Advanced Clean Trucks (ACT) Now Plan

A Plan for Near-Term Clean Air, Economic Investment and Job Creation, and Increased Port Competitiveness

Submitted by the California Natural Gas Vehicle Coalition

California Natural Gas Vehicle Coalition

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Executive Summary

The California Natural Gas Vehicle Coalition ("CNGVC") supports the development and implementation of an aggressive San Pedro Bay Ports (SPBP) Clean Truck Program ("CTP") as part of the updated 2017 Clean Air Action Plan ("CAAP"). The deployment of an increasing number of zero- and near-zero-emission trucks via the final CTP adopted by the SPBPs will – in the near term – dramatically improve regional air quality; drive job growth throughout the region and the State; and increase the competitiveness of the Ports of Los Angeles and Long Beach and the entire California goods movement system.

The CNGVC strongly supports the Clean Trucks Program Recommendation (also attached as Appendix A) put forward by Mayor Garcetti's Sustainable Freight Advisory Committee ("SFAC") to replace 100 percent of the existing drayage fleet with zero- and near-zero-emission trucks by 2023. The CNGVC firmly believes the SFAC's recommendation is completely feasible and should therefore be a *requirement*, and not just a goal. The CNGVC has therefore put together a number of specific ideas and suggestions on how the SFAC's recommendation can be successfully implemented in a cost-effective and efficient manner. These ideas are presented in this proposed "***Advanced Clean Trucks (ACT) Now Plan***." ("*ACT Now Plan*" or "*ACT Now*")

The *ACT Now Plan* is inclusive of all zero and near-zero emission technologies and fuels, including natural gas, propane, battery electric, hydrogen fuel cell electric, or others capable of meeting a 0.02 g/bhp-hr NOx standard and achieving at least a 40 percent reduction of greenhouse gas (GHG) emissions using renewable fuels/energy. The CNGVC does not exclude the use of diesel engines as part of this plan. However, caution is recommended when considering the use of "clean" diesel engine technologies given the ongoing and repeated challenges that have been documented when it comes to in-use emissions being five times (5x) [1] to nine times (9x) [2] higher than actual engine certification levels, particularly when operating in low-speed application such as port drayage or in regional goods movement along Southern California's congested freeways.

The proposed *ACT Now Plan* supports the calls of both Long Beach Mayor Robert Garcia and Los Angles Mayor Eric Garcetti to strengthen the CAAP in the months since the release of the 2017 Draft Discussion Document. As Mayor Garcia noted in the November release of the document, "*These updates will move the region closer to a zero emissions future. We have already proven that it's possible to increase jobs and trade with cleaner air and healthier communities and I want to thank all of our partners who helped make this possible.*" Mayor Garcetti then challenged the audience at the joint harbor commission meeting on November 17 to make sure that the ports and cities "*get it right*." He asked for "*ideas from advocates and community stakeholders*," "*cooperation from our local, state and federal officials*," and reminded the audience of the City's own two (2), five (5) and 10 year goal setting approach when focused on environmental and economic sustainability. Finally, Mayor Garcetti posed the questions:

- *How can we get there faster?*
- *Is there more we can do?*
- *Are we being bold?*
- *Can we get to zero emission truck trips?*
- *Can we get the dirtiest trucks off our roads in the next few years?*

[1] Miller, Johnson, Durbin, Dixit. "In-Use Emissions Testing and Demonstration of Retrofit Technology for Control of On-Road Heavy-Duty Engines." September 2013. www.cert.ucr.edu/research/efr/2013_AQMD_in-use_retrofit_Miller.pdf. UC Riverside CE-CERT Ultra-Low NOx Natural Gas Vehicle Evaluation Fact Sheet also attached hereto as Appendix C.

[2] Yoon, Collins, Misra, Herner, Carter, Sax. "High In-Use NOx Emissions From Heavy-Duty Diesel Trucks Equipped with SCR Systems and Their Impact on Air Quality Planning in California." October 26, 2016

The *ACT Now Plan* provides very firm and clear answers to all of these questions and provides a roadmap by which the two cities and their respective ports can provide healthier communities, while increasing jobs and trade, and simultaneously tackling the difficult challenges of climate change mitigation.

The *ACT Now Plan* prioritizes the most immediate and cost-effective emission reductions possible in order to provide improved air quality as soon as possible in the communities disproportionately impacted by diesel emissions, and to meet the near and long term energy and environmental regulatory requirements and policy goals of the region and the State.

The *ACT Now Plan* is based upon the three key pillars detailed below, and an underlying consideration that these important efforts must be implemented as quickly as possible (i.e. we must "act now"):

1. Environment – Clean Air and GHG Reductions
2. Economic Investment and Job Creation
3. Port Competitiveness

Environment – Clean Air and GHG Reductions

The *ACT Now Plan* offers the most proven, cost-effective and immediate opportunity to effectively eliminate emissions from the approximately 13,000-unit active drayage fleet now serving the Ports of Los Angeles and Long Beach (collectively the "San Pedro Bay Ports" or "SPBPs"). Leveraging commercially available and viable technology, by 2023, this plan will – once and for all – remove one of the largest sources of emissions in the San Pedro Bay and Southern California region. This will provide significant and important health benefits to those living near the SPBPs, along the goods movement corridors connecting the two ports to the rest of the nation, as well as to all residents in Southern California. The *ACT Now Plan* ensures that the region does not have to forgo incredibly important short-term health benefits while pursuing idealized long-term solutions.

The *ACT Now Plan* will contribute to realization of the 2023 Federal 80 ppb 8-hour ozone standard and other near-term goals outlined in the 2016 South Coast Air Quality Management District (AQMD) Air Quality Management Plan (AQMP), and other Federal air quality standards over the next one to two decades. Likewise, an increased reliance on zero and near-zero emission truck technologies – such as is recommended by the SFAC and CNGVC in this *ACT Now Plan* – will directly benefit those opposed to the potential AQMP amendments to consider the use of indirect source rules for ports, warehouse and distribution centers.

Beyond criteria pollutant benefits, the proposed *ACT Now Plan* will aggressively contribute to a number of important climate mitigation goals being driven by AB 32, SB 32 and other California policies through 2050 and beyond. The capture and use of waste methane streams as an ultra-low carbon fuel is one of the most effective ways by which the State can mitigate the release and impact of Short Lived Climate Pollutants (SLCPs), while at the same time drive considerable economic investment, development, and job creation throughout California.

Economic Investment and Job Creation

The full implementation of the proposed *ACT Now Plan* will require an estimated $1.0 to $1.3 billion in investment in the continued development of a regional low carbon fuel truck refueling network – ***nearly all of which is expected to be provided by private capital***. An estimated 50 to 100 or more fueling stations

will be required to support the proposed plan, and significant investment will occur in the RNG production, processing and distribution network within California. All of these infrastructure investments can begin immediately. They will require a large number of engineering and construction related jobs in all of the building trades over the next five to 10 years, as well as a number of operational and high tech permanent jobs required to operate and maintain these facilities on an ongoing basis. Best of all, these "green tech" jobs will contribute to significant reductions of criteria and greenhouse gas pollutants, and the increased competitiveness of the Southern California ports and connected goods movement system – all of which can take place in the short-term. Instead of trade-offs between jobs and clean air and climate protection, the *ACT Now Plan* provides both simultaneously.

Port Competitiveness

The proposed *ACT Now Plan* will yield a significant number of benefits to the continued dominance and forward competitiveness of the San Pedro Bay Ports.

- The *ACT Now Plan* will help to maintain the thousands of existing good paying jobs in the harbor and Southern California goods movement system; the plan presents no risk to the 1 in 9 jobs in the region connected to the activities of the SPBPs.
- With limited funding available, the *ACT Now Plan* provides the lowest cost pathway to cleaning truck emissions, thus reducing goods movement costs through the SPBPs. Further, the plan provides market flexibility and choice, and thus ensures that the "perfect does not get in the way of the good."
- Eliminating drayage truck emissions via this ambitious clean air plan will be widely heralded as an incredibly important environmental achievement. Such an achievement will provide greater flexibility to the two ports when working to modify and/or add new port infrastructure, attract resources and capital, and tenants.
- The sustainability benefits offered to cargo owners and shippers will provide an additional "value add" beyond the fastest, most robust and competitive path-to-market assets already offered in Southern California. It will also be seen as reducing the regulatory and environmental compliance risk faced by companies doing business in California.
- Leading heavy-duty truck manufactures (Freightliner, Volvo, Kenworth, Peterbilt, Mack) and their comprehensive dealer networks are fully prepared to design, engineer, sell, and support the clean trucks envisioned by this plan, thereby eliminating new technology manufacturer risk and ensuring goods will continue to move without disruption.

When implemented:

By 2023, the *ACT Now Plan* would provide:

- 99 percent reduction in annual NOx emissions, which equates to approximately 5.5 tons of NOx per day of surplus NOx emission reductions for Southern California
- 100 percent reduction in petroleum consumption (over 115 million DGE/year) and the corresponding use of ultra-low carbon renewable fuel, largely produced in California
- $1.0 to $1.3 billion of private sector investment in fueling infrastructure, supply chain assets and renewable natural gas production facilities throughout California
- Immediate and significant California-based job creation across a range of building trades in the next five to 10 year period.

By 2035, the cumulative benefits of the proposed *ACT Now Plan* compared to the current draft Clean Air Action Plan (CAAP) 2017 Draft Discussion Document would be:

- 60 percent fewer truck replacements: 21,000 trucks (cost: $2.4B) vs 52,000 trucks ($4.3B)
- 55 percent fewer NOx emissions: 12,800 tons vs 27,700 tons
- 35 percent fewer GHG emissions: 21.4 million tons vs 33.1 million tons

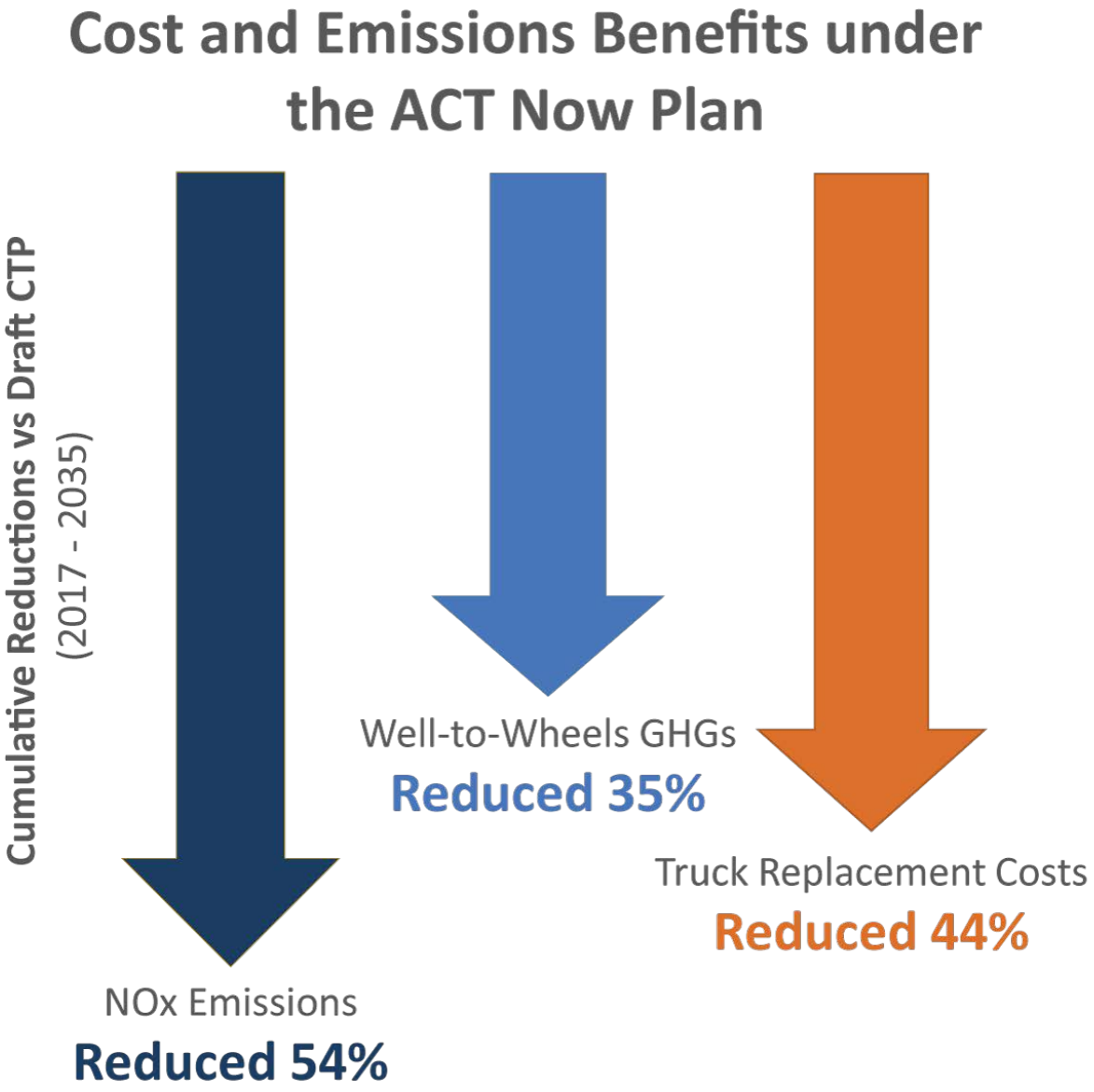


Figure 1: Benefits of the *ACT Now Plan* compared to the CAAP 2017 Draft Discussion Document Clean Truck Program

