. EPA required that all areas with an Extreme classification meet the 2008 ozone standard by 2032 (emissions reductions in place by 2031 for purposes of demonstrating attainment).

2012 Annual PM2.5 Standard

In 2012, U.S. EPA revised the NAAQS for the annual PM2.5 standard from 15.0 $\mu g/m^3$ to 12.0 $\mu g/m^3$. The PM2.5 standard is attained when the 3-year average of the annual arithmetic means does not exceed 12.0 $\mu g/m^3$. States would have until 2021 to meet the new 2012 PM2.5 standard as moderate non-attainment areas, and if necessary, up to 4 additional years if the area is classified as serious non-attainment.

[5] "Association of Improved Air Quality with Lung Development in Children," W.J. Gauderman et al, New England Journal of Medicine, Vol. 372, No. 10, March 5, 2015.

Additional Analysis Needed for 2016 AQMP

The 2016 AQMP will also provide updates to the attainment demonstrations of the federal NAAQS for 24-hour PM2.5 (35 μg/m^3), 1-hour ozone (0.12 ppm), and 8-hour ozone (0.08 ppm) standards. In addition to federal standards, there are state ambient air quality standards that the 2016 AQMP will address as well. The state annual standards are 0.09 ppm and 0.07 ppm for 1-hour ozone and 8-hour ozone, respectively. Progress has been made over the years such that the 1-hour ozone concentrations has decreased by about 50 percent since 1990, and by about 30 percent for the 8-hour standard. However, continued progress is needed, and the 2016 AQMP will seek further reductions necessary to meet the California Clean Air Act (CCAA) requirements.

Nonattainment areas such as the Basin also still have some continuing obligations under the 1997 federal 8-hour ozone standard and 1979 1-hour ozone standard. In order to show continued progress towards meeting the 1997 8-hour ozone standard by 2024, the 2016 AQMP will also include additional analysis on the adoption, implementation, and effectiveness of control measures committed to in the approved 8-hour and 1-hour ozone State Implementation Plans (SIPs). As a result, additional analysis will be included in the 2016 AQMP in order to demonstrate continued progress towards meeting the reduction goals by 2022 and 2023 for the 1979 and 1997 ozone standards.

What Will It Take to Achieve the Standards?

In order to realize the emission reductions by the federally mandated deadlines over the next two decades, the SCAQMD, CARB and the U.S. EPA will need to take a detailed look at what is technically and financially feasible as pollution reduction efforts progress. Continuing the Basin's progress toward clean air is a challenging task that combines science, engineering, technology, and public policy while allowing for growth and a healthy economy. Air quality agencies work to understand the complex interactions between emissions, control strategies, resulting air quality, and business impacts and use this information to pursue the most cost-effective set of strategies to improve air quality, while coordinating with other key public policy objectives including transportation, energy and climate goals. The plan is going to require steep emissions reductions to meet these health-based standards. These reductions come on top of decades of successful air pollution controls for both stationary and area sources as well as mobile sources.

Preliminary 2016 AQMP analysis indicates that this air basin will require approximately a 65 percent further reduction in nitrogen oxide (NOx) emissions – above and beyond all currently adopted measures – to meet the 8-hour ozone standards. These reductions will require widespread deployment of existing clean air technology and further commercialization of advanced technologies. Achieving clean air will require help from all stakeholders including businesses, manufacturers, public agencies and the general public.

The 2016 AQMP will include emission control strategies for all categories of emission sources: stationary sources, area sources, and mobile sources. The majority of NOx emission reductions must come from mobile sources, which are generally divided into two main categories: on-road mobile sources, which typically include automobiles, trucks, buses, and other vehicles that operate on public roadways; and off-road mobile sources which include aircraft, ships, trains, and construction equipment that operate off public roadways. The authority

to regulate these different emission sources is primarily divided between the California Air Resources Board (CARB) and the U.S. EPA. The SCAQMD does, however, have some limited authority to regulate mobile sources.

General Approach for the 2016 AQMP Control Strategies

The 2016 AQMP will use a variety of implementation approaches such as accelerated deployment of available cleaner technologies, best management practices, incentive programs, as well as development and implementation of zero- and near-zero technologies and control methods. Further demonstration and commercialization projects will be crucial to help deploy near-zero and zero emission technologies. Another key element to plan implementation will be private and public funding to help further the development and deployment of advanced technologies. Many of the same technologies will address both air quality and climate needs, such as those that increase energy efficiency or use renewable fuels. In developing the 2016 control strategies, the SCAQMD staff will consider the following general approach and conceptual framework:

1. **Eliminate Reliance on the "Black Box" to the Maximum Extent Feasible**
   Section 182(e)(5) of the federal Clean Air Act (CAA), authorizes regions classified as extreme nonattainment for ozone to rely on advanced technology measures to meet federal air quality standards; these measures have come to be known as the "Black Box." The 2016 AQMP approach will attempt to eliminate reliance on the "black box" and develop a more definitive pathway to attainment based on specific advanced technology control measures which have quantifiable emission reductions and associated costs. This approach is aided by the fact that the majority of zero and near-zero technologies which will be relied upon for control measure development have already been developed. It will be a matter of accelerating commercialization and deployment of these technologies using existing and new funding and incentive programs.

