Preliminary Draft

A Business Case for Clean Air Strategies

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1. Introduction

The South Coast Air Basin is one of the only two "extreme" non-attainment areas in the nation that have not reached the federal eight-hour ozone standards. Ground-level ozone, or smog, forms when volatile organic compounds (VOC) photochemically react with nitrogen oxides (NOx) in the presence of sunlight. Encompassing a major swath of Southern California, the South Coast Air Basin is among the most densely populated areas nationwide with about 13 million cars, trucks, and other vehicles operating on its extensive network of highways and roads.[1] The amount of pollutants produced by modern urban life and industrial activities, combined with Southern California's year-round sunny weather, all contribute to the high concentrations of ground-level ozone in the area. Ozone exposure can cause immediate, adverse effects on the respiratory system and result in various symptoms such as coughing, throat irritation, chest pain, and shortness of breath. It can also inflame the lining of the lungs, and for asthma patients, it may increase the number and severity of attacks. Long-term impacts of frequent exposure to ozone may lead to permanent lung damage and increase the risk of premature death.

Due to a myriad of factors, including advancements in transportation and pollution control technologies, it is expected that air pollutant emissions will continue to decline over the coming decades. However, SCAQMD staff projects that deeper reductions of NOx emissions are necessary in the South Coast Air Basin. To reach the 1997 standard of 80 parts per billion (ppb) by the attainment deadline, NOx emissions will have to be reduced by up to 65 percent from the projected baseline level in 2023. To reach the more stringent 2008 standard of 75 ppb, an up to 75-percent reduction will be needed from the projected baseline level in 2032.[2]

Attaining upcoming federal air quality standards will require particularly significant investments to develop and deploy advanced technologies, including those with zero and near zero emissions. Because of this challenge, SCAQMD staff —in addition to seeking the minimization of potentially adverse impacts— is also exploring potential means to maximize emission control strategies that have a "business case" for implementation. A business case could exist where a

[1] According to estimates provided by the California Department of Motor Vehicles, there were a total of 13.7 million registered vehicles in Los Angeles, Orange, Riverside, and San Bernardino counties, for the period of January 1 to December 31, 2013. (https://www.dmv.ca.gov/portal/wcm/connect/add5eb07-c676-40b4-98b5-8011b059260a/est_fees_pd_by_county.pdf?MOD=AJPERES, accessed February 18, 2015.) The South Coast Air Basin covers all of Orange County and the urban portions of Los Angeles, Riverside and San Bernardino counties; therefore, the total number of vehicles would have been somewhat smaller.

[2] The figures are based on the baseline projections made in the 2012 Air Quality Management Plan (AQMP). The baseline projection assumes a specific set of growth factors and that no additional clean air programs and regulations would be introduced beyond the control measures already implemented under the SCAQMD rules adopted as of June 2012 and under the rules adopted by California Air Resources Board and U.S. Environmental Protection Agency as of August 2011.

technology, fuel, or other strategy reduces emissions and also improves energy efficiency, reduces fuel or maintenance costs, creates new job opportunities, or has other cost savings and economic benefits. To this end, this white paper seeks to develop planning concepts for control measures and related programs (e.g., incentive or financing programs) to be included in the 2016 Air Quality Management Plan (AQMP) that, to the extent possible, create a business case for deployment of needed technologies and efficiency measures.

To actively involve stakeholders from the early stages of AQMP development, SCAQMD staff organized ten working groups, one for each of the 2016 AQMP white papers that aim to provide a policy framework and guidance for the formulation of upcoming control measures and programs. Staff solicited volunteer participation among the 2016 AQMP Advisory Group members who were also asked to recommend technical experts in relevant fields. Moreover, all working group meetings are open to the public.

The "A Business Case for Clean Air Strategies" white paper working group conducted a total of five meetings between June 2014 and March 2015. At the very first meeting, the participating stakeholders shared two premises that are consistent with the SCAQMD staff's evaluation:

1) Within the constraint of air quality attainment, it is unlikely that all affected industries would have a business case regardless of the design of AQMP control measures and related programs.
2) The upcoming AQMP will most likely produce the largest impact on the goods movement sector, which consists largely of transportation and logistics industries.

According to SCAQMD staff's estimates, about 60 percent of the region's NOx emissions in 2032 will come from passenger transportation and the goods movement sector, the latter of which includes emission-producing sources such as heavy-duty trucks, marine vessels, commercial harbor craft, cargo handling equipment, and freight locomotives. Hence, the working group discussions, and consequently this white paper, have placed particular emphasis on mobile source emission reductions. However, most of the proposed concepts for AQMP control strategies and related programs are also applicable to stationary sources.