Transition Strategy

Exempt Existing Natural Gas Trucks Until 2023

The CNGVC supports the SFAC Clean Trucks Program Recommendation that the SPBPs should work with their respective Mayors to "*cause older and higher emitting trucks to be removed from port drayage service in order that they are replaced with ultra-low emission and/or zero emission technology*." Should the approach selected by the ports be to impose fees on diesel trucks with engines that are 10 years or older, the CNGVC recommends that zero- and near-zero-emission trucks be exempt from fees on an ongoing basis.

The CNGVC advocates that existing in-use natural gas trucks in the San Pedro Bay Port Drayage Truck Registry ("Registry") be exempt from such fees until 2023, at which point all trucks in the Registry must be upgraded to units meeting the California Air Resources Board (CARB) Optional Low NOx emission standard of 0.02 g/bhp-hr.

The rationale for exempting existing in-use natural gas trucks from fees is that, while most of these trucks are model year 2007 through 2009, they are powered by Cummins Westport 8.9 liter ISLG natural gas engines that were certified to the 0.2 g/bhp-hr NOx standard before it became the national standard (commonly referred to as "the EPA 2010 Standard"). Therefore, at a minimum, these existing natural gas trucks have emissions equivalent to trucks powered by U.S. EPA model year 2010 engines and should considered equivalent to a model year 2010 truck/engine. Further, existing natural gas trucks in the SPBPs are fueling with RNG and are therefore reducing GHG emissions by more than 60 percent compared to diesel[3].

There are slightly more than 700 of these existing in-use natural gas trucks still operating in the Los Angeles and Long Beach port complex. These natural gas trucks were deployed as part of a commitment to lower emission alternative fuel platforms to help the two ports reduce emissions within the harbor. Nearly all of these trucks are still operating today and continue to provide important air quality benefits within the region. Further, these trucks continue to rely on and sustain the existing natural gas fueling infrastructure and RNG supply chains that will be imperative to support a zero emission future.

Recent in-use emissions performance testing by the nation's leading testing laboratories (WVU and UCR CE-CERT) of low emission natural gas trucks and U.S. EPA 2010 emission diesel trucks has shown that natural gas engines tend to operate at or below their certification level when operating in a port drayage duty cycle[4], while the diesels operate nearly 100 percent of the time with significantly reduced effectiveness of the after-treatment systems. A January 2017 CARB report[5] confirmed that in-use diesel truck emissions can be up to nine times (9x) higher than their U.S. EPA 2010 certification level when operating in low speed applications (such as port drayage). Therefore, it would not be in the best interest of air quality to replace an existing lower emitting natural gas truck (which is running on low carbon RNG)

[3] Based upon an approximately CI value of 40 gCO2e/MJ for the Clean Energy LNG/LCNG station in the Port of Long Beach.

[4] Johnson, Jiang, Yang. "Ultra-Low NOx Natural Gas Vehicle Evaluation – ISL G NZ." November 2016. www.cert.ucr.edu/research/efr/2016%20CWI%20LowNOx%20NG_Finalv06.pdf

[5] Yoon, Collins, Misra, Herner, Carter, Sax. High In-Use NOx Emissions From Heavy-Duty Diesel Trucks Equipped with SCR Systems and Their Impact on Air Quality Planning in California. October 26, 2016.

and replace it with a higher emitting used diesel truck (which is fueled with traditional petroleum-based fuel).

Immediately Seek Incentive Funding

Should fees be collected as part of the Clean Truck Program, as was the case in the 2006 Clean Truck Program, they will almost certainly be insufficient to fund the full replacement of the existing drayage fleet with zero- and near-zero-emission technology. Significant additional sources of funding will be required to fully fund the Clean Truck Program at the levels needed to achieve the replacement goals.

The CNGVC concurs with the SFAC and also recommends that the SPBPs, and the respective mayors and council, work as aggressively as possible "*with federal, state and local agencies, elected officials and others to advocate for the allocation of existing and new financial resources required to implement this vision by the end of 2023*." The CNGVC further agrees with the SFAC that "*with hundreds of millions of dollars in incentives available in the marketplace today from a variety of other sources, now is the time to demonstrate the leadership needed to focus these resources on the Clean Trucks initiative being recommended by the Port of Los Angeles Sustainable Advisory Committee*," and in this *ACT Now Plan*.

As is extensively documented in the first page and a half of the SFAC Clean Trucks Program Recommendation (Appendix A), there are a number of incredibly important reasons why stakeholders throughout the region need to mobilize with a sense of urgency in order to secure the necessary funds to implement this ambitious and important plan. Making considerable progress towards the elimination of emission from the SPBP drayage truck fleet will provide tremendous positive near-term air quality and health impacts on the communities living adjacent to the SPBPs and throughout the warehousing and distribution centers served by the two ports in South LA, Southeast LA, the Inland Empire and elsewhere in Southern California. These efforts, combined with the proliferation effect of the plan (i.e. a large deployment of near-zero emission port trucks will spur the use of this technology by other non-port trucks throughout the region, as was seen with the first Clean Truck Program), will have significant near-term benefits to the South Coast Air Basin and the ability to achieve the goals of the 2016 Draft AQMD Air Quality Management Plan. The emission reductions obtained from the mobile heavy-duty truck sector will not only directly contribute to the realization of the goals in the AQMP, but will also reduce the pressure on other stationary sources and the need to consider measures such as indirect source rules, "backstop" rules, etc. The ability to make such considerable progress in the fight for clean air in the South Coast Air Basin via the use of zero and near-zero emission trucks should be a rallying tool for all stakeholders to work collectively to secure the necessary financial resources to realize the goals of this proposed plan. With the measurement year for the 2023 U.S. EPA 80 ppb 8-hour ozone standard being 2022, and with a CARB goal to deploy up to 900,000 near-zero heavy-duty trucks by 2030[6], there needs to be a strong sense of determination and resolve to identify, confirm and use the funds needed to implement this plan in the next few years. All industry stakeholders must "act now."

Funding for Zero- and Near-Zero-Emission Trucks

The CAAP 2017 Draft Discussion Document proposes that "*all proceeds from the fee will be used to defray the administrative costs of the program and for incentives to the trucking industry to accelerate the*

[6] CARB Mobile Source Strategy, Table 2: On-Road Fleet Transformation (p.50), May 2016. https://www.arb.ca.gov/planning/sip/2016sip/2016mobsrc.pdf

transition to near-zero and zero-emission trucks." Should this approach be adopted by the two ports, the CNGVC strongly recommends that these funds only be provided to trucks with propulsion technology meeting the CARB Optional Low NOx emission standard of 0.02 g/bhp-hr. Further, as recommended by the SFAC, funding should only be provided to technologies "*that are commercially available and viable for commercial deployment as fully capable, heavy-duty drayage trucks in a port application*."

With limited resources and a need to potentially replace approximately 13,000 active drayage trucks, and a wide range of policy goals to achieve, it will be imperative that any investment of resources in zero- and near-zero-emission technology be done in the most cost-effective manner possible. Under no scenario shall any investment of fees and/or other port grant programs be exclusive to a specific technology. All technologies that meet or exceed a 0.02 g/bhp-hr NOx standard should be eligible for such funding.

To ensure all investments are reducing the maximum emissions possible for the least investment, the CNGVC recommends a series of cost-effectiveness metrics be established to guide investments by the San Pedro Bay Ports. These metrics should, first and foremost, be focused on the reduction of criteria pollutants. Reductions of GHG emissions, reductions in petroleum usage and the increased use of low carbon and non-petroleum fuels should be considered following criteria pollutant emission reductions. Consistent with the SFAC's recommendation, the SPBPs should "*require zero- and near-zero-emission trucks that receive funding to use a low carbon fuel that achieves at least a 40 percent well-to-wheels based carbon reduction from CARB diesel.*"

Funding Levels per Truck

The CNGVC recognizes that the amount of the incentive on a per truck basis will likely be impacted by the source of the money being used to fund the CTP Inventive Program ("Incentive Program"). However, the CNGVC recommends that funding from the Incentive Program should be $100,000 per zero- or near- zero-emission truck. This level of funding is consistent with the current CARB Prop 1B grant awards for near-zero emission trucks, which has seen considerable application by private sector fleets, especially in Southern California. A $100,000 grant was a sufficient amount to drive the purchase of ultra-low NOx natural gas truck technology in the 2016 CARB Prop 1B Program. With this level of funding, a disproportionate burden is not being placed upon the driver, which is a significant consideration for any new clean truck program going forward. Additionally, it is recommended that any incentives be structured in a way as to not result in an onerous tax burden to port drayage truck owners and/or drivers.

Open the CTP Incentive Program Immediately

Immediately upon adoption of the 2017 CAAP and corresponding CTP, the SPBPs should announce – and open as soon as possible – the details of the Incentive Program in order that the end-user community can become familiar with the program details and be fully prepared to apply to the program when funds become available. This will also send the right signals to public agencies from whom the two ports would like to receive additional funding support.

100 Percent Zero- and Near-Zero-Emission by 2023

The CNGVC supports the SFAC's recommendation and goals to replace 100 percent of the existing diesel powered drayage fleet in the San Pedro Bay Ports with equipment that provides zero and near-zero

emissions by the end of 2023 (if not sooner considering the replacement of the San Pedro Bay Ports drayage fleet was completed in less than five years in the first CTP).

The CNGVC therefore recommends that by July 1, 2023, all trucks in the Registry must have propulsion systems that meet or exceed the CARB Optional Low NOx emission standard of 0.02 g/bhp-hr and, where CTP Incentive Program funding is used, "*use a low carbon renewable fuel that achieves at least a 40 percent well-to-wheels based carbon reduction from CARB diesel*" (consistent with the SFAC recommendation). Documentation of fuel use should be similar to that which is required in the CARB Hybrid Voucher Incentive Program (HVIP).

A July 1, 2023, deadline will provide at least six (6) years of advanced notice to end-users in the market in order that they can seek out various funding sources required to purchase and deploy a compliant truck in advance of the deadline. This six-year phase-in approach will also spread out the annual funding needs of the Incentive Program and therefore make the yearly resource requirement more manageable given the various existing programs in California (see "Pay for Plan" for further details). To make this work properly, the SPBPs will need to develop a specific milestone-based approach to ensure a consistent implementation of zero and near-zero emission trucks throughout this six (6) year period.