2. **Fair-Share Emission Reduction Strategy**
   Develop a strategy with fair-share emission reduction commitments at federal, state, and local levels, which includes new federal engine emission standards as well as additional authority provided to the State of California in order to enact additional controls on sources (e.g., locomotives, aircraft, ships) traditionally under the jurisdiction of the federal government.

3. **Incentivize Early Deployment of Zero and Near-Zero Technologies**
   Implement strategies that incentivize early deployment of zero and near-zero technologies, which also include investments in technologies that meet multiple objectives - air quality, climate, toxics, and energy efficiency. The 2016 AQMP will strongly rely on a transition to zero- and near-zero emission technologies in the mobile source sector including automobiles, transit buses, medium- and heavy-duty trucks, and off-road applications to meet the air quality standards. The plan will focus on existing commercialized technologies and energy sources and newer technologies that are nearing commercialization based on demonstration programs and limited test markets, including their supporting infrastructure. To accomplish this, the SCAQMD staff will continue to support technology demonstration and deployment projects for both mobile and stationary sources.

4. **Develop Efficient and Cost-Effective Strategies**
   Select the most efficient and cost-effective path to achieve multi-pollutant and multi-deadline targets. For example, technologies needed for the state's air quality climate goals in GHG emission reductions[6] such as the deployment of zero and near-zero-technologies, as well as increasing the penetration of renewable energy resources and higher energy efficiencies, are "efficient strategies" as they are also needed to attain the air quality goals in the 2016 AQMP. Stationary source measures will include a wide array of advanced low-NOx technologies, low-volatile organic compound (VOC) coatings and processes, and clean energy alternatives, such as fuel cells, solar power, and other renewable energy systems.

5. **Prioritize Win-Win Strategies**
   As shown in the past, air quality standards can be achieved while maintaining a healthy economy. The 2016 AQMP will prioritize non-regulatory, innovative and "win-win" approaches for emission reductions. In designing the control strategy needed to achieve the ozone and PM2.5 air quality standards, there will be special consideration and prioritization of strategies that contribute to the economic vitality of the region and the needs of the public and businesses.

What Happens if the 2016 AQMP Fails to Meet Federal Air Quality Standards?

Failure to have an approved plan to meet these health-based standards within the required timeframes would result in sanctions from the federal government. These include: (1) new major stationary sources in the nonattainment area must obtain offsetting emissions reductions at a significantly increased 2-to-1 ratio; (2) restrictions on the state's use of federal highway funds for projects in the nonattainment area; and (3) the U.S. EPA is required to develop its own federal implementation plan (FIP) for the area to ensure improvement of air quality. This outcome not only leads to delayed air quality improvements withassociated serious health impacts, but it also has the potential to significantly impact the local economy beyond the impacts of a thoughtful and approvable local plan that has been crafted with input from local stakeholders.

[6] The State's air quality climate goals which require a 30% reduction in GHGs by 2020 to 1990 levels, and the Governor's new executive order mandating a 40% reduction below 1990 levels by 2030.

Need for Integrated Planning Process

The 2016 AQMP will need significant integration and coordination with other agencies in order to successfully meet the Basin's clean air goals. This integration should not only include the traditional collaboration between the SCAQMD, CARB, U.S. EPA and the Southern California Association of Governments (SCAG,) but should also include at the state level the California Energy Commission (CEC), the California Public Utilities Commission, and the California State Transportation Agency including Caltrans. Regional and local governments, such as counties, cities, coalitions of governments, and regional transportation agencies, also should be a part of the integrated planning process. Such a process would be useful in proposing and implementing strategies that are consistent with the state's Vision for Clean Air and strategies and goals of the 2016 AQMP. In addition to an integrated planning process with other agencies, the 2016 AQMP development process will have to incorporate collaborative efforts by a wide range of non-government stakeholders. These efforts will focus on businesses, environmental and health organizations, community groups, and academia.

2016 AQMP White Papers

As a prelude to the 2016 AQMP, the following white papers were developed to begin the dialogue and frame key policy questions surrounding the development of the plan. These papers are intended to assist the public, stakeholders and the SCAQMD to understand key facts and policy issues related to the development of the 2016 AQMP. The White Papers are also intended to provide for better integration of major planning issues regarding air quality, climate, energy, transportation, and business needs. Below is a brief description of the white paper topics. For more information on each white paper, please visit the SCAQMD website at http://www.aqmd.gov.

21st Century Goods Movement System and Air Quality

The 21st Century Goods Movement System and Air Quality White Paper will likely be the centerpiece of the 2016 AQMP. Advanced technologies will be needed to achieve clean air goals. This white paper will evaluate all goods movement sectors such as ships, locomotives, and trucks and will analyze a variety of advanced technologies such as hybrid-electric, advanced natural gas, fuel cells, and electric, as well as potential infrastructure needs and commercialization schedules. This white paper will also create scenarios that will assume different future mixes of advanced technologies.