In addition to open discussions and exchanges through the working group process, this white paper benefited greatly from stakeholder presentations of industry-specific case studies. The presentations covered various topics, including future opportunities enabled by technology advancement, successes and failures, and lessons learned from past experiences, all of which are instructive as to how business cases may be achieved under different circumstances. Section 2 of this white paper will discuss potential means to create a business case, based on lessons learned from the five industry case studies. In Section 3, other lessons from additional stakeholder comments will be discussed and supplemented by a number of examples researched by SCAQMD staff. Section 4 focuses on how to leverage incentive programs to create a business

case. Building on the findings and recommendations from the working group process and staff research, Section 5 then develops the principal planning concepts to support the creation of business cases within clean air planning and programs. Section 6 discusses the next steps for AQMP development.

2. Potential Means to Create a Business Case: Five Key Lessons from Industry Case Studies

This section summarizes five case studies that were presented by various stakeholders from the private sector. These case studies are all based on actual business experiences, which offer valuable lessons that will aid the SCAQMD in the development of the 2016 AQMP.

a. Understand Industry Structure and Small Business Needs for Technology Adoption

The California Trucking Association provided an overview of the state's trucking industry and recommended a list of important factors to be taken into account to craft clean air strategies that can potentially create a business case. Below is a summary:[3]

- *The majority of California trucking operators are small businesses:* Commercial truckers in California are extremely diversified in their fleet size and operation type. In 2006, more than half of California-registered trucks belong to fleets with five or fewer trucks, including one third being solo operators. Certain niche markets, such as drayage trucks operating at the Ports of Los Angeles and Long Beach, have an even larger presence of small trucking operators.
- *Small, local truckers tend to use pre-owned equipment:* New trucks are typically purchased by large national fleets or other high-mileage operations;[4] once the odometer hits 500,000 miles, the used truck is then traded in for sale in the secondary market or shifted to a company's local operation. Some "niche" operators (e.g., drayage, construction, seasonal agriculture) may buy from the tertiary market.
- *Fuel-neutral policy designs recommended to preserve fleet turnover model:* Two fuel-neutral policies were specifically recommended: first, enact a cap on fleet age/mileage to accelerate the retirement of older trucks with higher emissions while preserving the

[3] Slides for this presentation are available at http://www.aqmd.gov/docs/default-source/Agendas/aqmp/white-paper-working-groups/business-case-ca-trucking-10312014.pdf?sfvrsn=2.

[4] High-mileage operations typically refer to those that accumulate more than 100,000 miles a year.

existing fleet turnover model;[5] second, incentivize early adoption of zero or near zero emissions transportation technologies that otherwise cannot be achieved through normal fleet turnover due to high prices. It was argued that such policy design can better provide businesses with certainty on equipment life and minimize stranded assets.

- *Rules need to be adequately enforced and amendments should be avoided shortly after a rule goes into effect:* Policymakers must avoid inadequate enforcement and making amendments, especially those that would loosen rule stringency, shortly after the original compliance deadline. Otherwise, businesses that adhere to the rule requirements and the original rule compliance schedule may suffer from unfair competition for having made substantial investments to come into rule compliance.

b. Targeted Incentives Can Cost-Effectively Accelerate Advanced Technology Adoption

The Southern California Gas Company provided a comprehensive overview of the development and prospect of low emitting natural gas technologies. The presentation also reported the preliminary findings from an ongoing study that quantitatively analyzed the emission reduction potential of providing financial incentives for the purchase of natural gas vehicles. The lessons learned are summarized below:[6]

- *Conventional natural gas heavy-duty trucks are financially viable:* The price advantage of natural gas over conventional fuels can drive natural gas technology adoption by the heavy-duty trucking sector. The adoption can be further accelerated by near term and consistent financial and other incentives that shorten the payback period. In the meantime, the infrastructure of natural gas fueling stations has also improved in design that is lowering costs.
- *Near zero emission natural gas heavy-duty trucks will soon be technologically feasible:* The SCAQMD and the Southern California Gas Company have supported natural gas technology developers and engine manufacturers with their research, development, and deployment (RD&D) programs. Technological advancements for on-road heavy-duty natural gas engines are expected to achieve a 0.02 grams/bhp-hr level of NOx emissions between 2015 and 2023. Moreover, the anticipated advancements in compressed natural gas (CNG) storage technologies can potentially have a large impact on design, and thus costs, for both heavy- and light-duty vehicles.