In addition to end-users and funding program managers, the *ACT Now Plan* will send a strong signal to the market on the need and opportunity for zero- and near-zero-emission truck technology and low carbon fuels. With a market size of 13,000 or more units, there is sufficient potential demand to encourage everyone – from small technology providers to regional energy suppliers and global OEMs – to accelerate the development and commercialization of the products and fuels required to meet the needs of the final CTP by 2023.

It is worth noting that the Clean Air Act requires a phase-in of four (4) engine model years (which is effective a four calendar year period) for the implementation of a new emissions regulation for heavy-duty engines; thus the July 1, 2023 provides more time than is provided by U.S. EPA within the Clean Air Act. In the interim period between rule adoption and implementation, voluntary actions and incentives are common.

"Pay For" Plan – Funding is Available, Leadership Required

With approximately 13,000 active trucks in the San Pedro Bay Port Drayage Truck Registry, and assuming a $100,000 per truck incentive is to be offered, $1.3 billion in incentives will be required to fulfill the total potential needs of the Incentive Program. While this is undoubtedly a large sum, when spread over a six year period (assume July 2018 CTP commencement through full implementation of the CTP by July 2023), approximately $216 million per year will be required in each of these six years. Again, while a large sum, the CNGVC believes that it is very feasible that between $200 and $250 million per year could be allocated to this incredibly ambitious and important clean air plan – **a plan that will effectively eliminate one of the largest sources of emissions in the South Coast Air Basin**.

Given the cost-effective nature of the proposed investment, it is not unreasonable to assume that $225 million per year could be aggregated among key public agencies to provide the resources required to pay for this aggressive and important plan. Between $600 million to $700 million per year is spent in California transportation technologies and fuels, including technology development, demonstration, and

deployment.[7] With such resources being spent on an annual basis, it is clearly not a matter of available funds. What is needed is the political leadership, will and commitment to "act now" to dedicate these resources to a worthy plan such as the proposed *ACT Now Plan*.

The proposed *ACT Now Plan* is worthy of consideration for the aggregation of the required local (including port), State and federal funding given the multiple air quality, climate change, policy and economic benefits it will achieve. The following "strawman" provides a high level concept on how $225 million per year could be identified and commitment to this important clean air plan.

Table 1: Strawman Approach to Funding the *ACT Now Plan*

Program	Potential Annual Funding	Source
Environmental Mitigation Trust Funds	$25 million	VW Partial Consent Decree Settlement
Local Government Investment	$25 million	SCAQMD + MSRC
Local Port Authority Investment	$25 million	Port of Long Beach
Local Port Authority Investment	$25 million	Port of Los Angeles
Local Port Authority Investment	$25 million	Port Authority Truck Fees
California State Investment	$25 million	ARB's Low Carbon Transportation Program (GGRF) / AB 1613 / HVIP
California State Investment	$25 million	AB 118 / California Energy Commission
Federal Investment	$25 million	EPA DERA
Federal Investment	$25 million	US DOE
TOTAL	$225 million	

The above "strawman" in Table 1 provides a conceptual overview of how $225 million per year could be assembled amongst key public funders. The CNGVC does not believe that the kinds of allocations noted above are unreasonable given the tremendous discretionary resources available to these agencies on an annual basis, and the importance of this proposed *ACT Now Plan*.

The CNGVC has researched and analyzed a range of local, state and federal incentive programs to determine the potential contributions needed to support this plan. Details on these are provided in

Table 2. In some cases – such as the local investment from the two ports and AQMD – the annual contribution is suggested to come from the agency's general operating budget.

[7] Approximately $669 million was allocated to clean low carbon transportation in California in 2016 via ARB's Low Carbon Transportation and Fuels Program, CEC's Alternative and Renewable Fuel and Vehicle Technology Program, and a number of other similar state-level and local funding programs. This level of investment from these programs is generally comparable to prior years.

Table 2: Summary of Relevant Existing and Potential New Funding Programs

Program	Potential Annual Funding	Source[8]
Federal Government Investments	$45 - $70 million	DOE's Vehicle Technologies Office and EPA's DERA Program
Environmental Mitigation Trust Funds	$32 million	Volkswagen Partial Consent Decree Settlement
Local Government Investment	$25 million	SCAQMD and MSRC
Local Port Authority Investment	$25 million	Port of Long Beach
Local Port Authority Investment	$25 million	Port of Los Angeles
Local Port Authority Investment	$25 million	Port Authority Truck Fees
HVIP and Other Heavy-Duty Pilot Projects	$23 million	AB 1613 / ARB's Low Carbon Transportation Program (GGRF)
Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP)	$10 million	AB 118 / California Energy Commission
TOTAL	$210 - $235 million available each year	

While the programs presented in

Table 2 have resources beyond the likely requirement of the *ACT Now Plan*, these funds are not specifically dedicated to port or clean truck projects. The point of this summary table is to show that the challenge is not the availability of such resources, but rather gaining the cooperation and agreement of these controlling agencies to dedicate such resources to this important *ACT Now Plan* concept.

A few particularly relevant examples include:

(1) California does have the ability to "pull forward" its allotment of Volkswagen funds. Specifically, it can request up to one-third of its allocation (~$127 million) during the first year of funding. Also, California may request up to two-thirds of its allocation (~$254 million) during the first two years of funding. Thus, given the right application of political will, California could use a substantial portions of its Volkswagen settlement funds in 2017-2019 to fund this project.

(2) AB 1613 appropriated $900 million to GHG reducing programs that support transportation and sustainable communities programs ($650 million), clean energy and energy efficiency programs ($90 million), and natural resources and waste diversion programs ($160 million).[9] While $650 million represents a viable and impactful source of funds for clean transportation projects, only $23 million of it has been carved out specifically for low-NOx natural gas trucks as part of the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP).[10]

[8] More specific information on a selection of these sources in Appendix B.

[9] "Auction Proceeds Budget Appropriations". California Environmental Protection Agency, Air Resources Board, November 17, 2016. https://www.arb.ca.gov/cc/capandtrade/auctionproceeds/budgetappropriations.htm.

[10] "California Climate Investments from the Greenhouse Gas Reduction Fund". California Climate Investments, September 2016. https://www.arb.ca.gov/cc/capandtrade/auctionproceeds/final_expenditure_table_revised_10-6.pdf.

(3) EPA's DERA Program has long served as a reliable source of funding for clean diesel and alternative fuel transportation projects, with $520 million disbursed to clean up nearly 59,000 vehicles since 2008. However, the program is not being used to its full potential – authorized at $100 million annually, the DERA program only distributes $20 to $50 million each year on average, per Congressional budgets. Further, the DERA program developed The Ports Initiative in 2014. Importantly, this initiative can be used as a conduit for funds distributed to our nation's ports to conduct clean transportation projects. Of course, we must also recognize that the future of this program could be in jeopardy under the current Administration.

(4) The California Energy Commission's Alternative and Renewable Fuel Vehicle Transportation Program (ARFVTP) provides as much as $100 million each year to a wide variety of clean transportation projects. However, only $10 million of this is dedicated to its alternative fuel trucks program, the Natural Gas Vehicle Incentive Project (NGVIP), with the remaining 90 percent of funds dedicated to other fuel and project types.

These examples show that the level of funds required is available and, with the required political leadership and agreement of the parties, could be allocated to the *ACT Now Plan* for the next several years. Accordingly, the CNGVC strongly supports the recommendation of the Mayor's SFAC "*to further build and lead a coalition of businesses (including cargo owners, shipping companies, terminal operators and others), environmental, community, regulatory agency, and other stakeholders to advocate for this shared vision to the greatest extent possible*." More specifically, the CNGVC recommends that such a coalition work with the Energy Commission, CARB, SCAQMD, and others to modify funding plans and annual budgets in coming years to specifically dedicate significant funds to or at least make them competitively available to the *ACT Now Plan*.

It is worth noting that while the above funds can all be dedicated to advanced transportation projects such as proposed *ACT Now Plan*, each funding agency will have its own set of specific requirements. For example, certain Federal Government Investments, such as those from the Department of Energy, are not standard vehicle reimbursement grants. Rather, these are often multi-year agreements that will require innovative elements such as pre-commercial technology demonstrations, automation, and data sharing. In this case, as is the case with most of these programs, specific work with each funding organization will be required to determine how best to leverage these funds to support the *ACT Now Plan*.

In addition to the above listed funding opportunities, a number of other sources have been identified in the draft AQMP that could be dedicated at some point to a Clean Trucks Program. These potential opportunities, shown in Table 3 below, represent new sources of funding that could be added into existing or create new transportation funding programs, such as a program to fund the *ACT Now Plan* concept. The CNGVC recommends that the two ports work aggressively to ensure that an appropriate amount of any funds collected from these programs be allocated to the *ACT Now Plan*.

Table 3: Summary of Potential New Additional Funding Sources[11]

Potential Funding Opportunity	Potential Annual Funding for the South Coast Region
Cargo Container Fee (~11 to 12 Million Loaded TEUs @ $35/TEU)	$385 million
Expanded Motor Vehicle Registration Fees (~12 Million Registered Vehicles @ $20/vehicle)	$240 million
Mileage-Based User Fee ($0.005/Mile Add-On to SCAG RTP/SCS Analysis)	$1.04 billion
Gasoline/Diesel Excise Tax Add-On (~7.2 Billion Gallon @ $0.01/Gal)	$72 million
Crude Oil Sales Tax (~28.5 Million Barrels @ $40/barrel with 10% Tax)	$114 million
Property Tax ($2.3 Trillion Secured and Unsecured Tax Roll @ 0.01%)	$230 million
Retail Sales Tax Add-On ($273 Billion Taxable Sales @ 0.1%)	$273 million
TOTAL	$2.354 billion

In addition to the above incentives, which clearly show there is no shortage of funding programs that could be dedicated to the *ACT Now Plan*, there are a variety of other financial programs available to help drivers to replace their existing trucks with a new zero- or near-zero-emission unit. California has a specialized lending program (i.e. CalCAP[12]) available to independent owner operators. CalCap typically funds 3,000 to 4,000 trucks per year and has the capacity to support the port truck deployments discussed in the proposed *ACT Now Plan*. Likewise, SBA financing is available, in addition to traditional lending opportunities offered by banks and equipment capital companies (i.e. GE Capital, Wells Fargo, Citi National, Crossroads, etc.), and captive financing available from truck dealers. To help less credit worthy drivers, the industry has relied on risk pools to help finance clean trucks. Of course, full service leasing is also an option from companies like Penske, Ryder, PacLease, Velocity Vehicle Group, and others.

California-centric Infrastructure Investments Using Private Capital

To support the full implementation of a 100 percent ultra-low emission natural gas truck and renewable natural gas fuel strategy would require approximately $1.0 to $1.3 billion in investment. This investment will fund:

- The expansion of several existing natural gas refueling stations currently serving the port truck community, as well as the construction of 50 to 100 new refueling stations throughout Southern California and Southwestern United States ($235 million);
- "Upstream" investments, including pipeline improvement projects for CNG stations and/or new LNG production plants and cryogenic transport trailers for LNG stations ($200 to $500 million); and,
- A number of in-state renewable natural gas production facilities ($570 million).

[11] Based on information presented during the SCAQMD Governing Board Meeting, Agenda No. 19, on January 6, 2017. http://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2017/2017-jan6-019.pdf?sfvrsn=5.
[12] http://www.treasurer.ca.gov/cpcfa/calcap/

Nearly one hundred percent (100%) of the required $1.0 to $1.3 billion investment in the fueling infrastructure (fuel stations, production plants, supply chain assets and renewable natural gas production facilities) will come from the private sector. Taxpayer, ratepayer or other sources of public funds will not be required to fund this portion of the infrastructure investment.