Passenger Transportation

The Passenger Transportation White Paper will examine advanced technologies and operational efficiency opportunities, as well as programs that can help accelerate fleet turnover. Advantages could be gleaned from the implementation of other programs such as SB375.

Energy Outlook

The Energy Outlook White Paper will be evaluating the energy implications of various types of advanced technologies – some of these advanced pollution control technologies for mobile sources will be based on traditional energy sources, while others will rely on alternative energy sources such as electricity or hydrogen. The Energy Outlook White Paper will describe the demand and supply of all energy sources for the Basin and explore how that might change under current and future programs to reduce GHG and pollutant emissions. In addition, this white paper will evaluate the existing and needed infrastructure for various energy sources. This white paper will also evaluate the cost of these energy sources – including cost of distribution of the energy source, cost impact or benefit to the end user, and infrastructure costs, if any.

Residential and Commercial Energy Use

Reducing, managing, and changing the way energy is used in the commercial and residential sectors can provide emission reductions, reduced energy costs, and can provide cross sector benefits such as reduced water consumption. The Residential and Commercial Energy Use White Paper will provide insight and analysis on energy usage while reviewing resulting emissions within the residential and commercial sectors.

Industrial Facility Modernization

The Industrial Facility Modernization White Paper will identify the barriers to and incentives for clean equipment technologies and modernization of industrial stationary sources.

VOC Controls

The VOC Controls White Paper will study the role VOCs play in the ozone and $PM_{2.5}$ attainment strategy. The potential contribution of intermediate and semi-volatiles will be explored. The need for VOC reductions to achieve clean air goals will be re-examined, along with the requisite quantity and timing of VOC emissions reductions.

PM Controls

The PM Controls White Paper will continue to evaluate feasible control technologies for commercial cooking, fugitive dust, ammonia and SOx sources. Modeling results will assist in demonstrating the benefits from implementing strategies targeting sources of directly emitted PM2.5 as well as precursor emission sources. This white paper will address each of these elements, including source categories for potential control through traditional approaches as well as seasonal, episodic or geographically focused controls.

A Business Case for Clean Air Strategies

This white paper seeks to develop principles and concepts for control measures and related programs to be included in the 2016 AQMP that, to the extent possible, create a business case for deployment of needed technologies and efficiency measures towards attaining upcoming federal air quality standards. A business case could exist where a technology, fuel, or other strategy reduces emissions and also improves energy efficiency,

reduces fuel or maintenance costs, creates new job opportunities, or has other economic benefits. In addition to seeking to minimize potentially adverse impacts, the SCAQMD staff, in developing the 2016 AQMP, will explore means to maximize emission control strategies that have a business case for implementation.

Off-Road Commercial/Industrial Equipment

The Off-Road Commercial/Industrial Equipment White Paper will examine advanced technology opportunities as well as programs to accelerate the transition to newer equipment. This category consists of a wide variety of emission sources including construction and mining equipment such as forklifts, cranes, and portable engines. The focus will be on advanced control technologies that go beyond current emission standards and what efforts will be needed to further reduce emissions from these sources.

Participation in the Clean Air Discussion

Public input is an integral part of the planning process and the SCAQMD staff relies on input from all stakeholders. There are a variety of ways to participate in the development of the 2016 AQMP. SCAQMD staff is working with an advisory group which represents over 50 stakeholders from the business community, environmental and community groups, academia, and other agencies. Members of the advisory group generally represent an organization and are approved by the SCAQMD's Governing Board Chairman. Each White Paper has an associated Working Group with members that include representatives from the advisory group as well as other technical experts. The public is invited to attend AQMP Advisory Group and White Paper Working Group meetings.

You can follow the development of the 2016 AQMP on SCAQMD's website at www.aqmd.gov and on social media including Facebook and Twitter. The SCAQMD's website includes meeting dates and information about the AQMP Advisory Group, White Paper Working Groups, public workshops, and public hearings. The website also includes presentations and documents as they become publicly available. In addition, throughout the development of the 2016 AQMP, organizations can request a meeting with or a presentation by SCAQMD staff to receive an update on the 2016 AQMP. This provides the opportunity for SCAQMD staff to have a more inter-active and targeted dialogue with specific groups or organizations.

Reaching Further

The SCAQMD staff is looking for ways to conduct further outreach. If you have ideas on additional organizations to participate in the clean air discussion and/or to enhance our 2016 AQMP communication efforts, please let us know at aqmp@aqmd.gov.

If you are interested in participating in the clean air discussion and would like to be added to the mailing list, have questions or comments, or would like to schedule a meeting with SCAQMD staff to discuss the 2016 AQMP with your organization, please e-mail SCAQMD at aqmp@aqmd.gov.

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