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[5] According to SCAQMD staff estimates using the EMFAC 2011 model, the average age of heavy-duty trucks in the SCAB region is about 11 years, with many trucks, especially those in the light heavy-duty categories, being utilized well beyond the expected life of 12 years.

[6] Slides for the presentations are available at http://www.aqmd.gov/docs/default-source/Agendas/aqmp/white-paper-working-groups/business-case-socalgas-pres-final.pdf?sfvrsn=2.

- *Increased financial incentives can encourage early adoption of near zero emission natural gas technologies:* The company's economic analysis indicated that additional financial incentives ($10,000 or less per vehicle) can shift conventional natural gas technology purchases to near zero emission natural gas technology purchases. Among all categories of heavy-duty trucks, financial incentives provided to the heavy-heavy-duty trucks will be the most cost-effective in terms of NOx emission reductions, due to their use in high mileage operations.

c. Stakeholder Involvement and Financial Assistance Are Necessary for Industry-Wide Technology Adoption

Burrtec Waste Industries, Inc. presented the waste management industry's conversion to natural gas vehicles, following the 2010 amendments to the SCAQMD Rule 1193 – Clean On-Road Residential and Commercial Refuse Collection Vehicles. This rule requires public solid waste collection fleet operators with 15 or more solid waste collection vehicles and private fleet operators that provide solid waste collection services to governmental agencies to acquire alternative-fuel refuse collection heavy-duty vehicles when procuring or leasing these vehicles for use by or for governmental agencies in the SCAQMD region. The lessons learned from the industry's experience are summarized below:[7]

- *Both large and small businesses have to be involved in the rule-making process; moreover, the affordability for smaller fleets to finance capital costs needs to be carefully considered:* Today, almost all waste management trucks in the region, whether belonging to large or small fleets, are powered by natural gas.[8] The "phase-in" rule implementation schedule—which allowed more time for small fleets to come into compliance—and financial incentives (e.g., the Carl Moyer Program[9]) made it possible for small- and medium-sized companies to finance the upfront capital costs.
- *A unique business model provides greater certainty of returns to capital investment:* A typical contract between a private solid waste collection fleet operator and a governmental agency is an exclusive ten-year franchise. The nature of such contracts, in addition to the persistently low price of natural gas relative to diesel, ensured that the capital costs of fleet conversion would be sufficiently paid back within the contract

[7] Slides for this presentation are available at http://www.aqmd.gov/docs/default-source/Agendas/aqmp/white-paper-working-groups/burrtec-bus-case-31115.pdf?sfvrsn=2.

[8] Electric vehicles were not considered as a technically viable option due to a list of battery-related limitations, including the pure weight of the battery pack.

[9] The Carl Moyer Memorial Air Quality Standards Attainment Program provides grant funding for cleaner-than-required engines and equipment. The grants are funded by the State of California and administered by local air districts including the SCAQMD.

lifetime. Moreover, a solid waste collection fleet consists mostly of route trucks with long[10] expected equipment lifetimes, which also allows for a longer pay-back period than that of higher-mileage trucking operations.

- *Public funds are potentially needed to help build the infrastructure for an industry-wide adoption of needed transportation technologies:* The waste management industry's conversion to low emission technologies also involved building fueling infrastructure, since there were few natural gas fueling stations at the same time. Companies such as Burrtec had to obtain public funds to afford necessary installation of natural gas fueling stations. Government funds also promoted infrastructure at "network nodes," such as landfill and transfer stations that provide public access to natural gas fueling stations.
- *Government support, such as facilitating information flow about the needed technologies, can help individual businesses choose the best fitting technology*: During the Rule 1193 process, many solid waste collection operators were faced with technical challenges, including the choice between different engine technologies. At the SCAQMD's request, engine manufacturers provided technology demonstrations so that the affected businesses could be better informed and choose the technology that would best fit their operational needs.

d. Learn From Early-Adopters of Clean Air Technologies

Frito Lay North America Inc. shared their successful experience of building a fuel-efficient fleet and identified the challenges and hurdles in their implementation process. Below is a summary:[11]

- *Corporate vision to build the most fuel-efficient fleet in America catalyzed the early voluntary adoption of alternative transportation technologies:* Senior management at Frito Lay promoted the "Green Vision" to transform North America's seventh largest fleet. With 280 all-electric trucks and 333 CNG tractors, it has reduced the use of traditional fuel by 20 percent to date and is on track to reach their 50 percent target by 2020.
- *Alternative fuel vehicles are a viable fleet option:* The CNG tractor is financially viable on its own. It currently provides 40-50 percent fuel cost savings compared to diesel and has a pay-back period of 2-3 years, which is significantly shorter than the time the company keeps the equipment. For all-electric trucks with zero emissions, however, public grants were needed to shorten the payback time on the initial capital investment despite the significantly lower operating and maintenance (O&M) costs for the vehicles

[10] According to Chuck Tobin, Development Director of Burrtec Waste Industries, Inc., a solid waste collection truck is functional as long as its chassis remains in a good condition; other parts of the truck are replaceable.