The projected $1.0 to $1.3 billion in capital investment will have a wide range of very positive economic impacts throughout the State – ranging from investment in local RNG production projects throughout California, to a significant investment in advanced 'clean tech' refueling infrastructure in disadvantaged communities in around the port area, along the goods movement corridors, and near freight hubs. Significant investments will be made at the local level in these important engineering and construction projects, as well as in the long-term operational jobs required to run these "green tech" facilities. The RNG production facilities required to ensure a robust and reliable supply of low carbon fuel to meet the needs of this plan are projected to be built in the state of California. These facilities will not only drive local job creation and economic investment, but they will be on the most effective means by which to mitigate fugitive methane emissions from landfills, dairies, and other sources; thus helping California to meet its Short-Lived Climate Pollutant reduction goals.

The *ACT Now Plan* provides tremendous opportunity for short-term and long-term green tech jobs throughout California, while simultaneously protecting the existing jobs throughout the region's goods movement sector. There are no trade-offs, only opportunities. While the $1.3 billion in incentives that would be required to deploy 13,000 zero and near-zero emission trucks can be justified based upon the clean air and climate mitigation benefits alone, this investment will provide significant additional return in terms of additional private-sector investment and the creation of thousands of state-wide green tech jobs. Note that a parallel economic impact analysis and jobs study is being developed by the CNGVC to further detail these benefits. The results of this study are expected within the next 60 days and will be shared with the POLA and POLB staff and commissioners.

Costs & Benefits of the *ACT Now Plan*

The proposed *ACT Now Plan* will provide the greatest emission reductions in the shortest period of time and for the least investment. Implementation of this plan will provide the South Coast AQMD, CARB and EPA with the emission reductions from this sector required to demonstrate Federal air quality attainment in timelines required. Eliminating emissions from the port drayage fleet will also provide significant benefits to the SPBPs as they work to support future economic growth and regional job creation while continuing to drive down the environmental externalities of such development.

The proposed *ACT Now Plan* will provide significant environmental, economic and job benefits in the immediate San Pedro Bay region, throughout Southern California and the State, and at the Federal level, and the competitiveness of the Southern California Port Gateway will be strengthened. The *ACT Now Plan* offers the lowest cost pathway, market choice and flexibly for port truck drivers and the San Pedro Bay Ports drayage fleet to modernize to zero- and near-zero-emission technology, in the shortest period of time, and thus provide their "fair share" of emission reductions in the regional battle for clean air and the achievement of National Air Quality Attainment Standards. CARB, SCAQMD and others agree, if all trucks in California were powered by engines certified to 0.02 g/bhp-hr NOx, or lower, emissions from this sector would be below the levels needed to achieve healthy air. The *ACT Now Plan* provides a plan by which a large segment of California's trucking population can achieve such performance in the near term.

Cost-Benefit Analysis: Background and Overview

As structured, the draft CTP included in the CAAP 2017 Draft Discussion Document ("draft CTP") will likely result in diesel-to-diesel replacements until at least 2032, when fleets will need to begin transitioning to zero-emission trucks. By contrast, the *ACT Now Plan* would incentivize early turnover of the fleet to zero- and near-zero-emission trucks using renewable fuel and allow fleets to operate these trucks without fees for the life of the truck. While initial deployments of near-zero-emission natural gas trucks will likely be higher, additional battery electric and hydrogen fuel cell powered trucks will be phased in as they become more commercially available, and operationally and economically viable in the years leading up to 2035.

A model of the drayage fleet was constructed to evaluate various versions of the CTP, including the proposed *ACT Now Plan* and the draft CTP. The model also considered the impact of a pre-buy of 2022 trucks to avoid purchasing zero and near-zero emission trucks under the draft CTP and considered the effect of removing the Clean Truck Fee from the *ACT Now Plan*.

It is well known that fleets will accelerate their equipment replacements to avoid purchasing equipment during the first few years of a new emission standard. This is known as a "pre-buy" and it was clearly evident in 2006 as fleets purchased a record number of trucks to avoid purchasing EPA 2007-compliant trucks. It is reasonable to assume that fleets would initiate pre-buys in 2022 under the draft CTP as there is little disincentive to do so. Shown below are modeling results of the draft CTP, assuming that new trucks are brought into the fleet to replace trucks that become subject to the Clean Truck Fee (CTF) and to accommodate port growth. The pre-buy is modeled by assuming that all truck replacements that would normally take place in 2023 and 2024 are pulled ahead to 2022. It is clear that the pre-buy has a meaningful effect on NOx emissions for several years. Cumulative NOx emissions through 2035 under the pre-buy scenario are approximately 9 percent higher than the baseline scenario. There is relatively little impact on cumulative well-to-wheels GHG emissions or costs between the baseline and pre-buy scenarios. Because the impact on NOx emissions is significant and persists for several years, the pre-buy scenario is used to represent the draft CTP.

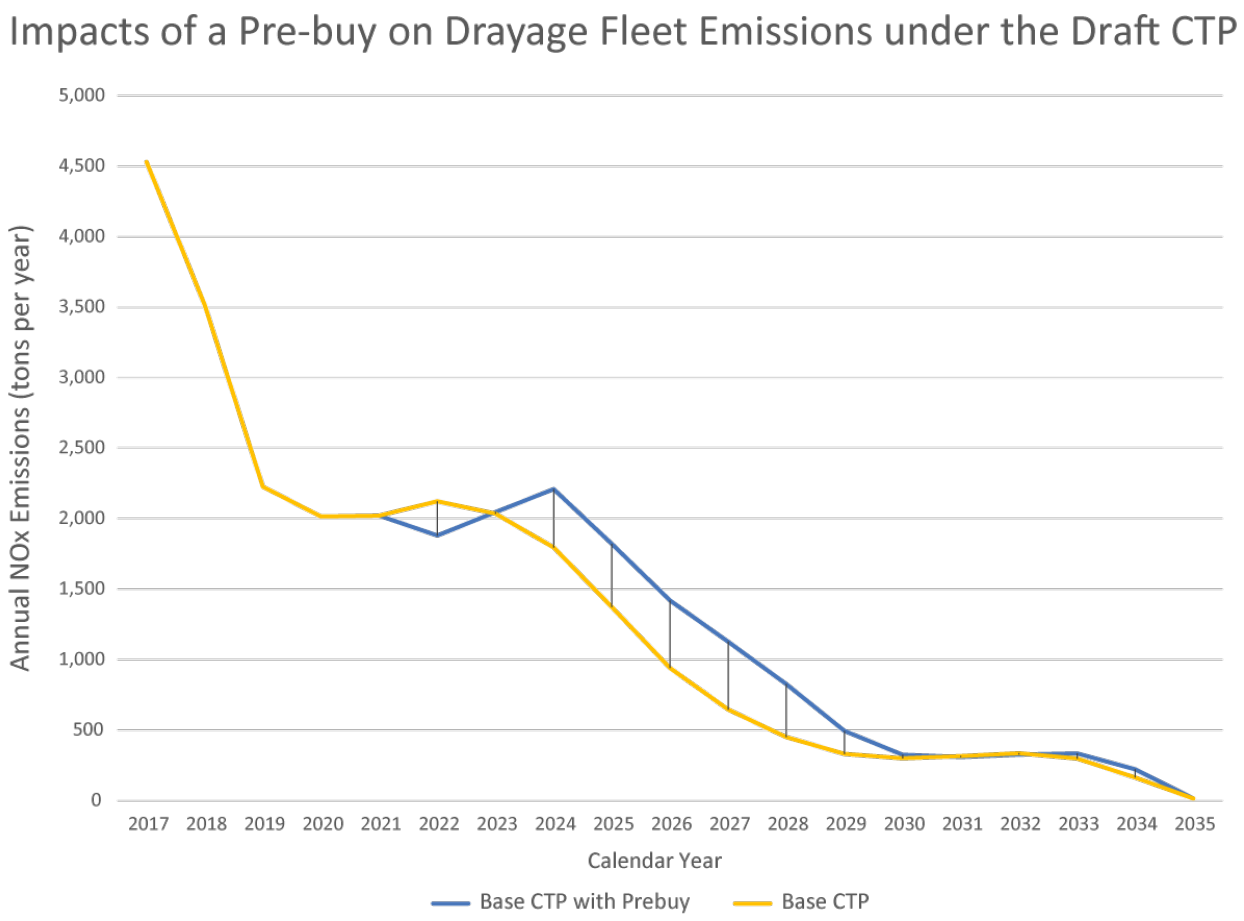


Figure 2: Impacts of a Pre-buy on Drayage Fleet Emissions under the CAAP 2017 Draft Discussion Document

The *ACT Now Plan* is based on three (3) key changes to the Clean Truck Program concept included in the CAAP 2017 Draft Discussion Document.

1. The PDTR registration cap on EPA 2010-compliant engines in 2023 is replaced by a full ban or imposition of a CTF on all non-zero emission trucks/engines in 2023.
2. The ban on zero and near-zero emission trucks/engines in 2035 is removed.
3. The CTF is eliminated from all zero and near-zero emission trucks/engines, hence eliminating the effect of the 10-year rolling CTF on these ultra-low emission vehicles.

These three (3) changes are summarized in the tables below.

Table 4: SPBP Fee/Ban Schedule per the CAAP 2017 Draft Discussion Document

SPBP Fee/Ban Schedule per the CAAP 2017 Draft Discussion Document				
Technology	**Intro Year**	**PDTR Reg Cap**	**Ban**	**CTF**
Diesel/NG	2007	2023	2035	Yes
Near-zero	2018 (NG), 2023 (diesel)	2035	2035	Yes
ZEV	2018	Never	Never	Yes

Table 5: SPBP Fee/Ban Schedule under the *ACT Now Plan*

SPBP Fee/Ban Schedule under the *ACT Now Plan*				
Technology	**Intro Year**	**PDTR Reg Cap**	**Ban**	**CTF**
Diesel/NG	2007	2023	2023	Yes
Near-zero	2018 (NG), 2023 (diesel)	Never	Never	No
ZEV	2018	Never	Never	No

Finally, the potential impact of removing the CTF entirely from the CTP was considered. Removing the CTF and relying solely on a ban of non-zero emission trucks in 2023 is a much simpler program structure and may therefore be appealing to some stakeholders. However, many view the CTF as the only mechanism currently proposed that would ensure that a significant portion of the fleet transitions to cleaner trucks ahead of the 2023 ban of non- zero emission trucks. Without the CTF, truck operators will likely continue to operate their trucks until the last possible moment. The result is a compression of truck replacements such that nearly the entire fleet is replaced in the year preceding the ban. Modeling was completed to evaluate the impact of such a fee, and the removal of such a fee.

Without a CTF, the delayed transition to zero and near-zero emission trucks results in the continued use of pre-2010 trucks with higher NOx emissions and no meaningful transition to zero and near-zero emission technology until 2023. **Cumulative NOx emissions under the "no fee" version of the *ACT Now Plan* are nearly three times (3x) higher than when the CTF is in place and replacements are incentivized to use zero and near-zero emission trucks. There is also significant risk to the capacity and ability to move freight to and from the SPBPs should the transition of the drayage fleet be attempted in a single year before the ban.**

Baseline Draft CTP and ACT Now Plan Cost Analysis and Impacts

Costs associated with truck replacements are higher in early years, highlighting the importance of a robust funding strategy for incentives. However, these early investments pay dividends by allowing the two ports to eliminate the CTF in 2023 and dramatically reducing the number of trucks that must be replaced.