[11] Slides for this presentation are available at http://www.aqmd.gov/docs/default-source/Agendas/aqmp/white-paper-working-groups/agenda-no-2---frito-lay-march-11-2015---scaqmd.pdf?sfvrsn=2.

per se. In the near future, government incentives for electric vehicles are expected to continue to be needed.

- *Multi-dimensional approach helps manage operational challenges:* The key to success is to 1) ensure that new technologies are well integrated into business operations, which include understanding equipment capabilities, improving fueling/charging capacity, and having reliable maintenance; 2) engaging drivers and technicians throughout the transition by offering training, site preparation, program leadership, and frequent communication via meetings, calls, and sign boards.

e. One Size Doesn't Fit All and Infrastructure Is Needed to Expand Technology Adoption

United Parcel Service (UPS) Inc. is the world's largest package delivery company with more than 100,000 vehicles worldwide. The company shared their experience experimenting with a wide array of alternative fuels and technologies in building up their "green fleet." Similar to Frito Lay's experience, UPS also found it important to provide driver training and to fully understand the key operational variables that can be very different from operating a conventional fleet. The additional lessons learned from the UPS experience are summarized below:[12]

- *Current alternative fuel technologies have attributes that are suitable for different business operations:* By the end of 2015, UPS will have about 7,800 vehicles in operation worldwide that are powered by alternative fuel technologies, including natural gas, hydraulic hybrid, propane, hybrid electric, plug-in electric, and fuel cells. Among them, about 1,200 will be operating in California alone, mostly in the package fleet. Since the attributes of current alternative fuel technologies are varied, only compressed and liquefied natural gas (CNG and LNG) technologies have been found sufficiently mature and suitable for tractor operations currently. Concerning electric vehicles, they are very sensitive to slope and weight of load, thus resulting in a very different energy use pattern that a fleet operator must be aware of and take into account.
- *Infrastructure can be a challenge in green fleet expansion:* UPS stated that the alternative fuel vehicles can have, at most, a five-year payback period to be financially feasible for its fleet operations; importantly, this pay-back period is calculated assuming that the necessary infrastructure is already in place. UPS has temporarily saturated the nation's LNG fueling infrastructure, which presents an important constraint on its LNG fleet expansion. Without proper fueling infrastructure, natural gas vehicles can also suffer from "range anxiety," an issue that is more often associated with limited battery capacity among electric vehicles. For plug-in electric vehicles (PEVs), the infrastructure issue can be more complicated. In addition to the number and condition of charging stations, the

[12] Slides for this presentation are available at http://www.aqmd.gov/docs/default-source/Agendas/aqmp/white-paper-working-groups/ups-bus-case-31115.pdf?sfvrsn=2.

existing grid capacity in smaller towns may not be able to accommodate a large fleet of PEVs.

- *Partnership with other stakeholders is crucial to find a better way forward:* UPS works with manufacturers, government agencies, and nonprofit organizations to advance new fuel technologies and find less expensive, cleaner-burning domestic fuels that are better for the environment and more sustainable than conventional diesel. UPS emphasized that, to promote alternative fuel technologies, more businesses and interested parties need to be involved to help increase the market demand for the vehicles. Financial incentives and other types of regulatory programs help with this process.

3. Potential Means to Create a Business Case: Other Lessons from Additional Stakeholder Comments and Examples

This section begins by summarizing the valuable comments and suggestions provided by other participating stakeholders on what is necessary to create a business case for clean air strategies.[13] Stakeholder comments are supplemented by additional examples researched by SCAQMD staff where applicable.

a. Provide Regulatory Certainty to Minimize Long-term Business Investment Risks

In addition to cost-effectiveness, regulatory certainty needs to be another important factor in the evaluation of AQMP control measures and related programs. Specifically, SCAQMD staff and stakeholders need to work together to carefully examine credible projections of zero and near zero emission technologies, evaluate and compare their technical applicability and financial viability for commercial adoption, while keeping in mind the global business environment and how it may impact the financial capacity of the affected industries. Regulatory certainty is also affected by the ease of rule compliance and enforcement. The ability to adequately enforce air regulations should be an important consideration, as lack of enforcement could hurt business profits by creating competitive disadvantages for those who have made investments to comply with the regulation. It was additionally suggested that clean air strategies should involve minimal red tape, such as better streamlining the permitting process, which can also reduce staff time and other resources needed for rule enforcement.

[13] Many stakeholders also expressed concerns regarding the SCAQMD's socioeconomic analysis and the need to reform the California Environmental Quality Act. These issues are being or have been separately addressed by the SCAQMD and will not be repeated in this white paper.

b. Maximize Compliance Flexibility within the Constraint of Air Quality Attainment

By allowing individual businesses to choose from a menu of permissible actions to come into compliance, flexible air regulations have a greater potential for improving air quality while minimizing the overall compliance costs, and possibly create economic benefits for some businesses that can identify innovative solutions to cost-effectively lower pollutant emissions. It was also suggested that the SCAQMD look into a more flexible use of emission reduction credits and potentially allow for conversion of credits that are created from different sources so that, for example, a company that generates a large amount of stationary source credits can use or sell its credits for mobile source emission reductions and *vice versa*.[14]

c. Seek Support and Funding from Outside the Region

A case was made that, since mobile source emissions partly originate from outside the SCAB region, individuals and businesses within the region should not bear the sole responsibility for and incur all costs of emission reductions. It was suggested that outside funds (e.g., federal grants and the California Greenhouse Gas Reduction Fund) should be appropriately channeled to the SCAB region to assist the region and its businesses in achieving the emission reduction targets. These funds can come in the form of financial incentives, grants, and subsidies.

d. Offer Financial Incentives for Both Technology Development and Adoption

It was emphasized that financial incentives are necessary not only for technology adoption, but equally importantly, for research and development (R&D) activities to develop and enhance zero and near zero emission technologies. Moreover, the stakeholders cautioned that, in order to make incentive programs work, it is necessary to identify the best practices, learn from past successes and failures, and ensure that they do not attach unnecessary and/or impractical contingencies that work to discourage the use of these incentive programs.

e. Consider Making Public Grants Available for Necessary New Technology Adoption

New technologies are not always costly if one takes a long-term view. Often, they have higher upfront capital costs, but offer a continuous stream of cost-savings when in operation. When new technologies are commercially available and deemed necessary for clean air objectives, public grants may be necessary for certain sectors or some segments of an industry (e.g., small

[14] Currently, the application of emission reduction credits is generally restricted within the origin source category. The Rule 2202 program is an exception: those employers who are subject to the rule are allowed to use stationary source credits to reduce mobile source emissions produced by the daily commutes of their employees.

businesses) which have limited financial capacity and resources to invest in the new technologies.

- *Transit agencies continue to leverage federal, state, and local funds to develop alternative fuel fleets:* Several major transit authorities in Southern California, including the Los Angeles County Metropolitan Transit Authority (LA Metro), utilized public funds from federal, state, and local sources to convert all buses from petroleum to CNG fuel over the past decade. Not only did grants help mitigate the upfront costs of adopting cleaner technologies, they also enabled the transit agency to cut operational costs, due to the lower fuel price, as well as participate in R&D activities that improved design and lowered costs even further. Today, the over 2,000 CNG buses run by LA Metro will continue to lead to cost savings and reduced emissions over the long-term. Agencies are now following the same model for deploying Zero Emissions Buses (ZEBs) by using funds from California's Cap and Trade program.
- *Public grants were provided for professional wet cleaning systems to phase out perchloroethylene (perc):* In addition to the initial capital costs involved in replacing perc machines, operation of a wet cleaning machine requires learning time and is more labor intensive. Therefore, since the 2002 amendments to Rule 1421, the SCAQMD has provided grants of up to $10,000 to each owner/operator of dry cleaners to install professional wet cleaning systems (and $20,000 is offered for the more costly carbon dioxide machines). The State of California offers an additional $10,000 to replace a perc machine with a wet cleaning machine or another non-toxic and non-smog forming alternative. Moreover, compared to perc machines, a professional wet cleaning system offers operational benefits, such as potential energy savings, and allows dry cleaners located in more affluent areas to charge higher prices for providing environmentally friendly services.[15]

4. Beyond Initial Equipment Purchase Subsidies: Other Ways to Incentivize Clean Air Actions in the Private Sector

In the case studies and examples summarized above, it is recognized that targeted financial incentives that offset initial capital costs of equipment purchases can accelerate and broaden the adoption of zero and near zero emission technologies. However, public assistance that directly subsidizes equipment purchases is not the only route. The following examples demonstrate how various types of incentives can be used to promote clean air actions in the business community.