Under the draft CTP, the effect of the 10-year rolling CTF, combined with a second transition of the fleet to zero-emissions and a modest port growth rate or 2 percent per year would require the replacement of an estimated 52,000 trucks between 2017 and 2035. By comparison, the *ACT Now Plan* would only replace an estimated 21,000 trucks over that same timeframe. <u>The replacement of nearly 2.5x more trucks under the draft CTP has substantial costs estimated at over $4.2 billion</u>. Under the *ACT Now Plan*,

these costs would be reduced almost 50 percent to $2.4 billion. **Further, as is clearly demonstrated below, the less expensive of the two plans will yield significantly greater environmental benefit.**

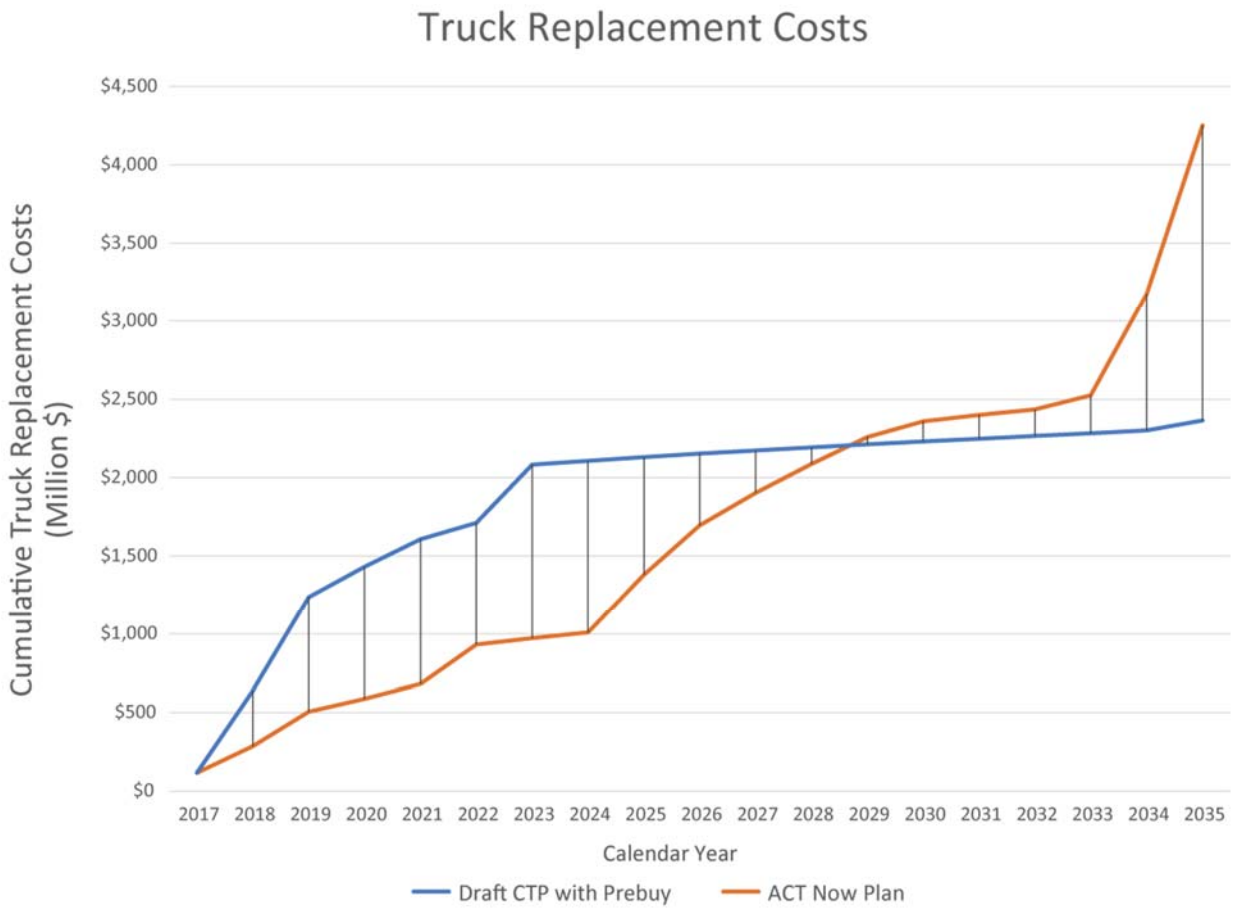


Figure 3: Truck Replacement Cost Reductions under the *ACT Now Plan*

Note that these costs are separate from the infrastructure costs required to support a transition to electric truck charging, hydrogen fuel cell electric trucks, and/or large scale natural gas fueling. Each strategy will require substantial investment in fueling infrastructure. However, with a current estimate of approximately $1 billion, the natural gas pathway – including the upstream production of RNG – will likely be the least expensive of these alternative fuel options. When those costs are included, and the private capital approach that will be utilized for an RNG based solution, the advantages to a near-zero-emission renewable natural gas truck strategy become clearer.

Emissions Benefits Analysis – Significant Reductions Achievable

The proposed ACT Now Plan would dramatically reduce the drayage fleet's projected NOx and GHG emissions, achieving these reductions at a lower cost and with fewer truck replacements than the current draft CTP proposed in the Clean Air Action Plan 2017 Draft Discussion Document.

When implemented:

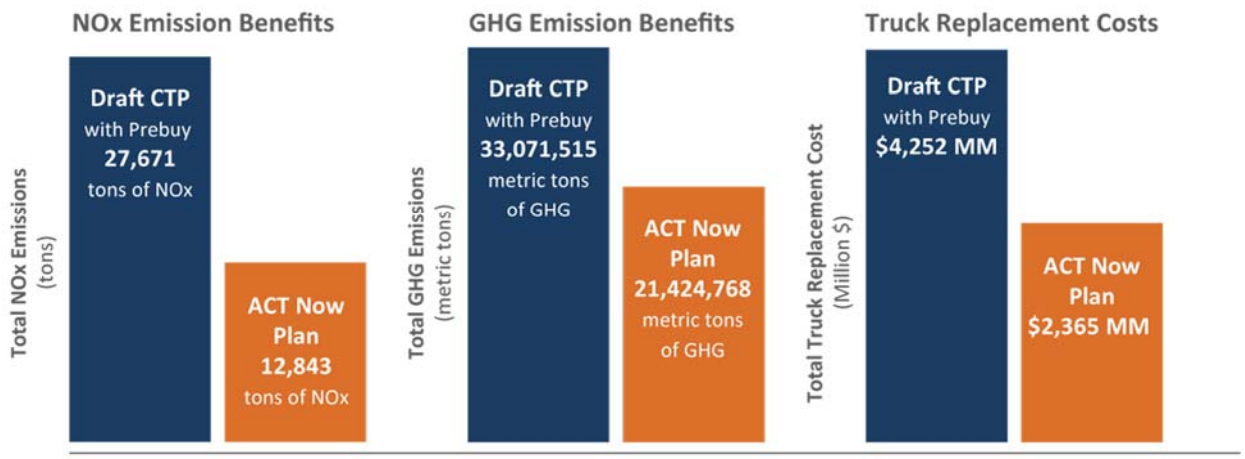
By 2023, the *ACT Now Plan* would provide:

- 99 percent reduction in annual NOx emissions, which equates to approximately 5.5 tons of NOx per day of surplus NOx emission reductions
- 100 percent reduction in petroleum consumption (over 115 million DGE/year) and the corresponding use ultra-low carbon renewable fuel, largely produced in California
- Immediate and significant California-based job creation across a range of building trades in the next five to 10 year period

By 2035, the cumulative benefits of the proposed *ACT Now Plan* compared to the current draft CTP would be:

- 60 percent fewer truck replacements: 21,000 trucks (cost: $2.4B) vs 52,000 trucks ($4.3B)
- 55 percent fewer NOx emissions: 12,800 tons vs 27,700 tons
- 35 percent fewer GHG emissions: 21.4 million tons vs 33.1 million tons

Figure 4: Benefits of the *ACT Now Plan* compared to the CAAP 2017 Draft Discussion Document Clean Truck Program



Combined with incentives that promote the early adoption of zero and near-zero emission trucks between 2018 and 2023, **the *ACT Now Plan* structure provides significant NOx and well-to-wheel GHG reductions at a lower cost than the draft CTP**. As shown in the following figures, the *ACT Now Plan* reaches near-zero emissions by 2023 and remains at those levels through 2035. **Cumulatively, this early action to convert to zero and near-zero emission trucks results in 55 percent less total NOx emitted through 2035, or a total of 14,900 tons of NOx.**

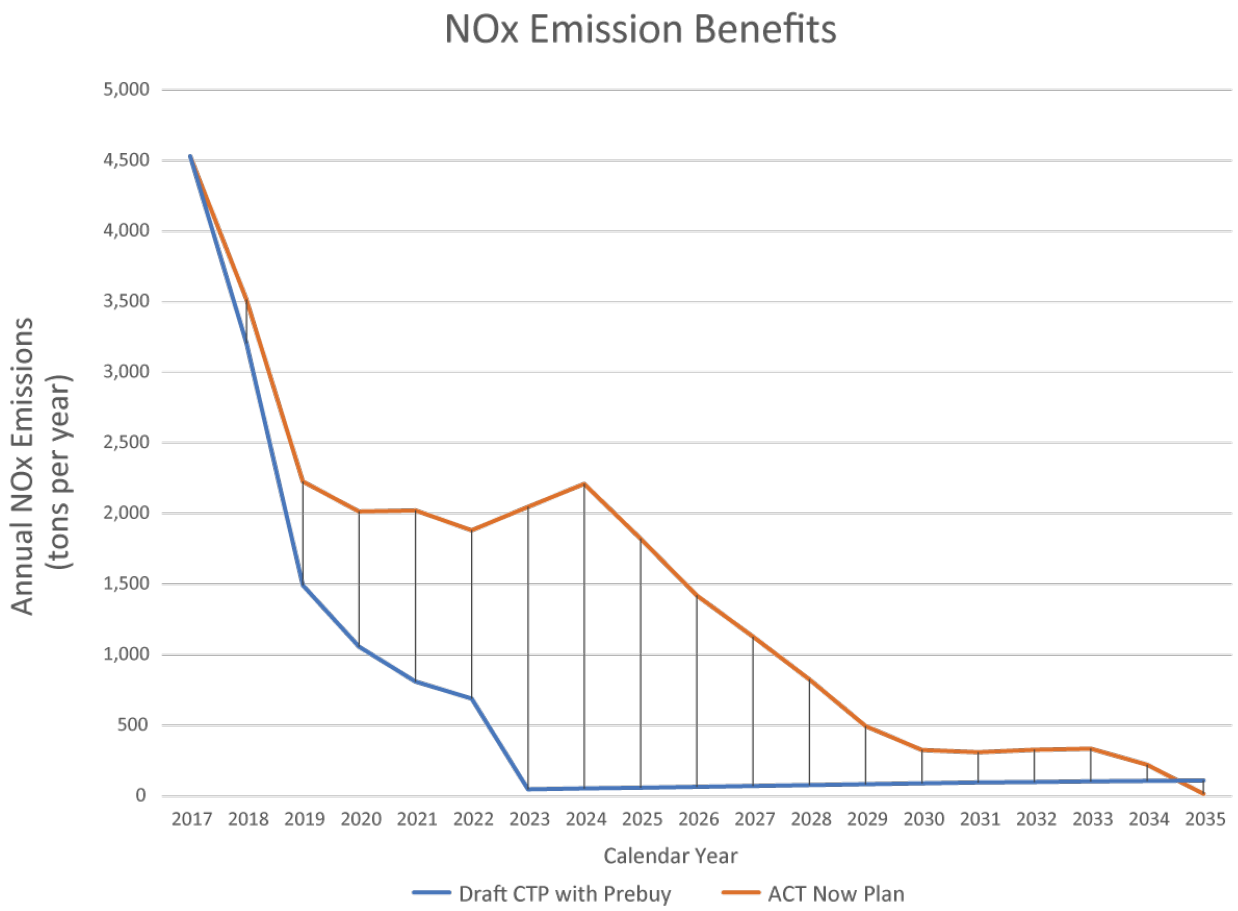


Figure 5: NOx Emissions Benefits under the *ACT Now Plan*

Well-to-wheels GHG emissions benefits are also substantial. The renewable natural gas fueled fleet will reduce cumulative GHG emissions by at least 35 percent under the *ACT Now Plan* – a savings of over 10.4 million tons. As several in-state RNG production facilities now under development are brought on line in the next few years, it is expected that the carbon intensity of the RNG being supplied throughout California will be further reduced. For example, the CR&R high solids anaerobic digester project being brought on line in early 2017 will produce RNG for heavy-duty fleet applications with a carbon intensity value of approximately -25 gCO2e/MJ, thus providing a 125 percent reduction in GHG emissions compared to CARB diesel. Such a fuel will therefore provide GHG emission reductions 25 percent beyond that which could be provided by a battery electric truck charging from a solar panel (as electricity from a solar panel has a carbon intensity value of 0.0 gCO2e/MJ).

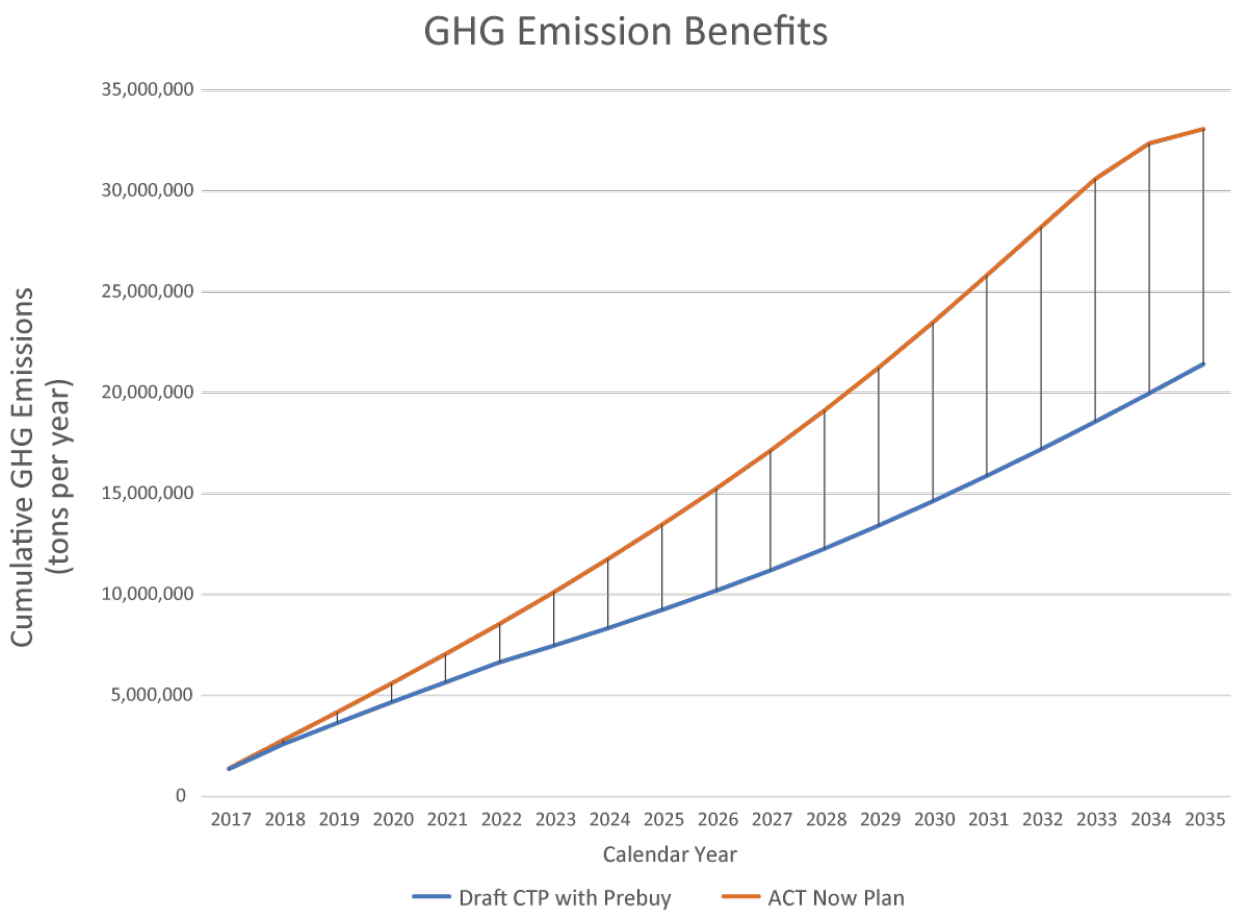


Figure 6: Well-to-Wheels GHG Emissions Benefits under the *ACT Now Plan*

Jobs Benefits – Immediate and Widespread Opportunity

The estimated $1.0 to $1.3 billion in infrastructure investment required to support the proposed *ACT Now Plan* will drive significant and immediate job growth across a range of building trades in the next five to 10 year period. This job growth will be particularly pronounced in Southern California but will undoubtedly extend throughout the State. Job growth will come in both highly urbanized areas dealing with waste stream disposal issues, and in rural areas (such as the San Joaquin Valley) dealing with agricultural waste stream issues.

Building upon the base infrastructure and 700+ natural gas truck market, these investments will begin immediately. There will be no delay while new truck technologies are developed and commercialized. Immediate investment can begin at the local level, building fueling stations on street corners, regional LNG fuel supply and natural gas distribution infrastructure, and new RNG supply sources throughout the state. A large number of construction, high tech and engineering related jobs will be required in the forward 10 year growth period, while significant permanent green tech jobs will be required to operate and maintain these facilities on an ongoing basis.

The proposed *ACT Now Plan* provides an immediate catalyst for job growth and economic investment in California. This investment will support the elimination of dangerous diesel truck emissions in the

neighborhoods surrounding the ports and throughout Southern California, and will build the foundational supply chain for RNG that is required to support future zero emission equivalent truck operations – both those running off of the RNG directly, and those using the RNG as the feedstock for low carbon hydrogen production and/or electricity generation. Even as California reaches its 50 percent RPS goals by 2030, the RNG product and supply chain assets developed to support the near-term natural gas truck market opportunity will be able to provide ultra-low carbon renewable natural gas for the other 50 percent of the grid fed almost exclusively by natural gas power plants.

As noted above, a more detailed jobs impact study is being developed by CNGVC. It will be provided to the SPBPs to provide additional support for the proposed *ACT Now Plan*.

Policy Goals Benefits Analysis – A Multiple Wins Approach

A tremendous number of local, state and federal policies point to the need for the significant increased use of ultra-low NOx heavy-duty engine technology and renewable fuels. By providing NOx reductions that exceed 90 percent and GHG reductions of 40 percent (relative to conventional diesel powered trucks) or more (depending on the source of the RNG, with some sources providing more than 100 percent benefit), near-zero-emission heavy-duty natural gas heavy-duty vehicles using RNG can immediately and cost-effectively provide very tangible results for these initiatives. The increased use of renewable natural gas will drive in-state production of this very carbon-friendly fuel as it will provide a market mechanism by which to capture methane and other short-lived climate pollutants, per SB 1383. As more in-state RNG production is brought on line, the carbon intensity of all RNG being produced, sold and used in California will be reduced. It is also worth noting that the development of a robust RNG production and supply chain will also benefit future fueling of battery and/or hydrogen fuel cell electric trucks as this RNG can be used to produce renewable power in natural gas-fired power plants, or used to produce renewable hydrogen for fuel cell trucks.

An ultra-low NOx engine technology and renewable fuel combination is a cornerstone element of the CARB Sustainable Freight Action Plan, as well as the draft SIP and related South Coast AQMD Air Quality Management Plan (as noted, the *ACT Now Plan* can provide 5.5 tons per day of surplus NOx reductions in the South Coast Air Basin). The use of ultra-low emission heavy-duty engine technology and ultra-low carbon renewable fuels can make meaningful and *immediate* contributions to a wide variety of petroleum use, criteria pollutant/ambient air quality, and climate emission reduction goals (while also driving economic investment and job growth). In most cases, this technology-fuel combination can help to meet these short- and long-term goals *well in advance of the established achievement dates*.

Full implementation of the proposed *ACT Now Plan* by 2023 will meet and exceed the City of Los Angeles Sustainability pLAn goals in several areas. The pLAn calls for 25 percent of port-related goods movement trips to use zero-emission technology by 2035. As ultra-low NOx natural gas truck fueled by renewable natural gas can provide equivalent – if not better environmental performance than a full size electric truck plugged into the California grid, the *ACT Now Plan* will allow for 100 percent of port-related goods movement trips to use zero emission equivalent technology 12 years sooner. This will have a tremendous impact on the pLAn's target to have zero days when air pollution reaches unhealthy levels by 2025, and it will significantly reduce emissions from goods movement within low-income neighborhoods.

The table below lists some of the most important, urgent State and local policy issues, with specific ways that wide-scale use of near-zero emission NGVs fueled by RNG can make major contributions toward their achievement. Uniquely, the fuel-technology combination forming the basis of the *ACT Now Plan* can cost-

effectively and immediately start achieving major results to improve urban ambient air quality, reduce ground-level exposure to toxic air contaminants like diesel particulate matter (especially in disadvantaged communities), mitigate climate change by reducing emissions of GHGs (including SLCPs), and reduce organic waste streams.

Table 6: Summary of key California policy initiatives strongly and cost effectively supported by *ACT Now Plan*

Major Energy / Environmental Policy or Regulation	Jurisdiction / Agency	Key Goal(s) and Timeline to Achieve	How the *ACT Now Plan* Relates to and Assists Achievement of Major Policy Objective(s)
State Implementation Plan (SIP)	CARB, individual air districts like SCAQMD, SJVAPCD	Attain NAAQS by reducing mobile source NOx by 70 percent (2023) and by 80 percent (2030)	Near-zero emission natural gas engines reduce NOx emissions > 90 percent below the existing applicable standard (2010) and the cleanest certified heavy-duty diesel engines
California Mobile Source Strategy (MSS)	CARB	MSS "scenario" for "on-road fleet transformation" calls for 900,000 "low-NOx trucks" to be deployed by 2030	Only trucks powered by near-zero emission natural gas engines currently meet the definition of "low-NOx"; it is unknown when (or if) heavy-duty diesel engines will achieve this ultra-low NOx level
Sustainable Freight Action Plan (Executive Order B-32-15)	California: numerous state agencies	2016: complete plan 2050: achieve end goals	Improve freight efficiency, transition to ZEV technologies, and increase CA freight system competitiveness Zero- and near-zero-emission heavy-duty trucks are a cornerstone of the on-highway elements of this plan.
Adoption of National Low-NOx standard (0.02 g/bhp-hr) for new heavy-duty engines	EPA	CARB and >10 other air regulatory agencies have requested EPA to adopt (end of 2017) a national low-NOx standard (full implementation no later than 2024)	Certification of world's first heavy-duty engine (9 liter natural gas) to 0.02 NOx standard demonstrated feasibility needed to petition EPA; this was further strengthened by the upcoming certification / commercialization of 12 liter engine
2017 Update of the San Pedro Bay Clean Air Action Plan (CAAP)	Port of Los Angeles / Port of Long Beach	Aggressively deploy zero-/near-zero-emission drayage trucks and cargo handling equipment	Heavy-duty NGVs with near-zero emission engines using RNG provide zero-emission equivalency on NOx and GHG reductions; they can be deployed in the most-challenging HDV applications where ZEVs (BEVs, FCVs) may not be feasible for decades
City of Los Angeles Sustainability pLAn	City of Los Angeles	Reduce GHG emissions 80 percent below 1990 levels by 2050. Increase use of zero-emission technology in goods movement trips (>15 percent in 2025, >25 percent in 2035)	RNG provides a 50 percent or greater GHG benefit compared to CARB diesel, today, with additional reductions in the carbon intensity of in-state RNG being produced in the near-term. More than 60 percent of all California NGV fuel is certified as RNG[13], including the LNG being dispensed in the port. Heavy-duty NGVs with near-zero emission engines using RNG provide zero-emission equivalency on NOx and GHG reductions; they can be deployed in the most-challenging HDV applications where ZEVs (BEVs, FCVs) may not be feasible for decades
Petroleum Reduction / Displacement	Governor Brown / CARB / CEC	Reduce petroleum use in California cars and trucks by up to 50 percent by 2030	Will require significant deployment of non-petroleum HDVs to meet this goal; NGVs offer a commercially proven option in HDV sector that can displace large volumes of petroleum