[15] Based on phone interviews conducted by SCAQMD staff in April, 2015.

a. Creative Incentive Programs Can Promote Technology Adoption via Market Mechanisms

SCAQMD staff has identified two examples where smart uses of market mechanisms can reduce air pollutant emissions with minimal public funds. Albeit fiscally desirable, this approach may however have limited applications as both cases involve public authorities that manage crucial transportation infrastructure.

- *Cargo owners incentivized to work with "clean" truck operators:* As part of the Clean Air Action Plan (CAAP) at the Ports of Los Angeles and Long Beach, the Clean Air Trucks program exempts cargo owners from paying the Clean Truck Fee ($35 per container) when they use truckers operating with alternative fuel equipment or "clean" diesel trucks.[16] According to the progress report published at the end of 2012, all diesel trucks calling at the Ports had 2007 or newer model year engines, and 8 percent of the entire fleet was powered by natural gas. Moreover, the collected fees have enabled the Ports to offer financial assistance to truckers for the purchase of cleaner trucks, with little impact on the Ports' budgets.
- *'Privileged' use of infrastructure incentivizes clean technology adoption:* A freight corridor is currently being evaluated as a component of an alternative for the Interstate Highway 710 Corridor Project, which extends from the Ports of Long Beach and Los Angeles to the Pomona Freeway (SR-60), an 18-mile major trucking artery. The project alternative would expand I-710 to include four lanes designated exclusively for trucks with zero tailpipe emissions, which are expected to significantly reduce traffic congestion for these trucks, thus increasing their operational efficiency with less travel time. According to preliminary estimates made by the project team, the monetized time savings over a payback period of five years are projected to be large enough to substantially offset the price premium of zero emission trucks.

b. Small Operational Changes Can Be Incentivized to Reduce Emissions

In addition to adopting new technologies and purchasing new or retrofitting equipment, some of the emission reductions that are needed for the upcoming air quality standard deadlines can be achieved by small operational changes that have low marginal costs. Financial incentives can be targeted to offset these costs to induce emission-reducing changes.

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[16] The "clean" diesel trucks need to meet or exceed the U.S. EPA's 2007 engine standard. However, cargo owners may not be exempted from the Clean Truck Fee if the "clean" trucks are purchased with Clean Truck Program funds. For details, see http://www.portoflosangeles.org/ctp/CTP_Clean_Truck_Fee.pdf (accessed June 16, 2015).

- *Ports of Los Angeles and Long Beach Incentivize Voluntary Speed Reduction to Reduce Emissions of Multiple Pollutants:* The Ports' Voluntary Speed Reduction program, a component of the Clean Air Action Plan, offers reduced dockage rates and environmental awards for ocean-going vessel operators who voluntarily reduce their speed to 12 knots within 20-40 nautical miles out from Port Fermin. More than 90 percent of all vessels calling at the Ports currently participate in the program, thus leading to substantial emission reductions of multiple pollutants.

c. Clean Technology R&D Incentives Reduce Investment Risks, Lower New Technology Cost Premiums, and Potentially Create Jobs

As already stated by many of the stakeholders, incentive programs will play a pivotal role in encouraging and promoting clean technology R&D efforts. These programs serve two major purposes. First, they have the potential to expedite technology advancement by reducing the upfront investment costs, and if the research efforts do not come to fruition, minimizing potential investment loss. Second, they can bring down the price premium needed for R&D cost recovery, thus potentially increasing the scale of early technology adoption.

- *Public grants can help demonstrate and eventually commercialize emerging electric truck technology:* The California Energy Commission and the SCAQMD[17] co-funded a demonstration project of battery-electric heavy-duty trucks developed by Transportation Power, Inc. (TransPower). The funding enabled the technology developer and manufacturer to test its pilot truck in real-world conditions for nearly a year and use the experience to further enhance technology and incorporate more advanced components. By the end of 2015, the technologies and components will have been used in an expanded demonstration project of at least 20 medium- and heavy-duty electric trucks, and they are also being applied to other types of heavy-duty vehicles, including off-road yard tractors and school buses. Recent testing of these electric trucks, conducted by University of California, Riverside, projected that the combined fuel and maintenance savings can significantly outweigh the higher upfront equipment cost.
- *Public R&D incentives spur private investment in zero emission vehicle (ZEV) infrastructure:* Newport Beach based FirstElement Fuel Inc. received nearly $28 million from the California Energy Commission's Alternative and Renewable Fuel and Vehicle Technology Program to construct publically available hydrogen refueling stations across the state. Encouraged by the state's commitment to developing a consumer market for ZEVs, Toyota and Honda supplied FirstElement Fuel with millions more in additional