[13] https://www.arb.ca.gov/fuels/lcfs/lrtqsummaries.htm

Major Energy / Environmental Policy or Regulation	Jurisdiction / Agency	Key Goal(s) and Timeline to Achieve	How the *ACT Now Plan* Relates to and Assists Achievement of Major Policy Objective(s)
CA Senate Bill (SB) 1383 / Short Lived Climate Pollutant (SLCP) Strategy	CARB	Requires adoption of comprehensive plan to reduce SLCPs by 2030 (methane by 40 percent, black carbon by 50 percent), and "significantly increase production / use of renewable gas," to reduce organic waste	Heavy-duty NGVs with near-zero emission engines do not emit black carbon (unlike diesel engines); RNG used in near-zero emission engines is produced from, and reduces, organic waste streams (including dairy manure); this avoids release of methane emissions
AB 32, Executive Orders S-3-05 and B-30-15	California: all applicable state agencies	Reduce GHG emissions to 1990 levels by 2020, 40 percent by 2030 and 80 percent below 1990 levels by 2050	CARB has noted that RNG used as a heavy-duty truck fuel can provide "deep" GHG reductions relative to diesel fuel
Low Carbon Fuel Standard	CARB	Reduce carbon intensity of transportation fuels by 10 percent, by 2020	RNG has a carbon intensity that is 75 percent to 125 percent lower than diesel fuel; approximately 57 percent of the natural gas reported under the LCFS program is now RNG

The South Coast AQMD, California Energy Commission, and many other public and private sector organizations have made substantial investments in the development of near-zero-emission engine technology and renewable fuels over the last several decades. These investments were made in order to develop the technology needed to meet the array of policy goals noted above. Now that the technology is commercially viable, these agencies are counting on the rapid and widespread deployment of these technologies and fuel in order to achieve the stated policy goals on or before their stated deadlines.

Summary

The *ACT Now Plan* being put forward by the CNGVC offers the most cost-effective and immediate opportunity to eliminate emissions from the approximately 13,000-unit active drayage fleet now serving the Ports of Los Angeles and Long Beach. It leverages commercially available and viable technology that can serve the full duty-cycle and operational needs of port truck drivers. The *ACT Now Plan* will accelerate the development and implementation of zero- and near-zero-emission heavy-duty truck technology, which will almost certainly be leveraged and used throughout California and on a national basis (as was the case with CTP 1.0). The fuel supply and refueling infrastructure expansion required to support these super-low emission trucks will be provided by third parties using private capital resources.

The *ACT Now Plan* detailed herein builds upon the forward-thinking Clean Trucks Program Recommendation put forward by Mayor Garcetti's SFAC to replace 100 percent of the existing drayage fleet with zero- and near-zero-emission trucks by 2023. It recommends that by July 1, 2023, all trucks in the Registry must have propulsion systems that meet or exceed the CARB Optional Low NOx emission standard of 0.02 g/bhp-hr and that use a low carbon renewable fuel that achieves at least a 40 percent well-to-wheels based carbon reduction from CARB diesel. The plan is inclusive of natural gas, propane, battery electric, hydrogen fuel cell electric, and even diesel technology.

The implementation of this groundbreaking and visionary *ACT Now Plan* will provide significant public health benefits as one of the largest sources of hazardous criteria pollutant emissions in the San Pedro Bay and in Southern California will be eliminated. It will eliminate dangerous diesel truck emissions in the vulnerable and disproportionately impacted communities surrounding the SPBPs and regional goods movement corridors/hubs; significantly reduce NOx emissions in the South Coast Air Basin and GHG emissions throughout California. This plan will allow the City of LA to accelerate and exceed the goals outlined in its Sustainable City pLAn to have 25 percent of port-related goods movement trips to use zero-emission technology by 2035, and thus, to have zero days when air pollution reaches unhealthy levels by 2025. Full implementation of the proposed *ACT Now Plan* will provide 5.5 tons of surplus NOx emission reductions in the South Coast Air Basin by 2023, which is a significant gain within the context of the AQMP. The plan will reduce more NOx emissions than any other potential technology approach and by more than two times (2x) compared to the baseline Clean Truck Program proposed in the CAAP 2017 Draft Discussion Document. Beyond the NOx reductions and public health benefits, the *ACT Now Plan* provides the greatest reduction of GHG emissions in the shortest period of time. Further, it will drive investment in various methane mitigation projects throughout the state of California, thereby actively aiding in the State's urgent efforts to address Short Lived Climate Pollutants. In turn, this will create sustainable jobs throughout the State, particularly in rural communities and other areas in need of employment opportunities and economic investment.

While the cost to implement this aggressive and bold plan will be significant, spread out of a six-year term, the CNGVC has outlined the potential sources of funds that could be used to successfully support this vision. There are more than sufficient resources available to support the implementation of this plan; what is needed is the political leadership and commitment to "act now" to dedicate these resources to this plan.

The CNGVC does not believe that "because it's expensive" is a reasonable excuse not to work to implement the proposed *ACT Now Plan*, particularly given the tremendous environmental, economic and job creation benefits that will be driven by such investment. The implementation of the proposed *ACT Now Plan* will drive more than $1.0 billion in private investment and job creation in California's clean fuel

infrastructure. This massive investment will provide a range of near and long term jobs to various building trades and skilled laborers, engineering, plant operators and others.

This California-centric investment in high tech green jobs will be critical for the near term reduction of SLCPs and the long term economic and environmental sustainability of the State. The proposed *ACT Now Plan* provides a catalyst opportunity to address these near and long term policy objectives, while creating tremendous economic activity and job growth in the process. Simply, the proposed *ACT Now Plan* addresses a significant number of the key goals and objectives the State's leading policy makers have been promoting in the last decade.

Ultimately, the successful implementation of the *ACT Now Plan* will significantly increase the competitiveness of the San Pedro Bay Port Complex and the overall Southern California goods movement gateway. The elimination of emissions from the massive drayage truck fleet will be widely regarded as an incredible environmental achievement and will help ensure the ports are not stymied by future regulations or air quality related constraints. This will provide greater opportunity for the SPBPs, port tenants, dockworkers and the one in nine jobs employed in the Southern California goods movement sector to continue to grow to keep pace with the expected volume growth. The SPBP will continue to be regarded as the world's "greenest" ports; thus, providing significant sustainability benefits and to cargo owners and shippers that rely on the port complex, not to mention those who are gainfully employed by these activities. Combined with a large built-in domestic market in the Southwest U.S., and the robust supply chain network connected to the SPBPs that already offers the fastest path-to-market at competitive rates, these additional sustainability benefits will help to ensure the Southern California port market remains a top destination for global trade.

Appendix A – Port of Los Angeles Sustainable Freight Advisory Committee Clean Trucks Program Recommendation

Clean Trucks Program Acceleration Recommendation

The SFAC recognizes that the immediate and wide scale implementation of zero and near-zero emission heavy-duty trucks in the South Coast Air Basin and throughout California is a priority focus. Such efforts are required to protect public health, comply with state and federal air quality standards, and avoid Clean Air Act sanctions that could cut off federal transportation funding, result in the potential takeover of local air quality regulatory programs by the federal government, and an increased offset ratio (2:1) that would make it much more difficult for stationary sources wishing to obtain required permits for new or modified equipment. In addition to immediate and large scale criteria pollutant emission reductions, clean trucks and the fuel that powers them must also provide critical greenhouse gas (GHG) emission benefits.

- California's Sustainable Freight Action Plan seeks to improve freight efficiency, transition to zero-emission technologies, and increase competitiveness of California's freight system. Zero and near-zero emission heavy-duty trucks are a cornerstone of the on-highway elements of this plan.
- The City of Los Angeles Sustainability pLAn targets an increase in the percentage of Port-related goods movement trips that use zero-emission technology to at least 15% by 2025 and 25% by 2035.
- The Ports of Los Angeles and Long Beach are considering putting a goal in the updated Clean Air Action Plan that results in 100% zero-emission cargo handling equipment and drayage trucks by 2030 and 2035 respectively.
- CARB's Mobile Source Strategy and State Implementation Plan (SIP) calls for the reduction of NOx from mobile sources by 70 percent by 2023 and 80 percent by 2030. To reach these required reductions, and thus federal ozone attainment deadlines, ARB has stated that 900,000 zero and near-zero emission trucks must be deployed by 2030, with a majority of these required by 2023 to meet the major NOx emission reductions required by this time.[1]
- In the South Coast Air Basin, significant progress towards federal ozone standard attainment deadlines must be achieved by 2023. The SCAQMD, joined by 17 other air quality agencies across the U.S., has recently filed a petition with the US EPA calling for a 0.02 g/bhp-hr NOx heavy-duty emission standard. Without near-term access to and deployment of heavy-duty trucks with emissions at or below a 0.02 g/bhp-hr NOx standard, the South Coast Air Basin will be unable to reach its near-term ozone attainment goals by 2023.

[1] CARB Mobile Source Strategy, Table 2: On-Road Fleet Transformation (p.50), May 2016. https://www.arb.ca.gov/planning/sip/2016sip/2016mobsrc.pdf

- Governor Brown has called for the reduction of petroleum use in California cars and trucks by up to 50 percent by 2030[2]. In addition, California has stated widespread transportation electrification is critical to achieving ambient air quality standards and greenhouse gas emission reduction goals[3]. Significant deployment of non-petroleum fueled heavy-duty vehicles will be required to meet this goal.

Further, the widespread use of low carbon and renewable fuels that achieve a 40 percent to 80 percent reduction in well-to-wheel based carbon emissions will be critical to the State's efforts to achieve the goals of SB 32 and AB 32, respectively.

The SFAC recognizes that the ports have the ability to influence and drive investments in cleaner technologies by virtue of their unique leadership position in the marketplace and ability to develop and implement aggressive clean air programs. As an example, the original Clean Truck Program was a key contributor to moving nearly all of the heavy-duty truck manufacturers to develop and sell natural gas powered trucks as part of their technology portfolio. As the onset of the Clean Truck Program, Cal Cartage's 132 Daimler (Sterling brand) natural gas truck project, co-funded by Proposition 1B bond monies, was the first time a major truck OEM engineered and sold a natural gas truck in the U.S. Kenworth, Volvo, Mack and Peterbilt immediately followed with commercial natural gas products. Since this port-driven catalyst, more than 10,000 heavy-duty natural gas on-road trucks have been sold throughout the U.S. and Canada to fleets such as UPS, Frito Lay, Anheuser-Busch and many others, including more than 8,000 units powered by 12 liter Cummins Westport natural gas engines. The wide scale adoption of this technology by major trucking companies indicates an important level of technological robustness has been achieved in the last decade. The importance and opportunity for the ports to drive such technological innovation and development in the marketplace should not be underestimated.

A near-zero emission 9-liter natural gas engine is now commercially available to the heavy-duty market. A manufacturer expects to request CARB and EPA certification of a 12 liter near-zero engine – fully capable of meeting the needs of a port drayage application - in 2017, with commercial sales of this product starting in Q1 2018. Testing taking place at Southwest Research has raised the possibility of having diesel engines certified to 0.02 g/bhp-hr NOx in the 2023 timeframe. At the same time, new battery and fuel cell electric and hybrid heavy-duty trucks are being built and tested by Volvo, BYD, TransPower, US Hybrid, and others.

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[2] https://www.arb.ca.gov/cc/pillars/pillars.htm
[3] https://energycenter.org/blog/senate-bill-350-major-triumph-transportation-electrification

Given the need for zero emission and ultra-low NOx heavy-duty engine technology to be immediately deployed on a wide scale, the SFAC sees a unique opportunity for the updated San Pedro Bay Ports Clean Truck Program to again provide the catalyst needed to see an acceleration of industry-leading technology in the heavy-duty truck sector in the next three to five years. Given the higher cost of these ultra-low NOx and zero emission technology, it will be imperative that public funding and innovative financing mechanisms be utilized to ensure that the financial burden of clean technology does not become the sole responsibility of the port truck driver, nor result in cargo diversion due to a requirement that would significantly increase the cost of trucking from the San Pedro Bay Ports. The SFAC values solutions that advance both the economic and environmental sustainability of the Port.

Provided that the necessary public and private funding and financing are available to the market, replacing 100 percent of the existing diesel powered drayage fleet in the San Pedro Bay Ports with equipment that provides zero and near-zero emissions is a shared goal of the SFAC. The SFAC, therefore, recommends that LA Mayor Eric Garcetti and the Port of Los Angeles executive director, Gene Seroka:

- Take advantage of the diverse stakeholder group represented within the SFAC to further build and lead a coalition of businesses (including cargo owners, shipping companies, terminal operators and others), environmental, community, regulatory agency, and other stakeholders to advocate for this shared vision to the greatest extent possible.
- Leverage this coalition to work with federal, state and local agencies, elected officials and others to advocate for the allocation of existing and new financial resources required to implement this vision by the end of 2023.
- Continue to work with Long Beach Mayor Robert Garcia and the Port of Long Beach to develop and implement a series of new measures related to drayage trucks that will cause older and higher emitting trucks to be removed from port drayage service in order that they are replaced with ultra-low emission and/or zero emission technology.
- Ensure that the San Pedro Bay Ports' competitiveness is increased based upon the sum of actions taken.
- Utilize existing and new port resources, public funding, incentives, grants, bulk purchasing collaboratives, and innovative financing to lower the cost to the truck owner to transition to zero and near-zero emission trucks (i.e., those with emissions at or below the 0.02 g/bhp-hr NOx standard) that are commercially available and viable for commercial deployment as fully-capable heavy-duty drayage trucks in a port application.

- Require zero and near-zero emission trucks that receive funding to use a low carbon fuel that achieves at least a 40 percent well-to-wheels based carbon reduction from CARB diesel.
- Provide meaningful support for public, private, and Public/Private joint ventures to develop low carbon fueling and charging infrastructure projects that enhance and/or accelerate the efficacy of zero and near zero emission trucks.

The SFAC recommends that a new Clean Truck Program, with the above elements incorporated, be implemented as soon as possible, but no later than April 1, 2018.

It is recommended that a letter be submitted to relevant federal, state and local agencies and elected officials by January 15, 2017 in order to outline the above goals and request funding support for this important initiative. With hundreds of millions of dollars in incentives available in the marketplace today from a variety of other sources, now is the time to demonstrate the leadership needed to focus these resources on the Clean Trucks initiative being recommended by the Port of Los Angeles Sustainable Freight Advisory Committee.

Appendix B – Details on Existing Funding Programs

DOE's Vehicle Technologies Office. DOE's Vehicle Technologies Office funds a number of grant and loan programs throughout each fiscal year. Most relevant to the Clean Trucks Program are the "Open Funding Opportunity Announcement" and "Deployment Funding Opportunity Announcement." These two opportunities issue multi-year, multi-million dollar awards to teams of applicants for large scale alternative fuel vehicle deployment and refueling station construction projects. It is worth noting that these awards require substantial cost-share on behalf of the applicants. As an example, the 2017 iteration of the Deployment Funding Opportunity Announcement requires applicants provide at least 50 percent in cost-share.

Volkswagen Partial Consent Decree Settlement. California will be allocated $318 million of the entire $2.7 billion Environmental Mitigation Trust being made available from the Volkswagen Partial Consent Decree Settlement Environmental Mitigation Trust Funds. These funds can be used over the 10-year funding period, which will run from 2017 through 2026. As the funds can be used for a wide variety of on- and off-road projects, including drayage trucks, transit buses, marine shorepower, forklifts, and others, the *ACT Now Plan* provides a very compelling and well-thought through plan (with a lot of cost-share). California funding agencies should therefore dedicate an annual portion of these Volkswagen funds to this plan.

AB 1613 / ARB's Low Carbon Transportation Program and Greenhouse Gas Reduction Fund. The GGRF represents a $900 million pot of funds collected from the sale of pollution allowances via the cap-and-trade program. These funds can be used to conduct emission reduction projects throughout the state with prioritization going to disadvantaged communities.

AB 118 / California Energy Commission. ARFVTP is a $100 million annual program, but only $10 million is provided annually for heavy-duty NGVs via the NGVIP. The remaining $90 goes to other programs, such as EV infrastructure, manufacturing, hydrogen, etc.

Appendix C – UC Riverside CE-CERT Ultra-Low NOx Natural Gas Vehicle Evaluation Fact Sheet

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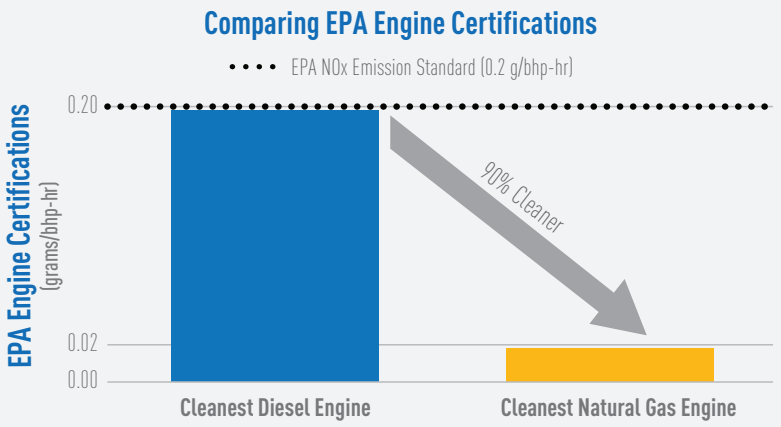
ULTRA-LOW NOX NATURAL GAS VEHICLE EVALUATION
FACT SHEET

A report released by the University of California Riverside's College of Engineering-Center for Environmental Research and Technology (CE-CERT), found that new ultra-low NOx natural gas heavy-duty vehicles met and exceeded their certification standards during a full range of duty cycles. This finding is in stark contrast to previously released CE-CERT data of heavy-duty diesel trucks that emitted higher levels of NOx than their certification standards in the same duty cycles. With the near-zero emission factors demonstrated for natural gas vehicles, it is expected that these vehicles could play an important role in providing much needed emissions reductions required for the South Coast Air Basin and California to reach federal air quality attainment standards.

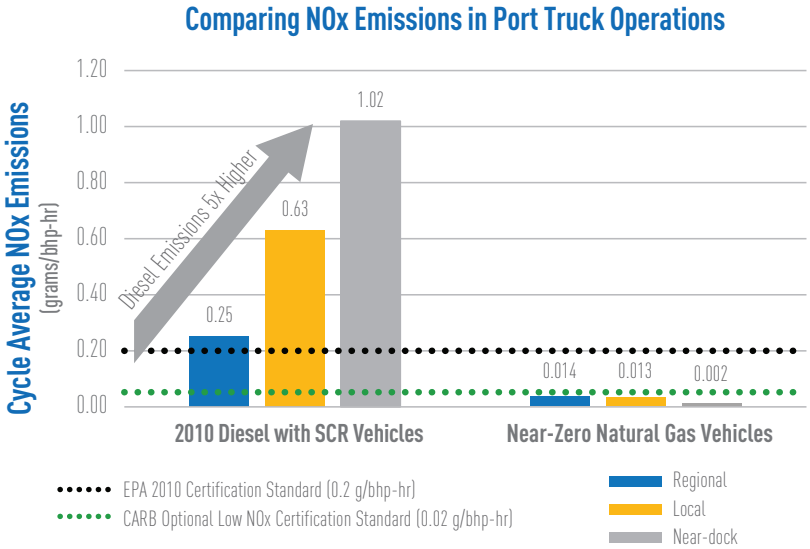
Key Facts:

- The current EPA NOx emission standard is 0.2 g/bhp-hr[1]
- The cleanest heavy-duty diesel engine available today is certified at 0.2 g/bhp-hr
- The cleanest heavy-duty natural gas engine available today is certified by CARB at 0.02 g/bhp-hr, **90% cleaner than the EPA NOx emission standard**



In-use testing results of heavy-duty trucks in port applications found:

(The data has been pulled from UCR CE-CERT test results of the Cummins Westport ISL G near-zero natural gas engine and 2010 diesel engines with selective catalytic reduction (SCR) emission control systems.)



- **Natural gas vehicles emitted lower NOx:**

  The ISL G natural gas engine emitted lower NOx emissions than its EPA certification standard. Emissions decreased as the duty cycles decreased (i.e., slower speeds, idling, stop-and-go traffic).

- **Diesel vehicles emit up to 5x higher NOx:**

  2010 diesel engines with SCR emitted up to 5 times higher NOx emissions than its EPA certification standard. Emissions increased as the duty cycles decreased.

While port applications are illustrated in the figure above, UCR CE-CERT also tested refuse and transit applications and found that they provided similar comparative results. These duty cycles represent a significant majority of heavy-duty vehicle trips in the South Coast Air Basin and in other urbanized areas.

[1]g/bhp-hr is an abbreviation for grams per brake horsepower-hour, which is a standard measurement used by the EPA to measure a gram of emissions per unit of work (one horsepower in one hour).

ULTRA-LOW NOX NATURAL GAS VEHICLE EVALUATION

FACT SHEET

About the Report:

- Authored by Dr. Kent Johnson (PI), College of Engineering-Center for Environmental Research and Technology (CE-CERT), University of California Riverside.
- The goal of the report is to evaluate the ISL G near-zero natural gas vehicle emissions during in-use conditions.
- The testing was done on duty cycles that represent operations in the South Coast Air Basin. These cycles included the urban dynamometer driving schedule (i.e., city driving conditions), port cycles (including near dock, local and regional), refuse cycles, and central business district cycles. Refuse and central business district duty cycles show similar in-use emissions performance to the local and near-dock port cycles, while urban dynamometer driving schedule (UDDS) represents the standard cycle the EPA uses for vehicle and fuel emissions testing.
- The report concludes that ISL G near-zero natural gas engines perform with NOx emissions below the optional 0.02 g/bhp-hr emission target and averaged between 0.014 and 0.002 g/bhp-hr. With these near-zero emission factors demonstrated, it is expected that natural gas vehicles with the ISL G near-zero engine could play an important role in the reduction of the NOx inventory in the South Coast Air Basin.
- The report also found that methane emissions were notably lower than previous versions of the same engine, likely due to the closed crankcase ventilation system.
- Funding for the emissions testing work was provided by the California Energy Commission, the South Coast Air Quality Management District, and the Southern California Gas Company.

Background Information:

- Diesel-fueled medium- and heavy-duty vehicles are the number one source of smog-forming emissions of nitrogen oxides (NOx) in almost every single metropolitan region in the U.S.
- In areas with the most severe air quality problems – such as southern and central California – achieving healthy air quality will require a transition of heavy-duty vehicles to ones that emit zero or near-zero emissions.
- Since 1994, the EPA has systematically reduced the allowable emissions of NOx from new heavy-duty engines, through application of progressively lower federal standards.
- With the 2010 NOx certification limit of 0.2g/bhp-hr, NOx emissions dropped 90% compared to 2006 and older heavy-duty vehicles. Additional NOx reductions of another 90% are desired for the South Coast Air Basin to meet its 2023 NOx inventory requirements.
- NOx emissions lead to the formation of ozone and small particulate matter (PM2.5), each of which contributes to significant health impacts, including asthma and heart disease.

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The full report of the Ultra-Low NOx Natural Gas Vehicle Evaluation can be found on the UCR CE-CERT website or by clicking here.

The previously released CE-CERT report on heavy-duty diesel trucks referenced in the figure can also be found on the UCR CE-CERT website or by clicking here.