[17] The SCAQMD obtained funding from U.S. EPA Region 9's Clean Air and Technology Innovation (CATI) Program.

infrastructure funding. This example illustrates how R&D incentives can mitigate risk and send signals to private businesses and investors to enter the market.

Importantly, R&D grants and incentives have the potential to create jobs related to advanced technology manufacturing and also in businesses that will support infrastructure building and maintenance. According to TransPower's estimate, for example, commercial manufacturing of 2,500 electric Class 8 trucks per year is expected to create a total of 1,500 new jobs.

5. Planning Concepts to Support a Business Case in the 2016 AQMP

This section lays out the principal planning concepts that will guide the development of the 2016 AQMP, based on the potential means that have been identified to help create a business case for clean air strategies. Many of the concepts proposed in this section are consistent with the set of criteria for evaluating the 2012 AQMP control measures, which include cost-effectiveness, emission reduction potential, enforceability, legal authority, public acceptability, rate of emission reduction, and technological feasibility. Some of the proposed planning concepts further elaborate or expand upon these existing criteria.

a. Prioritize Business Case Strategies

To the extent possible, the 2016 AQMP will prioritize implementation of strategies that have the potential to create a business case. This is consistent with the existing approach of cost-effectiveness ranking of control measures, as the business case strategies will be designed to generate economic benefits, such as better energy efficiency, lower capital, fuel, or other operation and maintenance costs, all of which are anticipated to offset the overall compliance costs for at least some of the affected industries.

b. Maximize Compliance Flexibility with Multiple Emission Reduction Pathways

The 2016 AQMP will, to the extent possible, maximize compliance flexibility by allowing multiple pathways to achieve an emission reduction target. This is in recognition of the fact that each individual business operates with different business models and faces different cost curves; thus, a facility would be able to choose the path that is the most cost-effective for its business to achieve the required policy target. Moreover, regulatory flexibility is also shown to be more likely to promote voluntary actions that can result in implementation that goes above and beyond the policy target.

c. Maintain a Technology Neutral Approach

Acknowledging that different fuel technologies may be more suitable for different types of business operations, the 2016 AQMP will maintain a technology-neutral approach in the design of control measures and related programs and by advocating for national performance standards, the latter of which will at the same time level the playing field for businesses that may operate in different locations but serve the same market. Diversity in fuel choices and zero and near zero emission technologies will help to maximize compliance flexibility, and at the same time, bolster innovation and promote cost reduction through competition. A technology neutral approach also helps to provide greater regulatory certainty by not requiring businesses to commit to a specific fuel/technology.

d. Ensure A Fair Share of Emission Reduction Obligations and Broad Stakeholder Involvement

The 2016 AQMP will identify ways to more fairly distribute emission reduction and funding obligations by, for example, seeking interstate collaboration, as well as federal and international support to reduce emissions from sources in interstate and international commerce. In addition, the 2016 AQMP will also make a good faith effort to fairly distribute emission reduction obligations among the sources of pollution within the region. This will require broad stakeholder involvement; therefore, the 2016 AQMP and the ensuing rule-making activities will further strengthen the agency's public outreach and consensus building efforts to actively involve the broadest possible base of potential stakeholders.

e. Avoid Stranded Assets By Utilizing the Strategies That Can Potentially Enhance Operational Efficiency While Reducing Emissions

Within the constraint of the given air quality attainment deadlines, the 2016 AQMP will minimize the need to replace equipment that has a remaining useful life consistent with the industry standard. To the extent possible, the 2016 AQMP will make every effort to first explore the emission reduction potential of strategies that can possibly enhance operational efficiency on the existing equipment, while maintaining the current level of throughput. These strategies may include, for example, promotion of best management practices and full utilization of information and data acquisition technologies to monitor and optimize operations.

f. Propose Targeted Incentive, Financing, and Funding Programs for Business Operators

In cases where equipment replacement and procurement are needed, the 2016 AQMP will propose financing and funding programs with public grants, through private collaborators, or via public-private partnerships. These programs will be specifically designed to assist equipment operators with overcoming the economic "gaps" in achieving a business case (e.g., high up front

capital costs and long payback periods). The 2016 AQMP will also propose targeted incentive programs to accelerate voluntary early adoption of zero and near zero emission technologies as well as to speed up voluntary retirement of old equipment with high emission rates. The incentives will provide direct financial benefits or indirect, non-monetary benefits with economic values. For example, the SCAQMD may consider seeking public-private partnerships with truck manufacturers and other public agencies to establish a conditional incentive program that limits its participation to small truckers. The design of such a program could offer price discounts/financial assistance to purchase zero and near zero emissions vehicles on the condition that the previously used "dirty" truck is scrapped. The amount of financial incentives can be determined in a way that is proportional to a weighted index of the scrapped truck's emissions of air pollutants and its market value.

g. Propose Targeted Public Grants and Explore Innovative Financing Tools for Technology Developers and Infrastructure Providers

Due to their inherently high investment risks, early stage research and development as well as long-term infrastructure planning usually have to rely heavily on public grants. To potentially increase technological feasibility, the 2016 AQMP will propose to focus public RD&D funding and incentives on technologies and fuels with the potential to reduce capital or O&M costs, and/or potential to address multiple needs (e.g., criteria pollutants, local toxics, energy security, greenhouse gas, etc.) with single investments. A similar proposal will also be made to spur infrastructure investment to support zero and near zero emission technologies, either by lowering investment risks or ensuring a financially sustainable level of market demand. Moreover, the 2016 AQMP will explore innovative financing tools, such as impact investment bonds, that have been used for projects where institutions and organizations traditionally have difficulties recruiting private investors and have shown success in promoting cross-sector collaboration to achieve socially or environmentally desirable outcomes.

h. Pay Special Attention to the Unique Needs of Small Businesses

SCAQMD staff is fully aware of the importance of small businesses in supporting the regional economy and creating jobs. Therefore, the 2016 AQMP and the ensuing rule making activities will continue, and enhance where needed, the ongoing practice of paying special attention to the unique needs of small businesses and establishing small business assistance programs as applicable. As small businesses tend to hold on to equipment for a longer-than-average amount of time (e.g., small truckers), the 2016 AQMP will carefully evaluate the industry structure of affected sectors and their equipment usage pattern to avoid stranded assets, within the constraint of attaining air quality standards by the given deadlines. When proposing incentives and other financing/funding programs, special consideration will also be given to the relatively limited financial capacity of small business operators.

i. Minimize Resources Required for Compliance and Enforcement

In anticipation that the 2016 AQMP may propose to have some segments of the goods movement sector begin or expand the adoption of zero or near zero emission technologies, the SCAQMD will make every effort to help ensure full information flow between businesses and the technology developers/equipment manufacturers to minimize the resources spent on trial and error. This can be potentially achieved by, for example, providing venues for technology demonstration and assisting with information dissemination. The 2016 AQMP and the ensuing rule-making activities will also, to the extent possible, minimize the administrative burdens required for the regulated facilities to come into compliance and for the SCAQMD to enforce regulations. This will work toward the goal of minimizing inadvertent costs to business due to possible competitive disadvantages created by inadequate enforcement.

j. Facilitate Job Training and Job Creation Associated with Low Emission Technologies

One important lesson provided by the large fleets that have adopted low emission transportation technologies is that driver and technician training is critical in successfully adopting new advanced technologies. Therefore, the 2016 AQMP will explore the possibility of multi-sector collaboration to support job training associated with zero and near zero emission technologies in order to facilitate and accelerate broader adoption of advanced technologies. In addition, the 2016 AQMP will also explore feasible ways to facilitate siting of new/relocated businesses developing, manufacturing, or employing with zero and near zero emission technologies, with the aim of creating well-paid advanced technology jobs in this region.

6. Next Steps

This preliminary draft white paper and the proposed principal planning concepts to support a business case for clean air strategies will be discussed in the next working group meeting, scheduled in the second quarter of 2015. Stakeholder comments and other feedback will be incorporated into the final draft to be presented to the SCAQMD Governing Board in September, 2015.

As mentioned at the beginning of this white paper, SCAQMD staff is committed, to the extent possible, to creating a business case for deployment of needed technologies and efficiency measures when developing the 2016 AQMP. The principal planning concepts will be used to guide the development of control measures and related programs. Moreover, SCAQMD staff will also develop an evaluation matrix, to be included in the 2016 AQMP, to monitor and assess whether and to what degree these concepts have been integrated into the proposed clean air strategies to support a business case for clean air strategies.